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"A Randomized Controlled Trial to Evaluate the Impact of Heparin Saline and 0.9% Sodium Chloride on Maintaining Central Venous Catheter Patency in Critically Ill Patients at PGIMS, Haryana."

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ABSTRACT

Background: *Central venous catheters (CVCs) are frequently utilized in healthcare environments, especially within intensive care units (ICUs), for various medical purposes. They are inserted to facilitate the delivery of fluids, blood products, medications, parenteral nutrition, as well as for monitoring central venous pressure and performing dialysis.*

Objectives: *The main objective of the study was to assess the effectiveness of heparin saline compared to 0.9% sodium chloride in ensuring the patency of central venous catheters in the PCCM department at PGIMS, Rohtak.* ***Methods:*** *A randomized controlled trial included 100 patients with central venous catheters, selected using a sequentially numbered, snose sampling method. The study assessed the impact of heparin saline and 0.9% sodium chloride solution on maintaining catheter patency using a checklist, with evaluations conducted on days 1, 3, and 5. Variables under study dependent variables such as patency of central venous catheter and independent variables such as Heparin saline and normal saline*

Results: *Overall, Heparin Saline appears to be more effective in maintaining the patency of the central venous catheter compared to 0.9% Sodium Chloride particularly on Day 3 and Day 5. Heparin Saline shows higher mean scores and lower variability (smaller standard deviations) across all three days compared to 0.9% Sodium Chloride. The t-tests confirm that the difference in means between Heparin Saline and 0.9% Sodium Chloride is statistically significant on Day 3 and Day 5 suggesting a consistent advantage of Heparin Saline in maintaining catheter patency on these days.* ***Conclusion****: The study was conducted on patient with central venous catheter. The study sample was 100.The sample*

was divided in to group 1 heparin saline and group 2 normal saline each containing 50 subjects. Heparin saline flush was applied on the subjects of group 1 two times a day on day1, day3 and day5 whereas normal saline flush was applied on subjects of group 2 two times a day on day1, day3 and day5.The result of the finding showed that both the interventions were helpful in maintaining patency of central venous catheter but the heparin saline was more effective.
KEYWORDS: Heparin Saline, 0.9% Sodium Chloride, Substitution, Physical health care needs, Mental health care needs.

INTRODUCTION

"Be the change that you wish to see in the world''
- **Mahatma Gandhi**

BACKGROUND OF THE STUDY

Central venous catheters (CVCs) are commonly used in medical practice, particularly in intensive care units (ICUs). [1]. These devices are inserted to facilitate the delivery of fluids, blood products, medications, parenteral nutrition, as well as to carry out dialysis and monitor central venous pressure. [2,3]. At present, central venous catheters (CVCs) are classified into four categories: non-tunneled, tunneled, peripherally inserted central catheters (PICCs), and totally implantable venous access devices (TIVADs). [4] A central venous catheter (CVC) is a thin, flexible tube that is inserted into a major central vein, with its tip usually located in the superior vena cava. [5] It allows for the administration of medications and fluids, the collection of blood samples, and helps prevent the need for multiple venipunctures. CVCs are often referred to as "central lines" or by specific brand names like Broviac, Hickman, and Port-a-Cath. The use of long-term CVCs has significantly enhanced the quality and safety of care for infants and children with chronic medical conditions. These catheters are generally placed when prolonged intravenous medication or nutritional support is needed. Certain hypertonic medications, such as vesicant chemotherapy, specific antibiotics, and parenteral nutrition, cannot be safely given through peripheral venous catheters. For pediatric patients with cancer or other long-term conditions requiring continuous treatment, CVCs provide a safer alternative and are typically kept in place for the duration of the therapy. [6]

In the United States, more than five million central venous catheters (CVCs) are inserted each year, leading to approximately 15 million central line days annually in intensive care units (ICUs). CVCs allow for the monitoring of hemodynamic parameters that cannot be reliably measured through non-invasive techniques (although some minimally invasive options are now available), and they provide a means of delivering blood, medications, and nutritional support that cannot be safely administered through peripheral veins. Despite their benefits, the use of CVCs comes with a range of potential complications. Among these, mechanical issues during insertion (such as arterial puncture, hematoma, and pneumothorax) occur in 5% to 29% of cases, infectious complications affect 5% to 26%, and thrombosis occurs in 2% to 26% [7-13].

A central venous catheter (CVC), commonly known as a central line, central venous line, or central venous access catheter, is inserted into a large vein to provide reliable venous access. Larger catheters placed in centrally located veins are often necessary for critically ill patients or those requiring long-term intravenous treatments, as they offer more dependable vascular access. These catheters are usually inserted into veins in the neck (internal jugular vein),

chest (subclavian or axillary vein), groin (femoral vein), or through veins in the arms (referred to as a PICC line, or peripherally inserted central catheter).
Central lines are used to administer medications or fluids that cannot be taken orally or would damage smaller peripheral veins, collect blood samples (especially to measure central venous oxygen saturation), deliver large volumes of fluids or blood products for resuscitation, and monitor central venous pressure. The catheters are usually 15–30 cm long, made of silicone or polyurethane, and may have one or multiple lumens for infusion purposes.
The following are the major indications for the use of central venous catheters:

- **Challenges with peripheral venous access –** Central venous catheters are often used when it is difficult to establish or maintain peripheral venous access, such as in cases of obesity, veins scarred from previous insertions, or patients who are agitated.
- **Administration of certain medications or fluids –** Medications like vasopressors (e.g., norepinephrine, vasopressin, phenylephrine) and chemotherapeutic drugs, as well as hypertonic solutions, can damage peripheral veins and typically require central line placement. Moreover, catheters with multiple lumens allow for the simultaneous delivery of several parenteral medications.
- **Extended intravenous treatments –** For medications that need to be administered over long durations, such as long-term parenteral nutrition or extended intravenous antibiotics, central lines are often the preferred method of delivery.
- **Specialized medical procedures –** Procedures such as hemodialysis, plasmapheresis, transvenous cardiac pacing, and invasive hemodynamic monitoring (e.g., pulmonary artery catheterization) necessitate central venous access.

There are no absolute contraindications for using central venous catheters. However, certain conditions may present relative contraindications, including coagulopathy, trauma or infection at the insertion site, and the potential for injury to nearby blood vessels. While central line placement offers significant benefits, it also carries potential risks and complications that need to be carefully evaluated.
Complications can arise during central line insertion, and the expected benefits must outweigh these risks. One of the most common issues is pneumothorax, particularly with subclavian vein catheterization, due to its close anatomical proximity to the lung apex. The risk of pneumothorax is significantly reduced when the internal jugular vein is catheterized, especially when ultrasound guidance is used. For experienced practitioners, the incidence of pneumothorax ranges from 1.5% to 3.1%. Medical organizations, including the National Institute for Health and Care Excellence (UK), recommend routine ultrasonography to help reduce the likelihood of complications.

If a pneumothorax is suspected, an upright chest X-ray should be performed. The upright position is preferred as it allows any free air to rise to the top of the lung, making it more visible. However, this may not always be possible, particularly for critically ill patients in the intensive care unit.
Radiographs obtained in the supine position fail to detect 25–50% of pneumothoraxes.Instead, bedside ultrasound is a superior method of detection in those too ill to obtain upright imaging.
Vascular perforation by a catheter is a serious and potentially life-threatening complication of central line insertion. Fortunately, such complications are very rare, particularly when ultrasound guidance is used. One potential issue when inserting a central line into the internal

jugular vein is the unintentional puncture of the carotid artery. With ultrasound guidance, this occurs in about 1% of cases, but the risk increases to 0.5–11% when an anatomical approach is used. If the carotid artery is punctured and the catheter is accidentally inserted into it, the catheter should remain in place, and a vascular surgeon should be contacted, as removing the catheter could result in life-threatening consequences.

All catheters carry the risk of introducing bacteria into the bloodstream, which can lead to severe infections, with fatal outcomes in up to 25% of cases. Central line-associated bloodstream infections (CLABSI) have become a growing concern in recent years due to their considerable effect on patient morbidity and mortality, as well as the additional healthcare expenses they incur. Patients with a CLABSI are 2.75 times more likely to die compared to those without the infection. Furthermore, CLABSI is associated with longer hospital and intensive care unit stays, with an average increase of 2.5 and 7.5 days, respectively, after adjusting for other illness-related factors.

NEED OF THE STUDY

In 2009, Bishop and colleagues reported that heparin locking of catheters is a common practice for maintaining central venous catheters (CVCs). However, a systematic review has not yet validated the effectiveness of this approach. Furthermore, there is considerable variation in nursing practices, as existing guidelines offer conflicting recommendations on the frequency of locking and the appropriate concentration and volume of heparin. [15].

A recent survey conducted in ICUs across the United States revealed that 64.6% of respondents used normal saline (NS), while 31% used heparin. The most frequently used heparin concentrations were 100 IU/mL (37.5%) and 10 IU/mL (29.7%), with the most common locking intervals being every eight hours and after each use (74.4%). There is no available data on CVC maintenance practices in other countries, raising the question of whether clinical expertise should serve as the primary guiding principle in this area. The purpose of the present study is to assess the patency of central venous catheter among critically ill patient by using the heparin saline and 0.9% sodium chloride solution.

Objectives:

- To evaluate the effectiveness of heparin saline in maintaining the patency of central venous catheters.
- To assess the role of 0.9% sodium chloride in preserving the patency of central venous catheters.
- To compare the efficacy of heparin saline and 0.9% sodium chloride in maintaining central venous catheter patency.
- To investigate the relationship between the effects of heparin saline versus 0.9% sodium chloride and various demographic and clinical factors of the patients.

HYPOTHESIS

H1: A significant association is expected between the effects of heparin saline and 0.9% sodium chloride solution.

H01: No significant difference is anticipated between the effects of heparin saline and 0.9% sodium chloride solution.

H2: A significant association is expected between the effects of heparin saline versus 0.9% sodium chloride and selected demographic variables.

H02: There will not be a significant difference between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables.

ASSUMPTIONS

Flushing of central venous catheter with heparin saline may have more effect than 0.9 ml normal saline.
Flushing of central venous catheter with normal saline may have more effect than heparin saline.

OPERATIONAL DEFINITIONS

1. **Assess:** It refers to the procedure used to assess the patency of a central venous catheter.
2. **Effect:** In this study effect means a patency of central venous catheter that is caused by heparin saline and normal saline
3. **Heparin saline:** Heparin saline injection belong to a group of medicines known as anticoagulant work by decreasing the clotting ability of blood and maintain patency of central venous catheter
4. **0.9% sodium chloride: The injection is a sterile, non-pyrogenic solution with an osmolarity similar to that of blood.**
5. **Patency:** It is described as the smooth passage of 1ml of normal saline and medications through a central venous catheter.
6. **Central venous catheter:** A central venous catheter is a thin, flexible tube placed into a major vein to deliver medications, fluids, or blood products.
7. **Critically ill patient: One** who has an illness or life threating condition require central venous catheter insertion.

DELIMITATION

✓ The study is delimited at patient admitted in PGIMS Rohtak
✓ The study is limited to sample size of 100.
✓ Data collection procedure is limited to7 weeks.

THEORETICAL & CONCEPTUAL FRAMEWORK

A conceptual framework is a system of related concepts that work together to offer a thorough understanding of a specific phenomenon or set of phenomena. The concepts within a conceptual framework support one another, describe their respective phenomena, and establish a specific philosophical foundation for the framework (Fig 1).

Unlike theories, a conceptual framework is generally less formal and less developed in terms of its structure. As the term suggests, it focuses on abstract concepts that are grouped together due to their relevance to a common theme. A conceptual framework uses these concepts as foundational elements. It can act as a roadmap for research, ultimately aiding in the formulation of new theories. Conceptual models aim to represent reality with minimal complexity, while a conceptual framework is essentially a collection of concepts and propositions that clarify the relationships between them. The framework plays several key roles in advancing scientific knowledge. Its primary purpose is to make scientific findings more meaningful and broadly applicable. It also enhances communication and offers a structured approach to research, education, administration, and practice, particularly in fields such as nursing.

This study is grounded in Imogene King's Goal Attainment Theory, which is particularly relevant for assessing the effectiveness of heparinized saline and normal saline flushes in maintaining the patency of central venous catheters among critically ill patients at PGIMS, Rohtak. In this study, the researcher and participants worked together to establish the goals.

The researcher created and modified the conceptual framework using King's Goal Attainment Theory to guide the research process.

Perception: -

Perception is a process by which people translates sensory impression into coherent and unified manner to view the world around them. In this study the researcher perceived that the development of inadequate patency is more common among samples undergoing central venous catheter.

Judgment: -

The capacity to assess situations and make decisions or form opinions in an objective, authoritative, and thoughtful manner, particularly when it comes to matters that influence actions. In this study the researcher judges the need for certain measures to maintain the patency of central venous catheter among critically ill patient.

Action: -

Each member of the group makes a judgement and thereby action follows to attain the goal. In this study, the researcher identifies two methods for maintaining the patency of central venous catheters: heparinized saline and normal saline.

Mutual goal setting: -

It is a process that helps in reaching a goal. This dynamic process entails making decisions and taking actions based on available options, either individually or as a group, to address a question and achieve a particular objective. In this study, the researcher and participants work together to understand and pursue their common goal. The main focus of the study is to ensure the patency of central venous catheters in critically ill patients.

Reaction: -

Reaction is the process where individuals collaboratively develop a plan and work together to achieve the goal. In this study the researcher gets the concern from the samples who are at risk of developing inadequate patency of intravenous cannula.

Intervention: -

It involves the interaction of two or more individuals, where they engage in a sequence of verbal behaviors aimed at achieving a goal. In this study, the researcher applies two planned interventions—heparinized saline and normal saline—to preserve the patency of central venous catheters in two separate groups.

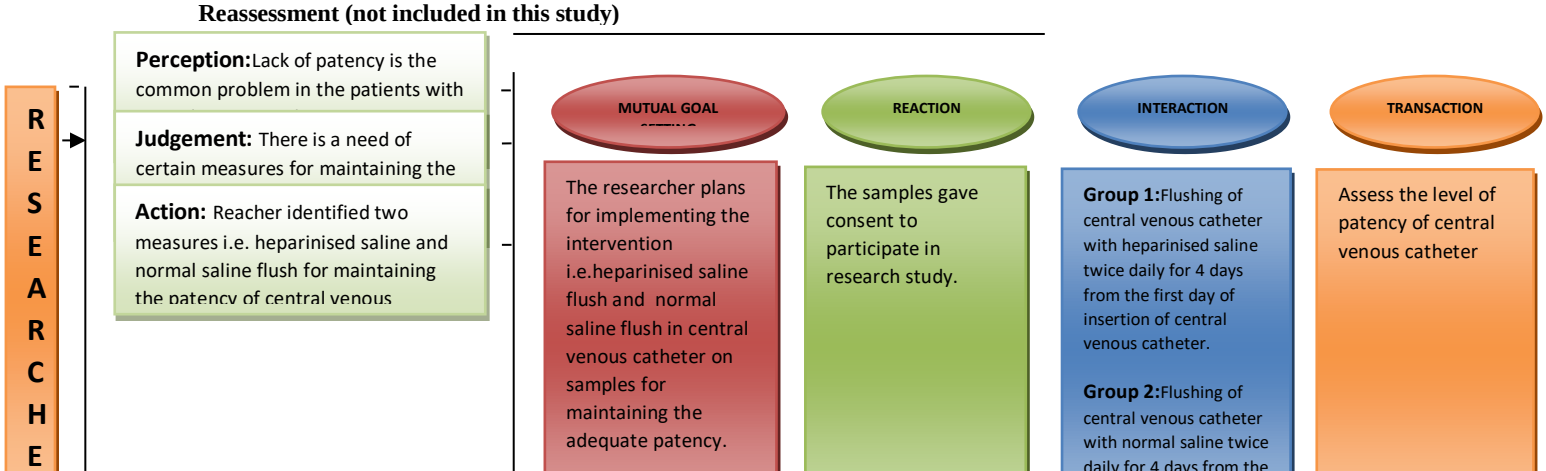
Transaction:-

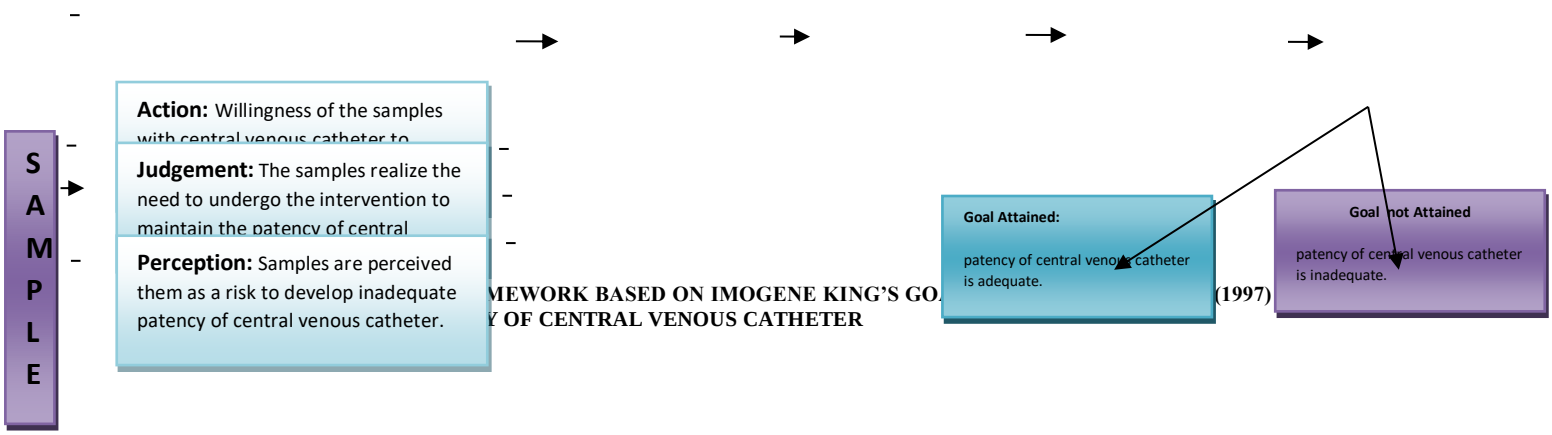
It is the process of interaction in which individuals engage with their environment to achieve goals that are important, guiding their goal-directed behaviors. In this study the researcher assess the patency of central venous catheter using structured rating scale.

Goal attainment: -

In this study the researcher's goal is to maintain the patency of central venous catheter, if the goal is attained then the patency will be maintained and if the goal is not attained then the reassessment is done, but the reassessment is not included in this study.

This article covers the introduction, the rationale for the study, the problem statement, objectives, hypotheses, operational definitions, assumptions, delimitations, and the conceptual framework based on Imogene King's Goal Attainment Theory.





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LITERATURE REVIEW

Literature review can serve a number of important functions in the research process. According to Polit and Hungler (1999), reviewing research literature involves identifying, selecting, critically analyzing, and describing existing information related to the topic of interest. The literature review is a crucial part of the research process, offering a detailed examination of recent findings in a specific area of focus. It contributes to expanding the knowledge base on a particular issue or highlights gaps in the existing knowledge on the subject.

The appropriate literature research provides a rich basis for the establishing the importance of the study, verifies that the studyhas not already been performed by other researcher; clarifies the issues that are directly relatedto research questions reveals an appropriate theoretical framework [14-16].

Literature related to studies conducted among regarding central venous catheter across the globe.

1. A Randomized Controlled Trial (RCT) was conducted to compare the use of normal saline (NS) versus heparinized saline (HS) for maintaining the patency of central venous catheters (CVCs) in adult patients, which was included in our meta-analysis. This meta-analysis incorporated ten RCTs with a total of 7,875 participants, analyzing data at the patient, catheter, lumen, and line access levels. Subgroup analysis of patients with short-term versus long-term CVC placement showed results largely consistent with the main outcome, especially regarding catheter patency in patients with long-term placements (i.e., >30 days). The results of this meta-analysis indicate that heparinized saline (HS) is not more effective than normal saline (NS) in preventing central venous catheter (CVC) occlusion. However, in the short term, HS seems to have a slight statistical advantage over NS when it comes to flushing catheters. [17].
2. A randomized controlled trial was conducted to compare the use of heparin versus normal saline in maintaining the patency of permanent double-lumen hemodialysis catheters. In the heparin group, the catheter (PermCath) was flushed with 1,000 IU of heparin, while the saline group used 0.9% saline. Patients were monitored for 24 hours, and the outcomes measured included catheter thrombosis, the need for interventions to maintain patency, and bleeding at the catheter site. A total of 96 patients participated (average age = 63.1 ± 11.2 years, 54.2% male). No participant experienced catheter thrombosis. Two patients (4.2%) in the heparin group and three patients (6.1%) in the saline group required catheter manipulation (P = 0.520). In the heparin group, no significant change in partial

thromboplastin time (PTT) was observed over time: baseline 30.9 ± 3.4, 12 hours 31.8 ± 3.4, and 24 hours 31.2 ± 6.6 (P = 0.628). The study concluded that flushing the PermCath with 0.9% saline was as effective as heparin in maintaining catheter patency, with the added benefit of lowering the risks associated with heparin use. [18].

3. A randomized controlled trial was conducted to compare the effectiveness of heparin saline flushes versus normal saline flushes in maintaining the patency of peripheral intravenous lines. Seventy-five patients were conveniently recruited and randomly assigned to one of three groups: the control group, the normal saline group, and the heparin saline group. In the normal saline group, a 1ml saline flush was administered using the SAS technique (Saline flush, Administration of drug, followed by Saline flush). In the heparin saline group, a 1ml flush containing 10 units of heparin was used, following the SASH technique (Saline flush, Administration of drug, followed by Saline flush, then Heparin saline flush).
This procedure was carried out after each intravenous medication administration for 72 hours, with no intervention in the control group.

4. A significant difference was found ($p < 0.05$) in the duration of IV line patency between the control group (53.84 ± 19.46 hours) and both the normal saline group (64.44 ± 14.70 hours) and the heparin saline group (66.96 ± 11.70 hours). No significant difference was found between the normal saline and heparin saline groups ($p = 0.50$). The study concluded that normal saline is equally effective as heparin saline in keeping IV lines patent. [19].

5. A randomized controlled trial was carried out to compare the use of normal saline (0.9% sodium chloride) and heparin for intermittent flushing to prevent occlusion in long-term central venous catheters (CVCs) in infants and children. The study included 255 participants. Four separate trials directly compared normal saline to heparin, though these studies differed in their intervention methods, control groups, heparin concentrations, and flushing frequencies.

6. The estimated relative risk (RR) for central venous catheter (CVC) occlusion per 1000 catheter days in the normal saline group compared to the heparin group was 0.75 (95% CI 0.10 to 5.51; 2 studies, 229 participants), based on very low certainty evidence. For CVC-related bloodstream infections, the estimated RR was 1.48 (95% CI 0.24 to 9.37; 2 studies, 231 participants), reflecting low-certainty evidence. The review concluded that there was insufficient evidence to determine which flushing method, normal saline or heparin, is more effective in preventing occlusion in long-term CVCs for infants and children. Additionally, it remains unclear whether the use of heparin is necessary to prevent occlusion, reduce bloodstream infections, or influence the length of catheter use. [20].

7. A single-blinded, randomized controlled trial was conducted to compare the use of saline versus heparin for locking hemodialysis permanent central venous catheters in chronic kidney disease patients. The study took place in the vascular surgery ward of a university hospital in Isfahan between 2012 and 2013. Patients were randomly assigned to two groups: one receiving heparin and the other receiving saline. Ninety six patients were included.None of the patients experienced catheter thrombosis in either group, indicating that both saline

and heparin were effective in preventing this complication.. The differences in the amount of bleeding and bleeding time were not statistically significant (P = 0.476 for incidence of bleeding, P = 0.721 for amount of bleeding, P = 0.322 for bleeding time).In the heparin group, there was no significant increase observed in PTT over time. Based on these results, the study concludes that flushing PermCath with normal saline 0.9% is as effective as using heparin in maintaining catheter patency, while potentially reducing the risks associated with heparin.[21]

8. A randomized controlled clinical trial was conducted to evaluate the effectiveness of heparin versus 0.9% normal saline solution in maintaining the patency of non-tunneled central venous catheters in surgical patients. The study included 58 patients, with 54 completing the trial. In the heparin group, 30 patients received diluted heparin flushing, while the normal saline group consisted of 24 patients who were administered 0.9% sodium chloride for flushing. The study found no significant difference in catheter occlusion between the heparin and normal saline groups for non-tunneled central venous catheters.The study concluded that flushing with 0.9% normal saline solution is as effective as using heparin solution for maintaining the patency of non-tunneled central venous catheters [22].

9. A comprehensive literature review was conducted to evaluate the effectiveness of normal saline (0.9% sodium chloride) as a flushing solution for maintaining the patency of arterial lines, comparing it to heparin flush. The review also examined the incidence of heparin-induced thrombocytopenia (HIT types I and II). Ten studies were found eligible for inclusion in the review. The findings suggest that both normal saline and heparin can maintain arterial line patency, but for longer durations, heparin is more effective. Additionally, the impact of heparin flush is dose-dependent, requiring fewer flushes. No adverse effects were reported with heparin flushing. Level 1 evidence supports the use of heparin as a flush solution after 48 hours. Furthermore, higher doses of heparin, especially in continuous infusion, have been shown to result in better patency without any reports of HIT type I or II. [23]

10. A systematic review was performed to evaluate the effectiveness of heparin flush compared to normal saline flush in maintaining the patency of central venous catheters (CVCs) in adult patients. The review followed the guidelines set by the Cochrane Handbook for Interventions and involved a comprehensive search across databases including MEDLINE, Embase, Cochrane Library, Clinical Trials Database, as well as relevant article reference lists. Only randomized controlled trials published in English between January 2012 and December 2018 were considered for inclusion in the review. Nine studies, encompassing a total of 3,113 participants, met the inclusion criteria. The combined results from eight studies showed a minimal benefit for heparin in maintaining CVC patency compared to normal saline, with a risk ratio of 0.83 (95% CI 0.50–1.40; P = 0.13). The analysis of secondary outcomes revealed no evidence that heparin was superior to normal saline in terms of safety, except for a potential increase in heparin-induced thrombocytopenia. [24]

11. A systematic review and meta-analysis was performed to evaluate the effectiveness of Normal Saline (NS) versus Heparin Saline (HS) in maintaining the patency of central venous catheters (CVCs) in adult patients. Randomized controlled trials (RCTs) comparing the use of NS and HS for maintaining CVC permeability were identified through searches of PubMed, Embase, and the Cochrane Library databases. Ten RCTs involving 7,875 subjects were included.Subgroup analysis based on catheter duration indicated that for

catheters in place for >30 days, NS and HS were comparable in maintaining patency (RR 0.97, 95% CI 0.76–1.23, P = 0.796). However, for catheters in place for <30 days, HS showed slight superiority over NS (RR 1.52, 95% CI 1.02–2.27, P = 0.041). This meta-analysis indicates that heparin saline (HS) is not more effective than normal saline (NS) in preventing central venous catheter (CVC) occlusion. [25]

12. A systematic review was conducted to evaluate the effectiveness of heparin flush compared to 0.9% saline flush in reducing the risk of occlusions in central venous catheters (CVC) in adults. The review included eight randomized controlled trials and one cohort study. The meta-analysis revealed no significant difference between the two solutions (RR=0.68, 95% CI=0.41-1.10; p=0.12). Subgroup analysis showed no difference in fully deployed CVCs (RR=1.09, CI 95%=0.53-2.22; p=0.82). However, multi-lumen CVCs showed a beneficial effect with heparin (RR=0.53, CI 95%=0.29-0.95; p=0.03), while double-lumen CVCs used for hemodialysis (RR=1.18, CI 95%=0.08-17.82; p=0.90) and peripherally inserted CVCs (RR=0.14, CI 95%=0.01-2.60; p=0.19) showed no significant differences. The findings suggest that saline solution is adequate for maintaining the patency of central venous catheters while avoiding the risks associated with heparin administration [26].

13. A systematic review of randomized controlled trials was conducted to evaluate the clinical outcomes (both benefits and harms) of using heparin versus normal saline to prevent occlusion in long-term central venous catheters in infants, children, and adolescents. The review calculated rate ratios per 1000 catheter days for two key outcomes: CVC occlusion and CVC-associated bloodstream infections. Three trials, involving a total of 245 participants, were included. The estimated rate ratio for CVC occlusion between the normal saline and heparin groups was 0.75 (95% CI 0.10 to 5.51, based on two studies with 229 participants; very low-quality evidence). The rate ratio for CVC-associated bloodstream infections was 1.48 (95% CI 0.24 to 9.37, based on two studies with 231 participants; low-quality evidence). The findings do not provide sufficient clarity on whether heparin is necessary for maintaining CVC patency. [27]

14. A randomized controlled trial was conducted to compare the effectiveness of heparin saline and normal saline as locking solutions for maintaining the patency of peripheral venous catheters in Chinese patients. The study took place in two hepatobiliary surgery wards at a tertiary hospital, where all participants received the same treatment. Patients were randomly assigned to either 3 ml of normal saline (NS) or 3 ml of heparin saline (HS) with a concentration of 50 IU/ml for sealing the catheters. A total of 286 patients were enrolled, and 609 peripheral venous catheters were examined. Neither group showed any evidence of local infections or catheter-related bloodstream infections. No significant differences were observed between the two groups regarding catheter obstruction rates, catheter duration, or the incidence of phlebitis, infiltration, or accidental catheter removal. The findings suggest that there were no notable differences in the effectiveness of normal saline and heparin saline for sealing peripheral venous catheters in this patient population [28].

15. A systematic review was conducted to assess the effectiveness of normal saline versus heparin solution in preserving the patency and functionality of peripheral intravenous catheters (PIVCs), while also minimizing associated complications. The review included original research studies published in English between 2009 and 2019, focusing on hospitalized

patients with PIVCs, regardless of age. The review encompassed 10 studies meeting the inclusion criteria. Findings from these studies suggested a lack of conclusive evidence regarding the superiority of normal saline (N/S 0.9%) over heparin solution (H/S) for PIVC flushing in terms of maintaining patency and averting complications. Concerns regarding potential complications associated with heparin solution prompted the development of guidelines favoring N/S 0.9% in countries such as Australia [29].

16. A systematic review and meta-analysis were conducted to evaluate the effectiveness of heparin flush versus normal saline flush in maintaining the patency of central venous catheters (CVCs) in adult patients. Meta-analysis was performed using Stata/MP v.16.Out of 94 potentially relevant titles and abstracts, eight studies were included in the systematic review. Assessment of complications including catheter-related infection, bleeding, venous thrombosis, heparin-induced thrombocytopenia, and mortality showed no statistically significant difference between the heparin and normal saline groups (RR 0.00, 95% CI -0.01 to 0.01; RR 0.00, 95% CI 0.00 to 0.01; RR 0.00, 95% CI -0.01 to 0.00; RR 0.00, 95% CI -0.01 to 0.03; RR 0.00, 95% CI -0.01 to 0.06, respectively).This systematic review and meta-analysis found no evidence of differences in catheter-related infection, venous thrombosis, heparin-induced thrombocytopenia, bleeding, or mortality between heparin and normal saline flush solutions [30].

17. A randomized controlled clinical trial was conducted to compare the effectiveness of heparin flush versus 0.9% normal saline flush in maintaining the patency of non-tunneled central venous catheters in surgical patients. Initially, 58 patients were enrolled, with 54 completing the study. The heparin group included 30 patients who received flushing with a 100 IU/ml heparin solution, while 24 patients in the normal saline group received 0.9% sodium chloride flushes. The results showed no significant difference in catheter occlusion between the two groups, nor was there a notable difference in the incidence of catheter-related infections. The findings suggest that flushing with 0.9% normal saline is just as effective as heparin flushing for maintaining the patency of non-tunneled central venous catheters in patients undergoing surgery.[31]

18. A randomized controlled trial was carried out to assess the maintenance of patency in peripheral intravenous locks (IVLs). Children aged 1 to 17 years with IVLs were randomly assigned to two groups: group A, which received saline flushing every 12 hours, and group B, which received flushing every 24 hours. The primary outcome measured was the preservation of catheter patency.Four hundred patients were randomized, with 198 subjects analyzed in the 12-hour group and 199 in the 24-hour group (three patients were lost at follow-up). Occlusion occurred in 15 children (7.6%) in group A compared to 9 (4.5%) in group B (p=0.21). The difference in catheter patency was +3.1% in favor of the 24-hour group (95% CI −1.6% to 7.7%), demonstrating the non-inferiority of the 24-hour procedure (with a non-inferiority margin set at −4%). Catheter-related complications did not differ between the two groups (12.1% in group A vs. 9.5% in group B; p=0.42) [32].

19. A randomized controlled trial was conducted to evaluate the efficacy and safety of ethanol lock prophylaxis in preventing catheter-related infections in patients with central venous catheters. The analysis included nine studies with a total of 2,451 patients. The meta-analysis revealed that ethanol lock prophylaxis significantly reduced catheter-related bloodstream infections (CRBSI) when compared to heparin alone (OR = 0.53, 95% CI 0.34–0.82, P = 0.004). However, no statistically significant effects were observed for other

outcomes, such as exit site infections, catheter dysfunction, catheter removal, thrombosis, or mortality ($P > 0.05$). Additionally, while the effect of ethanol on CRBSI compared to 0.9% NaCl locks trended in the expected direction, it was not statistically significant ($P > 0.05$).Ethanol lock prophylaxis appears to be a potential candidate for preventing CRBSI in patients with CVCs [33].

20. A prospective study conducted over a 12-month period aimed to compare the effectiveness and safety of Heparinized Saline (HS) and Normal Saline (NS) flush solutions in neonates. The study included 100 neonates, using 1 unit/ml of HS and 0.9% NS solution. The results indicated no significant difference between the two solutions in terms of maintaining the patency of 24-gauge peripheral intravenous locks (rate ratio = 1.12, p-value = 0.584). Variables such as gestational age, body weight, and insertion site did not significantly influence patency outcomes. The main reasons for catheter removal were similar in both groups, with most cases being non-elective. However, the HS group experienced a higher incidence of thrombocytopenia, which was linked to sepsis. Based on these findings, NS can be considered a viable alternative to HS flush solution in neonates, as both were found to be equally effective and safe in the study population [33].

21. A pilot randomized controlled trial (RCT) was conducted at a tertiary pediatric hospital in Australia to explore the feasibility of a larger trial and to assess occlusive events, the use of thrombolytics, adverse events, and direct costs related to catheter lock solutions in children with cancer and central venous access devices (CVADs). The study involved children aged 18 years or younger with oncological or hematological malignancies who had a CVAD. Out of 217 children initially evaluated for eligibility, 61 were enrolled and randomized into two groups: 30 in the normal saline group and 31 in the heparinized saline group. Complete occlusion of the CVADs occurred solely in the heparinized saline group (6.7% of CVADs), while partial occlusions were observed in both groups (heparinized saline: 23.3%; normal saline: 13.8%). Thrombolytic agents were more commonly used in the heparinized saline group (16.7% of CVADs) compared to the normal saline group (3.5%). No notable differences in adverse events were observed between the two groups. This pilot trial demonstrated that multisite RCTs on CVAD lock solutions are safe; however, strategies and additional resources are necessary to improve recruitment and eligibility rates for larger studies [34,35]

22. A study was conducted to compare the patency and pressure wave quality of radial artery catheters maintained with either heparinized or non-heparinized solutions. Consecutive sampling was used, and participants were randomly assigned to either the heparin group ($n = 18$) or the normal saline (NS) group ($n = 16$). The study assessed the functional duration of the radial artery catheters, the differences between arterial catheter and brachial cuff blood pressures, and the quality of pressure waveforms. The mean duration of functional cannulas was similar between the heparin and NS groups (120 ± 129 hours and 105 ± 82 hours, respectively, $P = 0.689$). No significant difference in blood pressure was observed between measurements taken with an arterial catheter and those taken with a brachial cuff in both groups ($P = 0.607$). Additionally, there were no notable differences between heparinized and nonheparinized flush solutions in terms of maintaining the patency and functionality of the radial artery catheter [36].

RESEARCH METHODOLOGY

The authors describe research methodology as the overall plan or framework that a researcher uses to outline their approach to identifying or addressing a problem.
As stated methodology involves the techniques used to collect, organize, and analyse data. This article describes the approach employed in the study to assess the effectiveness of heparin saline and 0.9% sodium chloride solutions in preserving the patency of central venous catheters in critically ill patients at PGIMS, Rohtak (Fig 2).
Research methodology provides a structured framework for systematically collecting valid and reliable data for investigations. It involves the study of how research is conducted in a structured, scientific manner, making it a crucial aspect of the research process. The methodology serves as a blueprint for the research undertaken. This section details the various steps followed, including the research approach, design, setting, target population, sampling methods, criteria for sample selection, tool development and description, content validity, tool reliability, pilot study, data collection procedures, challenges faced by the investigator, ethical considerations, and the plan for data analysis.

RESEARCH APPROACH

According to Polit and Hungler, the research approach refers to the overall strategy for answering research questions and testing hypotheses. It guides the researcher on what data needs to be collected, how to analyze it, and how to draw conclusions. Essentially, the research approach serves as the framework for hypothesis testing or answering the research questions, and it encompasses both the plan and the methodology.

For this study, a quantitative approach was adopted, as it was deemed the most suitable for achieving the study's objectives. In quantitative research, data is collected as numbers and analyzed through both descriptive and inferential statistical techniques.

RESEARCH DESIGN

Research design is a structured plan that outlines how, when, and where data will be collected and analyzed. Choosing a suitable design that matches the study's objectives is essential. Research design refers to the framework of a scientific investigation, guiding the process of data collection and analysis. The choice of design depends on the study's purpose, the experimental variables to be manipulated, and the conditions under which the experiment will take place.

According to Suresh Kumar K, research design represents the investigator's overall plan to answer the research questions and test the hypotheses. For this study, a randomized control trial (RCT) design was used. RCTs are forward-looking studies that evaluate the effectiveness of a new treatment or intervention. In this research, a randomized controlled trial design was used to assess the intervention.

SETTING FOR THE STUDY

As defined by Polit and Hungler (1999), the "setting" refers to the physical environment and circumstances where data collection occurs in a study. Selecting the appropriate setting is essential, as it can influence how participants act, feel, and react throughout the study.
For the present study, the chosen setting was the PCCM ICU at PGIMS, Rohtak. The rationale for selecting the PGIMS Rohtak is:
Feasibility of the subjects
Feasibility of time and easy access

POPULATION

A population is an entire set of individuals having some common characteristics. Defining a population for a research project is essential because it helps determine the group to which the study results will apply. The researcher must clearly specify the criteria for selecting this group. Researcher usually takes samples from an accessible population and hopes to generalize to a target population.
The population for the present study was clients who were in PCCM ICU at PGIMS, Rohtak. In the present study target population was patients with central venous catheter. The accessible population was the patient with central venous catheter admitted in PCCM ICU, PGIMS, Rohtak.

SAMPLING TECHNIQUE

Sampling is the method of choosing a representative portion from the population under study. The choice of sampling technique depends on factors such as the nature of the research problem, the types of variables involved, the research design, and the number of sampling units. A sample is a subset of the larger population selected to take part in the study. In essence, sampling involves selecting a portion of the population to represent the whole group.
The present study was conducted by using sequentially numbered, opaque, sealed envelope (SNOSE) sampling technique. The total patients who were available during study period were included.

SAMPLING CRITERIA:

The samples were chosen according to specific inclusion and exclusion criteria.
Inclusion criteria –
Patients with CVC who are-
1.Willing to give consent.
Exclusion criteria – Patients with CVC who are-
1.Not willing to participate
2.On anticoagulant
3. Liver disease
4. Blood coagulopathy
5. Dialysis patient

VARIABLES

A variable, as the term suggests, is something that changes or fluctuates. It refers to a trait or feature of an individual, group, or situation that can vary in different instances. Variables represent the qualities, properties, or features of an individual or situation that can vary or change.
In this present study the variables used were:
Dependent variables: patency of central venous catheter
Independent variables: Heparin saline and normal saline

DATA COLLECTION TOOLS AND TECHNIQUES

The crucial aspect of any investigation is the collection of appropriate information, which provides necessary data for the study. The research instrument chosen should be the most effective tool for gathering data that will help draw relevant conclusions for the study.

TOOLS OF DATA COLLECTION

A check list regarding the patency of central venous catheter includes (Table 1):

1. Catheter thrombosis: locking of the central venous catheter.
2. Backflow: backflow from all the lumens of the central venous catheter.
3. Infusion: freely infusing fluid in the central venous catheter.

Table 1: Checklist for assessing patency of central venous catheter:

S.No	Measures for Patency	Variables	Day 1	Day 3	Day 5
1.	Locking of the CVC	a) No locking after flushing -1 b) Locking after flushing -2			
2.	Patency	a) No back flow from the lumens-1 b) Slow back flow-2 c) Easily back flow-3			
3.	Continuous infusion in CVC.	a) No fluid is infusing-1 b) Slow infusing-2 c) Freely infusing-3			

CONTENT VALIDITY OF TOOL

In surveys, research validity refers to how accurately the survey measures the specific elements it is meant to assess. In simple terms, validity refers to how accurately an instrument measures what it is intended to measure. The tool validity was obtained from experts in the field of Critical care, College of Nursing, Pt BD Sharma, PGIMS, Rohtak.

RELIABILITY

Reliability refers to the degree of consistency and accuracy with which a tool measures the characteristic it is designed to evaluate. A test was conducted to verify the reliability of the instrument and to ensure the clarity of the language used. The tool after validation was subjected to test for its reliability

For testing the reliability of tool, checklist for assessing patency of central venous catheter was done to assess the patency of central venous catheter in PCCM unit subjected to test for its reliability. In pilot study, the patency of 10 central venous catheter patients was assessed in PCCM of Pt. B.D. Sharma, Rohtak. The self-structured questionnaire was administered to the samples. The reliability was calculated by using t- test.

ETHICAL APPROVAL

The research was approved by institutional ethical committee. The study was well within ethical norms and ethically justified. A formal introduction was given to the participants; and a written and verbal informed consent was taken from all the subjects for willingness to participate in the study The confidentiality of the subjects and their response were assured.

PILOT STUDY: -

Polit and Hungler (2004) explained that a pilot study is a small-scale version of the main study, where the instruments are tested on a sample from the same population. It serves as a preliminary investigation, similar in nature to the larger study, and is aimed at helping the researcher identify and address potential issues before conducting the full research project. The objective of the pilot study was to assess the feasibility of the research and ensure the clarity of the language used in the tool. The pilot study was conducted in 10% of the total samples were selected by using Sequentially numbered, opaque, sealed envelope (SNOSE) sampling method.

The pilot study was conducted from 2-1-2024 to 10-1-2024 in PCCM unit of PGIMS Rohtak (Haryana). The written permission to conduct the pilot study was obtained from HOD of PCCM department, PGIMS, Rohtak. The data was collected from 10 patients who had central venous catheter which was 10% of total study subjects by using sequentially numbered, opaque, sealed envelope (SNOSE) sampling technique was used. Confidentiality was guaranteed for all participants in the study. Data was collected using the designated tools, and the results indicated that the study was both feasible and well-received.

CONCLUSION OF PILOT STUDY

The pilot study included a total sample of 10 participants. The purpose of the study was to assess the impact of heparin saline and 0.9% sodium chloride solution on preserving the patency of central venous catheters in critically ill patients at PGIMS, Rohtak. In Group-1 (Heparin Saline), with regards to age, most of the subjects 3 (60%) were in the age above 47 years, majority were females 3 (60%), length of hospital stay with central venous catheter of subjects, depicts that majority 3(60%) were 48-10 days. All subjects were bedridden 5(100%).Size & Site of central venous catheter of all subjects 5(100%). Indication of central venous catheter of subjects 3(60%) were patient on inotropes drugs,2(40%) were emergency venous access.

In Group-1 (0.9% sodium chloride), with regards to age, most of the subjects 3 (60%) were in the age between 28-37 years, majority were females 3 (60%), Length of hospital stay with central venous catheter of subjects, depicts that majority 4 (80%) were 4-7 days. All subjects were bedridden 5(100%).Size & Site of central venous catheter of all subjects 5(100%). Indication of central venous catheter of subjects 2(40%) were patient on inotropes drugs,1(20%) were electrolyte imbalance,2(40%) were emergency venous access.

PROCEDURE FOR FINAL DATA COLLECTION

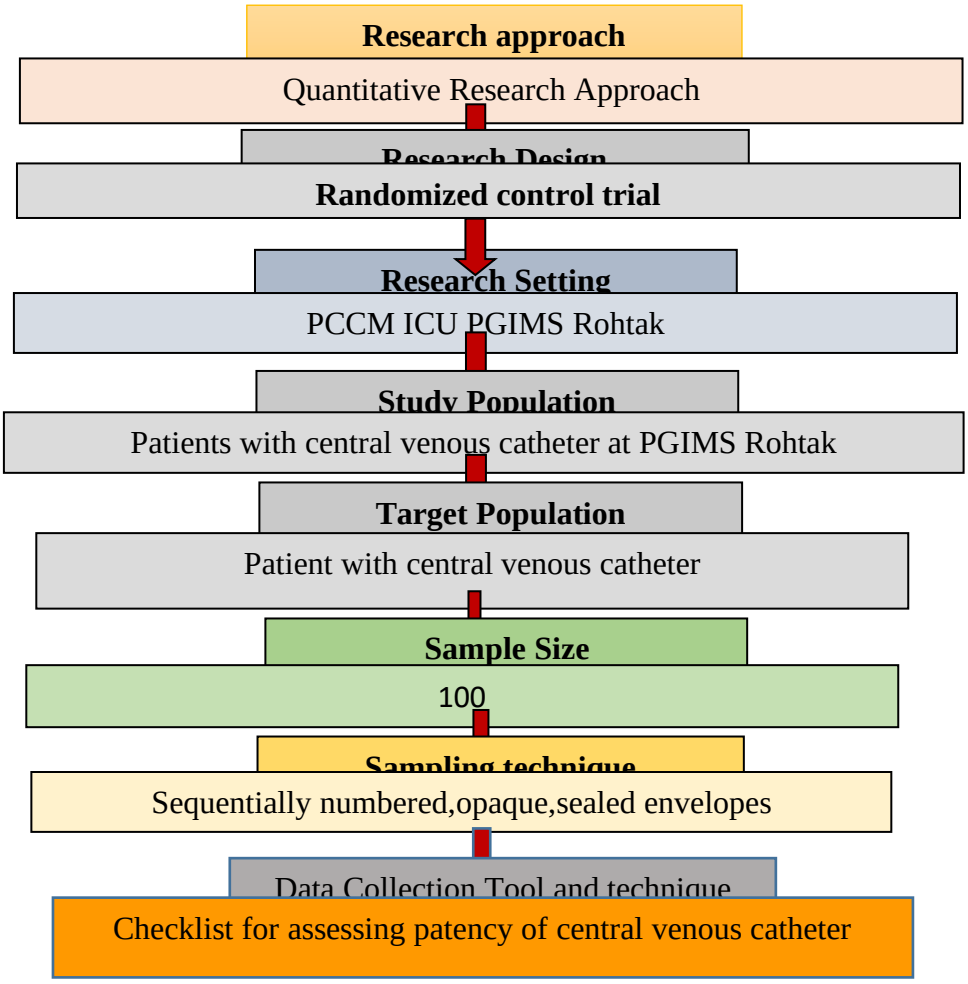
1) Final study was conducted from 25-01-2024 to 21-03-2024.
2) Formal approval was obtained in advance from the Head of the PCCM department, Pt. B.D. Sharma, PGIMS, Rohtak.
3) Informed consent was taken from subjects.
4) The purpose of study was explained prior.
5) A self-structured questionnaire was used to gather demographic information in order to evaluate the patency of central venous catheters.

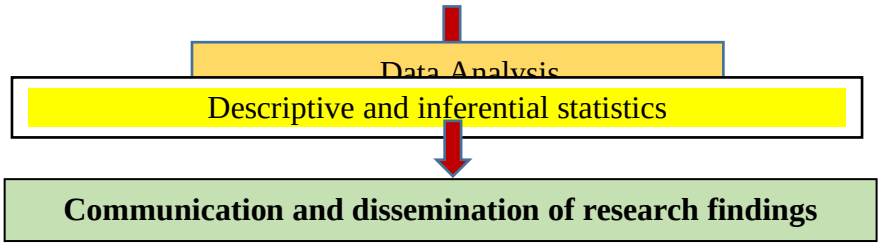
PLAN FOR DATA ANALYSIS:

The collected data was carefully organized, tabulated, and analyzed in accordance with the study's objectives. Descriptive and inferential statistical methods were used for data analysis, utilizing IBM's Statistical Package for the Social Sciences (SPSS). A significance level of 0.05 ($p<0.05$) was maintained throughout the study. The data analysis was carried out based on the study's goals, employing both descriptive and inferential statistics:

a. The data was compiled in a master sheet.
b. The demographic characteristics of the samples were described by frequency and percentage for both Heparin Saline (Group 1) and 0.9% Sodium Chloride (Group 2).
c. The mean and standard deviation of the tool were calculated.
d. A t-test was conducted to compare the effect of Heparin Saline versus 0.9% Sodium Chloride in maintaining the patency of central venous catheters.
e. The results were presented in tables and charts.

Fig 2: SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY




Data Analysis
Descriptive and inferential statistics
Communication and dissemination of research findings

DATA ANALYSIS AND INTERPRETATION

This article centers on the analysis and interpretation of the data collected to assess the impact of heparin saline and 0.9% sodium chloride solution on maintaining the patency of central venous catheters. Data analysis involves organizing and presenting the information in a clear and accessible way, utilizing statistical techniques to help the researcher categorize, interpret, analyze, summarize, evaluate, and communicate numerical data. As noted by Kerlinger (1983), analysis is the process of classifying, organizing, manipulating, and summarizing data to answer the research questions. The aim is to transform raw data into a format that is understandable and suitable for investigating and testing the research problem.

Abdellah and Levine (1979) highlighted that interpreting the organized data is crucial for uncovering the true meaning of the study's findings. Polit and Hungler (1999) defined data analysis as the structured organization and synthesis of research data, followed by hypothesis testing using that data. In this study, analysis and interpretation were based on information gathered through standardized questionnaires. Both descriptive and inferential statistics were used to analyze the data, which was processed with SPSS software.

ORGANISATION OF THE STUDY FINDINGS:

Raw data was collected and entered in the master sheet for the statistical analysis. The data was analyzed using both descriptive and inferential statistics and displayed in tables and charts. The data finding have been organized and presented under the following sections: -

Section A: Description of samples according to demographic characteristics by frequency and percentage with Heparin Saline(Group-1) and with 0.9% Sodium chloride (Group-2).

Section B: To assess the effect of Heparin saline in maintenance of patency of central venous catheter.

Section -C: To assess the effect of 0.9% sodium chloride in maintenance of patency of central venous catheter.

Section D: To compare the effect of heparin saline versus 0.9% sodium chloride in maintain of patency of central venous catheter.

Section E: To determine the association between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables and clinical profile of patient

Section A: Description of samples according to demographic characteristics by frequency and percentage with Heparin Saline(Group-1) and with 0.9% Sodium chloride (Group-2).

This part deals with the description of samples according to demographic characteristics by frequency and percentage with Heparin Saline(Group-1) and with 0.9% Sodium chloride (Group-2) (Table 2).

N=100

Clinical Profile		**Group 1**	**Group 1(%)**	**Group 2**	**Group 2(%)**
Age	18-27	8	16.0	6	12.0
	28-37	12	24.0	12	24.0
	38-47	9	18.0	7	14.0
	Above 47	21	42.0	25	50.0
Sex	Female	16	32.00	19	38.00
	Male	34	68.00	31	62.00
Length of Hospital Stay	4 to 7 days	29	58.00	34	68.00

	8 days to 10 days	10	20.00	4	8.00
	Above 10 days	11	22.00	12	24.00
Patient Status	Bed Ridden	50	100.00	50	100.00
	Complete ambulation	0	0	0	0.00
Size of Central Venous Catheter	5	0	0.00	0	0.00
	6	0	0	0	0
	7	50	100.00	50	100.00
Site of Central Venous Catheter	Femoral	0	0.00	0	0.00
	Subclavian	7	14.00	8	16.00
	Juglar	43	86.00	42	84.00
Indication of CVCHS	Patient on Inotropes drugs	27	54.00	29	58.00
	Electrolyte imbalance	8	16.00	9	18.00
	Emergency venous access	15	30.00	12	24.00

Table 2: Frequency and Percentage Distribution of Demographical Profile of Patients

Group 1 (%): This column represents the percentage of participants within each age group who were assigned to Group 1 (receiving heparin saline).

Group 2 (%): This column represents the percentage of participants within each age group who were assigned to Group 2 (receiving 0.9% sodium chloride solution).

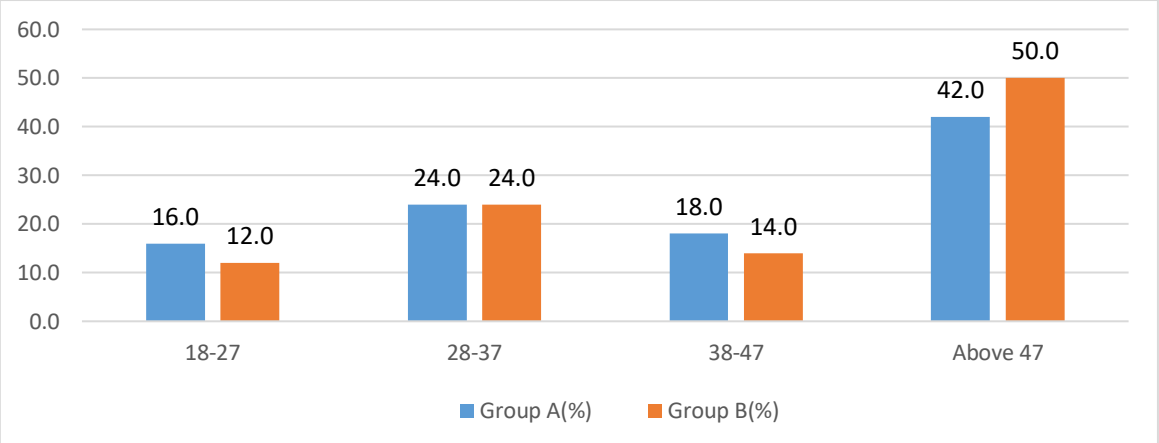


Fig 3: Bar chart of age distribution of patients

Among participants aged 18-27, 16.0% were assigned to Group 1 (heparin saline) while 12.0% were assigned to Group 2 (sodium chloride). In the age group 28-37, 24.0% of participants were assigned to both Group 1 and Group 2. In the age group 38-47, 18.0% were assigned to Group 1 and 14.0% were assigned to Group 2. For participants above 47, 42.0% were assigned to Group 1 and 50.0% were assigned to Group 2 (fig 3).

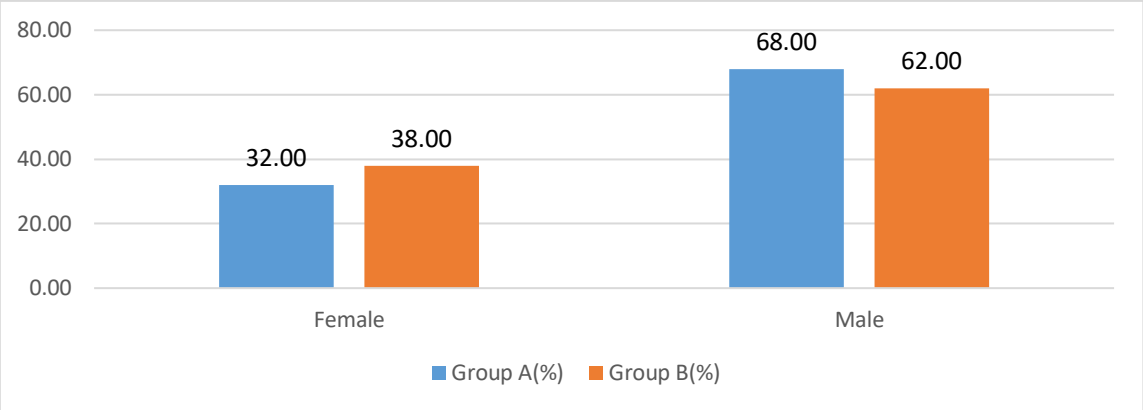


Fig 4. : Bar chart of gender distribution of patients

In Group 1, 32% of the participants were female, and 68% were male. In Group 2, 38% of the participants were female, and 62% were male (fig 4).

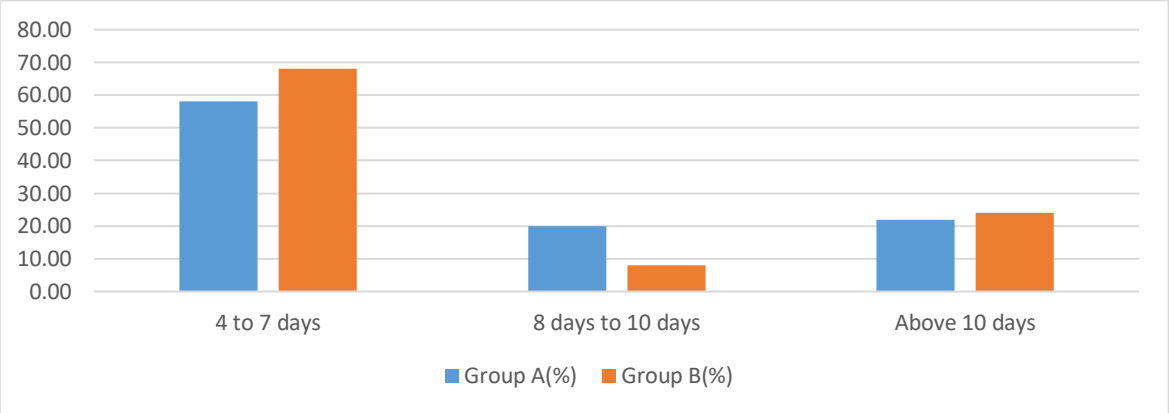


Fig 5. : Bar chart of Length of Hospital Stay distribution of patients

In Group 1, 58% of patients had a hospital stay of 4 to 7 days while in group 2 68% of patients had a hospital stay of 4 to 7 days. A larger proportion of patients in Group 2 had a hospital stay of 4 to 7 days compared to those in Group 1. In Group 1, 20% of patients stayed for 8 to 10 days, while only 8% of patients in Group 2 had a similar length of stay. Conversely, a higher percentage of patients in Group 1 had hospital stays of 8 to 10 days compared to Group 2. Additionally, 22% of patients in Group 1 stayed longer than 10 days, while 24% of patients in Group 2 had stays exceeding 10 days. Thus, slightly more patients in Group 2 had a hospital stay longer than 10 days compared to Group 1(fig 5).

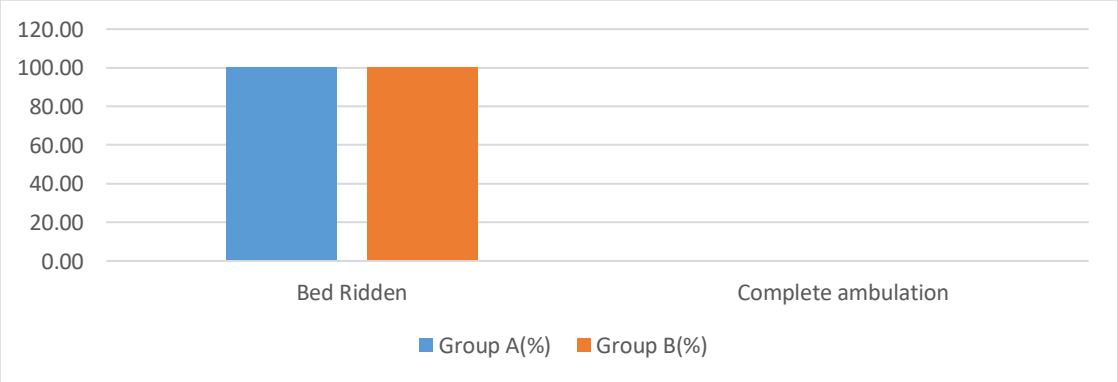


Fig 6: Bar Chart of Distribution of Patient Status

In Group 1, which received heparin saline, 100.00% of patients were bedridden and 0.00% had complete ambulation. In Group 2, which received 0.9% sodium chloride solution, 100.00% of patients were bedridden, and 0.00% had complete ambulation. There appears to be no significant difference in the distribution of patient statuses between the two groups (fig 6).

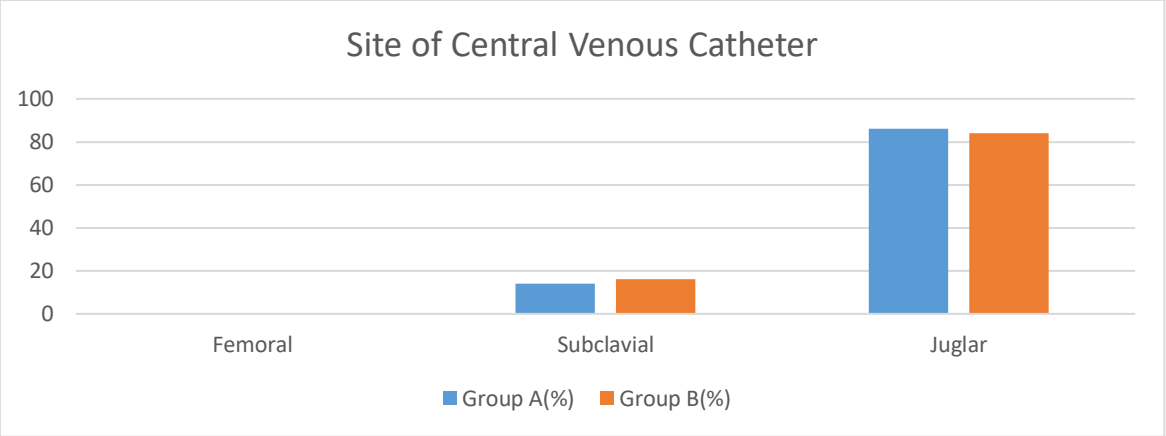


Fig 7: Bar Chart of Distribution of Site of Central Venous Catheter in patients

None of the patients in either Group 1 or Group 2 had a CVC placed in the femoral vein. 14% of patients in Group 1 and 16% of patients in Group 2 had their CVCs placed in the subclavian vein. The majority of patients had their CVCs placed in the jugular vein, with 86% in Group 1 and 84% in Group B (fig 7).

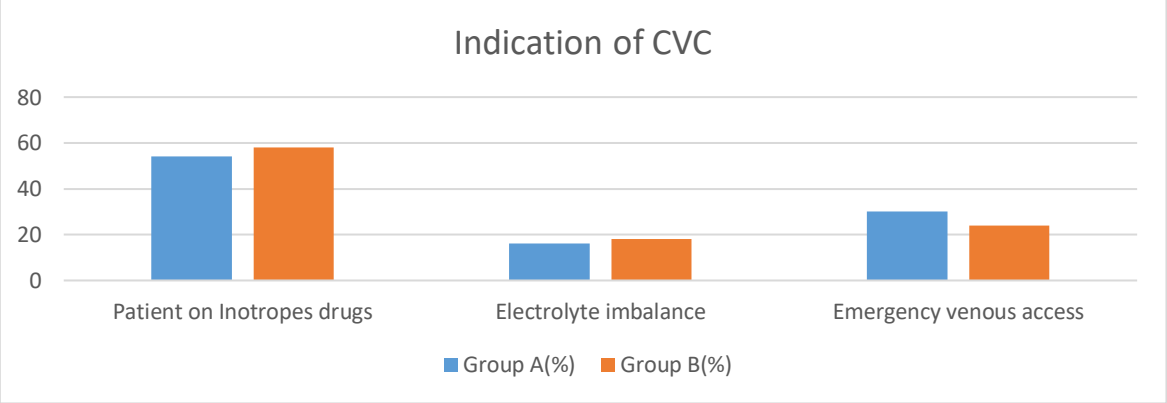


Fig 8.: Bar Chart of Distribution of Indication of CVC in patients

In Group 1 (heparin saline), 54% of patients experienced this indication, while in Group 2 (0.9% sodium chloride solution), 58% of patients had the same indication. This suggests that there's a slightly lower incidence of patients on inotropic drugs in the Group 1 compared to Group 2, though the difference is not substantial. In Group 1, 16% of patients had electrolyte imbalance, whereas in Group 2, 18% of patients experienced the same. Similar to the first indication, there's a slightly lower occurrence of electrolyte imbalance in Group 1 compared to Group 2. In Group 1, 30% of patients required emergency venous access, while in Group 2, 24% required it. This indicates that there's a higher incidence of needing emergency venous access in Group 1 compared to Group 2 (fig 8).

SECTION B: TO ASSESS THE EFFECT OF HEPARIN SALINE IN MAINTENANCE OF PATENCY OF CENTRAL VENOUS CATHETER.

Table 3: Descriptive Statistics

Score HS

Days	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Day 1	50	6.8000	.75593	.10690	6.5852	7.0148	5.00	8.00
Day 3	50	7.7600	.43142	.06101	7.6374	7.8826	7.00	8.00
Day 5	50	7.9600	.19795	.02799	7.9037	8.0163	7.00	8.00
Total	150	7.5067	.72117	.05888	7.3903	7.6230	5.00	8.00

Table 4: ANOVA

Score HS

	Sum of Squares	d.f	Mean Square	F	Sig.
Between Groups	38.453	2	19.227	72.395	.000
Within Groups	39.040	147	.266		
Total	77.493	149			

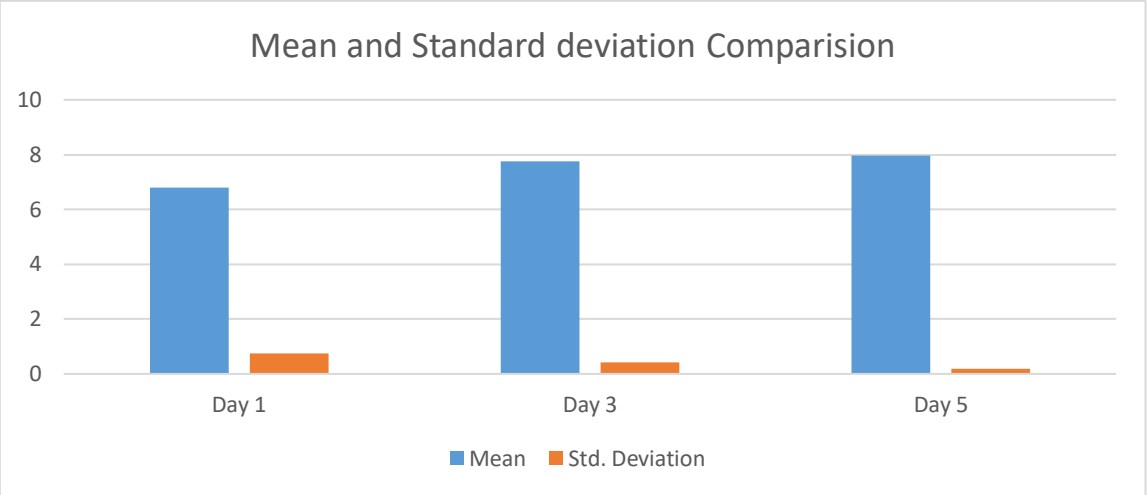


Fig 9.: Bar Chart of Comparison of Mean and Standard deviation

- The mean scores show an increase from Day 1 to Day 5indicating an improvement in maintaining the patency of the central venous catheter over time.
- The standard deviation decreases from Day 1 to Day 5, suggesting that the scores are more tightly clustered around the mean as time progresses indicating potentially increased consistency in the effect of heparin saline.
- The total mean score across all days suggests an overall positive effect of heparin saline in maintaining the patency of the central venous catheter.
- The small p-value (Sig. = .000) indicates that there is a significant difference in mean scores between at least one pair of the days (Day 1, Day 3 or Day 5) in terms of the effect of heparin saline on maintaining the patency of the central venous catheter (Table 3 & 4 and Fig 9).

SECTION C: TO ASSESS THE EFFECT OF 0.9% SODIUM CHLORIDE IN MAINTENANCE OF PATENCY OF CENTRAL VENOUS CATHETER

Table 5: Descriptive Statistics

Score SC

Days	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Day 1	50	6.7000	.70711	.10000	6.4990	6.9010	5.00	8.00
Day 3	50	7.2000	.72843	.10302	6.9930	7.4070	6.00	8.00
Day 5	50	7.3400	.89466	.12652	7.0857	7.5943	6.00	8.00
Total	150	7.0800	.82348	.06724	6.9471	7.2129	5.00	8.00

Table 6: ANOVA

Score SC

	Sum of Squares	d.f	Mean Square	F	Sig.
Between Groups	11.320	2	5.660	9.274	.000

Within Groups	89.720	147	.610		
Total	101.040	149			

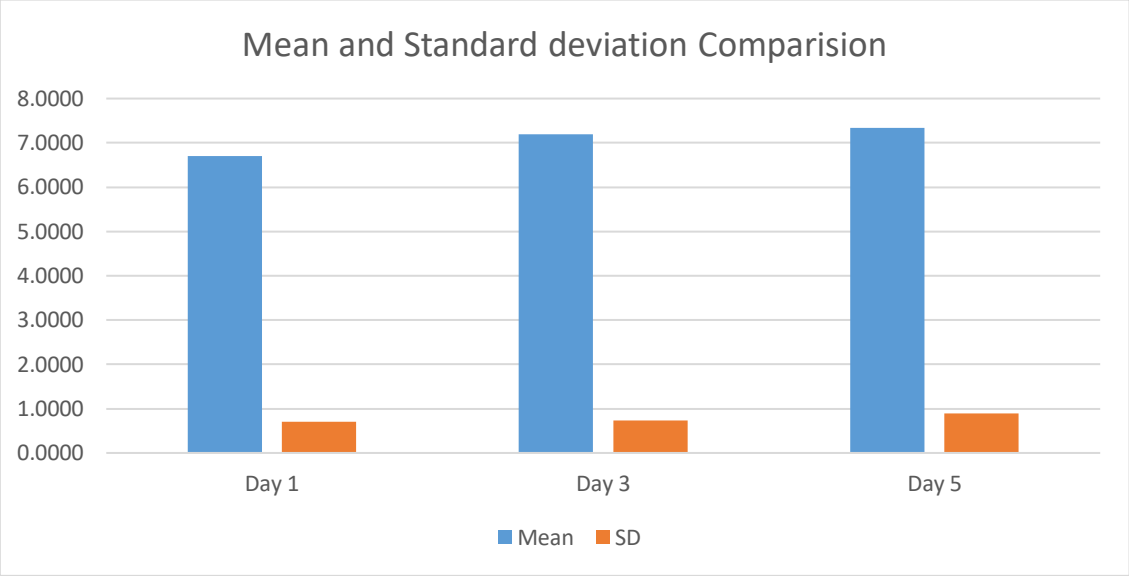


Fig 10: Bar Chart of Comparison of Mean and Standard deviation

- The mean scores show an increase from Day 1 to Day 5, indicating an improvement in maintaining the patency of the central venous catheter over time when using 0.9% sodium chloride solution.
- The standard deviation slightly increases from Day 1 to Day 5, suggesting that there is increasing variability in the scores as time progresses.
- The small p-value (Sig. = .000) suggests that there is a significant difference in the mean scores between at least one pair of days (Day 1, Day 3, or Day 5) regarding the effect of 0.9% sodium chloride solution on maintaining central venous catheter patency(Table 5 &6 and FIG 10).

SECTION D: TO COMPARE THE EFFECT OF HEPARIN SALINE VERSUS 0.9% SODIUM CHLORIDE IN MAINTAIN OF PATENCY OF CENTRAL VENOUS CATHETER

Table 7: COMPARISION OF THE EFFECT OF HEPARIN SALINE VERSUS 0.9% SODIUM CHLORIDE

	Day 1		**Day 3**		**Day 5**	
	Heparin Saline	**0.9% sodium chloride**	**Heparin Saline**	**0.9% sodium chloride**	**Heparin Saline**	**0.9% sodium chloride**
Mean	6.800	6.700	7.760	7.200	7.960	7.340
Standard Deviation	0.107	0.100	0.061	0.103	0.028	0.127
Sample Variance	0.571	0.500	0.186	0.531	0.039	0.800
Range	3	3	1	2	1	2
Minimum	5	5	7	6	7	6
Maximum	8	8	8	8	8	8

Count	50	50	50	50	50	50
t Stat	0.683		4.677		4.785	
P(T<=t) two-tail	0.496		0.000		0.000	

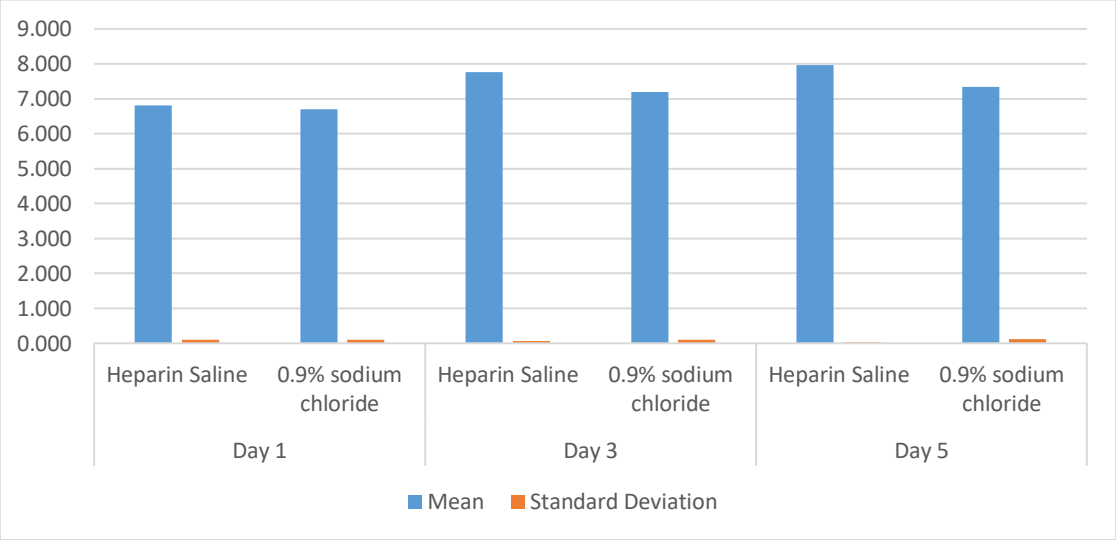


Fig 11: Bar Chart of Comparison of Mean and Standard deviation in different days

Table 7 and Fig 11 reveals that:

Day 1: The mean scores for both solutions are close with Heparin Saline having a slightly higher mean. However, the difference in means is not substantial. The standard deviations are also comparable, suggesting that the data points for both solutions are fairly close to the mean. The t-tests indicate that there is no notable difference between the mean values of Heparin Saline and 0.9% Sodium Chloride.

Day 3:

On Day 3, Heparin Saline has a significantly higher mean compared to 0.9% Sodium Chloride. Heparin Saline has a smaller standard deviation, indicating that the scores are more tightly clustered around the mean compared to 0.9% Sodium Chloride. The t-tests reveal a significant difference between the means of Heparin Saline and 0.9% Sodium Chloride.

Day 5:

On Day 5, Heparin Saline shows a higher mean than 0.9% Sodium Chloride. Additionally, Heparin Saline has a much lower standard deviation, suggesting more consistency in its effect compared to 0.9% Sodium Chloride. The t-tests confirm a significant difference between the means of Heparin Saline and 0.9% Sodium Chloride.

- Overall, Heparin Saline seems to be more effective than 0.9% Sodium Chloride in maintaining the patency of the central venous catheter, especially on Day 3 and Day 5. Heparin Saline shows higher mean scores and lower variability (smaller standard deviations) across all three days compared to 0.9% Sodium Chloride.
- The t-tests confirm that the difference in means between Heparin Saline and 0.9% Sodium Chloride is statistically significant on Day 3 and Day 5 suggesting a consistent advantage of Heparin Saline in maintaining catheter patency on these days.

SECTION E: TO DETERMINE THE ASSOCIATION BETWEEN EFFECT OF HEPARIN SALINE VERSUS 0.9% SODIUM CHLORIDE WITH SELECTED DEMOGRAPHIC VARIABLES AND CLINICAL PROFILE OF PATIENT

Table 8: EFFECT OF HEPARIN SALINE
Group 1: Heparin Saline (Day 1, 3 and 5)

		Heparin Saline (Day 1)			ANOVA			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	6.6250	.91613	8	3,46	0.231	0.875	Not Significant
	28-37	6.7500	.86603	12				
	38-47	6.8889	.78174	9				
	above 47	6.8571	.65465	21				
Gender	Male	6.706	0.79884	34	48	1.292	0.203	Not Significant
	Female	7	0.63246	16				
Length of Hospital Stay	4 to 7 days	6.7241	.79716	29	2,47	0.339	0.714	Not Significant
	8 days to 10 days	6.9000	.73786	10				
	Above 10 days	6.9091	.70065	11				
Site of Central Venous Catheter	Subclavian	6.5714	.78680	7	48	-0.86	0.394	Not Significant
	Juglar	6.8372	.75370	43				
Indication of CVCHS	Patient on Inotropes drugs	6.7037	.66880	27	2,47	1.388	0.26	Not Significant
	Electrolyte imbalance	6.6250	.91613	8				
	Emergency venous access	7.0667	.79881	15				

Table 8 reveals that:

1. **Age:** There is no significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 0.231 with a p-value of 0.875, indicating that the age groups do not significantly influence the effectiveness of Heparin Saline on Day 1.
2. **Gender:** No substantial difference was observed in the mean scores between males and females. The F-test value is 1.292 with a p-value of 0.203, suggesting that gender does not significantly affect the effectiveness of Heparin Saline on Day 1.
3. **Length of Hospital Stay:** There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 0.339 with a p-value of 0.714 indicating that the length of hospital stay does not significantly impact the effectiveness of Heparin Saline on Day 1.
4. **Site of Central Venous Catheter:** There is no significant difference in mean scores between subclavian and jugular sites for central venous catheter placement. The F-test value

is -0.86 with a p-value of 0.394, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of Heparin Saline on Day 1.

5. **Indication of CVC:** There is no significant difference in mean scores among different indications for CVC (patient on inotropes drugs, electrolyte imbalance, emergency venous access). The F-test value is 1.388 with a p-value of 0.26, indicating that the indication for CVC does not significantly affect the effectiveness of Heparin Saline on Day 1.

Table 9 EFFECT OF HEPARIN SALINE (DAY 3)

		Heparin Saline (Day 3)			**ANOVA**			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	7.63	0.518	8	3,46	0.346	0.792	Not Significant
	28-37	7.75	0.452	12				
	38-47	7.78	0.441	9				
	above 47	7.81	0.402	21				
Gender	Male	7.79	0.41	34	48	-0.812	0.421	Not Significant
	Female	7.69	0.479	16				
Length of Hospital Stay	4 to 7 days	7.79	0.412	29	2,47	0.868	0.426	Not Significant
	8 days to 10 days	7.6	0.516	10				
	Above 10 days	7.82	0.405	11				
Site of Central Venous Catheter	Subclavian	7.86	0.378	7	48	0.639	0.526	Not Significant
	Juglar	7.74	0.441	43				
Indication of CVCHS	Patient on Inotropes drugs	7.78	0.6688	27	2,47	0.052	0.95	Not Significant
	Electrolyte imbalance	7.75	0.91613	8				
	Emergency venous access	7.73	0.79881	15				

Table 9 reveals that:

1. Age: There is no significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 0.346 with a p-value of 0.792, indicating that age does not significantly influence the effectiveness of Heparin Saline on Day 3.

2.Gender: The mean scores do not show a significant difference between males and females. The F-test value is -0.812 with a p-value of 0.421, suggesting that gender does not significantly affect the effectiveness of Heparin Saline on Day 3.

3. Length of Hospital Stay: There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 0.868 with a p-value of 0.426, indicating that the length of hospital stay does not significantly impact the effectiveness of Heparin Saline on Day 3.

4. Site of Central Venous Catheter: There is no significant difference in mean scores between subclavian and jugular sites for central venous catheter placement. The F-test value is 0.639 with a p-value of 0.526, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of Heparin Saline on Day 3.
5. Indication of CVC: There is no significant difference in mean scores among different indications for CVC (patient on inotropes drugs, electrolyte imbalance, emergency venous access). The F-test value is 0.052 with a p-value of 0.95, indicating that the indication for CVC does not significantly affect the effectiveness of Heparin Saline on Day 3.

Table 10: **EFFECT OF HEPARIN SALINE (Day 5)**

		Heparin Saline (Day 5)			**ANOVA**			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	8	0	8	3,46	3.592	0.02	Significant
	28-37	8	0	12				
	38-47	7.78	0.441	9				
	above 47	8	0	21				
Gender	Male	7.97	0.171	34	48	-0.547	0.587	Not Significant
	Female	7.94	0.25	16				
Length of Hospital Stay	4 to 7 days	7.9	0.258	29	2,47	0.731	0.487	Not Significant
	8 days to 10 days	8	0	10				
	Above 10 days	8	0	11				
Site of Central Venous Catheter	Subclavial	8	0	7	48	0.573	0.57	Not Significant
	Juglar	7.95	0.213	43				
Indication of CVCHS	Patient on Inotropes drugs	7.96	0.6688	27	2,47	1.049	0.358	Not Significant
	Electrolyte imbalance	7.88	0.91613	8				
	Emergency venous access	8	0.79881	15				

Table 10 reveals that:

1. **Age:** There is a significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 3.592 with a p-value of 0.02, indicating that age significantly influences the effectiveness of Heparin Saline on Day 5. Specifically, individuals in the age group 18-27 have significantly higher mean scores compared to other age groups.

2**. Gender:** There is no significant difference in the mean scores between males and females. The F-test value is -0.547 with a p-value of 0.587, suggesting that gender does not significantly affect the effectiveness of Heparin Saline on Day 5.

3.Length of Hospital Stay: There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 0.731 with a p-value of 0.487, indicating that the length of hospital stay does not significantly impact the effectiveness of Heparin Saline on Day 5.

4. Site of Central Venous Catheter: There is no significant difference in mean scores between Subclavial and jugular sites for central venous catheter placement. The F-test value is 0.573 with a p-value of 0.57, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of Heparin Saline on Day 5.

5. Indication of CVC: There is no significant difference in mean scores among different indications for CVC. The F-test value is 1.049 with a p-value of 0.358, indicating that the indication for CVCHS does not significantly affect the effectiveness of Heparin Saline on Day 5.

Table 11: EFFECT OF 0.9% Sodium Chloride (Day 1)

		0.9% SODIUM CHLORIDE (Day 1)			**ANOVA**			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	6.5	0.837	6	3,46	0.289	0.833	Not Significant
	28-37	6.75	0.754	12				
	38-47	6.86	0.69	7				
	above 47	6.68	0.69	25				
Gender	Female	6.63	0.761	19	48	-0.532	0.597	Not Significant
	Male	6.74	0.682	31				
Length of Hospital Stay	4 to 7 days	6.65	0.691	34	2,47	1.337	0.273	Not Significant
	8 days to 10 days	7.25	0.957	4				
	Above 10 days	6.67	0.651	12				
Site of Central Venous Catheter	Subclavial	6.5	0.535	8	48	-0.871	0.388	Not Significant
	Juglar	6.74	0.734	42				
Indication of CVCHS	Patient on Inotropes drugs	6.69	0.604	29	2,47	0.394	0.676	Not Significant
	Electrolyte imbalance	6.56	0.726	9				

	Emergency venous access	6.83	0.937	12				

Table 11 reveals that:

1. **Age:** There is no significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 0.289 with a p-value of 0.833, indicating that age does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 1.
2. **Gender:** There is no notable difference in the mean scores between females and males. The F-test value is -0.532 with a p-value of 0.597, suggesting that gender does not significantly affect the effectiveness of 0.9% Sodium Chloride on Day 1.
3. **Length of Hospital Stay:** There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 1.337 with a p-value of 0.273, indicating that the length of hospital stay does not significantly impact the effectiveness of 0.9% Sodium Chloride on Day 1.
4. **Site of Central Venous Catheter:** There is no significant difference in mean scores between Subclavial and jugular sites for central venous catheter placement. The F-test value is -0.871 with a p-value of 0.388, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 1.
5. **Indication of CVC:** There is no significant difference in mean scores among different indications for CVC (patient on inotropes drugs, electrolyte imbalance, emergency venous access). The F-test value is 0.394 with a p-value of 0.676, indicating that the indication for CVCHS does not significantly affect the effectiveness of 0.9% Sodium Chloride on Day 1.

Table 12: **EFFECT OF 0.9% Sodium Chloride (Day 3)**

		0.9% SODIUM CHLORIDE (Day 3)			**ANOVA**			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	7	0.894	6	3,46	0.528	0.665	Not Significant
	28-37	7.42	0.669	12				
	38-47	7.14	0.9	7				
	above 47	7.16	0.688	25				
Gender	Female	7.11	0.737	19	48	-0.716	0.477	Not Significant
	Male	7.26	0.729	31				
Length of Hospital Stay	4 to 7 days	7.21	0.729	34	2,47	0.484	0.619	Not Significant
	8 days to 10 days	7.5	0.577	4				
	Above 10 days	7.08	0.793	12				
Site of Central Venous Catheter	Subclavial	7	0.756	8	48	-0.845	0.402	Not Significant
	Juglar	7.24	0.726	42				

Indication of CVCHS	Patient on Inotropes drugs	7.21	0.675	29	2,47	2.707	0.077	Not Significant
	Electrolyte imbalance	6.78	0.833	9				
	Emergency venous access	7.5	0.674	12				

Table 12 reveals that:

1. **Age:** There is no significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 0.528 with a p-value of 0.665, indicating that age does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 3.
2. **Gender:** There is no significant difference in mean scores between females and males. The F-test value is -0.716 with a p-value of 0.477, suggesting that gender does not significantly affect the effectiveness of 0.9% Sodium Chloride on Day 3.
3. **Length of Hospital Stay:** There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 0.484 with a p-value of 0.619, indicating that the length of hospital stay does not significantly impact the effectiveness of 0.9% Sodium Chloride on Day 3.
4. **Site of Central Venous Catheter:** There is no significant difference in mean scores between Subclavial and jugular sites for central venous catheter placement. The F-test value is -0.845 with a p-value of 0.402, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 3.
5. **Indication of CVC:** There is no significant difference in mean scores among different indications for CVC (patient on inotropes drugs, electrolyte imbalance, emergency venous access). The F-test value is 2.707 with a p-value of 0.077, indicating that the indication for CVC slightly influences the effectiveness of 0.9% Sodium Chloride on Day 3, but it does not reach statistical significance at the conventional threshold of 0.05.

Table 13: **EFFECT OF 0.9% Sodium Chloride (Day 5)**

		0.9% SODIUM CHLORIDE (Day 5)			**ANOVA**			
Variables	**Option**	**Mean**	**SD**	**N**	**DF**	**F/T test value**	**P value**	**Result**
Age	18-27	7.33	1.033	6	3,46	0.243	0.866	Not Significant
	28-37	7.5	0.905	12				
	38-47	7.43	0.976	7				
	above 47	7.24	0.879	25				
Gender	Female	7.26	0.933	19	48	-0.472	0.639	Not Significant
	Male	7.39	0.882	31				
Length of Hospital Stay	4 to 7 days	7.32	0.912	34	2,47	0.067	0.935	Not Significant
	8 days to 10 days	7.5	0.577	4				

	Above 10 days	7.33	0.985	12				
Site of Central Venous Catheter	Subclavial	7.25	0.886	8	48	-0.308	0.76	Not Significant
	Juglar	7.36	0.906	42				
Indication of CVCHS	Patient on Inotropes drugs	7.38	0.862	29	2,47	1.659	0.201	Not Significant
	Electrolyte imbalance	6.89	1.054	9				
	Emergency venous access	7.58	0.793	12				

Table 13 reveals that

1. **Age:** There is no significant difference in mean scores among different age groups (18-27, 28-37, 38-47, above 47). The F-test value is 0.243 with a p-value of 0.866, indicating that age does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 5.
2. **Gender:** There is no significant difference in mean scores between females and males. The F-test value is -0.472 with a p-value of 0.639, suggesting that gender does not significantly affect the effectiveness of 0.9% Sodium Chloride on Day 5.
3. **Length of Hospital Stay:** There is no significant difference in mean scores among different lengths of hospital stays (4 to 7 days, 8 days to 10 days, above 10 days). The F-test value is 0.067 with a p-value of 0.935, indicating that the length of hospital stay does not significantly impact the effectiveness of 0.9% Sodium Chloride on Day 5.
4. **Site of Central Venous Catheter:** There is no significant difference in mean scores between Subclavial and jugular sites for central venous catheter placement. The F-test value is -0.308 with a p-value of 0.76, indicating that the site of central venous catheter placement does not significantly influence the effectiveness of 0.9% Sodium Chloride on Day 5.
5. **Indication of CVC:** There is no significant difference in mean scores among different indications for CVC (patient on inotropes drugs, electrolyte imbalance, emergency venous access). The F-test value is 1.659 with a p-value of 0.201, indicating that the indication for CVC does not significantly affect the effectiveness of 0.9% Sodium Chloride on Day 5.

RESULT AND DISCUSSION

This article concentrates on presenting the study's results and exploring the findings. In the discussion section, the researcher provides an interpretation of the results' significance and their broader implications. This section seeks to explain the meaning behind the findings. The presentation of the results forms the foundation of any research project. This article presents the summary, conclusions, implications for nursing practice, recommendations and limitations of the study

This chapter presents the discussion of findings based on samples as per their demographic characteristics and checklist for assessing patency of central venous catheter was done to assess the patency of central venous catheter.

In order to achieve the objectives of the study, standardized questionnaires were asked to assess patency of central venous catheter from clients and their relatives in PCCM, PGIMS, Rohtak. Pilot study was carried out among 10 samples and Main data was collected among

100 subjects those who were fulfilling the inclusion criteria were selected by sequentially numbered opaque sealed envelope (SNOSE) sampling technique. The samples were assessed by demographic variables, checklist for assessing patency of central venous catheter. Central venous catheters are used to administer fluids, blood products, medications, parenteral nutrition, and for purposes such as dialysis and central venous pressure monitoring. The main objective of this study was to assess the effect of heparin saline and 0.9% sodium chloride solution on maintaining the patency of central venous catheters in critically ill patients in the PCCM unit at PGIMS, Rohtak. The collected data was organized and analyzed using SPSS Version 20. Both descriptive and inferential statistical methods were employed for data analysis. The findings of the study were discussed in relation to its objectives.

The aim of the study was to evaluate the impact of heparin saline and 0.9% sodium chloride solution on maintaining the patency of central venous catheters in critically ill patients at PGIMS, Rohtak. The findings were discussed under following sections:

Section A: A breakdown of the samples based on demographic characteristics, presented by frequency and percentage, for both Heparin Saline (Group 1) and 0.9% Sodium Chloride (Group 2).

Section B: To evaluate the impact of heparin saline on maintaining the patency of central venous catheters.

Section -C: To assess the effect of 0.9% sodium chloride in maintenance of patency of central venous catheter.

Section D: To compare the effect of heparin saline versus 0.9% sodium chloride in maintain of patency of central venous catheter.

Section E: To determine the association between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables and clinical profile of patient

Section F: Discussion related to testing of the hypothesis.

Section A: Description of samples according to demographic characteristics by frequency and percentage with Heparin Saline(Group-1) and with 0.9% Sodium chloride (Group-2).

Majority of clients were in the age above 47 years in both group 1(42%) and group 2 (50%). Most of the patients in both group 1 (68%) and group 2 (62%) were male. Majority of clients in Group-1 (Heparin Saline), with regards to age, most of the subjects 21(42%) were in the age above 47 years, majority were males 34(68%), length of hospital stay with central venous catheter of subjects, depicts that majority 29(58%) were 4-7 days. All subjects were bedridden 50(100%).Size of central venous catheter was 50(100%) in category 7. Site of central venous catheter was Juglar vein in 43(86%) patients. Indication of central venous catheter of subjects 27(54%) were patient on inotropes drugs.

Majority of clients in Group-2 (0.9% Sodium chloride) with regards to age, most of the subjects 25(50%) were in the age above 47 years, majority were males 31(62%), length of hospital stay with central venous catheter of subjects, depicts that majority 34(68%) were 4-7 days. All subjects were bedridden 50(100%).Size of central venous catheter was 50(100%) in category 7. Site of central venous catheter was Juglar vein in 42(84%) patients. Indication of central venous catheter of subjects 29(58%) were patient on inotropes drugs.

Section B: To assess the effect of Heparin saline in maintenance of patency of central venous catheter.

The mean scores show an increase from Day 1 to Day 5indicating an improvement in maintaining the patency of the central venous catheter over time.
The standard deviation decreases from Day 1 to Day 5, suggesting that the scores are more tightly clustered around the mean as time progresses indicating potentially increased consistency in the effect of heparin saline.
The total mean score across all days suggests an overall positive effect of heparin saline in maintaining the patency of the central venous catheter.
The small p-value (Sig. = .000) indicates that there is a significant difference in mean scores between at least one pair of the days (Day 1, Day 3 or Day 5) in terms of the effect of heparin saline on maintaining the patency of the central venous catheter.

Section -C: To assess the effect of 0.9% sodium chloride in maintenance of patency of central venous catheter.

The mean scores show an increase from Day 1 to Day 5, indicating an improvement in maintaining the patency of the central venous catheter over time when using 0.9% sodium chloride solution.
The standard deviation slightly increases from Day 1 to Day 5, suggesting that there is increasing variability in the scores as time progresses.
The small p-value (Sig. = .000) suggests a significant difference in mean scores between at least one pair of days (Day 1, Day 3, or Day 5) regarding the effect of 0.9% sodium chloride solution on maintaining the patency of the central venous catheter.

Section D: To compare the effect of heparin saline versus 0.9% sodium chloride in maintain of patency of central venous catheter.

Day 1:

The mean scores for both solutions are close with Heparin Saline having a slightly higher mean. However, the difference in means is minimal. The standard deviations are also comparable, suggesting that the data points are fairly close to the mean for both solutions. The t-tests revealed no significant difference between the average values of Heparin Saline and 0.9% Sodium Chloride.

Day 3:

On Day 3, Heparin Saline has a significantly higher mean compared to 0.9% Sodium Chloride. Heparin Saline has a smaller standard deviation, indicating that the values are more tightly clustered around the mean compared to 0.9% Sodium Chloride. The t-tests reveal a significant difference between the means of Heparin Saline and 0.9% Sodium Chloride.

Day 5:

On Day 5, Heparin Saline shows a higher mean than 0.9% Sodium Chloride. Additionally, Heparin Saline has a much lower standard deviation, suggesting a more consistent effect compared to 0.9% Sodium Chloride. The t-tests reveal a significant difference between the means of Heparin Saline and 0.9% Sodium Chloride.

a) Overall, Heparin Saline seems to be more effective than 0.9% Sodium Chloride in preserving the patency of the central venous catheter, especially on Day 3 and Day 5.

b) Heparin Saline shows higher mean scores and lower variability (smaller standard deviations) across all three days compared to 0.9% Sodium Chloride.

c) The t-tests confirm that the difference in means between Heparin Saline and 0.9% Sodium Chloride is statistically significant on Day 3 and Day 5 suggesting a consistent advantage of Heparin Saline in maintaining catheter patency on these days.

Section E: To determine the association between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables and clinical profile of patient

Group 1:

Heparin Saline Day 1: There was **Not significant** association **between effect of heparin saline and demographic variables** (Age, Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and indication of central venous catheter).

Heparin Saline Day 3: There was **Not significant** association **between effect of heparin saline and demographic variables** (Age, Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and Iindication of central venous catheter).

Heparin Saline Day 5: There was **Not significant** association **between effect of heparin saline and demographic variables** (Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and Iindication of central venous catheter). A significant relationship was found between the effect of heparin saline and the demographic variable of age.

Group 2:

0.9% Sodium Chloride Day 1: There was **Not significant** association **between effect of heparin saline and demographic variables** (Age, Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and Iindication of central venous catheter).

0.9% Sodium Chloride Day 3: There was **Not significant** association **between effect of heparin saline and demographic variables** (Age, Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and Iindication of central venous catheter).

0.9% Sodium Chloride Day 5: There was **Not significant** association **between effect of heparin saline and demographic variables** (Age, Gender, Length of hospital stay, Size of central venous catheter, Site of central venous catheter and Iindication of central venous catheter).

Section F: Discussion related to testing of the hypothesis

Since there was no significant difference in the effects of heparin saline and 0.9% sodium chloride solution.

So, H01 hypothesis was accepted and H1 hypothesis was rejected, because value of p was greater than 0.05(level of significance).

As There was not a significant significant difference between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables

So, H02 hypothesis was accepted and H2 hypothesis was rejected, because value of p was greater than 0.05(level of significance).

CONCLUSION

Central venous catheters (CVCs) are commonly used in clinical settings, particularly in intensive care units (ICUs). These catheters are inserted to facilitate the administration of fluids, blood products, medications, parenteral nutrition, as well as for dialysis and central venous pressure monitoring.

The primary goal of the study was to evaluate the impact of heparin saline and 0.9% sodium chloride solution on maintaining the patency of central venous catheters in critically ill patients in the PCCM unit at PGIMS, Rohtak.

The present study was conducted with the following significant results.

Majority of clients in Group-1 (Heparin Saline), with regards to age, most of the subjects 21(42%) were in the age above 47 years, majority were males 34(68%), length of hospital stay with central venous catheter of subjects, depicts that majority 29(58%) were 4-7 days. All subjects were bedridden 50(100%).Size of central venous catheter was 50(100%) in category 7. Site of central venous catheter was Juglar vein in 43(86%) patients. Indication of central venous catheter of subjects 27(54%) were patient on inotropes drugs.

Majority of clients in Group-2 (0.9% Sodium chloride) with regards to age, most of the subjects 25(50%) were in the age above 47 years, majority were males 31(62%), length of hospital stay with central venous catheter of subjects, depicts that majority 34(68%) were 4-7 days. All subjects were bedridden 50(100%).Size of central venous catheter was 50(100%) in category 7. Site of central venous catheter was Juglar vein in 42(84%) patients. Indication of central venous catheter

The present study did not found a statistical significant difference between effect of heparin saline and 0.9% sodium chloride solution and not found a statistical significant difference between effect of heparin saline versus 0.9% sodium chloride with selected demographic variables except Age

Prevalence of heparin saline on day 1 was 6.8%, on day 3 was 7.7% and on day 5 was 7.9% and prevalence of 0.9% sodium chloride on day 1 was 6.7%, on day 3 was 7.2% and on day 5 was 7.3%. The results suggested that Heparin Saline is more effective in preserving the patency of the central venous catheter. A t-test was performed to compare the effectiveness of Heparin Saline and 0.9% sodium chloride in maintaining catheter patency. The findings revealed no significant difference between the two solutions, as the p-value was higher than 0.05.

IMPLICATIONS:

The study holds important implications for nursing practice, including nursing services, nursing administration, nursing education, and nursing research.

IMPLICATION FOR NURSING SERVICE

This study gives the insight for the nurses to plan and organize care for patient with central venous catheter.

- The clinical nurse may use heparin saline twice daily for the patency of central venous catheter in the hospital setting.
- It will also improve the skill of nurses on assessment of patency of central venous catheter by checklist.
- The nurse can contribute the evidence based nursing practice through the experiences gained from uses of heparin saline on central venous catheter, the nurse can reduce further complication.

IMPLICATION FOR NURSING EDUCATION

The finding of the study can be of importance to the nurse educators, nurse educator may use the finding of this study during the instruction period to educate student nurses about the relevance of use of heparin saline on central venous catheter for management of their patency.

- Nursing students are the future educators and care providers. Hence they need to know all aspects of patency of central venous catheter.
- This study highlights most of all areas which will help nursing students to gain in-depth knowledge about assessment of patency of central venous catheter and effect of heparin saline flush.
- The tool and finding of this study will provide a guide line to develop clinical teaching and in-service education programs for all nursing staffs on management of patency of central venous catheter.

IMPLICATION FOR NURSING ADMINISTRATION

The study finding may contribute to the development of evidence based protocol on management of patency of central venous catheter.

- The key point of this study will help in formulating education programs like continuing education program and in-service education on patency of central venous catheter and its management which will improve the quality of nursing education and nursing care.
- The nurse administrator can plan in-service education program to make staff nurses aware of recent advances recording the management of patency of central venous catheter.

IMPLICATION FOR NURSING RESEARCH

The findings of the study add valuable insights to the field of nursing research.

- It serves as a guideline to conduct other similar studies in different setting and on a different population.
- This study could inspire other researchers to explore this topic on a larger scale, helping to expand the generalizability of the findings.

RECOMMENDATIONS

- The study recommends the following further research.
- The similar can be conducted in with large sample for better generalizations.
- This study can be conducted in different age group of people.

LIMITATIONS

- The study was confined to small number of subjects.
- The study was limited to subjects of PCCM ICU,PGIMS,Rohtak only.
- The study was limited to assess the subjects of the particular condition.

CONCLUSION:

The present study was to assess the effect of heparin saline in maintenance of patency of central venous catheter in PCCM unit at Pt. BD Sharma PGIMS Rohtak.

Review of literature of the study was related to central venous catheter and the conceptual framework selected for the study was based on Imogene King's Goal Attainment theory was used in this study.

Pilot study was conducted in PCCM unit of PGIMS Rohtak to assess the effect of heparin saline in maintenance of patency of central venous catheter and to find out the feasibility of undertaking the main study and to decide the plan of analysis.

The study recruited 100 patients of central venous catheter in PCCM unit by using sequentially numbered opaque sealed envelopes sampling technique. The research design used by researcher was randomized control trial design.

Structure questionnaire for demographic variables, checklist to assess the patency of central venous catheter among patient received heparin saline and normal saline flush was used as a tool for data collection in order to achieve the objectives. The tool was accepted by research committee, college of nursing PT. B.D. Sharma PGIMS Rohtak. Before conducting the final study, the pilot study was Conducted from 2-1-2024 to 10-1-2042 on 10 patients. Data was gathered using the designated tool, and analysis was performed employing both descriptive and inferential statistics.

The results of the pilot study indicated that the tool was effective, workable, and well-received. On the basis of success of pilot study final study was conducted in defined setting after Obtaining permission from the head of the medicine department, PGIMS Rohtak. The intervention of the heparin saline and normal saline twice a day on day1, day3 and day5 was done and the patency of central venous catheter was assessed. The study revealed that heparin saline is more effective than normal saline in maintenance of patency of central venous catheter.

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