A COMPARITIVE STUDY TO EVALUATE THE EFFICACY OF HEPARINISED SALINE AND NORMAL SALINE FLUSH ON PATENCY OF PERIPHERAL INTRAVENOUS CANNULA AMONG PATIENTS WITH MEDICAL CONDITIONS IN SELECTED HOSPITAL AT SALEM.

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DECLARATION BY THE CANDIDATE

I, **N.RAJALAKSHMI**, hereby declare that this dissertation entitled **"A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem**" has been prepared by me under the guidance and direct supervision of **Prof. Dina Rani, M.Sc(N), Ph.D(N).,** Professor cum principal and **Mrs. Sheeja, M.Sc (N),** HOD, Department of Medical surgical Nursing, Shanmuga College of Nursing, Salem as the requirement for the partial fulfilment of **Master of Science in Nursing** degree under **The Tamilnadu Dr. M.G.R Medical University, Chennai-32**. This dissertation represents independent work of mine, which has not been previously formed and this will not be used further award of any degree/ diploma.

Place: Salem

Month and Year: October 2016

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CERTIFICATE BY GUIDE AND PRINCIPAL

This is to certify that the dissertation entitled **" A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem**" is a bonafide work done by **N. RAJALAKSHMI,** Shanmuga College of Nursing, Salem in partial fulfilment of the university rules and regulations for the award of **MASTER OF SCIENCE IN NURSING** degree under our guidance and supervision during the academic year 2015-2016.

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N. RAJALAKSHMI

RESEARCH ABSTRACT

N. Rajalakshmi*, Prof. Dina Rani, Mrs. Sheeja*****
***M.Sc(N)., II – Year Student, ** Principal, ***HOD, Department of Medical Surgical Nursing Shanmuga College of Nursing, Salem at the time of doing the study in October 2016.**

ABSTRACT: Background - In modern medical practice, more than 60% of patients receive intravenous therapy during their hospitalization. Medication, fluids, nutrition, and blood products can all be given via the intravenous route. Peripheral veins are the most common intravenous access method in the hospitals. The problems associated with the peripheral Intravenous catheters are kinking, occlusion of the catheter itself, developing a clot or an infection at the venous insertion site (phlebitis). **Method –**A quantitative evaluative research approach, quasi experimental post-test only control group design was used. The sample size was 45, 15 in each experimental group I, experimental group II and control group were selected using non probability purposive sampling technique. Initially the researcher got permission from concerned authority. The written consent was obtained from the samples. The tools used were, Performa of demographic variable, structured rating scale to assess the patency of peripheral intravenous cannula. Heparinised saline flush was administered to experimental group I, 10 units of heparin in 2ml saline was given for 4 days twice daily after the administration of medication from the first day and within 12 hours of intravenous cannulation and 2ml of normal saline was given to experimental group II, for 4 days twice daily after the administration of medication from the first day and within 12 hours of intravenous cannulation. **Result –** The findings showed that there is a significant difference in the mean score of patency of peripheral intravenous cannula between experimental group I, experimental group II and control group, there is no significant association between the post test level of patency of peripheral intravenous cannula among samples in experimental group I with their selected demographic variable (age, size of cannula and site of cannula insertion), there is a significant association between the post test level of patency of peripheral intravenous cannula among samples in experimental group II with their age. **Conclusion-** Both heparinised saline and normal saline was found to be effective in maintaining the patency of peripheral intravenous cannula.

Keywords: Heparinised saline, Normal saline, Patency of peripheral intravenous cannula

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INTRODUCTION: Peripheral intravenous cannulation is the most common method used for intravenous therapy in the hospitals; however it can be associated with some complications like hematoma, phlebitis, pain, frequent blockage and infections. In almost all cases reported, about 4.0% to 60% of patients develop infiltration and extravasation and about 2.3%-67% of the patients develop phlebitis during their hospitalization, which will lead to the blockage of peripheral intravenous cannulas.

STATEMENT OF THE PROBLEM: A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.

OBJECTIVES: (1) To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-I (Heparinised Saline) and control group. (2) To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-II (Normal Saline) and control group. (3) To assess and compare the mean post test score of patency of peripheral intravenous cannula between Experimental group-I and Experimental group-II. (4) To find association between the post-test levels of patency of peripheral intravenous cannula among the Experimental group-I and Experimental group–II with their selected demographic variables (Age, Size of Cannula, site of cannula insertion).

RESEARCH HYPOTHESES (level of significance at $p<0.05$): H_1-There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and control group. **H_2-** There is a

significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–II (Normal Saline) and control group. **H_3-** There is a significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and Experimental group-II (Normal Saline). **H_4-** There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-I with their selected demographic variables (age, size of cannula, site of cannula insertion). **H_5:** There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-II with their selected demographic variables (Age, Size of cannula, Site of cannula insertion).

METHODS: (1) Heparinised saline: It is prepared by adding 0.5ml of heparin [5000 units in 5ml] with 100ml of 0.9% sodium chloride solution. After mixing the solution well 2ml of solution [10 units of heparin] is taken and flushed into the intravenous cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous line cannula insertion**. (2) Normal saline:** It is a sterile solution which is commercially available in the concentration of 0.9gm of sodium chloride in 100 ml normal saline. From that 2ml of normal saline is taken and flushed into the intravenous line cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous cannula insertion. **(3) Patency of peripheral intravenous cannula:** The patency of intravenous cannula is referred to as a state or quality of being open, expanded or unblocked in vein and allows the treatment to go freely into the vein.

Conceptual framework used in this study was Imogene King's goal attainment theory. A quantitative study with evaluative approach, quasi experimental post-test only control group design was used. The study was conducted in Shanmuga hospital, Salem. The sample size was 45. Using purposive sampling technique, 15 samples were selected in each group i.e experimental group I, experimental group II, and control group. Researcher got written permission from the concerned authority and obtained consent from the samples. Data collection was done from 24.03.2016 to 14.05.2016. Selected intervention was provided to experimental group I and experimental group II. Intravenous site was assessed daily 2 times using structured rating scale to assess the patency of peripheral intravenous cannula.

FINDINGS: (1) Demographic variables – Regarding the age of the samples in experimental group I majority 6(40%) were in the age group of 41 – 50 years. In experimental group II majority 6(40%) were in the age group of 31–40 years. In control group majority 7(46.67%) were in the age group of 41 – 50 years. Regarding the gender in experimental group I majority 8(53.33%) were male. In experimental group II majority 9(60%) were male. In control group majority 8(53.33%) were female. Regarding the educational status in experimental group I majority 6(40%) had primary education. In experimental group II majority 6(40%) had higher secondary education. In control group majority 7(46.67%) had higher secondary education. Regarding the ward in experimental group I majority 8(53.33%) were admitted in Male medical ward. In experimental group II majority 9(60%) were admitted in Male medical ward. In control group majority 9(60%) were admitted in Female medical ward. Regarding the patient status in experimental group I majority 7(46.67%) were in the status of bed mobility. In experimental group II majority 8(53.33%) were in the status of bed mobility. In control group majority 7(46.67%) were in the status of bed mobility. Regarding the no of hospitalization in experimental group I majority 7(46.67%) were admitted for the first time. In experimental group II majority 6(40%) were admitted for the first time. In control group majority 6(40%) were admitted for the first time. Regarding the size of cannula in experimental group I majority 11(73.33%) had size of cannula as 20G**.** In experimental group II majority 13(86.67%) had size of cannula as 20G. In control group majority 12(80%) had size of cannula as 20G. Regarding the site of cannula insertion in experimental group I majority 11(73.33%) had their intravenous cannulation in left hand. I n experimental group II majority 12(80%) had their intravenous cannulation in left hand. In control group majority 12(80%) had their intravenous cannulation in left hand. Regarding the classification drug infused all 15(100%) in experimental group I, experimental group II and control group had antibiotics and antacids.

(II). Findings related to post-test level of patency of peripheral intravenous cannula among samples.

In experimental group I, 15(100%) had adequate patency on day 1. On day 2, majority 14(93.33%) had adequate patency. On day 3, majority 12(80%) had adequate patency. In experimental group II, 15(100%) had adequate patency on day1. on day 2, majority 13(86.67%) had adequate patency. On day 3, majority 12(80%) had adequate patency. In control group, all 15(100%) had adequate patency on day1. On day 2, majority 9(60%) had adequate patency. On day 3, majority 6(40%) had moderately adequate patency.

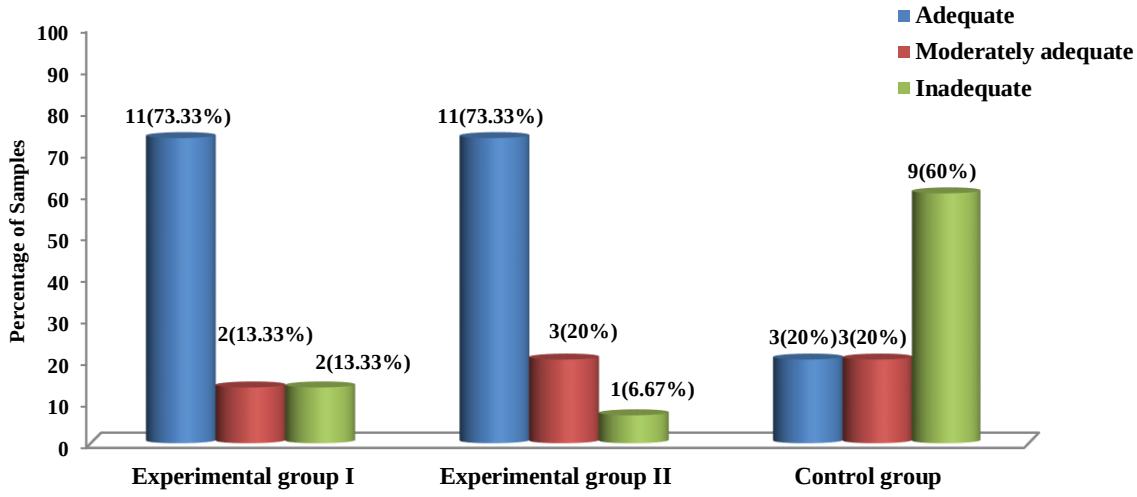

Fig-1: Column diagram shows the percentage distribution of post-test (day 4) level of patency of peripheral intravenous cannula among samples in experimental group I, Experimental group II and Control group.

On day 4 in experimental group I, majority 11(73.33%) had adequate patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency. In experimental group II, 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(33.3%) had inadequate patency. Whereas in control group, majority 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and 3(20%) had adequate patency.

III. Effectiveness of heparinised saline and normal saline on patency of peripheral intravenous cannula among samples.

Table-1: Effectiveness of heparinised saline and normal saline on patency of peripheral intravenous cannula. **n=45(15+15+15)**

Group	Mean	S.D	Unpaired 't' Value
Experimental group I	1.33	0.71	t =2.582*
Control group	2.07	0.89	
Experimental group II	1.23	0.54	t =3.167*
Control group	2.07	0.89	
Experimental group I	1.33	0.71	t =0.431(NS)
Experimental group II	1.23	0.54	

P<0.05 level of significant N.S-not significant

The above table -1 describes the mean score of patency of peripheral intravenous cannula in experimental group I was 1.33±0.71 and the mean score in experimental group II was 1.23±0.54 and the mean score in control group was 2.07±0.89. The calculated unpaired‘t’ value for experimental group I and control group was t=2.582 which was found to be statistically significant at p<0.05 level. The calculated unpaired‘t’ value for experimental group II and control group was t=3.167 which was found to be statistically significant at

$p<0.05$ level. The calculated unpaired't' value for experimental group I and experimental group II was t=0.431 which was found to be statistically not significant at $p<0.05$ level. Hence the research hypothesis H_1 was accepted, H_2 was accepted and null hypothesis H_{03} was accepted.

IV. Findings related to post test level of patency of peripheral intravenous cannula among samples in experimental group I and experimental group II with their selected demographic variables.

Experimental group I-The chi-square value of post test level of patency of peripheral intravenous cannula with the age was (3.98), with size of cannula is (3.15), with site of cannula insertion is (0.84) which is less than the table value(12.59) which indicates no significant association at $p<0.05$ level of significance. Hence the research hypothesis H_4 [$H_{04(a)}$ was accepted,$H_{04(b)}$ was accepted and $H_{04(c)}$ was accepted].

Experimental group II-The chi-square value of post test level of patency peripheral intravenous cannula with the age was (16.69), which is greater than the table value (12.59) which indicates there is a significant association between the experimental group II and age. The chi-square value of post test level of patency peripheral intravenous cannula with size of cannula is (0.83), with site of cannula insertion is (5.15) which is less than the table value(9.49) Which indicates no significant association at $p<0.05$ level of significance. Hence the research hypothesis H_5 [$H_{5(a)}$ was accepted,$H_{05(b)}$ was accepted and $H_{05(c)}$ was accepted].

DISCUSSION: Present study was supported by various other studies such as a study was conducted by **Jonker M.A, etal (2010)** to assess the effectiveness of heparinised saline flush and normal saline flush in maintaining the patency of central venous devices. The study result revealed that the heparinised saline flush is effective in decreasing the thrombotic occlusions of central venous access devices than the normal saline flush. A study was conducted by **HeidariGorji MA, etal (2015)** to assess the effectiveness of normal saline and heparinised saline flush in maintaining the patency of central venous catheters. The result revealed that the normal saline is effective in maintaining the patency of central venous catheters than the heparinised saline.

LIMITATIONS: (1) Few of the samples got discharged in between data collection period, so they were considered as attrition. **(2)** Re-cannulation was done for few samples on second, third day and fourth day in control group which influenced the results of the study.

CONCLUSION: Both normal saline flush and heparinised saline flush is effective in maintaining the patency of peripheral intravenous cannula. Normal saline can be used as an alternative flush solution instead of heparinised saline solution to provide a cost effective care. The patients will experience minimal pain and will maintain the patency of intravenous cannulas during the intravenous therapies by flushing the intravenous cannulas in between the medication administration. It will also reduce the work strain of the nurses in terms of re-inserting the intravenous cannulas.

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CHAPTER I

INTRODUCTION

Be the change that you wish to see in the world

-Mahatma Gandhi

In modern medical practice, more than 60% of patients are receiving intravenous therapy during their hospitalization. Medication, fluids, nutrition, and blood products can all be given through the intravenous route, either through peripheral or central. Peripheral veins are the most common intravenous access method in the hospitals for a peripheral intravenous cannulation to give intravenous therapy. Compared with other route of administration, intravenous route is the fastest way to deliver fluids and medication throughout the body. **(Kalpana khanal, 2013)**

Peripheral intravenous cannulas are usually considered a low risk; however it can be associated with some complications like hematoma, phlebitis, pain, frequent blockage and infections. The holistic assessment of the patient should be done on regular basis to prevent these complications. If the patient is not on continuous infusion in an inpatient setting, minimum six hourly assessments is necessary to prevent the complications and to maintain the patency of peripheral intravenous cannulas. Patients who are unstable and have the signs and symptoms of complications would be assessed more frequently. Hourly assessment of intravenous site and rate of infusion should be done when the patient is receiving continuous IV infusion. **(www. rch.org.au)**

A patent Intravenous line is one that is correctly placed and allows the treatment to flow directly into the patient's vein. Once the Intravenous line is in place, the nurse should check for patency of the line by inserting a syringe filled with saline solution, into the cannula and check for appropriate flow. During this process, the nurse should check for resistance, which can indicate blockage, and pain or swelling of the skin at the site of the Intravenous line, if intravenous line is not patent, either upon initial insertion or over the course of the treatment, and then the cannula should be removed and reinserted in another spot. **(www.ehow. com)**

Maintenance of patency in peripheral intravenous device is important to reduce the discomfort and expense of replacement. It is common practice to flush the catheters with solutions of various strengths of heparin in saline (0.9%sodium chloride solution), before and after use (phlebotomy or drug administration), in order to reduce the risk of clots forming in the lumen and hence to maintain their patency. **(UK Medicines Information, 2012)**

The problems associated with the peripheral Intravenous catheters are kinking, occlusion of the catheter itself, developing a clot or an infection at the venous insertion site (phlebitis). When the catheter becomes dislodged from the vein, it allows the medication and fluids into subcutaneous tissue (infiltration or extravasation), or air maybe introduced into the vein (air embolism). During the time of cannula insertion, the traumatized tissues release chemicals in response to the injury. Among these histamines which dilate the vein and surrounding vessels increasing blood flow to that area and also increases the permeability of the vessel wall enabling fluid and proteins to migrate to

the area from the surrounding tissues. This will lead to complications like infiltration, extravasation, and phlebitis. About 4.0-60% of the patients develops infiltration and extravasation and about 2.3-67% of the patients develops phlebitis during their hospitalization. **(H.Patil, L.M.Sams, 2014)**

Anticoagulant flush solutions are used widely to prevent catheter thrombosis. Because thrombi and fibrin deposits on catheters might serve as a nidus for microbial colonization of intravascular catheters, the use of anticoagulants might have a role in the prevention of catheter related blood stream infections. To prevent phlebitis and catheter-related infections Scheduled replacement of intravascular catheters should be proposed. Studies of short peripheral venous catheters indicate that the incidence of thrombophlebitis and bacterial colonization of catheters increases when catheters are left in place >72 hours. However, rates of phlebitis are not substantially different in peripheral catheters left in place 72 hours compared with 96 hours. phlebitis and catheter colonization are have been associated with an increased risk for catheter-related infection, the short peripheral catheter sites commonly are rotated at 72--96-hour intervals to reduce both the risk for infection and patient discomfort associated with phlebitis. **(CDC Guidelines 2015)**

Flushing and locking of intravenous catheters are essential in the prevention of occlusion. The clinical sign of an occlusion is catheter malfunction and flushing is strongly recommended to ensure a well-functioning of catheter. Flushing techniques and sufficient flushing volumes are important matters in adequate flushing in all catheter types. If a catheter is not in use, it is locked. For years, it has been thought that the catheter has to be filled with an anticoagulant to prevent catheter

occlusion. Heparin has played a key role in locking venous catheters. However, the high number of risks associated with heparin forces us to look for alternatives. Sodium chloride (0.9%) was also already introduced as locking solution in peripheral cannulas. Recently, a 0.9% sodium chloride lock has also been investigated in other types of catheters. Thrombolytic agents have also been studied as a locking solution because their antithrombotic effect was suggested as superior to heparin. The effective locking solution will depend on the catheter type and the patient's condition. **(Godelieve Alice Goossens, 2015)**

Heparin is a naturally occurring anticoagulant produced by basophils and mast cells. Heparin acts as an anticoagulant, preventing the formation of clots and extension of existing clots within the blood. Heparin does not break down the clots that have already formed (unlike tissue plasminogen activator), it allows the body's natural clot lysis mechanisms to work normally to break down clots that have formed. Heparin binds to the enzyme inhibitor antithrombin III (AT), causing a conformational change that result in its activation through an increase in the flexibility of its reactive site loop. The activated AT then inactivates thrombin and other proteases involved in blood clotting, most notably factor Xa. The rate of inactivation of these proteases by AT can increase by up to 1000-fold due to the binding of heparin. Heparin is generally used for anticoagulation. It is given parenterally because it is not absorbed from the gut, due to its high negative charge and large size. It can be injected intravenously or subcutaneously; intramuscular injections are avoided because of the potential for forming hematomas. Heparin is on the World Health Organization's List of Essential Medicines, the most important medications needed in a basic health system. **(www.wikipedia.com)**

Normal Saline is a sterile, nonpyrogenic solution for fluid and electrolyte replenishment. It contains no antimicrobial agents. It is a isotonic volume expander. The pH of the normal saline is 5.0 (4.5 to 7.0). It contains 9 g/L Sodium Chloride with an osmolality of 308 m Osmole/L. It contains 154 mEq/L Sodium and Chloride. The other name for normal saline is 0.9% Sodium Chloride Solution which contains 9.0g of salt per litter (0.90%). **(www.wikipedia.com)**

1.1 NEED FOR THE STUDY

Heparinised saline flush vs Normal saline flush has been the major topic in discussion among the health care professionals for effectiveness to maintain the peripheral intravenous cannula patency. There is a controversial aspect concerning the method of choice for maintaining the patency of peripheral intermittent intravenous catheters. Some institutes use a dilution of heparin for this purpose, whereas many others use a small amount of normal saline flush. So, it would be worthwhile to look for the best available evidence for this**. (Maria Mitsiou, 2008)**

Bertoglio. S, etal, (2012), conducted a retrospective observational cohort study with 610 vascular devices at National Institute for Cancer Research, IST Genova, and Italy. In heparinised saline group 297 samples were included and then in normal saline group 313 samples were included. The study result showed that there was no significant difference in between two groups in survival of vascular devices. So the researcher concluded that the normal saline seems to be as effective as heparinised saline for keeping patent vascular device.

Elsevier (2009), did a randomized double blind controlled trial to investigate the efficacy of normal saline versus heparin saline in maintaining the patency of intravenous catheter among 150 children of

paediatric unit at United States. In that, Group I received normal saline flush (n=77) whereas Group II received heparin saline flush (n=73). The result showed that 72% of children were recovered from blockage during normal saline flush. Thus researcher concluded that the normal saline flush was effective in maintaining the patency of intravenous catheter than the heparinised saline.

Visanu Thamlikitkul & Artit Indranoi. (2006), conducted a study among patients admitted to medical ward at Sir raj Hospital, Thailand. The study sites were ten medical wards containing two hundred and forty beds. Samples were selected and randomized into group I and group II. Heparinized saline was given to group I and normal saline was given to group II as a flushing agent. The results showed that the normal saline was effective in maintaining the patency of peripheral venous catheters in compared with the heparinised saline.

Intravenous drug administration is common in hospitalised patients. If the daily volume of infusion is less, and needed intermittently, during the gap time the intravenous catheter may occlude with blood clot which may lead to thrombo-emboli, severe pain may occur during subsequent infusions as the clot forcefully dislodges from the lumen and even blockage of the catheter so early, this needs selection of new site. To prevent all these complications maintaining the patency is the best choice.

Student researcher during her clinical practices had experienced that there is lack of practices regarding the intravenous cannula lock in between the drug administration among patients, which affects the patency of intravenous cannula frequently in patients receiving intermittent medications. Thus it leads to recannulation within short duration and also unnecessary expenditure, strain and pain to the patients.

The investigator felt the need to conduct study in order to find out the most effective method in maintaining the patency of peripheral intravenous cannula. The cost effective care is also one of the main concepts of quality of nursing care. The cost effective management should necessarily be carried out to maintain the patency of peripheral intravenous cannula.

Hence the researcher selected two interventions that is heparinised saline flush and normal saline flush for maintaining the patency of peripheral intravenous cannula.

1.2 STATEMENT OF THE PROBLEM

A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.

1.3 OBJECTIVES

1. To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-I (Heparinised Saline) and control group.
2. To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-II (Normal Saline) and control group.
3. To assess and compare the mean post test score of patency of peripheral intravenous cannula between Experimental group-I and Experimental group-II.
4. To find association between the post-test levels of patency of peripheral intravenous cannula among the Experimental group-I and Experimental group–II with their selected demographic variables (Age, Size of Cannula, site of cannula insertion).

1.4 RESEARCH HYPOTHESES :(Level of significance P < 0.05)

H_1: There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and control group.

H_2: There is a significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–II (Normal Saline) and control group.

H_3: There is a significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and Experimental group-II (Normal Saline)

H_4: There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-I with their selected demographic variables (Age, Size of Cannula, site of cannula insertion)

$H_{4\ (a)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I with their age.

$H_{4\ (b)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I and size of cannula.

$H_{4(c)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I and Site of cannula insertion.

H_5: There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-II with their selected demographic variables (Age, Size of cannula, Site of cannula insertion)

$H_{5(a)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II with their age.

$H_{5(b)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II and size of cannula.

$H_{5(c)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II and site of cannula insertion

1.5 OPERATIONAL DEFINITION

1. Effectiveness:

Effectiveness refers to the extent to which the selected intervention maintains the patency of peripheral intravenous cannula has manifested by longer duration in the post test scores assessed using structured rating scale to assess the patency of peripheral intravenous cannula.

2. Patency:

The patency of intravenous cannula is referred to as a state or quality of being open, expanded or unblocked in vein.

3. Normal Saline:

It is a sterile solution which is commercially available in the concentration of 0.9gm of sodium chloride in 100 ml normal saline. From that 2ml of normal saline is taken and flushed into the intravenous line cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous cannula insertion.

4. Heparinised Saline:

Heparinised saline is prepared by adding 0.5ml of heparin [5000 units in 5ml] with 100ml of 0.9% sodium chloride solution. After mixing the solution well 2ml of solution [10 units of heparin] is taken and flushed into the intravenous cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous line cannula insertion.

5. Peripheral Intravenous Cannula:

It refers to a short, thin, plastic tube called a catheter that goes through the skin and into a vein.

1.6 ASSUMPTIONS:

1. If intravenous cannula is not used continuously, it may get blocked.
2. Intravenous cannula block may be reduced by periodical flushing.
3. Heparin saline flush would be effective in maintaining the patency of peripheral intravenous cannula.
4. Normal saline flush would be effective in maintaining the patency of peripheral intravenous cannula.

1.7 DELIMITATIONS:

The study is delimited to,

1. Patients having medical conditions only.
2. Patients having 18G, 20G, 22G intravenous cannula only.
3. Seven weeks period of data collection only.
4. 45 samples.
5. Shanmuga Hospital at Salem.

1.8 ETHICAL CONSIDERATION:

1. Written permission was obtained from human ethical committee of Shanmuga College of nursing, Salem.
2. Written permission was obtained from the concerned hospital authorities where the study is going to be conducted.
3. Informed written consent was obtained from the samples enrolled in the study.
4. All information was kept confidential and used only for the present study.

1.9. CONCEPTUAL FRAMEWORK BASED ON IMOGENE KING'S GOAL ATTAINMENT THEORY.

The study is based on Imogene King's Goal Attainment theory which is most relevant to the present study to assess the effectiveness of heparinised saline and normal saline flush for maintaining patency of intravenous cannula among samples admitted in selected hospital in Salem. In this study the researcher and the samples mutually sets the goal. The researcher prepared, modified conceptual framework based on Imogene King's Goal Attainment Theory.

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 intravenous cannulation.

Judgement:

The ability to judge and make a decision or form an opinion objectively, authoritatively and wisely, especially in matters affecting action. In this study the researcher judges the need for certain measures to maintain the patency of peripheral intravenous cannula among samples.

Action:

Each member of the group makes a judgement and thereby action follows to attain the goal. In this study the researcher identifies two measures to maintain patency of cannula. i.e.,heparinised saline and normal saline.

Mutual Goal Setting:

It is a process that leads to goal attainment. It is a dynamic process by which goal directed choice of perceived alternatives is made acted upon by the individuals or groups to answer a question and attain a goal. In this study the researcher and the samples understand their goal and action mutually. The main goal of this study is to maintain the patency of intravenous line cannula among samples.

Reaction:

Reaction is the individual plan together and moves towards goal attainment. In this study the researcher gets the concern from the samples who are at risk of developing inadequate patency of intravenous cannula.

Intervention:

It is the action of two or more persons in mutual presents a sequence of verbal behaviours that are goal directed. In this study the researcher administers the 2 planned measures i.e., heparinised saline and the normal saline to maintain the patency of peripheral intravenous line cannula in two different groups.

Transaction:

It is the process of interaction in which human beings communicate with the environment to achieve goal that are valued towards goal directed human behaviours. In this study the researcher assess the patency of intravenous cannula using structured rating scale.

Goal Attainment:

In this study the researcher's goal is to maintain the patency of intravenous line cannula, 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.

SUMMARY

This chapter dealt with the introduction, need for the study, statement of the problem, objectives, hypotheses, operational definitions, assumptions, delimitations, ethical consideration and conceptual framework based on Imogene King's Goal Attainment Theory.

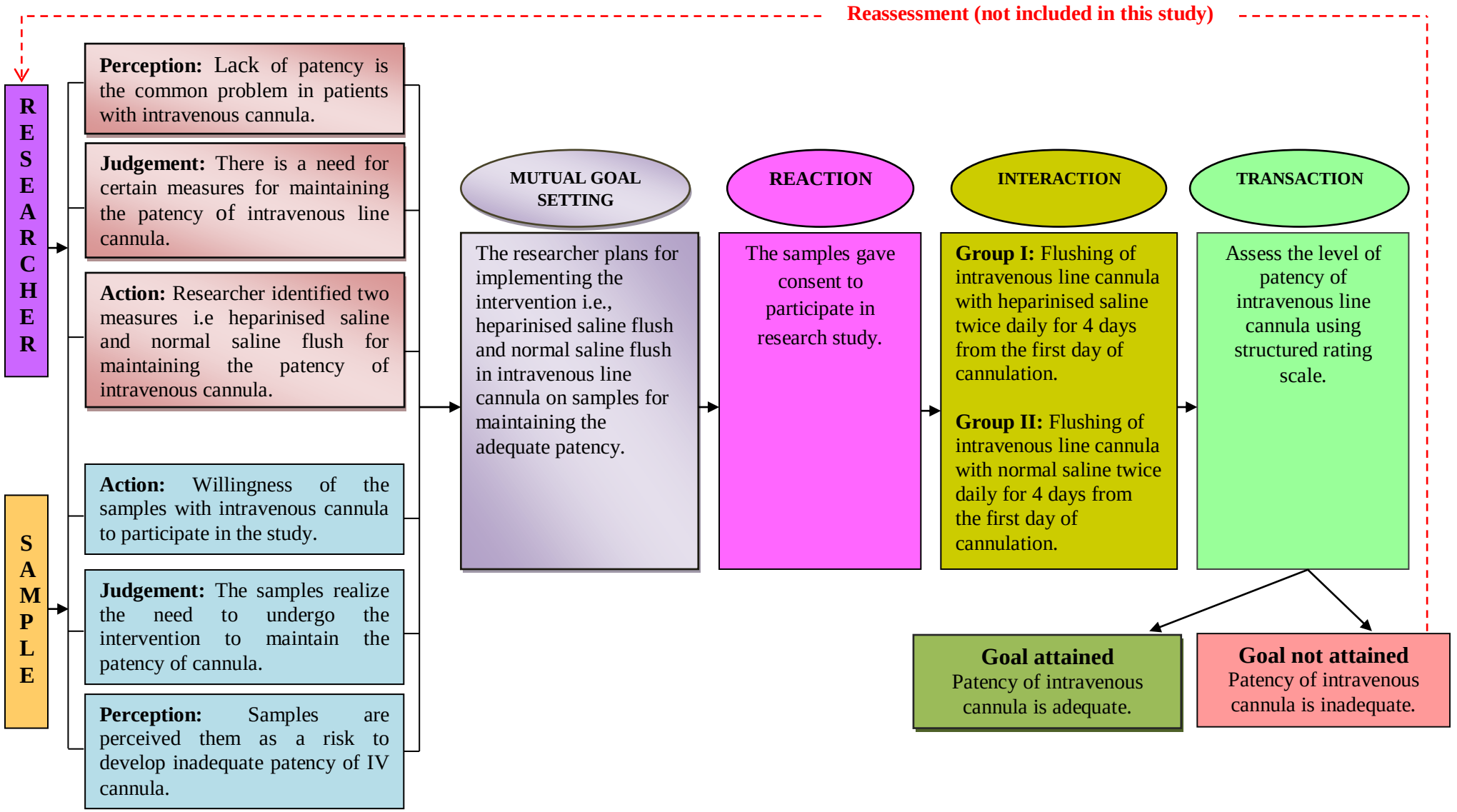

FIG-1.1: CONCEPTUAL FRAMEWORK BASED ON IMOGENE KING'S GOAL ATTAINMENT MODEL (1997) APPLIED ON MAINTAINING PATENCY OF INTRAVENOUS CANNULA

CHAPTER – II

REVIEW OF LITERATURE

Literature review is a laborious task, but it is essential if the research process is to be successful. One of the most satisfying aspects of the literature review is the contribution it makes to the new knowledge, insight and general scholarship of the researcher.

A literature review is the body of text that aims to review the critical points of knowledge on a particular topic of research. **Polit and Beck, (2004)**

In the present study, the review of literature was organised under the following headings:

Section–I: Studies related to patency and related complications of intravenous line cannulation.

Section- II: Studies related to heparinised saline flush for maintaining the patency of intravenous cannula.

Section-III: Studies related to normal saline flush for maintaining the patency of intravenous cannula.

Section-IV: Studies related to heparinised saline and normal saline flush for maintaining the patency of intravenous cannula.

Section-V: Studies related to application of Imogene King's Goal Attainment Theory.

SECTION-I: STUDIES RELATED TO PATENCY AND RELATED COMPLICATIONS OF INTRAVENOUS LINE CANNULATION.

Abolfotouh M.A, Salam M, etal, (2014), conducted a study in various wards of king Abdullah International Medical Research Center, Riyadh, Saudi Arabia to investigate the incidence and predicators of

peripheral intravenous catheter induced complications. About 359 patients were selected for the study. The results revealed the rate of complications such as phlebitis ranked 17.6%, pain 7.6%, leaking 3.9%, dislodgement 2.4%, extravasations and occlusions 0.5% each.

Meenakashi Agnihotri, (2011) conducted a study in emergency departments of Nehru Hospital; Chandigarh. Totally 168 samples were selected for the study. The study results revealed that the incidence of infiltration and phlebitis as 31.5% and 29.8% respectively. It was found that the peripheral intravenous cannula insertions with aseptic technique and ineffective handling and management of cannula, longer duration of cannula placement along with the use of IV infusion sets for more than 24hours, administration of large volumes of crystalloids and colloids at high flow rates through the peripheral intravenous cannulae were the most important risk factors for the development of infiltration and phlebitis and also it was found that 36.5% cannulae not flushed after insertion developed phlebitis.

Prabhjot, et.al, (2011) did a study to assess the risk factors leading to phlebitis in emergency outpatient department of a tertiary care hospital. Totally 200 samples were included in the study. The study result showed that there was a significant relationship between the phlebitis and duration of cannula in situ, administration of antibiotics.

SECTION – II: STUDIES RELATED TO HEPARINISED SALINE FLUSH FOR MAINTAINING THE PATENCY OF INTRAVENOUS CANNULA.

Upadhyay A, et.al, (2015), conducted a study on 120 neonates (60 in normal saline group and 60 in heparin saline group), the study results showed the mean functional duration of catheter was more (71hours) in

heparin saline group as compared with normal saline group(57 hours). The researcher concluded that the heparinised saline flush is effective in maintaining the functional duration of peripheral intravenous cannula than the normal saline flush.

Ziyaeifard M, Alizadehasl A, Aghdaii N, et.al, (2014), did a randomized controlled trial in Rajaie heart center; Tehran, Iran to compare the efficacy of normal saline with heparinised saline to maintain the patency of arterial catheter and central venous pressure monitoring catheter. Totally 100 patients were randomized into 50 in heparinised saline and 50 in normal saline flush solutions. The study results showed that there was no significant incidence of obstruction and changes in all other parameter between two groups. The researcher concluded that both flush solutions are effective in preventing the catheter occlusion.

Tripathi S, et.al, (2008), conducted a study on 88 samples in a general paediatric ward of Lady Harding Medical College and Kalawati Saran Children's Hospital. Samples were randomly assigned to experimental group and control group. Heparinised saline was used for experimental group and splint was applied to control group. The study results revealed that there was a statistically significant increase in the duration of patency of intravenous cannula with the use of heparinised saline flush. The research concluded that the heparinised saline is effective in maintain the patency of intravenous cannula.

SECTION – III: STUDIES RELATED TO NORMAL SALINE FLUSH FOR MAINTAINING THE PATENCY OF INTRAVENOUS CANNULA.

Alizadehasl A, et.al, (2015), did a randomized clinical trial on 100 patients undergoing elective cardiac surgery in Rajaje Cardiac vascular

Medical Research Center; Tehran, Iran. Patients were randomized to use heparinised saline (50 samples) and normal saline (50 samples) flush to maintain the patency of arterial catheter after operation. The study results revealed that there was no significant difference between heparinised and saline groups in maintaining the patency of arterial catheters and acceptable wave forms. Hence the researcher concluded that the normal saline can be used instead of heparinised saline to maintain the patency of arterial catheters.

Raziyeh Ghadiriyan, et.al, (2013), conducted a study on patients with peripheral venous catheter admitted in a cardiac care units in selected hospital of Isfahan university of medical sciences, Iran. Totally 88 samples were selected and randomly divided into two groups (normal saline group and control group). The study results showed that there was a significant difference in between two groups regarding the degree of phlebitis. The percentage of phlebitis in control group was 88.6% and normal saline group was 43.2%. Hence the researcher concluded normal saline is effective in maintaining the patency of peripheral venous catheters.

Wang R, Luo O, He L, et.al, (2012), did a prospective controlled trial to find the effectiveness of preservative free 0.9% sodium chloride for flushing and locking peripheral intravenous access device. Totally178 and 181 patients were selected with gastroenterology and hepatic diseases for heparinised saline and normal saline group respectively. The results showed that normal saline neither shortened the duration of peripheral intravenous cannula maintenance nor increases the proportion of abnormal withdrawal. The researcher concluded that the normal saline solution is as effective and safe conventional than heparinised saline solution.

Hephzibah Alexander, (2010), conducted a systematic review of the study on heparin versus normal saline as a flush solution. The electronic database of Ovid, Pub-Med, the Cochrane Library and the Cochrane Database of Systematic Reviews (CDSR) was searched for heparin or normal saline (either singly or in combinations). Relevant studies were critically appraised and evidence obtained, the findings indicate that it might be safer to use normal saline as it does not have the risks associated with heparin. For arterial catheters, majority of the available data suggest that heparin saline given as a continuous flush at low doses improved catheter patency. The result of the study revealed that normal saline can be used as an alternative to heparin in intravenous catheters. The researcher concluded that heparin as an intermittent flush was ineffective and normal saline was just as effective as and more efficacious than heparin.

Maninder Kaur, et.al, (2006), conducted a study on 60 samples in Nehru Hospital, Chandigarh, to evaluate effectiveness of normal saline lock solution in maintaining the patency of intravenous cannula. Samples were randomly divided into normal saline group (30 samples) and control group (30 samples). The results revealed that the 96.7% cannulae were patent in normal saline group and 56.7% cannulae were patent in control group at the end of day 3. The researcher concluded that the normal saline lock is effective in maintaining the intravenous cannula.

Fujita T, et.al, (2006), conducted a study to evaluate the effect of normal saline for flushing peripheral venous locks. Totally 321 patients were selected for the study. For the first two months period participants were received normal saline and for the next two months period the participants were received heparinised saline as a peripheral venous flush

solution. The study results revealed that there was no significant difference was found in the rates of phlebitis, extravasation and clotting in between two groups. Hence the researcher concluded that the normal saline is effective as heparinised saline in maintaining the peripheral venous locks.

SECTION – IV: STUDIES RELATED TO HEPARINISED SALINE AND NORMAL SALINE FLUSH FOR MAINTAINING THE PATENCY OF INTRAVENOUS CANNULA.

H. Patil, Sams LM, (2014) conducted a Quasi experimental study among 40 patients at medical and surgical wards of AJ Hospital and Research Centre, Mangalore, to assess the effectiveness of heparinised saline vs normal saline in maintaining the patency of intravenous cannula. Samples were randomly divided into heparinised saline group and normal saline groups. Results revealed that the mean patency score of experimental group I in 72 hrs were 1.50 ± 0.51, 1.50. In experimental group II the mean patency score in72 hrs were 1.90 ± 0.55, 2. There was no significant difference in the patency scores in between two groups. The researcher concluded that the heparinised saline flush and normal flush was effective in maintaining the patency of peripheral intravenous lines.

Patidar. AB, (2014) conducted a study among 75 patients at selected hospitals in Delhi to assess the efficacy of heparinised saline and normal saline flush for maintaining the patency of peripheral intravenous cannula. Samples were assigned to heparinised saline group, normal saline group and control group and respective interventions was given for three days. Control group was not received any interventions. The results revealed that the duration of patency of intravenous line in control group

was (53 ± 19 hrs) and normal saline group was (64 ± 14 hrs) and heparin saline group was (66 ± 11 hrs). So there is no significant difference in duration of patency of intravenous cannula among normal saline and heparinised saline groups. The researcher concluded that normal saline is as effective as heparinised saline in maintaining the patency of intravenous cannula.

Ling jia Goh (2011), Conducted a study in Neuro Science Intensive Care Unit, Singapore General Hospital; Singapore, to assess the effectiveness of heparinised saline and normal saline in maintaining the patency of Arterial and Central Venous Catheters. Totally 70 samples (36 in NS group and 34 in HS group) were included in the study. The study results showed that the normal saline and heparinised saline both were maintained the patency of catheters up to 72 to 120 hours. The researcher concluded that the use of normal saline is effective simple and safe than the heparinised saline in maintaining the patency of arterial and central venous catheters.

Francesco Vassallo (2010), conducted a study on 610 samples at the National Cancer Institute of Genova, to assess the efficacy of normal saline vs heparinised saline solutions for locking catheters of totally implantable long-term central vascular access devices in adult cancer patients. Samples were divided into heparinised saline group and normal saline group and respective interventions was given to both groups. The results of the study revealed that there was no significant statistical difference between two groups. The researcher concluded that normal saline solution can be used as an alternative to heparinised saline solutions for maintaining the patency of central vascular access device.

Vazquez. CM, et.al, (2010), did a systematic review using databases; Medline, cinahl, cuiden and Cochrane library. Two meta-analysis and six RCTS were identified and analysed, results from one meta-analysis and two RCTS supported the use of heparin for maintaining the peripheral arterial catheter patency. In rest of the studies no significant difference were found in between saline and heparin group in maintaining the patency of arterial catheter. From this review it is concluded that the use of heparinised is not necessary and saline is effective in maintaining the patency of arterial catheters.

Niesen KM, et.al, (2003), did a randomized double blind study at Academic Medical Centre in the Midwest. Totally 73 samples (pregnant women with 24 to 42 weeks) were selected and randomly assigned to heparinised saline and normal saline group. The study result showed no significant difference between two groups in intravenous lock patency and in phlebitis. So it is concluded that both were effective in maintaining the patency of peripheral intravenous cannulas.

SECTION–V: STUDIES RELATED TO APPLICATION OF IMOGENE KING'S GOAL ATTAINMENT THEORY.

Alligod MR, (2010) Kings conceptual system and therapy of goal attainment provided a systematic approach to the though and action of nursing that has stood the test of the time with continuing utility for organizing the complex factors of health care. Following a brief overview of the conceptual system and theory of goal attainment, application to family health care is discuss and illustrated with the programs of research of three exemplar king's scholars- family health care with a mentally-ill child, family healthcare with children with type, diabetes or asthma and family health when a family member has chronic obstruction pulmonary.

The scientific benefit and development progression of a theory driven program of research for practice is noted. Future studies are presented as well as additional source of king's conceptual system and theory of goal attainment.

Khurshid Khowaja, (2006), conducted a study to assess the effectiveness of implementing a clinical pathway for patients undergoing Trans urethral resection prostate at Aga Khan University Hospital, Pakistan. This study used King's Interacting system framework and theory of Goal Attainment. Findings of the study showed a significant difference in variances and outcomes as a result of TURP clinical pathway intervention. The clinical pathway significantly improved the nursing and physician related variances and outcomes. Clinical pathway has provided opportunities of interaction and transaction among the health team also through clinical pathway health care team communicates patient care goals with each other. So it is concluded that King's theory and framework provided direction for nursing practice by emphasising the processes of multi-disciplinary collaboration, communication, interaction, transaction and use of critical thinking.

SUMMARY:

This chapter dealt with the review related to patency and related complications of intravenous cannulation, effect of heparinised saline on patency of intravenous cannula, effect of normal saline on patency of intravenous cannula, effect of heparinised saline vs normal saline on patency of intravenous cannula, and application of Imogene King's Goal Attainment Theory.

CHAPTER – III

METHODOLOGY

Methodology of research organizes all the components of study in a way that is most likely to lead to valid answers to the problems that have been posted. **(Burns and Groove, 2002).**

This chapter deals with the description of research approach and design, study setting, population, sample, criteria for sample selection, sampling technique, sample size, variables, data collection instrument, description of tool, validity and reliability of tool, pilot study, data collection procedure and plan for data analysis.

3.1 RESEARCH APPROACH

Research approach is the umbrella that covers the basic procedures for conducting research. **(Treece and Treece 1996)**

The selection of research approach is a basic procedure for conducting the research study. In view of the nature of the problem selected for the study and the objectives to be accomplished, the researcher has selected quantitative evaluative research approach.

3.2 RESEARCH DESIGN

Research design is the overall plan for addressing a research question including specification for enhancing the study integrity. Research design helps the researcher in selection of variables, their manipulation and control, observation to be made and type of statistical analysis to interpret the data.

The research design selected for the present study is **quasi experimental post test only control group design.**

Groups	Intervention	Post Test							
		Day1		Day2		Day3		Day 4	
		M	E	M	E	M	E	M	E
C	-	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8
E_1	X_1	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8
E_2	X_2	O_1	O_2	O_3	O_4	O_5	O_6	O_7	O_8

Fig-3.1: Schematic representation of research design

Keys:

C - Control group

E_1 - Experimental group - 1

E_2 - Experimental group – 2

X_1 - Administration of Heparinised Saline Flush.

X_2 - Administration of Normal Saline Flush.

O_1 to O_8- Assessment of patency of peripheral intravenous line cannula in morning and evening for 4 days.

3.3 RESEARCH SETTINGS

Setting is the physical location in which data collection takes place**. (Polit and Hungler, 2008)**

The study was conducted in Shanmuga hospital at Salem. It is a 355 bedded multi-speciality hospital and it has separate Salem cancer institute with 50 beds. There are 4 floors and beds are distributed in 4 floors. It has 3 ICU's, 1 postoperative ward, 1emergency department, paediatric ward, labour ward and operation theatre with all advanced

equipment's. It has the facilities like ECG, ECHO, EEG, CT scan, Ultrasound scan, Dialysis unit, X ray and laboratory with advanced technologies.

3.4 DESCRIPTION OF VARIABLES

Concepts which can take on different qualitative value are called variables**. (Kothari. C.R, 2002)**

The variables under the study are the following,

Independent variables:

The variable that is believed to care or influence the behaviour and ideas. **(Polit and Hungler, 2008).**

In this study, independent variables are Heparinised saline and Normal saline flush to maintain the patency of peripheral intravenous cannula.

Dependent variables:

The dependent variable is the variable the researcher is interested in understanding explaining and preceding. **(Polit and Hungler, 2008).**

In this study, the dependent variable is the patency of peripheral intravenous cannula.

Demographic variables:

Demographic variables are those variables that are present in research environment which may interfere with research findings by acting as unwanted independent variables. **(Woods and Kahn, 1994).**

In this study it includes age, gender, ward, educational status, patient status, number of hospitalization, size of cannula, site of cannula insertion and classification of drug given through intravenous cannula.

3.5 POPULATION

The entire set of individuals or objects having the same or common characteristics**. (Polit and Hungler, 2008).**

The population of the study is the patients admitted with medical conditions in shanmuga hospital Salem.

3.6 SAMPLE

A sample is a subset of the population selected to participate in the research study **(Polit and Hungler, 2008)**

In this study samples are patients admitted with medical conditions and have undergone peripheral intravenous cannulation within 12hrs and having intravenous cannula of size 18G, 20G and 22G in Shanmuga hospital Salem.

3.6.1 Sampling criteria

Inclusion criteria:

1. Patients who had intravenous line cannula within 12 hrs of insertion.
2. Patients who are willing to participate in the study.
3. Patients who are available during the period of data collection.
4. Patients admitted in male medical ward and female medical ward.
5. Patients who are getting only intermittent medications through intravenous cannula.

Exclusion criteria

1. Patients who are having bleeding disorders.
2. Patients who are having severe hypertension.
3. Patients admitted with surgical conditions.
4. Patients who are already receiving heparin for other conditions.
5. Patients receiving platelet inhibitor drugs like Aspirin, antihistamines, indomethacin and hydroxychloroquine.

3.6.2 Sampling technique

Sampling technique is the method of selection of samples**. (Polit and Beck, 2004**)

In this study the researcher selected the samples using non-probability purposive sampling technique.

3.6.3 Sample size

Sample size in the study was 45 among which 15 samples in control group, 15 samples in experimental group I (Heparinised saline) and 15 samples in experimental group II (Normal saline).

3.7 DEVELOPMENT, DESCRIPTION, INTERPRETATION, VALIDITY AND RELIABILITY OF TOOL

The instruments selected in a research must be the vehicles that obtain best data for drawing conclusion to the study. **(Polit and Beck, 2004)**

In this study the researcher has prepared and modified tool to collect data from the samples. The tools are,

Tool-1: Demographic profile of the sample.

Tool-2: Structured rating scale to assess the patency of peripheral intravenous cannula.

Tool-1: Demographic profile of the sample

It dealt with demographical data which was used to collect the information about the patient. It includes age, gender, ward, educational status, no of hospitalization, patient status, size of peripheral intravenous cannula, site of intravenous cannula insertion, classification of drug infused through cannula.

Tool-2: Structured Rating scale to assess the patency of peripheral intravenous cannula.

The researcher prepared this tool with the help of review of literature and with guidance of experts. This tool consists of 12 questions which describes about the symptoms that is occurring while the patency is affected. Those symptoms were grouped into 4 aspects that were based on the intensity and severity. The maximum score is 3. Based on the group of symptoms shown by the samples score was given. If the score is 0-1the patency is adequate. If the score is 2 then the patency is moderately adequate. If the score is 3 then the patency is inadequate.

PREPARATION OF INDEPENDENT VARIABLE

Heparinised Saline [for experimental group-I]

Heparinised saline was prepared by adding 0.5ml of heparin [5000 units in 5ml] with 100ml of 0.9% sodium chloride solution. After mixing the solution well 2ml of solution [10 units of heparin] was taken and flushed into the intravenous cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous cannula insertion. Intravenous site was assessed daily 2 times using structured rating scale for patency.

Normal Saline [for experimental group-II]

It is a sterile solution which is commercially available in the concentration of 0.9gm of sodium chloride in 100 ml normal saline. From that 2ml of normal saline was taken and flushed into the intravenous line cannula twice daily (morning and evening) after administration of prescribed medications for 4 days from the first day and within 12 hrs of intravenous cannula insertion. Intravenous site was assessed daily 2 times using structured rating scale for patency.

For Control group

No intervention was given by the researcher, only the routine care from the nursing staff was provided as per the hospital protocol. Intravenous site was assessed daily 2 times for 4 days using structured rating scale for patency.

3.8 CONTENT VALIDITY AND RELIABILITY

The content validity refers to the degree to which an instrument measures, what it is supposed to be measure**. (Polit and Hungler, 2008).**

The prepared tool and independent variables along with the statement of the problem, objectives and hypotheses and evaluation criteria was submitted to six experts and validity was obtained from them. (Four nursing experts and two medical experts).

Reliability

Reliability of research instrument is defined as the extent to which the instrument has the same result on repeated measures**. (Polit and Hungler, 2008).**

Reliability of the tool was assessed by inter-rater reliability method by administering it to 5 samples. The reliability of the tool II structured rating scale to assess the patency tool was 0.98.

3.9 PILOT STUDY

The pilot study is a small scale version done in a preparation for main study. **(Polit and Hungler, 2008).**

The pilot study was conducted in Gobi hospital. Initially the researcher got written permission from the concerned authority after explaining the procedure and purpose of the study. The staff nurses of the

wards were oriented about the study and benefits of heparinised saline and normal saline flush in maintaining patency of intravenous cannula. Then the researcher selected 9 samples using non probability purposive sampling techniques. Written consent was obtained from the samples.

Three samples in each experimental group I, experimental group II and Control group was taken. In control group intravenous line cannula care was given as routine care by staff nurses and the patency was assessed by using rating scale from day 1 to day 4 at morning and evening.

In Experimental group I (Heparinised saline) intravenous line cannula care was given with Heparinised saline 12th hourly (Morning and evening). The level of patency was assessed every day morning and evening using structured rating scale from day 1 to day 4.

In Experimental group II (Normal saline) intravenous line cannula care was given with Normal saline 12th hourly (Morning and evening). The level of patency was assessed every day morning and evening using structured rating scale from day 1 to day 4.

There is a significant difference found in the mean post test score of peripheral intravenous cannula between experimental group I (Heparinised saline), experimental group II (Normal saline) and control group. And there has no significant association found between the post test level of patency of peripheral intravenous cannula among samples with their selected demographic variables (age ,size of cannula, site of insertion) in experimental group I(Heparinised saline) and experimental group II (Normal saline). No modification was done after the pilot study at any level.

3.10 DATA COLLECTION PROCEDURE

Data collection is the gathering of information needed to address a research problem. **(Polit and Hungler, 2008)**

The study was conducted in Shanmuga hospital from 24.03.2016 to 14.05.2016. Initially the researcher got written permission from the concerned hospital authority after explaining the procedure and purpose of the study. The staff nurses of the hospital were oriented about the study and benefits of heparinised saline and normal saline flush in maintaining the patency of intravenous cannula. Then the researcher selected 45 samples using non probability purposive sampling techniques and based on the sampling criteria. Written consent was obtained from the samples.

The researcher has collected the data from control group then experimental group I (Heparinised saline) and at last from experimental group II (Normal saline). The administration of Heparinised saline/Normal saline was done within 12 hours of intravenous cannulation. Assessment of intravenous cannulation site was done twice daily (morning and evening) from the first day onwards for 4 days using structured rating scale to assess the patency of peripheral intravenous cannula.

Experimental group I had 15 samples and Heparinised saline was administered into the intravenous cannula twice daily (morning and evening) for 4 days after administering the prescribed medications from the first day and within 12hrs of intravenous cannula insertion. Intravenous site was assessed twice daily (morning and evening) for four days using structured rating scale to assess the patency of peripheral intravenous cannula.

Experimental group II had 15 samples and Normal saline was administered into the intravenous cannula twice daily (morning and evening) for 4 days after administering the prescribed medications from the first day and within 12hrs of intravenous cannula insertion. Intravenous site was assessed twice daily (morning and evening) for four days using structured rating scale to assess the patency of peripheral intravenous cannula.

Control group had 15 samples and no intervention was given by the researcher, only the routine care from the nursing staffs was provided as per hospital protocol. Intravenous site was assessed twice daily (morning and evening) for four days using structured rating scale to assess the patency of peripheral intravenous cannula.

3.11 PLANS FOR DATA ANALYSIS

Analysis of quantitative data deals with information collected during research study, which can be quantified and statistical calculation, can be computed**. (Sharma S 2011)**

The data obtained was analysed in terms of the objective of the study using descriptive (mean, standard deviation, mean score percentage) and inferential (Unpaired t test and chi square test) statistics.

Tool-1: Demographic profile of the samples was analysed using frequency and percentage distribution.

Tool-2: Structured rating scale to assess the level of patency of peripheral intravenous cannula was analysed using descriptive statistics like mean, standard deviation and inferential statistics like unpaired ‘t’ test and chi square test.

SUMMARY

This chapter dealt with methodology for the present study, it includes research approach, research design, research setting, population used in the study, sample and sampling technique, description of the tools, reliability and validity, pilot study, data collection procedure and plan for data analysis.

CHAPTER – IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data collected from 45 samples admitted in a selected hospital at Salem, to assess the effectiveness of heparinised saline flush and normal saline flush in maintaining the patency of peripheral intravenous cannula. The data collected for the study was grouped and analysed as per the objectives set for the study. The findings drawn based on the descriptive and inferential statistical analysis are presented under the following sections.

STATEMENT OF THE PROBLEM

A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.

OBJECTIVES

1. To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-I (Heparinised saline) and Control group.
2. To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-II (Normal saline) and control group.
3. To assess and compare the mean post test score of patency of peripheral intravenous cannula between Experimental group-I and Experimental group-II.
4. To find association between the post-test levels of patency of peripheral intravenous cannula among the Experimental group-I and Experimental group–II with their selected demographic variables (Age, Size of Cannula, site of cannula insertion).

RESEARCH HYPOTHESES :(Level of significance P < 0.05)

H_1: There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and control group.

H_2: There is a significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–II (Normal Saline) and control group.

H_3: There is a significant difference in mean post test score of patency of peripheral intravenous cannula between Experimental group–I (Heparinised Saline) and Experimental group-II (Normal Saline)

H_4: There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-I with their selected demographic variables (Age, Size of Cannula, site of cannula insertion)

$H_{4\ (a)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I with their age.

$H_{4\ (b)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I and size of cannula.

$H_{4(c)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-I and Site of cannula insertion.

H_5: There is a significant association between post-test level of patency of peripheral intravenous cannula in Experimental group-II with their selected demographic variables (Age, Size of cannula, Site of cannula insertion)

$H_{5(a)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II with their age.

$H_{5(b)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II and size of cannula.

$H_{5(c)}$: There is a significant association between post-test level of patency of peripheral intravenous cannula among Experimental group-II and site of cannula insertion

4.1 ORGANIZATION OF DATA

The findings of the study were grouped and analysed under the following sections.

Section-A: Description of the demographic variables of samples.

Section-B: Assessment of post-test level of patency of peripheral intravenous cannula among samples in experimental group I and experimental group II and control group.

Section-C: Effectiveness of heparinised saline and normal saline on patency of peripheral intravenous cannula.

Section-D: Association of post-test level of patency of intravenous line cannula among samples with their selected demographic variables in experimental group I (Heparinised saline) and experimental group II (Normal saline).

4.1.1 SECTION-A: DESCRIPTION OF THE DEMOGRAPHIC VARIABLES.

This section deals with the details of the analysis about the distribution of the samples according to the frequency and percentage. The selected variables are age, gender, educational status, ward, patient

status, number of hospitalization, size of cannula**,** site of cannula insertion and classification of drug infused.

Table-4.1: Frequency and percentage distribution of demographic variables of samples $n_1 = 15$; $n_2 = 15$; $n_3 = 15$

S NO	Demographic variables	Ex. I (Hep saline)		Ex. II (Normal saline)		Control group	
		No	%	No	%	No	%
I	**Age**						
a	21-30	3	20.00	2	13.33	3	20.00
b	31-40	4	26.67	6	40.00	4	26.67
c	41-50	6	40.00	5	33.33	7	46.67
d	51-60	2	13.33	2	13.33	1	6.67
II	**Gender**						
a	Male	8	53.33	9	60.00	7	46.67
b	Female	7	46.67	6	40.00	8	53.33
III	**Educational status**						
a	No formal education	2	13.33	1	6.67	1	6.67
b	Primary education	6	40.00	5	33.33	5	33.33
c	Higher secondary	5	33.33	6	40.00	7	46.67
d	Graduate	2	13.33	3	20.00	2	13.33
IV	**Ward**						
a	Male medical ward	8	53.33	9	60.00	7	46.67
b	Female medical ward	7	46.67	6	40.00	8	53.33
V	**Patient status**						
a	Confined to bed	5	33.33	3	20.00	4	26.67
b	Bed mobility	7	46.67	8	53.33	7	46.67
c	Complete ambulation	3	20.00	4	26.67	4	26.67
VI	**No of hospitalization**						
a	First time	7	46.67	6	40.00	6	40.00
b	Second time	5	33.33	4	26.67	4	26.67
c	Third time	2	13.33	3	20.00	4	26.67
d	More than three times	1	6.67	2	13.33	1	6.67
VII	**Size of cannula**						
a	18G	2	13.33	1	6.67	2	13.33
b	20G	11	73.33	13	86.67	12	80.00
c	22G	2	13.33	1	6.67	1	6.67

VIII	**Site of cannula insertion**						
a	Right hand	4	26.67	3	20.00	3	20.00
b	Left hand	11	73.33	12	80.00	12	80.00
IX	**Classification of drug**						
a	Antibiotics	15	100	15	100	15	100
b	Antacids	15	100	15	100	15	100

The table 4.1 shows that in the experimental group I (Heparinised saline), majority 6(40%) were in the age group of 41 – 50 years, 8(53.33%) were male, 6(40%) had primary education, 8(53.33%) were admitted in Male medical ward, 7(46.67%) were in the status of bed mobility, 7(46.67%) were admitted for the first time, 11(73.33%) had their intravenous cannulation in left hand, 11(73.33%) had size of cannula as 20G and all 15(100%) have received antibiotics and antacids.

Also it shows that in the experimental group II(Normal saline flush), majority 6(40%) were in the age group of 31–40 years, 9(60%) were male, 6(40%) had higher secondary education, 9(60%)were admitted in Male medical ward, 8(53.33%) were in the status of bed mobility, 6(40%) were admitted for the first time, 12(80%) had their intravenous cannulation in left hand, 13(86.67%) had size of cannula as 20G and all 15(100%) have received antibiotics and antacids.

Also it portrays that in the control group, majority 7(46.67%) were in the age group of 41 – 50 years, 8(53.33%) were female, 7(46.67%) had higher secondary education, 8(53.33%) were admitted in Female medical ward, 7(46.67%) were in the status of bed mobility, 6(40%) were admitted for the first time, 12(80%) had their intravenous cannulation in left hand, 12(80%) had size of cannula as 20G and all 15(100%) %) have received antibiotics and antacids.

4.1.2 SECTION-B: ASSESSMENT OF POST-TEST LEVEL OF PATENCY OF PERIPHERAL INTRAVENOUS CANNULA AMONG SAMPLES IN EXPERIMENTAL GROUP I, EXPERIMENTAL GROUP II AND CONTROL GROUP.

This section deals with analysis of the post test level of patency of peripheral intravenous cannula among samples in experimental group I and experimental group II and control group.

It is divided into following subheadings;

a) Post test level of patency of peripheral intravenous cannula in experimental group I

b) Post test level of patency of peripheral intravenous cannula in experimental group II

c) Post test level of patency of peripheral intravenous cannula in control group.

d) Post test (day 4) level of patency of peripheral intravenous cannula among experimental group I, experimental group II and control group.

a) The Post test assessment of patency of peripheral intravenous cannula was presented as day by day findings among experimental group I.

Table-4.2: Frequency and percentage distribution of post test level of patency of peripheral intravenous cannula among samples in experimental group I (Heparinised saline). n=15

S No	Patency of peripheral intravenous cannula	Adequate patency		Moderately adequate patency		Inadequate patency	
		No	%	No	%	No	%
1	Day 1	15	100.00	0	0	0	0
2	Day 2	14	93.33	1	6.67	0	0
3	Day 3	12	80.00	3	20.00	0	0
4	Day 4	11	73.33	2	13.33	2	13.33

The table 4.2 shows that in the experimental group I, 15(100%) had adequate patency in day 1. In day 2, majority 14(93.33%) had adequate patency and 1(6.67%) had moderately adequate of patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4 majority 11(73.33%) had adequate patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency.

b) The Post test assessment of patency of peripheral intravenous cannula was presented as day by day findings among experimental group II.

Table- 4.3: Frequency and percentage distribution of post-test level of patency of peripheral intravenous cannula among samples in experimental group II (Normal saline). n=15

S NO	Patency of peripheral intravenous cannula	Adequate patency		Moderately adequate patency		Inadequate patency	
		No	%	No	%	No	%
1	Day 1	15	100.00	0	0	0	0
2	Day 2	13	86.67	2	13.33	0	0
3	Day 3	12	80.00	3	20.00	0	0
4	Day 4	11	73.33	3	20.00	1	6.67

The table 4.3 shows that in the experimental group II, 15(100%) had adequate patency in day 1. In day 2, majority 13(86.67%) had adequate patency and 2(13.33%) had moderately adequate of patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4, majority 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(6.67%) had inadequate patency.

c). The Post test assessment of patency of peripheral intravenous cannula was presented as day by day findings among control group.

Table- 4.4: Frequency and percentage distribution of post-test level of patency of peripheral intravenous cannula among samples in control group. n=15

S No	Patency of peripheral intravenous cannula	Adequate patency		Moderately adequate patency		Inadequate patency	
		No	%	No	%	No	%
1	Day 1	15	100.00	0	0	0	0
2	Day 2	9	60.00	3	20.00	3	20.00
3	Day 3	4	26.67	6	40.00	5	33.33
4	Day 4	3	20.00	3	20.00	9	60.00

The table 4.4 shows that in the control group, 15(100%) had adequate patency in day1. In day 2, majority 9(60%) had adequate patency, 3(20%) had moderately adequate patency and 3(20%) had inadequate patency and have undergone re-cannulation. Whereas in day 3, majority 6(40%) had moderately adequate patency, 4(26.67%) had adequate patency and 5(33.3%) had inadequate patency and have undergone re-cannulation. In day 4, 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and only 3(20%) had adequate patency. 9 samples have undergone re-cannulation on day 4.

d) The Post-test assessment of patency of peripheral intravenous cannula among Experimental group I, Experimental group II and Control group on Day 4.

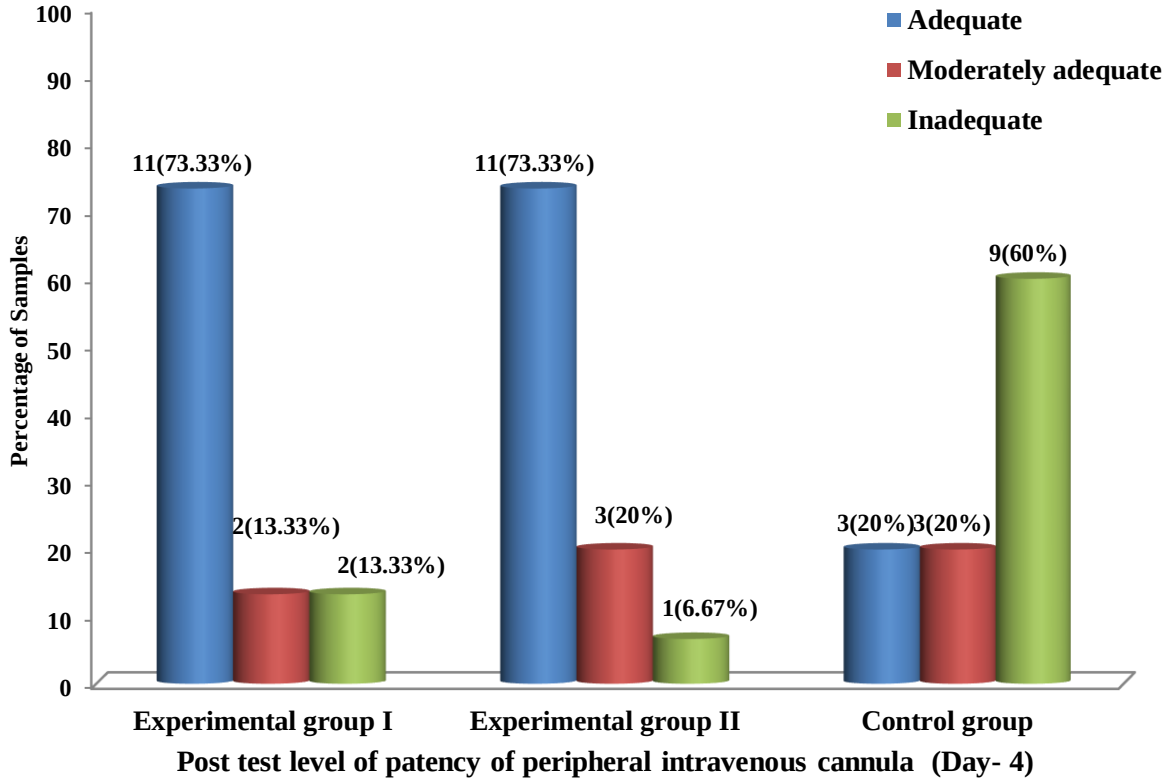

Fig-4.1: Column diagram shows percentage distribution of post-test (day 4) level of patency of peripheral intravenous cannula among samples in experimental group I, Experimental group II and Control group

The figure 4.1 shows that in the experimental group I, majority 11(73.33%) had adequate patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency. In experimental group II, 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(33.3%) had inadequate patency. Whereas in control group, majority 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and 3(20%) had adequate patency.

4.1.3 SECTION-C: EFFECTIVENESS OF HEPARINISED SALINE FLUSH AND NORMAL SALINE FLUSH ON PATENCY OF PERIPHERAL INTRAVENOUS CANNULA AMONG SAMPLES.

This section dealt with analysis and comparison of post test level of patency of peripheral intravenous cannula among samples between experimental group I (heparinised saline), experimental group II (normal saline) and control group using descriptive statistics i.e. Mean, standard deviation and inferential statistics i.e. unpaired "t" test with $p<0.05$ level of significance to test research hypothesis.

This section is divided under following subheading;

a) Analysis and comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised saline) and control group.

b) Analysis and comparison of post test level of patency of peripheral intravenous cannula between experimental group II (Normal saline) and control group.

c) Analysis and comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised saline) and experimental group II (Normal saline).

a) Comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised saline) and control group

Hypothesis H_1:

There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group I (heparinised saline) and control group

To test the hypothesis H_1 the following null hypothesis H_{01} was formulated.

Null Hypothesis H_{01}:

There is no significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group I (heparinised saline) and control group

In order to test the hypothesis H_1 the researcher used unpaired 't' test. The following table shows the finding.

Table–4.5: Comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised saline) and control group. n=30(15+15)

S No	Groups	Mean	SD	Unpaired 't' value
1	Experimental group I	1.3	0.7	t=2.58*
2	Control group	2.07	0.89	

***p<0.05 level of significance d.f=28, Table value – 2.048**

The table 4.5 shows the mean and SD post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean and SD score in control group was 2.07 ± 0.89. The calculated unpaired 't' value was t = 2.58 which was found to be statistically significant at $p < 0.05$ level.

The above findings clearly indicate that there was significant difference in the level of patency of peripheral intravenous cannula in the experimental group I after the administration of heparinised saline and the control group. Hence the hypothesis H_1 was accepted and null hypothesis H_{01} was rejected.

b) Comparison of post test level of patency of peripheral intravenous cannula between experimental group II (Normal saline) and control group.

Hypothesis H_2:

There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group II (Normal saline) and control group.

To test the hypothesis H_2 the following null hypothesis H_{02} was formulated.

Null Hypothesis H_{02}:

There is no significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group II (Normal saline) and control group.

In order to test the hypothesis H_2 the researcher used unpaired 't' test. The following table shows the finding.

Table–4.6: Comparison of post test level of patency of peripheral intravenous cannula between experimental group II (Normal saline) and control group. n=30(15+15)

S No	Group	Mean	SD	Unpaired 't' value
1	Experimental group II	1.2	0.54	t=3.167*
2	Control group	2.07	0.89	

***p<0.05 level of significance d.f=28, Table value – 2.048**

The table 4.6 shows the mean and SD post test score of patency of peripheral intravenous cannula in experimental group II was 1.2 ± 0.54

and the mean and SD score in control group was 2.07 ± 0.89. The calculated unpaired 't' value was t = 3.167 which was found to be statistically significant at $p < 0.05$ level.

The above findings clearly indicate that there was significant difference in the level of patency of peripheral intravenous cannula in the experimental group II after the administration of normal saline and the control group. Hence the hypothesis H_2 was accepted and null hypothesis H_{02} was rejected.

c. Comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised saline) and experimental group II (Normal saline)

Hypothesis H_3:

There is a significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group I (Heparinised Saline) and experimental group II (Normal saline).

To test the hypothesis H_3 the following null hypothesis H_{03} was formulated.

Null Hypothesis H_{03}:

There is no significant difference in the mean post test score of patency of peripheral intravenous cannula between experimental group I (Heparinised Saline) and experimental group II (Normal saline)

In order to test the hypothesis H_3 the researcher used unpaired't' test. The following table shows the finding.

Table–4.7: Comparison of post test level of patency of peripheral intravenous cannula between experimental group I (Heparinised Saline) and experimental group II (Normal saline). n=30(15+15)

S No	Group	Mean	SD	Unpaired 't' value
1	Experimental group I	1.3	0.7	t=0.43 N.S
2	Experimental group II	1.2	0.54	

N.S- not significant d.f=28, Table value – 2.048

The table 4.7 shows the mean and SD post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean and SD score in experimental group II was 1.2 ± 0.54. The calculated unpaired 't' value was t = 0.43 which was found to be statistically not significant at $p < 0.05$ level.

The above findings clearly indicate that there was no significant difference in the level of patency of peripheral intravenous cannula in the experimental group I after the administration of heparinised saline and the experimental group II after the administration of normal saline. Hence both has same effect in maintaining the patency of peripheral intravenous cannula. Hence the hypothesis H_{03} was rejected and null hypothesis H_{03} was accepted.

4.1.4 SECTION-D: ASSOCIATION OF POST-TEST LEVEL OF PATENCY OF PERIPHERAL INTRAVENOUS CANNULA AMONG SAMPLES WITH THEIR SELECTED DEMOGRAPHICAL VARIABLES IN EXPERIMENTAL GROUP I (HEPARINISED SALINE) AND EXPERIMENTAL GROUP II (NORMAL SALINE).

This section dealt with the association of post test level of patency of peripheral intravenous cannula among samples between experimental

group I (Heparinised saline) and experimental group II (Normal saline) using chi-square test. The cross tabulation analysis was employed effectively and the result of chi-square analysis was observed.

This section is divided under the following sub heading.

A. Association of post test level of patency of peripheral intravenous cannula among samples with their selected demographic variables in experimental group I (Heparinised saline).
B. Association of post test level of patency of peripheral intravenous cannula among samples with their selected demographic variables in experimental group II (Normal saline).

A. Association of post test level of patency of peripheral intravenous cannula among samples with their selected demographic variables in experimental group I (Heparinised saline).

This section dealt with the association of post test level of patency of peripheral intravenous cannula among samples in experimental group I using chi-square test. The cross tabulation analysis was employed effectively and the result of chi-square analysis was observed.

Hypothesis H_4:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised Saline) with their selected demographic variables(Age, Size of cannula and Site of cannula insertion)

To test the hypothesis H_4 the following null hypothesis H_{04} was formulated.

Null Hypothesis H_{04}:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with their selected demographic variables (Age, Size of cannula and Site of cannula insertion)

Hence, further it is divided into three sub headings

a) Association between experimental group I and age of the sample
b) Association between experimental group I and size of cannula
c) Association between experimental group I and site of cannula insertion

a. Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with their age.

Hypothesis $H_{4(a)}$:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with their age

To test the hypothesis $H_{4(a)}$ the following null hypothesis $H_{04(a)}$ was formulated.

Null Hypothesis $H_{04(a)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with their age.

In order to test the hypothesis $H_{4(a)}$ the researcher used chi-square test. The following table shows the finding.

Table–4.8: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with their age. n=15

S.NO	Demographic variables	Adequate patency (0-1)		Moderately adequate patency (2)		Inadequate (3)		Chi-square value (χ^2)
		No	%	No	%	No	%	
I	Age in years							3.98 N.S
a)	21-30	3	20.00	0	0	0	0	
b)	31-40	2	13.33	1	6.7	1	6.7	
c)	41-50	3	20.00	2	13.33	1	6.7	
d)	51-60	2	13.33	0	0	0	0	

N.S - Not significant p<0.05 level of significance, d.f = 6, Table value = 12.59

Data presented in table 4.8 Shows that calculated chi-square value is less than the table value, which indicates that there is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) and age at p<0.05 level. Hence the hypothesis $H_{4(a)}$ was rejected and null hypothesis $H_{04(a)}$ was accepted.

b). Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with size of cannula.

Hypothesis $H_{4(b)}$:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with size of cannula.

To test the hypothesis $H_{4(b)}$ the following null hypothesis $H_{04(b)}$ was formulated.

Null Hypothesis $H_{04(b)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with size of cannula.

In order to test the hypothesis $H_{4(b)}$ the researcher used chi-square test. The following table shows the finding.

Table–4.9: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with size of cannula. n=15

S.NO	Demographic variables	Adequate patency (0-1)		Moderately adequate patency (2)		Inadequate (3)		Chi-square value(χ^2)
		No	%	No	%	No	%	
II	Size of cannula							
a)	18G	2	13.33	0	0	0	0	3.15
b)	20G	6	40.00	3	20.00	1	6.7	N.S
c)	22G	2	13.33	0	0	1	6.7	

N.S - Not significant p<0.05 level of significance, d.f = 4, Table value = 9.49

Data presented in table 4.9 shows that calculated chi-square value is less than the table value, which indicates that there is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) and size of cannula at p<0.05 level. Hence the hypothesis $H_{4(b)}$ was rejected and null hypothesis $H_{04(b)}$ was accepted.

c. Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with site of cannula insertion

Hypothesis $H_{4(c)}$:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with site of cannula insertion.

To test the hypothesis $H_{4(c)}$ the following null hypothesis $H_{04(c)}$ was formulated.

Null Hypothesis $H_{04(c)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with site of cannula insertion.

In order to test the hypothesis $H_{4(c)}$ the researcher used chi-square test. The following table shows the finding.

Table–4.10: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) with site of cannula insertion. n=15

S.NO	Demographic variables	Adequate patency (0-1)		Moderately adequate patency (2)		Inadequate (3)		Chi-square value (χ^2)
		No	%	No	%	No	%	
III	Site of cannula insertion							0.84 N.S
a)	Right Hand	3	20.00	1	6.7	0	0	
b)	Left Hand	7	46.67	2	13.33	2	13.33	

N.S - Not significant p<0.05 level of significance, d.f=6, Table value = 12.59

Data presented in table 4.10 Shows that calculated chi-square value is less than the table value, which indicates that there is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group I (Heparinised saline) and site of cannula insertion at $p<0.05$ level. Hence the hypothesis $H_{4(c)}$ was rejected and null hypothesis $H_{04(c)}$ was accepted.

B. Association of post test level of patency of peripheral intravenous cannula among samples with their selected demographic variables in experimental group II (Normal saline)

This section dealt with the association of post test level of patency of peripheral intravenous cannula among samples in experimental group II using chi-square test. The cross tabulation analysis was employed effectively and the result of chi-square analysis was observed.

Hypothesis H_5:

There is a significant association between the post test level of score of patency of peripheral intravenous cannula in experimental group II (Normal saline) with their selected demographic variables(Age, Size of cannula and Site of cannula insertion)

To test the hypothesis H_5 the following null hypothesis H_{05} was formulated.

Null Hypothesis H_{05}:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their selected demographic variables(Age, Size of cannula and Site of cannula insertion)

Hence, further it is divided into three sub headings

a) Association between experimental group II and age of the sample
b) Association between experimental group II and size of cannula
c) Association between experimental group II and site of cannula insertion

a. Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their age.

Hypothesis $H_{5(a)}$:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their age.

To test the hypothesis $H_{5(a)}$ the following null hypothesis $H_{05(a)}$ was formulated.

Null Hypothesis $H_{05(a)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their age.

In order to test the hypothesis $H_{5(a)}$ the researcher used chi-square test. The following table shows the finding.

Table–4.11: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their age. **n=15**

S.NO	Demographic variables	Adequate patency (0-1)		Moderately adequate patency (2)		Inadequate (3)		Chi-square value (χ^2)
		No	%	No	%	No	%	
I	**Age in years**							16.69*
a)	21-30	1	6.7	0	0	1	6.7	
b)	31-40	5	33.33	1	6.7	0	0	
c)	41-50	5	33.33	0	0	0	0	
d)	51-60	0	0	2	13.33	0	0	

***level of significant p<0.05 level, d.f = 6, Table value = 12.59**

Data presented in table 4.11 Shows that calculated chi-square value is greater than the table value, which indicates that there is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with their age at p<0.05 level. Hence the hypothesis $H_{5(a)}$ was accepted and null hypothesis $H_{05(a)}$ was rejected.

b. Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with size of cannula.

Hypothesis $H_{5(b)}$:

There is a significant association between the post test levels of patency of peripheral intravenous cannula among experimental group II (Normal saline) with size of cannula.

To test the hypothesis $H_{5(b)}$ the following null hypothesis $H_{05(b)}$ was formulated.

Null Hypothesis $H_{05(b)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with size of cannula.

The following table shows the finding.

Table – 4.12: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with size of cannula. n=15

S.NO	Demographic variables	Adequate patency (0-1)		Moderately adequate patency(2)		Inadequate (3)		Chi-square value(χ^2)
		No	%	No	%	No	%	
II	Size of cannula							
a)	18G	1	6.7	0	0	0	0	0.828
b)	20G	9	60.00	3	20.00	1	6.7	N.S
c)	22G	1	6.7	0	0	1	6.7	

N.S - Not significant p<0.05 level of significance, d.f=4 Table value = 9.49

Data presented in table 4.12 Shows that calculated chi-square value is less than the table value, which indicates that there is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) and size of cannula at p<0.05 level. Hence the hypothesis $H_{5(b)}$ was rejected and null hypothesis $H_{05(b)}$ was accepted.

c. Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with site of cannula insertion

Hypothesis $H_{5(c)}$:

There is a significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with site of cannula insertion.

To test the hypothesis $H_{5(c)}$ the following null hypothesis $H_{05(c)}$ was formulated.

Null Hypothesis $H_{05(c)}$:

There is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with site of cannula insertion.

In order to test the hypothesis $H_{5(c)}$ the researcher used chi-square test. The following table shows the finding.

Table–4.13: Association of post-test (day 4) level of patency of peripheral intravenous cannula among experimental group II (Normal saline) with site of cannula insertion. n=15

S.No	Demographic variables	Adequate patency (0-1)		Moderately adequate patency(2)		Inadequate (3)		Chi-square value(χ^2)
		No	%	No	%	No	%	
III	**Site of cannula insertion**							5.15 N.S
a	Right Hand	1	6.7	2	13.33	0	0	
b	Left Hand	10	66.67	1	6.7	1	6.7	

N.S - Not significant p<0.05 level of significance, d.f=6 Table value = 12.59

Data presented in table 4.13 Shows that calculated chi-square value is less than the table value, which indicates that there is no significant association between the post test level of patency of peripheral intravenous cannula among experimental group II (Normal saline) and site of cannula insertion at $p<0.05$ level. Hence the hypothesis $H_{5(c)}$ was rejected and null hypothesis $H_{05(c)}$ was accepted.

SUMMARY

This chapter dealt with the analysis and interpretation of data on effectiveness of heparinised saline and normal saline in maintaining the patency of peripheral intravenous cannula. Here the distribution of demographic variables and score of patency of peripheral intravenous cannula was assessed. The hypothesis was tested and the association between mean post test score of patency of peripheral intravenous cannula with their demographic variable were found.

CHAPTER V

DISCUSSION

This chapter deals with the discussion of the major findings and recommendations in accordance with the objectives and hypothesis of the study. The problem statement was a comparative study to assess the effectiveness of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.

The research design selected for the present study was quasi experimental post-test only control group design. The study consists of 45 samples (15 in experimental group I, experimental group II, and Control group) who were admitted in Shanmuga hospital, Salem.

5.1 Objective-1: To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-I (Heparinised saline) and Control group.

In this study the researcher administered heparinised saline flush for experimental group I which consisting of 15 samples. The study was intended to evaluate the effectiveness of heparinised saline on patency of intravenous cannula among patients with medical conditions in selected hospital, Salem. The post test score of patency of intravenous cannula was assessed by using structured rating scale.

- In the experimental group I, 15(100%) had adequate patency in day 1. In day 2, majority 14(93.33%) had adequate patency and 1(6.67%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4 majority 11(73.33%) had adequate

patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency.

- In the control group, 15(100%) had adequate patency in day1. In day 2, majority 9(60%) had adequate patency, 3(20%) had moderately adequate patency and 3(20%) had inadequate patency and have undergone re-cannulation. Whereas in day 3, majority 6(40%) had moderately adequate patency, 4(26.67%) had adequate patency and 5(33.3%) had inadequate patency and have undergone re-cannulation. In day 4, 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and only 3(20%) had adequate patency.

- The mean post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean score in control group was 2.07 ± 0.89. The calculated unpaired‘t’ value was t = 2.58 which was found to be statistically significant at $p < 0.05$ level. The day 4 post test was taken to find the effectiveness of the intervention.

The above results supported by the following study**, Jonker M.A, Osterby KR, etal (2010)** did a retrospective cohort study to assess the effectiveness of heparinised saline flush and normal saline flush in maintaining the patency of central venous access devices over a one month period. The study result showed that the heparinised saline flush is effective in decreasing the thrombotic occlusions of central venous access devices than the normal saline flush.

5.2 Objective-2: To assess and compare the mean post test score of patency of peripheral intravenous cannula among Experimental group-II (Normal saline) and Control group.

In this study the researcher administered normal saline flush for experimental group II which consisting of 15 samples. The study was intended to evaluate the effectiveness of normal saline on patency of intravenous cannula among patients with medical conditions in selected hospital, Salem. The post test score of patency of intravenous cannula was assessed by using structured rating scale.

- In experimental group II, 15(100%) had adequate patency in day 1. In day 2, majority 13(86.67%) had adequate patency and 2(13.33%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4, majority 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(6.67%) had inadequate patency.

- In control group, 15(100%) had adequate patency in day1. In day 2, majority 9(60%) had adequate patency, 3(20%) had moderately adequate patency and 3(20%) had inadequate patency and have undergone re-cannulation. Whereas in day 3, majority 6(40%) had moderately adequate patency, 4(26.67%) had adequate patency and 5(33.3%) had inadequate patency and have undergone re-cannulation. In day 4, 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and only 3(20%) had adequate patency.

- The mean post test score of patency of peripheral intravenous cannula in experimental group II was 1.2 ± 0.54 and the mean

score in control group was 2.07 ± 0.89. The calculated unpaired‘t’ value was t = 3.167 which was found to be statistically significant at $p < 0.05$ level. The day 4 post test was taken to find the effectiveness of the intervention.

The above finding was supported by the study conducted by **Heidari Gorji MA, et.al, (2015).** A double blind study on 84 patients of intensive care unit in Mazandaran University of Medical Sciences, Iran. The patients were randomly divided into two groups of heparinised saline and normal saline receivers. It is suggested that use of normal saline solution is effective in maintaining the patency of central venous catheters than the heparinised saline.

Del Cotillo M, Grane N, et.al, (2008), conducted a double blind controlled clinical trial in intensive care unit of a hospital in Terrassa, Barcelona, Spain. In this study 133 patients were included (65 patients received heparinised saline solution and 68 patients received normal saline solution). The study result showed that the duration of catheter was 5 days in heparin group and 5 and half days in saline group. So it is suggested that the use of normal saline solution is effective than heparinised saline solution.

5.3 Objective-3: To assess and compare the mean post test score of patency of peripheral intravenous cannula between Experimental group-I and Experimental group-II.

- In the experimental group I, 15(100%) had adequate patency in day 1. In day 2, majority 14(93.33%) had adequate patency and 1(6.67%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately

adequate patency. In day 4 majority 11(73.33%) had adequate patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency.

- In experimental group II, 15(100%) had adequate patency in day 1. In day 2, majority 13(86.67%) had adequate patency and 2(13.33%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4, majority 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(6.67%) had inadequate patency.

- The mean post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean score in experimental group II was 1.2 ± 0.54. The calculated unpaired‘t’ value was t = 0.43 which was found to be statistically not significant at $p < 0.05$ level. The day 4 post test was taken to find the effectiveness of the intervention.

The above findings was supported by the study conducted by **Rui wang, Ming-Guang Zhang, (2012**), they did a prospective randomized, controlled, single- blinded trial to compare the effectiveness and safety of heparinised saline and normal saline as flushing and locking solutions for peripheral venous catheters in decompensated liver cirrhosis patients. A total of 32 – 36 patients were allocated to normal saline and heparinised saline respectively. The results showed that the maintenance times of the heparinised saline and the normal saline groups were 80.27 ± 26.47 and 84.19 ± 29.32 hours respectively. The peripheral venous catheters occlusion rates were 6.2% and 5.6% in the heparinised saline and normal saline groups respectively. The researcher concluded that the normal

saline is as effective like heparin saline for flushing and locking the peripheral venous catheters.

Schallom M.E, et.al, (2012), conducted a study in medical intensive care units at Barnes-Jewish hospital, St Louis to compare the effects of heparin and 0.9% normal saline flush solution for maintaining the central venous catheter lumen patency. Total 341 patients were randomly assigned to receive either heparin or 0.9% sodium chloride flush. The study results revealed that 0.9% sodium chloride and heparin flush solutions have similar rates of lumen patency. The researcher concluded that 0.9% saline seems to be as effective as heparinised solution for keeping patterned vascular devices.

5.4 Objective-4: To find association between the post test levels of patency of peripheral intravenous cannula among the Experimental group-I and Experimental group-II with their selected demographic variables (Age, Size of cannula, site of cannula insertion).

In this study, the association was analysed by using chi-square between post test level of patency of peripheral intravenous cannula among patients with their selected demographic variables (Age, Size of cannula and Site of cannula insertion) in experimental group I (heparinised saline) and experimental group II (normal saline). The findings showed that there was no significant association between the post test level of patency of peripheral intravenous cannula in experimental group I (heparinised saline) with their age, size of cannula and site of cannula insertion at $p < 0.05$ level. But there is a significant association between the post test levels of patency of peripheral intravenous cannula in experimental group II (normal saline) with their age.

Honnagouda Patil, L.M. Sames Gon, (2014), conducted a study in medical surgical wards of A.J hospital and Research Centre, Mangalore. 40 samples were selected in that 20 were assigned to heparinised saline group and 20 were assigned to normal saline group. The study results showed that there is a significant association in between patency and purpose of therapy, gauge of cannula, length of cannula, site of cannula and drug administered at $p > 0.05$ level.

Jeanette Robertson, (2011), did a randomized control trial in 152 patients with the age of 2 months to 2 years, to determine the effect of normal saline on patency of intravenous cannula. Samples were randomly allocated to heparinised saline and normal saline group. The study result showed that the young children were found to have a significantly higher incidence of blocked cannulae regardless of flushing solution.

SUMMARY

This chapter dealt with the discussion of the research findings with supportive studies based on each objective.

CHAPTER-VI

SUMMARY, MAJOR FINDINGS, IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

This chapter is divided into two sections. In the first section the summary of the study, findings and conclusion are presented. In the second section the suggestion and recommendations of study in the various areas of nursing like nursing education, nursing practice, nursing administration and nursing research is presented.

6.1 SUMMARY OF THE STUDY

The major objective of the study was to assess the effectiveness of heparinised saline vs normal saline on patency of peripheral intravenous cannula in patients with medical conditions admitted in Shanmuga hospital.

Imogene King's Goal Attainment theory was selected as conceptual framework to assess the effectiveness of heparinised saline and normal saline flush on patency of peripheral intravenous cannula. A quantitative evaluative research approach with quasi experimental post-test only control group design was adopted for this study. The samples were selected using non-probability purposive sampling technique. Total samples were 45, 15 in experimental group I, 15 in experimental group II and 15 in control group.

The tools selected were demographic profile of the samples and structured rating scale to assess the patency of peripheral intravenous cannula.

Content validity was obtained from 6 experts (2 medical and 4 nursing personnel). Reliability of tool was estimated by inter rater method. The score was 'r'=0.98. The pilot study was conducted among 9 samples in Gopi Hospital Salem. There was no modification done after pilot study.

The study was conducted in Shanmuga hospital from 24.03.2016 to 14.05.216. Initially the researcher got permission from the concerned authority after explaining the procedure and purpose of the study. The staff nurses of the Shanmuga hospital were oriented about the study and benefits of the heparinised saline and normal saline flush in maintaining the patency of peripheral intravenous cannula. Then the researcher selected 45 samples using non probability purposive sampling techniques. Written consent was obtained from the samples .The researcher has collected the data from control group then experimental group I (Heparinised saline) and at last from experimental group II (Normal saline).

Selected interventions that are heparinised saline and normal saline flush were provided to the respective groups as per the plan.

For experimental group I–Heparinised saline was used for maintaining the patency of peripheral intravenous cannula. It is prepared by adding 0.5ml of injection heparin in the strength of (5000 units in 5ml) with 100ml of normal saline. Now the prepared solution is having 2ml = 10 unit's heparin. Then the 2ml of heparinised saline is taken from the prepared solution and flushed into the intravenous cannula after the administration of prescribed medication twice daily (morning and evening) for 4 days from the first day and within 12 hrs of intravenous cannula insertion.

For experimental group II– Normal saline was used for maintaining the patency of peripheral intravenous cannula. Commercially available sterile 0.9% sodium chloride solution was used to flush the cannula. 2ml of saline is flushed into the peripheral intravenous cannula after the administration of prescribed medication twice daily (morning and evening) for 4 days from the first day and within 12 hrs of intravenous cannula insertion.

Post test was conducted by using the structured rating scale to assess the patency of peripheral intravenous cannula twice daily for 4 days from the first day.

Finally, the data obtained was analysed in terms of the objectives and hypothesis of the study using descriptive and inferential statistics.

6.2 MAJOR FINDINGS OF THE STUDY

I. Demographic variables

- Regarding the age of the samples in experimental group I majority 6(40%) were in the age group of 41-50 years. In experimental group II majority 6(40%) were in the age group of 31 – 40 years. In control group majority 7(46.67%) were in the age group of 41 – 50 years
- Regarding the gender of the sample in experimental group I majority 8(53.33%) were male. In experimental group II majority 9(60%) were male. In control group majority 8(53.33%) were female.

- Regarding the educational status in experimental group I majority 6(40%) had primary education. In experimental group II majority

6(40%) had higher secondary education. In control group majority 7(46.67%) had higher secondary education.

- Regarding the ward in experimental group I majority 8(53.33%) were admitted in Male medical ward. In experimental group II majority 9(60%) were admitted in Male medical ward. In control group majority 8(53.33%) were admitted in female medical ward.

- Regarding the patient status in experimental group I majority 7(46.67%) were in the status of bed mobility. In experimental group II majority 8(53.33%) were in the status of bed mobility. In control group majority 7(46.67%) were in the status of bed mobility.

- Regarding the number of hospitalization in experimental group I majority 7(46.67%) were admitted for the first time. In experimental group II majority 6(40%) were admitted for the first time. In control group majority 6(40%) were admitted for the first time.

- Regarding the size of cannula in experimental group I majority 11(73.33%) had 20G as size of intravenous cannula. In experimental group II majority 13(86.67%) had 20G as size of intravenous cannula. In control group majority 12(80%) had 20G as size of intravenous cannula.

- Regarding the site of cannula insertion in experimental group I majority 11(73.33%) had intravenous cannulation in left hand. In experimental group II majority 12(80%) had intravenous

cannulation in left hand. In control group majority 12(80%) had intravenous cannulation in left hand.

- Regarding the classification of drug all 15(100%) in experimental group I, experimental group II and control group had antibiotics and antacids.

II. Findings related to level of patency of peripheral intravenous cannula

- In the experimental group I, 15(100%) had adequate patency in day 1. In day 2, majority 14(93.33%) had adequate patency and 1(6.67%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4 majority 11(73.33%) had adequate patency, 2(13.33%) had moderately adequate patency and 2(13.33%) had inadequate patency.

- In the experimental group II, 15(100%) had adequate patency in day 1. In day 2, majority 13(86.67%) had adequate patency and 2(13.33%) had moderately adequate patency. In day 3, majority 12(80%) had adequate patency and 3(20%) had moderately adequate patency. In day 4, majority 11(73.33%) had adequate patency, 3(20%) had moderately adequate patency and 1(6.67%) had inadequate patency.

- In the control group, 15(100%) had adequate patency in day1. In day 2, majority 9(60%) had adequate patency, 3(20%) had moderately adequate patency and 3(20%) had inadequate patency. Whereas in day 3, majority 6(40%) had moderately adequate patency, 4(26.67%) had adequate patency and 5(33.3%) had

inadequate patency. In day 4, 9(60%) had inadequate patency, 3(20%) had moderately adequate patency and 3(20%) had adequate patency.

III. Findings related to effectiveness of heparinised saline and normal saline flush on patency of peripheral intravenous cannula.

- **Experimental group I and control group -** The mean post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean score in control group was 2.07 ± 0.89. The calculated unpaired't' value was t = 2.58 which was found to be statistically significant at $p < 0.05$ level. The above finding clearly indicates that there was significant difference in the level of patency of peripheral intravenous cannula in the experimental group I after the administration of heparinised saline and the control group.

- **Experimental group II and control group -** The mean post test score of patency of peripheral intravenous cannula in experimental group II was 1.2 ± 0.54 and the mean score in control group was 2.07 ± 0.89. The calculated unpaired't' value was t = 3.167 which was found to be statistically significant at $p < 0.05$ level. The above finding clearly indicates that there was significant difference in the level of patency of peripheral intravenous cannula in the experimental group II after the administration of normal saline and the control group.

- **Experimental group I and experimental group II -** The mean post test score of patency of peripheral intravenous cannula in experimental group I was 1.3 ± 0.7 and the mean score in

experimental group II was 1.2 ± 0.54. The calculated unpaired‘t’ value was t = 0.43 which was found to be statistically not significant at $p < 0.05$ level. The above finding clearly indicates that there was no significant difference in the level of patency of peripheral intravenous cannula in the experimental group I after the administration of heparinised saline and the experimental group II after the administration of normal saline. Hence the both have same effect in maintaining the patency of peripheral intravenous cannula.

IV. Findings related to post test level of patency of peripheral intravenous cannula in experimental group I and experimental group II with their selected demographic variables.

Experimental group I

- The chi-square value of post test level of patency of peripheral intravenous cannula with age among samples is (3.98) which is less than the table value (12.59) which indicates no significant association at $p < 0.05$ level of significance.

- The chi-square value of post test level of patency of peripheral intravenous cannula among samples and size of cannula is (3.15) which is less than the table value (9.49) which indicates no significant association at $p < 0.05$ level of significance.

- The chi-square value of post test level of patency of peripheral intravenous cannula among samples and site of cannula insertion is (0.84) which is less than the table value (12.59) which indicates no significant association at $p < 0.05$ level of significance.

Experimental group II

- The chi-square value of post test level of patency of peripheral intravenous cannula with age among samples is (16.69) which is greater than the table value (12.59) which indicates there is a significant association between age and patency of peripheral intravenous cannula in normal saline group at $p < 0.05$ level of significance.

- The chi-square value of post test level of patency of peripheral intravenous cannula among samples and size of cannula is (0.828) which is less than the table value (9.49) which indicates no significant association at $p < 0.05$ level of significance.

- The chi-square value of post test level of patency of peripheral intravenous cannula among samples and site of cannula insertion is (5.15) which is less than the table value (12.59) which indicates no significant association at $p < 0.05$ level of significance.

6.3 IMPLICATIONS

The findings of the study have implication in various areas of nursing like nursing practice, nursing education, nursing administration and nursing research.

6.3.1 Nursing Practice

A Nurse plays an important role in caring the intravenous cannulation site for prolonging the life and to prevent the complications occurring due to intravenous cannulation and improper maintenance. The key aim of the study was to maintain the patency of peripheral intravenous cannula. The finding of the study clearly states that the

administration of heparinised saline and normal saline are effective in maintaining the patency of peripheral intravenous cannula.

The nurses can be encouraged for the use of heparinised saline or normal saline according to the hospital protocol to maintain the patency of cannula which will reduce the work load of cannula removal and re inserting again. Also it will reduce the cost of cannula purchase for the hospital as well as to the patients.

6.3.2 Nursing Education

The nursing curriculum should emphasize on the various methods for maintaining the patency of peripheral intravenous cannula.

Present study proved that the heparinised saline and normal saline has same effect in maintaining the patency of peripheral intravenous cannula. The purpose and importance of maintaining the patency and preventing the intravenous cannula related complications and use of normal saline and heparinised saline should be taught to the student nurses, which will be helpful to the nurses in preventing the occurrence of complications in the hospital settings.

6.3.3 Nursing Administration

The nursing administration of the hospital should take a major step toward educating the nurses of the hospital about prevention of intravenous cannula related complications and maintenance of patency of intravenous cannula among the patients. This study helps the nurse administrator to formulate adequate policies in adopting the practice of administration of heparinised saline or normal saline among the nurses which will enable the patient in preventing the complications and

maintaining the patency and also reducing the manpower, money, material, method and time of the hospital as well as the nurse and the patient. The ward nurses should be provided with the heparinised or normal saline solution and explanation about how to administer to the patient along with the rationale for the uses given by the nursing administration department of the hospital. Also the nurse administrator has to insist the hospital management for developing standard protocol regarding intravenous line management and flushing technique.

Sufficient study materials must be supplied to the nurses and they must be encouraged to read about the articles related to complications that are occurring due to intravenous cannulation and improper management of cannulation site and also its prevention using heparinised saline and normal saline. In service education can be conducted for the nurses. Research findings can be utilized in clinical practice. The nurses in the hospital should be properly educated by providing training and encouraging them to apply the research findings in daily practice by the nurse administration.

6.3.4 Nursing Research

The study showed that there is a lack of practice for maintaining the patency of peripheral intravenous cannula and for prevention of cannula induced complications. It indicates there is a need for the research in assessing the effectiveness of heparinised saline and normal saline administration for maintaining the patency of peripheral intravenous cannula. Hence the nursing staffs and students should be encouraged to conduct research needed in maintaining the patency and reducing the occurrence of complications due to intravenous cannula.

Present study helps the nursing personnel to develop inquiry by providing a base for the further research in different settings. There is a need for extensive and intensive research focusing nursing staffs, so that strategies can be made to educate the nursing personnel about the importance of preventing the intravenous cannulation induced complications and maintaining the patency of intravenous cannula.

6.4 RECOMMENDATIONS

1. Similar study can be conducted in different settings.
2. Similar study can be replicated to a large sample for generalization.

6.5 LIMITATIONS

1. Few of the samples got discharged in between the data collection period, so they were considered as attrition of the study.
2. Re-cannulation was done for few samples on second, third day and fourth day in control group which might have influenced the result of the study.

6.6 CONCLUSION

In this study heparinised saline and normal saline are have the same effect in maintaining the peripheral intravenous cannula. Normal saline is effective in maintaining the patency of peripheral intravenous cannula as it is commercially available, cost effective and no need of specific preparation methods. Awareness of nursing staffs about these flushing solutions can prevent the complications and will maintain the patency of cannula. Considering the cost effective care the nurses can be encouraged to use normal saline as a flush solution in practice. Due to the administration of normal saline the patient will have less pain on cannulation site and also will maintain the patency of cannula. This method of maintaining the patency of cannula will reduce the financial

burden of the patients from buying intravenous cannula again and again. It will also help in cost containment of intravenous cannula supply in hospitals and reduces the work load of the nurses in terms of reinserting the intravenous cannula to the patients.

SUMMARY

This chapter dealt with summary, implications, recommendations and conclusion of the study.

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ANNEXURE –I

LETTER SEEKING PERMISSION TO CONDUCT RESEARCH STUDY

From,

N. Rajalakshmi,
II-Year M.Sc., (N) student,
Shanmuga College of Nursing,
24, Saradha college road,
Salem-636007.

To,

The chairman,
Shanmuga Hospital,
Salem - 636007.

Through

The Principal,
Shanmuga College of Nursing,
24, Saradha college road,
Salem -636007.

Respected Sir/Madam

Sub**: Requesting permission for conduct research study**

I, N. Rajalakshmi, II Year M.Sc.,(N) student of Shanmuga College of Nursing Salem, forthe partial fulfilmentof M.Sc.,(N) programme, have undertaken the following research study, which has to be submitted to the Dr.M.G.R. Medical University, Chennai.

STATEMENT OF THE PROBLEM

"**A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.**

In this regard, I seek permission to conduct the study in your hospital. I assure my presence will not disturb the routine functions in hospital.

Thanking you in anticipation,

Place: Salem
Date:

Your's faithfully

(N. Rajalakshmi)

ANNEXURE –II

LETTER SEEKING OPINION FOR CONTENT VALIDITY OF TOOL AND INDEPENDENT VARIABLE

From

N. Rajalakshmi
II-Year M.Sc., (N) student,
Shanmuga College of Nursing,
24, Saradha college road,
Salem- 636007.

To

Through

The Principal,
Shanmuga College of Nursing,
24, Saradha college road,
Salem – 636007.

Respected Sir/Madam,

Sub**: Expert opinion on content validity of the tool**

I, N. Rajalakshmi II year M.Sc., (N) student of Shanmuga College of Nursing Salem, for the partial fulfilment of M.Sc.,(N) programme, have undertaken the following research study, which has to be submitted to the M.G.R.Medical University, Chennai. I am conducting **"A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem.**

So I humbly request you to give your valuable suggestions regarding the appropriateness of the tool and independent variable.

I also request you to kindly sign the certificate stating that you have validated the tool.

Thanking you,

Place: Salem Yours Faithfully,

Date: (N. Rajalakshmi)

ANNEXURE –III

LIST OF EXPERTS WHO VALIDATED THE TOOL AND INDEPENDENT VARIABLES

1. Dr. R. Murugavel, MS,
   General Surgeon,
   Shanmuga Hospital,
   Salem.
2. Dr. P. Prabusankar, MS, MRCS
   General surgeon,
   Shanmuga Hospital,
   Salem.
3. Dr. S. Punitha Josephine, Ph.D.,
   Vice Principal,
   Dept of Medical Surgical Nursing,
   KarpagaVinayaga College of Nursing,
   Kanchipuram.
4. Mrs. M. Geetha, M.Sc(N).,
   Principal,
   Vivekanandha Nursing College for Women,
   Veerachipalayam,
   Sankari.
5. Mrs. P. Neela, M.Sc(N),
   Vice Principal,
   Dept of Medical Surgical Nursing,
   Swami Vivekanandha College of Nursing,
   Dharmapuri.
6. Mrs. R. Ruckmani, M.Sc(N).,
   Associate Professor,
   Dept of Medical Surgical Nursing,
   Aravind College of Nursing,
   Namakkal.

ANNEXURE - IV

EVALUATION CRITERIA FOR THE CONTENT VALIDITY OF TOOLS / INDEPENDENT VARIABLES

Respected Sir/Madam,

I kindly request you to go through the table and give your valuable response and suggestion in the respective column given in the criterion table which helps me in modifying the tool.

TOOL: I DEMOGRAPHIC VARIABLES

S. No	Items	Yes	No	Remarks
1	Age in years a) 20-30 b) 31-40 c) 41-50 d) 51-60			
2	Gender a) Male b) Female			
3	Educational Status a) No formal education b) Primary education c) Higher secondary d) Graduate & above			
4	Ward a) Male Medical ward b) Female Medical ward			
5	Patient status a) Bed ridden b) Movement only in the cot c) Complete ambulation			

6	Number of hospitalization a) 1st time b) 2nd time c) 3rd time d) More than 3 times			
7	Size of cannula a) 18 G b) 20 G c) 22 G			
8	Site of intravenous cannula a) Right hand b) Left hand c) Right leg d) Left leg			
9	Classification of drug infused			

TOOL - II

STRUCTURED RATING SCALE TO ASSESS THE PATENCY OF INTRAVENOUS CANNULATION SITE

Instructions:

The researcher assesses the intra venous site daily and put (√) mark at the appropriate score in the column given for four days.

S. No	Site Observation	Score	Yes	No	Remarks
1	Intravenous Site appears healthy No pain No redness No swelling	0			
2	Slight Pain around the IV site Slight Skin redness/blanching around the IV site	1			
3	**Along with symptoms of score 1** Tenderness along the path of cannula Swelling around the Iv site Warmth/Coolness around the Iv site Tightness around the Iv site Pain along the path of the cannula	2			
4	**Along with symptoms of score 1 and 2** Slow flow of medication Resistance while administering medicine Leaking from IV site Palpable venous card Complete blockage while administering medicine	3			
	Maximum Score	**3**			

SCORING

ADEQUATE PATENCY	-	0 – 1
MODERATE PATENCY	-	2
INADEQUATE PATENCY	-	3

EVALUATION CRITERIA FOR THE CONTENT VALIDITY OF INDEPENDENT VARIABLES

Respected Sir/Madam,

Kindly go through the content of procedure for administration of heparin saline and normal saline flush in the intravenous line. I kindly request you to give your suggestions on the content of procedure which will be helpful for me in modifying the procedure.

S.No	Criteria	Yes	No	Remarks
	Administration of heparinised saline and normal saline flush			
1.	Whether it has covered the entire procedure			
2.	Whether the procedure is appropriate			
3.	Whether the procedure is adequate			
4.	Whether it is relevant to the topic			
5.	Whether arranged in sequence			
6.	Whether arranged in logical order			

ANNEXURE - V

PERCENTAGE OF AGREEMENT/ DISAGREEMENT (VALIDITY OF TOOL)

TOOL I: DEMOGRAPHIC VARIABLES

S.No	Items	% of agree	% of disagree	Remarks
1	Age in years a) 20-30 b) 31-40 c) 41-5 d) 51-60	100%		Retained
2	Gender a) Male b) Female	80%	20%	Modified Added transgender
3	Educational Status a) No formal education b) Primary education c) Higher secondary d) Graduate&above	100%		Retained

4	Ward a) Male Medical ward b) Female Medical ward	100%		Retained
5	Patient status a) Confined to bed b) Bed Mobility c) Complete ambulation	80%	20%	Modified the term as Confined to bed and Bed mobility
6	Number of hospitalization a) First time b) Second time c) Third time d) More than 3 times	100%		Retained
7	Size of cannula a) 18 G b) 20 G c) 22 G	100%		Retained

8	Site of intravenous cannula a) Right hand b) Left hand c) Right leg d) Left leg	100%		Retained
9	Classification of the drug infused	100%		Retained

TOOL – II

STRUCTURED RATING SCALE TO ASSESS THE PATENCY OF INTRAVENOUS CANNULATION SITE

Instructions:

The researcher assesses the intra venous site daily and put (√) mark at the appropriate score in the column given for four days.

S. No	Site Observation	Score	% of agree	% of disagree	Remarks
1	Intravenous Site appears healthy No pain No redness No swelling	0	100%		Retained
2	Slight Pain around the IV site Slight Skin redness/blanching around the IV site	1	100%		Retained

3	**Along with symptoms of score 1** Tenderness along the path of cannula Swelling around the Iv site Warmth/Coolness around the Iv site Tightness around the Iv site Pain along the path of the cannula	2	100%		Retained
4	**Along with symptoms of score 1 and 2** Slow flow of medication Resistance while administering medicine Leaking from IV site Palpable venous card Complete blockage while administering medicine Fever	3	80%	20%	Modified Removed Fever
	Maximum Score	**3**			

SCORING

ADEQUATE PATENCY - 0 – 1

MODERATE PATENCY - 2

INADEQUATE PATENCY - 3

ANNEXURE - VI

CONTENT VALIDITY CERTIFICATE

I hereby certify that I have validated the tool of **N. Rajalakshmi, M.Sc.,(N)**student of Shanmuga College of Nursing at Salem, who is undertaking,**"A comparative study to evaluate the efficacy of heparinised saline and normal saline flush on patency of peripheral intravenous cannula among patients with medical conditions in selected hospital at Salem".**

Signature ofExpert

Name:

Designation:

Place:

Date:

ANNEXURE – VII

TOOL -I

DEMOGRAPHIC PROFILE

Instructions

The samples are requested to give some information about them. The response will be ticked by the researcher. The response will be kept confidential and it will be used for this study purpose only.

Sample No:

1. Age in years :
    a. 20 – 30 [ ]
    b. 31 – 40 [ ]
    c. 41 – 50 [ ]
    d. 51 – 60 [ ]
2. Gender :
    a. Male [ ]
    b. Female [ ]
    c. Transgender [ ]
3. Educational Status :
    a. No formal education [ ]
    b. Primary education [ ]
    c. Higher secondary [ ]
    d. Graduate & above [ ]
4. Ward :
    a. Male Medical ward [ ]
    b. Female Medical ward [ ]

5. Patient Status :
    a. Confined to bed [ ]
    b. Bed mobility [ ]
    c. Complete ambulation [ ]
6. Number of Hospitalization :
    a. First time [ ]
    b. Second time [ ]
    c. Third time [ ]
    d. More than 3 times [ ]
7. Size of Cannula :
    a. 18G [ ]
    b. 20G [ ]
    c. 22G [ ]
8. Site of Intravenous cannula inserted:
    d. Right hand [ ]
    e. Left hand [ ]
    f. Right leg [ ]
    g. Left leg [ ]

9. Classification of Drug infused : _____

TOOL – II

STRUCTURED RATING SCALE TO ASSESS THE PATENCY OF INTRAVENOUS CANNULATION SITE

Instructions:

The researcher assesses the intra venous site daily and put (√) mark at the appropriate score in the column given for four days.

S.No	Site Observation	Score	Day1		Day2		Day3		Day4	
			M	E	M	E	M	E	M	E
1	No symptoms	0								
2	Slight Pain around the IV site Slight Skin redness/blanching around the IV site	1								
3	**Along with symptoms of score 1** Tenderness along the path of cannula Swelling around the Iv site Warmth/Coolness around the Iv site Tightness around the Iv site Pain along the path of the cannula	2								

4	**Along with symptoms of score 1 and 2** Slow flow of medication Resistance while administering medicine Leaking from IV site Palpable venous card Complete blockage while administering medicine	3								
	MAXIMUM SCORE	**3**								

SCORING

ADEQUATE PATENCY - 0 – 1

MODERATE PATENCY - 2

INADEQUATE PATENCY - 3

ANNEXURE –VIII

INDEPENDENT VARIABLES

HEPARINISED SALINE AND NORMAL SALINE FLUSH

Purposes

1. To maintain the adequate patency of intravenous line cannula.
2. To provideintravenous line cannula care to the patient.
3. To prevent complications of intra venous line cannulation.
4. To prolong the life of intravenous line cannula.

Preliminary assessment

1. Observe the condition of the patient.
2. Check the cannulation insertion site weather it is clean or any leakage is present.
3. Inspect the site of cannula insertion for complications such as thrombophlebitis, infiltration, block etc.,

Preparation of the patient

1. Provide privacy for the patient
2. Provide information to patient regarding intravenous line cannula care.
3. Get consent from patient.

HEPARINISED SALINE FLUSH

Articles

1. Soap and soap dish for hand washing.
2. Sterile gloves.
3. Sodium chloride (0.9%) solution-100ml Bottle with top covering.(1)
4. Inj. Heparin (5000I.U in 5ml).(1vial)

5. Sterile syringe(2ml) with protective covering. (2)
6. Small mackintosh.(1)
7. Steel bowl with dry cotton swaps.(1)
8. Kidney tray.(1)

Procedure

1. Wash hands.
2. Prepare the heparinised saline solution. (Take 0.5ml of heparin from vial which is in the strength of (5000 I.U in 5ml) and add with 100ml of 0.9% sodium chloride solution, now 1ml of solution contains 5 units heparin).
3. Mix the solution well and take 2ml of prepared solution with aseptic manner in a sterile 2ml syringe.
4. Flush the intravenous line cannula with 2ml of heparinised saline twice daily (morning and evening) after administration of prescribed medication for experimental group I starting from within 12hrs of intravenous cannulation for 4 days.
5. Check for resistance, leakage and complete blockage
6. Instruct the patient (or) care taker to report if there is any pain, swelling, redness, etc.
7. Collect all the used articles replace properly and dispose the waste appropriately.
8. Wash hands.
9. Document the procedure (Date, time, condition of vein) with signature.

NORMAL SALINE FLUSH

Articles

1. Soap and soap dish for hand washing.
2. Sterile gloves.
3. Sodium chloride(0.9%) solution-100ml Bottle with top covering.(1)
4. Sterile syringe (2ml) with protective covering. (2)
5. Small mackintosh.(1)
6. Steel bowl with dry cotton swaps.(1)
7. Kidney tray.(1)

Procedure

1. Wash hands.
2. Take 2ml of sodium chloride (0.9%) solution from the bottle with aseptic manner in a sterile 2ml syringe.
3. Flush the intravenous line cannula with 2ml of solution twice daily (morning and evening) after administration of prescribed medication for experimental group II starting from within 12hrs of intravenous cannulation for 4 days.
4. Check for resistance, leakage and complete blockage.
5. Instruct the patient (or) care taker to report if there is any pain, swelling, redness, etc.
6. Collect all the used articles replace properly and dispose the waste appropriately.
7. Wash hands.
8. Document the procedure (Date, time, condition of vein) with signature.

ANNEXURE–IX

CONSENT FORM

I, **N. Rajalakshmi,** II year M.Sc. Nursing student of Shanmuga College of Nursing, as a part of my M.Sc. Nursing programme have selected a research topic on **"A COMPARATIVE STUDY TO EVALUATE THE EFFICACY OF HEPARINISED SALINE AND NORMAL SALINE FLUSH TO ASSESS THE PATENCY OF PERIPHERAL INTRAVENOUS CANNULA AMONG PATIENTS WITH MEDICAL CONDITIONS IN SELECTED HOSPITAL AT SALEM"**. For which I would like to include you as the study samples. I ensure you that the details collected will be kept confidential and will be utilized only for this research purpose.

Yours faithfully,

(N. Rajalakshmi)

The researcher has explained me in detail about the study and its benefits and no risk, and I came to know that I can withdraw from study at any time. She ensured that the information collected from me will be kept confidential and it is used only for this study. I am willing to be a sample for this study.

Yours faithfully,

Signature:

rk;ke;jg;gotk;

e.,uh$yl;Rkp Mfpa ehd; rz;Kfh brtpypah; fy;Y}hpapy; ,uz;lhk; Mz;L KJfiy brtpypah; gl;lg;gog;g[gof;Fk; khztp.. vdJ gog;gpd; xU gFjpahf Muha;r;rp xd;W fPH;fz;l jiyg;gpy; bra;a cs;nsd;. kUj;Jtkidapy; nehahspfSf;F nghlg;gLk; ,uj;jFHha; Crpapy; Vw;gLk; milg;g[f;F (bQg;ghpd; kw;Wk; ehh;ky; riyd;) Mfpa ,uz;L tHp Kiwfis gad;gLj;jp mjdhy; Vw;gLk; Kf;fpa gpd; tpist[fisg; gw;wp Muha;r;rp nkw;bfhs;s cs;nsd;. ,jpy; jh';fs; g';Fbfhs;SkhW jhH;ika[ld; nfl;Lf; bfhs;fpnwd;. nrfhpf;fg;gLk; tpgu';fs; ,ufrpakhfg; ghJfhf;fg;gLk; kw;Wk; Muha;;r;rpf;fhf kl;Lnk gad;gLj;jg;gLk; vd cWjpaspf;fpnwd;.

,g;gof;F

e.,uh$yl;Rkp

kUj;Jtkidapy; nehahspfSf;F nghlg;gLk; ,uj;jFHha; Crpapy; Vw;gLk; milg;g[f;F (bQg;ghpd; kw;Wk; ehh;ky; riyd;) Mfpa ,uz;L tHpKiwfis cgnahfg;;gLj;jp nehahspfSf;F Vw;gLk; typ/ tPf;fk;/ kUe;J brYj;Jk;nghJ Vw;gLk; milg;g[Mfpatw;iw xg;gPL bra;jiyg; gw;wp e.,uh$yl;Rkp Muha cs;sjhf mwpe;Jbfhz;nld;. Vdnt mtuJ Muha;r;rpapy; ehd; g';nfw;f KGkdJld; rk;kjpf;fpnwd;.

,g;gof;F

g';nfw;ghsh;

,lk; :

njjp: