ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 15, Issue, 01, pp.23323-23333, January, 2023
DOI: https://doi.org/10.24941/ijcr.44554.01.2023

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

THE EFFECT OF NURSE EDUCATIONAL PROGRAM REGARDING KNOWLEDGE, ATTITUDE AND PRACTICE OF INTENSIVE CARE UNIT NURSE REGARDING CARE OF CENTRAL VENOUS CATHETER IN OMDURMAN MILITARY HOSPITAL, KHARTOUM STATE, SUDAN(2016-2019)

[1]Marwa Adam Abdelrahman Adam Ph.D., [2]Prof. Osman Khalafallah Saeed; [3]Prof. Magda Alhadi Ahmed Yousif and [4]Amel Yousif Omer Mohamed B. Sc

[1]Registered Nurse, Psychiatry Department Prince Sultan Millitary Medical City, Doctor of Philosophy, University Of Gezira, Faculty Of Applied Medical Science, Khartoum-Sudan; [2]Professor of Medicine, Dean of Wad Madani College of Medical Science and Technology, Sudan; [3]Professor of Community Medicine, Director of Primary Health Center, Faculty of Medicine, University of Gezira; [4]Registered Nurse, Intensive Care Unit Department Prince Sultan Millitary Medical city, Bachaloria of Nursing, Aleimam Almahadi University, Kusti, Sudan

ARTICLE INFO

Article History:
Received 06th October, 2022
Received in revised form
09th November, 2022
Accepted 11th December, 2022
Published online 28th January, 2023

Key words:
Psychological Repercussions, Stigma, psychological Affect, Qualitative Approach, Leprosy.

**Corresponding Author:*
Jean Didier MBELE

ABSTRACT

Central venous catheters (CVCs) are life-sustaining devices but are associated with a risk for infections that can increase morbidity and mortality, Infections associated with intravascular catheters account for 10% to 20% of all nosocomial infections. The mean rate of CVC-related bloodstream infection in the intensive care unit (ICU) is 5.3 per 1000 catheter days From 10% to 70% of all CVC-related infections are preventable. therefore based guidelines have been publish(Galpern, D., Guerrero, 2013).this study was conducted to study The Effect of Nurse Educational Program regarding knowledge, Attitude and practice of intensive care unit nurse regarding care of Central Venous Catheter in Omdurman military hospital, Khartoum State, Sudan,(2016-2019.Atotal of 150 intensive care unit nurses in Omdurman military hospital were selected, A well-structured questionnaire for interviewing the respondents ,Check list included the nurse's practice regarding central venous catheters and Educational training for intensive care unit nurses use for the study ,data was analyzed using statistical package of social science (SPCC). 55% of the participant using stander precautions in pretest, regarding the hand washing compliancy the participant need more awareness and encouragement to perform proper hands washing only 40% of the participant performing hand hygiene before touching the patients, 53% of the participant performing hand washing after touching patients, in the posttest 39% only performing ,20% of the respondent performing hand hygiene after early procedure which is minimum percentage and it is increased in posttest by 30%,37% of the respondent performing hand washing after removing gloves and the is alight improvement in posttest by 39%,55% of the participant aware about organisms that cause central venous catheter 24% of the participants aware about the factor associated with central venous Catheter infection ,only 40% of pretest and posttest participant aware about the inserting the central venous catheter , the compliancy of hands hygiene increased from 20%in pretest participant to 30% in posttest participant, using of stander precaution increased from 23%-30%.the participant need more awareness regarding hand hygiene and use of stander precaution the study recommended that Cautiously updating the staff of infection control programmes and policies and Determine a clinical resource nurse to update and evaluate the staff regarding their knowledge and practice.

Citation: ***Marwa Adam Abdelrahman Adam Ph.D., Prof. Osman Khalafallah Saeed; Prof. Magda Alhadi Ahmed Yousif and Amel Yousif Omer Mohamed B. Sc.*** **2023.** "The Effect of Nurse Educational Program Regarding knowledge, Attitude and Practice of Intensive Care Unit Nurse Regarding Care of Central Venous Catheter in Omdurman Military Hospital, Khartoum State, Sudan(2016-2019)*". International Journal of Current Research*, 15, (01), 23323-23333.

INTRODUCTION

Central venous catheters (CVCs) are life-sustaining devices but are associated with a risk for infections that can increase morbidity and mortality, Infections associated with intravascular catheters account for 10% to 20% of all nosocomial infections. The mean rate of CVC-related bloodstream infection in the intensive care unit (ICU) is 5.3 per 1000 catheter days From 10% to 70% of all CVC-related infections are preventable, therefore, evidence-based guidelines have been published (Galpern, D., Guerrero2013).

The guidelines for the prevention of intravascular catheter-related infections published by the US Centers for Disease Control and Prevention, provide recommendations for catheter care whose preventive value is supported by scientific research. Although the recommendations are evidence based, no adherence to them has been reported, this lack of adherence may be due to a lack of knowledge of the guidelines (The Joint Commission, 2017). Research has indicated that education of healthcare workers, preferably as part of a multifaceted quality improvement program, can reduce the rate of CVC-related infection. We know that the rates of central line-associated bloodstream infections (CLABSI) outside the ICU setting are similar to those found in the ICUsite (Muto, Herbert, Edwards, Horan, Andrus, Jernigan, &Kitty, 2014). Infection of CVC leads to increased morbidity and costs in health-care systems. According to Graham *ET AL* infection with subclavian, jugular and femoral approach is associated to 4, 8.6, and 15.3/1,000 catheter-days, respectively. Femoral access has been shown to be associated with an increased risk of infection, but some authors suggest that there is no difference among the three puncture sites when the strict sterile technique is followed. Many types of dressing (gauze, transparent material, frequency of change) and care systems are described, although the optimal type cannot be recommended due to the lack of evidence. The use of medication-impregnated dressing (chlorhexidine gluconate and silver-alginate) reduces catheter colonization and catheter-related bloodstream infection, however, further research is necessary to assess the impact of these measures in CVC infectious complications. (Khanna NN, Jaypee; 2016)

Since most patient stays are outside the ICU, and approximately 20% of these patient days include a central line, the burden of disease is greater outside the ICU. A focus on central line-associated bloodstream infections, CLABSI surveillance and prevention outside the ICU therefore has the potential to significantly impact and reduce CLABSI rates. Nurses are knowledge-dependent workers, and knowledge plays a critical role in the quality of health care today. Improving nurses' knowledge results in nurses' high self- efficacy when providing CVC maintenance care, and it is important that the nurses feel capable of providing evidence– based care The Centers for Disease Control and Prevention (CDC) recently published guidelines for the prevention of CRBSI (CDC, 2014), which is the benchmark for all CVC care recommendations. The guidelines refer to recommendations for hand hygiene, maximal sterile personnel protection equipment (PPE), chlorhexidine for skin preparation, catheter site dressing regimens, and the site chosen for catheter placement. Several studies have validated the use of these factors in reducing CRBSI (Kim, Haltom, & Vigen, 2016). This will require an approach that is different from ICU prevention methods by focusing on post-insertion line care and nurse education (Stevens V, Geiger K, Colcannon C, and Nelso2013).

Justification: For Patients at risk for central line-associated bloodstream infections (CLABSI) in the acute Intensive care unit (ICU) population, the risk of CLABSI in ICU patients is high . Reasons for this include the frequent insertion of multiple catheters; the use of specific types of catheters that are almost exclusively inserted in ICU patients and associated with substantial risk (e.g. arterial catheters, (Hardaway, 2014). outside of the ICU or in outpatients Infection prevention and control efforts should include other vulnerable populations such as patients receiving hemodialysis through catheters and intraoperative patients The mortality rate for central venous catheter related bloodstream infections is estimated between 4% and 20% These statistics make preventing central venous catheter related bloodstream infections extremely important. Preventing these infections is so important, The Joint Commission has dedicated one of their National Patient Safety Goals to the prevention of catheter related bloodstream infections (The Joint Commission, 2015). A central venous catheter can act as a conduit for infection, which may result in septicemia, if it is not cared for appropriately. The site should be observed daily for any redness or discharge. A rise in the patient's temperature is a good indication that there may be infection around the catheter site or tip. Occlusion can also occur for a number of reasons, including kinking in the line, thrombosis and the precipitation of drugs in the line. If a patient has a catheter with more than one Lumina inserted there is a possibility, especially if the patient is critically ill, that ramps (extension sets) may be attached to the line to administer a number of drug infusions. If these lines are not adequately secured to the patient there is the potential for them to become tangled or kinked, causing occlusion. The catheter is a foreign body and the physiological response to a foreign body is a build-up of fibrin. Over time this can cause a thrombosis in the vein or within the lumen of the catheter. Early detection of this problem is vital to the patient's well-being. If it is left untreated, there is the likelihood of emboli dispersing to the lungs and other vital organs. Critically ill patients are often administered a concoction of highly potent drugs which have the potential to form solid deposits. This is sometimes caused by a chemical reaction and sometimes by an alteration in the solution so that the substance becomes less soluble. The advice of a pharmacist should be sought to ascertain that the drugs administered are compatible with one another and lines should be flushed with normal saline 0.9 per cent before and after the administration of intravenous drugs to ensure that a bolus of drug infusions is not given vascular complications during CVCincluding carotid artery puncture (75%), carotid injury (3%), stroke (1%), and hem thorax (4%). The use of ultrasound guidance may have increased since 2007. A shortage of suitable ultrasound equipment is sometimes a reason for not using ultrasound guidance. (Koenigsberg,2012).

Objectives

General objectives: To study The Effect of an Educational Program regarding knowledge and practice of intensive care unit (ICU) nurses on the Central Venous Catheter-Associated Bloodstream Infection in Omdurman Military Hospital in Khartoum State, Sudan, 2016-2019.

Specific objectives

- To assess the knowledge of ICU nurses regarding Central Venous Catheter-Associated blood stream infection.
- To evaluate the nurse's knowledge regarding Central Venous Catheter-Associated blood stream infection.
- To update the nurse's information to Prevent Central Line-Associated Bloodstream Infections.
- To improve the nursing knowledge regarding Central Venous Catheter-Associated blood stream infection
- To assess nurses practice regarding Central Venous Catheter-Associated blood stream infection

Central venous catheters: Also known as central venous access devices, are used to administer large amounts of intravenous (IV) fluids, medications that can be irritating to smaller veins, and blood products (Infusion Nurses Society, 2013). Central venous catheters were once used only in patients in the intensive care unit, or other high-acuity areas. Now nurses in all areas of healthcare, including home health and other less acute areas are taking care of patients with central venous catheters. Central venous catheters are inserted through a large central vein, such as the subclavian vein and terminate at the junction of the superior vena cava and the right atrium. In some instances, the catheter may be inserted through the femoral vein and terminate in the inferior vena cava. Because central venous catheters terminate in large veins, there is rapid blood flow around the tip of the catheter. This allows the fluids and medications infused through the catheter to be rapidly diluted and quickly moved into the patient's circulation. The easy and rapid access of central venous catheters to the patient's bloodstream increases the patient's risk for developing a catheter related bloodstream infections. Infections related to central venous catheters are more likely to occur in patients who are immunocompromised or seriously ill, such as patients in the intensive care unit. The organisms most likely to cause a central venous catheter related bloodstream infection are Staphylococcus epidermidis, Staphylococcus aureus, Candida albinos and Klebsiella pneumonia (Tilton, 2014). According to the Centers for Disease Control and Prevention (CDC), approximately 250,000 central venous catheter related bloodstream infections occur each year, at a cost of $25,000 per infection.

The mortality rate for central venous catheter related bloodstream infections is estimated between 4% and 20% (Hadaway, 2013). These statistics make preventing central venous catheter related bloodstream infections extremely important. Preventing these infections is so important (The Joint Commission, 2015). the Centers for Medicare and Medicaid Services have stopped reimbursing hospitals for conditions that have evidence-based prevention guidelines, which includes catheter-related bloodstream infections. Now, hospitals have additional incentive for preventing infection in patients with central venous catheters, as it has become directly tied to their payment. The Institute for Healthcare Improvement (IHI) also recognizes the importance of decreasing central venous catheter related bloodstream infections (Headway, 2013). A medical practitioner inserts the catheter via the internal jugular, subclavian or femoral veins using strict aseptic technique. Aubaniac (1952) first reported the use of central venous catheterization and the catheters are now in common use in a variety of health care settings though they are more commonly used in the high-dependency category patientthe patient should be informed about what is to happen during the procedure as well as the rationale behind it. The patient may be very anxious and it is important that the nurse gives a clear explanation and reassurance before, during and after the procedure (Dewitt, 2014).

Patient's position during insertion of the catheter is important. The patient should lie supine and the head of the bed should be lowered to encourage venous engorgement, which makes it easier to puncture the vein (Peters and Moore, 2013). The medical practitioner will decide which type of catheter should be used while the insertion site will determine the length of the catheter.Catheter care bundle: a structured way of improving the processes of care and patient outcomes: a small, straightforward set of evidence-based practices, generally a set of five steps to help prevent, catheter-related bloodstream infections,‖ deadly bacterial infections that can be introduced through an IV in a patient's vein supplying food, medications, blood or fluid. The steps are simple, common-sense tasks: using proper hygiene and sterile contact barriers; properly cleaning the patient's skin; finding the best vein possible for the IV; checking every day for infection; and removing or changing the line only when needed (Institute for Healthcare Improvement, 2014). Before inserting the catheter, all the necessary equipment should be available at the bedside (a manual on local policies and procedures should detail the procedure). After inserting the catheter, a chest X-ray should be performed to check that the central venous device is in the correct position and to rule out pneumothorax, haemothorax and cardiac tamponed. Recent attention has been focused primarily on reduction of infectious complications of CVCs. Application of strict aseptic precautions (the so-called ''central-line bundle'') when placing CVCs effectively has reduced the incidence of catheter-related infection,1 and Medicare no longer reimburses for costs related to these infections. However, mechanical complications of central venous cannulation remain a significant cause of morbidity and mortality. (The American Society of Anesthesiologists Closed Claims Project database have suggested that since 1990), the majority of mechanical complications associated with CVCs are vascular injuries, and ''accidental puncture or laceration'' is a reportable National Quality Measures Patient Safety Indicator. , most vascular injuries from CVCs should be preventable the purpose of this review is to examine evidence-based methods for preventing vascular complications of CVC placement. The diligent application of preventive measures can reduce the incidence of CVC-related vascular injuries to nearly zero. However, the evidence for treating vascular complications also will be examined, since CVC complications, even if infrequent, can be life-threatening. The review will be organized along anatomic lines, because the implications for arterial and venous injuries usually are different and the implications for intrathoracic vascular injuries usually are different from injuries outside of the chest (CDC2012).

COMMON SITES USED FRO VENOUS CANNULATION

- Internal Jugular Vein (IJ)
- External Jugular Vein (EJ)
- Sub Brachial Vein (BV)
- clavian Vein (SC)

Equipment

- 1% lidocaine
- Sterile gloves
- Catheter device
- I.V tubing, N/S 500ml + 500 iu of heparin
- Syringes
- Gauze pads
- Needle holder
- 4-0 silk sutures
- Sterile towel
- Scalpel
- Antiseptic solution
- Scissor
- Dressing supplies

Patient assessment

- Assess vital signs and pulse oximetry
- Assess electrolyte levels
- Assess coagulation status

The indication to insert central venous catchers

- To monitor central venous pressure in critically ill patients.
- For the rapid administration of intravenous fluids.
- For the administration of drugs, such as antibiotic therapy and cytotoxic drugs.
- For the administration of parenteral nutrition.
- To aid in the diagnosis of cardiac failure.
- To monitor postoperative patients.
- Lack of peripheral venous access

Factors associated with increased risk: 2-3

- Prolonged hospitalization before catheterization
- Prolonged duration of catheterization
- Heavy microbial colonization at insertion site
- Heavy microbial colonization of the catheter hub
- Internal jugular catheterization
- Femoral catheterization in adults
- Neutropenia
- Prematurity (i.e., early gestational age)
- Reduced nurse-to-patient ratio in ICU
- Total parenteral nutrition
- Substandard catheter care (e.g., excessive manipulation of the catheter)
- Transfusion of blood products (in children)..

Complications: Many complications can occur immediately after the insertion of a catheter and it is the nurse's responsibility to observe the patient carefully when the procedure is being carried out. These complications include:

- Arterial puncture: accidental puncture of the carotid, vertebral, subclavian, basilica, and axillary or femoral arteries can occur during insertion. Arterial blood is bright red and blood flow is substantial.
- Pneumothorax may occur if the catheter punctures the chest wall, allowing air to enter the pleural cavity.
- Cardiac dysrhythmias can occur if the tip of the catheter touches the cardiac wall. The nurse should observe the heart rate and rhythm, and inform the medical practitioner of any changes (Drewett, 2013).
- Air embolism, where air enters the venous system, can also occur on insertion or up to 48 hours after removal. The medical

team and nurses should ensure that all lines are primed with fluid before connection and that there is no leakage in the system. All ports should have lure lock connections and be clamped off if not in use. If a patient shows symptoms of an air embolus (for example acute dyspnea, low blood pressure), the medical practitioner should be informed immediately. Air emboli of less than 10-20ml rarely cause problems but a large pulmonary air embolus can cause death. (Hudak et al, 2015),

Catheter-Related Bloodstream Infections (CRBSIs) Guidelines for Prevention

- Hand hygiene should be performed before and after contact with intravascular catheter insertion sites (e.g., contact during insertion, replacing, accessing, repairing, dressing, and palpating).
- Use of aseptic technique –General aseptic no touch technique (ANTT; i.e., the skin is not touched after it is prepared with antiseptic cleanser) should be observed for most catheter-related care –Surgical aseptic technique should be followed during insertion of CVCs.
- Use of personal protective equipment (PPE) –Peripheral intravascular catheters: Nonsterile gloves can be worn during insertion and care if ANTT is observed –Arterial, central, and midline catheters: Sterile gloves should be worn for insertion; nonsterile or sterile gloves can be worn during dressing changes.
- Using maximal sterile barrier precautions: All maximal barrier precautions (e.g., cap, mask, sterile gloves and gown, and a sterile full-body drape) should be utilized for insertion of CVC and arterial and midline catheters, and for performing guide wire exchange
- Using an antiseptic agent for skin preparation and for cleaning intravascular devices –Peripheral intravascular catheters: 70% alcohol, tincture of iodine, or chlorhexidine gluconate (CHG) with alcohol can be used to prepare the skin prior to catheter insertion and to clean injection ports before accessing the intravascular device –CVC and peripheral arterial catheters: > 0.5% CHG with alcohol is recommended for cleansing the skin prior to catheter insertion, during dressing changes, and to clean injection ports before accessing the intravascular device. If CHG is contraindicated, tincture of iodine, an iodophor, or 70% alcohol can be used as an alternative. (Pereira, C. R., &Shepperd, S. 2013).
- Use of antibiotic ointment: Except for dialysis catheters, the CDC recommends against use of a topical antibiotic ointment or cream at the insertion site due to the increased risk of promoting fungal infection and antimicrobial resistance(Krizanovic, V., Lemmon, S. 2014).
- Daily use of a cleansing agent: A 2% CHG wash should be used for routine skin cleansing –Investigators at a regional medical center that tracked the rate of CLABSI reported a statistically significant reduction in the rate of CLABSI (from 5.7 to 0.2) after implementation of a CHG bathing policy that required daily patient baths using 2% CHG.
- All stopcocks should be capped when not in use.
- Chlorhexidine/silver sulfadiazine or minocycline/rifampin-impregnated CVCs should be used in patients whose catheter is expected to remain in place for > 5 days in circumstances in which CLABSI rates have not decreased despite the implementation of a comprehensive CLABSI risk reduction program–Cochrane reviewers found that the magnitude of the benefit of the use of antimicrobial-impregnated CVCs varies by clinical setting, and the practice is associated with significant reduction in rates of CRBSI only in ICU settings; they reported that antimicrobial-impregnated CVCs do not appear to reduce rates of sepsis and mortality (The CDC/HICPAC 2011)

Prevention Guidelines duringInsertion: Recent data reveal no difference in the infection rate based on the insertion catheter site. The following are some key components of a prevention program, abstracted from an extensive list provided by the CDC Hand hygiene by washing hands with soap and water or with alcohol-based gels or foams. Gloves do not obviate the need for hand hygiene.

- Strict aseptic technique by using maximal sterile barrier precautions, including a full-body drape when inserting central venous catheters.
- Use of 2% chlorhexidine skin preparations for disinfecting/ cleaning skin before insertion.
- Ultrasound guidance by an experienced provider for placement to circumvent mechanical complications and reduce the number of attempts.
- Avoid the femoral vein as a choice for central line placement, and prefer the subclavian vein when possible for non-tunneled catheters.
- Promptly remove any central line that is no longer required.
- Replace central lines placed during an emergency (asepsis not assured) as soon as possible or at least within 48 hours. (Atilla A, Doğanay Z, KefeliÇelik H 2017).

Prevention Guidelines during Maintenance

- Disinfect the catheter hubs, injection ports, and connections before accessing the line.
- Replace administration sets other than sets used for lipids or blood products every 96 hours.
- Assess the need for the central line daily.

Enhance Healthcare team outcomes: Central line-associated bloodstream infection (CLABSI) is a very common problem in the intensive care unit. These infections are associated with over 28,000 deaths each year and cost over $2 billion. Only through best practices, protocols, checklists, and establishing a culture of patient safety in healthcare institutions can one reduce CLABSI to zero one of the major reasons why central lines are removed is because of an infection or suspicion of an infection. This type of clinical practice not only leads to longer admission but repeat procedures and an increased rate of complications from central lines. The major problem with central lines is that there are many types of lines, some which are directly inserted, others which are tunneled, and others which are inserted into the forearm and passed into the large veins of the heart. In many hospitals, central lines are inserted by many specialists including anesthesiologists, surgeons, emergency room physicians, radiologists, and critical care physicians.[11] In addition, the use of a central line is not limited to any one nurse but all nurses. This heterogeneity has resulted in varied outcomes, but in almost every study, infections continue to be a common problem.Aloush SM, Alsaraireh FA.2018)

Evidence-Based Medicine: Over the years, many guidelines have been established; some hospitals have a policy that for long-term access, the line can only be inserted by a dedicated team that consists of the surgeon, nurses, and a pharmacist who will monitor the patient. In addition, when administering TPN, one port is dedicated to nutrition only. Plus, in some units, only nurses with training in central lines are allowed to infuse medications and other solutions. Evidence-based guidelines show that by adhering to protocols, one can reduce the rate of CLABSI. However, to ensure compliance, audits of doctors who insert the central lines and nurses who monitor the lines for infections is vital. (Level III) Hallam C, Jackson2018)

Guidelines recommend the following schedule for replacement of dressings for intravascular catheters

- Gauze dressings should be changed every 2 days
- Transparent dressings should be changed every 7 days, except in pediatric patients when the risk of dislodging the catheter may outweigh the value of changing the dressing (CareFusion. (2013).
- •Tunneled or implanted CVC sites with transparent dressings should be changed once per week until healed (Pereira, C. R., & Shepherd, S. 2013)..

Education and staff training

- Educate healthcare personnel on indications for central lines, proper procedures for insertion and maintenance, and appropriate infection prevention measures.
- Periodically assess staff knowledge and compliance to guidelines of care.
- Allow only trained personnel to insert and care for peripheral and central intravascular catheters and ensure these clinicians undergo a credentialing process to confirm competency.
- Ensure proper nursing staff levels in intensive care units (ICUs), a minimum ratio of 1 nurse to 2 patients.
- Provide a checklist to clinicians to ensure adherence to aseptic insertion practices.
- Reeducate personnel at regular intervals on central line insertion, handling and maintenance, and policies, procedures, supplies, or equipment changes.
- Empower staff to stop non-emergent CVC insertion if aseptic technique is not maintained.
- Ensure efficient access to supplies for central line insertion and maintenance.
- Use hospital-specific or collaborative performance initiatives to impove compliance with recommended evidence-based practices.
- Perform surveillance for CLABSI and measure unit-specific incidence (CLABSI per 1,000 catheter-days).(training and educating staff 2014)

Nursing care: The patient should be closely monitored and the catheter site and the system observed. The patient's vital signs should be monitored and recorded. Any handling of the line should be kept to a minimum to reduce the risk of contamination and the line should be securely fastened to the patient. The dressing on the central venous site should be changed in accordance with hospital policy and procedures. It should always be changed using aseptic techniques and a transparent dressing is often used to allow observation for evidence of redness or discharge. The nurse usually removes the catheter after the medical practitioner has given an instruction to do so. The patient should be informed and reassured and the procedure explained. The patient should lie flat in bed with the foot of the bed elevated to prevent air emboli on removal of the catheter. Before removing the catheter, ask the medical practitioner if the tip of the catheter should be kept and sent for microbiological examination. If the tip is to be sent to the laboratory to be cultured it should be cut with sterile scissors and placed in a sterile specimen pot to prevent further contamination.

The removal procedure is carried out using an aseptic technique. After removal of the sutures from around the catheter, a wad of sterile gauze should be held under pressure over the site. The catheter is pulled gently until it is removed, while the nurse continues to apply pressure to the site for up to five minutes until bleeding has stopped. The site is sealed with an airtight dressing, which should be left in place for 48 hours, and the patient can be returned to a comfortable position Patients with cancer are at increased risk of venous thromboembolism, which can be life-threatening. Health professionals and patients need to understand the risk factors UK nurse has for the first time been elected to the board of directors of a leading global body that promotes the safe use of intravenous medical devices. Central venous catheters, also known as central venous access devices, are used to administer large amounts of intravenous (IV) fluids, medications that can be irritating to smaller veins, and blood products (Infusion Nurses Society, 2016). Central venous catheters were once used only in patients in the intensive care unit, or other high-acuity areas. Now, nurses in all areas of healthcare, including home health and other less acute areas are taking care of patients with central venous catheters. A central venous catheter may be inserted by an advance practice nurse, physician's assistant, physician, or other health care professional, depending on each state's practice act. Choices that the healthcare professional makes during insertion of the catheter, such as the type of catheter inserted and where the catheter is inserted, can affect the patient's risk of infection. (Centers for Disease Control and Prevention, 2016). Some manufacturers also make catheters that have been impregnated with different antimicrobial and antiseptic agents.

The science behind these catheters is that if the organism cannot attach to and move along the catheter, the less chance the patient has of developing a central venous catheter related blood stream infection. Current guidelines recommended using them only if the catheter is expected to stay in place for longer than five days. These catheters are also used primarily in patients who are at a greater risk of infection, such as those with burns and severe neutropenia. If caring for a patient with one of these special catheters in place, the nurse should make sure she is familiar with the manufacturer's recommendations for caring for the catheter. Nurses perform much of the daily care of central venous catheters. Therefore, nurses play an integral role in preventing bloodstream infections. There are four activities that nurse perform related to central venous catheters on a regular basis that can help prevent catheter related bloodstream infections. These activities are:

- hand washing
- performing skin asepsis
- accessing the catheter hub
- Changing the insertion site dressing.

The best way nurses can help decrease the risk for a central venous catheter related bloodstream infection is by using meticulous hand hygiene. Proper hand hygiene before performing central venous catheter care can involve either the use of a waterless alcohol-based product, or using an antibacterial soap with water and adequate rinsing (Hadaway, 2015). A waterless alcohol-based product is sufficient if the hands are not visibly soiled. If hands are visibly soiled, or if the healthcare professional has been caring for a patient with .difficile, hands should be washed with soap and water (Hadaway, 2015). Hand hygiene should be performed before any central venous catheter care, even if a dressing change or accessing the catheter is not being performed. This helps decrease the number of bacteria that come in contact with catheter, and therefore helps decrease the patient's risk of developing an infection. Skin antisepsis, or cleaning the skin, is another important way to help prevent central venous catheter related bloodstream infections. Chlorhexidine gluconate is the preferred antiseptic to use at the insertion Studies have shown that chlorhexidine has a better rate of infection prevention than povidone-iodine (Muto, Herbert, Edwards, Horan, Andrus, Jernigan, &Kutty, 2015). Chlorhexidine should be used prior to insertion of the catheter to remove microorganisms at the insertion site It should also be used to clean the insertion site at every dressing change. When cleaning with chlorhexidine, use a back and forth scrubbing motion for at least 30 seconds. Then, let the site air dry in order to ensure asepsis (Infusion Nurses Society, 2010). Some chlorhexidine preparations may contain isopropyl alcohol, which can be damaging to central venous catheters made of polyurethane (Hadaway, 2015). When preparing to clean the catheter insertion site, check the facility's policy to make sure that it supports the use of chlorhexidine with central venous catheters. When the catheter hub is accessed, such as during a blood draw or to infuse a medication, the patient is at an increased risk for microorganisms entering the bloodstream. Microorganisms can be transferred into the catheter and bloodstream for the surface of the catheter hub as well as the syringes or needleless connectors that are attached to the hub (Hadaway, 2015). Blood and drug particulates, and tape residue also provide a prime environment for organisms to multiply. Each time the hub is accessed, clean the hub with a new alcohol pad before accessing it This helps decrease the number of organisms on the hub hat that could potentially be transferred into the patient's bloodstream (Infusion Nurses Society, 2010). The recommended dressing type to use on a central venous catheter is a semipermeable transparent dressing. A transparent dressing allows visualization of the insertion site to help monitor the patient for signs of infections. Signs of infection that may be visible at the insertion site include redness, drainage, and pain. Assess the insertion site through the dressing at least once a shift (Infusion Nurses Society). If the patient has a transparent dressing, it should be changed at least every seven days. If the dressing is loose, soiled, or damp, or if the dressing must be removed to examine the site closely, then the entire dressing should be replaced Scare bundle is a grouping of best practices that

individually improve care and when applied together results in greater improvement. Every component of the bundle is essential and indispensable. The CRBSI bundle consists of five essential elements:

- Hand hygiene,
- Maximal sterile barrier precautions including large sterile drape, sterile gown and gloves, mask, and a cap,
- Selection of optimal catheter insertion site with avoidance of the femoral vein for access in adults,
- Chlorhexidine skin antisepsis,

Daily review of the line necessity and prompt removal of unnecessary lines. Voluntary participants in this project will be nonprobability convenience sample of the registered dialysis nurses in the hemodialysis unit. The expected outcome of this educational intervention will increase knowledge about CVCociety, 2010). KlugerSome facilities are now using a round chlorhexidine impregnated dressing at the insertion site. Although studies with these dressings show promise in decreasing catheter related bloodstream infections, there have been no formal guidelines issued regarding the use of these dressings (Maki, Mermel, 2011).

Previous studies

Thirty-three nurses were interviewed in September 2017. Regarding CVC complications, 97% (n=32) reported the infectious risk, and only 33% (n=11) the hemorrhagic risk. All the nurses declared checking the blood reflux, but only 48% (n=16) reported checking the flow, 27% (n=9) the ease of injection and 24% (n=8) the absence of pain. Ninety-one per cent (n=30) of the nurses check the dressings every 8 hours, 85% (n=28) declared checking the conclusiveness and cleanliness of the dressings, and only 55% (n=18) mentioned control of the peripheral skin. Seventy-six per cent (n=25) change the dressing 2 days after the placement of the CVC and 91% (n=30) change the dressing every 4 days during the following period. The nurses' knowledge is quite good but this questionnaire allowed us to identify precisely the points of improvement. Pharmaceutical intervention permitted us to become aware of nurses' difficulties. The nurses supported our questionnaire and were interested by our approach. Educational measures are currently being implemented: e-learning and training sessions for nurses and posters displayed in nursing stations. Six months after the training, the rate of side-effects linked to CVC's complications will be evaluated and compared to those of the first period in order to assess the effectiveness of these measures.

Khanna et al. (2013) conducted a case-control study in tertiary care hospital. The number of participants in this study was 50 cases and 50 controls. The purpose of the study was to was undertaken to identify catheter-related bloodstream infections, to isolate pathogenic microorganisms present in intravascular catheter-related local infections, exit site infections, and to determine the predisposing factors for the development of such infections and antibiotic sensitivity pattern of the isolated organisms in tertiary care hospital. The results indicated that the commonest premorbidity among the controls and patients with CRBSI was renal failure (36% versus 36.4%) while that among the patients with local catheter infections was diabetes (28.2%). The study highlighted the increasing rate of CRBSI and helped in better management of patients as well as in prevention of nosocomial bloodstream infection, mainly due to multidrug-resistant organisms .

Aiken et al. (2011) conducted a cross-sectional study to measure the relationship between the levels of nurse-to- patient staffing, nurse work environment, nurse education and inpatient mortality and failure to rescue across 665 adult acute care general hospitals. The study addressed a clearly defined research question, and a comprehensive literature search was carried out. Descriptive statistics was provided to show characteristics of the study hospitals, and logistic regression models were used to estimating the effects of nurse staffing, nurse work environment, and nurse education on patient outcome.

The result of this study was directly applicable to the patient, and indicated positive effect of increasing percentages of BSN nurses is consistent across all hospitals, lowering the patient-to-nurse ratios markedly improves patient outcomes in hospitals with healthy work conditions. The study used appropriate methods to combine the individual research findings .

Apisarnthanarak et al. (2010) conducted a prospective quasi-experimental study, provided an educational intervention for nurses. The purpose of the study was to evaluate the long- term impact of bundled infection control practices on the reduction of CRBSI in a tertiary care center in Thailand. The results recorded in the first period, 88 episodes of CRBSI, and the CRBSI rate decreased by 54.1 % in the second period, then 78% in the third period. The study focused on conducting the educational course periodically, and the components were derived from CDC's Healthcare Infection Control Practices Advisory Committee's and WHO's hand hygiene guideline. The study supported the role of a bundle of care in achieving and maintaining low incidence of CRBSI.

Guerin, Wagner, Rains, &Bessesen (2010) conducted surveillance for CRBSI by trained infection preventionists using National Health Safety Network case definitions and device-day measurement methods. The sample size was Pronovost et al. (2010) conducted collaborative prospective cohort study to implement and evaluate interventions to improve patients' safety in intensive care units predominantly in Michigan, USA. Intervention conceptual model was used to develop clinicians' use of five evidence- based recommendations to reduce rates of RBSI. The resulted showed there is a significant decrease in incidence rate ratios of CRBSI 0.68 (95% confidence interval 0.53 to 0.88) at 0-3 months to 0.38 (0.26 to 0.56) at 16-18 months and 0.34 (0.24-0.48) at 34-36 months post-implementation. The potential confounders were not addressed, for example, previous antibiotic therapy, and the sample size was large which may increase the statistical significant of the data.

Deshmukh and Shinde (2014) conducted quasi-experimental study with pre-test-post-test design.The sample size for the study was 60 purposive sampling technique by the investigator. The purpose of the study was to assess the Impact of structure education on knowledge and practice regarding venous access device among nurses. The study was conducted in three phases. The result showed that the structured education was effective in knowledge and practice of staff nurses regarding venous access device car. The sample size is not large enough; only 30 in the control group and 30 in the case group; a small sample size may reduce the statistical significant of the data .

Pushpakala and Ravinath (2014) conducted pre- experimental study to inform the recommendations concerning nursing care of the patient with central venous catheter among staff nurses working in ICU. The sample size was 50 staff nurses working in intensive critical care units, coronary intensive care unit and cardiovascular intensive care unit. The result showed that a significant increase in the staff nurses' knowledge scores after self- instructional module. The mean pre-test score was 9.80 %, and the mean post-test score was 16.58 % and the difference between pre-test and post-test knowledge scores was 6.78%. The study indicated that the staff nurses in post-test were having average of moderately 30 % knowledge and adequate 70 % of knowledge regarding nursing care of patients with central venous catheter. Self-instructional module is effective in increasing the knowledge regarding nursing care of patients with central venous catheter among staff nurses. The potential confounder was addressed, for example, the behavior changes and the compliance of personnel. The sample size is not large enough; a small sample size may reduce the statistical significant of the data.

Shrestha (2014) conducted a pre-experimental study design (pre-intervention, intervention, and post- intervention) which determine the effectiveness of educational intervention in improving nurses' knowledge regarding care of patients with CVC among nurses. Forty nurses were selected by randomization sampling method to participate in the study.

The results indicated that there was a significant difference between the pre-intervention and post-intervention knowledge score (p = .039). The study showed that educational intervention program significantly improved the nurses' level of knowledge about care of the patient with CVC. Overall, mean knowledge score between pre- intervention and post- intervention was found to be significant. The outcomes were clearly defined and the results of this study directly applicable to the patient. Confidence intervals were not provided.

Bianco et al. (2013) conducted a cross-sectional self- administered survey, taking place from September to December 2008; the target population comprised health care workers (HCW) who insert CVCs and responsible for CVC management. The purpose of the study was to acquire information about the level of knowledge, attitudes, and frequency of evidence-based practices associated with insertion and maintenance of CVCs for the prevention of CRBSI. The anonymous self-administered instrument for data collection included questions designed to capture information in the following areas: (1) sociodemographic and practice characteristics, including queries about gender, age, ward of activity, position, and total number of years in practice; (2) knowledge, attitudes, and practice regarding evidence-based procedures associated with insertion.

METHODOLOGY

The Study Design: This interventional study design to structure a training framework, the study group given pretest and posttest questionnaire respondent given educational training and 10 days lecture Containing haw to deal with central venous catheter dressing.

The Study Area: The participants were selected from Omdurman Military Hospital, the medical corps was established as a unit of the Sudanese army in February 1956, that is, immediately after independence. Before that, the medical services in the armed forces were handled by volunteer doctors. The first military hospital started to provide its services from Al Ashlaq Al Shamali (currently the dormitories of the University of Khartoum) and then moved to the General Command. The study area selected from all high dependency units at Established in 2010 under the flagship of Sudan ministry of defense, it is now one of the largest hospitals in the Sudan. The hospital has emerged as an important healthcare institution, providing state-of-the-art emergency and critical care services. Omdurman Military Hospital contains (trauma room. hot area, cold area. outpatient clinic, dressing room, triage, medicine word, surgical words, VIP wards, intensive care units, theaters, laboratory, blood bank, pharmacy-ray department, CT–scan department, ambulance, engineering, diet therapy, nutritional department and management department.

Study Population: There were 200 registered nurses, working in different intensive care units at Omdurman Military hospital at the time of data collection. Nurses comprise the majority of workers in the Critical Care Units of Omdurman military hospital. These nurses came from different institutions bringing with them their varied training, education and experiences.

Sample Size: Sample size consisted of (150) nurses during the period of the study

Sample selection technique: The total population was 200staff nurses in the Omdurman military hospital. After the inclusion criteria had been met, 150 nurses presenting the total coverage during the study. The assignment for the respondents in each group was done through a random sampling technique. Sampling was done by the database and the self-administered questionnaires for ICU nurses. All the nurses in the different ICUs were listed in one Rotation Schedule. Experimental and comparison group were then selected from the same pool of potential participants in the ICU. It is important to note that the research acquired rich data, because the participants represented a range of, ages and years of critical care experience across a large critical care unit. Introduced, (Lo-Biondi Wood & Haber 2010).

Data Collection tools

Data was collected using the fallowing

- A well-structured questionnaire for interviewing the respondents. The questionnaire included information that covers the variables under study.
- Check list included the nurse's practice regarding central venous catheters
- Educational training for intensive care unit nurses included: -
- Maximal sterile barrier precautions including large sterile drape, sterile gown and gloves, mask, and a cap,
- Daily review of the line necessity and prompt removal of unnecessary lines
- The central line dressing. Changing the central line dressing
- Use antiseptic technique
- Proper technique for obtaining blood sample
- E) Frequency of CVC changes

Phases of the study & Study Design

Pre intervention phase

- Intensive communications was made with the related directors and administrators at Omdurman military hospital, for official permission. Permission was obtained.
- The researcher identified care of central venous catheter and infection caused by from the documented records, records will be collected throughout 2016 – 2019 – Descriptive Retrospective Design.
- Observations utilizing checklist were collected from the target group to assess their practice regarding infection prevention and control measures.
- Before the training sessions a pretest will be distributed to the respondents to assess their knowledge, attitude and practice. This session will take 10 days. The researcher explained the queries of questionnaire to the respondents. The duration of the intervention programmed in10 days. A programme was designed to improve nurses, knowledge, attitudes and practices and to involve them in a training course on care of central venous catheter and infection prevention and control.

The training course included three phases as following

Group number	Number of participant	Date	Period og teaching	Method of teaching
FIRST GROUP	50	FROM16/08/2018-26/08/2018TO	10 DAYS	PRACTICAL
SECOND GROUP	50	FROM 29/08/2018 TO07/09/2018	10 DAYS	PRACTICAL
THIRD GROUP	50	FROM 11/09/2018 TO 20/09/2018	10 DAYS	PRACTICAL

Intervention phase: The trainees attended all the training sessions included in the intervention program, they fully and actively participated in the training sessions which delivered in a practical method rather than lecturing work. Experts with high professional competence delivered such sessions. Application of care of central venous catheter Infection Prevention and Control guidelines. All study period population was divided in to three groups according to their duty (day shift and night shift) 10 days bed side practical lecture was given to each group.

Post intervention phase: Evaluation of the effect of the intervention (training & Application of infection control measures).

Monitoring and follow up: To evaluate the trainee's practices regarding care of central venous catheter and infection prevention and control. The researcher used to conduct periodic surprise check

visits. As surprise visits took place during the three months following the training course. Visits conducted during all the work shift in intensive care units.

Inclusion criteria: The study chosed based on ICU Nurses graduated of bachelor in science in nursing (BSN) or higher, has a contract with the hospital or will stay at least for one year, has an ICU experience At least 1 Year. Nurses staff or a charge nurse has an depth experience in critical care knowledge.

Exclusion criteria: From the study all nurses worked out intensive care unit those nurses who will be resigning within the study period, also the study leave nurses having less than one year experience in intensive care unit.

Data Analysis: For the purposes of this study, the data will be analyzed through using statistical package for social sciences (SPSS). Ethical Considerations. Permission taken from the hospital of the study with an official letter from the Faculty of Nursing Sciences to the director of the hospital with the agreement of the target population, every individual will observe once. Verbal consent from the interviewed persons was also taken after explaining the study and its objectives to them. Confidentiality was given consideration and the information is used for the research purpose only.

RESULTS AND DISCUSSION

In this chapter, data collected in the survey questionnaires results were presented, interpreted and analyzed in both tabular and narrative forms. Data were reported and computed as aggregate of all responses by the respondents. The data were organized in reference to the research questions in this study

Pretest and posttest

	Frequency	Percent
20-30years	103	68.7
30-40years	35	23.3
40-50years	10	6.7
>50years	2	1.3
Total	150	100.0

Maternal statusIntensive Care Unite nurses

	Frequency	Percent
Single	90	60.0
Married	60	40.0
Total	150	100.0

Sex Intensive Care Unite nurses

	Frequency	Percent
Male	40	26.7
Female	110	73.3
Total	150	100.0

Qualification level

	Frequency	Percent
Diploma	49	32.7
Bachalcria	93	62.0
Master	7	4.7
PHD	1	.7
Total	150	100.0

years of experience in Omdurman military hospital intensive care unit

	Frequency	Percent
6month-year	50	33.3
2-4-years	55	36.7
4-6 years	40	26.7
6 - 8 years	5	3.3
Total	150	100.0

Attending training on infection control in Omdurman military hospital; intensive care unit

	pretest		post test	
	Frequency	Percent	Frequency	Percent
Yes	30	20.0	30	20.0
No	120	80.0	120	80.0
Total	150	100.0	150	100.0

Signs of infection

	pre test		post test	
	Frequency	Percent	Frequency	Percent
Redness	30	20.0	30	20.0
Drainage	30	20.0	20	13.3
Pain	40	26.7	40	2.67
all above	50	33.3	60	40
Total	150	100.0	150	100.0

Do you use slander precaution Omdurman military hospital intensive care unit

	pre test		post test	
	Frequency	Percent	Frequency	Percent
proper hand washing	45	30	40	26.66
use alcohol when washing	20	13.3	20	13.3
body fluid controlled	30	20.0	30	20.0
all above	55	36.7	60	40
Total	150	100.0	150	100.0

When do you wash hands in Omdurman military hospital intensive care unit?

	pre test		post test	
	Frequency	Percent	Frequency	Percent
before touching the patient	40	26.7	42	28
After touching the patient	53	35	39	26
after early procedure	20	13.3	30	20
wash your hand immediately after taking off your gloves	37	24.6	39	26
Total	150	100.0	150	100.0

The organisms most likely to cause a central venous catheter related bloodstream infection: **Omdurman military hospital intensive care unit**

	pre test		post test	
	Frequency	Percent	Frequency	Percent
Staphylococcus epidermis's	30	20.0	24	16.0
Staphylococcus aurous	30	20.0	31	21.0
Candida albinos	20	13.3	20	13.0
Klebsiella pneumonia	25	16.7	30	20.0
All above	45	30	45	30
Total	150	100.0	150	100.0

Inserting the catheter, all the necessary equipment should be available in **Omdurman military hospital intensive care unit**

	pre test		post test	
	Frequency	Percent	Frequency	Percent
central line kit	20	13.33	20	13.3
normal saline and heparin	20	13.33	30	20.0
Sutures	30	20.0	35	23.3
chest X-ray to check accurate position	20	13.33	30	20.0
strict aseptic precautions	25	16.7	15	10.0
All Above	35	23.3	20	13.3
Total	150	100.0	150	100.0

Factors associated with increased risk of infection in Omdurman military hospital intensive care unit

	pretest		post test	
	Frequency	Percent	Frequency	Percent
Prolonged hospitalization before catheterization	15	10.0	20	13.33
Prolonged duration of catheterization	30	20.0	30	20.0
Heavy microbial colonization at insertion site	34	22.7	20	13.33
Heavy microbial colonization of the catheter hub	10	6.7	15	10.0
Internal jugular catheterization	10	6.7	5	3.3
Femoral catheterization in adults	13	8.7	15	10.0
Total parenteral nutrition	14	9.3	10	6.7
All above	24	16	35	23.33
Total	**150**	**100.0**	**150**	**100.0**

The indication of inserting central venous catchers

	pre test		**post test**	
	Frequency	**Percent**	**Frequency**	**Percent**
monitor central venous pressure in critically ill patients	20	13.3	30	20.0
the rapid administration of intravenous fluids	30	20.0	30	20.0
the administration of drugs, such as antibiotic therapy and cytotoxic drugs	30	20.0	35	23.33
the administration of parenteral nutrition	30	20.0	15	10
All above	40	26.66	40	26.7
Total	**150**	**100.0**	**150**	**100.0**

Complications of CVC insertion Omdurman military hospital intensive care unit

	pre test		post test	
	Frequency	Percent	Frequency	Percent
Arterial puncture	24	16.0	25	16.66
Pneumothorax	26	17.3	25	16.66
Cardiac dysrhythmias	30	20.0	15	10.0
Air embolism	35	23.3	45	30.0
Septicemia	35	23.33	45	30.0
Total	150	100.0	150	100.0

Decreasing central venous catheter related bloodstream infections Omdurman military hospital intensive care unit

	pre test		post test	
	Frequency	Percent	Frequency	Percent
Hand Hygiene	20	13.3	20	13.3
Maximal Barrier Precautions Upon Insertion	23	15.3	30	20.0
Chlorhexidine Skin Antisepsis	15	10.0	10	6.7
Optimal Catheter Site Selection, with Avoidance of the Femoral Vein	25	16.7	25	16.7
Central Venous Access in Adult Patients	28	18.7	25	25
Daily Review of Line Necessity with Prompt Removal of Unnecessary Lines	39	26	40	26.7
Total	**150**	**100.0**	**150**	**100.0**

DISCUSSION

A central venous catheter can act as a conduit for infection, which may result in septicemia, if it is not cared for appropriately. The site should be observed daily for any redness or discharge. A rise in the patient's temperature is a good indication that there may be infection around the catheter site or tip. Occlusion can also occur for a number of reasons, including kinking in the line, thrombosis and the precipitation of drugs in the line. If a patient has a catheter with more than one Lumina inserted there is a possibility, especially if the patient is critically ill, that ramps (extension sets) may be attached to the line to administer a number of drug infusions. If these lines are not adequately secured to the patient there is the potential for them to become tangled or kinked, causing occlusion. The catheter is a foreign body and the physiological response to a foreign body is a build-up of fibrin. Over time this can cause a thrombosis in the vein or within the lumen of the catheter. Early detection of this problem is vital to the patient's well-being. If it is left untreated there is the likelihood of emboli dispersing to the lungs and other vital organs. Critically ill patients are often administered a concoction of highly potent drugs which have the potential to form solid deposits. This is sometimes caused by a chemical reaction and sometimes by an alteration in the solution so that the substance becomes less soluble

The advice of a pharmacist should be sought to ascertain that the drugs administered are compatible with one another and lines should be flushed with normal saline 0.9 per cent before and after the administration of intravenous drugs to ensure that a bolus of drug infusions is not given vascular complications during CVC including carotid artery puncture (75%), carotid injury (3%), stroke (1%), and hem thorax (4%). The use of ultrasound guidance may have increased since 2007. A shortage of suitable ultrasound equipment is sometimes a reason for not using ultrasound guidance. (Koenigsberg, 2012). Nurses perform much of the daily care of central venous catheters. Therefore, nurses play an integral role in preventing bloodstream infections. There are four activities that nurse perform related to central venous catheters on a regular basis that can help prevent catheter related bloodstream infections. These activities are:

- hand washing
- performing skin asepsis
- accessing the catheter hub
- Changing the insertion site dressing.

The best way nurses can help decrease the risk for a central venous catheter related bloodstream infection is by using meticulous hand hygiene. Proper hand hygiene before performing central venous catheter care can involve either the use of a waterless alcohol-based

product, or using an antibacterial soap with water and adequate rinsing (Hadaway, 2015). A waterless alcohol-based product is sufficient if the hands are not visibly soiled. If hands are visibly soiled, or if the healthcare professional has been caring for a patient with .difficile, hands should be washed with soap and water (Hadaway, 2015). Hand hygiene should be performed before any central venous catheter care, even if a dressing change or accessing the catheter is not being performed. This helps decrease the number of bacteria that come in contact with catheter, and therefore helps decrease the patient's risk of developing an infection. Skin antisepsis, or cleaning the skin, is another important way to help prevent central venous catheter related bloodstream infections. Chlorhexidine gluconate is the preferred antiseptic to use at the insertion Studies have shown that chlorhexidine has a better rate of infection prevention than povidone-iodine (Muto, Herbert, Edwards, Horan, Andrus, Jernigan, & Kutty, 2015). Chlorhexidine should be used prior to insertion of the catheter to remove microorganisms at the insertion site It should also be used to clean the insertion site at every dressing change. When cleaning with chlorhexidine, use a back and forth scrubbing motion for at least 30 seconds. Then, let the site air dry in order to ensure asepsis (Infusion Nurses Society, 2010). Some chlorhexidine preparations may contain isopropyl alcohol, which can be damaging to central venous catheters made of polyurethane (Hadaway, 2015). When preparing to clean the catheter insertion site, check the facility's policy to make sure that it supports the use of chlorhexidine with central venous catheters. When the catheter hub is accessed, such as during a blood draw or to infuse a medication, the patient is at an increased risk for microorganisms entering the bloodstream. Microorganisms can be transferred into the catheter and bloodstream for the surface of the catheter hub as well as the syringes or needleless connectors that are attached to the hub (Hadaway, 2015). Blood and drug particulates, and tape residue also provide a prime environment for organisms to multiply. Each time the hub is accessed, clean the hub with a new alcohol pad before accessing it This helps decrease the number of organisms on the hub hat that could potentially be transferred into the patient's bloodstream (Infusion Nurses Society, 2010).

- There is same age of pre and posttest participant 68%which is arranged between 20-3- years old, 35% of the participant between 30-40 years old.
- the pretest and post participant 90% of them are single and 60% of them are married
- 40% of the participant are male while the majority of participant are representing female 110%
- 49% of the respondents has diploma ,93 have bachaloria,7% have master degree and only one staff with PhD degree
- 55% of the participant have 2-4 years of experience in intensive care unit,50% of the participant have 6 months experiance in intensive care unit,40% of them have 4-6 years of experience and 50 % have experience arranged between 6-8 years in intensive care unit
- Majority of the participant did not attend the infection control training while 30% percent only attended. Staff need more encouragement and facilitating to attend the infection control training
- There's improving of the participant knowledge about the infection control sings
- 55% of the participant using stander precautions in pretest and they improving in posttest by 60%
- Regarding the hand washing compliancy the participant need more awareness and encouragement to perform proper hands washing only 40% of the participant performing hand hygiene before touching the patients, in the posttest 42% performing hand haygeine,53% of the participant performing hand washing after touching patients, in the posttest 39% only performing ,20% of the respondent performing hand hygiene after early procedure which is minimum percentage and it is increased in posttest by 30%,37% of the respondent performing hand washing after removing gloves and the is alight improvement in posttest by 39%
- 55% of the participant aware about organisms that cause central venous catheter
- 24% of the participants aware about the factor associated with central venous Catheter infection
- only 40% of pretest and posttest participant aware about the inserting the central venous catheter
- The compliancy of hands hygiene increased from 20%in pre test participant to 30% in posttest participant, using of stander precaution increased from 23%-30%.the participant need more awareness regarding hand hygiene and use of stander precaution.

This study is different from Pushpakala and Ravinath (2014) conducted pre- experimental study to inform the recommendations concerning nursing care of the patient with central venous catheter among staff nurses working in ICU. The sample size was 50 staff nurses working in intensive critical care units, coronary intensive care unit and cardiovascular intensive care unit. The result showed that a significant increase in the staff nurses' knowledge scores after self-instructional module. The mean pre-test score was 9.80 %, and the mean post-test score was 16.58 % and the difference between pre-test and post-test knowledge scores was 6.78%. The study indicated that the staff nurses in post-test were having average of moderately 30 % knowledge and adequate 70 % of knowledge regarding nursing care of patients with central venous catheter. Self-instructional module is effective in increasing the knowledge regarding nursing care of patients with central venous catheter among staff nurses. The potential confounder was addressed, for example, the behavior changes and the compliance of personnel. The sample size is not large enough; a small sample size may reduce the statistically significant of the data.

In the pretest: On the basis of the guidelines, interventions or strategies related to central venous catheters and with relevance for nursing practice the result show that13% of nurses are early do the central line dressing all the time,33% doing the dressing most of the time, and 53% doing the dressing all the time. The result shown that only 6.% of the staff changing the central line dressing all the time which is considered lower percentage regarding changing of the central line dressing and there is possibility of central line infection,26% of nurses changing the central line most of the time and 66% of nurses changing the central line dressing sometimes . 73% of the nurses using the antiseptic techniques most of the time,22% of them using antiseptic technique some times and only 4% of nurses using the antiseptic technique all the time which should be most of the nurses using the antiseptic technique all the time .66% of nurses using barrier protection all the time which is acceptable to protect themselves and their patients from infection ,66% of the nurses sometimes doing the proper technique of obtaining blood sample,3% of the nurses obtaining the blood sample all the time. Nurses need to be aware about the importance of proper obtaining blood sampling. 2% of nurses are not using personal protective equipment, 88% of nurses using personal protective equipment sometimes. only 10% of nurses using the personal protective equipment most of the time. Nurses need to be aware about the personal protective equipment and the process of donning and doffing including hand hygiene. Use of gauze and polyurethane catheter dressings 40% of nurses used sometimes, 56% used most of the time and only 3% used the gauze and polyurethane all the time.

79% of nurses are frequently changing the administration all the time and 66% are changing the administration set most of the time. In the posttest On the basis of the guidelines, interventions or strategies related to central venous catheters and with relevance for nursing practicethe study result shown that there is slight improvement of nurse's intervention regarding central line dressing from 33%to 36%. There is improving in changing the central line dressing from 6.6% to 14% all the time. Nurse's staff upgrade their percentage from 41% to 67% regarding using antiseptic technique. Still 26% of nurses use barrier protection when performing central line dressing 3% of nurses obtaining the correct blood sample all the time 21% of nurses are using personal protective equipment all the time, the importance of wearing personal protective equipment for nurses and their patients.

Using of gauze and polyether catheter dressing most of the time dropped from 66% to 56%. There is improvement from 20% to 26% of nurses regarding frequently changing of administration set. Nurses need to be aware about the ideal dressing of central venous Cather and used of stander precaution and the performance of hand hygiene including hand washing and hand rubbing.

Recommendations

Conclusion

- Care of central venous Catheter in intensive care unit could be improved by providing well-organized practical training programme.
- Sustained application of infection control measures by training nursing staff could be negatively affected by in availability of necessary recourses (hand washing facilities, personal protective equipment, a septic techniques antiseptic materials, surgical towels and bed linen).
- Functioning infection control committee and infection control team with clearly specified roles and responsibilities are necessary structures to supervise daily infection control practices regarding care of central venous catheters.
- Check on the availability of necessary infection control resources and ideal dressing practice in intensive care unit.
- Continues monitoring of intensive care unit nurses regarding care of central venous catheter can reduce the risk of infection associated central venous catheter.

RECOMMENDATIONS

- Conutiosly updating the staff of infection control programmes and policies.
- Countiously evaluation the staff of infection control examinations.
- Attaching posters and posts consisting of infection.
- Control practise including the five moment, hand washing and hand rubbing.
- Increasing the infection control committee and improve their practice
- Encourage staff to attend infection control symposiums and courses.
- Availability of equipment and solutions needed during handwashing and inserting of central venous catheters.
- Determine a clinical resource nurse to update and evaluate the staff regarding their knowledge and practice.

REFERENCES

EMAP Publishing Limited Company number 7880758 (England & Wales) Registered address: C/O Top Right Group, The Prow, 1 Wilder Walk, London, W1B 5AP

Centers for Disease Control and Prevention. Guidelines for the prevention of intravascular catheter-related infections. MMWR. 51(RR10):1-28, August 2002.

Galpern, D., Guerrero, A., Tu, A., Fahoum, B., and Wise, L. (2008) Effectiveness of a central line bundle campaign on line-associated infections in the intensive care unit. Surgery 144(4):492-5, October 2008.

The Joint Commission. (2009) Comprehensive Accreditation Manual for Hospitals: The Official 8-Handbook. Standard NPSG.07.04.01. Oakbrook Terrace, Il. The Joint Commission, 2009.

Maki, D.G., Mermel, L.A., and Kluger, D. (2000).The efficacy of a chlorhexidine impregnated sponge (Biopatch) for the prevention of intravascular catheter-related infection- a prospective randomized controlled multicenter study [Abstract]. Presented at the Interscience Conference on Antimicrobial Agents and Chemotherapy. Toronto, Ontario, Canada: American Society of Microbiology, 2000.

Muto, C., Herbert, C., Harrison, E., Edwards, J., Horan, T., Andrus, M., Jernigan, J., and Kutty, P. (2006). Reduction in central line–associated bloodstream infections among patients in intensive care units—Pennsylvania, April 2001–March 2005 JAMA 295(3):, January 2006.

Tilton, D. (2006). Central venous access device infections in the critical care unit. Critical Care Nursing Quarterly. 29(2):117-122, April-June 2006

Pearson ML. Guideline for prevention of intravascular device-related infections. Part I. Intravascular device-related infections: an overview. Hospital Infection Control Practices Advisory Committee. Am J Infect Control. 1996;24(4):262–277.

Dumyati G, Concannon C, van Wijngaarden E, Love TM, Graman P, Pettis AM, Greene L, El-Daher N, Farnsworth D, Quinlan G, Karr G, Ward L, Knab R, Shelly M."Sustained reduction of central line-associated bloodstream infections outside the intensive care unit with a multimodal intervention focusing on central line maintenance." American journal of infection control. 2014 Jul; 42(7):723-30. Epub 2014 May 23.

Stevens V, Geiger K, Concannon C, Nelson RE, Brown J, Dumyati G. "Inpatient costs, mortality and 30-day re-admission in patients with central-line-associated bloodstream infections." Clinical microbiology and infection : the official publication of the European Society of Clinical Microbiology and Infectious Diseases. 2014 May; 20(5):O318-24. Epub 2013 Nov 06

International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064(2013): 6.14 | Impact Factor (2013): 4.438 Index Copernicus Value

.16-Abad, C. L., &Safdar, N. (2011). Catheter-related bloodstream infections. Infectious Disease Special Edition. Retrieved December 3, 2015, from http://www.idse.net/download/ BSI_IDSE11_WM.pdf (RV)

Scheithauer, S., Lewalter, K., Schroder, J., Koch, A., Hafner, H., Krizanovic, V., ...Lemmen, S. (2014). Reduction of central venous line-associated bloodstream infection rates by using a chlorhexidine-containing dressing. Infection, 42(1), 155-159. doi:10.1007/s15010-013-0519-7 (R)

CareFusion. (2013). Customer letter: ChloraPrep label change. Retrieved December 3, 2015, from http://dev.aabb.org/advocacy/ correspondence/ Documents/ChloraPrep_Label %20Change%20 Letter_ Care Fusion_Nov2013.pdf (GI)

Centers for Disease Control and Prevention (CDC). (2015, January). Bloodstream infection event (Central line-associated bloodstream infection and non-central line-associated bloodstream infection). Retrieved December 3, 2015, from http://www.cdc.gov/nhsn/PDFs/pscManual/4PSC_CLABScurrent .pdf (G)

Flodgren, G., Conterno, L. O., Mayhew, A., Omar, O., Pereira, C. R., &Shepperd, S. (2013). Interventions to improve professional adherence to guidelines for prevention of device-related infections. Cochrane Database of Systematic Reviews, Issue 3. Art. No.: CD006559. doi:10.1002/14651858.CD006559.pub2 (SR)

Institute for Healthcare Improvement. Implement the IHI Central Line Bundle. (n.d.). Retrieved December 3, 2015, from http://www.chpso.org/sites/main/files/file-attachments/ihi_central_line_bundle_0.pdf (G)

Kim, J. S., Holtom, P., &Vigen, C. (2011). Reduction of catheter-related bloodstream infections through the use of a central venous line bundle: Epidemiologic and economic consequences. *American Journal of Infection Control*, 39(8), 640-646. doi:10.1016/j.ajic.2010.11.005 (R.