

**EFFECTIVENESS OF BETADINE Vs NORMAL SALINE FOR
CATHETER CARE IN REDUCING THE OCCURRENCE OF
URINARY TRACT INFECTION AMONG PATIENTS
WITH INDWELLING CATHETER IN KMCH,
COIMBATORE.**

Reg No. 30104408

**A DISSERTATION SUBMITTED TO THE TAMILNADU Dr.M.G.R.
MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT
OF REQUIREMENT FOR THE DEGREE OF
MASTER OF SCIENCE IN NURSING
APRIL 2012**

CERTIFICATE

This is to certify that the Dissertation entitled **EFFECTIVENESS OF BETADINE Vs NORMAL SALINE FOR CATHETER CARE IN REDUCING THE OCCURRENCE OF URINARY TRACT INFECTION AMONG PATIENTS WITH INDWELLING CATHETER IN KMCH, COIMBATORE** , is submitted to the faculty of Nursing, **The Tamilnadu Dr. M.G.R Medical University, Chennai** by **Mr.Sibi Zacharia** , in partial fulfillment of requirement for the degree of Master of Science in Nursing. It is the Bonafide work done by him and the conclusions are his own. It is further certified that this dissertation or any part thereof has not formed the basis for award of any degree, diploma or similar titles.

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CATHETER IN KMCH, COIMBATORE.**

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CHAPTER I

INTRODUCTION

A nosocomial infection, also known as a hospital-acquired infection or HAI, is an infection whose development is favoured by a hospital environment, such as one acquired by a patient during a hospital visit or one developing among hospital staff. Such infections include fungal and bacterial infections and are aggravated by the reduced resistance of individual patients (Oxford Reference, 2008)

Urinary tract infections are responsible for over a third of all hospital acquired infections. Most of these (at least 80%) follow some type of invasive procedures or instrumentation of the urinary tract, usually catheterization. The pathogens responsible for catheter-associated urinary tract infections include Escherichia coli, Klebsiella, Proteus, Pseudomonas, Enterobacter, Serratia and Candida. Many of these organisms are part of the patient's endogenous or normal bowel flora or are acquired through cross contamination by patients or hospital personnel or through exposure to non sterile equipment. (Brenda, et.al., 1996)

Urinary tract infections (UTI) associated with urinary catheters is the leading cause of secondary nosocomial bacteremia. Approximately 20 percent of hospital-acquired bacteremias acquired due to catheter associated urinary tract infection and the mortality associated with this condition is about 10 percent (Gould, 2010).

A catheter is defined as a drainage tube that is inserted into the bladder through the urethra, is left in place, and is connected to a closed drainage system. The catheter is sometimes called a "Foley catheter" or indwelling urinary catheter. Straight in-and-out catheterizations are not included in Catheter Associated Urinary Tract Infection (CAUTI) surveillance. Suprapubic catheters and other urological diversions are also not included in CAUTI surveillance (Siegel, 2006)

A urinary tract infection (UTI) is a bacterial infection that affects any part of the urinary tract. Symptoms include frequent feeling and/or need to urinate, pain during urination, and cloudy urine (Zalmanovici,2010)

In hospital settings, clinicians may use guideline-based definitions in the diagnosis of urinary tract infections. The Infectious Diseases Society of America gives various forms of definition. They are

1. Asymptomatic bacteriuria, or asymptomatic urinary infection: Isolation of a specified quantitative count of bacteria in an appropriately collected urine specimen obtained from a person without symptoms or signs referable to urinary infection.
2. Acute uncomplicated urinary tract infection: Symptomatic bladder infection characterized by frequency, urgency, dysuria, or suprapubic pain in a woman with a normal genitourinary tract, and is associated with both genetic and behavioral determinants.
3. Acute nonobstructive-pyelonephritis: Renal infection characterized by costovertebral angle pain and tenderness, often with fever; it occurs in the same population that experiences acute uncomplicated urinary infection.
4. Complicated urinary tract infection: Symptomatic urinary infection involving either the bladder or kidneys, found in individuals with functional or structural abnormalities of the genitourinary tract.
5. Pyuria: The presence of increased numbers of polymorphonuclear leukocytes in the urine, evidence of an inflammatory response in the urinary tract.

The urinary tract infection is defined as an infection of one or more structures in the urinary system. Most UTIs are caused by gram-negative bacteria, most commonly *Escherichia coli* or species of *Klebsiella*, *Proteus*, *Pseudomonas*, or *Enterobacter*, although other strains, such as *Staphylococcus* and *Serratia*, are emerging. The condition is more common in women than in men. UTI may be asymptomatic but is usually characterized by urinary frequency, burning pain with voiding, and, if the infection is severe, visible blood and pus in the urine present. Fever and back pain often accompany kidney infections. Diagnosis of the cause and location of the infection is made by physical examination of the patient, microscopic examination and bacteriologic culture of a urine specimen, and, if necessary, various radiologic techniques such as retrograde pyelography or cystoscopy can be done. Treatment includes antibacterial, analgesic, and urinary antiseptic drugs and increased fluid intake up to 3L/day, unless contraindicated. Teaching the patient about increased fluid intake, frequent voiding, and good perineal hygiene is also helpful.

Catheter-associated (CA) bacteriuria is the most common health care-associated infection occurs worldwide and is a result of the widespread use of urinary catheterization, much of which is inappropriate, in hospitals and long-term care facilities (LTCFs). Considerable personnel time and costs are expended by health care institutions to reduce the rate of CA infections, especially for those that occur with signs or symptoms related to the urinary tract

CA infection refers to infection occurring in a person whose urinary tract is currently catheterized or has been catheterized within the previous 48 hrs. UTI refers to significant bacteriuria in a patient with symptoms or signs attributable to the urinary tract. Asymptomatic bacteriuria (ASB) refers to significant bacteriuria in a patient without symptoms or signs attributable to the urinary tract. Bacteriuria is a non-specific term that refers to UTI and ASB combined. In the urinary catheter literature, CA-bacteriuria is comprised mostly of Catheter Associated Asymptomatic Bacteriuria (CA-ASB) (Pappas, 2009).

Most hospital-acquired UTIs are associated with catheterization, and most occur in patients without signs or symptoms referable to the urinary tract. CA-bacteriuria is the most frequent health care associated infection worldwide, accounting for up to 40% of hospital-acquired infections in US hospitals each year (Haley, 2004)

In hospitalized patients, CA-bacteriuria accounts for many episodes of nosocomial bacteremia, and one study has found an association with increased mortality (Nicolle., 1996)

According to an estimate from the CDC published in 2001, healthcare-associated UTIs resulted in an excess cost to the U.S. healthcare system of more than \$400 million annually. In a study published in 2002, every catheter-related incidence of bacteriuria added an average of \$589 (1998 dollars) to the financial burden of the healthcare system. It follows that, high cost reported in 2002 represent the high proportion of UTIs in healthcare settings. The effect of UTIs on present-day healthcare dollars is significant. Healthcare facilities can depend on UTI surveillance to support interventions that will positively impact the cost. (Pratt, et.al., 2007).

NEED FOR THE STUDY

Infections associated with urinary catheters occur in both endemic & epidemic circumstances; common – source outbreaks are infrequent, although an estimated 15% of endemic infection occur in clusters, mainly due to cross infection. Most UTIs- whether endemic or epidemic are asymptomatic and removal of catheter is usually curative. The usually benign nature of catheter-associated UTIs are easily treated by antibiotic & it inhibits the aggressive measures for their prevention and recognition. (Schaberg, et. al.,1980)

According to recent National Nosocomial Infections Surveillance (NNIS) system report, nosocomial UTIs rates ranged from 0.5 to 12.7 per 1000 urinary catheter – days in intensive care patients. (NNIS report, 2002).

The challenge of preventing UTIs has multiplied with changes in the character of hospitalized population. These changes include the increased number of patients with advanced age & more severe underlying illnesses, the emergence of specialized units for the care of critically ill patients, the increased use of multiple invasive devices, the growing population of immunosuppressive patients and the expanding use of organ transplantation. These are the factors may increased both the use of indwelling catheters & the susceptibility of catheterized patient. Even today, despite significant progress and technological advancement, virtually all patients with chronic indwelling bladder catheters are continuously infected. Moreover, as a result of the extensive use of broad spectrum antimicrobial agents and the emergence of drug resistant pathogens, patients with urinary catheter-associated UTIs also acts as a reservoir of antibiotic resistant pathogens.(Vartvarian,1996)

A multivariate analysis reviewed by Salgado et al. reported five risk factors associated with the development of a UTI: 1) duration of catheterization, 2) catheter care violations, 3) absence of systemic antibiotics, 4) female gender, and 5) older age.

The presence of bacteria (bacteriuria) in the urine of healthy catheterized patients is often asymptomatic and will resolve spontaneously with the removal of the catheter. Even when not catheterized, older adults may have bacteria in their urine without any signs or symptoms of infection (asymptomatic bacteriuria, or ASB). ASB usually will not predispose the patient to UTI unless other factors contribute to UTI occurrence. If antibiotics are inappropriately used as treatment or prophylaxis,

the occurrences of UTI from ASB will be more. Overuse of antibiotics, especially for ASB, may lead to selection for antibiotic resistant organism. (Nicolle, 2005)

More than 30 million Foley catheters are inserted annually in the United States, and these catheterization procedures probably contribute to 1 million CAUTIs. Estimation showed that the patients catheterized at any one time have ranged from 10% in acute care hospitals, to 7.5% to 10% of patients in long-term care facilities, to a more recent estimate of 25%. Reasons for this increased use of catheterization include complexities of care, increased acuity, severity of illness and decreased staffing levels (Kunnin, 1997)

Many investigations have shown high frequency of inappropriate and unjustified use of urinary catheters, especially in older, female patients. Inappropriate urinary catheter use in acute care hospitals has been reported to range from 21% to greater than 50%. It is estimated that 30% of all Foley catheters are inserted in the Emergency Department (Hazelett., 2006)

UTI is a main cause of secondary bloodstream infections, responsible for 0.5% to 4% of these infections. Males develop secondary bacteremia twice as often as females. Although mortality is generally associated with bacteremia, one study found that bacteriuria was associated with an almost threefold higher chance of dying than for patients without bacteriuria (Stephan, 2006)

From a broad epidemiological surveillance, the problems of catheter associated infections takes priority. Each year, 3 to 6 million of the 33 million patients admitted to acute care hospitals receive indwelling catheters. It has been estimated that about 15 to 25% of patients in general hospitals have a catheter inserted sometime during their stay & that prevalence of urinary catheterization has increased over recent decades. The problem encountered in many different medical specialties is probably due to local practice patterns & geographical differences. 52.4% of the patients received indwelling catheters and the incidence of catheter related UTI was 13%. In 1992, the CDC estimated that more than 9, 00,000 nosocomial UTIs occurred in the United States and it consumes nearly the charges exceeded Dollar 600 million. (Langley,et.al, 2001)

If urinary catheters were used only when it needed and in appropriate situation, the theoretical risk of UTI will reduce and also that the actual UTI rates will decrease. Exposure to a urinary catheter is the major risk factor for acquiring infection. Duration of catheterization is the

secondary risk factor. The best method to create the safest patient situation would be to avoid unnecessary catheter use and to use appropriate catheters for a shorter duration whenever indicated (Saint, et. al., 2005)

During the clinical postings in the various wards of KMCH, including the intensive care units, the investigator noticed that majority of the patients in intensive care units and medical surgical units are having urinary catheters. It induced a curiosity in the investigator to have a look on the urinary catheter and its indication as well as the complication etc. Moreover the investigator did a mini project on the topic, “A study to assess the incidence rate of UTI among patients with indwelling urinary catheter in KMCH, Coimbatore.” Through the mini project investigator recognized the incidence rate of UTI in KMCH and it motivates to find a solution which will reduce the problem or prevent the complications of UTI.

STATEMENT OF THE PROBLEM

Effectiveness of Betadine Vs Normal Saline for catheter care in reducing the occurrence of Urinary Tract Infection among patients with indwelling catheter in KMCH, Coimbatore.

OBJECTIVES:

Objectives were to

1. assess the occurrence of UTI among patients receiving catheter care with Normal Saline.
2. estimate the occurrence of UTI among patients receiving catheter care with Betadine.
3. compare the rates of UTI among patients who received catheter care with Normal Saline and those who received catheter care with Betadine.

OPERATIONAL DEFINITIONS

Urinary tract infection:

It is the colonization of the urinary tract with the microorganism along with the presence of UTI symptoms such as elevated temperature above 100⁰ F, supra pubic tenderness, loin pain, burning micturation and a positive microscopic analysis findings with presence of the pus cells, casts, bacteria and other abnormal cells.

Betadine solution:

It is a topical microbicidal solution which is used in the patients with indwelling urinary catheter and it contains 5% povidone iodine.

Normal saline:

It is a sterile isotonic solution which contains 0.9gram sodium chloride in 100 ml of water.

Patients:

The subjects who were having indwelling catheter insitu for 48-72 hours.

HYPOTHESIS

There is no significant difference between the occurrences of UTI in Betadine or Normal Saline group.

ASSUMPTIONS

- The catheter associated UTI is higher in women than men.
- Prolonged use of catheter is a factor of UTI.

CONCEPTUAL FRAMEWORK

Nursing is a complex field of study with a need for practical and hands-on training as well as knowledge of theoretical and historical basis. Conceptual framework for this study was developed on the basis of this important theory called prescriptive theory of nursing, created by Ernestine Wiedenbach who was an early leader in the field of nursing, proposed her theory in 1969 as a prescriptive theory directs action towards an explicit goal.

Elements of Nursing

Wiedenbach believed that there are four essential components to the field of nursing:

1. Philosophy of Nursing

A nurse's philosophy includes the attitudes and beliefs about life the nurse maintains and how these beliefs affect reality. Philosophy leads the nurse to act a certain way.

2. Nursing Purpose

A nurse's purpose is what a particular nurse wishes to accomplish through his or her profession. It also includes the activities directed to the overall good of the patient.

3. Nursing Practice

The practice of nursing involves identifying a patient's need for help, administering the help that is required and determining whether or not the actions were helpful to the patient.

4. Art of Nursing

Wiedenbach encouraged nurses to see nursing as an art which includes understanding patient concerns and needs and addressing them accordingly.

The five realities identified by Wiedenbach are agent, recipient, goal, means and framework.

- ❖ Weidenbach's views nursing as an art based on goal directed care
- ❖ Weidenbach's vision of nursing practice closely parallels the assessment, implementation and evaluation steps of the nursing process
- ❖ According to her factual and speculative knowledge , judgement and skills are necessary for effective nursing practice
- ❖ According to Wiedenbach, nursing practice consists of identifying a patient's need for help, ministering the needed help and validating that the need for help was met.

The attributes adopted in this study are:

Central purpose :

The central purpose of the study is to reduce the occurrence of UTI among the indwelling urinary catheterized patients.

Prescription :

The investigator plans the prescription that will fulfill the central purpose (reduction of the occurrence of UTI) by identifying the various needs to achieve the goal. Thus the investigator selected the method, Normal Saline and Betadine used urinary catheter care.

Realities :

1. Agent - Investigator
2. Recipient - Patients with indwelling urinary catheter
3. Goal - Reduction of the occurrence of UTI among catheterized patients
4. Means - Normal Saline or Betadine used urinary catheter care
5. Framework - Various ICU's and wards of KMCH.

Identification :

This includes identification of the risk to develop the UTI, need for catheter care and preventive method to reduce the UTI.

Ministration :

Refers to the application of the Normal Saline or Betadine solution for catheter care & periurethral cleaning.

Validation :

Refers to the evaluation of the effect of both the Normal Saline and Betadine group through culture reports, urine microscopic analysis & UTI symptom assessment.

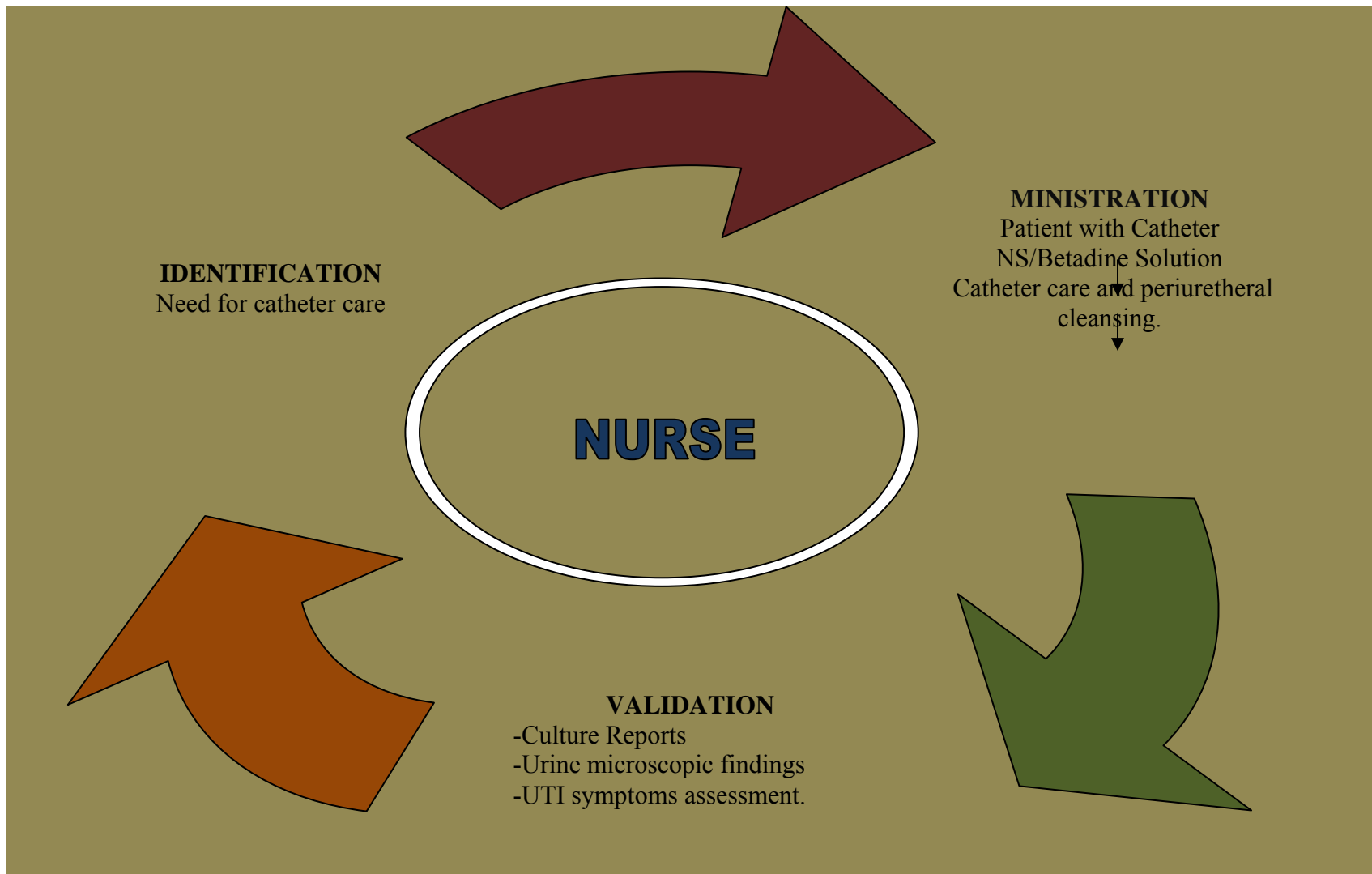


FIGURE NO-1: CONCEPTUAL FRAME WORK- MODIFIED WIEDENBACH'S THEORY OF HELPING ART OF CLINICAL NURSING (1964).

CHAPTER – II

REVIEW OF LITERATURE

The extensive view was made to strengthen the present study, and to lay down the foundation, which helps to reveal the prevailing situation of the similar studies in different areas. This chapter includes sections like,

Section A : Literature related to appropriate use of urinary catheter in hospital setting.

Section B : Literature related to the incidence of Catheter Related Urinary Tract Infection (CAUTI).

Section C : Literature related costs associated with healthcare associated UTI

Section D : Literature related to the risk factors of UTI.

Section E :Literature related to pathogenesis & common organisms causing UTI.

Section F : Literature related to effectiveness of Normal Saline &/or Betadine for catheter care in reducing the occurrence of UTI.

Section A : Literature related to urinary catheter use in hospital setting.

Gokula (2004) conducted a study to assess the inappropriate urinary catheter use in the hospital settings. 285 patients older than 65 who had an indwelling Foley catheter were reviewed for catheter indications. The result showed that 46% of the patients had appropriate indications for catheterization. Only 13% of the time was there adequate documentation by nurses and physicians regarding the use of the catheter. In addition, 13% of the time, there was no documented order for the catheter.

Hazelett (2004) conducted a study to assess the association between indwelling urinary catheter use in the elderly and urinary tract infection. Retrospective design was used. Records of all patients greater than 65 years of age, admitted through the Emergency Department(ED) during a one-month period in 2004 were reviewed. Of the 1,633 patients admitted to the hospital from the ED, urinary catheters had been inserted in 379 (23%); 277 of whom (73%) were older than 65 years. Only 46% of these catheters were later identified as appropriately placed. Moreover the result states that Inappropriate urinary catheter use in acute care hospitals has been reported to range from 21% to greater than 50%. It is estimated that 30% of all Foley catheters are inserted in the Emergency Department (ED).

Kunnin(2000) conducted a study to assess urinary catheter use in health care settings. He reviewed reports from various hospitals in USA. Result showed that more than 30 million Foley catheters are inserted annually in the United States, and these catheterization procedures probably contribute to 1 million UTIs. Estimates of how many patients are catheterized at any one time have ranged from 10% in acute care hospitals, to 7.5% to 10% of patients in long-term care facilities, to a more recent estimate of 25%. Reasons for this increased use include complexities of care, increased acuity, severity of illness and decreased staffing levels.

Deron,et.al.,(2011) conducted a study on Trends in urinary catheter associated infections in adults. The objective was to examine changes in rates of CAUTI events in adult. Data were reported to the Centers for Disease Control from 1990 to 2007 was retrieved. They observed nearly 367 facilities representing 1,223 adult ICUs, including combined medical/surgical (505), medical (212), surgical (224), coronary (173), and cardiothoracic (109) ICUs. The result found that all ICU types experienced significant declines of 19%–67% in Urinary Tract Infection (UTI) rates and 29%–72% in Asymptomatic Bacteriuria (ASB) rates from 1990 through 2007. Between 2000 and 2007, significant reductions in UTI rates Since 1990, occurred in all ICU types except cardiothoracic ICUs. They concluded that CAUTI rates have declined significantly in all major adult ICU types in facilities reporting to the CDC.

Thomsen,et.al.,(2011) publishes an article on urethral cauterization. He states that Urethral catheterization is a routine medical procedure that facilitates direct drainage of the urinary bladder.-It may be used for diagnostic purposes (to help determine the etiology of various genitourinary

conditions) or therapeutically (to relieve urinary retention, instill medication, or provide irrigation). Catheters may be inserted as an in-and-out procedure for immediate drainage, left in with a self-retaining device for short-term drainage (eg, during surgery), or left indwelling for long-term drainage for patients with chronic urinary retention. Patients of all ages may require urethral catheterization, but patients who are elderly or chronically ill are more likely to require indwelling catheters, which carry their own independent risks.

Nirmanmoh,et.al., (2010) conducted a study to assess the urinary catheters in medical wards. The aim is to determine the frequency of inappropriate catheterization in medical wards and the reasons for doing it. One hundred and twenty five patients admitted in the medical wards who underwent catheterization with a Foley's catheter, at admission, have been included in the study. Result showed that Thirty-six out of 125 (28.8%) patients included were inappropriately catheterized and developed in 52.8% and 22.4% were diagnosed with a UTI. The most significant indication for inappropriate catheterization was urinary incontinence without skin breakdown (27.8%). The risk factors for acquiring a UTI were age>60 years (RR=0.47, 95% CI=0.25, 0.90, $P<0.05$), impaired mental status (RR=0.37, 95% CI=0.18, 0.77, $P<0.01$) and duration of catheterization>3 days (RR=0.24, 95% CI=0.10, 0.58, $P<0.01$).

Loeb,et.al., (2008) conducted a study on Stop orders to reduce inappropriate urinary catheterization in hospitalized patients. A randomized controlled trial was used. The aim is to assess whether stop orders for indwelling urinary catheters reduces the duration of inappropriate urinary catheterization and the incidence of urinary tract infections. They selected six hundred ninety-two hospitalized patients admitted to hospital with indwelling urinary catheters inserted within 48hrs. They observed that there were fewer days of inappropriate and total urinary catheter use in the stop-order group than in the usual care group (difference -1.69 [95% CI -1.23 to -2.15], $P < 0.001$ and -1.34 days, [95% CI, -0.64 to -2.05 days], $P < 0.001$, respectively). Urinary tract infections occurred in 19.0% of the stop-order group and 20.2% of the usual care group, relative risk 0.94 (95% CI, 0.66 to 1.33), $P = 0.71$. Catheter reinsertion occurred in 8.6% of the stop-order group and 7.0% in the usual care group, relative risk 1.23 (95% CI, 0.72 to 2.11), $P = 0.45$. They concluded as stop orders for urinary catheterization safely reduced duration of inappropriate urinary catheterization in hospitalized patients but did not reduce urinary tract infections.

Gokula, et.al.,(2004) conducted a study on inappropriate use of urinary catheters in elderly patients. Literature reviewed from various hospital reports in USA. The study found that 46% of patients had an appropriate indication for catheterization. A physician or nurse explicitly documented the reason for catheter placement in only 13%. No order for catheterization was written in 33% of the charts. Mean duration of catheter use was 3 days. They conclude that less than half of urinary catheterizations in this hospital were indicated and even fewer not having a proper indication.

Munasinghe,et.al.,(2003) conducted a study on Appropriateness of use of indwelling urinary catheters in patients admitted to the medical service. 836 subjects were evaluated over a 1-month period. Among them 89 (10.7%) had a urinary catheter placed within 24 hours. Out of 89, 34 placements (38%) had no justifiable indication. Risk for inappropriate catheterization was independent of age, gender, functional status, and mental status at admission. They conclude that preventive measures should focus on increasing awareness among healthcare providers.

Jain (1995) conducted a study on overuse of the indwelling urinary tract catheter in hospitalized medical patients. The aim is to identify the prevalence of the unjustified use of the Indwelling Urinary Tract Catheter (IUTC) in hospitalized medical patients and identified situations associated with its unjustified use. 202 patients were included in this study. The findings states the initial indication for the placement of an IUTC was found to be unjustified in 21%. Continued catheterization was unjustified in 47%. In the medical intensive care unit, 64% of the total unjustified patients were catheterized for longer duration. Urinary incontinence was found to be the major cause of unjustified initial and continued use of IUTC in the noncritical care areas. They concluded that the IUTCs are significantly overused in hospitalized medical patients and careful attention to this aspect of medical care may reduce catheter-related complications by primary prevention.

Black (1994) states that the Common indications to catheterize a patient include acute or chronic urinary retention (which can damage the kidneys), orthopedic procedures that may limit a patient's movement, the need for accurate monitoring of input and output (such as in an ICU), benign prostatic hyperplasia, incontinence, and the effects of various surgical interventions involving the bladder and prostate

Section B : Literature Related To The Incidence Of Catheter Related Urinary

Tract Infection(CAUTI).

Smith,et. al., (2008) conducted a study on infection prevention and control in the long term care facility (LTC). Result showed that CAUTI as the most common infection in LTC residents, with a bacteriuria prevalence without indwelling catheters of 25% to 50% for women, and 15% to 40% for men. Therefore, usage of indwelling urinary catheters in residents of LTC facilities can be expected to result in higher CAUTI rates with an associated risk of CAUTI-related bacteremia, unless appropriate prevention efforts are implemented.

Sedor,et.al., (2007) publishes an article on Hospital Acquired UTI associated with an indwelling catheter. The article states that Indwelling urethral catheters are commonly used in patients admitted to acute care hospitals. 40% of nosocomial infections occur in the urinary tract, and greater than 80% of these infections are secondary to an indwelling urethral catheter. Fortunately, the majority of catheters are left indwelling for a short period of time. The duration of catheterization is directly related to the development of bacteriuria, nosocomial infection, and possible bacteremia with sepsis. A relatively low percentage of patients become infected during the first 3 to 5 days if sterile technique and proper maintenance of a closed system are performed. Bacteria may grow in the urine (planktonic) and ascend via the lumen, or bacteria in the biofilm around the outside of the catheter may infect the bladder.

Bryan,et.al., (2004) conducted a study on hospital acquired bacteraemic urinary infection: Epidemiology and Outcome. 40 hospitals were included in this study. The result indicated that between 75 and 80% of all healthcare associated UTIs follow the insertion of a urinary catheter and around 26% of all hospitalized patients have a urinary catheter inserted during their stay in hospital.

Centers for Disease Control and prevention Recommendations (2002) states that Healthcare-associated infections (HAIs) are acquired during the period of taking treatment for other conditions within a clinical setting. HAIs are one of the top 10 leading causes of death in the United States, according to the Centers for Disease Control and Prevention (CDC), which estimates that 1.7 million infections annually were reported among patients

Paul, et.al., (2000) conducted a prospective study on Catheter-Associated Urinary Tract Infection (CAUTI) Is Rarely Symptomatic. The aim is to define the clinical features of CAUTI. 235 cases of nosocomial CAUTI were included in this study. More than 90% of the infected patients were asymptomatic; only 123 patients produce symptoms. The result showed that there were no significant differences between patients with and without CAUTI in signs or symptoms commonly associated with urinary tract infection—fever, dysuria, urgency, or flank pain—or in leukocytosis. Only 1 of the 235 episodes of CAUTI that were prospectively studied was unequivocally associated with secondary bloodstream infection. They conclude that whereas CAUTIs are a major reservoir of antibiotic-resistant organisms in the hospital, they are rarely symptomatic and infrequently cause bloodstream infection.

Saint (2000) collected various literatures on urinary tract infections related to the use of urinary catheters. The findings reported that 26% of patients who have indwelling catheters for two to 10 days will develop bacteriuria, after which 24% of those with bacteriuria will develop a UTI. Of these patients, approximately 3% will develop bacteremia

Plowman, et.al., (1999) submitted a report on incidence of UTI. The report states that Urinary tract infections (UTI) are the most common infections acquired in hospitals and long-term care facilities. Moreover the study estimated the incidence of healthcare associated UTIs at around 2-3 patients per 100 admissions. A number of risk factors for healthcare associated UTI have been suggested and it is now well established that the major predisposing factor for healthcare associated UTI is the presence of an indwelling urethral catheter.

Ouslander (1997) conducted a prospective study on complications of chronic indwelling urinary catheters. Male patients in a nursing home who were catheterized for longer period were included in this study. The aim is to illustrate the problem of CAUTI in long term care of the elderly. The study found that during the one-year study period 80% of patients had at least one UTI and 48% of patients had two or more CAUTIs

Liedberg (1989) conducted a study on catheter induced urethral inflammatory reaction & Urinary Tract Infections (UTI). The study showed that Urinary tract infections accounts for over 40% of all nosocomial infections and almost all these infections are associated with indwelling catheters. The acquisition of urinary tract infections following urinary bladder catheterizations is associated with

nearly a threefold increase in mortality among hospitalized patients. The economic impact of nosocomial urinary infections is difficult to assess. An estimate of the cost of these infections have shown that patients with hospital-acquired urinary tract infections secondary to indwelling catheters, spent an average of 2.4 additional days in the hospital. Bearing this in mind, even a marginal decrease in urinary tract infections may be cost-effective.

Conterno,et.al.,(2011) conducted a study on excessive use of urinary catheters among hospitalized patients. The cohort study was conducted. 254 patients who used a urinary catheter (UC) during their hospitalization were included. Catheter use, indication, time of permanence, urinary infection density, mortality, and hospital stay were evaluated. The study findings showed that 14% of the hospitalized patients received UC. In 23% of cases, the indication is not clear. The average time of UC use was 6.8 days. Patients with inadequate UC use had more urinary tract infections and longer hospital stay (11.9 and 8.9 days, $p=0.002$). This study identifies difficulties in the care process that are potentially changeable and important to avoid urinary tract infection by urinary catheter use.

Center for Disease Control & Prevention(2002) states that The urinary tract is the most common site of nosocomial infection, accounting for more than 40% of the total number reported by acute-care hospitals and affecting an estimated 600,000 patients per year. Most of these infections 66% to 86% follow instrumentation of the urinary tract, mainly urinary catheterization

Section C : Literature related costs associated with healthcare associated UTI

Foxman (2002) conducted a study to assess the Epidemiology of Urinary Tract Infection (UTI). They found that UTIs, the most common type of nosocomial infection, account for over 1 million cases annually or over 40% of all nosocomial infections in hospitals and nursing homes and constitute 80% of all nosocomial UTIs. Due to this high incidence, the overall cost for medical intervention of nosocomial UTIs is increasing, with an estimated \$424 million to \$451 million spent annually in the United States to manage these infections. Costs for treatment of nosocomial UTIs include antimicrobial therapy, increases in length of stay during hospitalization, physician visits, and morbidity. These costs will considerably rise due to advances in preventive medicine that extend life expectancy, increasing the elderly population. This population today (those ≥ 65 years old) accounts for approximately 12.6% (37,849,672) of the total population of the United States (301,139,947); their care accounts for about one-third of the estimated \$1 trillion in U.S. health expenditures

Platt,et.al.,(1992) publishes an article on mortality associated with urinary Tract Infection. It states that the costs associated with healthcare associated UTIs result from additional diagnostic testing, treatment regimes and increased hospital stays of on average 5-6 days. The Plowman report published in 1999 estimated the additional NHS costs of treating a healthcare associated UTI were Â£1327 per case and the national burden of healthcare associated UTI was approximately Â£125 million per annum. The majority of these costs result from extended hospital stays for the large numbers of patients affected by UTI and this place a significant burden on the healthcare system

Section D : Literature related to the risk factors of UTI.

Crouzet (2007) conducted a study to assess the control of duration of urinary catheterization on Urinary Tract Infection (UTI). The study states that UTIs have been shown to occur more frequently than other infections associated with healthcare, accounting for 36% of all HAIs in the United States. Most healthcare-associated UTIs are associated with an indwelling urinary catheter. The risk of acquiring a UTI depends on the method of catheterization, duration of catheter use, the quality of catheter care, and host susceptibility. Studies have shown a strong and direct correlation between catheter use greater than six days and UTI occurrence.

Shapiro,et.al.,(2004) conducted a prospective study to assess the risk factors for Catheter Associated Bacteriuria. 112 patients who were catheterized for >24hrs were selected. The study showed that the factors independently associated ($P<0.05$) with a higher risk of catheter associated bacteriuria. The factors are hospitalization, ethnic origin, insertion of catheter after six days of catheterization, lack of administration of systemic antibiotics, unsatisfactory catheter care & prolonged duration of catheterization before infection occurred.

Hussain,et.al.,(1996) conducted a prospective study to assess the risk factors of Hospital Acquired Infection (HAIs). 436 elderly patients were selected. Among them, 113 subjects acquired nosocomial infection. The study indicate the risk factors such as gender, increasing age and general debilitation are associated with CAUTIs. Females are at increased risk of acquiring UTIs due to the relative ease with which bacteria colonizing the perineum can reach the urethra and in common with other HAIs. Moreover it states that the elderly and debilitated are at risk of acquiring infections

Garibaldi,et.al.,(1994) conducted a study to assess the risk factors predisposing to Urinary Tract Infection (UTI) during indwelling urethral catheter. The study results have demonstrated that various risk factors for UTI. Factors including a history of previous catheter use, the duration the catheter is in situ , the length of hospital stay prior to catheter insertion, the reason for and location of catheter insertion

Section E : Literature related to common organisms causing UTI.

Barford (2009) conducted a study on pathogenesis of Catheter Associated Urinary Tract Infection. It showed that Catheter-associated urinary tract infection (CAUTI) remains one of the most common types of hospital-acquired infections. Further progress in the prevention of CAUTI requires a better understanding of its pathogenesis. Bacteria may enter the bladder through contamination of the tip during insertion with the flora of the distal urethra or from bacteria ascending the outside or the inside of the catheter. Residual urine in the bladder of catheterised patients increases the risk of bacteriuria. Catheters by themselves may cause immediate physical damage to the bladder epithelium; they may be toxic and also cause inflammation. Bacteria can also damage the epithelium and cause inflammation and the combination of both may be synergistic in producing symptoms in the patient.

Kucheria,et.al.,(2005) conducted a study on Urinary Tract infections (UTIs) , a new insight into a common problem. The study result state that E.Coli strains are the most commonly isolated organisms in community-acquired UTIs (70 to 90%) and among the most commonly isolated in nosocomially acquired UTIs (50%) including UTIs. *E. coli* has been identified as the causative agent in 90% of all case of UTI in ambulatory patients. These organisms are capable of colonizing the intestinal and vaginal tracts as well; these sites can serve as potential reservoirs for UTIs and CAUTIs.

Manjunath,et.al., (2011) conducted a study on changing trends in the spectrum of antimicrobial drug resistance pattern of uropathogens. 6350 samples were analyzed in various hospitals during the study period. Culture positive cases of UTI were included for analysis. About 12 different species of uropathogens were identified from 6350 cases. Among them, E.coli was the most common uropathogen which constituted 59.2% of the total samples followed by Klebsiella spp (12.1%), Enterococcus (10.1%) & Pseudomonas (9.3%). Also it indicates the female patients (58.5%) were more vulnerable to UTIs than male patients (41.5%).

O'Mahony (1999) conducted a study to describe the Antimicrobial sensitive's & Causative organisms of UTI. Descriptive & Prospective design was adopted. Urine samples collected from patients with symptoms of UTI and pyuria and did a bacterial culture. 53 samples were included in this study consist of 46 females and 7 male. E.coli (37%) was the commonest organism isolated. Of all organisms isolated, only 15 (28%) were sensitive to ampicillin and 22 (42%) to cotrimaxazole. All organisms tested were sensitive to fosfomycin.

Mead,et.al.,(1978) conducted a study on prevalence of Urinary Tract Infections. 430 women were selected. Among them, the prevalence rate of UTI was 4.9%. They found that Trichomoniasis was more common in the small group of patients with UTI. The most common causative organism of UTI was E.coli and isolates were usually sensitive to ampicillin, sulphonamides, trimethoprim and nitrofurantoin.

Warren (2001) states that the preferred mechanism of bladder entry during CAUTIs is extraluminal (66%), where organisms ascend from the urethral meatus along the catheter urethral interface. Organisms can also enter the bladder intraluminally (34%), where the bacteria migrate into the bladder as a result of manipulation of the catheter system.

Jocabson,et.al., (2008) conducted a study on complicated catheter associated UTIs due to E.coli & Proteus mirabilis. The findings state that Catheter Associated Urinary Tract Infections represent the most common type of nosocomial infections and are a major health care concern due to the complications and frequent recurrence. These infections are often caused by E.coli and Proteus mirabilis. Gram negative bacterial species that cause CAUTIs express a number of virulence factors associated with adhesions, motility, biofilm formation, immunoavoidance and nutrient acquisition as well as factors that cause damage to the host. These infections can be reduced by limiting catheter usage & prefer condom catheters.

Section F : Literature related to effectiveness of Normal Saline &/or Betadine for catheter care in reducing the occurrence of UTI.

Al-Farsi,et.al.,(2009) conducted a study to compare urinary infection rate in clients cleaned with sterile water versus a 10% povidone-iodine before bladder catheterization. Prospective randomized control trail was used. The participants were randomly assigned to two groups in which sterile water or povidone-iodine was to be used for peri-urethral cleaning. The sterile water group had 92 patients and the povidone –iodine group had 94. Urine culture was positive in 16% of clients in the povidone- iodine group & in 18% in the sterile water group. The result showed that there was no significant association between solution preparation and cultures on univariate regression analysis. The study concluded that the periurethral cleaning with sterile water prior to catheterization in not inferior to cleaning with povidone- iodine.

Shin,et.al.,(2008) conducted a study to compare the effects of meatal care with 10% betadine or with normal saline on the incidence of urinary tract infection for elderly clients with indwelling urinary catheter in the ICU.A quasi experimental design with non-equivalent control group was used. The 37 patients who participated in this study were 65yr old or older. Patients in the normal saline group (n=20) received meatal care with normal saline and those in the betadine group (n=17) received meatal care with 10% betadine once a day for 6 days. A urine culture was done on the 7th day for both groups to detect UTIs. No difference was observed in the incidence of urinary tract infection between the two groups regardless of patient’s gender, ability to communicate or history of operation. The results indicated that use of saline which is cheap and does not irritate the mucous membrane is effective in preventing UTI within first 7 days and can be used instead of betadine for meatal care for elderly clients with indwelling urinary catheter in the ICU.

Ken,et.al.,(2006) were conducted a study on Evaluation of 3 Methods of catheter care to treat Bacteriuria in Persons. Eighty-nine persons with bacteriuria were randomized to receive catheter care twice daily with (a) sterile saline, (b) acetic acid, or (c) neomycin-polymyxin solution. Urinalysis, cultures, and antimicrobial susceptibility tests were performed at baseline and after care to determine the extent to which each of the solutions affected numbers and types of bacteria, urinary pH, urinary leukocytes, and generation of antimicrobial-resistant organisms. The result showed that none of the 3 solutions had a detectable effect on the degree of bacteriuria or pyuria in 52 persons who completed the

study protocol. A significant increase in urinary pH occurred in all 3 groups. No significant development of resistance to oral antimicrobials beyond what was observed at baseline was detected. They had concluded that there is no significant difference exists between these three groups. All are having the same effect only.

Jacobson,et.al.,(2003) conducted a study to assess the effect of daily meatal care with poly-antibiotic solutions in prevention of urinary catheter associated bacteriuria. Randomized clinical trial was adopted. 846 subjects were randomized to receive (1) twice-daily meatal care comprising cleansing with a povidone-iodine solution and application of a povidone-iodine ointment, (2) once-daily meatal cleansing with a nonantiseptic solution or (3) no special meatal care. The main outcome measure was bacteriuria. Subjects randomized to receive meatal cleansing combined with application of an ointment had higher bacteriuria rates when compared to those receiving no special care. This difference was statistically significant, indicating an unexpectedly higher risk of bacteriuria among patients randomized to meatal care with an antimicrobial solution as compared to those managed with no meatal care. Similarly, patients treated with a nonantiseptic solution also experienced higher rates of bacteriuria than did subjects randomized to no special meatal care

Burke,et.al.,(2001) conducted a study to evaluate the efficacy of daily cleansing of the urethral meatus-catheter junction in preventing bacteriuria during closed urinary drainage. randomized controlled trial was adopted. In 32 (16.0 percent) of 200 patients given twice daily applications of a povidone-iodine solution and ointment bacteriuria was acquired, as compared with 24 (12.4 percent) of 194 patients not given this treatment. In 28 (12.2 percent) of 229 patients given once daily meatal cleansing with a nonantiseptic solution bacteriuria was acquired, as compared with 18 (8.1 percent) of 23 patients not given special meatal care. The study found that there was no evidence in either trial of a beneficial effect of meatal care. Moreover, each of four different statistical methods indicated that the rates of bacteriuria were higher in the treated groups than in the untreated groups. Female patients were at high risk in both studies significantly higher rates of bacteriuria.

Matsumoto (1997) conducted a study to assess the prevention of catheter associated UTI by meatal disinfection. The subjects included 72 patients with an indwelling, urethral catheter inserted post-operatively. These patients were divided into three groups treated with once or twice daily application of povidone-iodine or once daily application of povidone-iodine cream. In these groups, the

relation between changes in isolation of bacteria from the meatal area and the incidence of UTI was evaluated. The result showed that reduction in bacterial count by antiseptics is effective to prevent ascending UTIs. Moreover, once daily application of povidone-iodine was proven to be effective in male patients. The effective antiseptics in females was twice daily application of povidone-iodine.

Ihnsook,et.al.,(2010) conducted a study on comparison of catheter associated urinary tract infection rates by perineal care agents in ICUs. Aim of this study is to compare the catheter-associated urinary tract infection (CAUTI) rates resulting from the use of four perineal care agents (soap-and-water, skin cleansing foam, 10% povidone-iodine, and normal saline) among patients in intensive care units (ICUs). Experimental study was done with 97 adult patients who had urinary catheters over 2 days in ICUs. The patients received one of the four types of perineal care. Data collected included the incidence of UTI at baseline prior to perineal care, 1 week, 2 weeks, and 4 weeks after beginning perineal care. The result showed that the cumulative incidence of CAUTIs per 100 urinary catheter days were 3.18 episodes during 1 week with urinary catheter, 3.31 during 2 weeks, and 3.04 during 4 weeks. No statistically significant difference in hazard ratios of UTIs for each perineal care agent was evident with reference to soap-and-water at 1 week, 2 weeks, and 4 weeks after beginning perineal care after controlling for age, use of antibiotics, fecal incontinence, consciousness level, fever, and diabetes.

CHAPTER III

METHODOLOGY

This chapter details the research design, setting of the study, variables under the study, population, sample size, sampling technique, criteria for sample selection, description of the tools, pilot study, data collection process and plan for data analysis.

RESEARCH DESIGN

The research design adopted for this study was randomized block design, a specific type of 2x2 factorial design. Schematic representation of the design is as follows.

	Normal saline A	Betadine B
Female X	AX	BX
Male Y	AY	BY

VARIABLES UNDER THE STUDY

In this study Betadine and Normal Saline usage for catheter care was the independent variables and occurrence of UTI was the dependent variable.

SETTING OF THE STUDY

This study was conducted in the intensive care units and neuro ward of KMCH, Coimbatore. It is an 800 bedded super specialty hospital which has an excellent technological facility to take care the patients from different parts of the world.

POPULATION

The population of the study was all the patients who have indwelling urinary catheter.

SAMPLE SIZE

The sample size was 60 patients with indwelling urinary catheter. 30 subjects were assigned to the Normal Saline group and 30 subjects were assigned to Betadine group.

SAMPLING TECHNIQUE

In this study non random purposive sampling technique was adopted.

CRITERIA FOR SAMPLE SELECTION

INCLUSION CRITERIA

- The patient who had an indwelling urinary catheter.
- The subjects between the age group 20-60yrs.
- Both male and female patients.
- Both conscious and unconscious patients.
- Patients who had urinary catheter insitu for minimum 5 days.

EXCLUSION CRITERIA

- ❖ Patients who had UTI or any other genito urinary disorders at the time of admission.
- ❖ Patients who were catheterized outside.
- ❖ The patients who were immunocompromised.
- ❖ The patient who had temperature above 100⁰F on admission.

RANDOMIZATION

Simple randomization was done by preparing 60 lots, out of which 30 were in Normal Saline group and other 30 were in Betadine group. The lots were mixed and collectively placed in the box. The ICU in-charge were picked up one lot at a time and based on this patients were assigned to Normal Saline group or Betadine group. The lot “N” was considered as Normal Saline group and the lot “B” was considered as Betadine group.

MANIPULATION

Manipulation was done by altering the solution for catheter care namely the Normal Saline or Betadine solution.

DESCRIPTION OF THE INTERVENTION:

The experimental group received urinary catheter care twice daily by the investigator using normal saline as a solution to provide the catheter care. The researcher used sterilized catheter care set for the procedure. The salient features of the urinary catheter care protocol includes various new techniques such as performing catheter care twice daily, performing perineal care before cleaning the catheter, securing the catheter over the e anterior thigh. Before the bag gets filled, the urine is emptied . This intervention was not for only performing the catheter care twice daily, but taking care of the urinary catheter while positioning the patient and transferring the patient from bed to stretcher or wheel chair .

DESCRIPTION OF THE TOOL

The tool for the data collection was structured in four sections; they are,

Section A : Demographic profile of the subjects

Section B : Clinical profile

Section C : UTI clinical symptoms assessment checklist

Section D : Urine microbiological analysis

Section A: Demographic profile of the subjects

This consists of demographic profile of the subjects including age, sex, religion and marital status.

- Age
- Sex
- Religion
- Marital status

Section B : Clinical profile

It consists of diagnosis, indication for catheterization, previous experience of catheterization, previous history of UTI and duration of catheter care.

Section C: UTI clinical symptoms assessment checklist

It consists of temperature, supra pubic tenderness, pus discharge from urethra, cloudy urine and bad odour of urine.

Section D: Urine microbiological analysis

It consists of urine microscopic analysis and urine culture report.

- Urine microscopic analysis
- Urine culture report (only if the UTI symptoms exists)

PROCEDURE FOR DATA COLLECTION

Prior to the data collection, permission was obtained from the College of Nursing and Hospital authorities. Formal information's were given to the ICU in-charges and supervisors. Pilot study was conducted for a period of one week and the result showed that the study was practically feasible.

Subject with indwelling urinary catheter were selected on the day of catheterization and for these subjects clinical symptoms of UTI were assessed and sent for complete urine analysis.

The KMCH catheter protocol was followed for catheter care except for altering the solution. The catheter care was given till the day of catheter removal and after two days clinical symptoms of UTI was assessed and if it is presents urine specimen was obtained for urine culture and microscopic analysis by the investigator.

STATISTICAL ANALYSIS:

Collected data were analyzed by using both descriptive and inferential statistics. Percentage analysis was used for distributing the subjects according to their demographic Variables, clinical profile, clinical symptoms and urine microscopic findings. Percentage analysis and fisher exact test were used for comparison of occurrence of UTI between normal saline and betadine groups.

CHAPTER – IV

DATA ANALYSIS & INTERPRETATION

This chapter deals with the description of demographic and clinical profile of the study subjects and classification, analysis and interpretation of the data collected to evaluate the effectiveness of Betadine Vs Normal saline for catheter care in reducing the occurrence of urinary tract infection among patients with indwelling catheter.

ORGANIZATION OF THE DATA:

The data are presented under the following sections:

Section - A : Demographic and clinical profile of the subjects.

Section - B : Distribution of subjects according to clinical symptoms and urine microscopic findings.

Section – C : Comparison of occurrence of UTI between normal saline and betadine groups

SECTION – A : DEMOGRAPHIC AND CLINICAL PROFILE OF THE SUBJECTS:

Table 1) Distribution of subjects according to their demographic profile in betadine and normal saline groups:

Characteristics	Betadine group				Normal saline group			
	Male		Female		Male		Female	
	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)
a)Age in years								
20 – 40	5	33.3	6	40	8	53.3	7	46.7
41 – 60	10	66.7	9	60	7	46.7	8	53.3
b)Marital status :								
Married	13	86.7	15	100	9	60	13	86.7
Unmarried	2	13.3	-	-	6	40	2	13.3
c) Religion								
Hindu	15	100	15	100	13	86.67	15	100
Muslim	-	-	-	-	2	13.33	-	-

Table 1 shows that the distribution of subjects according to the demographic variables in normal saline and betadine groups. In betadine group, among 15 males, majority 66.7 % (n=10) were between the age group of 41 – 60 years and the remaining 33.3% (n=5) were in the age group of 20 to 40 yrs. In terms of marital status, majority 86.7% (n=13) of the males were married and the remaining 13.3% (n=2) were unmarried. All the subjects were belong to the religion of Hindu.

In betadine group, among 15 females, majority 60 % (n=9) were in the age group of 41-60 years and the remaining 40% (n=6) were between the age group of 20-40yrs. With regard to marital status, all the females in the normal saline groups were married. All the subjects belong to the religion of Hindu.

In normal saline group, among 15 males, majority 53.3% (n=8) were between the age group of 20-40yrs and the remaining 46.7% (n=7) were in the age group of 41-60yrs. In terms of marital status, majority 60% (n=9) of the males were married and the remaining 40% (n=6) were unmarried. Most of them 86.67 % (13) belong to the religion of Hindu and the remaining 13.33(2) belong to Christian.

In normal saline group, among 15 females, majority 53.3 % (n=8) were at the age group of both 41-60yrs and the remaining 46.7% (n=7) were between the age group of 20-40yrs. With regard to marital status, majority 86.7% (n=13) of the females were married and the remaining 13.3% (n=2) were unmarried. All the subjects belong to the category of Hindu.

Table 2) Distribution of subjects according to their clinical profile in normal saline and betadine group :

Characteristics	Betadine group				Normal saline group			
	Male		Female		Male		Female	
	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)	No of samples(f)	Percentage (%)
a)Diagnosis :								
Neuro	11	73.3	7	46.7	10	66.7	9	60
Cardiac	-		2	13.3	-		3	20
Others	4	26.7	6	40	5	33.3	3	20
b)Indication for Catheterization:								
For monitoring output	14	93.3	13	86.7	13	86.7	10	66.7
For surgical purpose	1	6.7	2	13.3	2	13.3	5	33.3
c)Previous experience of Catheterization								
Yes	7	46.7	4	26.7	4	26.7	6	40
No	8	53.3	11	73.3	11	73.3	9	60
d)Previous history of Urinary Tract Infection :								
Yes	3	20	3	20	5	33.3	2	13.3
No	12	80	12	80	10	66.7	13	86.7
f)Total days of catheter used								
a. 1 week	6	40	5	33.3	8	53.3	7	46.7
b. 2week	8	53.3	9	60	6	40	6	40
c. >2 week	1	6.7	1	6.7	1	6.7	2	13.3

Table 2 depicts the distribution of subjects according to their clinical profile in normal saline and betadine groups. In betadine group, among 15 males, in terms of diagnosis, majority 73.3% (n=11) belong to the category of neuro. Most of the males 93.3% (n=14) were catheterized for monitoring purpose. 53.3% (n=8) don't have any previous experience of catheterization. Most of the subjects 80% (n=12) do not have previous history of UTI. With regard to total days of catheterization, majority 53.3% (n=8) were belongs to the category of 2wks, 40% (n=6) were in the category of 1wk and for the remaining 6.7% (n=1), the duration was more than 2 wks.

Among 15 females, majority 46.7% (n=7) were diagnosed in neuro category. In terms of indication for catheterization, most of them 86.7% (n=13) were catheterized for monitoring. Majority 73.3% (n=11) do not have a previous experience of UTI. Majority 80% (n=12) do not have a previous history of catheterization. With regard to total days of catheterization, majority 60% (n=9) were belongs to the category of 2wks, 33.3% (n=5) were in the category of 1wk and for the remaining 6.7% (n=1), the duration was more than 2 wks.

In normal saline group, among 15 males, in terms of diagnosis, majority 66.7% (n=10) belongs to the category of neuro and the remaining 33.3% (n=5) belongs to others category. With regard to indications, most of them 86.7% (n=13) were catheterized for monitoring purpose. 26.7% (n=4) had a previous experience of catheterization. 33.3% had a previous history of UTI. In terms of total days of catheterization, majority 53.3% (n=8) had a duration of 1 wk, 40% (n=6) were in 2 wks duration and the remaining 6.7% (n=1) had more than 2wks duration.

Among 15 females, in terms of diagnosis, majority 60% (n=9) belongs to the category of neuro. With regard to indications, most of them 66.7% (n=10) were catheterized for monitoring purpose. 40% (n=6) had a previous experience of catheterization. 13.3% (n=2) had a previous history of UTI. In terms of total day of catheterization, majority 46.7% (n=7) had a duration of 1 wk, 40% (n=6) were in 2 wks duration and the remaining 13.3% (n=2) had more than 2wks duration.

SECTION-B: CLINICAL SYMPTOMS AND URINE MICROSCOPIC FINDINGS OF THE SUBJECTS.

Table 3: Distribution of subjects according to their clinical symptoms in normal saline and betadine group at post test (after 5 days of catheter care):

S.No	Characteristics	Betadine group		Normal Saline group	
		No of samples (N=30)	Percentage (%)	No of Samples (N=30)	Percentage (%)
1.	Temperature				
	a. Up to 100 ⁰ F	25	83.33	21	70
	b. Above 100 ⁰ F	5	16.67	9	30
2.	Suprapubic tenderness				
	a. Present	5	16.67	3	10
	b. Absent	25	83.33	27	90
3.	Pus discharge				
	a. Present	2	6.67	2	6.67
	b. Absent	28	93.33	28	93.33
4.	Cloudy urine				
	a. Present	9	30	8	26.67
	b. Absent	21	70	22	73.33
5.	Bad odor urine				
	a. Present	6	20	3	10
	b. Absent	24	80	27	90

Table 4 describes the distribution of subjects according to their clinical symptoms of UTI at post test (after 5 days of catheter care).

In betadine group, out of 30 samples,16.67%(n=5) of them had temperature above 100 F,16.67% (n=5) had suprapubic tenderness,6.67%(n=2) had pus discharge,30%(n=9) had cloudy urine and 20%(n=6) had bad odour urine.

In normal saline group, out of 30 samples,30%(n=9) of them had temperature above 100 F,10% (n=3) had suprapubic tenderness,6.67%(n=2) had pus discharge,26.67%(n=8) had cloudy urine and 10%(n=3) had bad odour urine.

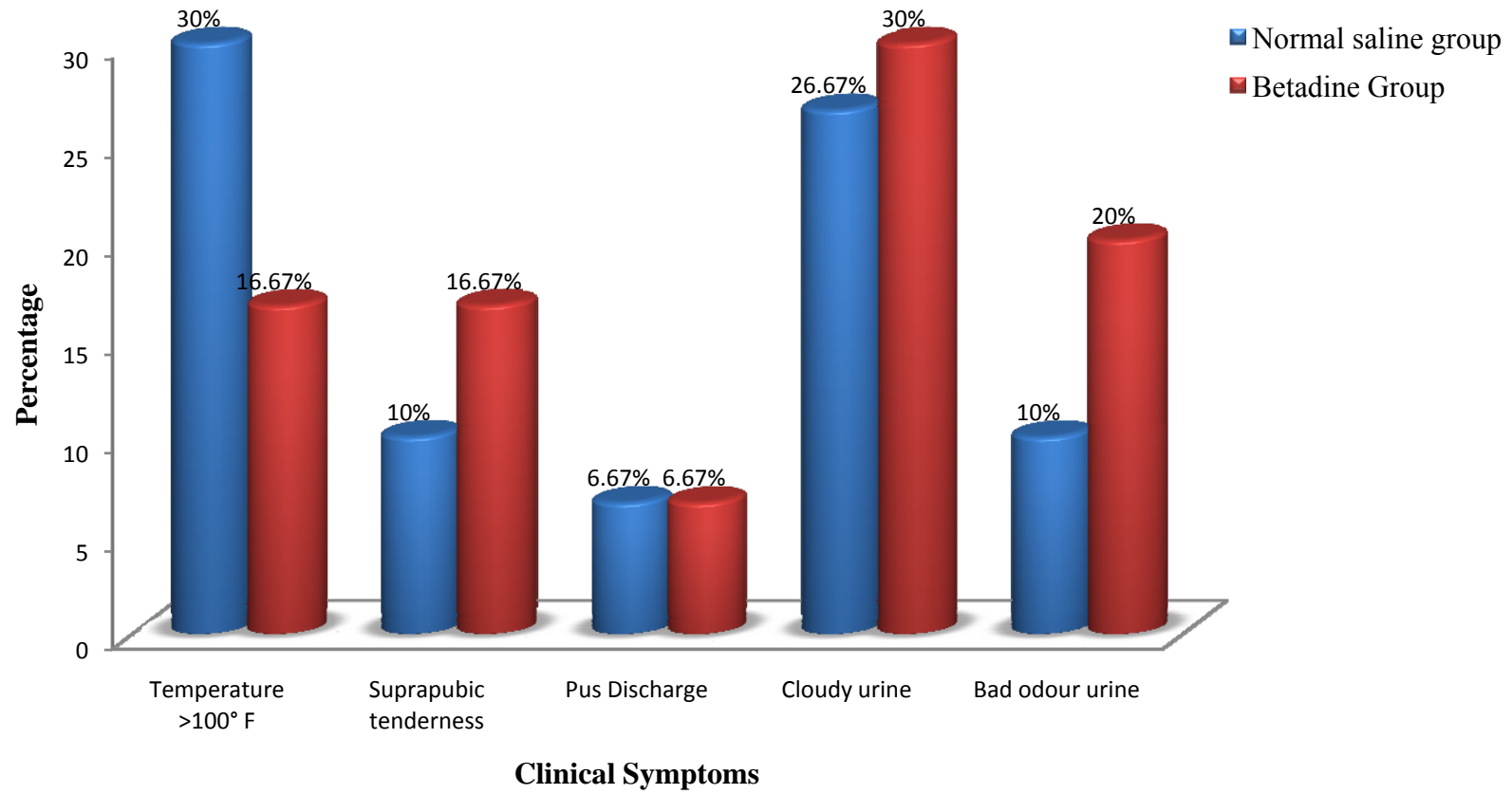


Figure-2: Distribution of subjects according to their clinical symptoms of normal saline and betadine groups.

Table 4: Distribution of subjects according to their urine microscopic findings in normal saline and betadine group at post test (after 5 days of catheter care):

S.No	Characteristics	Betadine Group		Normal Saline Group	
		No of samples (N=30)	Percentage (%)	No of samples (N=30)	Percentage (%)
1.	Pus cells a. Normal b. Abnormal	25 5	83.33 16.67	25 5	83.33 16.67
2	Epithelial cells a. Normal b. Abnormal	26 4	86.67 13.33	27 3	90 10
3	Bacteria a. Present b. Absent	5 25	16.67 83.33	3 27	10 90
4	Casts a. Normal b. Abnormal	24 6	80 20	25 5	83.33 16.67

Table 4 describes the distribution of subjects according to urine microscopic findings at post test.

In betadine group, out of 30 samples, 16.67 % (n=5) of them had pus cells in urine, 13.33% (n=4) had epithelial cells in urine, 16.67 % (n=5) had bacteria in urine and 20% (n=6) had cast cells.

In normal saline group, out of 30 samples, 16.67 % (n=5) of them had pus cells in urine, 10% (n=3) had epithelial cells in urine, 10% (n=3) had bacteria in urine and 16.67% (n=5) had cast cells.

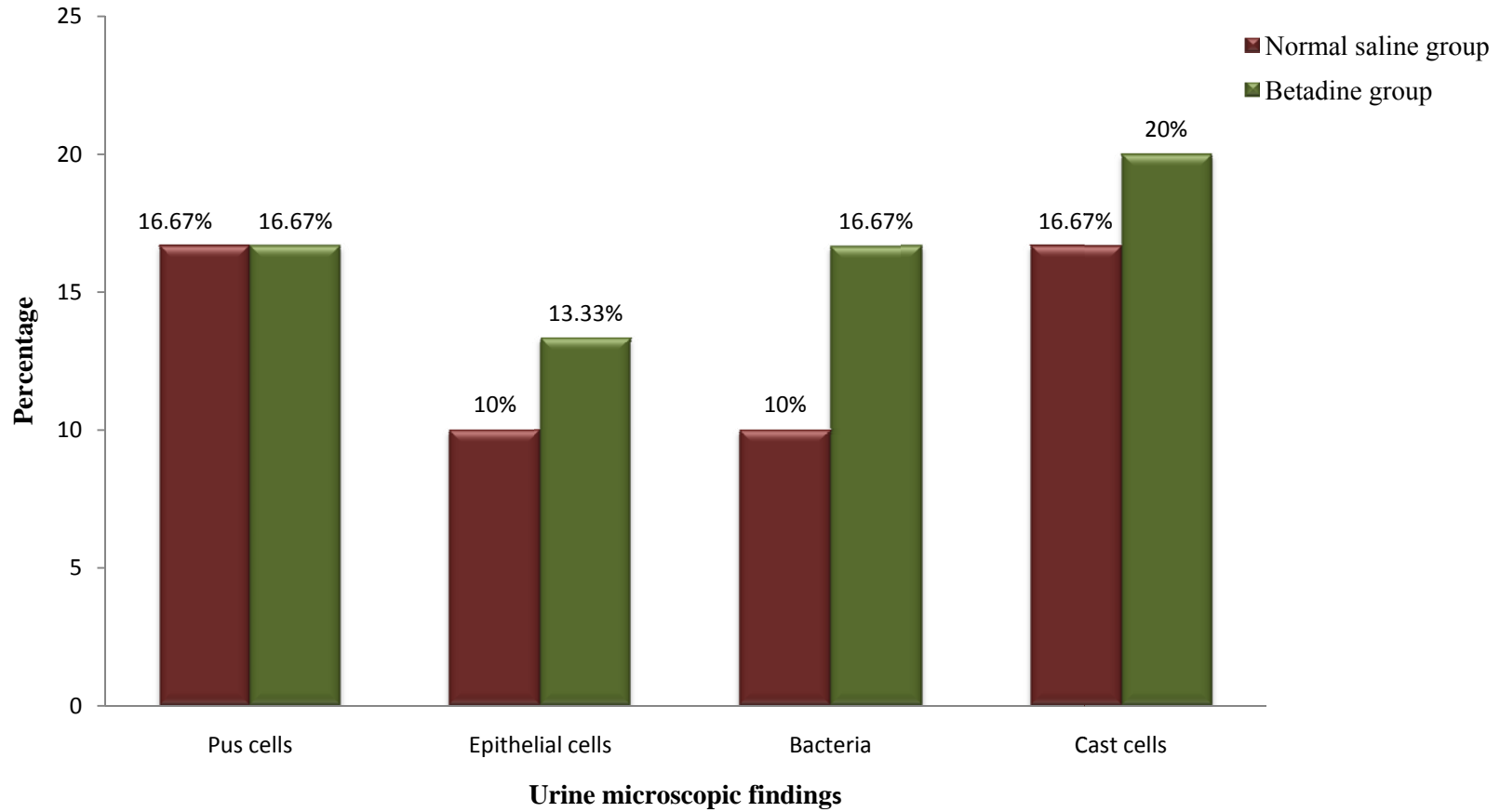


Figure 3: Distribution of subjects according to urine microscopic findings of normal saline and betadine groups.

SECTION – C: COMPARISON OF OCCURRENCE OF UTI BETWEEN NORMAL SALINE GROUP AND BETADINE GROUP:

Table 5) Comparison of urine culture results between normal saline and betadine groups:

Evidence of urinary tract infection	Betadine group		Normal saline group		Fisher exact <i>p</i> value
	No of samples	Percentage (%)	No of samples	Percentage (%)	
Colony count >10 ⁶	5	16.7	3	10	0.7065 (N.S)
No growth	25	83.3	27	90	

P<0.05

N.S: Non Significant

Table 5 depicts the comparison of occurrence of between normal saline and betadine groups according to the evidence of urinary tract infection. In betadine group 16.7% (n=5) and in normal saline group 10% (n=3) of subjects developed catheter associated urinary tract infection. The incidence of UTI was more in the betadine group when compared to the normal saline group.

The calculated fisher exact *p* value (0.7065) was less than the table value (1.85) at 0.05 level of significance. It shows that statistically there is no significant difference in the rate of UTI exists between betadine and normal saline groups.

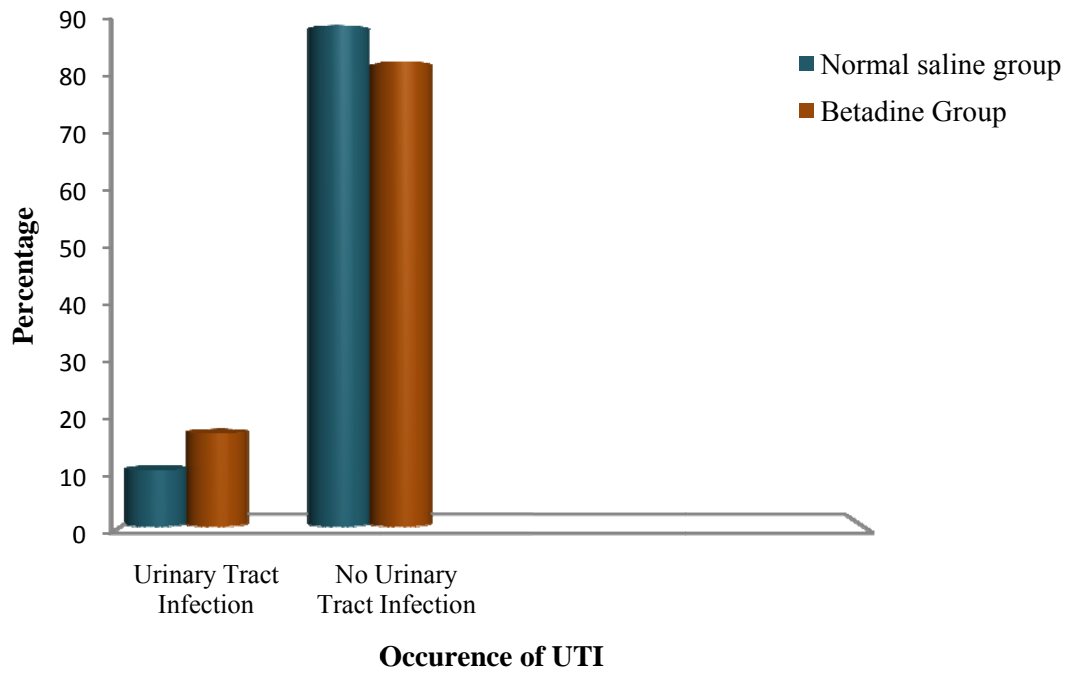


Figure 4: Comparison of occurrence of UTI between normal saline and betadine groups.

Table 6) According to the colony count of organisms grown in urine culture:

Colony count per ml	Betadine group		Normal saline group		Fisher exact p value
	No of samples	Percentage (%)	No of samples	Percentage (%)	
Above 50,000	2	6.67	1	3.33	1.000 (N.S)
Above 1,00,000	3	10	2	6.67	
No growth	25	83.3	27	90	

P<0.05

NS: Non Significant

Table 6 shows the comparison of colony count of organisms grown in urine culture between normal saline and betadine groups. Out of those subjects who developed urinary tract infection, majority 10% (n=3) from betadine group and 6.67% (n=2) from normal saline group demonstrated above 1, 00,000 colony count per ml.

The calculated fisher exact p value (1.000) was less than the table value (1.85) at 0.05 level of significance. It shows that statistically there is no significant difference exists in the colony count of organism between normal saline and betadine groups.

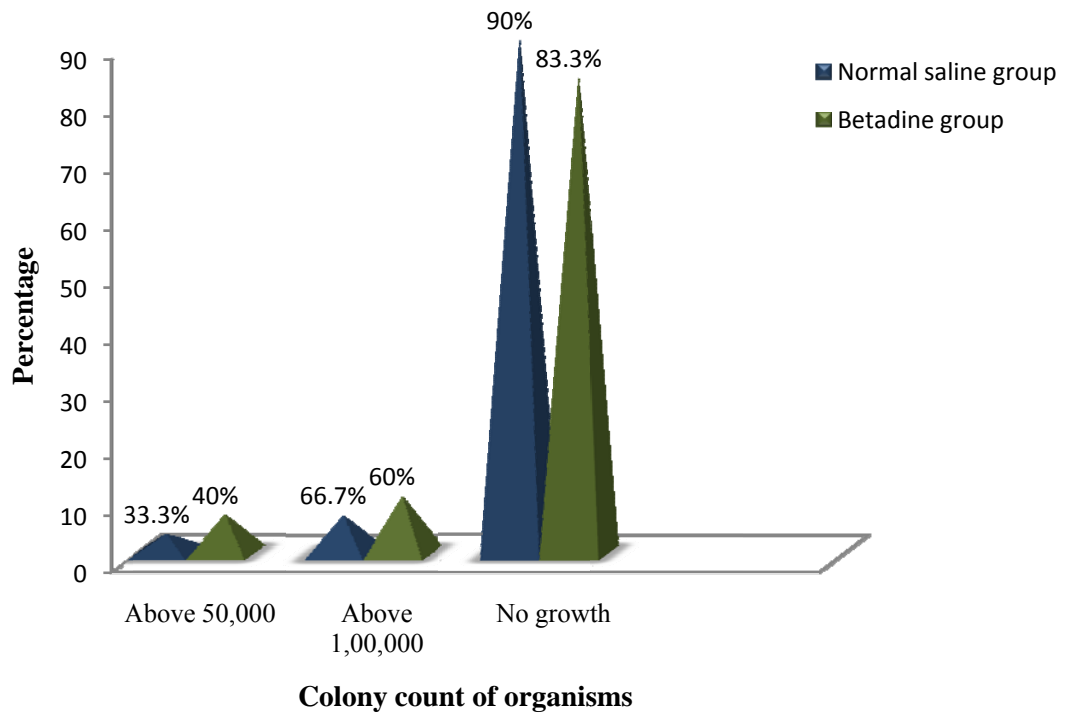


Figure 5: Comparison of colony count of organism between normal saline and betadine groups.

Table 7) Urinary tract infection among the male and female subjects based on urine culture results:

Evidence of urinary tract infection	Males				Females			
	Betadine group		Normal saline group		Betadine group		Normal saline group	
	No	(%)	No	(%)	No	(%)	No	(%)
Colonycount $>10^6$	3	20	1	6.7	2	13.3	2	13.3
No growth	12	80	14	93.3	13	86.7	13	86.7

Table 7 depicts the comparison of occurrence of UTI between males and females in both normal saline and betadine groups according to the evidence of urinary tract infection. Among 30 males, 20% (n=3) in betadine group and 6.7% (n=1) in normal saline group developed urinary tract infection. Among 30 females, in both the groups 2 subjects had developed UTI. Normal saline and betadine are equally effective in prevention of UTI.

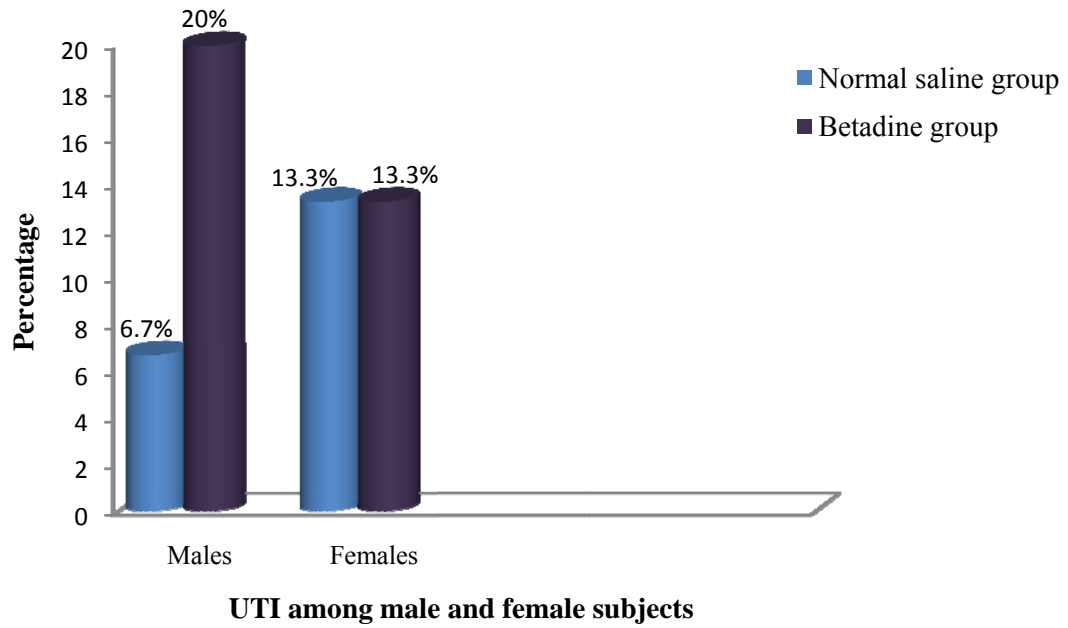


Figure 6: Comparison of occurrence of UTI between males and females in both normal saline and betadine groups.

Table 8) Comparison of type of organisms grown in urine culture between betadine and normal saline group:

Type of organisms	Betadine group		Normal saline Group		Total	
	No of samples	Percent age (%)	No of samples	Percent age (%)	No of samples	Percent age (%)
E.Coli	1	3.33	1	3.33	2	6.67
Klebseilla	2	6.67	1	3.33	3	10
Candida species	1	3.33	0	0	1	3.33
Enterococcus	1	3.33	1	3.33	2	6.67
No growth	25	83.33	27	90	22	73.33

Table 8 represents the comparison of type of organisms grown in urine culture between normal saline and betadine groups. Among 8 subjects developed urinary tract infection, about 6.67% (n=2) had growth of E.Coli organism in urine culture. 10 % (n=3) of subjects had Klebseilla, 3.33% (n=1) had Candida species and 6.67% (n=2) had Enterococcus growth in urine culture.

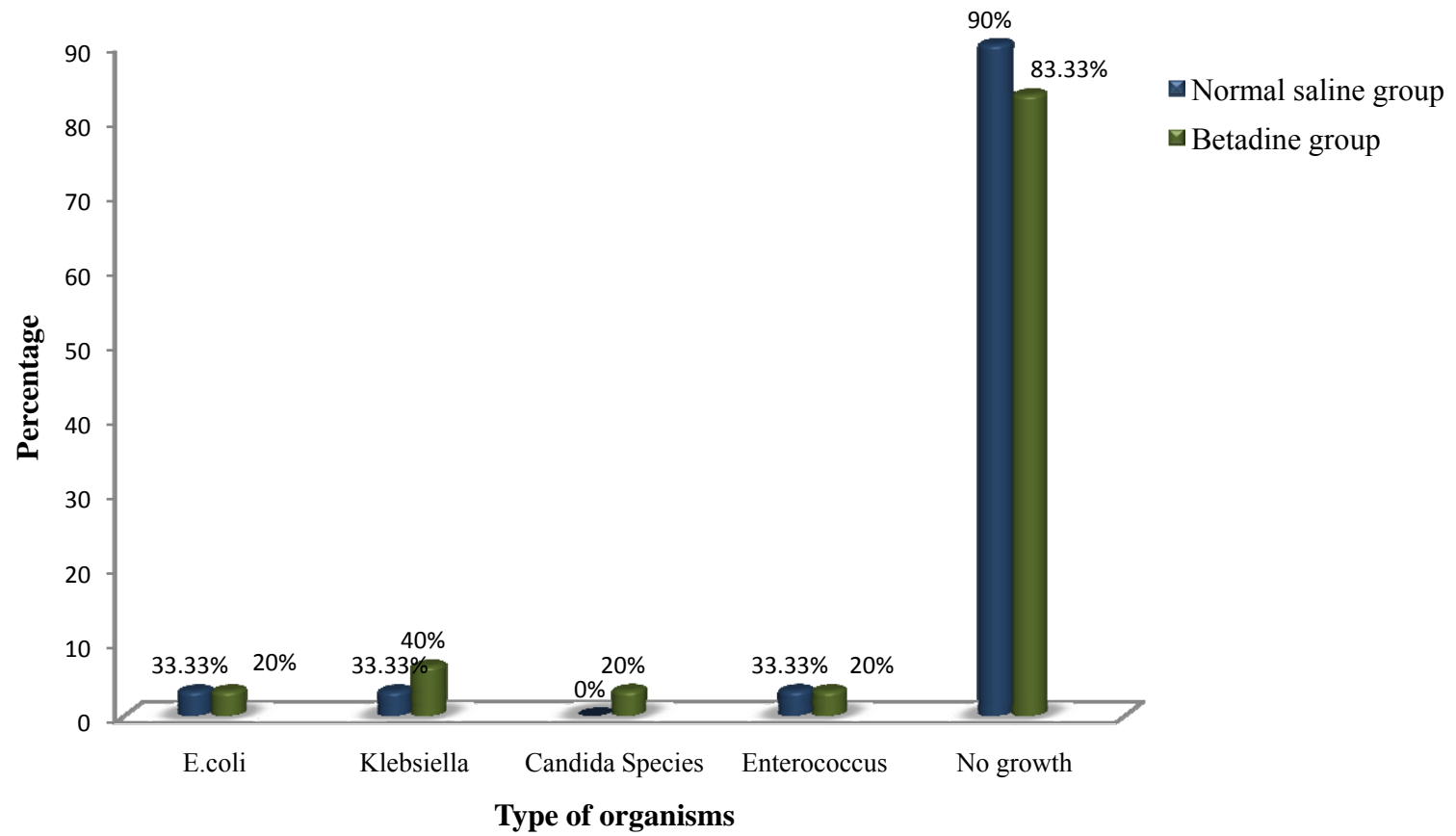


Figure 7: Comparison of type of organisms grown in urine culture between normal saline and betadine groups.

CHAPTER – V

DISCUSSION, SUMMARY, CONCLUSION, IMPLICATIONS, LIMITATIONS AND RECOMMENDATIONS

The present study was designed to assess the effectiveness of Betadine Vs. Normal Saline for catheter care in reducing the occurrence of Urinary Tract Infection among patients with indwelling catheter in KMCH, Coimbatore. The researcher carried out the study on 60 subjects and adopted randomized block design. 30 males and 30 females were selected, 15 males and 15 females in betadine group and other 15 males and 15 females in normal saline group. The researcher implemented the study to assess whether there is reduction in the occurrence of urinary tract infection after using betadine or normal saline for urinary catheter care.

DISCUSSION:

1) Demographic information:

In normal saline group, out of 15 males, majority 7 (46.7%) were belonging to the age group 41-60yrs, 9 subjects (60%) were married and 13 subjects (86.67%) belong to the Hindu religion. Out of 15 females in the normal saline group, majority 8 (53.3%) were belonging to the age group 41-60yrs, 13 (86.7%) were married and all of them belong to Hindu religion.

Similarly in betadine group, out of 15 males, majority 10 (66.7%) were belonging to the age group 41-60yrs, 13 subjects (86.6%) were married and all of them belong to the Hindu religion and among 15 females, majority 9 (60%) were belonging to the age group 41-60yrs, all of them were married and belong to the Hindu religion.

2) Clinical profile:

The relevant clinical variables like diagnosis, indication for catheterization, previous experience of catheterization, previous history of Urinary Tract Infection, reason for catheter removal and total days of catheter were collected.

In normal saline group, Out of 15 males, most of them 10 (66.7%) were diagnosed to have neurological problems, 13 (86.7%) were catheterized for monitoring purpose, 4 (26.7%) had a previous experience of catheterization, 5 (33.3%) had a previous history of urinary tract infection and for 8 subjects (53.3%) the total days of catheter used was 1 week.

Whereas in females most of the subjects 9(60%) were diagnosed to have neurological disorders, 10 (66.7%) were catheterized for monitoring purpose, 6(40%) had a previous experience of catheterization, 2(13.3%) had a previous history of Urinary Tract Infection and for 7 (46.7%) the total days of catheter used was 1 week.

In betadine group, out of 15 males, most of them 11(73.3%) were diagnosed to have neurological disorders, 14 (93.3%) were catheterized for monitoring purpose, 7(46.7%) had a previous experience of catheterization, 3(20%) had a previous history of urinary tract infection and for 8 subjects (53.3%) the total days of catheter used was 2week.

However females, Out of 15, most of the subjects 7(46.7%) were diagnosed to have neurological disorders, 13 (86.7%) were catheterized for monitoring purpose, 4(26.7%) had a previous experience of catheterization, 3(20%) had a previous history of Urinary Tract Infection and for 9 subjects (60%) the total days of catheter used was 2 weeks.

3) The first objective was to assess the occurrence of UTI among patients receiving catheter care with Normal Saline.

While assessing the clinical symptoms of UTI in normal saline group, out of 30 samples,30%(n=9) of them had temperature raise above 100⁰ F,10% (n=3) had suprapubic tenderness,6.67%(n=2) had pus discharge, around 26.67%(n=8) had cloudy urine and 10%(n=3) had bad odour urine.

Regarding the urine microscopic findings, In normal saline group, out of 30 samples,16.67%(n=5) of them had pus cells in urine,10% (n=3) had epithelial cells in urine, around 10%(n=3) had bacteria in urine and 16.67%(n=5) had cast cells.

Findings indicate that out of 30 samples in the normal saline group, 3 subjects (10%) acquired urinary tract infection: two of them were females and the remaining one was a male. It clearly shows that the occurrence of urinary tract infection in the normal saline group was more in the females when compared to males.

A similar finding of increased occurrence was demonstrated by Hussain.et al., (1996). In their prospective study that the risk factors such as gender, increasing age and general debilitation are associated with UTIs. 436 elderly patients were selected. Among them, 113 subjects acquired nosocomial infection. The study concludes that females are at increased risk of acquiring UTIs due

to the relative ease with which bacteria colonizing the perineum can reach the urethra and in common with other HAIs. Hussain.et al finding is consistent with the present study.

4) To estimate the occurrence of UTI among patients receiving catheter care with betadine.

While assessing the clinical symptoms of UTI in betadine group, out of 30 samples, 16.67%(n=5) of them had temperature raise above 100⁰F,16.67% (n=5) had suprapubic tenderness,6.67%(n=2) had pus discharge, around 30%(n=9) had cloudy urine and 20%(n=6) had bad odour urine.

Regarding the urine microscopic findings, In betadine group, out of 30 samples, 16.67%(n=5) of them had pus cells in urine,13.33% (n=4) had epithelial cells in urine, around 16.67%(n=5) had bacteria in urine and 20%(n=6) had cast cells.

According to the urine culture report, out of 30 samples in the betadine group, 5 subjects (16.7%) acquired urinary tract infection: three of them were males and the remaining two were females. It clearly shows that the betadine also effective in reduction of CAUTI.

5) To compare the rates of UTI among patients who received catheter care with normal saline and those who received catheter care with betadine.

While comparing the rates of UTI between normal saline and betadine groups, the rate of occurrence was more in the betadine group when compared with normal saline group i.e three of the subjects in normal saline group and five in betadine group acquired urinary tract infection. It shows that clinically there is a significant difference in reduction of UTI exists between betadine and normal saline group but The calculated fisher exact p value (0.7065) was less than the table value (1.85) at 0.05 level of significance. It shows that statistically there is no significant difference in the rate of UTI exists between betadine and normal saline groups.

According to the colony count, majority 10% (n=3) from betadine group and 6.67% (n=2) from normal saline group demonstrated above 1, 00,000 colony count per ml. It shows that the amount of organisms grown in normal saline group was significantly reduced than in the betadine group. The calculated fisher exact p value (1.000) was less than the table value (1.85) at 0.05 level of significance. It shows that statistically there is no significant difference exists in the colony count of organism between normal saline and betadine groups.

Among 30 males, 20% (n=3) in betadine group and 6.7% (n=1) in normal saline group developed urinary tract infection. Among 30 females, in both the groups 2 subjects had developed UTI. Normal saline and betadine are equally effective in prevention of UTI among males and females.

Regarding the type of organisms, among 5 UTI samples in betadine group, 2(6.67%) had growth of Klebsiella and the remaining 3(10%) were equally shared by the growth of E.coli(3.33%),Candida species(3.33%) and Enterococcus(3.33%) while in normal saline group, all the 3 subjects were equally shared by the growth of E.coli(3.33%),Klebsiella(3.33)and Enterococcus(3.33%). There is no candida growth in normal saline group.

All these findings show that clinically there is a significant difference exists between the effectiveness of Betadine solution and Normal Saline in reduction of symptomatic Urinary Tract Infection but statistically there is no significant difference exist between both groups.

SUMMARY:

This study was conducted to assess the effectiveness of Betadine Vs. Normal Saline for catheter care in reducing the occurrence of Urinary Tract Infection among patients with indwelling catheter in KMCH, Coimbatore.

The objectives of the study were to,

1. assess the occurrence of UTI among patients receiving catheter care with Normal Saline.
2. estimate the occurrence of UTI among patients receiving catheter care with Betadine.
3. compare the rates of UTI among patients who received catheter care with Normal Saline and those who received catheter care with Betadine.

Related literatures were retrieved from various sources to design the methodology, to formulate the tool & to carry out the study. Ernestine Widenbach's Helping art of clinical nursing theory (1970) was framed to conceptualize the study. The investigator adopted the randomized block design for conducting this study

Hypothesis set for the study was that, there is no significant difference between the effectiveness of Betadine solution and Normal Saline in reduction of symptomatic Urinary Tract Infection.

Pilot study was conducted for a period of one week prior to actual study to assess the feasibility. Non probability purposive sampling technique was adopted to select the samples. Data was collected among 60 subjects out of that, 30 samples belong to normal saline and betadine group each. Equal number of males and females were included in both normal saline and betadine group. The tool consists of four sections & it includes demographic profile, clinical profile, UTI clinical checklist & urine microbiological analysis. Demographic variables and the outcome results were analyzed by both descriptive and inferential statistics.

MAJOR FINDINGS OF THE STUDY:

- œ Out of 30 samples in normal saline group, 3 subjects (10%) acquired urinary tract infection. It includes 2 females and 1 male.
- œ Among 30 samples in betadine group, 5 subjects (16.7%) acquired urinary tract infection. It includes 2 females and 3 males.
- œ The rate of occurrence of UTI was less in the normal saline group when compared with betadine group. It shows that clinically there is a significant difference exist between normal saline and betadine groups in reduction of UTI.
- œ In the urine culture of normal saline group, all the 3 subjects were equally shared by the growth of E.coli(3.33%),Klebseilla(3.33%) and Enterococcus(3.33%)
- œ In the urine culture of betadine group, 2(6.67%) had growth of Klebseilla and the remaining 3(60%) were equally shared by the growth of E.coli(3.33%),Candida species(3.33%) and Enterococcus(3.33%)
- œ Out of 8 subjects who developed UTI in both groups, majority 37.5% (n=3) from betadine group and 25% (n=2) from normal saline group demonstrated above 1, 00,000 colony count per ml.
- œ The F-test value of the rate of occurrence of UTI between normal saline and betadine groups were less than the table value at 0.05 level of significance. It shows statistically there is no difference exists between normal saline and betadine groups.

CONCLUSION:

The study results showed that both normal saline and betadine solutions were effective in reducing the occurrence of catheter associated urinary tract infection. Clinically there is a significant reduction in the rate of UTI in normal saline group but statistically there is no significant difference between the Betadine solution and Normal Saline in reduction of Urinary Tract Infection. Normal saline can be recommended for urinary catheter care in clinical practice which helps for evidence based practice as well as cost effective. This study findings agree with various other similar studies conducted.

IMPLICATIONS :

The present study has its own implications in nursing practice, nursing education, nursing research and nursing administration.

Nursing practice:

- UTI is the most common nosocomial infection occurring in critical care settings.this study implies the effectiveness of normal saline in reducing the UTI.
- The study creates awareness among the nursing personal about the importance of proper catheter care to reduce the infection.
- The present study shows that usage of normal saline instead of betadine for catheter care which is cost effective.
- Urinary catheter care is not just cleaning the perineum & the catheter but also it includes various techniques like hand washing, technique for securing the catheter & technique for caring the tubings and urinary bag.

Nursing education:

- The nurse educator can create awareness among nurses & other health care professionals about the importance of urinary catheter care.
- The nurse educator can arrange in-service education programme to update their knowledge regarding the new techniques and modalities while giving urinary catheter care.
- The nurse educator can teach the students about present study findings and its implication while demonstrating urinary catheter care procedure.
- The nurse educator can motivate the nursing personnel & students to use normal saline for urinary catheter care instead of betadine

Nursing administration:

- Nurse administrator can plan & organize seminars, workshops & conferences about “Prevention of Nosocomial infections in critical care settings” to health care professionals.
- Nurse administrator should allocate appropriate resources for further similar studies.
- Nurse administrator can formulate protocol to incorporate the study findings in nursing intervention.
- This study has its own contribution to quality control & infection control programmes.

Nursing research:

- This study provides a basis for further studies.
- This study favors for updating the knowledge & proper utilization of resources in the field of nursing practice.
- This study favors to practice evidence based practice.

LIMITATIONS:

- ∞ The study was limited to small sample of 30.
- ∞ The study was limited to single settings.

RECOMMENDATIONS:

- A similar study can be conducted with large number of samples.
- A study can be conducted at different settings.
- A comparative study can be conducted to assess the effect of betadine Vs chlorhexidine solution for catheter care in reducing the occurrence of urinary tract infection.
- A study can be conducted to assess the incidence rate of nosocomial infections among patients who admitted in ICU.
- A comparative study can be conducted to assess the effect of betadine Vs soap & water solution for catheter care in reducing the occurrence of urinary tract infection.

ABSTRACT

The present study was to assess the effectiveness of Betadine Vs. Normal Saline for catheter care in reducing the occurrence of Urinary Tract Infection among patients with indwelling catheter in KMCH, Coimbatore. This study was undertaken during the year 2011-2012, in partial fulfillment of requirement for the degree of Master of Science in Nursing at KMCH College of Nursing, Coimbatore, which is affiliated to the Tamilnadu Dr.M.G.R. Medical University, Chennai.

Objective : To assess the occurrence of UTI among patients receiving catheter care with Normal Saline, to estimate the occurrence of UTI among patients receiving catheter care with Betadine & to compare the rates of UTI among patients who received catheter care with Normal Saline and those who received catheter care with Betadine. **Design:** Randomized Block design, a specific type of 2x2 factorial design. **Setting:** Intensive Care Unit, Kovai Medical Center and Hospital, Coimbatore. **Sample:** 60 subjects who were catheterized, 30 subjects for normal saline group (15 males and 15 females) and 30 subjects for Betadine group (10 males and 10 females). **Sampling technique:** Non probability purposive sampling technique. **Conceptual framework:** Ernestine Widenbach's Helping Art of Clinical Nursing Theory (1970) was framed. **Intervention:** The KMCH catheter protocol was followed for catheter care except for altering the solution. The catheter care was given till the day of removal of catheter and after two days clinical symptoms of UTI was assessed and if it is presents urine specimen was obtained for urine culture and microscopic analysis by the investigator. **Outcome measures:** UTI clinical symptoms assessment checklist, urine microscopic analysis and urine culture report were analyzed. **Results:** Clinically there was a significant difference in the rate of Urinary Tract Infection between the normal saline & betadine groups but statistically it's not proven. **Conclusion:** This study supported that the usage of normal saline was not inferior to betadine for catheter care. Hence the normal saline solution can be recommended in clinical practice, to reduce the incidence of Urinary Tract Infection, which is cost effective.

REFERENCES

BOOKS

- 1) Arnow,D. (1992). Nursing procedures-student version. (1st ed). USA: Springhouse.
- 2) Augustine,A., Augustine,J., & Chacko,A. (2004). Clinical nursing procedure manual. 1st ed., New Delhi:BI Publishers.
- 3) Black,M.A. (1994). Textbook of Medical Surgical Nursing. (2nd ed.).Philadelphia: Springhouse corporation.
- 4) Brenda,G.B & Suzanne,C.S. (1996). Textbook of Medical-Surgical Nursing. (8th ed). Philadelphia: Lippincott Williams & wilkins.
- 5) Burns,N., & Groves,S.K. (1999). Understanding nursing research. (2nd ed).Philadelphia: WB. Saunders Company.
- 6) Charney,W. (1999). Handbook of modern hospital safety. (1st ed). London: Lewis publishers.
- 7) Christensen,B.L., & Kockrow,E.O. (2006). Foundations of nursing. (5th ed). Missouri: Mosby Elsevier publishers.
- 8) Corpe,W.(2000). Microbial surface components involved in adsorption of micro organisms onto surfaces.(1st ed.). New York: John wiley & Sons.
- 9) Craven,R.F., & Hirnle,C.J. (2009). Fundamentals of nursing. (6th ed). Philadelphia: Wolkers Kluwer publishers.
- 10) Daniels,R. (2004). Nursing fundamentals – caring and clinical decision making. (11th ed),. Australia: Thomson publishers.
- 11) Dougherty,L., & Lister,S.E. (2004). The Royal Marsden hospital manual of clinical nursing procedures. (6th ed). Australia:Blackwel publishers.
- 12) Geroge,J.B. (2002). Nursing Theories – The base for professional nursing practice. (5th ed). New Jersey: Prentice Hall publishers.
- 13) Gupta,S.P. (2007)Statistical methods. (35th ed). New Delhi: Sultan Chand & Sons Publishers.
- 14) Harkreader,H., Hogan,M.A., & Thobaben,M. (2007). Fundamentals of nursing – caring and clinical judgement. (3rd ed). Canada: Elsevier publishers.
- 15) Kothari,C.R. (1990). Research methodology. (1st ed). New Delhi: NR Publishers.
- 16) Koziar,B., Erb,G., Berman,A., & Burke, K. (2007). Fundamentals of nursing – concepts process and practice. (7th ed).New Delhi:Dorling Kindersley publishers.

- 17) Kunnin, C.M., (2000). Care of the Urinary Catheter. UTIs: Detection, Prevention and Management. (2nd ed.). Baltimore: Williams & Wilkins.
- 18) Marini, J.J., & Wheeler, A.P. (1997). Critical care medicine- The essentials. (2nd ed). Baltimore: Williams & Wilkins – A Waverly company.
- 19) Mayhall, C.G. (2004) Hospital epidemiology. (3rd ed). Philadelphia: Lippincott Williams & Wilkins – A Wolters Kluwer company.
- 20) Munro, B.H. (1999) Nursing research – principles & methods. (6th ed). Philadelphia: Lippincott Publishers.
- 21) Natesan, S., & Jacob, S. (1999). Manual on nursing principles and practice. (1st ed). India: Omayal Achi College of Nursing publishers.
- 22) Polit, D.F., & Hungler, B.P. (1999) .Nursing research – principles and methods. (6th ed). New Jersey: Pearson Prentice Hall Publishers.
- 23) Potter, P.A., & Perry, A.G. (2007). Basic nursing – essentials for practice. (10th ed). Missouri: Mosby publishers.
- 24) Rosdahl, C.B., & Kowalski, M.T. (2008). Textbook of basic nursing. (9th ed). Philadelphia: Lippincott publishers.
- 25) Salgado, C.D., Karchmer, T.B & Farr, B.M. (2003). Prevention and Control of Nosocomial Infections. (1st ed.). Philadelphia: Lippincott Williams & Wilkins.
- 26) Sharon, B. (2000). Nursing procedure. (4th ed). Philadelphia: Lippincott Publishers.
- 27) Nancy., & Ivan. (2007). Stephanie's principles and practice of nursing – nursing arts procedures. (6th ed). Indore: N.R. Brothers publications.
- 28) Taylor, C.R., & Lillies. (2008). Fundamental of nursing – the art and science of nursing care. (6th ed). New Delhi: Wolters Kluwer publishers.
- 29) Tomey, A.M., & Aligood, M.R. (2002). Nursing theorists and their work. (5th ed). Philadelphia: Mosby publishers.
- 30) Udwardia, F.E. (2007). Principles of critical care. (2nd ed). New Delhi: Oxford University publishers.
- 31) White, L. (2002). Basic nursing – foundations of skills and concepts. (1st ed). Australia: Delmar publishers.
- 32) Wilson, H.S. (2004). Introduction to nursing research. (2nd ed). California: Addison Wesley Nursing Publishers.

JOURNALS

- 33) Al-Farsi,S., Olivia,M., Davidson,R., Richardson,S.E & Ratnapalan,S. (2009). Periurethral cleaning prior to urinary catheterization; sterile water versus 10% povidone-iodine. *Journal of Medicine*, 48(6): 656-660.
- 34) Barford,J. (2009). The pathogenesis of catheter associated urinary tract infection. *Journal of Infection Prevention*, 10(2): 50-56.
- 35) Bryon, C.S & Reynolds,K.L. (2004). Hospital acquired bacteraemic urinary infection; *Epidemiology & outcome. Journal of Urology*, 132 : 494-498.
- 36) Burke,J.P.,Garibaldi,R.A.,Britt,M.R.,Jacobson,J & Conti,M.(2001). Prevention of catheter associated UTIs. *Journal of Medicine*,70(3):655-658.
- 37) Conterno,L.,Lobo,J.A & Masson,W. (2011). Excessive use of urinary catheters among hospitalized patients. *Journal of urology*,45(5): 1089-96.
- 38) Crouzet,J.,Bertrand,X.,Venier,A.G.,Badoz,M.,Hussan,C & Talan,D. (2007). Control of the duration of urinary catheterization impact on CAUTI. *Journal of Hospital Infections*,63(3):253-257.
- 39) Deron,C., Janathan,R., Arjun Srinivasan., Scott,K & Carolyn,V. (2011). Trends in catheter Associated Urinary Tract Infections in adult intensive care units. *Infection Control & Epidemiology*, 32(8): 748-756.
- 40) Foxman,B. (2002). Epidemiology of UTI; Incidence, Morbidity & Economic costs. *American Journal of Medicine*, 113(1A): 55-135.
- 41) Garibaldi,R.A. ,Burke,J.P., Dickmann,M.L & Smith,C.B. (1994). Factors predisposing to bacteriuria during indwelling urethral catheterization. *New England Journal of Medicine*, 291: 213-219.
- 42) Gokula,R.R., Hickner,J.A & Smith,M.A. (2004). Inappropriate use of urinary catheters in elderly patients. *American Journal of Infection Control*, 32(4):196-199.
- 43) Gould,C.V.,Umschild, C.A., Agarwal, R.K.,et al. (2010). Guideline for prevention of catheter associated urinary tract infections. *Infection Control & Hospital Epidemiology*, 31: 319.
- 44) Haley,R.W., Hooton,T.M & Culver,D.H. (2004). Nosocomial infections in U.S. Hospitals. *American Journal of Medicine*, 70:947-959.
- 45) Hazelett, S.E.(2004). The association between indwelling urinary catheter use in the elderly and urinary tract infection in acute care. *Biomedical Central Geriatrics*, 6:15.

- 46) Hussain, M., Oppenheim, P., Neill, C et al. (1996). Prospective survey of the incidence, risk factors & outcome of hospital acquired infections in the elderly. *Journal of Hospital Infection*, 32:117-126.
- 47) Ihnsook Jeong., Soonmi. P., Jae. S. J., Duck. S. K & Young. S. C. (2010). Comparison of catheter associated urinary tract infection rates by perineal care agents in ICUs. *Asian Nursing Research*, 4(3):142-150.
- 48) Jacobson, J. A., Alling, D. W. (2003). Evaluation of daily meatal care with poly-antibiotic ointment in prevention of urinary catheter-associated bacteriuria. *Journal of Urology*, 129:331-334.
- 49) Jacobson, S. M., Stickler, D. J., Mobley, H & Shirliff, M. E. (2008). Complicated Catheter Associated UTIs due to E. coli & Proteus mirabilis. *American Journal of Infection Control*, 21(1):26-59.
- 50) Jain, P., Parada, J. P., David, A & Smith, L. (1995). Overuse of the indwelling urinary catheters in hospitalized medical patients. *Archives of Internal Medicine*, 155 : 1425-1429.
- 51) Ken, B., Kay, C., James, F., Susan, M & Yuying chen. (2006). Evaluation of 3 methods of Bladder Irrigation to Treat Bacteriuria in Persons With Neurogenic Bladder. *Journal of Spinal cord Medicine*, 29(3):217-226.
- 52) Kucheria, R. P., Dasgupta, S. H., Sacks., Khan, M. S., Sheerin, N. S. (2005). UTIs; new insights into a common problem. *Journal of Medicine*, 81:83-86.
- 53) Langley, J. M., Hanakowski, M & Leblanc, J. C. (2001). Unique epidemiology of nosocomial urinary tract infection. *American Journal of Infection Control*, 121:159-167.
- 54) Liedberg, H. (1989). Catheter induced urethral inflammatory reaction & UTI; an experimental & clinical study. *Scandinavian Journal of Urology & Nephrology Supplementation*, 124:1- 43.
- 55) Loeb, M., Hunt, D., Halloran, K., Carusone, S. C., Dafoe, N & Walter, S. D. (2008). Stop orders to reduce inappropriate urinary catheterization in hospitalized patients. *Journal of General Internal Medicine*, 23(6):816-820.
- 56) Manjunath, G. N., Prakash, R., Vamseedhar annam & Kiran shetty. (2011). Changing trends in the spectrum of antimicrobial drug resistant pattern of uropathogens. *International Journal of Biology and Medical Research*, 2(2):504-507.
- 57) Matsumoto, T., Sakumoto, M., Takahashi, K & Kumazawa, J. (1997). Prevention of catheter associated UTI by meatal disinfection. *Journal of urology*, 195(2): 73-77.
- 58) Mead, M. G & Gruneberg. (1978). Prevalence of UTI. *British Journal of Diseases*, 54:274-277.

- 59) Munasinghe,R.L., Yazdani,H., Siddique,M & Hafeez,W. (2003). Appropriateness of use of indwelling urinary catheters in patients admitted to the medical service. *Infection Control & Hospital Epidemiology*, 22(10):647-649.
- 60) Nicolle, L.E., Strausbaugh, L.J & Garibaldi, R.A. (1996). Infections and antibiotic resistance in nursing homes. *Clinical Microbiological Review*, 9:1–17.
- 61) Nicolle, L. E.,(2005). Infectious Diseases Society of America Guidelines for the Diagnosis and Treatment of Asymptomatic Bacteriuria in Adult. *Clinical Infectious Diseases*, 40:643-654.
- 62) Nirmanmoh.B.,Mradul, K.D & Sandeep.G.(2010). Urinary catheterization in medical wards. *Journal of global infectious diseases*,2: 83-90.
- 63) O'Mahony,D. (1999). Antimicrobial Sensitives and causative organisms of UTIs. *South African Academy of Family Practice*,20 (1):54-58.
- 64) Ouslander,J.G., Greengold,B & Chen,S.(1997). Complications of chronic indwelling urinary catheters; A prospective study. *Journal of Urology*,138: 1191-1195.
- 65) Pappas, P.G., Kauffman, C.A., Andes, D., et al.(2009). Clinical practice guidelines for the management of candidiasis: Update by the Infectious Diseases Society of America. *Clinical Infectious Disease* , 48:503–535.
- 66) Paul, A., Tambyah & Dennis,G. (2000). Catheter associated urinary tract infection is rarely symptomatic. *Archives of Internal Medicine*, 160(5): 678-682.
- 67) Pratt,R.J. (2002). National evidence based guidelines for preventing Health care Associated UTIs. *Infection Control Hospital Epidemiology*, 23(4):27-31.
- 68) Platt,R., Plok,B.F., Murdock,B & Rosner,B. (1992). Mortality associated with nosocomial urinary tract infection. *New England Journal of Medicine*, 307(11): 637-642.
- 69) Plowman et al. (1999). Epidemiology of health care associated UTIs. *Catheter associated urinary tract infection surveillance*, 132: 494-498.
- 70) Saint,S. (2000). Clinical & Economic consequences of nosocomial catheter related bacteriuria. *American Journal of Infection Control*, 28:68-75.
- 71) Saint,S., Kaufman,S.R., Thompson,M., et al.(2005). A Reminder Reduces Urinary Catheterization in Hospitalized Patients. *Journal on Quality and Patient Safety*, 31(8): 455-462.
- 72) Schaberg, D.R., Haley, R.W & Highsmith,A.K. (1980). Nosocomial bacteriuria: A prospective study of case clustering & antimicrobial resistance. *Annals Internal Medicine*,93: 420-424.

- 73) Sedor, J & Mulholland, S.G. (2007). Hospital acquired UTI associated with the indwelling catheters. *The urologic clinics of North America*, 26(4): 821-828.
- 74) Shapiro, M., Simchen, E., Izraeli, S & Sacks, T.G. (2004). A multivariate analysis of risk factors for acquiring bacteruria in patients with indwelling catheters for longer than 24 hours. *Infection Control Journal*, 5:525-532.
- 75) Shin, J.S & Sohng, K.Y. (2008). Effects of Meatal care in reduction of catheter-associated urinary tract infection for elderly patients in the ICU. *Korean Academic Fundamental Nursing Journal*, 15(4):449-456.
- 76) Siegel, J.D., Rhineheart, E., Jackson, M & Linda, C. (2006). Management of multidrug-resistant organisms in healthcare settings, *Healthcare Infection Control Practices Advisory Committee*. Retrieved from <http://www.cdc.gov>.
- 77) Smith, P.W et al. (2008). SHEA/ APIC Guideline; Infection prevention & control in the long term care facility. *American Journal of Infection Control*, 36(7):504-535.
- 78) Stephan, F., Sax, H & Waschsmuth, M. (2006). Reduction of Urinary Tract Infection and Antibiotic Use after Surgery: A Controlled, Prospective, Before-After Intervention Study. *Clinical Infectious Diseases*, 42:1544-1551.
- 79) Thomsen, T.W & Setnik, G.S. (2011). Male catheterization. *New England Journal of Medicine*, 354(21): 22.
- 80) Vartvarian, S.E., Papadakas, K.A & Anaissie, E.J. (1996). *Stenotrophomonas maltophilia* urinary tract infections: A disease that is usually severe & complicated. *Archives of Internal Medicine*, 156: 433-435.
- 81) Warren, J.W. (2001). Catheter associated UTI. *International journal of antimicrobial agents*, 17:299-303.
- 82) Zalmanovici, T. A., Green, H., Paul, M., Yaphe, J & Leibovici, L. (2010). Antimicrobial agents for treating uncomplicated urinary tract infection in women. *Cochrane Database of Systematic Reviews*. *Cochrane Database Systemic Review*, 10 (10): CD007182.

REPORTS

- 83) Centre for disease control & prevention. (2002). National Nosocomial Infections study report. Atlanta. Retrieved from www.cdc.com.
- 84) Health care associated infections. Agency for health care research & quality report. Retrieved from <http://www.ahrq.gov.htm>.
- 85) Mosby Medical Dictionary. (8th ed).2009. Elsevier publishers.
- 86) National nosocomial infections surveillance (NNIS) system report. (2002). Retrieved from <http://www.springerlink.com/content/hv71447587005744>.
- 87) Oxford Reference. (2008). Nosocomial infection. 08-15. Retrieved from <http.nosocomialinfection.org>.

WEBSITES:

- 88) www.google.com
- 89) www.pupmed.com
- 90) www.medline.com
- 91) www.wikipedia.com

APPENDIX-A

The tool for the data collection was structured in four sections; they are,

- Section A : Demographic profile of the subjects
- Section B : Clinical profile
- Section C : UTI clinical symptoms assessment checklist
- Section D : Urine microbiological analysis

Section A: Demographic profile of the subjects

This consists of demographic profile of the subjects including age, sex, religion and marital status.

- Age
 - 20-40yrs
 - 41-60yrs
- Sex
 - Male
 - Female
- Religion
 - Hindu
 - Christian
 - Muslim
- Marital status
 - Married
 - Unmarried

Section B : Clinical profile

- ❖ Diagnosis :
- ❖ Indication of catheterization :
- ❖ Previous experience of catheterization :
- ❖ Previous history of UTI :
- ❖ Duration of catheter care :

Section C: UTI clinical symptoms assessment checklist

- Temperature : _____⁰ F
- Supra pubic tenderness : present / not present
- Pus discharge from urethra : yes / no
- Cloudy urine : yes / no
- Bad odour urine : yes/no
- Swelling around the meatus : yes/no

Section D: Urine microbiological analysis

It consists of urine microscopic analysis and urine culture report.

Urine microscopic analysis :

- Pus cells : _____ cells / HPF
- Epithelial cells : _____ cells / HPF
- Bacteria : _____
- Casts : _____ (specify)
- Other abnormal cells : _____ (specify)

Urine culture report : (only if the UTI symptoms exists)

- Positive / negative : _____
- Type of organism : _____ (specify if any)
- Colony count : _____ / ml

APPENDIX-C

LIST OF EXPERTS

- 1.Prof. DR. S. Madhavi, M.Sc(N)., Ph.D.,**
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- 2. Dr. N. Rajendiran, M.A(App.Psy)., Ph.D.,**
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- 3.Dr. Sivakumar,M.N,**
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- 4.Dr.V.K.Visweswaran, M.Sc(Micro).,**
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- 5.Prof. K. Balasubramanian, M.Sc(N)., (Ph.D).,**
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