An-Najah National University

Faculty of Graduate Studies

HEPARINIZATION VERSUS SALINE FLUSH OF CENTRAL VENOUS CATHETER (CVC) LUMENS IN CRITICAL CARE UNIT PATIENTS IN LARGE TERTIARY HOSPITAL

By
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Dedication

إلى أبي الذي فارقنا بجسده، ولكن روحه ما زالت تُرفرف في سماء حياتي.

إلى أمي.... من علَّمتني العطاء، وغمرتني بحنانها وكرمها.

إلى أقرب الناس إلى نفسي. زوجي الغالي حكيم.

إلى روحي وقُرَّة عيني ونبض فؤادي ابنائي (كنان،توليب، اوركيد، مكة).

إلى إخوتي واخواتي محمد ، احمد،محمود، اماني،سمر، أسيل سندي وعضدي ومشاطري أفراحي وأحزاني.

الى عائلة زوجي عائلتي الثانية.

الى من زرعوا في حب العلم و روح الاصرار، قدوتي و اساتذتي الفاضلين.

الى الذين يفرحهم نجاحنا و يحزنهم فشلنا، الأقارب دما و قلبا و وفاء.

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Declaration

I, the undersigned, declare that I submitted the thesis entitled:

HEPARINIZATION VERSUS SALINE FLUSH OF CENTRAL VENOUS CATHETER (CVC) LUMENS IN CRITICAL CARE UNIT PATIENTS IN LARGE TERTIARY HOSPITAL

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: إيناس عبد الكريم خليل طالب

Signature: Enas Talb

Date: 28/12/2022

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HEPARINIZATION VERSUS SALINE FLUSH OF CENTRAL VENOUS CATHETER (CVC) LUMENS IN CRITICAL CARE UNIT PATIENTS IN LARGE TERTIARY HOSPITAL

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Abstract

Background: The central venous catheter (cvc) has a risk of complications, including catheter thrombosis. To prevent this thrombosis, flushing of CVC is needed. There are several methods for flushing (CVC): the first one is heparin with saline after each use while the second method is saline flush.

Objectives: To assess the effectiveness of intermittent flushing of normal saline versus heparin to prevent occlusion in long□term central venous catheters among adult patients in the ICU of Large Tertiary Hospital.

Methodology: Randomize Control trial (RCT) design was used in this study. The sample was selected from all patients who were admitted to the ICU department of An-Najah Hospital during the period of August 2020 to October 2020 and have CVC. Patients were selected in a convenience method, and 53 patients agreed to participate in the study. These patients were distributed randomly into two groups; an experimental group (n =26 patients) and a control group (n =27 patients). The experimental group was given flush (a combination of heparin and normal saline), and the control group was given a flush with (normal saline only). To monitor the two procedures, the researcher developed a Check list that included demographic data, lab values, hemodynamic, Patency and complication of CVC. The researcher was able to fill the checklist for every patient.

Results: The results showed that coagulation profile (PTT) was less than 35 seconds at admission for experimental group (76.9%) versus control group that got (48.1%) at significant level of P value; (0.031). For easy patency of CVC, the experimental group got (69.2%) which was higher than control group; (37%) while in moderate and difficult patency, the experimental group had less value than the control group (40.7% VS 26.9) and (22.2% VS 3.8%) respectively, at significant level of P value of (0.035). No

differences were noticed between the experimental group and the control group in occurrence of complication such as discharge color around CVC, Swab culture result, Oozing from the CVC site.

The study showed that dressing daily was for the control group (96.3%) while it was weekly for the experimental group (76.9%).

Conclusion: There was a significant difference in the coagulation profile only at admission (p value is 0.031) and significant in patency (p value is 0.035). CVC of the experimental group (combination N/S with heparin group) showed easier patency than the control group (normal saline group), while there was no significant difference in the complications between the two groups.

Recommendation: Nurses working at the ICU units should be oriented about the use of normal saline (0.9%) alone without heparin to flush CVC for adult patients. The benefit of this method should be emphasized as to decrease cost of heparin use, and to avoid any adverse effects with heparin use

Keywords: Central Venous Catheter (CVC), Heparin, Normal Saline (NS),

Chapter One
Introduction

1.1 Background

It is important to consider the effectiveness and safety of different solution when flushing Central venous catheters (CVCs) in order to reduce the risk of complications. One solution that is commonly used for flushing CVCs is normal saline, which is a sterile, isotonic solution that is composed of water and electrolytes. Another solution that is sometimes used for flushing CVCs is heparin, which is an anticoagulant that can help to prevent blood clot from forming in the catheter.

It is important to note that both normal saline and heparin have their own potential benefits and drawbacks when it comes to flushing CVCs. Normal saline is a widely available and inexpensive solution that is generally considered to be safe for use in most patients. However, it may not be as effective as other solutions at preventing catheter – related complications, such as thrombosis or infection.

On the other hand, heparin is a more potent anticoagulant and may be more effective at preventing complications related to thrombosis. However, it can also increase risk of bleeding and may not be suitable for use in all patients specially those who have a history of bleeding disorders or are taking medication that may increase the risk of bleeding.

Overall, the decision of which solution to use for flushing CVCs should be based on the specific needs and characteristics of the patient, as well as the potential benefits and risks of each solution. It is important for health care provider to carefully consider the available evidence and consult with colleagues or guidelines when making this decisio.

Central venous catheter (CVC) is a catheter with a tip inside the right atrium, inferior vena cava, or the proximal third of the superior vena cava. This catheter is often used for patients in the ICU who requires frequent and prolonged treatment as administering medication for Pain, infection, or other medical issues. Further uses of the CVC include access for infusion of irritant medication such as chemotherapy, total parenteral nutrition, bad peripheral access, and long-term therapy as plasma exchange, renal replacement therapy, and antibiotics (Dhindsa, 2019). The handling of catheters and

intravenous (IV) drug infusion pose a significant burden for in-hospital patient care and may be linked to substantial catheter-related morbidity and pain. Despite being simple to install, peripheral catheters (PCs), frequently need to be replaced due to the possibility of getting blocked by superficial venous thrombosis (SVT), or phlebitis. Additional venous punctures are typically required since peripheral catheters cannot be utilized consistently for blood sample. So, many patients in intensive care units generally need to apply central venous catheter to be utilized for numerous purposes and for prolonged periods (Periard et al., 2008).

The adult patient has three locations where a CVC could be implanted. There are benefits and flaw to each. The femoral vein, subclavian vein, and internal jugular vein are among the placement sites. The most direct routes from the superior vena cava to the right atrium are through the right internal jugular vein and left subclavian vein. Patients with coagulopathy may benefit more from using the compressible femoral veins (Tan & Gibson, 2006).

In order to increase the standard of care, doctors carefully assess the type of CVC they used-for many patients in the ICU. There are four different varieties of central venous catheters: catheters that are not tunneled, tunneled, peripherally implanted, and completely implantable (Dhindsa, 2019).

However, the use of central venous catheters has a risk of complications, including problems with the (CVC) insertion, infections at the site of insertion, and problems with catheter thrombosis. To prevent some complications such as forming a thrombosis, flushing of central venous catheter is crucial then. There are several methods for flushing (CVC), but the first one is to apply heparin either after each use or on a regular basis. It is well known that flushing the CVC with anticoagulants as heparin, or maintaining saline solution through the CVC will prevent blood clotting and thrombosis formation in the CVC. Zhong et al., at 2017 demonstrated the efficiency of heparin flush as opposed to regular saline flush in maintaining the patency of central venous catheters and preventing occlusion. In terms of lowering CVC occlusion, Heparin saline (HS) is not superior to normal saline (NS). But for flushing catheters in the short term, HS is marginally superior to NS (L. Zhong et al., 2017).

A central venous catheter is a venous catheter with one or more lumens for blood withdrawal, infusion, and monitoring purposes, and it terminates in the great veins close to the heart. When quick or frequent intravenous access is required, patients have temporary central venous catheters (CVCs) Placed frequently by doctors-which is used to monitor patients in intensive care, administer chemotherapy, or administer intravenous nourishment. However, these catheters have been shown to increase the chance of blood clots, which can block the line, raise infection risk, and spread to other parts of the body, such as the lung(López- Briz et al., 2014), Heparin is a medication that works to stop blood clots and may help stop these negative effects. Heparin, however, can also have very negative side effects like: bleeding, allergic reactions, fall in platelet count, etc (Oduah, Linhardt, & Sharfstein, 2016).

Dal Molin (2014) reported that certain negative effects of heparin use, including autoimmune-mediated heparin-induced thrombocytopenia, allergic reactions, and the possibility for bleeding problems after numerous, unsupervised heparin flushes (Dal Molin et al., 2014).

It was recommended that heparin should be given as 10 units per mL, and to be prepared in 5 ml with (50 units). This is known as combination of heparin and NS that is flushed once or twice weekly. However, using higher or more frequent doses of the heparin-lock solution did not affect the incidence of thrombosis (Goossens, 2015).

To the best of knowledge, there is no study has been conducted in Palestine to describe normal saline versus heparin for patency of central venous catheters in adult patients.

Therefore, this study aimed to assess the effectiveness of intermittent flushing of normal saline versus heparin to prevent occlusion in long- term central venous catheters among adult patients in the ICU of Large Tertiary Hospital.

1.2 Problem Statement

Using About 40% of catheter-related complications, which are the main causes of catheter dysfunctions related to CVCs, are widely used in critical care units and are associated with complications like hematoma, pneumothorax, infections. CVC obstruction may lead to venous thrombosis or develop a fibrin sheath. Catheter-related thrombosis is influenced by a number of factors, including the patient's health, the

catheter's position and lumen size, the insertion site and technique, and the flushing solution's composition. Therefore, maintaining catheter patency and extending its lifespan are essential for reducing the danger of catheter occlusion. To achieve this, the clinician must properly flush the catheter using solutions like heparin or 0.9% sodium chloride (Sharma et al., 2019).

The most widely used method to prevent thrombus development in CVCs is heparin flushing, which is also regarded as a standard practice to maintain the patency of CVCs. However, the efficacy of this accepted procedure is still debatable and linked to various side effects, including heparin-induced thrombocytopenia (HIT), allergy, and bleeding risk (Cuker et al., 2018).

In Palestine, in some Large Tertiary Hospital, the protocol of flushing CVC is to use normal slain only, but in other private and governmental hospitals in Palestine the protocol is to use heparin slain flush for CVC. This contradiction in the use of flush in the Palestinian hospitals is worth studying; to understand which is the best method to be used.

As a result, numerous researches with contradictory findings have been released, sparking additional discussion about what is the preferable approach for CVC maintenance. Therefore, this RCTs was carried out to assess the effectiveness of heparin in maintaining CVCs patency when compared with normal saline.

1.3 Significance of the Study

This is the only study compared between flush of CVC Heparin or N/S.9% & complication of use heparin flush in Palestine which defined which type of flush is enough to maintain CVC patient without any complication, increase awareness of health team in hospitals about complication of heparin when flush CVC and to decrease cost of treatment.

1.4 Aims of the Study

This study aimed to assess the effectiveness of intermittent flushing of normal saline versus heparin to prevent occlusion in long-term central venous catheters among adult patients in the ICU of Large Tertiary Hospital through achieving the following objectives:

1. Finding out a difference between the result of coagulation profile(PTT) when flushing with Normal Saline or heparin saline.
2. Finding out a difference between the patency of central venous catheter when flushing with Normal saline or heparin saline.
3. Finding out a difference of complication related to flushing with normal saline or heparin saline.

1.5 Questions of the Study

This study aimed to explore the following questions:

1. Is there is a difference between the result of coagulation profile (PTT) when flushing with Normal Saline or heparin?
2. Is there is a difference between the patency of central venous catheter when flushing with Normal saline or heparin?
3. Is there is a difference of complication related to flushing with normal saline or heparin?

1.6 Study Hypotheses

This study aimed to test the following statistical hypotheses (null hypothesis):

H_0: There is no significant difference between results of coagulation profile (PTT) when flushing with Normal Saline compare with flushing with heparin saline at a significant level of P value (0.05).

H_0: There is no significant difference between the patency of central venous catheter when flushing with Normal saline compare with flushing with heparin saline at a significant level of P value (0.05).

H_0: There is no significant differences of occurrence of complication when flushing with Normal Saline compare with flushing with heparin saline at a significant level of P value (0.05).

1.7 Conceptual Framework

1.7.1 Conceptual Definition

Central venous catheters (CVCs): A tube having a tip placed within the right atrium, inferior vena cava, or the superior venacava's proximal third is known as a central venous catheter. Catheters can be inserted into a proximal central vein or a peripheral vein, most typically the internal jugular, subclavian, or femoral vein (Dhindsa, 2019).

Intravenous tube (IV): It's thin and about an inch long. It goes into your arm or hand (Dhindsa, 2019).

Heparin: Itis a drug that, even when used sparingly in CVC optimization, works as an anticoagulant by inhibiting platelet aggregation at the level of the coagulation cascade, leading to thrombocytopenia and bleeding.

Sodium Chloride (Normal Saline 0.9%): An isotonic concentration of sodium chloride is best suited for the parenteral replacement of chloride losses that exceed or equal the sodium loss. Within each 100 mL of 0.9% sodium chloride Injection USP, there is 15.4 mEq of sodium ions and 15.4 mEq of chloride ions (Chang & Holcomb, 2016).

ICU: "is a structured approach to caring for critically ill patients that entails providing them with specialized, intensive medical and nursing care, increased monitoring capabilities, and a variety of physiologic organ support modalities to keep them alive while their organ systems are in danger of failing completely (Marshall et al., 2017).

Lepirudin: Recombinant Lepirudin inhibits thrombin by binding to both free and thrombin that is attached to a clot, recombinant Lepirudin directly and permanently blocks thrombin. It is approved to treat unfractionated heparin-induced thrombocytopenia (HIT), a severe antibody-mediated adverse drug reaction that is usually caused by the use of unfractionated heparin(Salmela, 2010).

Vital signs: are measurements of the body's most basic functions. The four main vital signs routinely monitored by medical professionals and health care providers include the following: Body temperature, Pulse rate,Respiration rate,Blood pressure (X. Zhong, 2020).

PTT: A partial thromboplastin time test uses a blood sample to measure how long it takes for your blood to make a clot (McPherson & Pincus, 2021).

Hickman line: Itis a central venous catheter that is typically employed to deliver chemotherapy or other medications and to take blood samples for testing. Some variations are mainly employed in apheresis or dialysis. When long-term intravenous access is required, Hickman lines are used because they can last for a long time (Teichgräber, Pfitzmann, & Hofmann, 2011).

Positive-pressure–valve cap: devices that prevent blood from refluxing backward will reduce CVC occlusion and make flushing simpler by eliminating the need for heparin solutions (Teichgräber et al., 2011).

Age: "The duration of life or existence to the moment pronounced; the duration of a being's or thing's existence. Or a period of time measured in years beginning at birth and marked by a specific stage or degree of mental or physical development, as well as by the potential for legal responsibility (Tanner & Tanner, 1990).

1.7.2 Operational Definition

Patient with Central venous catheters (CVCs): A person needs catheter that has its tip inside the right atrium, inferior vena cava, or the proximal third of the superior vena cava is required. A peripheral vein or a proximal central vein, most frequently the internal jugular, subclavian, or femoral vein, can be used to place catheters (Dhindsa, 2019).

ICU: Patients who have been admitted to the intensive care unit (ICU) or died there.

Age: Adult patients are those that are over the age of 18 years.

Gender: In this study, both genders (male and female) were assessed.

Chapter Two
Literature Review

2.1 Introduction

The research literature on the main concepts of this study is examined in this chapter. The literature review serves as a solid foundation for writing a research paper. It contributes to the study's basis and may elicit fresh research ideas. The report's early literature analysis gives readers a foundation for understanding current knowledge about the issues and emphasizes the significance of the new study. It contains two parts: Background and Previous Studies.

2.2 Search Strategy

A thorough literature search was carried out utilizing a variety of electronic databases, including Science Director, Springer, Google Scholar, PubMed, and CINAHL. The study thoroughly examined crucial topics such as Central Venous Catheter (CVC), heparin flush, and, normal saline flush which were previously found in the similar study.

For literature that is likely to be relevant, checklists of selected articles were searched. The relevancy of the selected articles was established by drawing abstracts of the papers. This method has led to the discovery of a vast volume of literature. The papers were then organized into categories based on the study's keywords and subjects. Original research was identified in journals that were available in English in full text.

2.3 Background

2.3.1 Central Venous Catheter

The terminal lumen of a central venous catheter (CVC) is located within the inferior vena cava, superior vena cava, or right atrium after being advanced into a major, central vein (most frequently the internal jugular, subclavian, or femoral). These components and the methods used to install them are referred to as central lines or central venous access. The first description of a CVC location dates back to 1929. Central venous access quickly advanced over the ensuing decades into a crucial experimental tool for researching heart physiology and a critical clinical tool for treating numerous disease processes. (Lockwood & Desai, 2019).

Treatment of seriously sick individuals requires implantation CVC. Depending on the reason for catheter implantation, central venous catheters can be used for a variety of purposes. In general, central venous catheters were used to administer medications known to cause vasoconstriction as well as known venous irritants. They were also used to perform plasmapheresis or dialysis, as a conduit to measure central venous pressure, or to insert additional devices for more complicated procedures. In 1929, a CVC was installed (Jamshidi, 2019).

There are many different and frequently contextual indications for central venous access. They are, in no particular order:

1. Peripheral intravenous access, such as vasopressors, total parenteral nutrition chemotherapy, and other acidic drugs, may not be compatible with many infusions.
2. Unable to get venous access in an emergency.
3. The start of extracorporeal treatments such continuous renal replacement therapy, plasmapheresis, and hemodialysis.
4. Monitoring of the hemodynamics, such as central venous pressures.
5. For venous procedures such as intravenous stenting, the installation of an inferior vena cava filter, thrombolytic treatment, and transvenous cardiac pacing. (Jamshidi, 2019).

A catheter with a tip in the superior vena cava, inferior vena cava, or the right atrium is referred to as a central venous catheter. Also, Catheters can be inserted into a central vein or a major peripheral vein, most typically the subclavian, internal jugular or femoral vein (Lockwood & Desai, 2019).

Contraindications for CVC:

1. At the prospective location of the central line, there is an active skin or soft tissue infection.
2. Implantable/indwelling devices at the site, such as pacemakers and hemodialysis catheters, might cause anatomical deformation.
3. Vascular injury close to or far from the catheter insertion site, such as those caused by trauma.

Contraindications relative:

1. Coagulopathy, despite the fact that only 0.8% of cases involve clinically severe bleeding.
2. The risk of adverse outcomes appears to be higher in people who have thrombocytopenia.
3. Uncooperative patient who is awake.
4. Congenital landmark distortion (Lockwood & Desai, 2019).

Equipment

There are multiple producers of central venous catheter insertion kits, as well as numerous varieties of catheters. One will typically need an ultrasound machine with a high-frequency linear transducer, sterile products, a mask, and a head covering, the introducer kit with a central venous catheter, lidocaine, various sterile syringes, sterile saline flushes in 10 cc disposables syringe, a sterile occlusive dressing, and a bio-patch.

Items that are not sterile.

A surgeon's cap or a bouffant.

Mask with eye protection.

Sterilized items

1. Accoutrements for personal defense, such as gloves and a robe.
2. Drape a mask (4x4).
3. Swabs made of chlorhexidine or a comparable antiseptic.
4. Sterile ultrasound gel and sterile ultrasound probe covers.
5. Catheter caps or biopatch "Luer locks" for every lumen.

Kit for a central venous catheter often contains:

1. Venous catheter, central (triple-lumen, dual-lumen, or large bore single-lumen).
2. Introducer in 18 gauge.
3. Blade Scalpel.
4. Guidewire.
5. Vasodilator.

6. Suture Material (generally 3-0 silk suture with a straight needle or a needle driver).
7. Saline lock.
8. 1% lidocaine, a tiny gauge needle (25 or 27 gauge), and a syringe.
9. High-frequency linear transducer lumen on an ultrasound device (Jamshidi, 2019).

Personnel

A proceduralist with experience in the method should insert CVCs, with the aid of a nurse.

Preparation

It is imperative to initially, if at all feasible, get agreement for the procedure. Discuss the procedure's dangers, advantages, and potential drawbacks. Once permission has been gained, let nursing know that the patient will be getting a central venous catheter. To preserve the highest level of sterility, gather the aforementioned tools and the required personnel while removing any visitors or extra staff from the area. Use the ultrasound equipment to evaluate the preferred access point (internal jugular, subclavian, or common femoral veins), noting any anatomical changes, nearby structures, and the simplicity of the treatment at that site. Put the patient in a posture that will benefit the procedure anatomically (Zhong et al., 2017).

The patient should be positioned in the Trendelenburg position for the internal jugular vein and subclavian to enlarge the vascular and increase the likelihood of first-pass success. The patient should be supine in order to access the femoral vein. Adjust the bed's height, and remove any clothing, jewelry, or extra equipment that might prevent the creation of a clear, sterile field. The patient needs to be hooked up to a cardiac monitor with telemetry and the ability to cycle vital signs every five minutes. (Gorji, Rezaei, Jafari, & Cherati, 2015).

Cleanse and get the patient ready for the surgery after an ultrasound scan of the anatomy is done quickly. Put on the non-sterile personal protection equipment and do hand hygiene when the primary nurse is present and the patient is prepared. Create a "sterile field" by opening the sterile apparatus. The pure wraps can be opened outward and away from the proceduralist by gripping the corners and doing so. Clean the area with your selected antiseptic after a sterile field has been established. Make the vascular

probe ready so that it can be quickly covered with a sterile probe cover. Wear the sterile PPE and prepare the central venous catheter by connecting saline locks with saline flushes and flushing all of the ports to make sure there are no leaks after that. Next, take the saline lock out of the port that is furthest away. With the access point over the procedure location, drape the patient with the sterile material. Use the sterile probe cover to encase the ultrasonic probe. To prevent the probe from slipping off the sterile field during the procedure, the needle driver from the central line kit may clamp the proximal portion of the probe cover to the sterile drape. Before starting the treatment, make sure that all the necessary equipment is accessible. The proceduralist should conduct a "time out" with nurses just prior to the surgery. (Babu et al., 2014).

Technique

The patient should be lying flat for subclavian access or in the Trendelenburg position for IJ. Depending on the anatomy of the patient, a cushion may be positioned behind the spinal column to aid SC vein entry and dilatation.

Following the completion of preparation, the following actions should be taken:

Use 1% lidocaine to numb the skin and subcutaneous tissue while locating the vein under the assistance of ultrasound. If in doubt, use doppler color flow to see if the vessel is compressible (in awake patients).

Use the ten-cc syringe-attached finder needle under ultrasound guidance to move the hand through the skin while maintaining negative pressure on the syringe until a flash of black venous blood appears. Make sure to keep the needle tip's dynamic depiction in focus as it enters the vessel.

Once the venous blood has been aspirated, remove the needle from the syringe, stabilize it with the dominant hand, and then thread the guidewire through it. The wire needs to move forward swiftly. If there is any resistance, you might not be within the vessel, there might be something blocking the way distally, or the wire's j-tip might be moving backward. Try to unthread and rethread the wire. Ectopy can be observed if the cable enters the appropriate atrium. The cable should be quickly pulled back until the arrhythmia stops if telemetry shows any ectopy or arrhythmia. Usually, only a portion ofStabilize the wire between two or more fingertips once it reaches 15 cm (three hash

marks), at which point you should withdraw the needle carefully to avoid unintentionally sticking yourself. Hold onto the wire at all times!

Reimage the vessel with ultrasound in both a transverse and longitudinal plane once the needle has been taken out. It is important to see the wire within the vessel lumen. Do not move on to the following step if you cannot see the wire within the lumen. If you are unsure whether the wire is in the vessel's lumen, remove it, apply pressure to the area, and then try again with the finder needle or an other anatomic point to get access to the boat. the wire needs to be removed.

Some practitioners employ manometry to confirm that the catheter is in the venous system and not the artery system in addition to the dynamic ultrasound viewing of the process. To do this, an angiocatheter is threaded over the wire, the wire is cut, and the central venous catheter's associated extension set is connected and held in the air. If the angiocath is in the venous system, the meniscus created by the blood column that slowly fills the extension tubing should plateau. In shock situations, this approach is time-consuming and unreliable. Nevertheless, it can be useful for the subclavian approach, which dynamic ultrasound imagery frequently makes challenging to properly execute.

After confirming that the wire is inside the vessel lumen, "preload" the dilator onto the guidewire and thread it in the direction of the wire-and-skin junction. The distance between the dilator and the edge of the skin should be 2 to 3 cm. Use the scalpel to produce a tiny nick in the skin by gliding the blunt end of the blade along the wire to create an incision that is half as deep as the blade and about 0.5 cm wide. After removing the scalpel, insert the dilator through the wound. Pre-loading the dilator makes insertion easier and reduces blood loss.

Apply gentle, consistent pressure while holding the dilator in its middle, occasionally with a little twisting motion, to widen the soft tissue and allow the central venous catheter to pass through. It will be necessary to insert the dilator into the skin/soft tissue area from around one-third to half of its length. This is dependent on the anatomical location and particular central venous catheter. Dialysis catheters will need to be dilated in stages with progressively larger dilators, and the incision may need to be widened with a scalpel numerous times.

To maintain sterility and reduce bleeding, remove the dilator and cover the wound with sterile gauze. Once more, the proceduralist must always maintain control of the guidewire.

Over the guidewire, thread the central venous catheter. To aid control the guidewire while advancing the catheter, slide it just a little bit outside the skin.

Holding the central venous catheter's distal end, slowly insert it through the vascular lumen until the proximal hub is close to the insertion point. Always keep one hand on the guidewire while performing this procedure. When advancing the catheter, sliding the guidewire just a little bit out of the skin can assist regulate it. The guidewire can be carefully dragged through the distal port once the catheter is fully placed (usually brown).

Aspirate blood with a syringe, expel air from each port, and then flush with sterile saline solution. Each port's end may have "Luer locks" added to it either before or after this stage.

Two sutures should be used to close the central venous catheter, a bio-patch should be positioned between the catheter hub and the skin, and a sterile occlusive dressing should be applied to the area where the catheter enters the skin. Bins for biohazard waste should be used to dispose of clean draperies and soiled, non-sharp items. Bins for sharps should be used for all sharps. The procedurelist should ensure that the line is properly positioned into a central vein before returning the patient to a comfortable position.

Some practitioners employ manometry to confirm that the catheter is in the venous system and not the artery system in addition to the dynamic ultrasound viewing of the process. To do this, an angiocatheter is threaded over the wire, the wire is cut, and the central venous catheter's associated extension set is connected and held in the air. If the angiocath is in the venous system, the meniscus created by the blood column that slowly fills the extension tubing should plateau. In shock situations, this approach is time-consuming and unreliable. Nevertheless, it can be useful for the subclavian approach, which dynamic ultrasound imagery frequently makes challenging to properly execute.

Some medical professionals employ manometry in addition to ultrasound's dynamic view of the process to make sure the catheter is in the venous rather than the artery

system. The supplied extension set for the central venous catheter is attached and held in the air while an angiocatheter is threaded over the wire, the wire is removed, and this is accomplished. If the angiocath is in the venous system, the blood column that gradually fills the extension tube should plateau and create a meniscus. This approach is time-consuming and unreliable in shock conditions, though. However, it can be useful for the subclavian approach, which is frequently challenging to fully execute with dynamic ultrasound visualization.

After confirming that the wire is inside the vessel lumen, "preload" the dilator onto the guidewire and thread it in the direction of the wire-and-skin junction. The distance between the dilator and the edge of the skin should be 2 to 3 cm. Use the scalpel to produce a tiny nick in the skin by gliding the blunt end of the blade along the wire to create an incision that is half as deep as the blade and about 0.5 cm wide. After removing the scalpel, insert the dilator through the wound. Pre-loading the dilator makes insertion easier and reduces blood loss.

Apply gentle, consistent pressure while holding the dilator in its middle, occasionally with a little twisting motion, to widen the soft tissue and allow the central venous catheter to pass through. It will be necessary to insert the dilator into the skin/soft tissue area from around one-third to half of its length. This is dependent on the anatomical location and particular central venous catheter. Dialysis catheters will need to be dilated in stages with progressively larger dilators, and the incision may need to be widened with a scalpel numerous times.

To maintain sterility and reduce bleeding, remove the dilator and cover the wound with sterile gauze. Once more, the proceduralist must always maintain control of the guidewire.

Over the guidewire, thread the central venous catheter. To aid control the guidewire while advancing the catheter, slide it just a little bit outside the skin.

Holding the central venous catheter's distal end, slowly insert it through the vascular lumen until the proximal hub is close to the insertion point. Always keep one hand on the guidewire while performing this procedure. When advancing the catheter, sliding the guidewire just a little bit out of the skin can assist regulate it. The guidewire can be

carefully dragged through the distal port once the catheter is fully placed (usually brown).

Aspirate blood with a syringe, expel air from each port, and then flush with sterile saline solution. Each port's end may have "Luer locks" added to it either before or after this stage.

Two sutures should be used to close the central venous catheter, a bio-patch should be positioned between the catheter hub and the skin, and a sterile occlusive dressing should be applied to the area where the catheter enters the skin. Bins for biohazard waste should be used to dispose of clean draperies and soiled, non-sharp items. Bins for sharps should be used for all sharps. The procedurelist should ensure that the line is properly positioned into a central vein before returning the patient to a comfortable position.

Three techniques, including dynamic ultrasound guidance, guarantee proper placement of a central venous catheter. A chest x-ray can be taken, a venous blood gas can be obtained from the central line's distal port, and the distal port can also be used to measure central venous pressure. The central venous pressure (CVP) and blood gas are optional. Nevertheless, a chest x-ray should be taken after every IJ and SC CVC installation to ensure proper positioning and to make sure no issues (like an iatrogenic pneumothorax) have developed. The inferior vena cava (IVC) or superior vena cava (SC/IJ) should be visible on the x-ray as the location of the central venous line's distal tip (femoral) (Lockwood & Desai, 2019).

Complications

There are many potential issues that could arise not just from the indwelling equipment but also from the procedure of placing a central venous catheter.

procedural complications

Arrhythmias, usually ventricular or bundle branch blockages brought on by guidewire atrioventricular or ventriculoventricular irritation.

Arterial bleed.

Puncture of the lungs with or without pneumothorax as a result.

Hematoma development from bleeding can block the airway.

Tracheal damage.

During venous puncture or catheter removal, air emboli.

Postoperative complications.

Infections of the bloodstream caused by catheters, either bacterial or fungal [33].

Stenosis of the central vein.

Thrombosis.

Multiple efforts at delayed bleeding in a coagulopathic patient. (Babu et al., 2014).

2.3.2 Heparin

In 1916 Heparin, was discovered by Mclean in an attempt to separate a thromboplastic factor, is the oldest anticoagulant still in use in modern medicine. A natural polymer found in mast cells; Its first usage in a clinical setting began in 1935 after additional research (Oduah, Linhardt, & Sharfstein, 2016).

Even when administered sparingly in CVC optimization, the anticoagulant heparin inhibits platelet aggregation at the level of the coagulation cascade, increasing the risk of thrombocytopenia and bleeding (Santos et al., 2015).

2.3.3 0.9% Sodium Chloride (Normal Saline)

Chloride ions total 15.4 mEq and Salt ions total 15.4 mEq in 0.9% sodium chloride, which are considered to be an isotonic concentration. The pH ranges from 4.5 to 7, and is employed for parenteral replacement when chloride losses exceed or are comparable to sodium losses. Additionally, the osmolality of 0.9% Sodium Chloride Injection USP is 308 mOsm/L per 100 mL (Tonog & Lakhkar, 2019).

The use of saline on a regular basis might cause an iatrogenic excess. Individuals' treatment with precise consideration of intravenous infusions for those with impaired renal function and congestive heart failure. Because this complication is especially concerning in these patients (Hayes, 2019).

2.4 Previous Studies

Heparins flushing to prevent catheter occlusion have weak evidence bases and low-quality published studies, according to a comprehensive evaluation of effectiveness undertaken by Mitchell, Anderson, Williams, & Umscheid, 2009. It is not clear from the available data whether flushing a catheter with heparin is superior to flushing it with saline solution (Mitchell, Anderson, Williams, & Umscheid, 2009).

A randomized trial comparing 0.9% sodium chloride and heparin to keep central venous catheters open that was carried out at Barnes-Jewish Hospital in 2012 by Schallom, et al. A total of 709 lumens from 326 central venous catheters were evaluated and used for the research. (N = 314) In the heparin group, the no patency rate was 3.8%, but (n = 395) in the 0.9% sodium chloride group. The time to initial patency loss according to the Kaplan-Meier analysis did not differ substantially among groups. Flush failure and loss of blood return were encountered by both the 0.9% sodium chloride and heparin groups at similar rates. No patency rates for pressure-injectable. The researchers Conclusion sodium chloride flushing and Heparin flushing similarly high rates of lumen patency. Central venous catheter for short-term usage. It could be best to use 0.9% sodium chloride as a flushing agent. due to the possibility of safety issues while using heparin (Schallom, Prentice, Sona, Micek, & Skrupky, 2012).

Similar findings were highlighted in 9% sodium chloride or heparin to keep the central venous catheter open in 2014 by Babu et al. They sampled 100 adult patients who needed short-term CVC between March 2012 and August 2012 and examined the effects of two flush solutions on catheter lumen patency: 0,9% sodium chloride and heparin. In conclusion, the study has shown that 9% sodium chloride and heparin flushes do not significantly affect catheter patency. in adult patients using CVCs for a brief period of time (Babu, Rao, Rajesh, & Babu, 2014). In the Heparin group (two lumens), the non-patency was 4% but in the Sodium Chloride group (four lumens)., it was 8% (Babu et al., 2014).

Eduardo López-Briz et al., conducted randomized controlled trials (RCTs) in Spain (2014) When 0.9% normal saline flushing and intermittent heparin flushing for central venous catheter maintenance were contrasted, we looked for solid evidence of significant differences in terms of efficacy or safety. Our findings raise questions about

continued use of heparin in catheter flushing outside of clinical trials because It costs more than normal saline (López- Briz et al., 2014).

While the purpose of the study, which was carried out by Eduardo López- Briz et al. in 2014, aimed to assess the efficacy of 9% saline flush and heparin flush in reducing adult CVC occlusion risk. Who discovered that saline solution is adequate for maintaining the catheter opens, reducing the risk associated with taking heparin (López- Briz et al., 2014).

Heparin Required for Central Venous Catheter Flushing? This question is a study implemented in 2014 by Dal Molin et al. The researcher searched MEDLINE and CINAHL databases with the use of Bayesian hierarchical modeling and network meta-analysis. Parameter values for catheter occlusion were combined. 462 references were found by the researcher. There were eight studies in total. There was no proof that heparin reduced occlusions more effectively than regular saline. It was uncertain if urokinase and lepirudin reduced occlusions better than heparin. The catheter patency does not seem to be extended by vitamin C solution. The research found no evidence to support the idea that flushing heparin is more efficient. at preventing catheter occlusions than regular saline or other treatments. Given the scanty and conflicting information that is currently available in this area, additional research may be required (Dal Molin et al., 2014).

Gorji, Rezaei, Jafari, & Cherati, 2015 did a study at the Roohani Hospital in the city of Babol. On patients (N=84) with central venous catheters in the ICU, a double-blind study was conducted. Divided At random, the patients were split into two groups and given heparin-saline in group 1 and plain saline in group 2. In the heparin group, 3 cc of heparin saline solution was also administered into the catheter after each medication injection into the lumen. Group 2 was merely given 10 cc of ordinary saline. The catheters were examined for flushing and blood return every eight hours for 21 days. Then, descriptive and analytical statistics were examined. The outcome showed that there was no discernible change After coming to the conclusion that there may be heparin side effects and that the use of heparin did not significantly affect catheter patency under study, the researcher ultimately advised using normal saline solution in order to keep central venous catheters open (Gorji, Rezaei, Jafari, & Cherati, 2015).

An Italian study CINAHL and MEDLINE databases were searched by Alberto Dal Molin et al., in 2015. Randomized controlled trials Investigations evaluating the effectiveness of using normal saline vs. heparin or another solution to flush CVC in patients were desired. To find pertinent publications, two reviewers separately screened abstracts. 462 references were found by the reviewer. There were eight studies in total. Following that, the study found There was no evidence that heparin prevented occlusions any better than normal saline. The researcher came to the conclusion that there is no proof that heparin flushing is any more successful at preventing catheter occlusions than regular saline or other solutions. The identical two reviewers both restored and assessed entire texts. Using network meta-analysis and Bayesian hierarchical modeling, parameter estimates for catheter occlusion were gathered. They mentioned some negative effects related to heparin use, such as the possibility of bleeding complications after numerous, unmonitored heparin flushes, allergic reactions, and autoimmune-mediated heparin-induced thrombocytopenia (Dal Molin et al., 2015).

In an experiment, Zhong et al., 2017 found that heparin saline was not more effective than regular saline at preventing CVC blockage. However, a statistical point evaluation shows that, In the near term, using HS is just slightly better than using an NS flushing (Zhong et al., 2017).

A Spanish study, Controlled Trials, which was conducted by (Lopez-Briz, Garcia, Cabello, Bort-Marti, & Sanchis, 2022. Additionally, searches were done in the clinical trials, MEDLINE, CINAHL, Embase, and other databases. To assess in adults the safety and efficacy of intermittent Central venous catheter versus heparin locking with normal saline (NS) in preventing occlusion. RCT that assessed intermittent locking with heparin at any dose in combination with normal saline in individuals with CVC who were 18 years old NS were included in the researchers' selection criteria. Two review writers independently chose the trials, assessed their quality, and collected the data. When necessary, the researcher contacted the trial authors to obtain more data. The researcher rated the overall strength of the supporting evidence for the determined outcomes following statistical analysis utilizing Review Manager 5. The intended subgroup analysis was carried out by the researcher. Using Review Manager 5, the researcher evaluated the overall quality of the evidence that supported the determined results of the statistical analysis. The researcher performed the intended subgroup

analysis. Heparin concentrations (10 to 5000 IU/mL) varied, as did the unit of analysis (person, catheter, line access), procedures, and length of follow-up (1 to 251.8 days), according to the researcher (Lopez-Briz, Garcia, Cabello, Bort-Marti, & Sanchis, 2022).

The combined results from these trials revealed very low-quality data and showed that heparin caused fewer occlusions than NS. By unit of analysis, the subgroup analysis was conducted, and subgroup differences were evaluated. Results indicate no discernible differences between heparin and NS in any of the occlusions when the participant served as the unit of analysis. According to a subgroup analysis utilizing the catheter as the analysis unit, heparin usage is linked to fewer occlusions. Results from one study using 770-line accesses as the unit of analysis comparing heparin and NS occlusions, there are no apparent changes.

Given this result and the extremely poor quality of the data, researchers are skeptical if intermittent locking with NS resulted in larger occlusions than intermittent locking with heparin.

Low-quality studies suggest that heparin may have little to no effect on patency of catheter and occlusion. Despite the fact that the researchers found no proof of changes in safety, the combined studies are underpowered to identify rare side events such heparin-induced thrombocytopenia (death, sepsis, or bleeding) (Lopez-Briz et al., 2022).

Sharma et al 2019 study compared the effectiveness of heparin flush against standard saline flush in maintaining the patency of CVC in adult patients that uses systemic review. The researcher searched the Cochrane Library and used Cochrane Handbook as a guide. Embase, MEDLINE, Clinical Trials Database, and reference list of relevant English-language papers published between January 2012 and December 31, 2018. In this analysis, nine research totaling 3,113 participants were included. We only included randomized controlled trials (Sharma et al., 2019).

The comparison of intermittent heparin flushing vs. normal saline (0.9% sodium chloride) for the protection of occlusion in long-term central venous catheters in newborns and children was carried out by Bradford, Edwards, & Chan in 2020. In order to avoid blockage in newborns' and kids' long-term central venous catheters. It is crucial to assess the clinical outcomes (benefits and risks) of intermittent flushing with regular

saline against heparin using the search methods of the Cochrane Vascular Specialized Register, Embase, CENTRAL, MEDLINE, and CINAHL databases, as well as the Clinical Trials.gov database register, were all searched through April 9, 2019, by the Cochrane Vascular Information Specialist. To find further research, we also checked references, looked up citations, and contacted study authors. The results showed till this update, that we found one additional study, making four studies in all, the included studies (255 participants). The four trials used diverse heparin concentrations and different techniques for the intervention and control arms, but they all directly contrasted the use of heparin and normal saline. The frequency of flushes varied between trials as well. Additionally, not all research included reporting on every result. Because there was no blinding, there was a high degree of study heterogeneity and inconsistency, and the confidence intervals (CIs) were broad. The evidence has a moderate to very low degree of certainty. All four experiments investigated CVC occlusion. Findings from two studies on CVC blockage and catheter-associated blood stream might be combined; thanks to our ability to do so. The researchers came to the conclusion that there was not enough data to assess the effects of intermittent flushing with normal saline vs. heparin in order to preserve catheter patency in infants and children. It is yet unknown if heparin is required to avoid occlusion, blood stream infection linked with CVCs, or consequences of catheter implantation duration. There is still a lack of agreement among institutions worldwide on the proper use and maintenance of these devices, participants, and this lack of agreement is not documented in the remaining research (Bradford, Edwards, & Chan, 2020).

When compared to normal saline, the consolidated findings from previous studies showed modest benefit for maintaining CVC patency with heparin. We also conducted analysis for secondary outcomes, and aside from heparin-induced thrombocytopenia, there was no proof that heparin was safer than regular saline. The researcher came to the conclusion that heparin had less beneficial benefits to preserve catheter patency than NS 0.9%, but not in side effects.

Chapter Three
Methodology

3.1 Study Design

Randomize (Conveniences sample) Control Trail (RCT s) design and experimental methods were used in this study. This design is chosen because it is the most appropriate to achieve the objectives and aims of this study. RCT have many advantages, bias is minimized, most reliable technique.

3.2 Site and Setting

The research was carried out in An_Najah university Hospital in Palestine. This hospital has the high number of ICU Patient. Communication and data collecting by computerized health system are also easier at this institution.

3.3 Sample Population and Sampling

The population of the Study was, patients with CVC admitted to intensive care units at Large Tertiary Hospital, between (August 2020- October 2020).

The sample was chosen convenience from all ICU department from Large Tertiary Hospital, which was (53) patients according to Steven Thampson equation from ICU. whereas Each patient enters the ICU, and applied CVC for him, after we take his consent to participate in the study.. Patients carry paired numbers (Experimental group) N: 26 flush with heparin saline. Unpaired numbers (control group) N: 27 flushes with Normal Saline.

Sample size (53) was calculated based on the equation of Steven Thampson including:

N: The size of the Populations.

Z: Class standard corresponding to the level of significance (0.95) and is equal to (1.96)

Q: The error rate is equal to (0.05)

P: Ratio provides a neutral property and equal (0.50

3.4 Inclusion and Exclusion Criteria

Inclusion criteria

Patients with central venous catheter (CVC) were included in the study if they were over the age of 18 years, regardless of gender or educational level. They were also admitted to the ICU departments in Large Tertiary Hospital

Exclusion Criteria

On the other hand, patients with

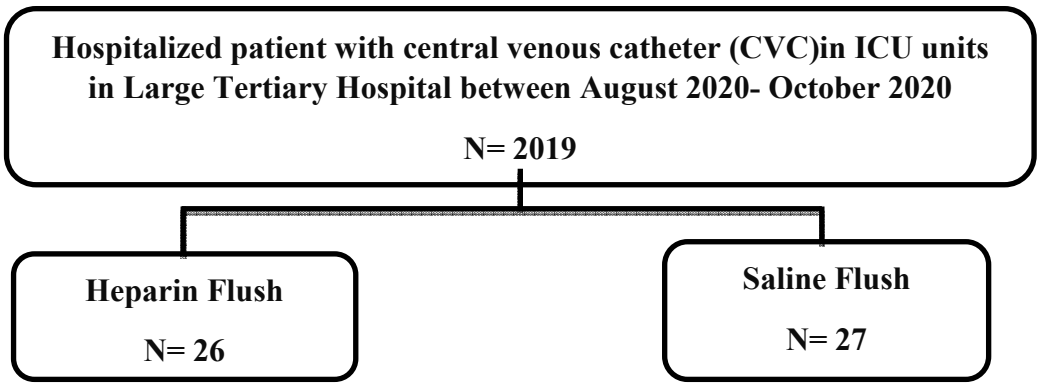
- Hematological disorder.
- Coagulation disorders
- Family history of heparin allergy
- Oral or systemic treatment with anticoagulant drugs
- Patients indicated for abdominal or orthopedic surgery
- Pt. that takes heparin or clexane regularly were excluded.

The following Figure clarifies the study flow diagram.

Study flow diagram of Central Venous Catheter (CVC) Lumens in intensive Care Unit in Large Tertiary Hospital. And flushed with heparin or saline.

Figure 1

flow diagrame of the study



3.5 Period of the Study

From August 2020- October 2020, data were extracted for all ICU patients who were with central venous catheter (CVC) and admitted to Large Tertiary Hospital between August 1st, 2020 and October 30th, 2020.

3.6 Data Collection Tool and Process

After reviewing related literature, the researcher developed a check list (Appendix 1).

After IRB Approval and hospital approval gave patients with CVC that agree to participate in the study numbers. Patients carry paired numbers (Experimental group) N: 26 flush with heparin saline solution given as 10 units per ml and to be prepared in 5 ml with (50 units). Unpaired numbers (control group) N: 27 flush with Normal Saline solution. The data collected by using check list, through face-to-face interviews the patients and nurse by researcher, patients file, and (PTT) test and observation to the CVC site by one expert nurse.

The check list divided into five sections. The first section of the sheet contains 12 questions about basic demographic information such as gender (Male, Female), age, weight, and height, this information taken from patients themselves by (face to face interview) or from file.

The second section was About CVC insertion which contains date of admission, date of CVC insertion, Time of insertion, Time of removing CVC, Date of discharge. Where the CVC was inserted, Dressing of CVC, what is the discharge color around CVC? Dose take swab culture? Swab culture result. this information was taken from a patient`s file and face to face interview with an expert nurse.

The third section is concerned with the Hemodynamic: BP, Pulse, Temperature, SPO2.this information taken by the one expert nurse.

The fourth section is concerned with the Lab test. Which contain CBC: WBCs, RBCs, Platelets, HGB. APTT. This information taken from patient file.

The fifth section is concerned with the Patency of CVC. this information taken by one expert nurse, Whereas, the one expert nurse doing flush for CVC lumens to see the patency.

The check list then divided into two major groups based on flush central venous catheter with heparin saline solution or normal saline solution. (26 pt. heparin saline group and 27 pt. normal saline group).

Data that was retrieved from patients' records was obtained from patients' computerized records, with the researcher retrieving data from patients' records in an institution using an authorized account after received approval. Based on the researcher's clinical expertise and previous training, whereas the researcher did it all by herself and one expert nurse. Missing data from the patient's records is left blank on the data sheet and is treated as a missing value by statistical analysis software, that statistical measures were done according to "all sample" value.

3.7 Validity and Reliability

The check list was developed by the researchers and then reviewed by critical care experts, including an intensives doctor and an academic doctor who specializes in critical care nursing. Their comments were considered when developing the data collection tool to its final form in order to collect data in the most appropriate way for obtaining the best possible data and for the data analysis process.

Reliability is the consistency of the measurement, or the degree to which an instrument measures the same way each time it is used under the same condition with the same subjects (Carole et al., 2008).

3.8 Statistical Analysis

The data acquired from the medical records analyzed using The Statistical Package for Social Sciences (SPSS) software on Windows operating system, using the descriptive and analytical (inferential) functions. The descriptive results included generating frequencies, percentages, mean and standard deviation for the variables related to patients' demographic data, comorbidities, clinical presentation, initial and peak laboratory tests, complications, and length of CVC stay.

Moreover, analytical results included the differentiation between heparin flush and saline flush in their data, including all of the mentioned variables, using Chi-square test for the differentiation according to categorical variables and independent sample t-test for the differentiation according to scale variables.

3.9 Ethical Considerations

The research presented in this thesis was carried out in compliance with the Helsinki Declaration. The approval to begin data collecting was acquired from the Institutional Review Board (IRB) (Appendix B) of the Faculty of Medicine and Health Sciences at An-Najah National University. After that, a facilitating paper was obtained from the AN-Najah University Hospital in order to collect data, consent was obtained from all. Furthermore, the data was kept anonymous; participant information and the results obtained were retained in a secure location where no one could access them; and the data was collected only for research purposes.

Chapter Four
Findings of the Study Statistical Methods

SPSS Version 20 is used for data analysis. Descriptive statistics (Frequencies, Percentages, Means, and Standard Deviations) are used. The following Tests and Methods were used to analyze the results based on that the P-Value (>0.05) which is considered significant, and so the hypotheses of no differences in means or percentages between study groups will be rejected:

1. Chi-Square test: It tests the differences between groups of patients for qualitative or discrete variables such as (Gender, Educational level, History of medical or surgical disease, Where the CVC insertion is, Dressing of CVC, discharge color around CVC, Dose take swab culture, Swab culture result, Oozing from the site of CVC, PTT results, and Patency of CVC results).

2. Two Independent Samples T test: It tests the differences between groups of patients for quantitative or continuous variables such as (Age, height, weight, SBP, DBP, Pulse, Temperature, SPO2, HGB, RBCs, Platelets, and WBCs).

This chapter will present the most important findings of the study in accordance with the questions and hypotheses from which the study was launched.

The following is the Tests of Normality results for the continuous variables; to decide using the parametric or the non-parametric statistical test in the analysis of this study.

Table 1

Tests of Normality results

Variable	Flush solution used for lumens of CVC	Kolmogorov-Smirnov[a]	
		Statistic	P-value
Age	Normal Saline	0.178	0.028
	Combination of N/S and Heparin	0.304	0.000
Height	Normal Saline	0.184	0.019
	Combination of N/S and Heparin	0.170	0.053
Weight	Normal Saline	0.119	0.200
	Combination of N/S and Heparin	0.143	0.183
SBP	Normal Saline	0.120	0.200
	Combination of N/S and Heparin	0.137	0.200
DBP	Normal Saline	0.138	0.200
	Combination of N/S and Heparin	0.212	0.004
Pulse	Normal Saline	0.187	0.016
	Combination of N/S and Heparin	0.114	0.200
Temperature	Normal Saline	0.178	0.027
	Combination of N/S and Heparin	0.171	0.050
SPO2	Normal Saline	0.249	0.000
	Combination of N/S and Heparin	0.305	0.000
WBCs	Normal Saline	0.192	0.012
	Combination of N/S and Heparin	0.173	0.045
RBCs	Normal Saline	0.135	0.200
	Combination of N/S and Heparin	0.178	0.033
Platelets	Normal Saline	0.158	0.082
	Combination of N/S and Heparin	0.312	0.000
HGB	Normal Saline	0.176	0.031
	Combination of N/S and Heparin	0.106	0.200

The results of normality tests show that some of continuous variables are normally distributed (P-value>0.05) and the others are not according to the study groups (Flush solution used for lumens of CVC). So, we need to use both the non-parametric Mann-Whitney test and the parametric Two Independent Samples T test, but since we have more than 15 cases in each study group, we decide to use the parametric Two Independent Samples T test in all the analysis.

Table 2

Frequencies and Percentages of the Flush solution used for lumens of CVC

Group	Frequency	Percentage
Normal Saline	27	50.9%
Combination of N/S and Heparin	26	49.1%
Total	53	100%

The sample of the study contained 27 cases in the Normal Saline group and 26 cases in the Combination of N/S and heparin group.

4.1 Demographic data which included patient`s information.

The following table shows the results of differences between the study groups in Demographic data:

Table 3

Frequencies and Percentages and the results of Chi-square test of differences between the study groups in Demographic data

Indicator or Variable	Category	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
		Normal Saline n=27	Combination of N/S and Heparin n=26			
Age		59.22 ± 6.38	57.77 ± 11.43	58.51 ± 9.15	0.574	0.568
Gender	Male	18(66.7%)	15(57.7%)	33(62.3%)	0.454	0.500
	Female	9(33.3%)	11(42.3%)	20(37.7%)		
	Total	27(100%)	26(100%)	53(100%)		
Educational Level	Primary School	7(25.9%)	5(19.2%)	12(22.6%)	12.883	0.025
	Secondary School	3(11.1%)	7(26.9%)	10(18.9%)		
	Diploma	3(11.1%)	7(26.9%)	10(18.9%)		
	Bachelor	4(14.8%)	4(15.4%)	8(15.1%)		
	Master	0(0%)	2(7.7%)	2(3.8%)		
	Other	10(37%)	1(3.8%)	11(20.8%)		
	Total	27(100%)	26(100%)	53(100%)		
Height		167.56 ± 6.7	168.81 ± 8.68	168.17 ± 7.68	-0.589	0.558
Weight		74 ± 11.37	72.38 ± 11.96	73.21 ± 11.58	0.504	0.616
History of Medical or Surgical Disease	Free	4(14.8%)	12(46.2%)	16(30.2%)	6.173	0.013
	Non-free	23(85.2%)	14(53.8%)	37(69.8%)		
	Total	27(100%)	26(100%)	53(100%)		

The results in the table above show that there are significant differences at 0.05 level between the Normal Saline group and the Combination of N/S and heparin group only in an Educational level and History of medical or surgical disease (the P-values are less than 0.05).

Regarding Educational level, the percentage of Secondary school educated patients in the Normal Saline group is (n=3, p=11.1%); which is significantly lower than that in the Combination of N/S and heparin group (n=7, p=26.9%), and also the percentage of diploma educated patients in the Normal Saline group is (n=3, p=11.1%); which is significantly lower than that in the Combination of N/S and heparin group (n=7, p=26.9%). Moreover, the percentage of the other educational levels in the Normal Saline group is (n=10, p=37%); which is significantly higher than that in the Combination of N/S and heparin group (n=1, p=3.8%), and the P-value of the test corresponding to the educational level is (0.025).

Regarding History of medical or surgical disease, the percentage of the Free-history patients (The patient does not have any previous diseases) in the Normal Saline group is (n=4, p=14.8%); which is significantly lower than that in the Combination of N/S and heparin group (n=12, p=46.2%), and the P-value of the test corresponding to History of medical or surgical disease is (0.013).

On the one hand, the results in the table above show that there are no significant differences at 0.05 level between the Normal Saline group and the Combination of N/S and heparin group in all the other variables (Age, Gender, weight, height) studied in the table (the P-values are higher than 0.05).

4.2 Hemodynamic

The following tables show the results of differences between the study groups in Hemodynamic indicators: this information taken by the researcher measured himself.

Table 4

Means, Standard Deviations and the Results of Independent T-test for Differences Between the Study Groups in Hemodynamic Indicators

Indicator or Variable	Flush solution used for lumens of CVC		Total n=53	Test Statistic	P-value
	Normal Saline n=27	Combination of N/S and heparin n=26			
SBP	128 ± 15.12	124.42 ± 7.9	126.25 ± 12.15	1.073	0.288
DBP	76.15 ± 12.51	71.62 ± 7.84	73.92 ± 10.63	1.574	0.122
Pulse	75.89 ± 11.71	69.04 ± 9.52	72.53 ± 11.14	2.332	0.024
Temperature	36.74 ± 0.25	36.75 ± 0.36	36.74 ± 0.3	-0.108	0.914
SPO2	0.96 ± 0.01	0.96 ± 0.01	0.96 ± 0.01	-1.615	0.113

The results in the table above show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in Pulse (the P-value is 0.024 less than 0.05).The mean of Pulses in the Normal Saline group is(Mean=75.89); which is significantly higher than the mean of Pulses in the Combination of N/S and heparin group (Mean=69.04).That means flush with normal saline leads to an increase in the heart rate and the P-value of the test corresponding to Pulse is (0.024).

On the other hand, the results in the table above show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other Hemodynamic indicators (SBP, DBP, Temperature, SPO2) studied in the table (the P-values are higher than (0.05).

4.3 Lab Test

The following table shows the results of differences between the study groups in Lab test indicators:

Table 5

Means, Standard Deviations and the Results of Independent T-test for Differences Between the Study Groups in Lab Test Indicators

Indicator or Variable	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
	Normal Saline n=27	Combination of N/S and Heparin n=26			
WBCs	7.01 ± 2.79	8.13 ± 4.25	7.56 ± 3.59	-1.145	0.258
RBCs	3.59 ± 0.34	3.43 ± 0.46	3.51 ± 0.41	1.438	0.157
Platelets	237.3 ± 68.32	202.61 ± 94.75	220.28 ± 83.41	1.533	0.131
HGB	10.6 ± 1.51	10 ± 1.26	10.31 ± 1.41	1.556	0.126

Moreover, the results in the table above show that there are no significant differences at 0.05 level between the Normal Saline group and the Combination of N/S and heparin group in all the Lab test indicators (WBCs, RBCs, Platelets, HGB) studied in the table (all the P-values are higher than 0.05).

4.4 About Site of CVC

The following tables show the results of differences between the study groups in site of CVC indicators:

Table 6

Frequencies and Percentages and the Results of Chi-square Test of Differences Between the Study Groups in Site of CVC Indicators.

Indicator or Variable	Category	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
		Normal Saline n=27	Combination of N/S and Heparin n=26			
Q1: Where the CVC is insertion	Subclavian Vein	1(3.7%)	0(0%)	1(1.9%)	2.426	0.297
	Internal Jugular	16(59.3%)	20(76.9%)	36(67.9%)		
	Femoral Vein	10(37%)	6(23.1%)	16(30.2%)		
	Other	0(0%)	0(0%)	0(0%)		
	Total	27(100%)	26(100%)	53(100%)		
Q2: Dressing of CVC	No Dressing	1(3.7%)	2(7.7%)	3(5.7%)	36.461	0.000
	Daily	26(96.3%)	4(15.4%)	30(56.6%)		
	Weekly	0(0%)	20(76.9%)	20(37.7%)		
	Other	0(0%)	0(0%)	0(0%)		
	Total	27(100%)	26(100%)	53(100%)		
Q3: Discharge Color Around CVC	No Discharge	22(81.5%)	20(76.9%)	42(79.2%)	2.544	0.280
	Yellow	4(14.8%)	2(7.7%)	6(11.3%)		
	White	0(0%)	0(0%)	0(0%)		
	Bright Pink	1(3.7%)	4(15.4%)	5(9.4%)		
	Other	0(0%)	0(0%)	0(0%)		
	Total	27(100%)	26(100%)	53(100%)		
Q4: Dose Take Swab Culture	Yes	6(22.2%)	6(23.1%)	12(22.6%)	0.006	0.941
	No	21(77.8%)	20(76.9%)	41(77.4%)		
	Total	27(100%)	26(100%)	53(100%)		
Q5: Swab Culture Result	Positive	4(66.7%)	3(50%)	7(58.3%)	0.343	0.558
	Negative	2(33.3%)	3(50%)	5(41.7%)		
	Total	6(100%)	6(100%)	12(100%)		
Q6: Oozing From the Site of CVC	Yes	4(14.8%)	3(11.5%)	7(13.2%)	0.124	0.725
	No	23(85.2%)	23(88.5%)	46(86.8%)		
	Total	27(100%)	26(100%)	53(100%)		

The results in the table above show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only

in Dressing of CVC (the P-value is 0.000 less than 0.05), the percentage of patients with daily Dressing of CVC in the Normal Saline group is (n=26, p=96.3%); which is significantly higher than that in the Combination of N/S and heparin group (n=4, p=15.4%). There are also no patients with weekly Dressing of CVC in the Normal Saline group, the percentage is (n=0, p=0%); which is significantly lower than that in the Combination of N/S and heparin group (n=20, p=76.9%) where the P-value of the test corresponding to Dressing of CVC is (0.000). This result means flushing CVC with saline encourages the nurse to do daily dressing on CVC.

In addition, the results in the table above show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other site of CVC indicators (Where the CVC is insertion, discharge color around CVC, Dose take swab culture, Swab culture result, oozing from the site of CVC) studied in the table (the P-values are higher than 0.05).

4.5 LAB TEST (APTT results)

The following tables show the results of differences between the study groups in APTT results:

Table 7

Frequencies and Percentages and the Results of Chi-square Test of Differences Between the Study Groups in APTT Results

Indicator or Variable	Category	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
		Normal Saline n=27	Combination of N/S and Heparin n=26			
Less than 35 sec:						
At Admission	Yes	13(48.1%)	20(76.9%)	33(62.3%)	4.668	0.031
	No	14(51.9%)	6(23.1%)	20(37.7%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 1	Yes	21(77.8%)	21(80.8%)	42(79.2%)	0.072	0.788
	No	6(22.2%)	5(19.2%)	11(20.8%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 2	Yes	21(77.8%)	20(76.9%)	41(77.4%)	0.006	0.941
	No	6(22.2%)	6(23.1%)	12(22.6%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 3	Yes	23(85.2%)	19(73.1%)	42(79.2%)	1.181	0.277
	No	4(14.8%)	7(26.9%)	11(20.8%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 4	Yes	10(37%)	15(57.7%)	25(47.2%)	2.268	0.132
	No	17(63%)	11(42.3%)	28(52.8%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 5	Yes	4(14.8%)	4(15.4%)	8(15.1%)	0.003	0.954
	No	23(85.2%)	22(84.6%)	45(84.9%)		
	Total	27(100%)	26(100%)	53(100%)		
Between 35-45:						
At Admission	Yes	11(40.7%)	6(23.1%)	17(32.1%)	1.897	0.168
	No	16(59.3%)	20(76.9%)	36(67.9%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 1	Yes	5(18.5%)	4(15.4%)	9(17%)	0.092	0.761
	No	22(81.5%)	22(84.6%)	44(83%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 2	Yes	6(22.2%)	5(19.2%)	11(20.8%)	0.072	0.788
	No	21(77.8%)	21(80.8%)	42(79.2%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 3	Yes	4(14.8%)	4(15.4%)	8(15.1%)	0.003	0.954
	No	23(85.2%)	22(84.6%)	45(84.9%)		
	Total	27(100%)	26(100%)	53(100%)		

Indicator or Variable	Category	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
		Normal Saline n=27	Combination of N/S and Heparin n=26			
Day 4	Yes	0(0%)	1(3.8%)	1(1.9%)	1.058	0.304
	No	27(100%)	25(96.2%)	52(98.1%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 5	Yes	0(0%)	1(3.8%)	1(1.9%)	1.058	0.304
	No	27(100%)	25(96.2%)	52(98.1%)		
	Total	27(100%)	26(100%)	53(100%)		
More than 45:						
At Admission	Yes	3(11.1%)	1(3.8%)	4(7.5%)	1.002	0.317
	No	24(88.9%)	25(96.2%)	49(92.5%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 1	Yes	1(3.7%)	1(3.8%)	2(3.8%)	0.001	0.978
	No	26(96.3%)	25(96.2%)	51(96.2%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 2	Yes	0(0%)	1(3.8%)	1(1.9%)	1.058	0.304
	No	27(100%)	25(96.2%)	52(98.1%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 3	Yes	0(0%)	1(3.8%)	1(1.9%)	1.058	0.304
	No	27(100%)	25(96.2%)	52(98.1%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 4	Yes	0(0%)	1(3.8%)	1(1.9%)	1.058	0.304
	No	27(100%)	25(96.2%)	52(98.1%)		
	Total	27(100%)	26(100%)	53(100%)		
Day 5	Yes	0(0%)	0(0%)	0(0%)	----	----
	No	27(100%)	26(100%)	53(100%)		
	Total	27(100%)	26(100%)	53(100%)		

The results in the table above show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in APTT result; where it is (Less than 35 sec) At admission (the P-value is 0.031 less than 0.05), the percentage of patients with APTT result Less than 35 sec At admission in the Normal Saline group is (n=13, p=48.1%); which is significantly lower than that in the Combination of N/S and heparin group (n=20, p=76.9%), and the P-value of the test corresponding to APTT result Less than 35 sec At admission is (0.03).

On the one side, the results in the table above show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other APTT results (Between 35-45 and more than 45) studied in the table (the P-values are higher than 0.05).

4.6 Patency of CVC

The following tables show the results of differences between the study groups in Patency of CVC indicators: the researcher doing flush for CVC lumens to see the patency.

Table 8

Frequencies and Percentages and the Results of Chi-square Test of Differences Between the Study Groups in Patency of CVC Indicators.

Indicator or Variable	Category	Flush Solution Used for Lumens of CVC		Total n=53	Test Statistic	P-Value
		Normal Saline n=27	Combination of N/S and Heparin n=26			
Q1: Drawing the Blood from CVC	Easy	10(37%)	18(69.2%)	28(52.8%)	6.730	0.035
	Moderate	11(40.7%)	7(26.9%)	18(34%)		
	Difficult	6(22.2%)	1(3.8%)	7(13.2%)		
	Total	27(100%)	26(100%)	53(100%)		
Q2: Does your facility have a policy on the type of flush solution to use on central venous catheters to maintain patency?	Yes	27(100%)	26(100%)	53(100%)	----	----
	No	0(0%)	0(0%)	0(0%)		
	I don't know	0(0%)	0(0%)	0(0%)		
	Total	27(100%)	26(100%)	53(100%)		
Q4: Frequency of flush a lumen	8 hours and after each use	0(0%)	26(100%)	26(49.1%)	53.000	0.000
	Only after each use	27(100%)	0(0%)	27(50.9%)		
	Total	27(100%)	26(100%)	53(100%)		
Q5: If heparin is used, what concentration of heparin do you use?	1000 units/mL	0(0%)	26(100%)	26(100%)	----	----
	Total	0(0%)	26(100%)	26(100%)		

The results in the table above show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in

Drawing the blood from CVC, and Frequency of flush a lumen (the P-values are less than 0.05).

Regarding Drawing the blood from CVC, the percentage of easy drawing in the Normal Saline group is (n=10, p=37%) which is significantly lower than that in the Combination of N/S and heparin group (n=18, p=69.2%), while the percentage of moderate drawing in the Normal Saline group is (n=11, p=40.7%); which is significantly higher than that in the Combination of N/S and heparin group (n=7, p=26.9%), and the percentage of difficult drawing in the Normal Saline group is (n=6,p=22.2%); which is significantly higher than that in the Combination of N/S and heparin group (n=1, p=3.8%), the P-value of the test corresponding to Drawing the blood from CVC is (0.035).

Regarding Frequency of flush a lumen, it was (Only after each use) for all cases in the Normal Saline group (n=27, p=100%) while it is (8 hours and after each use) for all cases in the Combination of N/S and heparin group (n=26, p=100%), the P-value of the test corresponding to Frequency of flush a lumen is (0.000).

Furthermore, the results in the table above show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in the other Patency of CVC indicators studied in the table.

Chapter Five
Discussion

5.1. Introduction

This chapter reviews the discussion of the present study's findings by comparing them to those of earlier studies and provides a critical overview from the researchers' perspective.

This chapter discusses the main result which was found in the study. Based on findings of current study; it is likely that flush of central venous catheter has a significant relation with the factors evaluated.

The aim of this Randomize (convenience sample) Control trail (RCT s) design and Experimental method study was to compare the effectiveness of normal saline versus heparin in catheter flushing among adult patients with central venous catheter and reduce the complication among patients with CVC admitted to critical care units at Large Tertiary Hospital.

To our knowledge, this study is the first performed in Palestine. This study will compare between flush of CVC Heparin saline or N/S.9% & complication of use heparin saline flush.

This study contained the sample of 27Cases (50.9 %) in the Normal Saline group and 26 cases(49.1%) in the Combination of N/S and heparin group.

5.2. Socio-Demographic Data

The results in the study show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in an Educational level and History of medical or surgical disease the P-values are less than (0.05).

Regarding Educational level, the percentage of Secondary school educated patients in the Normal Saline group is (n=3, p=11.1%); which is significantly lower than that in the Combination of N/S and heparin group (n=7, p=26.9%), and also the percentage of diploma educated patients in the Normal Saline group is (n=3, p=11.1%); which is significantly lower than that in the Combination of N/S and heparin group (n=7,

p=26.9%), while the percentage of the other educational levels in the Normal Saline group is (n=10, p=37%); which is significantly higher than that in the Combination of N/S and heparin group (n=1, p=3.8%), and the P-value of the test corresponding to Educational level is 0.025. This means that patient studied to secondary school in the normal saline group is 11.1%; which is significantly lower than that in combination of normal saline with heparin group (26.9%).

Regarding History of medical or surgical disease, the percentage of the Free-history patients in the Normal Saline group is (n=4, p=14.8%); which is significantly lower than that in the Combination of N/S and heparin group (n=12, p=46.2%), and the P-value of the test corresponding to History of medical or surgical disease is (0.013) which means patient with free history in normal saline group (14,8%)which is significantly lower than in combination normal saline and heparin group (46.2%).

Above all, no significant differences exist at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other variables (Age, Gender, weight, height) studied in the table (the P-values are higher than (0.05); which means there are no significant differences between normal saline group and normal saline with heparin group in age, gender, weight and height.

5.3. Hemodynamic

The results show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in Pulse (the P-value is 0.024 less than 0.05), the mean of Pulses in the Normal Saline group is (Mean=75.89) which is significantly higher than the mean of Pulses in the Combination of N/S and heparin group (Mean=69.04), the P-value of the test corresponding to Pulse is (0.024).

This result refers to the use of Normal Saline flush leads to an increase in the heart rate.

In addition, the hemodynamic results show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other Hemodynamic indicators (SBP, DBP, Temperature, SPO2) the P-values are higher than 0.05).

All hemodynamic indicator are not affected by CVC flushing methods, except the heart rate that increases by using saline flush.

5.4. Lab Test

The results show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the Lab test indicators (WBCs, RBCs, Platelets, HGB) studied in the table (all the P-values are higher than (0.05). That means that the Lab test results (WBCs, RBCs, Platelets, HGB) are not affected by CVC flushing methods

5.5 Hypothesis one

H_0. There is no significant difference between the result of coagulation profile when flushing with Normal Saline compared to flushing with heparin at a significant level of P value (0.05).

The results show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in PTT result (Less than 35 sec) At admission (the P-value is 0.031 less than 0.05), the percentage of patients with PTT result Less than 35 sec At admission in the Normal Saline group is (n=13, p=48.1%) which is significantly lower than that in the Combination of N/S and heparin group (n=20, p=76.9%), the P-value of the test corresponding to PTT result Less than 35 sec At admission is (0.031).

From one side, the results show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other PTT results (Between 35-45 and more than 45) the P-values are higher than 0.05.

Similar results were highlighted in coagulation profile result in comparison between heparin versus normal saline flush for CVC by Beigi, HadiZadeh, Salimi, & Ghaheri, 2014 who found that bleeding time variations between the heparin and saline groups. PTT in the heparin group did not significantly increase over time; baseline values were 30.9 3.4, 31.8 3.4, and 31.2 6.6 (P = 0.628)(Beigi, HadiZadeh, Salimi, & Ghaheri, 2014).

Sharma et al.,in 2019 also found that nine studies were qualified; total of 3,113 participants. When compared to normal saline, the consolidated findings from eight studies showed modest benefit for maintaining CVC patency with heparin (risk ratio 0.83, 95% CI 0.50 - 1.40; P = 0.13). We also conducted analysis for secondary outcomes, and aside from heparin-induced thrombocytopenia, there was no proof that heparin was safer than regular saline. This concludes that Heparin has little favorable effects to maintain patency of catheter than normal saline but not in secondary outcomes. As the quality of evidence was very low(Sharma et al., 2019).

From this abovementioned information, I concluded that PTT in the heparin group and saline group did not significantly increase over time.

5.6 Hypothesis Two

H0. There is no significant difference between the patency of central venous catheter when flushing with Normal saline compare with flushing with heparin at a significant level of P value (0.05).

The results show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in Drawing the blood from CVC, and Frequency of flush a lumen (the P-values are less than 0.05).

Regarding Drawing the blood from CVC, the percentage of easy drawing in the Normal Saline group is (n=10, p=37%); which is significantly lower than that in the Combination of N/S and heparin group (n=18, p=69.2%), while the percentage of moderate drawing in the Normal Saline group is (n=11, p=40.7%); which is significantly higher than that in the Combination of N/S and heparin group (n=7, p=26.9%), and the percentage of difficult drawing in the Normal Saline group is (n=6, p=22.2%); which is significantly higher than that in the Combination of N/S and heparin group (n=1, p=3.8%), the P-value of the test corresponding to Drawing the blood from CVC is (0.035).

Regarding Frequency of flush a lumen, it was (Only after each use) for all cases in the Normal Saline group (n=27, p=100%) while it is (8 hours and after each use) for all cases in the Combination of N/S and heparin group (n=26, p=100%), and the P-value of the test corresponding to Frequency of flush a lumen is (0.000).

On the other side, the results show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in the other Patency of CVC indicators studied.

Flushing a catheter with heparin is superior to flushing it with saline solution to avoid catheter occlusion? This is a question answered by (Mitchell, Anderson, Williams, & Umscheid, 2009) who said according to a comprehensive evaluation of the evidence base for heparin flushing and other therapies to avoid catheter occlusion. (It is not clear whether flushing a catheter with heparin is superior to flushing it with saline solution (Mitchell, Anderson, Williams, & Umscheid, 2009).

Furthermore, a randomized trial that was carried out at Barnes-Jewish Hospital by Schallom, Prentice, Sona, Micek, & Skrupky, highlighted similar outcomes (2012). The following results: the time to initial patency loss according to the Kaplan-Meier analysis did not differ substantially (log rank = 0.093) between groups. Heparin and 0.9% sodium chloride groups experienced equal rates of blood return loss and flush failure. No patency rates for pressure-injectable lead the researchers to conclusion heparin flushing solutions and 0.9% sodium chloride solutions which had comparable rates of lumen no patency. For short-term use central venous catheter maintainable catheters, 0.9% sodium chloride may be the appropriate flushing solution because to potential safety concerns with the use of heparin (Schallom, Prentice, Sona, Micek, & Skrupky, 2012).

Similar findings were highlighted in Heparin Or,9% Sodium chloride to maintain central venous catheter patency by Babu et al., 2014. They sampled 100 adult patients who needed short-term CVC between March 2012 and August 2012 and compared the effects of two flush solutions: Heparin and 0,9% Sodium chloride, on catheter lumen patency. In conclusion. The study has shown that there is no appreciable difference in catheter patency between heparin and 9% sodium chloride flushes in adult patients using CVCs for a brief period of time (Babu et al., 2014).

The purpose of the study, which was carried out by Eduardo López- Briz et al. in 2014, was to compare the effectiveness of heparin flush and 9% saline flush for lowering the adult's risk of CVC occlusion. The researcher concluded that the Saline solution is

sufficient for keeping the central venous catheter open, preventing the risk associated with heparin administration, according to the study's findings (López‐ Briz et al., 2014).

Flushing the Central Venous Catheter: Is Heparin Necessary? It is a study done in 2014 by Dal Molin et al. the researcher searched MEDLINE and CINAHL databases with the use of Bayesian hierarchical modeling and network meta-analysis, parameter values for catheter occlusion were combined. 462 references were found by the researcher. The researcher concluded there is no proof that heparin flushing is more effective at preventing catheter occlusions than regular saline or other treatments, the study concluded. Given the scanty and conflicting information that is currently available in this area, additional research may be required (Dal Molin et al., 2014).

Similar result was highlighted in the study the patency of CVC in comparison between heparin versus normal saline flush by Mohammad Ali Heidari Gorji, et al., (2015) did a study at the Roohani Hospital in the city of Babelon 84 patients in the intensive care unit which concluded that there may be heparin side effects and that the use of heparin did not significantly affect the patency and survival of catheters in the patients under study. The researcher ultimately advised of using normal saline solution to maintain the patency of central venous catheters(Gorji, Rezaei, Jafari, & Cherati, 2015).

Also in an experiment, Zhong et al., 2017 found that heparin saline was not more effective than regular saline at preventing CVC blockage. However, a statistical point evaluation shows that, in the short run, the use of HS is marginally preferable to that of an NS flushing catheter (L. Zhong et al., 2017).

5.7 Hypothesis Three

H0. There are no significant differences of occurrence of complication when flushing with Normal Saline compare with flushing with heparin at a significant level of P value (0.05).

The results show that there are no significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group in all the other site of CVC indicators (Where the CVC is insertion, discharge color around CVC, Dose take swab culture, Swab culture result, oozing from the site of CVC) and the P-values are higher than (0.05).

Similar results also found in an Italian study; CINAHL and MEDLINE databases were searched by Alberto Dal Molin et al., 2014. Randomized controlled trials comparing the use of normal saline to heparin or another solution in flushing central catheters in adult patients were desirable investigations. To find pertinent publications, two reviewers separately screened abstracts. 462 references were found by the reviewer. There were eight studies in total. Following that, the study found no proof that heparin was any more effective than regular saline at preventing occlusions. The researcher came to the conclusion that there is no proof that heparin flushing is any more successful at preventing catheter occlusions and the researcher not found any significant differences of occurrence of complication when flushing with Normal Saline compare with flushing with heparin (Dal Molin et al., 2014)

Similar result was highlighted in the study which was carried out by Santos et al. In 2015, it aimed to compare the effectiveness of heparin flush and 9% saline flush for lowering the adult's risk of CVC occlusion. At last, they concluded that Saline solution is sufficient for keeping the central venous catheter open, preventing the risk associated with heparin administration, according to the study's findings (Santos et al., 2015).

The study carried out by Bradford, Edwards, & Chan in 2020 concluded in order to prevent occlusion in long-term central venous catheters in infants and children, there was insufficient information to compare the effects of intermittent flushing with normal saline against heparin. It is yet unknown if heparin is required to avoid occlusion, blood stream infection linked with CVCs, or consequences of catheter implantation duration. Participants (moderate-certainty evidence), and not documented in the remaining research, there is still a lack of consensus among institutions around the world about the proper use and upkeep of these devices (Bradford, Edwards, & Chan, 2020).

Additionally, searches were done in a Spanish by Lopez-Briz, Garcia, Cabello, Bort-Marti, & Sanchis. To compare the effectiveness and safety of intermittent CVC locking with normal saline (NS) against heparin in preventing occlusion in adults. The combined results from these trials revealed very low-quality data and showed that heparin caused fewer occlusions than NS (risk ratio (RR) 0.70, 95% confidence interval (CI) 0.51 to 0.95; P = 0.02; 1672 participants; 1025 catheters from 10 studies; I2 = 14%).The subgroup analysis was carried out by unit of analysis, and subgroup differences were tested (P = 0.23; I2 = 30.3%). Results indicate no discernible

differences between heparin and NS in any of the occlusions when the participant served as the unit of analysis (RR 0.79, 95% CI 0.58 to 1.08; P = 0.15; 1672 participants; seven trials). Heparin use is associated with fewer occlusions, according to a subgroup analysis using the catheter as the unit of analysis (RR 0.53; 95% CI 0.29 to 0.95; P = 0.03; 1025 catheters; three trials). Results from one study using 770line accesses as the unit of analysis show no discernible differences in occlusions between heparin and NS (RR 1.08, 95% CI 0.84 to 1.40).

The average difference in catheter patency was 0.44 days, with a 95% confidence interval of 0.10 to 0.99 (P = 0.11; 1036 individuals; 752 catheters; 6 trials; low-quality data).

No definite proof of a difference in the following was discovered by researchers: The risk of CVC-related sepsis was 0.74 (95% CI 0.03 to 19.54; P = 0.86; 1097 participants; two studies; low-quality evidence); the risk of mortality was 0.76 (95% CI 0.44 to 1.31; P = 0.33; 1100 participants; three studies; low-quality evidence); the risk of bleeding at any site was 1.32 (95% CI 0.57 to 3.07; P = 0.52; 1245 participants; four studies; moderate-quality evidence);

Researchers are unsure whether intermittent locking with heparin resulted in fewer occlusions than intermittent locking with NS given this outcome and the very low quality of the data. Heparin may have little to no impact on catheter patency and occlusion, according to low-quality research. The combined studies are poorly powered to detect uncommon adverse events like heparin-induced thrombocytopenia, even though we found no evidence of differences in safety (sepsis, death, or bleeding) (Lopez-Briz et al., 2022).

Also the results show that there are significant differences at (0.05) level between the Normal Saline group and the Combination of N/S and heparin group only in Dressing of CVC (the P-value is 0.000 less than 0.05), the percentage of patients with daily Dressing of CVC in the Normal Saline group is (n=26, p=96.3%); which is significantly higher than that in the Combination of N/S and heparin group (n=4, p=15.4%).There are also no patients with weekly Dressing of CVC in the Normal Saline group, the percentage is (n=0, p=0%); which is significantly lower than that in the Combination of

N/S and heparin group (n=20, p=76.9%), the P-value of the test corresponding to Dressing of CVC is (0.000). This result is according to the department of policies.

The study highlighted on that the hospital has a policy for CVC flushing methods to maintain patency of CVC (normal saline flushing) and this policy should generalize to other hospital in Palestine according to study results.

5.8 Conclusion

The study concluded that flushing protocol for CVC in Large Tertiary Hospital with normal slain is Agree with the results of this study and This protocol should be circulated to other hospitals in Palestine.

Acceptance for hypothesis that indicates there is no significant difference between the result of coagulation profile when flushing with Normal Saline compared with flushing with heparin at a significant level of P value (0.05).

Partial acceptance for hypothesis that indicates there is no significant difference between the patency of central venous catheter when flushing with Normal saline compare with flushing with heparin at a significant level of P value (0.05)and Drawing the blood from CVC affected partially by CVC flushing methods which 69.2% of patient with easy drawing flushing with heparin in another hand 40.7%of patient with moderate drawing and 22.2% op patient with difficult drawing flushing with normal saline.

Acceptance for hypothesis that indicates there are no significant differences of occurrence of complication when flushing with Normal Saline compared with flushing with heparin saline at a significant level of P value (0.05); where discharge color around CVC, Dose take swab culture, Swab culture result, oozing from the site of CVC: all these indicators not affected by CVC flushing methods.

Finally, the study concluded that no difference in patency when flushing the CVC with heparin saline or with normal saline alone.

5.9 Recommendations

For clinical practice, it is highly recommended to flush CVC with Normal Saline (0.9%) alone without heparin; to avoid ad control adverse effects that are associated with heparin use, such as autoimmune-mediated heparin-induced thrombocytopenia, allergic reactions and the potential for bleeding complications and to decrease the cost of heparin use.

Give instruction to nurse in an-Najah university hospital to continuo with same protocol flush CVC with normal saline alone.

Presenting the results of this study to the Palestinian Ministry of Health to make a comprehensive protocol for all hospitals regarding flushing CVC with normal saline alone without heparin.

5.10 Limitations

1. limitations of experimental study like mistakes can occur in recording observations when measuring patency of CVC
2. Difficulty obtaining consent from patients because some patients are unconscious
3. Collected data by one expert nurse
4. Not collected about history of patient.
5. Decrease the number of patients that use CVC.
6. Collaborations of nurses.
7. Some patients refused to participate.

There are numerous challenges in gathering data, such as the lack of a standard order to extract the information they require.

List of Abbreviations

Abbreviation	Meaning
APTT	Activated Partial Thromboplastin Time
CVC	Central Venous Catheter
CVADs	Central Venous Access Devices
GAG	Glycosaminoglycan's
HIT	Heparin –Induce Thrombocytopenia
HS	Heparin Saline
HGB	Hemoglobin
ICU	Intensive Care Unit
INR	International Normalized Ratio
IRB	Institutional Review Board
IV	Intravenous
NS	Normal Saline
PCS	Personal Communications Service
PT	Prothrombin Time
PTT	Partial Thromboplastin time
PICCs	Peripherally Inserted Central Catheters’
RCTs	Randomized Control Trails
SVT	Superficial Venous Thrombosis
TIVADs	Totally Implantable Venous Access Devices

References

Babu, B. M., Rao, A. K., Rajesh, K., & Babu, V. H. (2014). Heparin or 0.9% sodium chloride to maintain central venous catheter patency: a randomized trial. Journal of Evolution of Medical and Dental Sciences, 3(1), 46-51.

Beigi, A. A., HadiZadeh, M. S., Salimi, F., & Ghaheri, H. (2014). Heparin compared with normal saline to maintain patency of permanent double lumen hemodialysis catheters: a randomized controlled trial. Advanced biomedical research, 3.

Bradford, N. K., Edwards, R. M., & Chan, R. J. (2020). Normal saline (0.9% sodium chloride) versus heparin intermittent flushing for the prevention of occlusion in long□term central venous catheters in infants and children. Cochrane Database of Systematic Reviews (4).

Carole, l., Almut,w (2008) Validity and reliability of measurement instruments used in research, *American Journal of Health-System Pharmacy*, Volume 65, (23), 2276–2284,

Chang, R., & Holcomb, J. B. (2016). Choice of fluid therapy in the initial management of sepsis, severe sepsis, and septic shock. Shock (Augusta, Ga.), 46(1), 17.

Cuker, A., Arepally, G. M., Chong, B. H., Cines, D. B., Greinacher, A., Gruel, Y.,... Warkentin, T. E. (2018). American Society of Hematology 2018 guidelines for management of venous thromboembolism: heparin-induced thrombocytopenia. Blood advances, 2(22), 3360-3392.

Dal Molin, A., Allara, E., Montani, D., Milani, S., Frassati, C., Cossu, S.,... Rasero, L. (2014). Flushing the central venous catheter: is heparin necessary? The Journal of Vascular Access, 15(4), 241-248.

Dhindsa, K. K. (2019). Central Venous Access Devices. Clinical Skills for Nursing Adults: Step by Step, 69.

Goossens, G. A. (2015). Flushing and locking of venous catheters: available evidence and evidence deficit. Nursing research and practice, 2015.

Gorji, M. A. H., Rezaei, F., Jafari, H., & Cherati, J. Y. (2015). Comparison of the effects of heparin and 0.9% sodium chloride solutions in maintenance of patency of central venous catheters. Anesthesiology and pain medicine, 5(2).

Hayes, W. (2019). Ab-normal saline in abnormal kidney function: risks and alternatives. Pediatric Nephrology, 34(7), 1191-1199.

Jamshidi, R. (2019). Central venous catheters: Indications, techniques, and complications. Paper presented at the Seminars in pediatric surgery.

Lockwood, J., & Desai, N. (2019). Central venous access. British Journal of Hospital Medicine, 80(8), C114-C119.

Lopez-Briz, E., Garcia, V. R., Cabello, J. B., Bort-Marti, S., & Sanchis, R. C. (2022). Heparin versus 0.9% sodium chloride locking for prevention of occlusion in central venous catheters in adults. Cochrane Database of Systematic Reviews (7).

López□Briz, E., Garcia, V. R., Cabello, J. B., Bort□Marti, S., Sanchis, R. C., & Burls, A. (2014). Heparin versus 0.9% sodium chloride intermittent flushing for prevention of occlusion in central venous catheters in adults. Cochrane Database of Systematic Reviews (10).

Marshall, J. C., Bosco, L., Adhikari, N. K., Connolly, B., Diaz, J. V., Dorman, T.,... Pelosi, P. (2017). What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. Journal of critical care, 37, 270-276.

McPherson, R. A., & Pincus, M. R. (2021). Henry's clinical diagnosis and management by laboratory methods E-book: Elsevier Health Sciences.

Mitchell, M. D., Anderson, B. J., Williams, K., & Umscheid, C. A. (2009). Heparin flushing and other interventions to maintain patency of central venous catheters: a systematic review. Journal of advanced nursing, 65(10), 2007-2021.

Oduah, E. I., Linhardt, R. J., & Sharfstein, S. T. (2016). Heparin: Past, Present, and Future. Pharmaceuticals (Basel), 9(3). doi: 10.3390/ph9030038

Oduah, E. I., Linhardt, R. J., & Sharfstein, S. T. (2016). Heparin: past, present, and future. Pharmaceuticals, 9(3), 38.

Periard, D., Monney, P., Waeber, G., Zurkinden, C., Mazzolai, L., Hayoz, D.,... Denys, A. (2008). Randomized controlled trial of peripherally inserted central catheters vs. peripheral catheters for middle duration in□hospital intravenous therapy. Journal of Thrombosis and Haemostasis, 6(8), 1281-1288.

Salmela, B. (2010). Thrombophilia and direct thrombin inhibitor lepirudin: clinical and monitoring aspects.

Santos, E. J. F. d., Nunes, M. M. J. C., Cardoso, D. F. B., Apóstolo, J. L. A., Queirós, P. J. P., & Rodrigues, M. A. (2015). Effectiveness of heparin versus 0.9% saline solution in maintaining the permeability of central venous catheters: a systematic review. Revista da Escola de Enfermagem da USP, 49, 995-1003.

Schallom, M. E., Prentice, D., Sona, C., Micek, S. T., & Skrupky, L. P. (2012). Heparin or 0.9% sodium chloride to maintain central venous catheter patency: a randomized trial. Critical care medicine, 40(6), 1820-1826.

Sharma, S. K., Mudgal, S. K., Gaur, R., Sharma, R., Sharma, M., & Thakur, K. (2019). Heparin flush vs. normal saline flush to maintain the patency of central venous catheter among adult patients: A systematic review and meta-analysis. Journal of family medicine and primary care, 8(9), 2779.

Tan, P., & Gibson, M. (2006). Central venous catheters: the role of radiology. Clinical Radiology, 61(1), 13-22.

Tanner, J. M., & Tanner, J. M. (1990). Foetus into man: Physical growth from conception to maturity: Harvard University Press.

Teichgräber, U. K., Pfitzmann, R., & Hofmann, H. A. (2011). Central venous port systems as an integral part of chemotherapy. Deutsches Ärzteblatt International, 108(9), 147.

Tonog, P., & Lakhkar, A. D. (2019). Normal saline.

Zhong, L., Wang, H.-L., Xu, B., Yuan, Y., Wang, X., Zhang, Y.-y.,... Hu, Z.-S. (2017). Normal saline versus heparin for patency of central venous catheters in adult patients-a systematic review and meta-analysis. Critical Care, 21(1), 1-9.

Appendices

Appendix A

Study Protocol

Study protocol for patients with CVC in ICU at Large Tertiary Hospital.

Several visits to the hospital were made. Metron and head nurse in ICU were met and the purpose of study was explained.

At the beginning, the researcher took approval from Large Tertiary Hospital to start the research in ICU for patients with Central Venous Catheter. After that, the researcher went to the ICU and checked the PTT who had CVP, a head nurse asked to help in talking to every nurse in all the shifts that there is a questionnaire how to apply the research criteria.

Then the researcher took the consent from patients; in both cases if they were conscious or oriented by their families. The demographic had been done by the researcher. After that the researcher divided patients into two groups. She gave pts. Numbers from 1-53, divided them to paired and unpaired numbers. Paired numbers (Experimental group) N:26 UN-paired number (Control group) N:27. Next, the researcher and sometimes the nurse took the demographic data from patients or their families.

There was one expert nurse in the morning shift that drew sample of blood in the same tube sodium citrate to all pts. in the same techniques: used a needle of 22G and syringe 5cc. Then, the sample would be sent immediately to the lab and was done in the same machine.

Paired Number (Experimental group) N:26 would flush the CVC lumen of heparin when it was used as 10 IU of heparin per 1 ml normal saline (5 ML N/S with 50-unit heparin) before closing the catheter, using needle of 22 G Syringe 5ml. Un-paired Number (Control group) would flush the CVC lumen of Normal Saline,9% before closing it, using needle 22 G syringe 5ml.

Appendix B

Check List

HeparinizationVersus Saline Flush of Central Venous Catheter (CVC) Lumens in Intensive Care Unit in Large Tertiary Hospital.

Data Consists of Five Parts:

Part one: Demographic data which include patient information:	
1 Patient ID: -	2- Age: -
3- File number: -	4- Study number: -
5- Gender: -	6- Educational level: -
7- Height (Ht.): -	8- Weight (Wt.): -
9- History of Medical or Surgical Disease:	10- Allergy: -
11- Diagnosis: -	12- Mobile number: -

Part two: - About CVC insertion.

1-Date of Admission: - ----------.

2-Date of Insertion: - ----------.

3-Time of Insertion: ----------.

4- Time of Remove it: ----------.

5-Date of Discharge: ----------.

Part Three: - Hemodynamic: -

BP: - ----------. Pulse: - ----------.

Temperature: ----------. SPO2: - ----------.

Part Four: - Lab Test

CBC: WBCs----------. RBCs----------. Platelets: ----------.

HGB: -

Part five: -About Site of CVC.

Q1: - Where the CVC insertion is?

-Subclavian Vein

-Internal Jugular

-Femoral Vein

- Other

Q2: -Dressing of CVC.

-No Dressing

- Daily

- Weekly

-Other

Q3: - What is the discharge color around CVC?

-No discharge

-Yellow

-White

-Bright Pink

-Other

Q4: - Dose take swab culture?

-Yes _ No

Q5: - Swab Culture Result.

-Positive _Negative

If result is positive what will be done?----------.

Q6: - Oozing from the site of CVC.

-Yes - No

Part Four: - LAB TEST

a- APTT (sec):

APTT Result	At Admission	Day 1	Day 2	Day 3	Day 4	Day 5
Less than 35 sec						
Between 35-45						
More than 45						

Part Five: - Patency of CVC: -

Q1: - Drawing the blood from CVC:

-Easy

-Moderate

-Difficult

Q2: - Does your facility have a policy on the type of flush solution to use on central venous catheters to maintain patency?

_____Yes _____No _____ I don't know

Q3: - What flush solution do you use for lumens of CVC?

- No flush

- Normal Saline,9% only

- Heparin flush only

- Combination of N/S and heparin

- Other

Q4: - How frequently do you flush a lumen?

___Q 8 hours and after each use ___Q 12 hours

___Q 12 hours and after each use ___Q 24 hours

___Q 24 hours and after each use ___Only after each use

___Q 8 hours Other_____

Q5: - If heparin is used, what concentration of heparin do you use?

___10 units/mL ___100 units/mL ___1000 units/mL ___Other_____

Appendix C

Informed Consent

You have been invited because you are an employee in the ICU and you deal with patients who have Central venous catheter (CVC); to compere the effect of using Normal saline versus heparin when flushing the lumen and reduce complications. To participate in a research project being conducted in the department of ICU; your participation is entirely voluntary. It is up to you to decide whether or not to take part in this study.

Before you decide, it is important for you to understand what the research involves. This consent form will tell you about the study, why the research is being done and the possible benefits, risks and discomforts.

If you wish to participate, you will be asked to sign this form. If you decide to take part in this study, you are still free to withdraw at any time and without giving any reasons for your decision.

If you do not wish to participate, you do not have to provide any reason for your decision. You will not lose the benefit of any medical care to which you are entitled or are presently receiving.

Please, read this form carefully and feel free to discuss it with your family, friends and doctors before you decide.

Risks and Discomforts:

There are no physical risks associated with this study.

Costs and Reimbursements:

There is no cost to you for participating in this study. You will not be paid for your participation.

Who to Contact for Questions About This Study:

If you have any questions about this study, you can contact The Principal Investigators,

Enas Abed AL- Kareem Taleb (0569399040).

Consent:

I, _____, have read and

understand the above information and agree to participate in the study entitled:

I understand that my participation is voluntary and that all the information collected will be kept confidential and used only for scientific objectives.

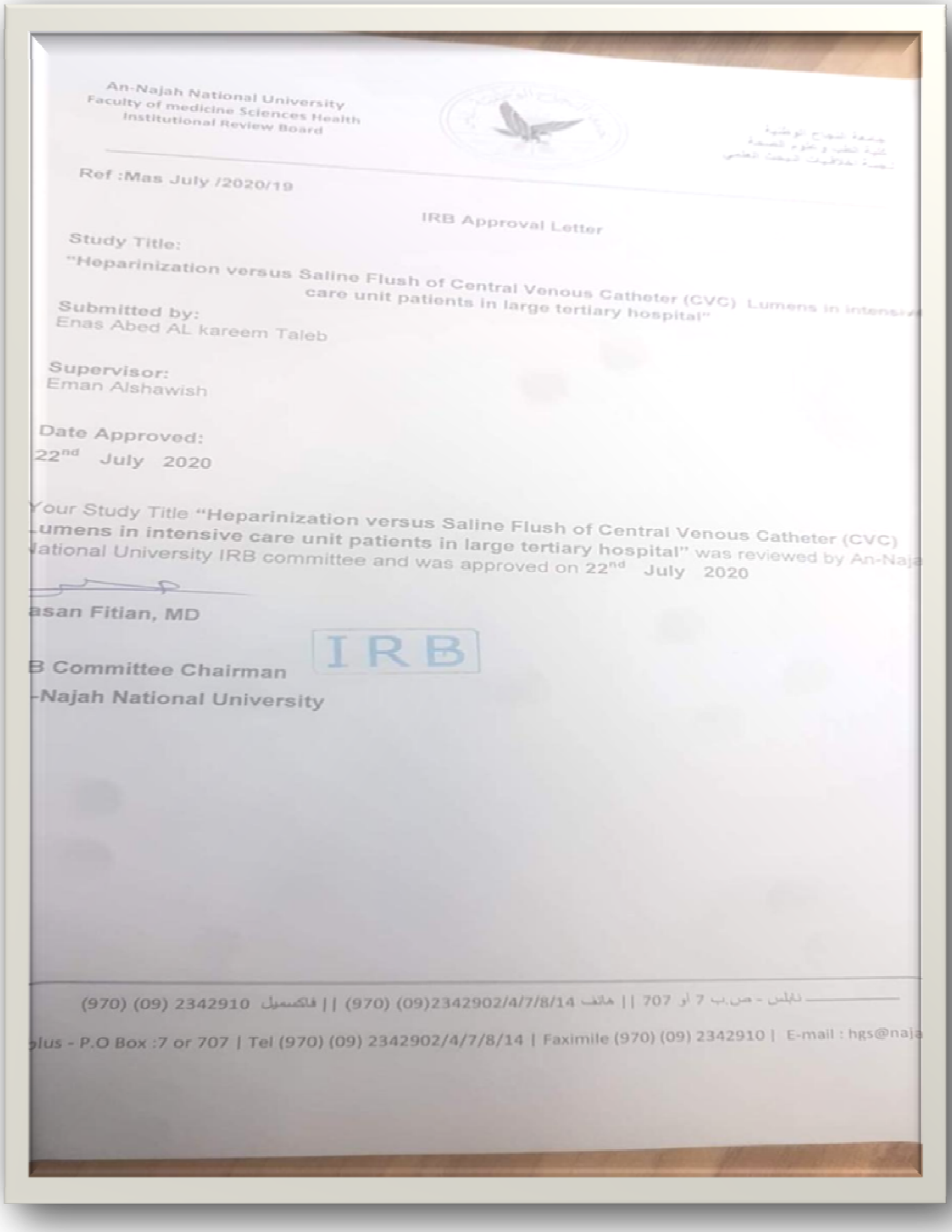
I am not waiving any of my legal rights by signing this consent form. I freely consent to

Participate in this study.

Signature_____ Date_____.

Appendix D

IRB Approval



An-Najah National University
Faculty of medicine Sciences Health
Institutional Review Board

Ref :Mas July /2020/19

IRB Approval Letter

Study Title:
"Heparinization versus Saline Flush of Central Venous Catheter (CVC) Lumens in intensive care unit patients in large tertiary hospital"

Submitted by:
Enas Abed AL kareem Taleb

Supervisor:
Eman Alshawish

Date Approved:
22nd July 2020

Your Study Title "Heparinization versus Saline Flush of Central Venous Catheter (CVC) Lumens in intensive care unit patients in large tertiary hospital" was reviewed by An-Najah National University IRB committee and was approved on 22nd July 2020

asan Fitian, MD

B Committee Chairman
-Najah National University

IRB

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جامعة النجاح الوطنية
كليَّة الدراسات العليا

تدفق الهيبارين مقابل المحلول الملحي في تجويف القسطرة الوريدية لمرضى الوحدات الحثيثة في مستشفى كبير

إعداد
ايناس عبد الكريم خليل طالب

إشراف
د. ايمان الشاويش

قدمت هذه الرسالة استكمالاً لمتطلبات الحصول على درجة الماجستير في تمريض العناية المكثفة، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس–فلسطين.

2022

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الملخص

خلفية الرسالة: ينطوي استخدام القسطرة الوريدية المركزية على مخاطر حدوث مضاعفات ، بما في ذلك تجلط القسطرة. لمنع هذا الجلطة ، هناك حاجة إلى تنظيف CVC ، وهناك عدة طرق للتنظيف (CVC) ، الطريقة الأولى هي الهيبارين مع محلول ملحي بعد كل استخدام ، والطريقة الثانية هي تدفق المياه المالحة.

أهداف الرسالة: لتقييم فعالية التنظيف المتقطع للمحلول الملحي العادي مقابل الهيبارين لمنع انسداد القسطرة الوريدية المركزية طويلة الأمد بين المرضى البالغين في وحدة العناية المركزة بمستشفى النجاح.

منهجية الرسالة: تصميم مسار التحكم العشوائي (RCT s) ، تم استخدام الطريقة التجريبية في هذه الدراسة. تتكون العينة من 53 مريضًا وفقًا لمعادلة Steven K. Thompson تم اختيارهم عشوائيًا في طريقة النتائج من جميع أقسام وحدة العناية المركزة وتم إدخالهم إلى المستشفيات بين أغسطس 2020 – أكتوبر 2020 ولديهم CVC. المرضى الذين يحملون أرقامًا زوجية تعتبر (المجموعة التجريبية (مجموعة الهيبارين مع المحلول الملحي الطبيعي) ن = 26) تتدفق مع الهبارين ومحلول ملحي عادي ، بينما الأرقام غير المقترنة (المجموعة الضابطة (مجموعة المحلول الملحي الطبيعي) ن = 27) تتدفق بمحلول ملحي عادي. تم تطوير قائمة التحقق وملؤها من قبل الباحث بما في ذلك البيانات الديموغرافية ، والقيم المعملية ، والعلامات الحيوية ،، ومضاعفات CVC.

نتائج الدراسة: أظهرت النتائج أن نتائج تجلط الدم (PTT) أقل من 35 ثانية عند القبول للمجموعة التجريبية (76.9٪) مقابل المجموعة الضابطة (48.1٪) عند مستوى معنوي من قيمة P هو 0.031. لسهولة سالكية

CVC ، كانت المجموعة التجريبية (69.2٪) أعلى من المجموعة الضابطة (37٪) بينما في السالكية المعتدلة والصعبة ، كانت المجموعة التجريبية أقل قيمة من المجموعة الضابطة (40.7٪ مقابل 26.9) و (22.2٪ مقابل 3.8٪) على التوالي ، عند مستوى معنوي من قيمة P هو 0.035. لا توجد فروق بين المجموعة التجريبية والمجموعة الضابطة في حدوث المضاعفات مثل لون التفريغ حول CVC ، ونتائج زراعة المسحة ، والنز من الموقع.

.أوضحت الدراسة أن الضماد كان يومياً للمجموعة الضابطة (96.3٪) بينما كان أسبوعياً للمجموعة التجريبية (76.9٪) ، بمستوى معنوي من P قيمة 0.000

الاستنتاجات: اختلاف عوامل التخثر, كان هناك اختلاف كبير في عوامل التخثر فقط عند القبول (قيمة p هي 0.031) وكان معنويا في سالكيه (قيمة p 0.035) المجموعة التجريبية (تركيبة N / S مع مجموعة الهبارين) كانت سالكة أسهل من المجموعة الضابطة (المجموعة المالحة العادية) ولكن من ناحية أخرى لم تكن المضاعفات كبيرة بين المجموعتين.

توصية: يجب توجيه الممرضات العاملات في وحدات العناية المركزة حول استخدام المحلول الملحي العادي (0.9٪) وحده بدون الهيبارين لغسل القسطرة المركزية للمرضى البالغين. ويجب التأكيد على فائدة هذه الطريقة لتقليل تكلفة استخدام الهبارين ، ولتجنب الآثار السلبية لاستخدام الهبارين

الكلمات المفتاحية: القسطرة الوريدية المركزية (CVC) ، المحلول الملحي العادي (NS) ، الهيبارين.