Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Wad Medani, Gezira State, Sudan (2015)

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B.Sc. in Nursing
University of Elimam Elmahdi (2007)

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Community Health Nursing
Department of Nursing
Faculty of Applied Medical Sciences

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Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Gezira State, Sudan (2015)

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Date: ......................, 2016
Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Gezira State, Sudan (2015)

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<td>Chair Person</td>
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Date of Examination: ................. 2016
Dedication

I will like to Dedicate this work

To

My mother…….

My Husband…….

My all family… and my Collages….

With my love …

Maria
Acknowledgement

First I wish to thank God for affording me the time and the ability needed to stand face of difficulty.

I am deeply indebted to and grateful for the main supervisor, Dr. Saiyda Idress Abed Elrhman Fadd Alla and the Co-supervisor Dr. Ietimad Ibrahim Abdelrhman for their helpful advices and valuable suggestions at the various stages of the research and their ultimate consultation. I also appreciate their patience and the effort that they expended and supplying me with valuable opinion and suggestions.

I would like to thank my colleges in the Faculty of Applied Medical Sciences, Gezira University for giving me this opportunity to continue my postgraduate education.

Finally my a lot of thanks go to all nursing staff of Gezira Hospital for Renal Diseases and Surgery for their guidance to collect the data.
Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Gezira State, Sudan (2015)

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Abstract

Urinary tract infection is an infection in the urinary tract. Infections are caused by microbes—organisms too small to be seen without a microscope—including fungi, viruses, and bacteria. Nurses are the key providers whose role allows for caring of patient with Urinary tract infection. A descriptive hospital-based study was conducted in Gezira Hospital for Renal diseases and surgery, Gezira State, Sudan during the period of the study (from October to November 2015), aimed to assess Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infections. The sample size consisted of (63) registered nurses who are available during the period of the study at Gezira hospital for renal diseases and surgery in all units from all shifts. The data was collected by using structured questionnaire designed for the purposes of the study. Data was analyzed by using statistical package for social sciences (SPSS). The results showed that {92.1%} of the study sample responded with correct complete answers regarding definition of urinary tract infections. {82.5% and 79.4%} of the study sample responded with correct complete answers regarding nursing diagnoses and intervention of patient with UTI and nurses' diagnosis and intervention regarding acute pain related to infection of urethra, bladder and other urinary tract structures respectively. {76.2% and 93.7%} of the study sample responded with correct complete answers regarding nurses’ diagnoses and intervention regarding hyperthermia related to the reaction to infection and in dealing with patient with UTI, nurses can wear respectively. The study concluded that: nurses’ knowledge regarding urinary tract infections in Gezira Hospital for Renal Diseases and Surgery were knowledgeable. So it recommended that: Routine and periodic training program must be done to all nurses to allow excellent degree in quality of knowledge technology about caring of patients with urinary tract infections in Gezira Hospital for Renal Diseases And Surgery.
المعرفة الممرضين والممرضات تجاه الرعاية التمريضية لمرضى التهاب الجهاز البولي في مستشفى الجزيرة لأمراض وجراحة الكلى، ولاية الجزيرة، السودان (2015)

ماريا عبد المجيد عبد الله الكارب

ملخص الدراسة

التهاب المسالك البولية هو عبارة عن التهاب يصيب المسالك البولية، وتسببه ميكروبات دقيقة لا يمكن رؤيتها إلا بواسطة المجهر وتشمل الفطريات والفيروسات والبكتريا. ويلعب الكادر التمريضي دوراً هاماً في الرعاية التمريضية لمرضى التهاب الجهاز البولي.

أجريت هذه الدراسة في مستشفى الجزيرة لأمراض وجراحة الكلى، ولاية الجزيرة، السودان خلال فترة الدراسة (من أكتوبر إلى نوفمبر 2015)، هدفت إلى تقييم معرفة الممرضين والممرضات تجاه الرعاية التمريضية لمرضى التهاب الجهاز البولي. بلغ حجم العينة (63) من الكادر التمريضي المتواجد خلال فترة الدراسة في مستشفى الجزيرة لأمراض وجراحة الكلى في جميع وحدات المستشفى. وقد تم جمع البيانات باستخدام استبيان مصمم لأغراض الدراسة. تم تحليل البيانات باستخدام الحزمة الإحصائية للعلوم الاجتماعية (SPSS). وأظهرت النتائج أن (92.1%) من عينة الدراسة كانت إجاباتها كاملة صحيحة فيما يتعلق بتقديم التهابات المسالك البولية. (82.5% و 79.4%) من عينة الدراسة كانت إجاباتهم كاملة صحيحة عن التشخيص والتدخل التمريضي لمرضى التهاب المسالك البولية والتدخل التمريضي فيما يتعلق بالألام الحادة لالتهابات المسالك البولية والمثانة وغيرها من الجهاز البولي على التوالي. (76.2%) و (93.7%) من عينة الدراسة كانت إجاباتهم كاملة صحيحة بشأن التشخيص والتدخل التمريضي لارتفاع درجة الحرارة الناتج عن التهابات المسالك البولية وتعامل مع مرضى التهاب المسالك البولية على التوالي. خلصت الدراسة إلى أن: معرفة الممرضين والممرضات فيما يتعلق بالرعاية التمريضية لالتهابات المسالك البولية في مستشفى الجزيرة لأمراض وجراحة الكلى لديهم معرفة كافية. أوصت الدراسة: بإقامة برنامج تدريبي روتيني دوري لجميع الممرضين والممرضات عن الرعاية التمريضية لمرضى التهابات المسالك البولية في مستشفى الجزيرة لأمراض وجراحة الكلى.
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## List of Abbreviations

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<tr>
<td>HAIs</td>
<td>Healthcare-associated infections</td>
</tr>
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<td>CDC</td>
<td>Central Diseases Control</td>
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<td>CAUTIs</td>
<td>Catheters-associated with Urinary Tract Infections</td>
</tr>
<tr>
<td>UTI</td>
<td>Urinary Tract Infections</td>
</tr>
<tr>
<td>IPPS</td>
<td>Inpatient Prospective Payment System</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
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<td>ICUs</td>
<td>Intensive Care Units</td>
</tr>
<tr>
<td>UT</td>
<td>Urinary Tract</td>
</tr>
<tr>
<td>CT</td>
<td>Computerized Tomography</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
</tr>
<tr>
<td>TMP/SMX</td>
<td>Trimethoprim/Sulfamethoxazole</td>
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<tr>
<td>EBP</td>
<td>Evidence-Based Practice</td>
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<tr>
<td>DM</td>
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<td>MDR</td>
<td>Multidrug Resistant</td>
</tr>
<tr>
<td>CFU</td>
<td>Colony-Forming Units</td>
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<tr>
<td>IUC</td>
<td>Indwelling Urinary Catheter</td>
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1. Introduction

1.1 Background:

Healthcare-associated infections (HAIs) have been around for many years and are considered to be preventable infections that patients can acquire while in hospital settings receiving care and treatments for other conditions (Schneider, 2012). According to the CDC, HAIs are one of the top leading causes of morbidity and mortality in the United States (Klevens et al., 2007). Most healthcare organizations have not focused on the frequency of CAUTIs, yet in a national study by Klevens et al. (2007), urinary tract infections (UTIs) comprised 36% of all HAIs. Saint (2000) stated that out of the millions of patients who are admitted into the hospital each year, at least 25% of them will receive an Indwelling Urinary Catheter (IUC), of which more than 17% of nosocomial bacteremia infections are attributed to CAUTIs. (Klevens et al., 2007).

Nurses are the key providers whose role allows for insertion and maintenance of IUCs and producing positive outcomes (Bernard et al., 2012). Several studies have identified the need to assess the necessity of an IUC as well as reducing the duration usage time. However, because nursing has a key role in patient’s outcomes, there is a need to provide them with the evidence-based knowledge needed to advocate for patients and implement best guidelines in their practice. The ultimate goal of nursing research is to develop a body of knowledge to support and advance nursing practices (Reed & Lawrence, 2008), which projects the outcomes of this experiment to add to the body of literature concerning nursing knowledge, assessment, and improving practices through nursing education to decrease CAUTI rates. It is also suggested that CAUTIs best practice guidelines knowledge will empower nurses to challenge IUC usage and inappropriate indications (Crouzet et al., 2007). Moreover, the effectiveness of an educational intervention designed to improve nurses’ assessments, knowledge, and IUC practices such as IUC/peri-care, hand hygiene, and management of IUC will provide a solid foundation for future research (Bernard et al., 2012).

Nurses are able to translate evidence-based knowledge into practice, and nursing care, and nursing interventions are effective in decreasing the prevalence of UTI in patients hospitalized. Evidence from Bernard et al. (2012), Huang et al.
(2004), and Trautner and Darouiche (2004) showed that nursing education and nurse driven interventions can produce a significant improvement in patient outcomes regarding UTIs. Therefore, given the frequency of urinary catheterization in hospitalized patients, all attempts should be made to promote nursing interventions by educating the nursing staff on the recommended best practice guidelines and advocacy for their patient hospital wide (Trautner & Darouiche, 2004). Lastly, surveillance with compliance to the recommended guidelines would reduce the risk of UTIs and assure that nurses are promoting good EBPs (CDC, 2009).

1.2 Problem Statement

Worldwide: Additionally, HAIs have been linked to significant morbidity, with UTIs accounting for more than 30% of HAIs reported, comprising an estimated 560,000 infections. Nearly 80% of UTIs in hospital settings are estimated to be catheter-associated, leading to longer lengths of stay as well as being the leading cause of secondary bloodstream infections. The continued use of antibiotics to treat UTIs without symptoms contributes to antibiotic resistance, encouraging the development of clostridium difficile infection. According to Klevens et al. (2007), it is estimated that 13,000 deaths, with a mortality rate of 2.3%, are attributed to UTIs annually in the United States. Further investigation by Rogers et al. (2008) identified that the mortality rate increases to approximately 10% when patients incur a secondary bloodstream infection as a result of the CAUTI. In 2008, CMS added CAUTI to the never events list, recognizing it as a patient safety issue that can be avoided in many cases (CMS, 2010). The non-reimbursement of these funds will have a financial impact on patient care, staff development, and future research initiatives. The CDC defined HAIs as the result of pathogens acquired by the patient during hospitalization that were not present at the time of admission (Klevens et al., 2007). McKibben et al. (2005) estimated that each day a patient is hospitalized; there is a 3–7% chance that the patient will acquire a CAUTI. The U.S. Department of Health and Human Services Action Plan to prevent HAIs calls for a 25% reduction in the number of symptomatic CAUTIs per 1,000 urinary catheter-days in the hospital as a national prevention target. In January 2012, CMS began requiring acute care hospitals participating in their Inpatient Prospective Payment System (IPPS) to report CAUTIs in adult and pediatric intensive care units (Fakih et al., 2012). During October 2012,
CMS also required reporting of CAUTIs throughout inpatient rehabilitation facilities with the proposed data made available for the public at large (Klevens et al., 2007).

In developed countries: WHO (2012) Estimated that: The exact incidence of urinary tract infections in South Africa is not known. With the exception of the newborn period urinary tract infections are much more common in women than in men. In the USA urinary tract infections necessitate or complicate over one million hospital admissions annually. Surveys screening for bacteriuria (bacteria in the urine) have shown that 1% of schoolgirls aged 5-14 years have bacteriuria and that this figure increases to 4% by young adulthood and then by an additional 1-2% per decade of age. The prevalence of urinary tract infections in young women is 30 times that of young men. However, with increasing age this ratio decreases as relatively more older men develop urinary tract infections. This is probably related to the high incidence of prostatic enlargement in older men, which leads to urinary stasis and an increased risk of infection. 25-30% of women between the ages of 20 and 40 years have had urinary tract infections. 20% of women and 10% of men over 65 years of age have bacteria in the urine. The prevalence of bacteriuria also increases with institutionalisation or hospitalisation and concurrent disease such as diabetes. About 40% of patients with urinary tract infections have a recurrence within one year. (WHO 2012).

Developing countries: “Candiduria in catheterized intensive care unit patients: emerging microbiological trends” at Department of Microbiology, GB Pant Hospital, New Delhi, India. The study on Urinary tract infection as a result of Candida spp. is becoming increasingly common in hospitalized setting. Clinicians face dilemma in differentiating colonization from true infection and whether to treat candiduria or not. The patients admitted in the ICUs and perform microbiological characterization of yeasts to guide treatment protocols. The result of the study Candiduria was more common at extremes of age. The mean duration of catheter days was 11.1 ± 6 days. Concomitant candidemia was seen in 4.3% of cases. Non-albicans Candida spp. (71.4%) emerged as the predominant pathogen causing nosocomial UTI. The urinary system is the most common site for all hospital-acquired infections, accounting for approximately 40% of all nosocomial infections. The knowledge of staff nurses regarding prevention of urinary tract infection in patients with indwelling catheter can help patients prevent urinary tract infection. Therefore the researchers were interested to take on the study. (Vijay Purbia1 et al 2014).
In Sudan: Urinary tract infection (UTI) is the most common infection among patients with DM and is responsible for considerable morbidity, particularly if it is unrecognized or untreated. In Ethiopia, the rates of symptomatic and asymptomatic bacteriuria among diabetic patients are an estimated 13.6% and 10.4%, respectively. Risk factors for UTI among patients with and without DM have been identified e.g. obesity, female sex, and prostate syndrome in men. Furthermore, glycosuria, low immunity, are considered particular risk factors for UTI. Escherichia coli is the most commonly isolated organism in both diabetic and non-diabetic patients. The prevalence of DM is increasing worldwide and the emergence of multi-drug-resistant strains is escalating; hence, determining the prevalence of UTI among diabetic patients and investigating the sensitivity of bacterial isolates to antimicrobial agents is important for the epidemiologist, scientist, health planner, and clinician. To the best of our knowledge, there are no published data regarding the epidemiology of UTI among diabetic patients in Sudan. Thus, this study was conducted at the Khartoum Hospital, Sudan, to provide epidemiological data about UTI among diabetic patients in Sudan. (Hamdan Z, et al, 2014)

Due to several anatomical and hormonal changes, pregnant women are more susceptible to develop Urinary tract infections (UTI). UTI is a major health problem, it has been reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards. Symptomatic and asymptomatic bacteriuria have been reported among 17.9% and 13.0% pregnant women, respectively. UTI (perhaps if untreated) can lead to serious obstetric complications, poor maternal and perinatal outcomes e.g. intrauterine growth restriction, pre-eclampsia, caesarean delivery and preterm deliveries. Furthermore, it has been observed that asymptomatic bacteriuria can lead to cystitis and pyelonephritis which can lead to acute respiratory distress, transient renal failure, sepsis and shock during pregnancy. Screening of pregnant women for UTI can minimize these UTI associated complications. Recently various risk factors of UTI during pregnancy have been reported; perhaps these are varied according the geographical, social and biological settings. Escherichia coli- with its multidrug resistant strains- has been found to be the commonest cause of UTI among pregnant women. Investigating epidemiology of UTI during pregnancy is fundamental for care givers and health planners to guide the expected interventions. While an extensive published literature concerning UTI during pregnancy is available
from other African countries, there is no published data concerning UTI in pregnant Sudanese women. Thus, this was the objective of this study which has been conducted at the Antenatal Care Clinic of Khartoum North hospital during the period of February-June 2010. (Hamdan Z, et al, 2010).

1.3 Justification

The researcher chose this topic because nurses are able to translate evidence-based knowledge into practice, and nursing care, and nursing interventions are effective in decreasing the prevalence of UTI in patients hospitalized. Evidence from Bernard et al. (2012) and nurses are the key providers whose role allows for insertion and maintenance of IUCs and producing positive outcomes (Bernard et al., 2012). Several studies have identified the need to assess the necessity of an IUC as well as reducing the duration usage time. However, because nursing has a key role in patient’s outcomes, there is a need to provide them with the evidence-based knowledge needed to advocate for patients and implement best guidelines in their practice.

Also there was no studies done in the area of the study by the same name of this topic (assess nurses’ knowledge regarding nursing care of patient with urinary tract infections at Gezira Hospital for Renal Diseases and Surgery).

The researcher observed the increased of patients with urinary tract infection in Gezira Hospital for Renal Diseases and Surgery.
Table (1) Admission of adult patient with UTI from 2012 to 2014 during the months from July, August and September at Gezira Hospital for Renal Diseases and Surgery.

<table>
<thead>
<tr>
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<tr>
<td></td>
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</tr>
<tr>
<td>August</td>
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1.4 Objectives

1.4.1 General Objective:

- To study Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Wad Medani, Gezira State, Sudan, during the period of the study from October to November (2015)

1.4.2 Specific Objectives:

- To assess Nurses' Knowledge regarding Urinary Tract Infection such as definition, causes, treatment, prevention at etc. at Gezira Hospital for Renal Diseases and Surgery, Wad Medani, Gezira State, Sudan, during the period of the study from October to November (2015)

- To identify Nurses' knowledge regarding nursing care of patients with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Wad Medani, Gezira State, Sudan, during the period of the study from October to November (2015).
2. Literature Review:

2.1 Definitions:

2.1.1 Definition of urinary tract (UT):

The urinary tract (UT) is the body's drainage system for removing wastes and extra water. The urinary tract includes two kidneys, two ureters, a bladder, and a urethra. The kidneys are a pair of bean-shaped organs, each about the size of a fist and located below the ribs, one on each side of the spine, toward the middle of the back. Every minute, a person’s kidneys filter about 3 ounces of blood, removing wastes and extra water. The wastes and extra water make up the 1 to 2 quarts of urine a person produces each day. The urine travels from the kidneys down two narrow tubes called the ureters. The urine is then stored in a balloonlike organ called the bladder and emptied through the urethra, a tube at the bottom of the bladder. When the bladder empties, a muscle called the sphincter relaxes and urine flows out of the body through the urethra. The opening of the urethra is at the end of the penis in males and in front of the vagina in females. (Warren J, 2011).

2.1.2 Definition of urinary tract infection (UTI):

A urinary tract infection (UTI) is an infection in the urinary tract. Infections are caused by microbes—organisms too small to be seen without a microscope—including fungi, viruses, and bacteria. Bacteria are the most common cause of UTIs. Normally, bacteria that enter the urinary tract are rapidly removed by the body before they cause symptoms. However, sometimes bacteria overcome the body’s natural defenses and cause infection. An infection in the urethra is called urethritis. A bladder infection is called cystitis. Bacteria may travel up the ureters to multiply and infect the kidneys. A kidney infection is called pyelonephritis. (Hooton T, 2008).

Urinary tract infection also known as acute cystitis or bladder infection, is an infection that affects part of the urinary tract. When it affects the lower urinary tract it is known as a simple cystitis (a bladder infection) and when it affects the upper urinary tract it is known as pyelonephritis (a kidney infection). Symptoms from a lower urinary tract include painful urination and either frequent urination or urge to urinate (or both); while symptoms of pyelonephritis include fever and flank pain in addition to the symptoms of a lower UTI. In some cases, a painful burning sensation
in the urethra may be present even when not urinating. In the elderly and the very young, symptoms may be vague or non-specific. The main causal agent of both types is Escherichia coli, though other bacteria, viruses or fungi may rarely be the cause. (Hooton T, 2008).

Urinary tract infections occur more commonly in women than men, with half of women having at least one infection at some point in their lives. Recurrences are common. Risk factors include female anatomy, sexual intercourse and family history. Pyelonephritis, if it occurs, usually follows a bladder infection but may also result from a blood-borne infection. Diagnosis in young healthy women can be based on symptoms alone. In those with vague symptoms, diagnosis can be difficult because bacteria may be present without there being an infection. In complicated cases or if treatment has failed, a urine culture may be useful. In those with frequent infections, low dose antibiotics may be taken as a preventative measure. In uncomplicated cases, urinary tract infections are easily treated with a short course of antibiotics, although resistance to many of the antibiotics used to treat this condition is increasing. In complicated cases, a longer course or intravenous antibiotics may be needed, and if symptoms have not improved in two or three days, further diagnostic testing is needed. In women, urinary tract infections are the most common form of bacterial infection with 10% developing urinary tract infections yearly. In those who have bacteria or white blood cells in their urine but have no symptoms, antibiotics are generally not needed, although pregnant women are an exception to this recommendation. (Getliffe K, 2007).

**Signs and symptoms**

Urine may contain pus (a condition known as pyuria) as seen from a person with sepsis due to a urinary tract infection. Lower urinary tract infection is also referred to as a bladder infection. The most common symptoms are burning with urination and having to urinate frequently (or an urge to urinate) in the absence of vaginal discharge and significant pain. These symptoms may vary from mild to severe and in healthy women last an average of six days. Some pain above the pubic bone or in the lower back may be present. People experiencing an upper urinary tract infection, or pyelonephritis, may experience flank pain, fever, or nausea and vomiting.
in addition to the classic symptoms of a lower urinary tract infection. Rarely the urine may appear bloody or contain visible pus in the urine. (Hooton T, 2008).

Symptoms of a UTI vary by age, gender, and whether a catheter is present. Among young women, UTI symptoms typically include a frequent and intense urge to urinate and a painful, burning feeling in the bladder or urethra during urination. The amount of urine may be very small. Older women and men are more likely to be tired, shaky, and weak and have muscle aches and abdominal pain. Urine may look cloudy, dark, or bloody or have a foul smell. In a person with a catheter, the only symptom may be fever that cannot be attributed to any other cause. Normally, UTIs do not cause fever if they are in the bladder. A fever may mean the infection has reached the kidneys or has penetrated the prostate. Other symptoms of a kidney infection include pain in the back or side below the ribs, nausea, and vomiting. (Warren J, 2011).

**In Children:**

In young children, the only symptom of a urinary tract infection may be a fever. Because of the lack of more obvious symptoms, when females under the age of two or uncircumcised males less than a year exhibit a fever, a culture of the urine is recommended by many medical associations. Infants may feed poorly, vomit, sleep more, or show signs of jaundice. In older children, new onset urinary incontinence (loss of bladder control) may occur. (Getliffe K, 2007).

**In Elderly:**

Urinary tract symptoms are frequently lacking in the elderly. The presentations may be vague with incontinence, a change in mental status, or fatigue as the only symptoms, while some present to a health care provider with sepsis, an infection of the blood, as the first symptoms. Diagnosis can be complicated by the fact that many elderly people have preexisting incontinence or dementia. It is reasonable to obtain a urine culture in those with signs of systemic infection that may be unable to report urinary symptoms, such as when advanced dementia is present. Systemic signs of infection include a fever or increase in temperature of more than 1.1 °C (2.0 °F) from usual, chills, and an increase white blood cell count. (Hooton T, 2008).
Causes of UTIs

- Most UTIs are caused by bacteria that live in the bowel. The bacterium Escherichia coli (E. coli) causes the vast majority of UTIs. Microbes called Chlamydia and Mycoplasma can infect the urethra and reproductive system but not the bladder. Chlamydia and Mycoplasma infections may be sexually transmitted and require treatment of sexual partners.

- The urinary tract has several systems to prevent infection. The points where the ureters attach to the bladder act like one-way valves to prevent urine from backing up toward the kidneys, and urination washes microbes out of the body. In men, the prostate gland produces secretions that slow bacterial growth. In both sexes, immune defenses also prevent infection. But despite these safeguards, infections still occur. Certain bacteria have a strong ability to attach themselves to the lining of the urinary tract.

- E. coli is the cause of 80–85% of community-acquired urinary tract infections, with Staphylococcus saprophyticus being the cause in 5–10%. Rarely they may be due to viral or fungal infections. Healthcare-associated urinary tract infections (mostly related to urinary catheterization) involve a much broader range of pathogens including: E. coli (27%), Klebsiella (11%), Pseudomonas (11%), the fungal pathogen Candida albicans (9%), and Enterococcus (7%) among others. Urinary tract infections due to Staphylococcus aureus typically occur secondary to blood-borne infections. Chlamydia trachomatis and Mycoplasma genitalium can infect the urethra but not the bladder. These infections are usually classified as a urethritis rather than urinary tract infection.

- Sex: In young sexually active women, sexual activity is the cause of 75–90% of bladder infections, with the risk of infection related to the frequency of sex. The term "honeymoon cystitis" has been applied to this phenomenon of frequent UTIs during early marriage. In post-menopausal women, sexual activity does not affect the risk of developing a UTI. Spermicide use, independent of sexual frequency, increases the risk of UTIs. Diaphragm use is also associated. Condom use without spermicide or use of birth control pills does not increase the risk of uncomplicated urinary tract infection. (Hooton T, 2008).

- Women are more prone to UTIs than men because, in females, the urethra is much shorter and closer to the anus. As a woman's estrogen levels decrease with
menopause, her risk of urinary tract infections increases due to the loss of protective vaginal flora. Additionally, vaginal atrophy that can sometimes occur after menopause is associated with recurrent urinary tract infections.

- Chronic prostatitis may cause recurrent urinary tract infections in males. Risk of infections increases as males age. While bacteria is commonly present in the urine of older males this does not appear to affect the risk of urinary tract infections.
- Urinary catheters: Urinary catheterization increases the risk for urinary tract infections. The risk of bacteriuria (bacteria in the urine) is between three to six percent per day and prophylactic antibiotics are not effective in decreasing symptomatic infections. The risk of an associated infection can be decreased by catheterizing only when necessary, using aseptic technique for insertion, and maintaining unobstructed closed drainage of the catheter.
- Male scuba divers utilizing condom catheters or the female divers utilizing external catching device for their dry suits are also susceptible to urinary tract infections.
- Others: A predisposition for bladder infections may run in families. Other risk factors include diabetes, being uncircumcised, and having a large prostate. Complicating factors are rather vague and include predisposing anatomic, functional, or metabolic abnormalities. In children UTIs are associated with vesicoureteral reflux (an abnormal movement of urine from the bladder into ureters or kidneys) and constipation.
- Persons with spinal cord injury are at increased risk for urinary tract infection in part because of chronic use of catheter, and in part because of voiding dysfunction. It is the most common cause of infection in this population, as well as the most common cause of hospitalization. Additionally, use of cranberry juice or cranberry supplement appears to be ineffective in prevention and treatment in this population. (Hooton T, 2008).

**Pathogenesis:**

The bacteria that cause urinary tract infections typically enter the bladder via the urethra. However, infection may also occur via the blood or lymph. It is believed that the bacteria are usually transmitted to the urethra from the bowel, with females at greater risk due to their anatomy. After gaining entry to the bladder, E. Coli are able
to attach to the bladder wall and form a biofilm that resists the body's immune response. (Datta P, 2014).

Risk for a UTI:

Although everyone has some risk, some people are more prone to getting UTIs than others. People with spinal cord injuries or other nerve damage around the bladder have difficulty emptying their bladder completely, allowing bacteria to grow in the urine that stays in the bladder. Anyone with an abnormality of the urinary tract that obstructs the flow of urine—a kidney stone or enlarged prostate, for example—is at risk for a UTI. People with diabetes or problems with the body’s natural defense system are more likely to get UTIs. (Warren J, 2011).

Sexual activity can move microbes from the bowel or vaginal cavity to the urethral opening. If these microbes have special characteristics that allow them to live in the urinary tract, it is harder for the body to remove them quickly enough to prevent infection. Following sexual intercourse, most women have a significant number of bacteria in their urine, but the body normally clears them within 24 hours. However, some forms of birth control increase the risk of UTI. In some women, certain spermicides may irritate the skin, increasing the risk of bacteria invading surrounding tissues. Using a diaphragm may slow urinary flow and allow bacteria to multiply. Condom use is also associated with increased risk of UTIs, possibly because of the increased trauma that occurs to the vagina during sexual activity. Using spermicides with diaphragms and condoms can increase risk even further. (Getliffe K, 2007).

Another common source of infection is catheters, or tubes, placed in the urethra and bladder. Catheters interfere with the body’s ability to clear microbes from the urinary tract. Bacteria travel through or around the catheter and establish a place where they can thrive within the bladder. A person who cannot urinate in the normal way or who is unconscious or critically ill often needs a catheter for more than a few days. The Infectious Diseases Society of America recommends using catheters for the shortest time possible to reduce the risk of a UTI. (Datta P, 2014).
Recurrent Infections

Many women suffer from frequent UTIs. About 20 percent of young women with a first UTI will have a recurrent infection.4 With each UTI, the risk that a woman will continue having recurrent UTIs increases.5 Some women have three or more UTIs a year. However, very few women will have frequent infections throughout their lives. More typically, a woman will have a period of 1 or 2 years with frequent infections, after which recurring infections cease. Men are less likely than women to have a first UTI. But once a man has a UTI, he is likely to have another because bacteria can hide deep inside prostate tissue. Anyone who has diabetes or a problem that makes it hard to urinate may have repeat infections. Research funded by the National Institutes of Health (NIH) suggests that one factor behind recurrent UTIs may be the ability of bacteria to attach to cells lining the urinary tract. One NIH-funded study found that bacteria formed a protective film on the inner lining of the bladder in mice.6 If a similar process can be demonstrated in humans, the discovery may lead to new treatments to prevent recurrent UTIs. Another line of research has indicated that women who are “nonsecretors” of certain blood group antigens may be more prone to recurrent UTIs because the cells lining the vagina and urethra may allow bacteria to attach more easily. A nonsecretor is a person with an A, B, or AB blood type who does not secrete the normal antigens for that blood type in bodily fluids, such as fluids that line the bladder wall. (Getliffe K, 2007).

Infections during Pregnancy

Pregnant women seem no more prone to UTIs than other women. However, when a UTI does occur in a pregnant woman, it is more likely to travel to the kidneys. According to some reports, about 4 to 5 percent of pregnant women develop a UTI. Scientists think that hormonal changes and shifts in position of urinary tract during pregnancy make it easier for bacteria to travel up the ureters to the kidneys and cause infection. (Getliffe K, 2007).

Diagnoses

To find out whether a person has a UTI, the health care provider will ask about urinary symptoms and then test a sample of urine for the presence of bacteria and
white blood cells, which are produced by the body to fight infection. Because bacteria can be found in the urine of healthy individuals, a UTI is diagnosed based both on symptoms and a laboratory test. The person will be asked to give a “clean catch” urine sample by washing the genital area and collecting a “midstream” sample of urine in a sterile container. This method of collecting urine helps prevent bacteria around the genital area from getting into the sample and confusing the test results. Usually, the sample is sent to a laboratory, although some health care providers’ offices are equipped to do the testing. For people with recurring infections and patients in the hospital, the urine may be cultured. The culture is performed by placing part of the urine sample in a tube or dish with a substance that encourages any bacteria present to grow. Once the bacteria have multiplied, which usually takes 1 to 3 days, they can be identified. The health care provider may also order a sensitivity test, which tests the bacteria for sensitivity to different antibiotics to see which medication is best for treating the infection. (Lewis S 2013).

Kidney and bladder ultrasound. Ultrasound uses a device, called a transducer, that bounces safe, painless sound waves off organs to create an image of their structure. The procedure is performed in a health care provider’s office, outpatient center, or hospital by a specially trained technician, and the images are interpreted by a radiologist—a doctor who specializes in medical imaging; anesthesia is not needed. The images can show abnormalities in the kidneys and bladder. However, this test cannot reveal all important urinary abnormalities or measure how well the kidneys work. Voiding cystourethrogram. This test is an x-ray image of the bladder and urethra taken while the bladder is full and during urination, also called voiding. As the person lies on the x-ray table, a health care provider inserts the tip of a thin, flexible tube called a catheter through the urethra into the bladder. The bladder and urethra are filled with a special dye called contrast medium, to make the structures clearly visible on the x-ray images. The x rays are taken from various angles while the bladder is full of contrast medium. The catheter is then removed and x-ray images are taken during urination. The procedure is performed in a health care provider’s office, outpatient center, or hospital by an x-ray technician. The technician is supervised by a radiologist while the images are taken. The radiologist then interprets the images. Anesthesia is not needed, but light sedation may be used for some people. This test can show abnormalities of the inside of the urethra and bladder. The test can also
determine whether the flow of urine is normal when the bladder empties. (Lewis S 2013).

Computerized tomography (CT) scan. CT scans use a combination of x rays and computer technology to create three-dimensional (3-D) images. A CT scan may include the injection of contrast medium. CT scans require the person to lie on a table that slides into a tunnel-shaped device where the x rays are taken. The procedure is performed in an outpatient center or hospital by an x-ray technician, and the images are interpreted by a radiologist; anesthesia is not needed. CT scans can provide clearer, more detailed images to help the health care provider understand the problem.

Magnetic resonance imaging (MRI). MRI machines use radio waves and magnets to produce detailed pictures of the body’s internal organs and soft tissues without using x rays. An MRI may include an injection of contrast medium. With most MRI machines, the person lies on a table that slides into a tunnel-shaped device that may be open ended or closed at one end; some newer machines are designed to allow the person to lie in a more open space. The procedure is performed in an outpatient center or hospital by a specially trained technician, and the images are interpreted by a radiologist; anesthesia is not needed though light sedation may be used for people with a fear of confined spaces. Like CT scans, MRIs can provide clearer, more detailed images.

Radionuclide scan. A radionuclide scan is an imaging technique that relies on the detection of small amounts of radiation after injection of radioactive chemicals. Because the dose of the radioactive chemicals is small, the risk of causing damage to cells is low. Special cameras and computers are used to create images of the radioactive chemicals as they pass through the kidneys. Radionuclide scans are performed in a health care provider’s office, outpatient center, or hospital by a specially trained technician, and the images are interpreted by a radiologist; anesthesia is not needed. Radioactive chemicals injected into the blood can provide information about kidney function. Radioactive chemicals can also be put into the fluids used to fill the bladder and urethra for x ray, MRI, and CT imaging. (Warren J, 2011).

Urodynamics. Urodynamic testing is any procedure that looks at how well the bladder, sphincters, and urethra are storing and releasing urine. Most of these tests are
performed in the office of a urologist—a doctor who specializes in urinary problems—by a urologist, physician assistant, or nurse practitioner. Some procedures may require light sedation to keep a person calm. Most urodynamic tests focus on the bladder’s ability to hold urine and empty steadily and completely. Urodynamic tests can also show whether the bladder is having abnormal contractions that cause leakage. A health care provider may order these tests if there is evidence that the person has some kind of nerve damage.

Cystoscopy. Cystoscopy is a procedure that uses a tubelike instrument to look inside the urethra and bladder. Cystoscopy is performed by a doctor in a health care provider’s office, outpatient facility, or hospital with local anesthesia. However, in some cases, sedation and regional or general anesthesia are needed. Cystoscopy may be used to look for swelling, redness, and other signs of infection.

Multiple bacilli (rod-shaped bacteria, here shown as black and bean-shaped) shown between white blood cells in urinary microscopy. These changes are indicative of a urinary tract infection. In straightforward cases, a diagnosis may be made and treatment given based on symptoms alone without further laboratory confirmation. In complicated or questionable cases, it may be useful to confirm the diagnosis via urinalysis, looking for the presence of urinary nitrites, white blood cells (leukocytes), or leukocyte esterase. Another test, urine microscopy, looks for the presence of red blood cells, white blood cells, or bacteria. Urine culture is deemed positive if it shows a bacterial colony count of greater than or equal to 10³ colony-forming units per mL of a typical urinary tract organism. Antibiotic sensitivity can also be tested with these cultures, making them useful in the selection of antibiotic treatment. However, women with negative cultures may still improve with antibiotic treatment. As symptoms can be vague and without reliable tests for urinary tract infections, diagnosis can be difficult in the elderly. (Getliffe K, 2007).

**Classification:**

A urinary tract infection may involve only the lower urinary tract, in which case it is known as a bladder infection. Alternatively, it may involve the upper urinary tract, in which case it is known as pyelonephritis. If the urine contains significant bacteria but there are no symptoms, the condition is known as asymptomatic bacteriuria. If a
urinary tract infection involves the upper tract, and the person has diabetes mellitus, is pregnant, is male, or immunocompromised, it is considered complicated. Otherwise if a woman is healthy and premenopausal it is considered uncomplicated. In children when a urinary tract infection is associated with a fever, it is deemed to be an upper urinary tract infection. (Datta P, 2014).

**Differential diagnosis:**

In women with cervicitis (inflammation of the cervix) or vaginitis (inflammation of the vagina) and in young men with UTI symptoms, a Chlamydia trachomatis or Neisseria gonorrhoeae infection may be the cause. These infections are typically classified as a urethritis rather than a urinary tract infection. Vaginitis may also be due to a yeast infection. Interstitial cystitis (chronic pain in the bladder) may be considered for people who experience multiple episodes of UTI symptoms but urine cultures remain negative and not improved with antibiotics. Prostatitis (inflammation of the prostate) may also be considered in the differential diagnosis.

Hemorrhagic cystitis, characterized by blood in the urine, can occur secondary to a number of causes including: infections, radiation therapy, underlying cancer, medications and toxins. Medications that commonly cause this problem include the chemotherapeutic agent cyclophosphamide with rates of 2 to 40%. Eosinophilic cystitis is a rare condition where eosinophiles are present in the bladder wall. Signs and symptoms are similar to a bladder infection. Its cause is not entirely clear; however, it may be linked to food allergies, infections, and medications among others. (Datta P, 2014).

**Prevention:**

A number of measures have not been confirmed to affect UTI frequency including: urinating immediately after intercourse, type of underwear used, personal hygiene methods used after urinating or defecating, or whether a person typically bathes or showers. There is similarly a lack of evidence surrounding the effect of holding one's urine, tampon use, and douching. In those with frequent urinary tract infections who use spermicide or a diaphragm as a method of contraception, they are advised to use alternative methods. In those with benign prostatic hyperplasia urinating in a sitting position appears to improve bladder emptying which might
decrease urinary tract infections in this group. Using urinary catheters as little and as short of time as possible and appropriate care of the catheter when used prevents infections. They should be inserted using sterile technique in hospital however non-sterile technique may be appropriate in those who self catheterize. Urinary catheter set up should also be kept sealed. Evidence does not support a significant decrease in risk when silver-alloy catheters are used. (Datta P, 2014).

Medications:

For those with recurrent infections, taking a short course of antibiotics when each infection occurs is associated with the lowest antibiotic use. A prolonged course of daily antibiotics is also effective. Medications frequently used include nitrofurantoin and trimethoprim/sulfamethoxazole. Methenamine is another agent used for this purpose as in the bladder where the acidity is low it produces formaldehyde to which resistance does not develop. Some recommend against prolonged use due to concerns of antibiotic resistance. (Lewis S 2013).

In cases where infections are related to intercourse, taking antibiotics afterwards may be useful. In post-menopausal women, topical vaginal estrogen has been found to reduce recurrence. As opposed to topical creams, the use of vaginal estrogen from pessaries has not been as useful as low dose antibiotics. Antibiotics following short term urinary catheterization decreases the subsequent risk of a bladder infection. A number of vaccines are in development as of 2011. (Getliffe K, 2007).

Children:

The evidence that preventative antibiotics decrease UTIs in children is poor. However recurrent UTIs are a rare cause of further kidney problems if there are no underlying abnormalities of the kidneys, resulting in less than a third of a percent (0.33%) of chronic kidney disease in adults. Whether routine circumcisions prevents UTIs has not been well studied as of 2011.

Alternative medicine:

Some research suggests that cranberry (juice or capsules) may decrease the number of UTIs in those with frequent infections. A Cochrane review concluded that the benefit, if it exists, is small. Long-term tolerance is also an issue with
gastrointestinal upset occurring in more than 30%. Cranberry juice is thus not currently recommended for this indication. As of 2011, intravaginal probiotics require further study to determine if they are beneficial. (Lewis S 2013).

**Treatment:**

Most UTIs are caused by bacteria, which are treated with bacteria-fighting medications called antibiotics or antimicrobials. The choice of medication and length of treatment depend on the patient’s history and the type of bacteria causing the infection. Some antibiotics may be ruled out if a person has allergies to them. The sensitivity test takes 48 hours to complete and is especially useful in helping the health care provider select the antibiotic most likely to be effective in treating an infection. Longer treatment may be needed if the first antibiotic given is not effective. When a UTI occurs in a healthy person with a normal, unobstructed urinary tract, the term uncomplicated is used to describe the infection. Most young women who have UTIs have uncomplicated UTIs, which can be cured with 2 or 3 days of treatment. Single-dose treatment is less effective. Longer treatment causes more side effects and is not more effective. A follow-up urinalysis helps to confirm the urinary tract is infection-free. Taking the full course of treatment is important because symptoms may disappear before the infection is fully cleared.

The mainstay of treatment is antibiotics. Phenazopyridine is occasionally prescribed during the first few days in addition to antibiotics to help with the burning and urgency sometimes felt during a bladder infection. However, it is not routinely recommended due to safety concerns with its use, specifically an elevated risk of methemoglobinemia (higher than normal level of methemoglobin in the blood). Acetaminophen (paracetamol) may be used for fevers. There is no good evidence for the use of cranberry products for treating current infections.

**Asymptomatic bacteriuria:**

Those who have bacteria in the urine but no symptoms should not generally be treated with antibiotics. This includes those are old, those with spinal cord injuries, and those who have urinary catheters. Pregnancy is an exception and it is recommended that women take 7 days of antibiotics. If not treated it causes up to 30% of mothers to develop pyelonephritis and increases risk of low birth weight and
preterm birth. Some also support treatment of those with diabetes mellitus and treatment before UT procedures which will likely cause bleeding. (Warren J, 2011).

**Uncomplicated:**

Uncomplicated infections can be diagnosed and treated based on symptoms alone. Oral antibiotics such as trimethoprim/sulfamethoxazole, nitrofurantoin, or fosfomycin typically first line. Cephalosporins, amoxicillin/clavulanic acid, or a fluoroquinolone may also be used. These medications substantially shorten the time to recovery with all being equally effective. A three-day treatment with trimethoprim, TMP/SMX, or a fluoroquinolone is usually sufficient, whereas nitrofurantoin requires 5–7 days. Fosfomycin may be used as a single dose. (Getliffe K, 2007).

With treatment, symptoms should improve within 36 hours. 50% of people will recover without treatment within a few days or weeks. Fluoroquinolones are not recommended as a first treatment. Infectious Diseases Society of America states this due to the concern of generating resistance to this class of medication. Amoxicillin-clavulanate appears less effective than other options. Despite this precaution, some resistance has developed to all of these medications related to their widespread use. Trimethoprim alone is deemed to be equivalent to TMP/SMX in some countries. For simple UTIs, children often respond to a three-day course of antibiotics. Women with recurrent simple UTIs may benefit from self-treatment upon occurrence of symptoms with medical follow-up only if the initial treatment fails. (Getliffe K, 2007).

**Complicated:**

Complicated UTIs are more difficult to treat and usually requires more aggressive evaluation, treatment and follow-up. It may require identifying and addressing the underlying complication. Increasing antibiotic resistance is causing concern about the future of treating those with complicated and recurrent UTI. Complicated UTIs occur when a person—for example, a pregnant woman or a transplant patient—is weakened by another condition. A UTI is also complicated when the person has a structural or functional abnormality of the urinary tract, such as an obstructive kidney stone or prostate enlargement that squeezes the urethra. Health care providers should assume that men and boys have a complicated UTI until proven otherwise. (Lewis S 2013).
Severely ill patients with kidney infections may be hospitalized until they can take fluids and needed medications on their own. Kidney infections may require several weeks of antibiotic treatment. Kidney infections in adults rarely lead to kidney damage or kidney failure unless they go untreated or are associated with urinary tract obstruction. Bladder infections are generally self-limiting, but antibiotic treatment significantly shortens the duration of symptoms. People usually feel better within a day or two of treatment. Symptoms of kidney and prostate infections last longer. Drinking lots of fluids and urinating frequently will speed healing. If needed, various medications are available to relieve the pain of a UTI. A heating pad on the back or abdomen may also help. (Lewis S 2013).

**Pyelonephritis:**

Pyelonephritis is treated more aggressively than a simple bladder infection using a longer course of oral antibiotics or intravenous antibiotics. Seven days of oral fluoroquinolone ciprofloxacin is typically used in areas where resistance rate is less than 10%, or a dose of intravenous ceftriaxone is often prescribed. Trimethoprim/sulfamethoxazole or amoxicillin/clavulanate orally for 14 days is another reasonable option. In those who exhibit more severe symptoms, admission to a hospital for ongoing antibiotics may be needed. Complications such as urinary obstruction from a kidney stone may be considered if symptoms do not improve following two or three days of treatment. (Lewis S 2013).

**Epidemiology:**

Urinary tract infections are the most frequent bacterial infection in women. They occur most frequently between the ages of 16 and 35 years, with 10% of women getting an infection yearly and 60% having an infection at some point in lives. Recurrences are common, with nearly half of people getting a second infection within a year. UTI occur 4 times more frequently in females than males. Pyelonephritis occurs between 20–30 times less frequently. They are the most common cause of hospital acquired infections accounting for approximately 40%. Rates of asymptomatic bacteria in urine increase with age from two to seven percent in women of child bearing age to as high as 50% in elderly women in care homes. Rates of asymptomatic bacteria in urine among men over 75 are between 7-10%. Asymptomatic bacteria in the urine occurs in 2%-10% of
pregnancies. Urinary tract infections may affect 10% of people during childhood. Among children urinary tract infections are the most common in uncircumcised males less than three months of age, followed by females less than one year. Estimates of frequency among children however vary widely. In a group of children with a fever, ranging in age between birth and two years, two to 20% were diagnosed with a UTI. (Lewis S 2013).

**Recurrent Infections in Women**

Health care providers may advise women who have recurrent UTIs to try one of the following treatment options:

- Take low doses of the prescribed antibiotic daily for 6 months or longer. If taken at bedtime, the medication remains in the bladder longer and may be more effective. NIH-supported research has shown this therapy to be effective without causing serious side effects.
- Take a single dose of an antibiotic after sexual intercourse.
- Take a short course—2 or 3 days—of an antibiotic when symptoms appear.
- To try to prevent an infection, health care providers may suggest women drink plenty of water every day
- urinate when the need arises and avoid resisting the urge to urinate
- urinate after sexual intercourse
- switch to a different method of birth control if recurring UTIs are a problem. (Weber D, 2011).

**Infections during Pregnancy**

During pregnancy, bacterial infection of the urine—even in the absence of symptoms—can pose risks to both the mother and the baby. Some antibiotics are not safe to take during pregnancy. In selecting the best treatments, health care providers consider various factors such as the medication’s effectiveness, the stage of pregnancy, the mother's health, and potential effects on the fetus. Urinary tract infections are more concerning in pregnancy due to the increased risk of kidney infections. During pregnancy, high progesterone levels elevate the risk of decreased muscle tone of the ureters and bladder, which leads to a greater likelihood of reflux,
where urine flows back up the ureters and towards the kidneys. While pregnant women do not have an increased risk of asymptomatic bacteriuria, if bacteriuria is present they do have a 25-40% risk of a kidney infection. Thus if urine testing shows signs of an infection—even in the absence of symptoms—treatment is recommended. Cephalexin or nitrofurantoin are typically used because they are generally considered safe in pregnancy. A kidney infection during pregnancy may result in premature birth or pre-eclampsia (a state of high blood pressure and kidney dysfunction during pregnancy that can lead to seizures). (Weber D, 2011).

Complicated Infections

Curing infections that stem from a urinary obstruction or other systemic disorder depends on finding and correcting the underlying problem, sometimes with surgery. If the root cause goes untreated, this group of patients is at risk for kidney damage. Also, such infections tend to arise from a wider range of bacteria and sometimes from more than one type of bacteria at a time. (Fakih MG, 2008).

Infections in Men:

Urinary tract infections in men are often the result of an obstruction—for example, a urinary stone or enlarged prostate—or are from a catheter used during a medical procedure. The first step in treating such an infection is to identify the infecting organism and the medications to which it is sensitive.

Prostate infections—chronic bacterial prostatitis—are harder to cure because antibiotics may be unable to penetrate infected prostate tissue effectively. For this reason, men with bacterial prostatitis often need long-term treatment with a carefully selected antibiotic. UTIs in men are frequently associated with acute bacterial prostatitis, which can be life threatening if not treated urgently. (Warren J, 2011).

Recurrent UTIs be prevented:

Changing some daily habits may help a person prevent recurrent UTIs.

Eating, Diet, and Nutrition

Drinking lots of fluid can help flush bacteria from the system. Water is best. Most people should try for six to eight, 8-ounce glasses a day. A person who has
kidney failure should not drink this much fluid. A health care provider should be consulted to learn how much fluid is healthy.

**Urination Habits**

A person should urinate often and when the urge arises. Bacteria can grow when urine stays in the bladder too long. Women and men should urinate shortly after sex to flush away bacteria that might have entered the urethra during sex. Drinking a glass of water will also help flush bacteria away. (Fakih MG, 2008).

After using the toilet, women should wipe from front to back. This step is most important after a bowel movement to keep bacteria from getting into the urethra.

**Clothing**

Cotton underwear and loose-fitting clothes should be worn, so air can keep the area around the urethra dry. Tight-fitting jeans and nylon underwear should be avoided because they can trap moisture and help bacteria grow. (Fakih MG, 2008).

**Birth Control**

For women, using a diaphragm or spermicide for birth control can lead to UTIs by increasing bacteria growth. A woman who has trouble with UTIs should try switching to a new form of birth control. Unlubricated condoms or spermicidal condoms increase irritation, which may help bacteria grow. Switching to lubricated condoms without spermicide or using a nonspermicidal lubricant may help prevent UTIs. (Fakih MG, 2008).

**Others Points :**

- Most urinary tract infections (UTIs) arise from one type of bacteria, Escherichia coli (E. coli), which normally lives in the bowel.
- Symptoms of a UTI in adults may include the following:
  - a frequent and intense urge to urinate
  - a painful, burning feeling in the bladder or urethra during urination
  - feeling tired, shaky, and weak
  - muscle aches
  - abdominal pain
• only small amounts of urine passed, despite a strong urge to urinate
• cloudy, dark, or bloody urine or urine that has a foul smell
• pain in the back or side below the ribs
• nausea and vomiting
• Fever may indicate a kidney or prostate infection.
• Because bacteria can be found in the urine of healthy individuals, a UTI is diagnosed based both on symptoms and a laboratory test.
• UTIs are treated with bacteria-fighting medications called antibiotics or antimicrobials. (Fakih MG, 2008).

**Nursing care plan:**

**Nurses' diagnosis and intervention:**

1. Acute Pain related to inflammation and infection of the urethra, bladder and other urinary tract structures.

Goal: Pain is reduced / lost, the spasms can be controlled.

Expected outcomes: client reported no pain on urination, no pain in the suprapubic region.

Intervention:

1. Monitor urine color changes, monitor the voiding pattern, input and output every 8 hours and monitor the results of urinalysis repeated.

Rationale: To identify the indications of progress or deviations from expected results

2. Note the location, time intensity scale (1-10) pain.

Rationale: To help evaluate the place of obstruction and cause pain.

3. Provide convenient measures, such as massage.

Rationale: Increase relaxation, reduce muscle tension.


Rational: To prevent contamination of the urethra.
5. If using a catheter, catheter treatment 2 times per day.  
Rationale: The catheter provides a way for bacteria to enter the bladder and urinary tract up to.

6. Divert attention to the fun.  
Rationale: Relaxation, avoid too feel the pain.

Rationale: to control the pain.

2. Impaired Urinary Elimination related to frequent urination, urgency, and hesitancy.

Goal: improve urinary elimination pattern.

Expected outcomes: clients reported a reduction in frequency (frequent urination), urgency, and hesitens.

Intervention:

1. Assess the patient's pattern of elimination.  
Rationale: as a basis for determining interventions.

2. Encourage the patient to drink as much as possible and reduce drinking in the afternoon.  
Rationale: To support the renal blood flow and to flush bacteria from the urinary tract. The liquid that can irritate the bladder (eg, coffee, tea, alcohol) is avoided. In order not to wake up frequently at night to urinate.

3. Encourage the patient to urinate every 2-3 hours and when it suddenly felt.  
Rationale: Because it significantly lowers the number of bacteria in the urine, reduced urine status and prevent recurrence of infection.

4. Prepare / encouragement do perineal care every day.  
Rationale: Reduce the risk of contamination / infection increased.
3. Disturbed Sleep Pattern related to pain and nocturia.

Goal: to improve sleep patterns.

Expected outcomes: clients reported being able to sleep, clients seem fresh.

Intervention:

1. Determine the usual sleeping habits and changes.
   Rationale: Assess and identify appropriate interventions.

2. Provide a comfortable bed.
   Rationale: Improve sleeping comfort and support of physiological / psychological.

3. Increase comfort bedtime regimen, for example, a warm bath and a massage, a glass of warm milk.
   Rationale: Increases the effect of relaxation. Note: The milk has sopofik quality, boost the synthesis of serotonin, a neurotransmitter that helps patients and sleep longer.

4. Reduce noise and light.
   Rationale: Provide a situation conducive to sleep.

5. Instruct relaxation measures.
   Rationale: Helps induce sleep.

4. Hyperthermia related to the reaction to inflammation.

Goal: body temperature back to normal.

Expected outcomes: client reported no fever, no palpable heat, vital signs within normal limits.

Intervention:

1. Assess any complaints or signs of increased body temperature changes.
   Rationale: Increased body temperature will shows a variety of symptoms such as red eyes and the body feels warm.
2. Observation of vital signs, especially temperature, as indicated.

Rationale: To determine interventions.

3. Warm water compress on the forehead and both axilla.

Rationale: To stimulate the hypothalamus to the temperature control center.


Rationale: Controlling fever

**Previous Studies:**

Worldwide: Nurses are the primary champions to promote preventative measures, provide patient education, and evaluate evidence-based practice (EBP) strategies to decrease CAUTIs. The purpose of this study was to determine if nursing education on EBP guidelines could decrease CAUTI rates in hospitalized patients on a medical surgical unit. A quasi-experimental, one group, before-and-after design was used to evaluate changes in CAUTI rates before and after the educational intervention in a hospital in the southeastern United States among staff of 63 nurses. The baseline unidentified CAUTI rate of the selected population was provided by the organization prior to the educational intervention. There were 55 nurses who attended the educational session and the post-CAUTI rate was evaluated 1 month after the educational intervention. At the end of the study period, analysis of CAUTI rates were conducted using a chi square test to evaluate whether there was a significant difference in the CAUTI rates. A statistically significant difference was found in the pre-to post-CAUTI rate (p < 0.05). The results of this study demonstrated that educating nurses on the CDC-recommended EBP guidelines and providing them with leadership supports significantly decreased CAUTI rates on a medical surgical unit. (Patricia Schweickert, 2015).

Study done by Vijay Purbia1 et al (2014): Study to assess the effectiveness of planned teaching programme on knowledge of staff nurses regarding prevention of urinary tract infection among patients with indwelling catheter in selected hospital at Udaipur, Rajasthan, India. Whose stated that: A One group pre-test post-test experimental study to assess the effectiveness of planned teaching program on knowledge of staff nurses regarding prevention of urinary tract infection among
patients with indwelling catheter. The sample consisting of 90 staff nurses was selected by using simple random sampling. The tool comprised of structured self-administered questionnaire. The pretest was conducted and the planned teaching program was administered. The post test was conducted after one week. The data obtained were analyzed by using differential and inferential statistics. The mean score of post-test knowledge 21.53 (71.76%) was apparently higher than the mean score of pre-test knowledge 13.51 (45.03%), suggesting that the planned teaching programme was effective in increasing the knowledge of the staff nurses regarding prevention of urinary tract infection among patients with indwelling catheter. The mean difference 8.02 between pre-test and post-test knowledge score of the staff nurses was found to be significant. (Vijay Purbia et al 2014).

In India study done by Manisha Jain, et al, (2011). The aimed of the study to assess Knowledge and attitude of nurses regarding indication for catheterization and prevention of catheter-associated urinary tract infection in a tertiary care hospital. Catheter-associated urinary tract infection (CAUTI) is one of the most common health care acquired infection encountered in clinical practice. The present study was planned to assess the knowledge and attitude of health care providers regarding the indications for catheterization and methods of preventing CAUTI. A structured questionnaire comprising of 41 items related to demographic details of the respondents, their knowledge regarding indications for catheterization and methods of preventing CAUTI was given to 54 doctors and 105 nurses. The response was evaluated for statistical correlation using a computer software. The mean years of experience of the respondents in the health care setup was 6.8 years. Only 57% of the respondents could identify all the measures for prevention of CAUTI. The knowledge regarding the indication for catheterization though suboptimal was significantly better amongst the doctors as compared to nurses. The knowledge regarding indication and preventive measures was suboptimal in our study group. There is a tremendous scope of improvement in catheterization practices in our hospital and education induced intervention would be the most appropriate effort toward reducing the incidence of CAUTI. (Manisha Jain, et al, 2011).

In Sudan study done by Hamdan Z et al (2010). Stated that: Urinary tract infections (UTI) can lead to poor maternal and perinatal outcomes. Investigating epidemiology of UTI and antibiotics sensitivity among pregnant women is
fundamental for care-givers and health planners. A cross sectional study has been conducted at Khartoum north teaching hospital Antenatal Care Clinic between February-June 2010, to investigate epidemiology of UTI and antibiotics resistance among pregnant women. Structured questionnaires were used to gather data from pregnant women. UTI was diagnosed using mid stream urine culture on standard culture media. Out of 235 pregnant women included, 66 (28.0%) were symptomatic and 169 (71.9%) asymptomatic. the prevalence of bacteriuria among symptomatic and asymptomatic pregnant women were (12.1%), and (14.7%) respectively, with no significant difference between the two groups (P = 0.596), and the overall prevalence of UTI was (14.0%). In multivariate analyses, age, gestational age, parity, and history of UTI in index pregnancy were not associated with bacteriuria. Escherichia coli (42.4%) and S. aureus (39.3%) were the commonest isolated bacteria. Four, 2, 2, 3, 4, 2 and 0 out of 14 E. coli isolates, showed resistance to amoxicillin, naladixic acid, nitrofurantoin, ciprofloxacin, co-trimoxazole, amoxicillin/clavulanate and norfloxacin, respectively. Escherichia coli were the most prevalent causative organisms and showing multi drug resistance pattern, asymptomatic bacteriuria is more prevalent than symptomatic among pregnant women. Urine culture for screening and diagnosis purpose for all pregnant is recommended. (Hamdan Z et al (2010).

Hamdan Z, et al, (2014). Patients with diabetes mellitus (DM) are more susceptible to urinary tract infection (UTI) than non-diabetics. Due to the emergence of multidrug resistant (MDR) uropathogenic strains, the choice of antimicrobial agent is restricted. This study investigated the epidemiology of UTI, antimicrobial susceptibility, and resistance patterns of bacterial isolates from adult diabetic patients. A cross-sectional study was conducted at Khartoum Hospital, Sudan during the period of March – September 2013. Consecutive patients (men and women) were approached to participate in the study, irrespective of UTI symptoms. Socio-demographic and clinical data were obtained from each participant using pre-tested questionnaires. Clean-catch, midstream urine samples were collected and cultured for UTI diagnosis and antimicrobial susceptibility. Symptomatic bacteriuria was defined as a positive urine culture (≥105 colony-forming units [CFU]/mL of a single bacterial species) from patients with symptoms associated with UTI; asymptomatic bacteriuria was defined as a positive urine culture from patients without symptoms associated with
UTI. A total of 200 diabetic patients were enrolled, 121 (60.5%) men and 79 (39.5%) women; 193 (96.5%) had type II DM. The overall prevalence of UTI was 39 (19.5%). Among the total population, 17.1% and 20.9% had symptomatic and asymptomatic bacteriuria, respectively. According to multivariate logistic regression, none of the investigated factors (age, sex, type of DM and duration) were associated with UTI. The predominant isolates were Escherichia coli (22, [56.4%]), and Klebsiella pneumoniae, [9, (23%)]. Eight of 22 E. coli, four of nine K. pneumoniae and one of five Enterococcus faecalis isolates originated from symptomatic patients. Six, four, three, and two of 22 E. coli isolates showed resistance to ampicillin, co-trimoxazole, nitrofurantoin, and amoxicillin-clavulanic acid, respectively. Two, two, one and one of nine K. pneumoniae isolates were resistant to ampicillin, co-trimoxazole, cephalexin, and amoxicillin-clavulanic acid. All 22 E. coli isolates were sensitive (100%) to gentamicin and cephalexin. All nine K. pneumoniae were sensitive to gentamicin (100%) and 88.8% were sensitive to cephalexin. In Sudan, about one-fifth of diabetic patients have UTI. E. coli is the most frequent isolate followed by K. pneumoniae. (Hamdan Z, et al, 2014).
3. Materials and Methods

3.1 Study Design:

A descriptive hospital-based study was conducted in Gezira Hospital for Renal diseases and surgery, Gezira State, Sudan during the period of the study (from October to November 2015), aim to assess Nurses' Knowledge regarding Nursing Care of Patient with Urinary Tract Infection.

3.2 Study Area:

The study was carried out in Gezira hospital for renal diseases and surgery at Wad Medani the capital of Gezira State. Gezira State is a large agricultural area located in the central region of Sudan. Wad Medani is about 186 km south to Khartoum state. It receives the patients from the whole state and neighboring states e.g. Algadarif, Sinnar. Gezira Hospital for Renal diseases and surgery contain many departments which are acute renal failure unit and hemodialysis ward and out patients unit. The hospitals units consisted of hemodialysis unit entailed 23 machines and 23 chairs, peritoneal dialysis unit 4 beds, intensive care unit (ICU) 4 beds, cystoscopy unit, female ward 18 beds and male ward 21 beds, Ultra Sound (US) Extracarobnal Shock Waves Lisotop (ESWL) and X-ray unit. Gezira Hospital for Renal Diseases and Surgery is the one of the well-established hemodialysis centres in Sudan with large catchment's area, where 276 patients per week are in regular hemodialysis. The capacity of renal diseases and surgery about 79 beds and 27 machines.
Table (3.1): Distribution of manpower who are direct contact in care of patients with urinary tract infection in the Gezira Hospital for Renal Diseases and Surgery

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultants</td>
<td>4</td>
</tr>
<tr>
<td>Registrars</td>
<td>9</td>
</tr>
<tr>
<td>Medical officers</td>
<td>15</td>
</tr>
<tr>
<td>House officers</td>
<td>10</td>
</tr>
<tr>
<td>Nurses</td>
<td>114</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>4</td>
</tr>
<tr>
<td>Assistant pharmacist</td>
<td>3</td>
</tr>
<tr>
<td>Nutritionists</td>
<td>2</td>
</tr>
<tr>
<td>Assistant Nutritionists</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>163</strong></td>
</tr>
</tbody>
</table>

**Source:** Statistical Department of Gezira Hospital for Renal Diseases and Surgery, 2015

Table (3.2): Distribution of wards and beds in Gezira Hospital for Renal Diseases and Surgery during the period of the study

<table>
<thead>
<tr>
<th>Wards</th>
<th>No of wards</th>
<th>No of beds</th>
<th>Average No of beds</th>
<th>Average No of patient staying</th>
</tr>
</thead>
<tbody>
<tr>
<td>General ward</td>
<td>17</td>
<td>60</td>
<td>44</td>
<td>3-9</td>
</tr>
<tr>
<td>ICU</td>
<td>1</td>
<td>4</td>
<td>2</td>
<td>3-7</td>
</tr>
<tr>
<td>Hemodialysis</td>
<td>1</td>
<td>23</td>
<td>23</td>
<td>Less 1 day</td>
</tr>
<tr>
<td>Outpatient room</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>Less 1 day</td>
</tr>
</tbody>
</table>

**Source:** Statistical Department of Gezira Hospital for Renal Diseases and Surgery, 2015
3.3 Study Population:

The population of the present study included (63) available registered nurses who are working at Gezira hospital for renal diseases and surgery in all units from all shifts during the period from October 2015 to November 2015.

3.3.1 Inclusion Criteria:

- All nurses who have direct contact in care of patients with urinary tract infection at Gezira hospital for renal diseases and surgery during the period from October 2015 to November 2015.
- All registered nurses with one year experience and more in hospital.
- All available registered nurse at the period of the study.

3.3.2 Exclusion Criteria:

- Nurses who didn’t directly contact with patients with urinary tract infection.
- Register Nurses have experience less than 1 year in the hospital.
- Register Nurses' who are not available as the period of the study from October 2015 to November 2015.
- Nurses under training.

3.4 Sampling size:

The sample size was consisted of (63) registered nurses who are available during the period of the study from October 2015 to November 2015 at Gezira hospital for renal diseases and surgery in all units from all shifts.

3.5 Data collection tool:

Structured questionnaire was designed by the researcher for the purposes of the study and utilized for three purposes as follows:
**First:** Data about characteristics of nurses such as age groups, gender, years of experiences and level of education.

**Second:** The nurses' knowledge regarding urinary tract infection at Gezira Hospitals for renal diseases and surgery in Gezira state such as definition, causes, sign and symptoms and complications …etc.

**Third:** The knowledge regarding nursing care of patients with urinary tract infection at Gezira Hospitals for renal diseases and surgery

### 3.6 Data collection and analysis:

Data was collected and entered to the computer to coded and analyzed by using statistical package for social sciences (SPSS).

### 3.7 Ethical consideration and sample technique:

- Official letters for the head manager and matron of Gezira hospital for renal diseases and surgery at Wad Medani for approval to collect the data.
- All nurses with one year experience and more (63) nurses who are responsible for caring of patients are informed about the research techniques
- Explanation for the nurses about the study questionnaire.
- Questionnaire was distributed for each available nurse to fill it within 20-25 minutes under the researcher guidance.
4. Results and Discussion

4.1 Results

4.1.1 Results of Demographic data:

Table {4.1}: Distribution of the study sample according to their gender and age groups:

<table>
<thead>
<tr>
<th>Gender</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>10</td>
<td>15.9%</td>
</tr>
<tr>
<td>Female</td>
<td>53</td>
<td>84.1%</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age groups</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 – 29 years</td>
<td>36</td>
<td>57.1%</td>
</tr>
<tr>
<td>30 – 34 years</td>
<td>20</td>
<td>31.8%</td>
</tr>
<tr>
<td>35 – 39 years</td>
<td>5</td>
<td>7.9%</td>
</tr>
<tr>
<td>40 years and more</td>
<td>2</td>
<td>3.2%</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

Table {4.1} shows that {84.1%} of the study sample were females and {15.9%} of them were male. Regarding age group this table showed that {57.1%} of them at age group range between 24 – 29 years and {31.8%} at age range between 30 – 34 years. {7.9%} of the their age range between 35 – 39 years and only 3.2% of them their age more than 40 years.
Table 4.2: Distribution of the study sample according to their level of education and years of experience:

<table>
<thead>
<tr>
<th>Educational level</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary</td>
<td>0</td>
<td>0.0%</td>
</tr>
<tr>
<td>Diploma</td>
<td>10</td>
<td>15.9%</td>
</tr>
<tr>
<td>Bachelor</td>
<td>39</td>
<td>61.9%</td>
</tr>
<tr>
<td>Post graduate</td>
<td>14</td>
<td>22.2%</td>
</tr>
<tr>
<td>Total</td>
<td>63</td>
<td>100.0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Years of experience</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>From 1 to 4 years</td>
<td>33</td>
<td>52.4%</td>
</tr>
<tr>
<td>From 5 to 9 years</td>
<td>29</td>
<td>46.0%</td>
</tr>
<tr>
<td>10 years and more</td>
<td>1</td>
<td>1.6%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4.2 revealed that {61.9%} of the study sample their level of education were bachelor, while {22.2%} were post graduate and {15.9%} had diploma. Regarding years of experience this results revealed that more than half {52.4%} of the study sample had experience range between 1 to 4 years, {46.0%} of them their experience range between 5 to 9 years and only {1.6%} of them their experience more than 10 years.
Figure {4.1} Distribution of the study sample according to their source of knowledge regarding Urinary Tract Infection

Figure {4.1} Illustrate that {34.9%} of the study sample their source of knowledge regarding urinary tract infections from university, {28.6%} of them their source of knowledge from books and references and {20.6%} from training programs while {15.9%} of them from colleagues.
Figure 4.2 Distribution of the study sample according to receiving training program before regarding care of patients with Urinary Tract Infection:

Figure 4.2 illustrate that \(20.6\%\) of the study sample had received training program regarding care of adult patients with Urinary Tract Infection before while \(79.4\%\) of them didn’t.
4.1.2 Results of Nurses' knowledge regarding care of patients with Urinary Tract Infection

Table {4.3}: Distribution of the study sample according to their knowledge about Definition of urinary tract and Definition of urinary tract infections

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Definition of urinary tract (UT)</td>
<td>56</td>
<td>88.9</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Definition of urinary tract infections (UTI)</td>
<td>58</td>
<td>92.1</td>
<td>4</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Table {4.3} shows that {88.9% and 92.1%} of the study sample responded with correct complete answers regarding definition of urinary tract and definition of urinary tract infections respectively, while {11.1% and 6.3%} of them responded with correction incomplete answers respectively, and {0.0% and 1.6%} of the study sample gave wrong answers.
Table 4.4: Distribution of the study sample according to their knowledge regarding Signs and symptoms of urinary tract infections and Causes of UTIs

<table>
<thead>
<tr>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>No</th>
<th>%</th>
<th>Total</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nurses’ knowledge</td>
<td>Correct complete answers</td>
<td>Correct incomplete answers</td>
<td>Incorrect</td>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signs and symptoms of urinary tract infections</td>
<td>50</td>
<td>79.4</td>
<td>10</td>
<td>15.9</td>
<td>3</td>
<td>4.8</td>
<td>63</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Causes of urinary tract infections</td>
<td>55</td>
<td>87.3</td>
<td>6</td>
<td>9.5</td>
<td>2</td>
<td>3.2</td>
<td>63</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

Table 4.4 shows that {79.4% and 87.3%} of the study sample responded with correct complete answers regarding signs and symptoms of urinary tract infections and causes of urinary tract infections respectively, while {15.9% and 9.5%} of them responded with correction incomplete answers respectively, and {4.8% and 3.2%} of the study sample gave wrong answers.
Table {4.5}: Distribution of the study sample according to their knowledge regarding Pathogenesis for urinary tract infections and Risk factors for urinary tract infections

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Pathogenesis for urinary tract infections</td>
<td>49</td>
<td>77.8</td>
<td>9</td>
<td>14.3</td>
</tr>
<tr>
<td>Risk factors for urinary tract infections</td>
<td>47</td>
<td>74.6</td>
<td>13</td>
<td>20.6</td>
</tr>
</tbody>
</table>

Table {4.5} shows that {77.8% and 74.6%} of the study sample responded with correct complete answers regarding pathogenesis for urinary tract infections and risk factors for urinary tract infections respectively, while {14.3% and 20.6%} of them responded with correction incomplete answers respectively, and {7.9% and 4.8%} of the study sample gave wrong answers.
Table 4.6: Distribution of the study sample according to their knowledge regarding Diagnoses of urinary tract infections and Treatment of urinary tract infections

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Diagnoses of urinary tract infections</td>
<td>41</td>
<td>65.1</td>
<td>17</td>
<td>27.0</td>
</tr>
<tr>
<td>Treatment of urinary tract infections</td>
<td>53</td>
<td>84.1</td>
<td>8</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Table 4.6 shows that {65.1% and 84.1%} of the study sample responded with correct complete answers regarding diagnoses of urinary tract infections and treatment of urinary tract infections respectively, while {27.0% and 12.7%} of them responded with correction incomplete answers respectively, and {7.9% and 3.2%} of the study sample gave wrong answers.
Table 4.7: Distribution of the study sample according to their knowledge regarding Recurrent urinary tract infections and Health care providers may advise women who have recurrent UTIs

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Recurrent urinary tract infections be prevented</td>
<td>50</td>
<td>79.4</td>
<td>9</td>
<td>14.3</td>
</tr>
<tr>
<td>Health care providers may advise women who have recurrent UTIs</td>
<td>49</td>
<td>77.8</td>
<td>8</td>
<td>12.7</td>
</tr>
</tbody>
</table>

Table 4.7 shows that {79.4% and 77.8%} of the study sample responded with correct complete answers regarding recurrent urinary tract infections be prevented and health care providers may advise women who have recurrent UTIs respectively, while {14.3% and 12.7%} of them responded with correction incomplete answers respectively, and {6.3% and 9.5%} of the study sample gave wrong answers.
Table {4.8}: Distribution of the study sample according to their knowledge regarding Classification of urinary tract infection, Urinary tract infection during pregnancy and Urinary tract infections in men

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Classification of urinary tract infection</td>
<td>49 77.8</td>
<td>8 12.7</td>
<td>6 9.5</td>
<td>63 100</td>
</tr>
<tr>
<td>Urinary tract infection during pregnancy</td>
<td>48 76.2</td>
<td>8 12.7</td>
<td>7 11.1</td>
<td>63 100</td>
</tr>
<tr>
<td>Urinary tract infections in men</td>
<td>44 69.8</td>
<td>11 17.5</td>
<td>8 12.7</td>
<td>63 100</td>
</tr>
</tbody>
</table>

Table {4.8} shows that {77.8%, 76.2% and 69.8%} of the study sample responded with correct complete answers regarding classification of urinary tract infection, urinary tract infection during pregnancy and urinary tract infections in men respectively, while {12.7%, 12.7% and 17.5%} of them responded with correction incomplete answers respectively, and {9.5%, 11.1% and 12.7%} of the study sample gave wrong answers.
Table 4.9: Distribution of the study sample according to their knowledge of nurses' regarding Nursing diagnosis and intervention of patients with urinary tract infections and Nurses' diagnosis and intervention regarding Acute Pain related to infection of the urethra, bladder and other urinary tract structures

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
<th>No</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nursing diagnosis and intervention of patients with urinary tract infections</td>
<td>52</td>
<td>8</td>
<td>3</td>
<td>63</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Nurses’ diagnosis and intervention regarding Acute Pain related to infection of the urethra, bladder and other urinary tract structures</td>
<td>50</td>
<td>9</td>
<td>4</td>
<td>63</td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

Table 4.9 shows that {82.5% and 79.4%} of the study sample responded with correct complete answers regarding nursing diagnosis and intervention of patients with urinary tract infections and nurses' diagnosis and intervention regarding acute pain related to infection of the urethra, bladder and other urinary tract structures respectively, while {12.7% and 14.3%} of them responded with correction incomplete answers respectively, and {4.8% and 6.3%} of the study sample gave wrong answers.
Table {4.10}: Distribution of the study sample according to their knowledge of nurses' regarding Nurses' diagnosis and intervention regarding Impaired Urinary Elimination related to frequent urination, urgency, and hesitancy and Nurses' diagnosis and intervention regarding Disturbed Sleep Pattern related to pain and nocturia

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
<th>Correct incomplete answers</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
</tr>
<tr>
<td>Nurses’ diagnosis and intervention regarding Impaired Urinary Elimination related to frequent urination, urgency, and hesitancy</td>
<td>44</td>
<td>69.8</td>
<td>13</td>
<td>20.7</td>
</tr>
<tr>
<td>Nurses’ diagnosis and intervention regarding Disturbed Sleep Pattern related to pain and nocturia</td>
<td>41</td>
<td>65.1</td>
<td>15</td>
<td>23.8</td>
</tr>
</tbody>
</table>

Table {4.10} shows that {69.8% and 65.1%} of the study sample responded with correct complete answers regarding nurses' diagnosis and intervention regarding impaired urinary elimination related to frequent urination, urgency, and hesitancy and nurses' diagnosis and intervention regarding disturbed sleep pattern related to pain and nocturia respectively, while {20.7% and 23.8%} of them responded with correction incomplete answers respectively, and {9.5% and 11.1%} of the study sample gave wrong answers.
Table (4.11): Distribution of the study sample according to their knowledge of nurses' regarding Nurses' diagnosis and intervention regarding Hyperthermia related to the reaction to infection and In dealing with patients with UTI, nurses can wear

<table>
<thead>
<tr>
<th>Nurses’ knowledge</th>
<th>Correct complete answers</th>
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<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>%</td>
<td>No</td>
<td>%</td>
<td>No</td>
</tr>
<tr>
<td>Nurses’ diagnosis and intervention regarding Hyperthermia related to the reaction to infection</td>
<td>48</td>
<td>76.2</td>
<td>11</td>
<td>17.5</td>
</tr>
<tr>
<td>In dealing with patients with UTI, nurses can wear</td>
<td>59</td>
<td>93.7</td>
<td>4</td>
<td>6.3</td>
</tr>
</tbody>
</table>

Table (4.11) shows that {76.2% and 93.7%} of the study sample responded with correct complete answers regarding nurses' diagnosis and intervention regarding hyperthermia related to the reaction to infection and in dealing with patients with UTI, nurses can wear respectively, while {17.5% and 6.3%} of them responded with correction incomplete answers respectively, and {6.3% and 0.0%} of the study sample gave wrong answers.
4.2 Discussion

Healthcare-associated infections have been around for many years and are considered to be preventable infections that patients can acquire while in hospital settings receiving care and treatments for other conditions. (Klevens et al., 2007).

Nurses are the key providers whose role allows for insertion and maintenance of IUCs and producing positive outcomes. The ultimate goal of nursing research is to develop a body of knowledge to support and advance nursing practices (Reed & Lawrence, 2008), which projects the outcomes of this experiment to add to the body of literature concerning nursing knowledge, assessment, and improving practices through nursing education to decrease CAUTI rates. It is also suggested that CAUTIs best practice guidelines knowledge will empower nurses to challenge IUC usage and inappropriate indications (Crouzet et al., 2007). Nurses are able to translate evidence-based knowledge into practice, and nursing care, and nursing interventions are effective in decreasing the prevalence of UTI in patients hospitalized. Evidence from Bernard et al. (2012).

A descriptive hospital-based study was conducted in Gezira Hospital for Renal diseases and surgery, Wad Medani town, Gezira State, Sudan during the period of the study (from October to November 2015), aim to assess Nurses’ Knowledge regarding Nursing Care of Patient with Urinary Tract Infections. The population of the present study included (63) available registered nurses who are working at Gezira hospital for renal diseases and surgery in all units from all shifts during the period of the study. The sample size consisted of (63) registered nurses who are available during the period of the study at Gezira hospital for renal diseases and surgery in all units from all shifts. The data was collected by using structured questionnaire designed for the purposes of the study. Data was analyzed by using statistical package for social sciences (SPSS).

The results showed that \(84.1\%\) of the study sample were females and \(15.9\%\) of them were male. Regarding age group this table showed that \(57.1\%\) of them at age group range between 24 – 29 years and \(31.8\%\) at age range between 30 – 34 years. \(7.9\%\) of the their age range between 35 – 39 years and only \(3.2\%\) of them their age more than 40 years. \(61.9\%\) of the study sample their level of education were bachelor, while \(22.2\%\) were post graduate and \(15.9\%\) had
diploma. Regarding years of experience this results revealed that more than half {52.4%} of the study sample had experience range between 1 to 4 years, {46.0%} of them their experience range between 5 to 9 years and only {1.6%} of them their experience more than 10 years.

{34.9%} of the study sample their source of knowledge regarding urinary tract infections from university, {28.6%} of them their source of knowledge from books and references and {20.6%} from training programs while {15.9%}of them from colleagues. {20.6%} % of the study sample had received training program regarding care of patients with Urinary Tract Infection before while 79.4% of them didn’t.

Regarding Nurses’ knowledge regarding care of patients with Urinary Tract Infection. These results showed that {88.9% and 92.1%} of the study sample responded with correct complete answers regarding definition of urinary tract and definition of urinary tract infections respectively, while {11.1% and 6.3%} of them responded with correction incomplete answers respectively, and {0.0% and 1.6%} of the study sample gave wrong answers.

{79.4% and 87.3%} of the study sample responded with correct complete answers regarding signs and symptoms of urinary tract infections and causes of urinary tract infections respectively, while {15.9% and 9.5%} of them responded with correction incomplete answers respectively, and {4.8% and 3.2%} of the study sample gave wrong answers.

{77.8% and 74.6%} of the study sample responded with correct complete answers regarding pathogenesis for urinary tract infections and risk factors for urinary tract infections respectively, while {14.3% and 20.6%} of them responded with correction incomplete answers respectively, and {7.9% and 4.8%} of the study sample gave wrong answers. These results is similar to study done in India study done by Manisha Jain, et al, (2011). The aimed of the study to assess Knowledge and attitude of doctors and nurses regarding indication for catheterization and prevention of catheter-associated urinary tract infection in a tertiary care hospital. Catheter-associated urinary tract infection (CAUTI) is one of the most common health care acquired infection encountered in clinical practice. The present study was planned to assess the knowledge and attitude of
health care providers regarding the indications for catheterization and methods of preventing CAUTI. A prospective questionnaire-based survey was done from March 2011 to August 2011. A structured questionnaire comprising of 41 items related to demographic details of the respondents, their knowledge regarding indications for catheterization and methods of preventing CAUTI was given to 54 doctors and 105 nurses. The response was evaluated for statistical correlation using a computer software. The mean years of experience of the respondents in the health care setup was 6.8 years. Only 57% of the respondents could identify all the measures for prevention of CAUTI. The knowledge regarding the indication for catheterization though suboptimal was significantly better amongst the doctors as compared to nurses. The knowledge regarding indication and preventive measures was suboptimal in our study group. There is a tremendous scope of improvement in catheterization practices in our hospital and education induced intervention would be the most appropriate effort toward reducing the incidence of CAUTI. (Manisha Jain, et al, 2011).

{65.1% and 84.1%} of the study sample responded with correct complete answers regarding diagnoses of urinary tract infections and treatment of urinary tract infections respectively, while {27.0% and 12.7%} of them responded with correction incomplete answers respectively, and {7.9% and 3.2%} of the study sample gave wrong answers.

{79.4% and 77.8%} of the study sample responded with correct complete answers regarding recurrent urinary tract infections be prevented and health care providers may advise women who have recurrent UTIs respectively, while {14.3% and 12.7%} of them responded with correction incomplete answers respectively, and {6.3% and 9.5%} of the study sample gave wrong answers.

{77.8%, 76.2% and 69.8%} of the study sample responded with correct complete answers regarding classification of urinary tract infection, urinary tract infection during pregnancy and urinary tract infections in men respectively, while {12.7%, 12.7% and 17.5%} of them responded with correction incomplete answers respectively, and {9.5%, 11.1% and 12.7%} of the study sample gave wrong answers.
These results is similar to study done by Vijay Purbia et al (2014): Study to assess the effectiveness of planned teaching programme on knowledge of staff nurses regarding prevention of urinary tract infection among patients with indwelling catheter in selected hospital at Udaipur, Rajasthan, India. Whose stated that: A One group pre-test post-test experimental study to assess the effectiveness of planned teaching program on knowledge of staff nurses regarding prevention of urinary tract infection among patients with indwelling catheter. The sample consisting of 90 staff nurses was selected by using simple random sampling. The tool comprised of structured self-administered questionnaire. The pretest was conducted and the planned teaching program was administered. The post test was conducted after one week. The data obtained were analyzed by using differential and inferential statistics. The mean score of post-test knowledge 21.53 (71.76%) was apparently higher than the mean score of pre-test knowledge 13.51 (45.03%), suggesting that the planned teaching programme was effective in increasing the knowledge of the staff nurses regarding prevention of urinary tract infection among patients with indwelling catheter. The mean difference 8.02 between pre-test and post-test knowledge score of the staff nurses was found to be significant. (Vijay Purbia et al 2014).

The results revealed that {82.5% and 79.4%} of the study sample responded with correct complete answers regarding nursing diagnosis and intervention of patients with urinary tract infections and nurses' diagnosis and intervention regarding acute pain related to infection of the urethra, bladder and other urinary tract structures respectively, while {12.7% and 14.3%} of them responded with correction incomplete answers respectively, and {4.8% and 6.3%} of the study sample gave wrong answers.

{69.8% and 65.1%} of the study sample responded with correct complete answers regarding nurses' diagnosis and intervention regarding impaired urinary elimination related to frequent urination, urgency, and hesitancy and nurses' diagnosis and intervention regarding disturbed sleep pattern related to pain and nocturia respectively, while {20.7% and 23.8%} of them responded with correction incomplete answers respectively, and {9.5% and 11.1%} of the study sample gave wrong answers.

{76.2% and 93.7%} of the study sample responded with correct complete answers regarding nurses' diagnosis and intervention regarding hyperthermia related
to the reaction to infection and in dealing with patients with UTI, nurses can wear respectively, while \(17.5\%\) and \(6.3\%\) of them responded with correction incomplete answers respectively, and \(6.3\%\) and \(0.0\%\) of the study sample gave wrong answers.
5. Conclusion and Recommendations

5.1 Conclusion

The study concluded that:

- Nurses’ knowledge regarding nursing care of patients with urinary tract infections in Gezira Hospital for Renal Diseases And Surgery were knowledgeable.
- Regarding Nurses' knowledge about Urinary Tract Infection, the study concluded that nurses’ knowledge in Gezira Hospital for Renal Diseases And Surgery were adequate.
5.2 Recommendations

Based on the conclusion of this study it recommended that:

- Routine and periodic training program must be done to all nurses to allow excellent degree in quality of knowledge technology about caring of patients with urinary tract infections in Gezira Hospital for Renal Diseases And Surgery.

- Logbook for care of patients about urinary tract infections must be design and available in the hospitals, also protocol for nursing management must be done by ministry of health government.

- Proper and continues monitoring and supervision of nurses’ performance is essential.
References:


Central Diseases Control (CDC) 2009. Lastly, surveillance with compliance to recommended guidelines would reduce the risk of UTIs and assure that nurses are promot good EBPsz.


Hamdan Z Hamdan*, Eman Kubbara1, Amar M Adam1, Onab S Hassan2, Sarah Suliman3 and Ishag Adam. (2014). Urinary tract infections and antimicrobial sensitivity among diabetic patients at Khartoum, Sudan


World Health Organization (WHO 2012).


Central Diseases Control (CDC) 2009.


Hamdan Z Hamdan1*, Eman Kubbara1, Amar M Adam1, Onab S Hassan2, Sarah O Suliman3 and Ishag Adam. (2014). Urinary tract infections and antimicrobial sensitivity among diabetic patients at Khartoum, Sudan.


World Health Organization (WHO 2012). About 4% of patients with urinary tract infections have a recurrence within one year.
Questionnaire for Nurses' Knowledge regarding Nursing Care of Adult Patient with Urinary Tract Infection at Gezira Hospital for Renal Diseases and Surgery, Gezira State, Sudan (2015)

A. General Characteristic

1. Gender:
   a. Male ( )
   b. Female ( )

2. Age group:
   a. From 24 – 29 years ( )
   b. From 30 – 34 years ( )
   c. From 35 – 39 years ( )
   d. 40 years and more ( )

3. Education level:
   a. Secondary ( )
   b. Diploma ( )
   c. Bachelor ( )
   d. Post graduate ( )

4. Years of experience:
   a. From 1 – 4 years ( )
   b. 5 to 9 years ( )
   c. 10 and years and more ( )

5. Source of knowledge regarding Urinary Tract Infection:
6. Did you receive training programs regarding care about Urinary Tract Infection?  
   a. Yes ( )  
   b. No ( )

7. If yes how many?  
………………………………………………………………………………………………………………

B. Nurses' Knowledge regarding care about Urinary Tract Infections:

1. Definition of urinary tract (UT):
   a. The urinary tract is the body's drainage system for removing wastes and extra water. ( )
   b. The urinary tract includes two kidneys, two ureters, a bladder, and a urethra. ( )
   c. The kidneys are a pair of bean-shaped organs, each about the size of a fist and located below the ribs ( )
   d. The urine travels from the kidneys down two narrow tubes called the ureters. ( )
   e. All of the above ( )
f. None of the above
   
2. **Definition of urinary tract infections (UTI):**
   
a. A urinary tract infection (UTI) is an infection in the urinary tract
   
b. Bacteria are the most common cause of UTIs
   
c. Bacteria overcome the body’s natural defenses and cause infection.
   
d. An infection in the urethra is called urethritis.
   
e. All of the above
   
f. None of the above
   
3. **Signs and symptoms of urinary tract infections:**
   
a. Lower urinary tract infection is also referred to as a bladder infection.
   
b. Burning with urination and having to urinate frequently (or an urge to urinate) in the absence of vaginal discharge and significant pain
   
c. People experiencing an upper urinary tract infection, or pyelonephritis, may experience flank pain, fever, or nausea and vomiting in addition to the classic symptoms of a lower urinary tract infection.
   
d. Urine may appear bloody or contain visible pus in the urine.
e. All of the above
   (  )

f. None of the above
   (  )

4. Causes of UTIs

a. Most UTIs are caused by bacteria that live in the bowel.
   (  )

b. E. coli
   (  )

c. Female Circumcision
   (  )

d. Chronic prostatitis
   (  )

e. Urinary catheters
   (  )

f. All of the above
   (  )

g. None of the above
   (  )

5. Pathogenesis for UTIs:

a. Bacteria that cause urinary tract infections typically enter the bladder via the urethra.
   (  )

b. Infection may also occur via the blood or lymph.
   (  )

77
c. The bacteria are usually transmitted to the urethra from the bowel, with females at greater risk due to their anatomy.

   (   )

d. E. Coli are able to attach to the bladder wall and form a biofilm that resists the body's immune response

   (   )

e. All of the above

   (   )

f. None of the above

   (   )

6. Risk factors for a UTI:

a. People with spinal cord injuries

   (   )

b. Abnormal Sexual activity

   (   )

c. Congenital abnormalities in the bladder.

   (   )

d. All of the above

   (   )

e. None of the above

   (   )

7. Diagnoses of UTI

a. UTI is diagnosed based both on signs and symptoms and a laboratory test.(   )
b. Laboratory diagnoses only
   (    )

c. UTI ultrasound
   (    )

d. Voiding cystourethrogram
   (    )

e. Computerized tomography (CT) scan
   (    )

f. Magnetic resonance imaging (MRI).
   (    )

g. Radionuclide scan
   (    )

h. Urodynamic testing
   (    )
i. Cystoscopy
   (    )

j. All of the above
   (    )

l. None of the above
   (    )

8. Treatment of UTIs:

a. Antibiotics
   (    )

b. Antifungal
   (    )
c. Traditional treatment
   
   (   )

d. All of the above
   
   (   )

e. None of the above
   
   (   )

9. **Recurrent UTIs be prevented:**

a. Nutrition regime
   
   (   )

b. Urination Habits
   
   (   )

c. Clothing
   
   (   )

d. Save labor
   
   (   )

e. All of the above
   
   (   )

f. None of the above
   
   (   )

10. **Health care providers may advise women who have recurrent UTIs to try one of the following treatment options:**

a. Take low doses of the prescribed antibiotic daily for 6 months or longer. If taken at bedtime, the medication remains in the bladder longer and may be more effective. (   )

b. Take a single dose of an antibiotic after sexual intercourse.  
   
   (   )
c. Take a short course—2 or 3 days—of an antibiotic when symptoms appear.(  )

d. To try to prevent an infection, health care providers may training and health education for women

(  )

e. All of the above

(  )

f. None of the above

(  )

11. Classification of urinary tract infection may involve only:

a. Lower urinary tract in which case it is known as bladder infection

(  )

b. Involve the upper urinary tract in which case it is known as pydonephritis (  )

c. If the urine condition significant bacteria but there are no symptoms the condition is known as symptomatic

(  )

d. If the urine contain significant bacteria but there are no symptom the condition is known as asymptomatic

(  )

e. All of the above

(  )

f. None of the above

(  )

12. Urinary tract infection during pregnancy:
a. May occur related to hormonal changes
   (  )

b. Position of the urinary tract during pregnancy make it easier for bacteria to travel up the uters to the to kidneys and case infection
   (  )

c. Health care providers routinely screen pregnant women for bacteria in the urine during the first 3 months of pregnant
   (  )

d. Personal hygiene to avoid UTI
   (  )

e. All of the above
   (  )

f. None of the above
   (  )

13. Urinary tract infections in men may be lead to:

   a. An obstruction —, a urinary stone or enlarged prostate
      (  )

   b. From a catheter used during a medical procedure.
      (  )

   c. Prostate infections — chronic bacterial prostatitis often need long-term treatment
      (  )

   d. UTIs in men are frequently associated with acute bacterial prostatitis, which can be life threatening if not treated urgently.
      (  )
1. Nursing diagnosis and intervention of patients with urinary tract infections:

   a. Acute Pain related to inflammation and infection of the urethra, bladder and other urinary tract structures.
      (        )

   b. Impaired Urinary Elimination related to frequent urination, urgency, and hesitancy.
      (        )

   c. Disturbed Sleep Pattern related to pain and nocturia.
      (        )

   d. Hyperthermia related to the reaction to inflammation.
      (        )

   e. All of the above
      (        )

   f. None of the above
      (        )

2. Nurses' diagnosis and intervention regarding Acute Pain related to infection of the urethra, bladder and other urinary tract structures.

   a. Monitor urine color changes, monitor the voiding pattern, input and output every 8 hours and monitor the results of urinalysis repeated.
      (        )
b. Note the location, time intensity scale (1-10) pain.  
   ( )

c. Provide convenient measures, such as massage.  
   ( )

d. Give perineal care.  
   ( )

e. Catheter treatment 2 times per day.  
   ( )

f. Divert attention to the fun.  
   ( )

g. Collaboration of analgesics.  
   ( )

h. All of the above  
   ( )
i. None of the above  
   ( )

3. Nurses' diagnosis and intervention regarding Impaired Urinary Elimination related to frequent urination, urgency, and hesitancy.

a. Assess the patient's pattern of elimination.  
   ( )

b. Encourage the patient to drink as much as possible and reduce drinking in the afternoon.  
   ( )

c. Encourage the patient to urinate every 2-3 hours and when it suddenly felt.  
   ( )
d. Prepare / encouragement do perineal care every day.

(    )

e. All of the above

(    )

f. None of the above

(    )

4. Nurses' diagnosis and intervention regarding Disturbed Sleep Pattern related to pain and nocturia.

a. Determine the usual sleeping habits and changes.

(    )

b. Provide a comfortable bed.

(    )

c. Increase comfort bedtime regimen, for example, a warm bath and a massage, a glass of warm milk.

(    )

d. Reduce noise and light.

(    )

e. Instruct relaxation measures.

(    )

f. All of the above

(    )

g. None of the above

(    )

5. Nurses' diagnosis and intervention regarding Hyperthermia related to the reaction to infection .

a. Assess any complaints or signs of increased body temperature changes.

(    )
b. Observation of vital signs, especially temperature, as indicated.  
   (   )

d. Warm water compress on the forehead and both axilla.  
   (   )

e. Collaboration of antipyretic drugs.  
   (   )

f. All of the above  
   (   )

g. None of the above  
   (   )

6. In dealing with patients with UTI, nurses can wear:

a. Shoes  
   (   )

b. Mask  
   (   )

c. Google  
   (   )

d. Gloves  
   (   )

e. Eyes class  
   (   )

f. All of the above  
   (   )

G. None of the above  
   (   )