EFFECTIVENESS OF NORMAL SALINE FLUSH AND HEPARINIZED FLUSH UPON INTRAVENOUS LINE PATENCY AMONG PATIENTS RECEIVING INTRAVENOUS MEDICATION

BY

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A DISSERTATION SUBMITTED TO THE TAMILNADU DR.M.G.R.MEDICAL UNIVERSITY, CHENNAI, IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE DEGREE OF

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DECLARATION

I hereby declare that the present dissertation entitled **"Effectiveness of normal saline flush and heparinised flush upon intravenous line patency among patients receiving intravenous medication"** is the outcome of the original research work undertaken and carried out by me under the guidance of **Dr. Latha Venkatesan,** M.Sc (N)., M.Phil (N)., Ph.D (N), Principal, Apollo College of Nursing and **Mrs. Lizy Sonia. A**, M.Sc (N)., Ph.D (N)., Professor cum Vice Principal, Apollo College of Nursing, Chennai. I also declare that the material of this has not found in any way, the basis for the award of any degree or diploma in this university or any other university.

II YEAR M.Sc (N)

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SYNOPSIS

An Experimental Study to Assess the Effectiveness of Normal Saline Flush and Heparinized Flush in Maintaining the Patency of Intravenous Lines Among Patients Receiving Intravenous Medication at Selected Hospitals, Chennai.

The Objectives of the Study were,

1. To assess the level of patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
2. To determine the effectiveness of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
3. To assess the level of satisfaction of nurses regarding normal saline flush in experimental group I and heparinized flush II in experimental group II among patients receiving intravenous medication.
4. To find out the association between the selected demographic variables upon the intravenous line patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
5. To find out the association between the selected clinical variables upon the intravenous line patency before and after normal saline flush experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.

The conceptual framework for the study was developed on the basis of King's Goal Attainment Theory. An intensive review of literature and experts guidance laid the foundation to the development of tools such as demographic variable proforma, clinical variable proforma, observation checklist and patient satisfaction rating scale.

In this study, true experimental research design was adopted. The present study was conducted at Apollo Speciality Hospital, Chennai among patients receiving intravenous medication. The sample size for the present study was 60 patients who receiving intravenous medication, among 60 which 30 patients were assigned to experimental group I and 30 patients in experimental group II who satisfied the inclusion criteria.

The investigator used the demographic variable proforma and clinical variable proforma of patients to obtain the baseline data. Observation checklist was used to assess the level of intravenous line patency before and after normal saline flush and heparinized flush and rating scale to assess the level of satisfaction of patient about normal saline flush in experimental group I and heparinized flush in experimental group II. The data collection tools were validated and reliability was established. After the pilot study, the data collection of main study was conducted for period of 4 weeks. The collected information was tabulated and analyzed by using appropriate descriptive and inferential statistics.

The Major Findings of the Study

- Significant percentage of the patients were in the age group of 41-50 years (40%, 36.6%), males (70%, 73.3%), were living in urban region (70%, 80%), graduates (26.7%, 53.3%), non professional (73.3%, 60%), got married (86.7%, 70%), most

of the patients were not having the history of previous hospitalization (66.7%, 73.3%), stayed in the hospital at the duration of 4-8 days (43.3%, 46.7%) in the experimental group I and experimental group II respectively.

- Significant percentage of the patients got admitted with various diagnosis (43.3%, 50%), received medical treatment (73.3%, 73.3%), had median cephalic intravenous line (40%, 36.7%), had 20 G cannula (43.3%, 50%), received drugs through intravenous line (63.3%, 63.3%), infused at rate of 40 to 60 drops/min (46.7%, 43.3%), received more than 2000ml of fluid (40%, 46.7%) and all of them were received intravenous therapy more than 48 hours (100%, 100%) in the experimental group I and experimental group II respectively.
- Majority of patients in experimental group I and experimental group II had no intravenous blockage (90%, 96.7%) in pre test respectively. However after normal saline flush and heparinized flush, no patients had intravenous blockage (100%, 100%) in experimental group I and experimental group II of patients receiving intravenous medication.
- The mean and standard deviation for the scores of intravenous line patency (M=25.4,SD=3.06), (M=26, SD=2.75) among patients before normal saline flush and heparinised flush in experimental group I and experimental group II is significant at $p<0.001$***. On the other hand after administration of normal saline flush in experimental group I and heparinised flush in experimental group II, the mean and standard deviation (M=17.3,SD=1.37), (M=17.1,SD=1.14) were low when compared with pre test intravenous line patency score. The difference was found statistically significant at $p<0.001$. Hence the null hypothesis H_{01} was rejected.

- Majority of the patients (93.33%) were highly satisfied with normal saline flush for maintaining intravenous line patency in experimental group I.
- Majority of the patients (93.3%) were highly satisfied with heparinized flush for maintaining intravenous line patency in experimental group II.
- There was a significant association between intravenous line patency and demographic variables of sex (χ^2=6.00, df=1), ($p < 0.05$*) in pre test and sex (χ^2=4.35, df=1), ($p < 0.05$*), residence (χ^2=9.66, df=1), ($p < 0.05$*) of post test in experimental group I and marital status (χ^2=9.30, df=1), ($p < 0.01$**) of pre test in experimental group II. Hence there was no association between other demographic variables like age, educational status, income per month, occupation, previous history of hospitalization, duration of hospitalization and intravenous line patency in experimental group I and experimental group II of patients. Hence the null hypothesis H_{02} was rejected with sex, residence, marital status and retained with other demographic variables.
- There was a significant association between intravenous line patency and other clinical variables of reason for admission (χ^2=6.30, df=1), ($p < 0.05$*), size of cannula (χ^2=4.23, df=1), ($p < 0.05$*) in pre test of experimental group I and diagnosis (χ^2=6.29, df=1), ($p < 0.05$*) in post test of experimental group II. However there was no significant association between other clinical variables like site of intravenous line, type of fluid, rate of fluid flow, total volume of fluid, duration of therapy and patency of intravenous line. Hence the null hypothesis Ho_3 was rejected with diagnosis, reason for admission, size of cannula and retained with other clinical variables.

Recommendations

- A similar study could be undertaken on larger scale for more valid generalization.
- Present study could be replicated in different settings.
- The intervention can be applied in practice for maintaining the patency for central venous catheter and arterial catheter.
- The study could be conducted to analyze the relationship between the use of intravenous flush and maintaining catheter patency.

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CHAPTER-I

INTRODUCTION

Background of the Study

"Excellence is never an accident; it's always the results of high intention, sincere effort, intelligent direction and skillfull execution"

- **Willam.A.Foster**

The greatest wealth is health. The trouble will always try to preserve the health of the body. Poor health is not caused by something which a person does not have, it is caused by disturbing the one which a person already has. Change is the law of life. When some changes occur in health it may lead to illness. Worldwide millions of patients are admitted everyday in hospitals. The need for health in advancing world is higher and higher. Treatment modalities differ for each hospital.

Believing that life is worth living and that belief will help to create the fact. At the midst of illness medication play a major role in healing sickness. Patients admitted in the hospitals definitely need a intravenous catheter in order to provide access for administration of medication, intravenous fluid and total parental nutrition. In addition many critically ill patients need arterial catheterization to monitor haemodynamic monitoring and blood sampling.

Now a days, most of the patients as well as doctors prefer minimal invasive and medical treatment, because of their cost effectiveness, decrease the duration of hospitalization and reduce the occurrence of infection.

In United states the estimated infection rate associated with intravenous lines are 2.013 per 1,000 hospital discharges in 2000 and each year 1,00,000 people were died because of intravenous catheter related infection. In order to prevent such mortality we have to maintain a proper line patency and follow aseptic technique while handling the intravenous line.

Intravenous therapy is delivered annually to millions of clients in the homes, hospitals, and other health care facilities. Maintaining an intravenous line patency is important in delivering the medications and preventing the vascular complications.

Peripheral venous access is the typical intravenous line inserted in hand or forearm for patients admitted in hospitals. It measures ¾ to 1 inch long, inserted into a small peripheral vein and designed to be in the site temporarily. These catheters need to be changed every 72 to 96 hrs, or more often if they get dislodged from the vein, because the veins used are of smaller caliber and many medications can irritate when administered through a peripheral veins. There is a plastic dressing over the catheter, which has to be kept clean and dry at all times.

In current clinical practice, loss of intravenous catheter patency is the common existing problem. There were no universal guidelines for maintaining the patency of intravenous catheter. There are two important considerations when looking at the ways of regulating patency to ensure whether intravenous fluids are in flow continuously or intermittently and the line flushed with normal saline and heparinized saline.

However some blood still slowly penetrates through the lumen at the tip of these catheters. For these reasons, it is common in some hospitals to have a protocol to flush such peripheral lines every eight hours or so. Further more, the state of facilitated diffusion is heightened with these catheters and thrombus formation can readily occur, causing catheter occlusion and, at times, dangerous thrombus formation.

Traditionally, intravenous therapy has been given continuously. In recent years, for cost and clinical benefit, intermittent intravenous therapy is in use. In these cases, a catheter or other vascular access device remains in a patients body continuously, but is periodically detached from traditional intravenous tubing. An anticoagulant combined with a carrier solution is injected into the lumen of the catheter to maintain the patency of the catheter by preventing blood clots forming in the catheter, while it is disconnected from the intravenous tubing.

Among medical professionals nurses are the one who commonly administer intravenous fluids and medication. In many cases intravenous lines were not kept patent for longer period of time, especially in post operative critically ill patients, though maintaining the patency is extremely important for treatment. The potential risk include intravenous blockage, thrombophelebitis, extravasation, erethema and pain around the intravenous site. Nurses can reduce the likelihood of the complications by frequent assessment of the intravenous site by administering normal saline flush and heparinized flush intermittently.

Patency of peripheral intravenous catheters is checked by aspirating the intravenous line with normal saline flush or heparinized flush syringe and noting for

back flow of blood. A backflow of blood indicates the access in patency. Traditionally Isodium heparin derived from either porcine intestinal mucosa or bovine lung tissue in concentrated strength from 1 to 100 units per ml in a carrier solution of physiologic saline is administered to the catheter.

Heparin is the oldest and still widely used substance in medical history. Heparin is an anticoagulant and works by inhibiting reactions that lead to the clotting of blood and the formation of fibrin clots both in vitro and in vivo. These drugs tend to prevent new clots from forming or an existing clot from enlarging, but they do not dissolve a blood clot. Heparin may also be employed as an anticoagulant in blood transfusions, extracorporeal circulation, and dialysis procedures and in blood samples for laboratory purposes.

Clinically, heparin is effective for prevention and treatment of venous thrombosis and pulmonary embolism, for prevention of mural thrombosis after myocardial infarction, and for treatment of patients with unstable angina and myocardial infarction. It is also useful in the diagnosis and treatment of acute and chronic consumptive coagulopathies, disseminated intravascular coagulation, prevention of clotting in arterial and cardiac surgery prophylaxis and in the treatment of peripheral arterial embolism. Normal saline, a class of intravenous fluids called crystalloids is the most widely used infusion solution in the entire world due to its isotonic concentration. It is a sterile solution of 0.9% sodium chloride in water.

Need for the Study

Nosocomial infections associated with intra venous therapy are a major concern in today's medical care. The field of intravenous therapy has been subject to major change, with increasing number of nurses giving technical aspect of care.

Intravenous flushing with heparinised saline or normal saline are the most frequent modalities adopted in many institutions to maintain the patency of peripheral intravenous catheter. In many clinical setting, heparinized saline flush is used to maintain the patency of peripheral intravenous catheter even after knowing the greater complications; normal saline has been used in very few of the clinical areas.

Many of the research studies were done in this area to find out the efficiency of heparinised flush and normal saline flush in maintaining the patency of peripheral intravenous catheter. But most of the research findings conclude that there was no significant difference between the heparinised saline flush and normal saline for maintaining the patency of peripheral intravenous catheter.

The variations in clinical practice associated with maintaining the patency of peripheral intravenous catheter and the extent of such clinical practice falls within the limits. 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.

The use of heparin to flush central venous catheters has been an accepted practice for decades. Heparin is thought to prevent clots developing in the catheter

which would decrease or prevent flow through it and might be a potential locus for infection. Using central venous catheters carries risks and their insertion is usually undertaken for specific medical reasons. Preventing functional loss of the catheter is an essential component of nursing care for patients with these devices.

A vast majority of studies on venous catheters came to a neutral conclusion that normal saline is as effective as heparin and it does not have the severe complications associated with heparin. A cost analysis revealed that switching over to normal saline cuts the cost significantly. Therefore, by weighing the benefits against the risks of normal saline flush over heparinised flush. It could be concluded that normal saline is beneficial for maintaining patent intravenous line without complications.

Over the past 30 to 40 years, the nursing care and health care system have undergone significant changes in various aspects like diagnosis, treatment, psychological aspect care, holistic care, family cantered care etc. Particularly in the last few decades, research and the expansion of evidence based practice have played a significant role in delivering the nusing care. Nursing care will have a considerably greater impact in the field of medicine and patient care. The study will provide guidance for practicing the normal saline flush or heparinised flush in the clinical set up for nurses as a evidence based practice. Hence the investigator felt the need of the study.

Statement of the Problem

An Experimental Study to Assess the Effectiveness of Normal Saline Flush and Heparinized Flush in Maintaining the Patency of Intravenous Lines Among Patients Receiving Intravenous Medication at Selected Hospitals, Chennai.

Objectives of the Study

1. To assess the level of patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
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5. To findout the association between the selected clinical variables upon the intravenous line patency before and after normal saline flush experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.

Operational Definitions

Effectiveness

In this study, effectiveness refers to the desired changes in intravenous line patency as measured by observation checklist which includes maintaining intravenous

line patency, prevetion of erythema, tenderness, swelling, leakage, hardness, warmth, colour, pain, discharge, clot around the line, mobility of the limb and hyperthermia.

Normal saline flush

In this study, the normal saline flush indicates injecting 2 ml of 0.9% sodium chloride flush into the intravenous line 2-3 times/day for two days.

Heparinized flush

In this study, heparinized flush also called as heplock indicates injecting 2ml into the intravenous line 2-3 times/day for two days to maintain patency of intravenous line.

Patency

In this study, patency of intravenous line means unobstructed or open passage way of the intravenous line as measured by observation check list.

Patient

In this study, it refers to the patients who are receiving intravenous medication irrespective of their diagnosis.

Assumptions

- Intravenous medication when given over a period of time can loose line patency.
- The prolonged bedridden clients may require long term intravenous fluids, medications. Hence there are chances to get inflammation due to inadequate line patency.
- Intravenous line may be have chance to block at any time if we don't maintain it's patency.
- Prolonged intravenous infusion may cause infection, inflammation and thrombophlebitis.

Null Hypotheses

H_{01} There will be no significant difference between intravenous line patency before and after administration of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving IV medication.

H_{02} There will be no significant association between selected demographical variables and intravenous line patency before and after administration of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving IV medication.

H_{03} There will not be any significant association between selected clinical variables and intravenous line patency before and after administration of normal saline in experimental group I and heparinized flush in experimental group II among patients receiving IV medication.

Delimitations

- The study was limited to patients receiving IV medications who are admitted in selected hospitals, Chennai.
- The study was limited to adult patients.
- The study period was limited to 4 weeks duration.

Conceptual Framework of the Study

The conceptual framework for research study presents reasoning on which the purposes of the proposed study are based. The framework presence the perspective from which the investigator views the problem. The conceptual framework deals with inter-related concepts that are assessable together in some rational schemes by virtue of their relevance to a common theme (Polit & Beck, 2004).

In the field of medical surgical nursing, a number of proponents have put forward various theories. Conceptual framework of present study is based on King's Goal Attainment Theory. According to Imogene King, nursing is defined as the process of action, reaction, interaction, whereby nurses and clients share the information about their perception. Through perception and communication they identified the problem through which they set goals and take necessary action.

King's goal attainment theory is based on the concepts of personal, interpersonal and social systems. The conceptualization of nursing practice according to this theory consists of six steps, that include,

1. Perception
2. Judgement
3. Action
4. Reaction
5. Interaction
6. Transaction
7. Perception.

Perception

A person imports energy from the environment and transforms, processes and stores it. The study assumes that there is an interpersonal relationship between the nurse investigator and participants. The nurse investigator perceives that there is a need for the development of an alternative nursing care - normal saline flush in experimental group I and heparinized flush in experimental group II to improve the intravenous line patency and assessed using observation checklist.

Judgement

Analyze the areas of action to be carried out. In this study the nurse investigator judges whether the normal saline flush and heparinized flush improve the patency of intravenous catheter among patients receiving intravenous medication. Thus the researcher takes decision to administer the normal saline flush for experimental group I and heparinized flush for experimental group II.

Action

Individuals export the perceived energy, as demonstrated by observable behaviours by taking physical activity. Nurse investigator takes action that actual administration of normal saline flush and heparinized flush among patients who receiving intravenous medication. The patients in the experimental group I and in experimental group II were highly satisfied with the normal saline flush and heparinized flush therapy and no complications developed.

Reaction

Reaction means developing action and acting on perceived choices for goal attainment. Here the reaction means decrease in blockage of intravenous line. The normal saline flush therapy through the intravenous line in experimental group I patients were highly satisfied and the heparinized flush therapy through the intravenous line in experimental group II patients were highly satisfied. The nurse investigator makes the arrangement for disseminating the information regarding normal saline flush and heparinized flush therapy and in turn the patients were benefitted.

Interaction

Refers to verbal and nonverbal behaviour between an individual and the environment or among two or more individuals. It involves goal directed perception and communication. Action leads to interaction where the nurse investigator executes her administration of normal saline flush and heparinized flush upon the level of

intravenous line patency associated with patients receiving intravenous medication and thereby intravenous catheter line patency is improved.

Transaction

Imogene King says that the transaction is two individuals mutually identify goals and the means to achieve them. They reach an agreement about how to attain these goals and then set about to realise them. In this study, patients from both the experimental group shows highly satisfactory in improvement in the level of intravenous line patency through normal saline flush and heparinized flush and developed no complications.

Feedback

Outcome may either be satisfactory or unsatisfactory. Satisfactory shows the effectiveness of normal saline and heparinized flush and improvement in the level of intravenous line patency or unsatisfactory the activity is planned again. In this study investigator appraise the level of satisfaction about normal saline flush and heparinized flush through rating scale, if the therapy is satisfactory it can be disseminated and implemented in a clinical settings. If unsatisfactory the activity is planned again or other best method is adopted.

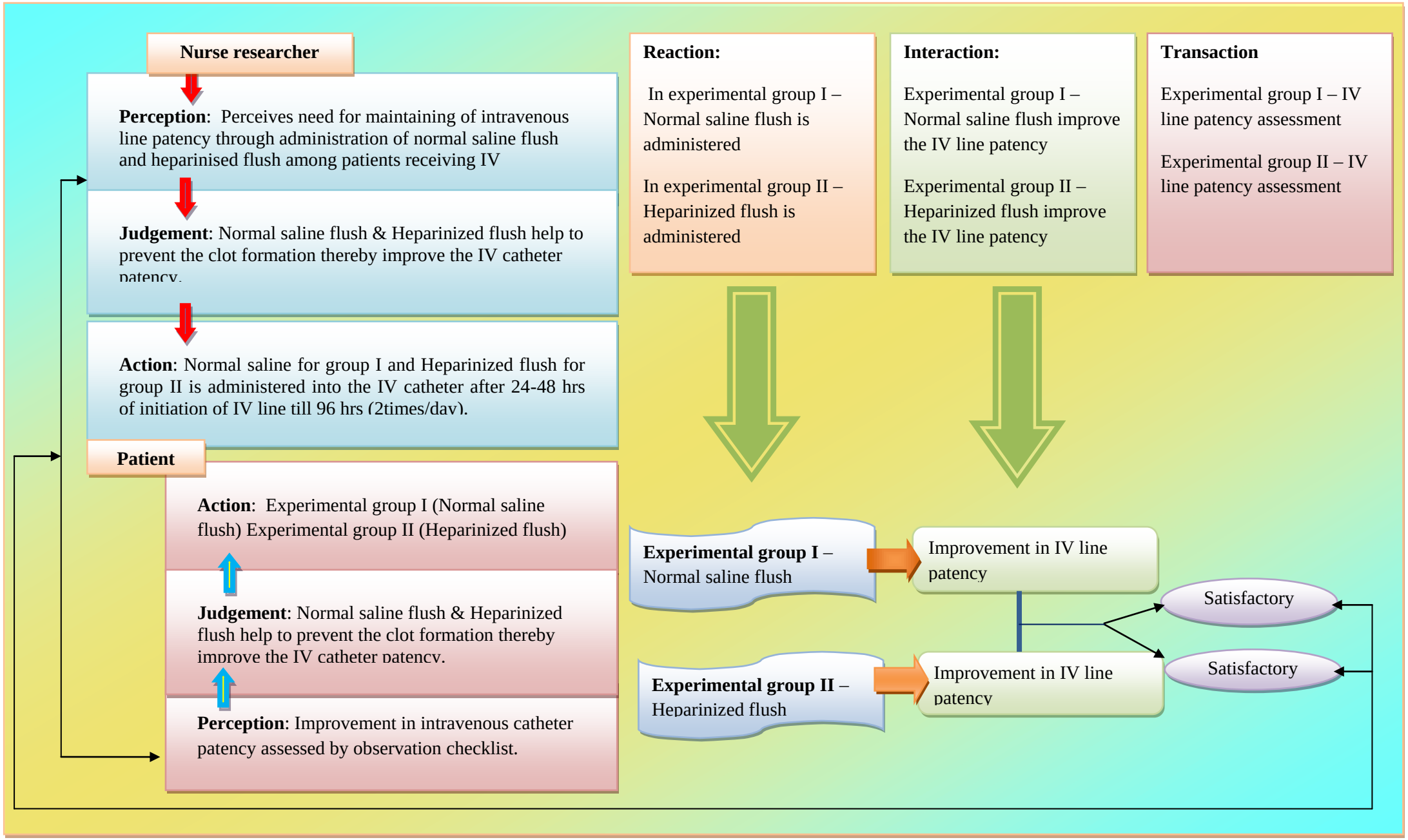

Fig 1: **Conceptual Framework based on Kings Goal Attainment Theory**

Projected Outcome

There will be improvement in patency of intravenous line while using the normal saline flush and heparinized flush.

Summary

This chapter has dealt with the background of the study, need of the study, statement of the problem, objectives, operational definition, hypothesis, assumption, delimitation and conceptual framework.

Organization of the Report

Further aspects of the study are presented in the following five chapters.

CHAPTER – II : Review of literature

CHAPTER – III : Research methodology includes research approach, research design, setting, population, sample and sampling techniques, tool description, content validity and reliability of tools, pilot study, data collection procedure and plan for data analysis.

CHAPTER – IV : Analysis and interpretation of data

CHAPTER – V : Discussion

CHAPTER – VI : Summary, conclusion, implications and recommendations.

CHAPTER – II

REVIEW OF LITERATURE

A review literature involves the systematic identification, location, scrutiny and summary of written materials that contains information on the research problem. (Polit and Hungler, 2007).

The task of reviewing literature involves the identification, selection, critical analysis and reporting of exciting information on the topic of interest. A review acquaints the researcher with what has been done in the field and it minimizes possibilities of un-intentional duplication. It justifies the need for replication, provides the basis of future investigation and help to relate the findings of one study to another.

This chapter deals with the review of published and unpublished research studies and from related materials for present study. The review helped the researcher in building the foundation of studies.

The review of literature is presented under the following headings.

I. Literature related to normal saline flush.
II. Literature related to heparinized flush.
III. Literature related to normal saline flush vs heparinized flush
IV. Literature related to complications of IV cannula.

Literature Related to Normal Saline Flush

An experimental study to evaluate the normal saline flush for intravenous line patency in children were conducted by Hanrahan, Kleiber and Fagan (1994). From

Midwest, 126 children over 28 days of age, with peripherally placed intravenous line. In group I 68 children were randomly selected to receive saline flush and in Group II 58 children receiving the saline flush after the change in practice was made. There was no significant difference between groups for either of two measures of IV duration. The result of this clinical evaluation support previous findings that saline is efficacious for maintaining the patency of peripheral intravenous line in children over 28 days of age.

Boyle and Kuntz, (1994**)** conducted a study on effectiveness of saline flush in intravenous line patency. The study population were patients who required intravenous access, but did not require fluid resuscitation. A total of 58 males and 42 female patients were enrolled. Initially the reservoir was flushed with 1 ml 0.9% normal saline solution and the flush was repeated only if medications subsequently were administered through intravenous line for each patient. The results showed that the intermittent normal saline is cost effective than traditional continuous intravenous infusion.

A prospective, non blind study with a saline lock intermittent device in the pre hospital environment was conducted by Carducci and Stein, (1994) to maintain the intravenous line patency. Study participants were those who received IV medications and the device was attached to the hub of the cannula and flushed with 2ml of 0.9% saline from prefilled carpujects. The results shown that the saline lock, intermittent infusion device is an effective method of maintaining pre hospital IV access when compared to traditional IV fluid bags, prefilled syringes. It is easier and less time consuming to initiate, and facilitated patient transportation. A cost savings was realized when saline lock usage was compared to traditional IV fluid bag infusion.

Literature Related to Heparinized Flush

In the year of 2005, a randomized trial was conducted by Shap and Shav. in continuous heparin infusion to prevent thrombosis and catheter occlusion in neonates with peripherally placed percutaneous central venous catheters. They were taken 66 neonates for the study. Two randomized trials on the use of heparin for peripherally placed PCVC were identified. In one trial the result was no statistically differences in the incidence of thrombosis, occlusion, catheter related sepsis. another trial was excluded due to several methodological issues.

In Canada, a randomized trial was conducted by Shah, Ng and Sinha, (2002) as the use of heparin for prolonging peripheral intravenous catheter in neonates. Heparin was administered either as a flush solution. Five studies reported data on the duration of use of the first catheter. Two of these studies found no statistically significant effect of heparin. Two of these studies found no statistically significant increase and one study showed a statistically significant decrease in the duration of peripheral intravenous catheter use in the heparin group. From a limited number of studies, there were no significant differences between the heparin and the no treatement groups in the risks of infiltration, phelabitis and intracranial haemorrhage.

Randolph, et al. (1998) conducted a study to analyze the benefit of heparin in peripheral venous and arterial catheters. Critical appraisal and meta analysis of 26 randomized controlled trials that evaluated infusion of heparin intermittently or continuously. The peripheral venous catheters locked between use flushing with 10U/ml of heparin instead of normal saline did not reduce the incidence of catheter clotting and

phelebitis or improve catheter patency. When heparin was given as a continuous infusion at 1 U/ml the risk of phelebitis decreased.

A prospective, nonrandomized study was conducted among 28 patients to assess the heparin flush over maintaining the intravenous line patency among patients with Groshong catheter. A historical control group of 28 patients with Groshong catheters that had been flushed weekly with 5ml of normal saline compared to data from 23 patients with Groshong catheters flushed weekly with 2.5ml heparinized saline (100U/ml). All 28 catheters in the saline flush group and 8 catheters in the heparin flush group were examined immediately after removal for adherent or nonadherent clot. The addition of a heparinized saline weekly flush to maintain Groshong catheters decreased the presence of intraluminal adherent clots and improved the catheter function Mayo, et al. (1996).

In Missourie a study was conducted by Treas and Bridges, (1992) on the efficacy of continous, low dose heparin in prolonging peripheral venous catheter patency in neonates. Total participants were 113 neonates requiring intravenous therapy. The heparin group received ½ unit of heparin per milliliter of continuous intravenous intravenous infusate or intermittent heparin flush. The mean duration of catheter patency was 62.75 hours in the heparin group and 27.3 hours in the no heparin group. According to this study the low dose heparin infusion in peripheral venous catheters in neonates increased the duration of intravenous catheter patency.

Literature Related to Normal Saline Flush vs Heparinized Flush

In the year 2011, Cool, et al. conducted a study on effectiveness of normal saline flush and heparinized flush in maintaining the intravenous line patency among infants.

Out of 70 infants, 34 were administered with heparinized flush and 36 were administered with normal saline flush for and the outcome was evaluated. The findings of this project support that the current literature base suggesting that the use of heparin is unnecessary exposure of neonates to heparin increases the risk of patient safety and should therefore be avoided.

Baskaran and Judie, (2011) conducted a study to maintain the patency of peripheral IV catheter for the hospitalized clients. The purposes of this study was to assess the effectiveness of normal saline flush for maintaining the patency of peripheral IV catheter among adult patients. Pre test was conducted on the end of the 2nd day followed by intervention which included normal saline & heparinized saline for 2 days. Post test was assessed at the end of the 4th day. The result showed that both normal saline and heparinized saline had same effect on maintaining intravenous line patency.

A study to assess the efficacy of normal saline solution verses heparin solution for maintaining patency of peripheral intravenous catheters could be done in the childrens hospital at Denver. White, et al. (2011) taken 150 emergency department patients with mean age of 5.5 years requiring IV heparin lock placement were included in the sample. There were 77 patients randomised to the control group to receive 3 ml of 10 units heparin/ml intravenous flush, or to the treatment group of 73 patients were receive 3 ml of normal saline solution only for intravenous flush. The result suggested that normal saline solution ($p<0.01$) may be an effective alternative to heparin flush in maintenance of patency in peripheral intermittent IV access devices in the paediatric emergency department.

A double blind randomized clinical trial to analyze the effectiveness of heparinized solution Vs normal saline solution for the maintenance of arterial catheters was conducted by Del cotillo, et al. (2008) inorder to detect the changes in the activated thromboplastin time and platelet count. One hundred and thirty three patients were included in the study. Out of that 65 patients received 1 IU/ ml heparinized solution and 68 patients received 2ml of saline solution. After the use of heparinized solution for arterial catheter maintenance, it did not increases the duration of the catheters, nor did it improve their patency.

An evidence-based study conducted by Kathryn, et al. (2006) to examine the effectiveness of 2 solutions, heparin and normal saline, when used to flush capped pediatric peripheral intravenous catheters. Study participants included 62 children out of which 32 for heparin and 30 for normal saline. There was no significant statistical difference found in IV catheter patency between children in the normal saline group and children in the heparin group. Intravenous locks were flushed after each medication administration, or at least every 24 hours, with the assigned blinded flush solution. Data indicate there were no statistically significant differences in intravenous lock patency nor in phlebitis between heparin or normal saline flushes.

Hamilton, (2001), conducted a study on heparin sodium verses 0.9% normal saline for maintaining patency of indwelling intermittent infusion devices. Heparin sodium was compared with 0.9% normal saline in maintaining patency of indwelling intermittent infusion. Adult patients who required intermittent intravenous devices were randomly assigned to receive 1 ml of heparin sodium, 100 units/ml flush solution or

0.9% normal saline. The results revealed that there was no significant difference in the duration of catheter patency or incidence of phlebitis was observed between the groups.

Literature Related to Complications of Intravenous Cannula.

In a study conducted by Guilbert and Elkori, (2008) on arterial trauma during central venous catheter insertion. During central venous placement, prevention of arterial puncture and cannulation is essential to minimize serious sequelae. If arterial trauma with a large-caliber catheter occurs, prompt surgical or endovascular treatment seems to be the safest approach. The pull or pressure technique is associated with a significant risk of hematoma, airway obstruction, stroke, and false aneurysm. Endovascular treatment appears to be safe for the management of arterial injuries that are difficult to expose surgically, such as those below or behind the clavicle.

Myrianthefs, et al. (2005) conducted a study to evaluate the efficiency of three differing methods for the maintenance of catheter patency and thrombophelebitis prevention. A total of 300 post operative patients undergoing elective orthopaedic surgery were prospectively studied. Patients were divided into 3 groups. Control group not flushed. Saline group, the catheter flushed with 3ml normal saline after each catheter use. Heparin group, the catheters flushed with 3ml of heplock after each catheter use. The normal saline group having high complication than heparinized flush group in case of post operative patients.

A study to evaluate the thrombolytic complications of central venous catheters in cancer patients was conducted by Kute, (2004). Despite routine flushing with heparin or saline, 41% of central venous catheters resulted in thrombosis of the blood vessel,

and this markedly increases the risk of infection. Aside from reducing the function of the catheter, these central venous catheter related thrombi can cause postphlebitic syndrome in 15%-30% of cases and pulmonary embolism in 11%. Risk factors for central venous catheter thrombosis include the type of malignancy, type of chemotherapy, type of CVC, and locations of insertion site and catheter tip, but not inherited thrombophilic risk factors.

A controlled trial was conducted by a Demir, et al. (2003**)**, the results indicate that quality of care can be enhanced by using normal saline as the flush solution as it eliminates the severe complications associated with heparin such as heparin induced thrombocytopenia (HIT), thrombus and hemorrhage. A case report states that the condition of a 3-year old boy with Haemophilia A, who developed systemic anticoagulation as a result of regular rinsing of central venous catheter with heparin.

Summary

This chapter has dealt with review of literature related to the problem stated. It has helped the researcher to understand the impact of the problem under study. It has also enabled the investigator to design the study, develop the tool, plan for data collection procedure and to analyze the data.

CHAPTER - III

RESEARCH METHODOLOGY

The methodology of the research study is defined as the way the information from the participants is gathered in order to answer the research questions or to analyze the research problem.It enables the researcher to project a blue print for the research undertaken. The research methodology involves a systematic procedure by which the researcher had a start from the initial identification of the problem to its final conclusion.

This chapter deals with a brief description of different steps undertaken by the researcher for the study. It involves research approach, research design, setting, population, sample and sampling technique, sampling criteria, selection and development of the instruments, validity and reliability of the instruments, pilot study, data collection procedure and plan for data analysis.

The present study was conducted to assess the patency of intravenous line among patients receiving IV medications in selected hospitals, Chennai.

Research Approach

Research approach is the most significant part of any research. The appropriate choice of the research approach depends on the purpose of the research study which is undertaken.

According to Polit and Beck. (2008), an experimental research is an extremely applied form of research and involves finding out how well a programme, product,

practice or policy is working. Its goal is to assess or evaluate the success of the program. An experimental research is generally applied where the primary objective is to determine the extent to which a given measures meets the desired results.

To accomplish the objective of this study, an experimental approach design was considered most appropriate to determine the effectiveness of normal saline flush and heparinized flush upon patency of intravenous line among patients receiving intravenous medications in selected hospital.

Research Design

The research design is the plan, structure and strategy of investigation of answering the research question. It is the overall plan or blue print to the researcher to select and to carry out the study.

A true experimental research design was adopted for conducting this study.

Pre test post test design

R O1 X1 O2

R O1 X2 O2

O1 – Pre test of experimental group

O2 – Post test of experimental group

X1 – Normal saline flush

X2 – Heparinized flush

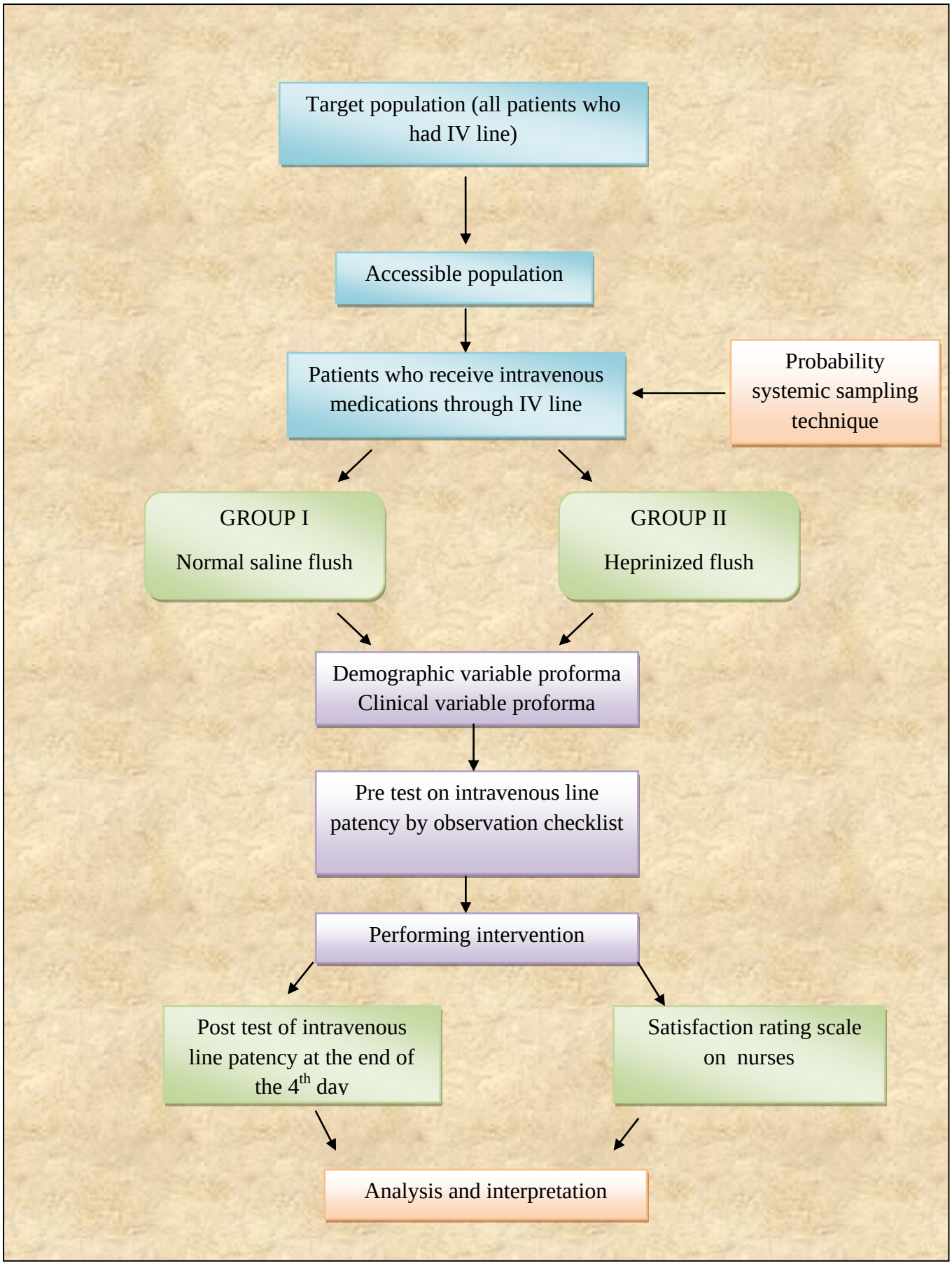

Fig.2 Schematic Representation of the Research Design.

Variables

Independent variable

The variable that is believed to cause or influence the dependent variable is the independent variable (Polit and Beck, 2008).

In this study normal saline flush in experimental group I and heparinized flush in experimental group II were considered as independent variables.

Dependent variable

The variable hypothesized to depend on or be caused by another variable is the dependent variable (Polit and Beck, 2008).

In this study the intravenous line patency was considered as the dependent variable.

Research Settings

Settings are the most specific places where data collection occur (Polit and Beck 2008). The present study will be conducted at Apollo Speciality hospitals, Chennai. Apollo specialty hospital is specialized for cancer and neurological disorders located about 8kms from Chennai central station and about 10kms from the main bus station. It's located about 15kms from Apollo College of nursing. It's a 350 bedded hospital with all specialties having the nurses strength about 400. This hospital has the cyber knife unit, BMT unit for cancer treatment.

Population

Population is the entire aggregation of cases which meet designated set of criteria. (Polit and Beck 2008).

The target population is the group of population that the researcher aims to study and to whom the study findings will be generalized. In this study, the target population comprises of all patients receiving intravenous medication who satisfy the inclusion criteria.

The accessible population is the list of population that the researcher finds in the study area. The accessible population in this study were patients receiving intravenous medication through intravenous line who satisfy the inclusion criteria at selected hospitals Chennai.

Sample

Sample consists of the subset of units that comprises the population (Polit and Beck, 2008). A sample consists of patients receiving IV medications who meets the inclusion criteria at selected hospitals Chennai, was selected for the study.

Sample Size

In this study the sample size comprises of 30 patients on intravenous therapy for experimental group I and 30 for experimental group II who satisfy the inclusion criteria.

Sampling Technique

Sampling is the process of selecting a portion of population to represent the entire population (Polit & Beck 2008). Probability systemic sampling technique was used in this study.

Sampling Criteria

Inclusion criteria

The study includes

- Initiation of intravenous line within 2 days.
- Patients who require intravenous line for at least 4 days.
- Patients who are receiving IV medication.
- Age between 20 – 60 years.
- Those who are willing to participate in study
- Available at the time of data collection

Exclusion criteria

The study excludes

- Receiving IV anticoagulant therapy.
- Patients who are sensitive to heparin.
- Patients with bleeding disorders.
- Not willing to participate in the study.

Selection and Development of Study Instruments

As the study was aimed at evaluating the effectiveness of normal saline flush and hearinized flush in maintaining the intravenous line patency, the data collection instruments were developed and chosen through an extensive review of literature in consultation with experts and with the opinion of faculty members. The instruments used in the study were Demographic variable Proforma, clinical variable proforma,

observation checklist for assessing the intravenous line patency, Rating scale on the level of satisfaction of group of nurses.

Demographic variables proforma of patients receiving intravenous medication

The demographic variable proforma consisted of age, gender, residence, marital status, educational status, income, occupation, previous history of hospitalization and duration of hospitalization.

Clinical variable proforma of patients receiving intravenous medication

The clinical variable proforma consisted of diagnosis, reason for admission, size of cannula, type of IV fluid, rate of flow, total volume of fluid, duration of therapy, type of treatment.

Observation checklist

It is based on intravenous line patency, prevention of erythema, tenderness, swelling, leakage, warmth, colour, pain, limb movement, back flow, discharge, line disconnection and hypothermia.

Score interpretation

Upto 15 : No blockage

16– 30 : Average blockage

31 – 45 : Partial blockage

Above 45 : Complete blockage

Satisfaction survey of nurses

This was developed by the investigator to assess the satisfaction on nurses about normal saline and heparinized saline flush in maintaining the intravenous line patency. This was a 4 point scale ranging from 1- 4

Score interpretation

Highly satisfied	-	> 75%
Moderately satisfied	-	50% – 75%
Just satisfied	-	25% - 50%
Dissatisfied	-	< 25%

Psychometric Properties of the Instruments

Validity

Content validity is the degree to which an instrument measures what it is supposed to measure. Content validity is the sampling adequacy of the content being measured. (Polit and Beck, 2008).

The content validity of the tool was obtained by getting opinion from experts in the field of Medicine and Nursing. The validation has suggested some specific modifications in the observation checklist and rating scale. The modifications and suggestions of experts were incorporated in the final preparation of the tool.

Reliability

Reliability is the degree of consistency with which an instrument measures the attribute it intended to measure (Polit & Beck, 2008). The reliability of the tools was determined by using split half method and inter rater technique. Karl Pearson's 'r' was computed for finding out the reliability.

Observation check list for patients	–	Inter rater technique (r = 0.77)
Rating scale for nurses satisfaction	–	Split half method (r = 0.80)

Pilot Study

According to Polit and Beck. (2009), a pilot study is a miniature or some part of the actual study, in which the instruments are administered to the subjects drawn from the population. It is a small scale version or trial run, done in preparation for the major study. The purpose is to find out the feasibility and practicability of the study design.

The pilot study was conducted in Apollo speciality hospital at Chennai from 11.06.2012 to 23.06.12. Twelve patients with intravenous line selected as study participants. Among them six patients received normal saline flush in experimental group I and six of them received heparinized flush in experimental group II. Pre observation of the intravenous line patency was observed by using observation check list. post observation was done at the end of the 4^{th} day.

Protection of Human Rights

- The study was conducted after obtaining clearance from Ethical committee, Apollo hospitals, Chennai.
- Consent was obtained from all the participants/bystander before the data collection.
- Confidentiality was maintained throughout the study

Data Collection Procedure

Data collection is the precise, systematic gathering of information relevant to the research purpose. The researcher presented the proposal to the Ethical committee of Apollo Hospitals and got ethical clearance to precede the study. The investigator collected the data from Apollo Speciality Hospital after obtaining proper administrative permission from concerned authorities. The observation time schedule was from 7a.m-3p.m and the data collection period was from June 18th to July 23rdth 2012.

A group of 60 who received intravenous medication were selected by probability sampling method and consent was obtained from the patients. Among the 60 patients, 30 patients belong to experimental group I (Normal saline flush) and 30 patients belong to experimental group II (heparinized flush). The baseline data are collected through the demographic variable and clinical variable proforma.

Pretest was conducted for both groups with the help of observation check list. The pre test was conducted at the end of 2nd day after insertion of intravenous line. Then followed by normal saline flush (2ml) for experimental group I and heparinized flush

(2ml) for experimental group II were given at 2 times/day that is 8 hours interval for 2 days. Then the post was conducted at the end of 4th day with the help of observation checklist. The findings should be marked in coding sheet for data analysis.

Problems Faced during Data Collection

The problems faced during the data collection were,

- some of the patients not willing to accept heparinized flush
- Few patients were not interested to participate in the study.
- Follow up is difficult in case of discharge.

Plan for Data Analysis

Data analysis is the systematic organization, synthesis of research data and testing of null hypothesis by using the obtained data (Polit and Beck, 2004). Analysis and interpretation of the data were carried out by using descriptive and inferential statistics. Descriptive statistics such as mean, frequency and percentage was used to describe the demographic variables, clinical variables and effectiveness of normal saline flush and heparinized flush in maintenance of intravenous line patency among experimental group I and experimental group II of patients. Inferential statistics such as paired‘t’ test, and independent‘t’ test was used to assess the effectiveness of normal saline flush and heparinized saline flush by comparing the pre test and post test mean score of stress. Chi-square test was used to find out the association between selected demographic variables, clinical variable and effectiveness of normal saline flush and heparinized flush in pre test and post test of experimental group I and experimental group II of patients.

Summary

This chapter dealt with the selection of research approach, research design, setting, population, sample, sampling technique, sampling criteria, selection and development of study instruments, validity, reliability of the study, pilot study, data collection procedure, problem faced during data collection and plan for data analysis

CHAPTER-1V

ANALYSIS AND INTERPRETATION

Data analysis is conducted to reduce, organize and give meaning to the data. The results obtained from data analyses require interpretation to be meaningful. Interpretation of data involves examining the results from data analysis forming conclusions, considering the implications for nursing, exploring the significance of the findings and suggesting further studies (Polit & Beck, 2010).

This chapter deals with analysis and interpretation of data including both descriptive and inferential statistics. The data were analysed according to the objectives and hypothesis of the study. Analysis of the data was compiled after all the data was transferred to the master coding sheet. The data were analyzed, tabulated and interpreted using appropriate descriptive and inferential statistics.

Organisation of the Findings

The findings of the study was organised and presented under the following headings.

- Frequency and percentage distribution of selected demographic variables in the experimental group I and experimental group II of patients receiving intravenous medication.
- Frequency and percentage distribution of clinical variable in the experimental group I and experimental groupII of patients receiving intravenous medication.

- Frequency and percentage distribution of intravenous line patency before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medication.
- Comparison of mean and standard deviation of intravenous line patency before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medication.
- Association between the selected demographic variables and the intravenous line patency before and after normal saline flush in the experimental group I and heparinised flush in experimental group II of patients receiving intravenous medication.
- Association between the selected clinical variable and the intravenous line patency before and after normal saline flush in the experimental group I and heparinised flush in the experimental group II.

Table .1

Frequency and Percentage Distribution of Demographic Variables in the Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication.

Demographic Variables	Experimental Group I (n=30)		Experimental Group II (n=30)	
	n	p	n	p
Residence				
Urban	21	70	24	80
Sub urban	0	0	0	0
Rural	9	30	6	20
Education				
Illiterate	3	10	1	33.3
Primary	6	20	4	13.3
Secondary	7	23.3	2	6.7
Higher secondary	6	20	7	23.3
Graduates	8	26.7	16	53.3
Income per month(Rs)				
< 5000	5	16.7	2	6.7
5000-15,000	19	63.3	18	60
>15,000	6	20	10	33.3

Occupation				
Professional	8	26.7	12	40
Non professional	22	73.3	18	60
Marital status				
Married	26	86.7	21	70
Unmarried	2	6.6	8	26.7
Divorced	0	0	0	0
Widow	2	6.6	1	3.3
Previous history of hospitalization				
Yes	10	33.3	8	26.7
No	20	66.7	22	73.3

It can be noted in table 1 that, most of the patients were living in urban region (70%, 80%), significant percentage of the patients were graduates (26.7%, 53.3%), most of them were non professional (73.3%, 60%), got married (86.7%, 70%), most of the patients were not having the history of previous hospitalization (66.7%, 73.3%) in the experimental group I and experimental group II respectively.

Fig.3 infers that a significant percentage of the patients were in the age group of 41-50 years (40%, 36.6%) in the experimental group I and experimental group II respectively.

Fig.4 infers that most of the patients who receiving intravenous medications were males (70%, 73.3%) in the experimental group I and experimental group II respectively.

Fig.5 infers that significant percentage of the patients were stayed in the hospital at the duration of 4-8 days (43.3%, 46.7%) in the experimental group I and experimental group II respectively.

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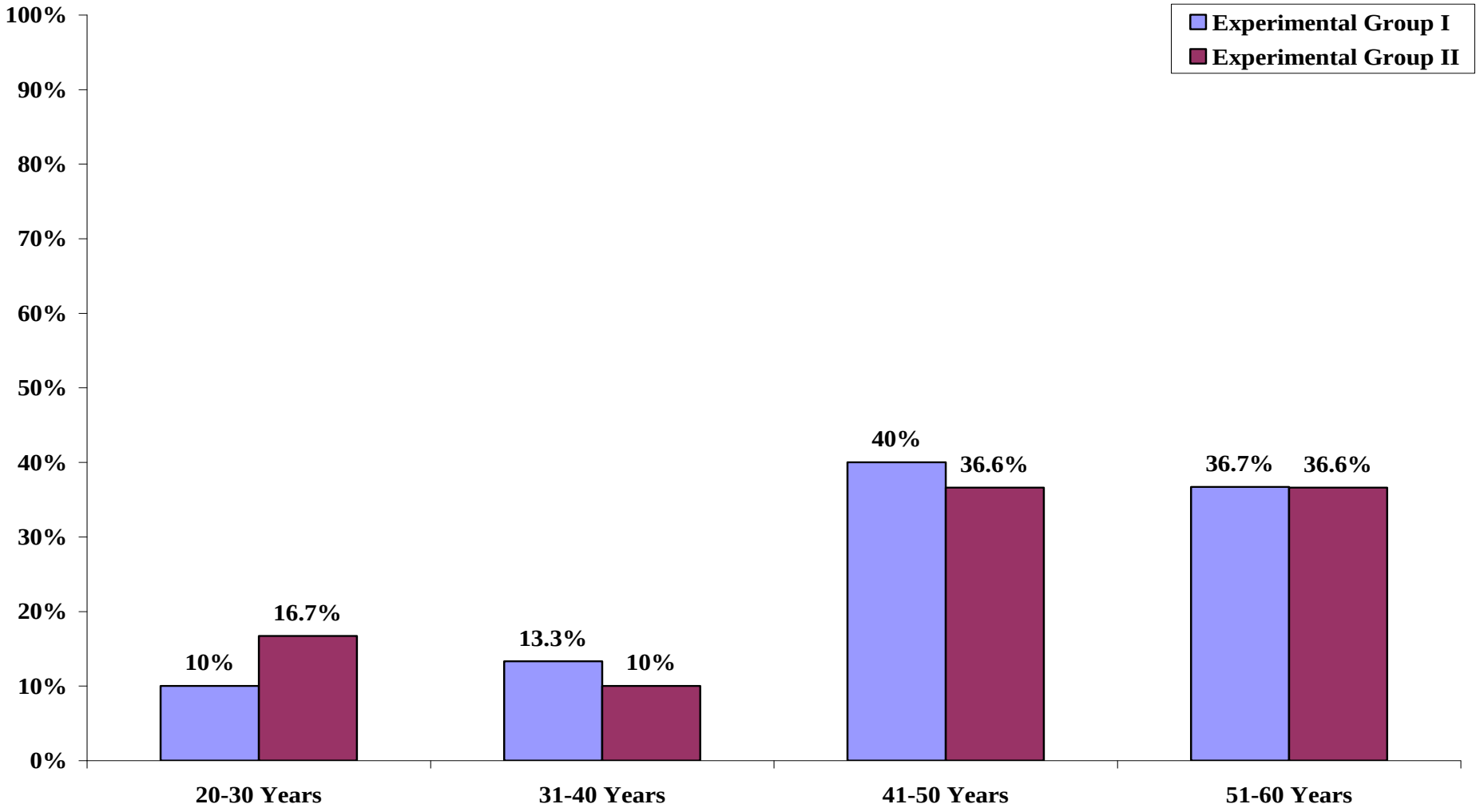

Fig. 3 Percentage Distribution of Age for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

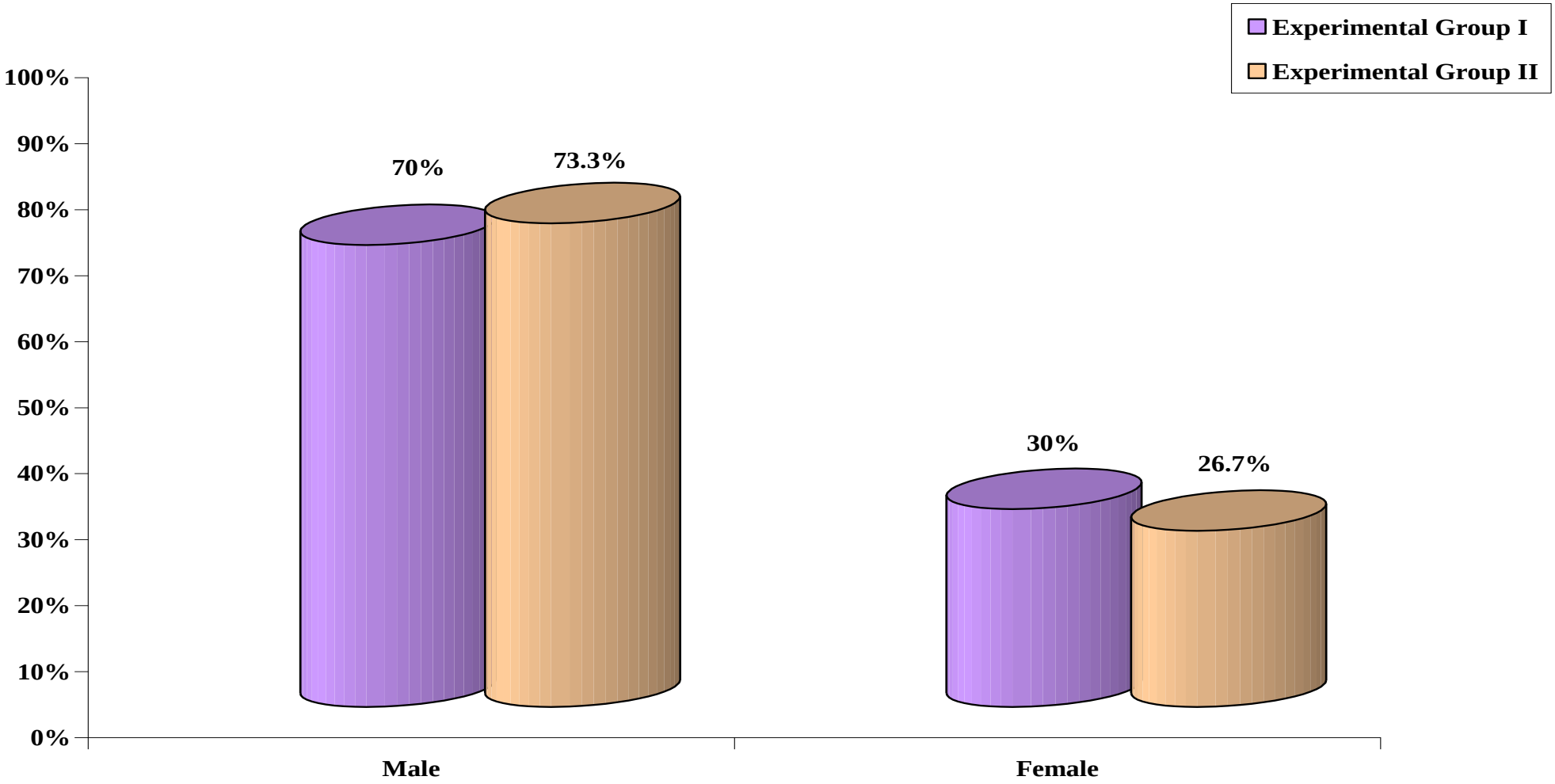

Fig. 4 Percentage Distribution of Gender for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

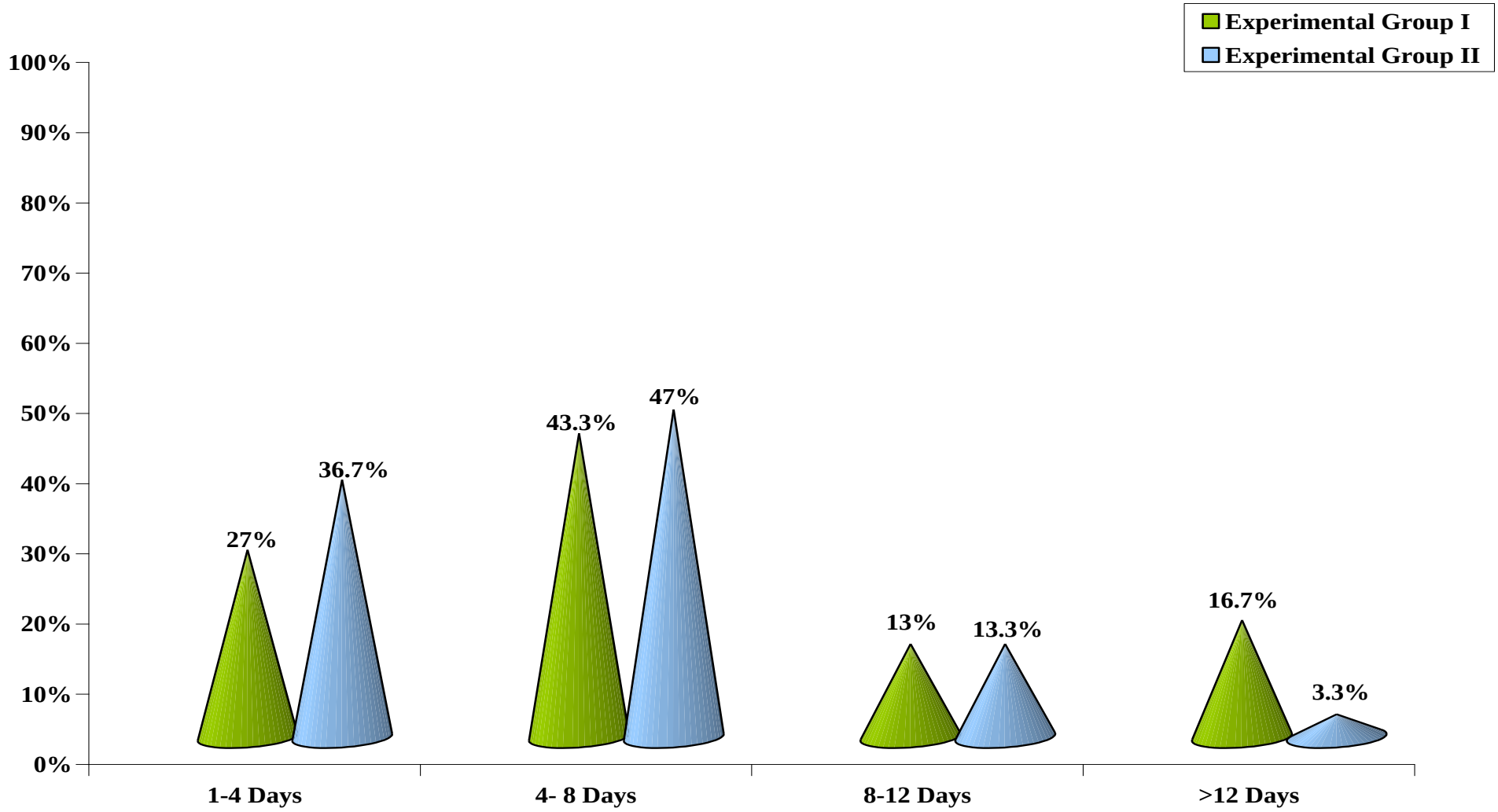

Fig. 5 Percentage Distribution of Duration of Hospitalization for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

Table.2

Frequency and Percentage Distribution of Clinical Variables in the Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication.

Clinical Variables	Experimental Group I (n=30)		Experimental Group II (n=30)	
	n	p	n	p
Diagnosis				
Neurological disorders	10	33.3	7	23.3
Cardiovascular disorders	2	6.7	0	0
Respiratory disorders	5	16.7	8	26.7
others	13	43.3	15	50
Reason for admission				
Medical	22	73.3	22	73.3
surgical	8	26.7	8	26.7
Others	0	0	0	0
Rate of fluid flow				
Below 40 drops/min	12	40	15	50
Between 40-60 drops/min	14	46.7	13	43.3
Above 60 drops/min	4	13.3	2	6.7

Duration of therapy				
24-48 hours	0	0	0	0
More than 48 hours	30	100	30	100

It can be inferred from table 2 that, significant percentage of the patients got admitted with various diagnosis (43.3%, 50%), received medical treatment (73.3%, 73.3%), infused at rate of 40 to 60 drops/min (46.7%, 43.3%), and all of them were received intravenous therapy more than 48 hours (100%, 100%) in the experimental group I and experimental group II respectively.

Fig.6 infers that significant percentage of the patients had median cephalic venous intravenous line (40%, 36.7%) in the experimental group I and experimental group II respectively.

Fig.7 infers that significant percentage of the patients who receiving intravenous medication had 20 G cannula (43.3%, 50%) in the experimental group I and experimental group II respectively.

Fig.8 infers that most of the patients received drugs through intravenous line (63.3%, 63.3%) in the experimental group I and experimental group II respectively.

Fig.9 infers that the significant percentage of the patients received more than 2000ml of fluid (40%, 46.7%) in the experimental group I and experimental group II respectively.

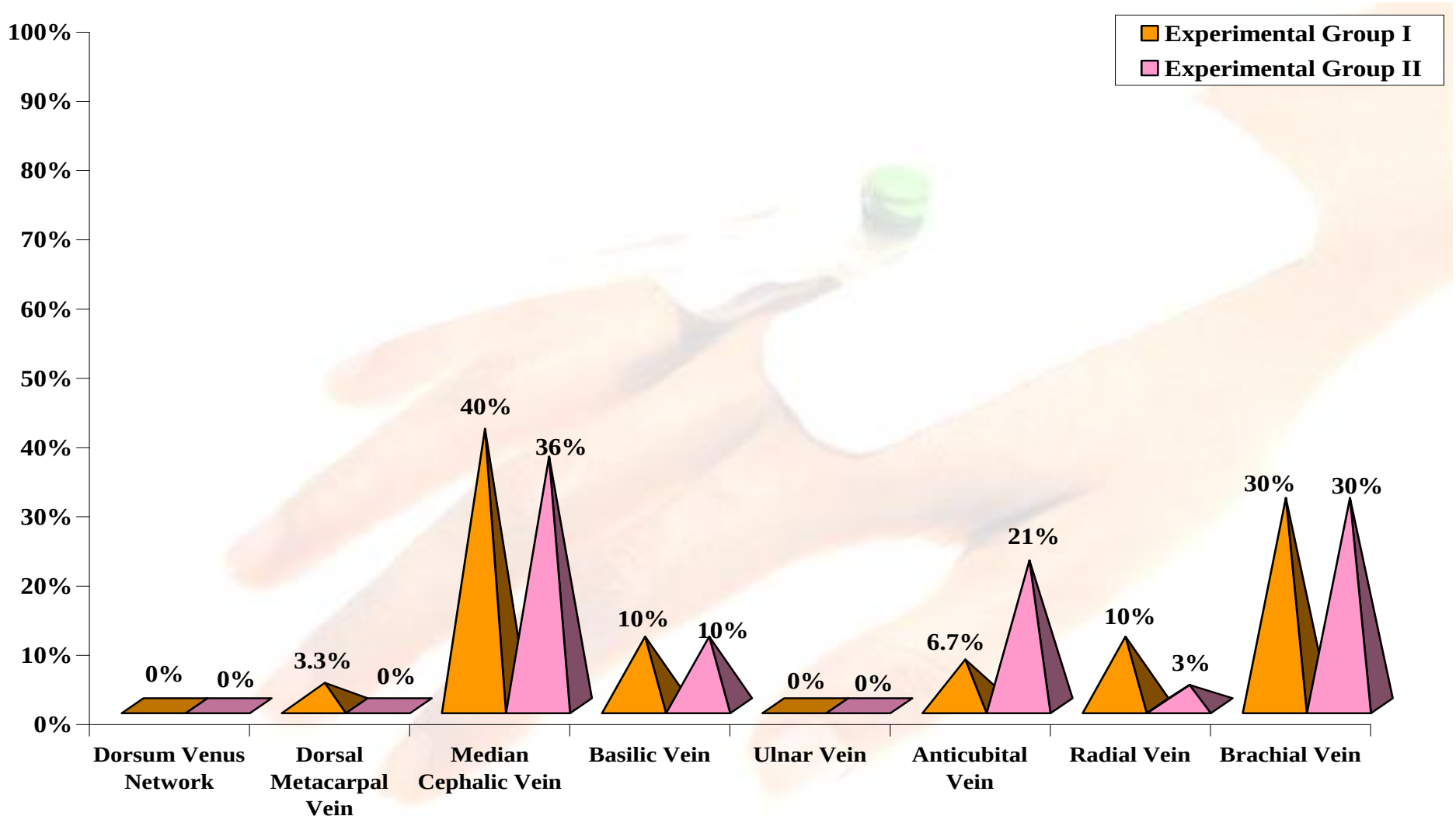

Fig. 6 Percentage Distribution of Site of Intravenous Catheter for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

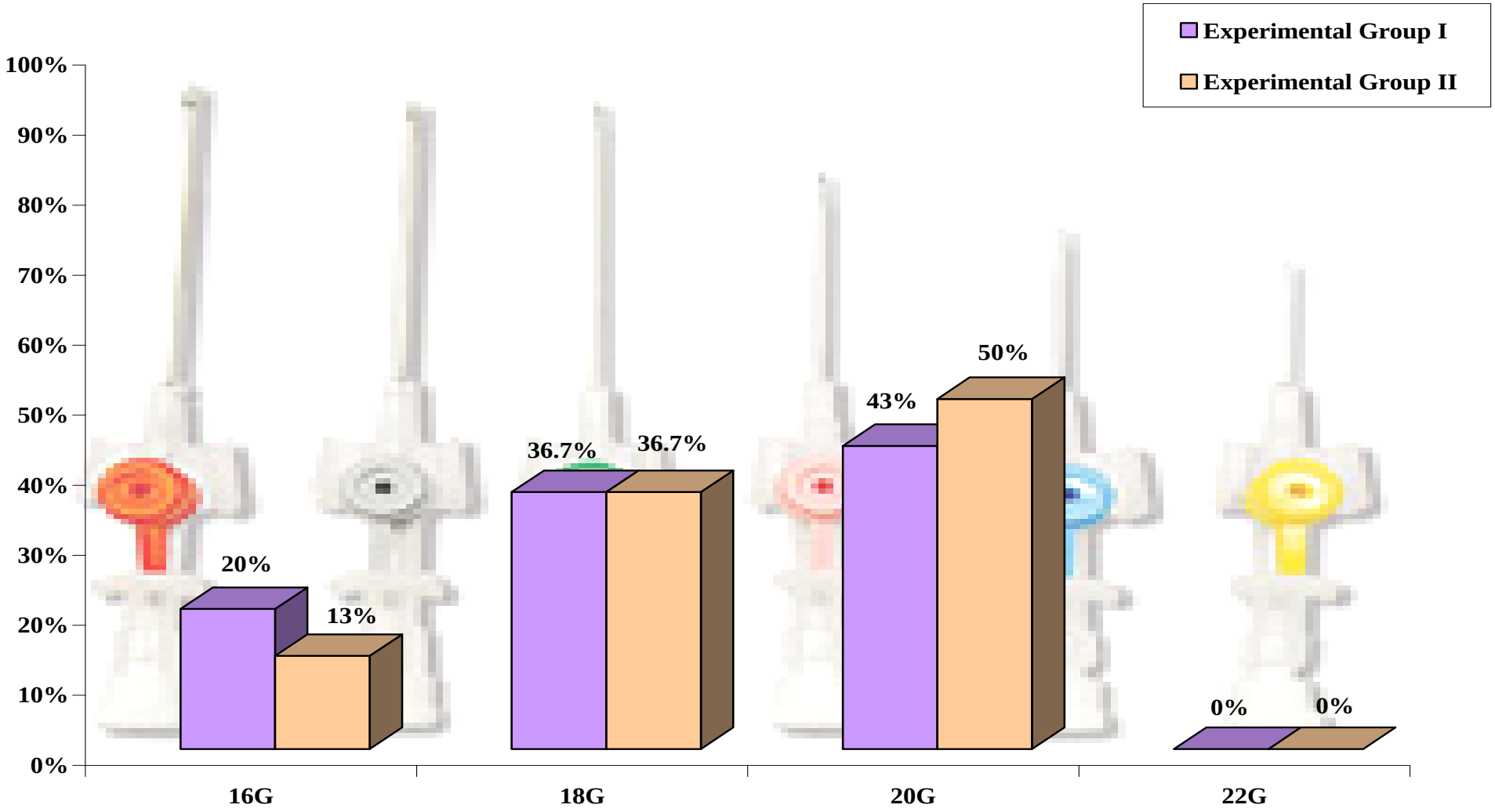

Fig. 7 Percentage Distribution of Size of Intravenous Cannula for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

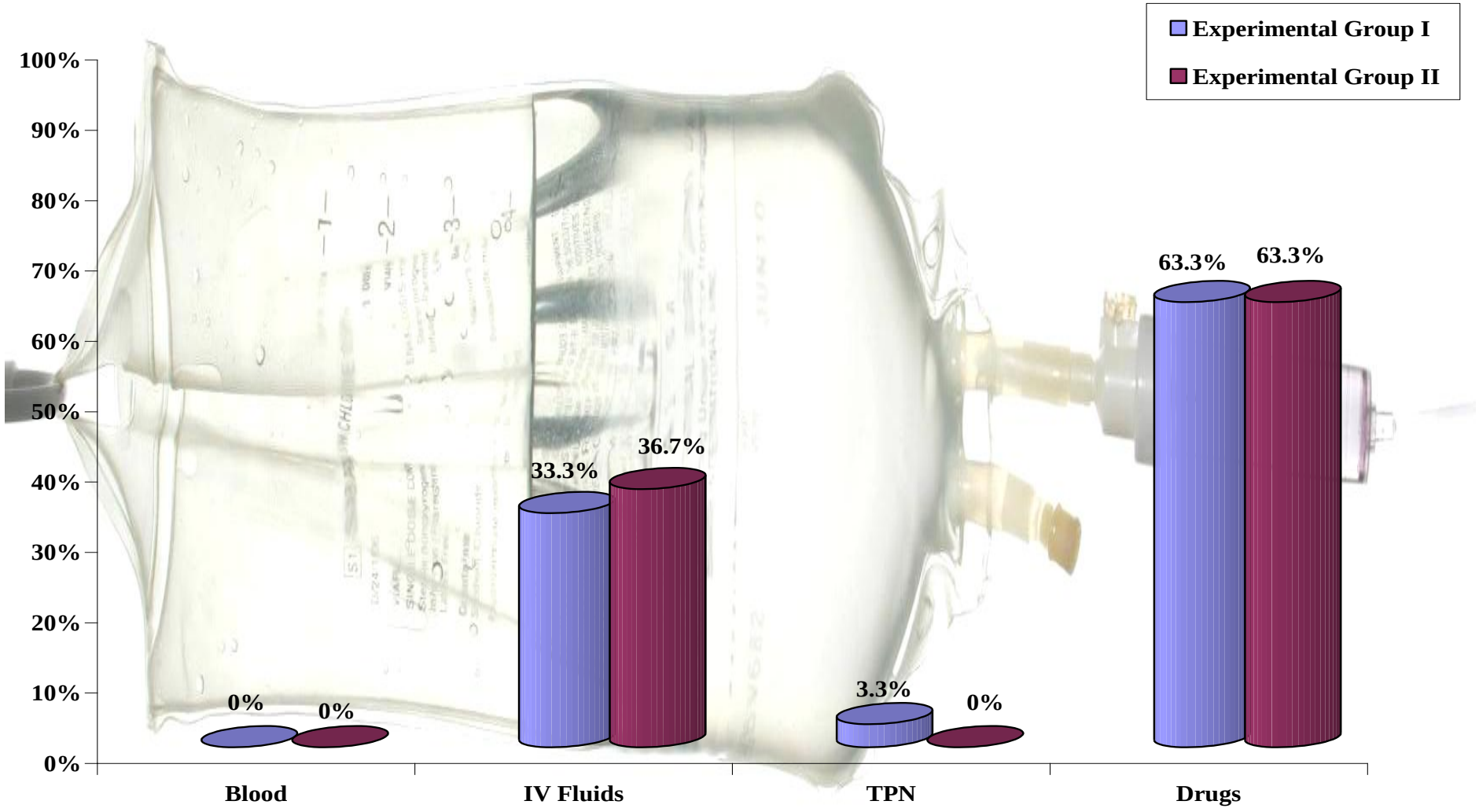

Fig. 8 Percentage Distribution of Type of Intravenous Fluid for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication

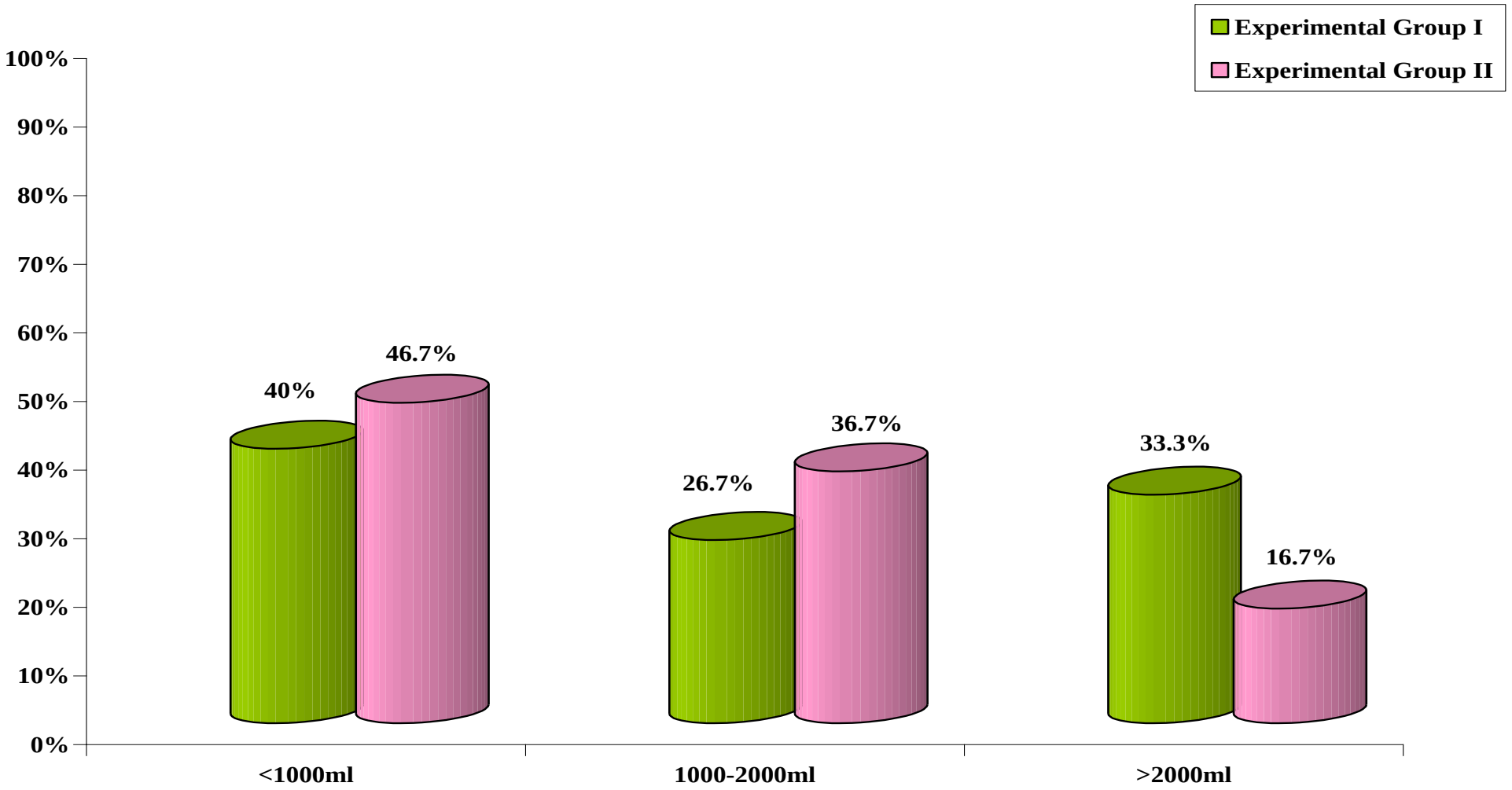

Fig. 9 Percentage Distribution of Total Volume of Fluid Through Intravenous Line for Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication.

Table.3

Frequency and Percentage Distribution of Patency of Intravenous Line Before and After Normal Saline Flush in Experimental Group I and Heparinized Flush in Experimental Group II of Patients Receiving Intravenous Medication.

Variables	Experimental Group I (n=30)				Experimental Group II (n=30)			
	Pre test		Post test		Pre test		Post test	
	n	p	n	p	n	p	n	p
No blockage	27	90	30	100	29	96.7	30	100
Partial blockage	3	10	0	0	1	3.3	0	0
Complete blockage	0	0	0	0	0	0	0	0

It can be inferred from table 3 that, majority of patients in experimental group I and experimental group II had no intravenous blockage (90%, 96.7%) in pre test respectively. However after normal saline flush and heparinized flush, all of them had no blockage (100%, 100%) in experimental group I and experimental group II of patients receiving intravenous medications.

Table.4

Comparison of Mean and Standard Deviation of Patency of Intravenous Line Before and After Normal Saline Flush and Heparinised Flush in Experimental Group I and Experimental Group II of Patients Receiving Intravenous Medication.

Group	N	Mean	Standard Deviation	"t" value
Experimental group I				
Pre test	30	25.4	3.06	13.21***
Post test	30	17.3	1.37	
Experimental group II				
Pre test	30	26	2.75	16.8***
Post test	30	17.1	1.14	

p< 0.001***.

The data presented in table 6 depicted that the mean and standard deviation for the scores of intravenous line patency (M=25.4,SD=3.06), (M=26, SD=2.75) among patients before normal saline flush and heparinised flush in experimental group I and experimental group II is significant at p<0.001***. On the other hand after administration of normal saline flush in experimental group I and heparinised flush in experimental group II, the mean and standard deviation (M=17.3,SD=1.37),

(M=17.1,SD=1.14) were low when compared with pre test intravenous line patency score. The difference was found statistically significant at $p<0.001$. Hence the null hypothesis H_{01} was rejected.

Table.5

Frequency and Percentage Distribution of Level of Satisfaction Scores of Normal Saline Flush in the Experimental Group I of Patients Receiving Intravenous Medication.

Variables	Experimental Group I (n=30)							
	Highly Satisfied		Moderately Satisfied		Satisfied		Dissatisfied	
	n	p	n	p	n	p	n	p
Researcher	28	93.3	2	6.7	-	-	-	-
Normal saline flush	27	90	3	10	-	-	-	-
Effectiveness of normal saline flush	28	93.3	2	6.7	-	-	-	-

It can be inferred from table 4 that majority of the patients (93.33%) were highly satisfied with normal saline flush for maintaining intravenous line patency in experimental group I.

Table.6

Frequency and Percentage Distribution of Level of Satisfaction Scores of Heparinised Flush in the Experimental Group II of Patients Receiving Intravenous Medication

Variables	Experimental Group II (n=30)							
	Highly Satisfied		Moderately Satisfied		Satisfied		Dissatisfied	
	n	p	n	p	n	P	n	p
Researcher	27	90	3	10	-	-	-	-
Heparinized flush	28	93.3	2	6.7	-	-	-	-
Effectiveness of heparinized flush	28	93.3	2	6.7	-	-	-	-

It can be inferred from table 5 that, majority of the patients (93.3%) were highly satisfied with heparinized flush for maintaining intravenous line patency in experimental group II.

Table.7

Association Between the Selected Demographic Variables and the Patency of Intravenous Line Before and After Normal Saline Flush in Experimental Group I and Heparinised Flush in Experimental Group II of Patients Receiving Intravenous Medication.

Demographic Variables	Experimental Group I (n=30)						Experimental Group II (n=30)					
	Pre test			Post test			Pre test			Post test		
	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2
Age in years												
≤ 40	6	1	3.20	4	3	0.03	2	6	3.94	4	4	0.45
> 40	17	12	(d=1)	14	9	(d=1)	14	8	(d=1)	14	8	(d=1)
Sex												
Male	9	12	6.00*	15	6	4.35*.	11	11	0.36	15	7	2.48
Female	8	1	(d=1)	3	6	(d=1)	5	3	(d=1)	3	5	(d=1)
Residence												
Urban	13	11	0.3	13	8	9.66**	11	13	2.81	13	11	1.64
Rural	4	2	(d=1)	5	4	(d=1)	5	1	(d=1)	5	1	(d=1)
Education												
Upto higher secondary	13	9	0.19	12	10	1.61	8	6	0.15	7	7	1.09
Graduates	4	4	(d=1)	6	2	(d=1)	8	8	(d=1)	11	5	(d=1)

Income per month(Rs)												
≤ 15,000	13	11	0.3	14	10	0.13	13	7	3.67	10	10	2.5
> 15,000	4	2	(d=1)	4	2	(d=1)	3	7	(d=1)	8	2	(d=1)
Occupation												
Professional	4	4	0.19	6	2	0.98	6	6	0.08	8	4	0.35
Non-professional	13	9	(d=1)	12	10	(d=1)	10	8	(d=1)	10	8	(d=1)
Marital status												
Married	16	10	0.12	17	11	0.08	15	7	9.30**	15	7	0.83
Unmarried	1	1	(d=1)	1	1	(d=1)	1	7	(d=1)	4	4	(d=1)
Prvious history of hospitalization												
Yes	5	5	0.016	7	3	0.60	5	3	0.36	7	1	3.43
No	12	8	(d=1)	11	9	(d=1)	11	11	(d=1)	11	11	(d=1)
Duration of hospitalization												
≤ 8 days	13	8	0.80	12	9	0.22	15	10	2.87	14	11	0.96
> 8days	4	5	(d=1)	6	3	(d=1)	1	4	(d=1)	4	1	(d=1)

$p < 0.05$*, $p < 0.01$**

Note : Categories under variables were clubbed for sake of chi-square analysis.

It could be inferred from Table 7 that there was a significant association between sex, residence, marital status and patency of intravenous line. Hence there was no

association between other demographic variables like age, educational status, income per month, occupation, previous history of hospitalization, duration of hospitalization and intravenous line patency in experimental group I and experimental group II of patients. Hence the null hypothesis H_{02} was rejected with gender, residence, marital status and retained with other demographic variables.

Table No.8

Association Between the Selected Clinical Variables and the Patency of Intravenous Line Before and After Normal Saline Flush in Experimental Group I and Heparinised Flush in Experimental Group II of Patients Receiving Intravenous Medication

Clinical Variables	Experimental Group I (n=30)						Experimental Group II (n=30)					
	Pre test			Post test			Pre test			Post test		
	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2	Upto mean	Above mean	χ^2
Diagnosis												
Neurological disorders	6	4	0.06	8	2	2.5	3	4	0.40	7	-	6.29*
Others	11	9	(d=1)	10	10	(d=1)	13	10	(d=1)	11	12	(d=1)
Reason for admission												
Medical	13	9	0.19	10	12	6.30*	13	9	1.13	14	8	0.45
Surgical	4	4	(d=1)	8	-	(d=1)	3	5	(d=1)	4	4	(d=1)
Site												
Median cephalic vein	8	4	0.81	8	4	0.35	5	6	0.43	7	4	1.02
Others	9	9	(d=1)	10	8	(d=1)	11	8	(d=1)	11	8	(d=1)

Size of cannula												
≤ 18 G	7	10	4.23*	11	6	0.35	9	6	0.54	9	6	-
> 18G	10	3	(d=1)	7	6	(d=1)	7	8	(d=1)	9	6	(d=1)
Type of fluid administered												
IV fluids	5	5	0.27	6	4	-	5	6	0.43	6	5	0.21
Drugs	12	8	(d=1)	12	8	(d=1)	11	8	(d=1)	12	7	(d=1)
Rate of fluid flow												
≤ 40 drops	8	4	0.81	8	4	0.35	9	6	0.54	10	5	0.54
> 40 drops	9	9	(d=1)	10	8	(d=1)	7	8	(d=1)	8	7	(d=1)
Total fluid received / day												
≤ 1000ml	7	5	0.01	7	5	0.02	8	6	0.15	10	4	1.42
> 1000ml	10	8	(d=1)	11	7	(d=1)	8	8	(d=1)	8	8	(d=1)
Duration of therapy												
≤ 48 hours	-	-	-	-	-	-	-	-	-	-	-	-
> 48 hours	17	13	(d=1)	16	14	(d=1)	18	12	(d=1)	17	13	(d=1)

$p < 0.05$*.

Note: Categories under the variables were clubbed for the sake of chi-square analysis.

It could be inferred from the table 8 that there was a significant association between diagnosis, reason for admission, size of cannula and the patency of intravenous line at $p<0.05$*. However there was no significant association between other clinical

variables like site of intravenous line, type of fluid, rate of fluid flow, total volume of fluid, duration of therapy and patency of intravenous line. Hence the null hypothesis Ho_3 was rejected with diagnosis, reason for admission, size of cannula and retained with other clinical variables.

Summary

This chapter has dealt with the analysis and interpretation of the data obtained by the researcher. The analysis of the results showed that the patency of intravenous line was improved after administration of normal saline flush in experimental group I and heparinised flush in experimental group II when compared to before the administration. This can be credited to the effectiveness of normal saline flush and heparinized flush.

CHAPTER-V

DISCUSSION

An Experimental Study to Assess the Effectiveness of Normal Saline Flush and Heparinized Flush in Maintaining the Patency of Intravenous Lines Among Patients Receiving Intravenous Medication at Selected Hospitals, Chennai.

Objectives of the Study

1. To assess the level of patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
2. To determine the effectiveness of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
3. To assess the level of satisfaction of nurses regarding normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
4. To find out the association between the selected demographic variables upon the intravenous line patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenos medication.
5. To find out the association between the selected clinical variables upon the intravenous line patency before and after normal saline flush experimental group I

and heparinized flush in experimental group II among patients receiving intravenous medication.

An experimental design was adopted for this study. Probability systematic sampling technique was used to select 30 patients in experimental group I and 30 in experimental group II from Apollo Speciality Hospital, Chennai. The Observation Checklist and rating scale for level of satisfaction of patients on maintaining the patency of intravenous line were the tools used to collect data, after establishing validity and reliability. The main data collection was done after determining the feasibility and practicability through pilot study.

The patency of intravenous line was checked for both experimental group I and experimental group II before and after normal saline flush and heparinized flush. The level of satisfaction of patients on maintaining the intravenous line patency was assessed .The data was tabulated and analyzed by using descriptive and inferential statistics.

The discussion is presented under the following headings

- Demographic variables of patients receiving intravenous medication.
- Clinical variables of patients receiving intravenous medication.
- Frequency and percentage distribution of patency of intravenous line before and after administration of normal saline flush and heparinized flush in experimental group I and experimental group II of patients receiving intravenous medication.
- Comparison of mean and standard deviation of patency of intravenous line before and after normal saline flush and heparinised flush in experimental group I and experimental group II of patients receiving intravenous medication.

- Frequency and percentage distribution of level of satisfaction scores of normal saline flush in the experimental group I of patients receiving intravenous medication.
- Frequency and percentage distribution of level of satisfaction scores of heparinised flush in the experimental group II of patients receiving intravenous medication.
- Association between the selected demographic variables and the patency of intravenous line before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medications.
- Association between the selected clinical variables and the patency of intravenous line before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medications.

Demographic variables of patients receiving intravenous medication.

In this study significant percentage of the patients were in the age group between 41-50 years (40%, 36.6%). The researcher felt that most of them were adult patients. This suggests need of intravenous fluids is more in case of adult.

Among the patients of both experimental group I and experimental group II, most of them were males (70%, 73.3%) respectively. The researcher felt that males are most likely to be affected with many disorders. So it is the responsibility of the patient and family members to follow life style modifications.

Among the patients of both control and experimental group, majority of them were living in urban region (70%, 80%) respectively. Even though the patients are distributed in different areas of residence they seek adequate medical advice and are aware about the advantages of taking adequate medical attention.

Among the patients of both experimental group I and experimental group II , the duration of hospitalization was for a period of 4 to 8 days (43.3%, 46.7%) respectively. A study conducted by US acute care hospitals regarding the length of hospital stay has been steadily decreased from 8.7 to 4.9 days. The researcher felt that the duration of hospitalization is based on quality of patient care. Hence, health care providers should make appropriate awareness and priority based care for the patients.

Clinical variables of patients receiving intravenous medication.

In this study most of the patients in the experimental group I and experimental group II had medical treatment (73.3%, 73.3%). Nowadays most of them prefer noninvasive or minimal invasive management. This may help to reduce the duration of stay in the hospitals and leads to cost effective care.

Significant percentage of the patients in the experimental group I and experimental group II had median cephalic intravenous line (40%, 36.7%) respectively. In adults, long straight veins are used for catheter insertion. A larger vein in the forearm or upper arm is appropriate for insertion of largebore catheter. As per norms of general directorate of nursing (2009) most widely used veins for intravenous cannulation and therapy in adult are cephalic, accessory cephalic, or basilic vein. And also the site depends on the expected duration of IV therapy, patient's activity level, and the

condition of her extremities. So the researcher felt that most of the hospitals used median cephalic vein for intravenous therapy in case of adult patients.

Significant percentage of the patients in experimental group I and experimental group II had 20 G cannula (43.3%, 50%) respectively. According to General Directorate Of Nursing (2009), use of smallest gauge and the shortest length cannula in the largest vein may irritate the skin. So the size of the cannula is differing from each patients based on their needs.

Significant percentge of the patients received fluids at a rate of 40 to 60 drops/min in experimental group I and experimental group II (46.7%, 43.3%) respectively. According to the Merk vertinary manual (2011), the average maintenance rate of fluid for adult is 40-60 ml/kg/day. It is the prime responsibility of the nurse to maintain the adequate fluid status based on their body weight.

Significant percentage of the patients in experimental group I and experimental group II received more than 2000ml/day of fluid (40%, 46.7%) respectively. According to this, an average 100 kg healthy adult, should get 3500-5000 ml per day of fluid. Hence it can be concluded that the adequate amount of intravenous fluid is very essential for patients with hospitalization and also to prevent intravenous blockage but few medication can irritate the intravenous line.

Effectiveness of normal saline flush and heparinized flush upon intravenous line patency

The present study reveals that 90% of patients in experimental group I had no blockage and 96.7% in experimental group II had no blockage in pre test. Some of them

had partial blockage (10%, 3.3%) before administration of normal saline flush and heparinized flush in both group. However after the administration of normal saline flush and heparinized flush, all of them had no blockage (100%, 100%) in experimental group I and experimental group II of patients receiving intravenous medications.

Kathryn, M. et al. (2006) conducted an evidence based study, the results shows that both normal saline and heparin may be equally effective in the maintenance of peripheral IV locks. Thus the researcher concluded that the partial blockage is reduced into no blockage after using normal saline flush in experimental group I and heparinized flush in experimental group II. Hence all nurses must be practiced to administer any one of the solution to maintain the intravenous line patency.

Comparison of mean and standard deviation of patency of intravenous line before and after normal saline flush and heparinised flush in experimental group I and experimental group II of patients receiving intravenous medication.

The mean and standard deviation for the scores of intravenous line patency (M=25.4,SD=3.06), (M=26, SD=2.75) among patients before normal saline flush and heparinised flush in experimental group I and experimental group II is significant at $p<0.001$***. On the other hand after administration of normal saline flush in experimental group I and heparinised flush in experimental group II, the mean and standard deviation (M=17.3,SD=1.37), (M=17.1,SD=1.14) were low when compared with pre test intravenous line patency score. The difference was found statistically significant at $p<0.001$. Hence the null hypothesis H_{01} was rejected.

Thus, it is the responsibility of every nurse to understand the importance of normal saline flush and heparinized flush in maintaining the intravenous line patency.

Level of satisfaction scores of normal saline flush in the experimental group I of patients receiving intravenous medication.

Majority of the nurses were highly satisfied (93.3%) with normal saline flush and none of them had un satisfaction towards the intervention. This interprets that the normal saline flush in maintaining the intravenous line patency is effective. Though there are many ways to maintain the intravenous line patency. Thus the nurses should understand the importance of maintaining intravenous line patency.

Level of satisfaction scores of heparinized flush in the experimental group II of patients receiving intravenous medications.

Majority of the nurses were highly satisfied (90%) with heparinized flush and none of them had un satisfaction towards the intervention. This interprets that the heparinized flush in maintaining the intravenous line patency is effective among the adult patients. Though there are many ways to maintain the intravenous line patency. Thus the nurses should understand the importance of maintaining intravenous line patency.

Association between the selected demographic variables and the patency of intravenous line before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medication.

Chi square test was used to find out the association between selected demographic variables and the intravenous line patency, there was a significant association between intravenous line patency and other demographic variables of sex (χ^2=6.00, df=1), ($p < 0.05$*) in pre test and sex (χ^2=4.35, df=1), ($p < 0.05$*), residence (χ^2=9.66, df=1), ($p < 0.05$*) of post test in experimental group I and marital status (χ^2=9.30, df=1), ($p < 0.01$**) of pre test in experimental group II. There was no association between other demographic variables and intravenous line patency in experimental group I and experimental group II of patients. Hence the null hypothesis H_{02} was rejected with gender, residence, marital status and retained with other demographic variables.

Association between the selected clinical variables and the patency of intravenous line before and after normal saline flush in experimental group I and heparinised flush in experimental group II of patients receiving intravenous medication.

Chi square test was used to find out the association between selected clinical variables and the intravenous line patency, there was a significant association between intravenous line patency and other clinical variables of reason for admission (χ^2=6.30, df=1), ($p < 0.05$*), size of cannula (χ^2=4.23, df=1), ($p < 0.05$*) in pre test of experimental group I and diagnosis (χ^2=6.29, df=1), ($p < 0.05$*) in post test of experimental group II. However there was no significant association between other

clinical variables and patency of intravenous line. Hence the null hypothesis Ho_3 was rejected with diagnosis, reason for admission, size of cannula and retained with other clinical variables.

Summary

This chapter has dealt with the discussion of various aspects of the study findings, this emphasized on the objectives of the study, major findings of the demographic and clinical variables, comparison of intravenous line patency among patients receiving intravenous medications before and after administration of normal saline flush and heparinized flush in line patency in experimental group I and experimental group II, association between selected demographic variables and clinical variables with intravenous line patency in both the groups and the level of satisfaction regarding the intervention among nurses who are working in the selected institutions.

CHAPTER-VI

SUMMARY, CONCLUSION, NURSING IMPLICATIONS AND RECOMMENDATIONS

The heart of the research project lies in reporting the findings. This is the most creative and demanding part of the study. This chapter gives a brief account of the present study, suggestions of the study and nursing implications. The present study was intended to analyze the effectiveness of intravenous line patency upon patients receiving intravenous medication.

Summary

The present study was indented to assess the effectiveness of normal saline flush and heparinized flush in maintaining the patency of intravenous lines among patients receiving intravenous medication at selected hospitals, Chennai.

Objectives of the Study

1. To assess the level of patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
2. To determine the effectiveness of normal saline flush in experimental group I and heparinized flush in experimental group II among patient receiving intravenous medication.
3. To assess the level of satisfaction of nurses regarding normal saline flush in experimental group I and heparinized flush II in experimental group II among patients receiving IV medication.

4. To find out the association between the selected demographic variables upon the intravenous line patency before and after normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.
5. To find out the association between the selected clinical variables upon the intravenous line patency before and after normal saline flush experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.

Null Hypotheses

H_{o1} There will be no significant difference between intravenous line patency before and after administration of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.

H_{02} There will be no significant association between selected demographical variables and intravenous line patency before and after administration of normal saline flush in experimental group I and heparinized flush in experimental group II among patients receiving intravenous medication.

H_{03} There will not be any significant association between selected clinical variables and intravenous line patency before and after administration of normal saline in experimental group I and heparinized flush in experimental group II among patients receiving intraenous medication.

The conceptual frame work was based on Kings Goal Attainment Theory which was modified for the present study, and extensive review of literature and guidance by expert formed the foundation of development of the research tool.

An experimental design was adopted for this study. Probability systematic sampling technique was used to select patients in experimental group I and experimental group II. The present study was conducted at Apollo Speciality Hospital, Chennai among patients who received intravenous medications. The study sample size for the present study was 60 patients who received intravenous medications, among which 30 in experimental group I and 30 in experimental group II who satisfied the inclusion criteria.

The investigator used the demographic and clinical variable proforma of patients to obtain the baseline data. The Observation check list and rating scale for level of satisfaction of nurses on maintaining intravenous line patency were the tools used to collect data, after establishing validity and reliability. The main data collection was done after determining the feasibility and practicability through pilot study.

Major findings of the study

Demographic variables of patients receiving intravenous medication

Significant percentage of the patients were in the age group of 41-50 years (40%, 36.6%), males (70%, 73.3%), living in urban region (70%, 80%), graduates (26.7%, 53.3%), non professional (73.3%, 60%), got married (86.7%, 70%), most of the patients were not having the history of previous hospitalization (66.7%, 73.3%), stayed

in the hospital at the duration of 4-8 days (43.3%, 46.7%) in the experimental group I and experimental group II respectively.

Clinical variables of patients receiving intravenous medication

Significant percentage of the got admitted with various diagnosis (43.3%, 50%), received medical treatment (73.3%, 73.3%), had median cephalic intravenous line (40%, 36.7%), had 20 G cannula (43.3%, 50%), received drugs through intravenous line (63.3%, 63.3%), infused at rate of 40 to 60 drops/min (46.7%, 43.3%), received more than 2000ml of fluid (40%, 46.7%) and all of them were received intravenous therapy more than 48 hours (100%, 100%) in the experimental group I and experimental group II respectively.

Effectiveness of normal saline flush and heparinized flush in experimental group I and experimental Group II of patients receiving intravenous medication.

Majority of patients in experimental group I and experimental group II had no intravenous blockage (90%, 96.7%) in pre test respectively. However after normal saline flush and heparinized flush, no patients had intravenous blockage (100%, 100%) in experimental group I and experimental group II of patients receiving intravenous medication.

Comparison of mean and standard deviation of patency of intravenous line before and after normal saline flush and heparinised flush in experimental group I and experimental group II of patients receiving intravenous medication.

The mean and standard deviation for the scores of intravenous line patency (M=25.4,SD=3.06), (M=26, SD=2.75) among patients before normal saline flush and heparinised flush in experimental group I and experimental group II is significant at $p<0.001$***. On the other hand after administration of normal saline flush in

experimental group I and heparinised flush in experimental group II, the mean and standard deviation (M=17.3,SD=1.37), (M=17.1,SD=1.14) were low when compared with pre test intravenous line patency score. The difference was found statistically significant at $p<0.001$. Hence the null hypothesis H_{01} was rejected.

Frequency and percentage distribution of level of satisfaction scores of normal saline flush in the experimental group I of patients receiving intravenous medication

Majority of them (93.33%) were highly satisfied with normal saline flush for maintaining intravenous line patency in experimental group I.

Frequency and percentage distribution of level of satisfaction scores of heparinised flush in the experimental group II of patients receiving intravenous medications.

Majority of them (93.3%) were highly satisfied with heparinized flush for maintaining intravenous line patency in experimental group II.

Association between the selected demographic variables and the patency of intravenous line before and after normal saline flush and heparinised flush in experimental group I and experimental group II of patients receiving intravenous medications.

Chi square test was used to find out the association between selected demographic variables and the intravenous line patency, there was a significant association between intravenous line patency and demographic variables of sex (χ^2=6.00, df=1), ($p < 0.05$*) in pre test and sex (χ^2=4.35, df=1), ($p < 0.05$*), residence (χ^2=9.66, df=1), ($p < 0.05$*) of post test in experimental group I and marital status

(χ^2=9.30, df=1), (p < 0.01**) of pre test in experimental group II. There was no association between other demographic variables and intravenous line patency in experimental group I and experimental group II of patients. Hence the null hypothesis H_{02} was rejected with gender, residence, marital status and retained with other demographic variables.

Association between the selected clinical variables and the patency of intravenous line before and after normal saline flush and heparinised flush in experimental group I and experimental group II of patients receiving intravenous medications.

Chi square test was used to find out the association between selected clinical variables and the intravenous line patency, there was a significant association between intravenous line patency and other clinical variables of reason for admission (χ^2=6.30, df=1), (p < 0.05*), size of cannula (χ^2=4.23, df=1), (p < 0.05*) in pre test of experimental group I and diagnosis (χ^2=6.29, df=1), (p < 0.05*) in post test of experimental group II. However there was no significant association between other clinical variables and patency of intravenous line. Hence the null hypothesis Ho_3 was rejected with diagnosis, reason for admission, size of cannula and retained with other clinical variables.

Conclusion

The present study concluded that normal saline flush and heparinized flush was effective in maintaining the intravenous line patency in patients receiving intravenous medication. The experimental group I and experimental group II interventions were highly satisfied by the nurses. Proper explanation and administration of intravenous

flush for patients who receiving intravenous medications may prevent infiltration, infection and promote proper line patency. Hence nurses could be encouraged to use this as a method of maintaining intravenous line patency.

Implications

The conclusion derived from the study can be implicated in the field of nursing practice, nursing education, nursing administration and nursing research.

Nursing practice

The intravenous line patency after administration of normal saline flush and heparinized flush were better when compared with patency before administration in experimental group I and experimental group II. Each patients disease condition, activity level, size of catheter, amount of fluids and type of fluids getting through intravenous lines is differ from one another as it also influences the patency of line. Hence it is the responsibility of the nurse to maintain a patent intravenous line to prevent infiltration, infection etc. There are various methods to maintain the intravenous line patency like intermittent flushing device and continuous flushing device. So the nurse should have adequate knowledge regarding maintaining intravenous line patency. The nursing staff can incorporate the derived conclusion in practice to maintain the intravenous line patency.

Nursing education

The emerging health care trends of nursing education we must focus on better and effective care to the patients. The nursing students should be taught the proper protocol in performing the procedure. Therefore nursing students should be made aware of the intravenous line, types of flushing solution and their need to maintaining the

intravenous line patency. Demonstration of proper technique and use of simulation in the clinical setup helps the students to acquire an adequate knowledge and incorporate it in their practice. Nurse educators should take initiatives to publish articles in journals related to maintenance of intravenous line patency.

Nursing administration

With technological advances and ever growing challenges of health care, the nurse administrators have a responsibility to provide nurses with substantive continuing nursing education opportunities. This will enable the nurses to update their knowledge, acquire special and demonstrate high quality care in maintenance of intravenous line patency.

This enables the nurses to update the knowledge and to render the cost effective care to the people. Nursing administrators should take the initiative in organizing educational programs on maintenance of intravenous line patency for the nursing personnel in the hospital to gain adequate knowledge. Nurse administrators should also conduct periodical review meetings to evaluate the safe infusion practices.

Nursing administrator should collaborate with governing bodies in formulating policies and protocols to reduce the intravenous catheter related infections and plan for man power, money, materials, methods and time to conduct successful and useful educational programs for safe infusion practices.

Nursing research

There is a need for extensive and intensive research in this area. It opens a big avenue for research on comparison of normal saline flush, heparinized flush and other methods of flush and its need, advantages, disadvantages and cost effectiveness. As evidence based practice is the recent trend in nursing care, this will further encourage studies on the effectiveness of intravenous flush upon the knowledge and practice of nurses and patient outcome. Dissemination of the findings of the research through conferences, seminars, publications in national and international nursing journals will benefit a wider community.

Recommendations

- A similar study could be undertaken on larger scale for more valid generalization.
- Present study could be replicated in different settings.
- The intervention can be applied in practice for maintaining the patency for central venous catheter and arterial catheter.
- The study could be conducted to analyze the relationship between the use of intravenous flush and maintaining catheter patency.

REFERENCES

Arnts, I. J. et al. (2011). Effectiveness of heparin solution verses normal saline in maintaining patency of intravenous locks in neonates: A double blind randomized controlled study. **Journal of Advanced Nursing,** 67(12), 2677-85.

Baskaran and Judie, (2011). A study to maintain the patency of peripheral IV catheter for the hospitalized clients. **Journal of Nursing Times**, 22(5), 118-23.

Barrett, P. J., & Lester, R. L. (1990). Heparin verses saline flushing solutions in a small community hospital. **Journal of Hospital Pharmacy,** 25(2), 115-8.

Bertolino, G. et al. (2012). Intermittent flushing with heparin verses saline for maintenance of peripheral intravenous catheters in a medical department: A Pragmatic Cluster Randomized Controlled Study. **World Views Evidenced Based Nursing,** 14.

Boyle, M. F., & Kuntz B. (1994). Saline locks in prehospital care. **Journal of Prehospital Disaster Medicine,** 9(3), 190-2.

Carducci, B., & Stein K, (1994). Intravenous maintenance with a saline lock intermittent infusion device in the prehospital environment. **Journal of Prehospital Disaster Medicine,** 9(1), 67-70.

Cool, et al, (2011). Conducted a study on effectiveness of normal saline flush and heparinized flush in maintaining the intravenous line patency among infants. **Journal of pediatric nursing,** 10(4), 440-50.

Del cotillo, M. et al, (2008). Heparinized solution vs saline solution in the maintenance of arterial catheters: A double blind randomized clinical trial. **Journal of Intensive Care Medicine.** 34(2), 339-43.

Garrelts, J. C. et al. (1989), Comparison of heparin and 0.9% sodium chloride injection in the maintenance of indwelling intermittent IV devices. **Journal of Clinical Pharmacy,** 8(1), 34-9.

Guilbert, M. C., & Elkouri. (2008). Arterial trauma during central venous catheter insertion. **Journal of Vascular Surgeries,** 48(4), 918-25.

Hanrahan, K. S. et al, (1994). Evaluation of saline for IV locks in children. **Journal Of Pediatric Nursing,** 20(6), 549-52.

Hepzibha, A. (2010). Heparin verse normal saline flush. **International Journal For The Advancement Of Science & Arts,** 1.

Kalyn, A. et al. (2000). A comparison of continous infusion and intermittent flushing methods in peripheral intravenous catheters. **Journal of Intravenous Nursing,** 23(3), 146-53.

Kannan, A. (2008). Heparinized saline or normal saline?. **Journal of Perioperative Practice, 18(10),** 440-1.

Kulkarni, M. & et al. (1994). Heparinized saline verses normal saline in maintaining patency of the radial artery catheter. **Canadian Journal of Surgery,** 37(1), 37-42.

Kute, D. J. (2004). Thrombotic complications of central venous catheters in cancer patients. **Journal of Oncology,** 9(2), 207-16.

Leduc, K. (1997). Efficacy of normal saline solution verses heparin solution. **Journal of Emergency Nursing,** 23(4), 306-9.

Mahajan, B.K. (2010). **Methods in Biostatistics**. (7th ed.). St.Louis: Jaypee Brothers Medical Publishers, 330-335.

Maria, M. et al.(2008). Finding the evidence for keeping the patency in peripheral intermittent intravenous devices. **Health Science Journal,** 1(3).

Mayo, D. J. et al, (1996). The effects of heparin flush on patency of the Groshong catheter: A pilot study. **Oncology Nursing Forum,** 23(9), 1401-5.

Mok, E. (2007). A randomized controlled trial for maintaining peripheral intravenous lock. **International Journal of Nursing Practice,** 13(1), 33-45.

Myrianthefs, P. et al. (2005). The epidemiology of peripheral vein complications. **Journal of Evaluative Clinical Practice,** 11(1), 85-9.

Polit, D.F., & Beck, C.T. (2008). **Nursing Research, Generating and Assessing Evidence for Nursing Practice.** (8th ed.). Newdelhi: Lippincott Williams and Wilkins, 506-25.

Randolph, et al. (1998). Benefit of heparin in peripheral venous and arterial catheters. **British Medical Journal**, 316(7136), 969-75.

Robertson, J. (1994). Intermittent intravenous therapy: A comparison of two flushing solutions. **Journal Of Contemporary Nursing,** 3(4), 174-9.

Shah, P., & Shah, V. (2005). Continous heparin infusion to prevent thrombosis and catheter occlusion in neonates with peripherally placed percutaneous central venous catheters. **Cochrane Database System Review,** 20(3).

Shah, P. S. et al, (2005). Heparin for prolonging peripheral intravenous catheter use in neonates. **Cochrane Database System Review**, 19(4).

Shoaf, J., & Oliver, S. (1992). Efficacy of normal saline injection with and without heparin for maintaining intermittent intravenous site. **Application of Nursing Research**, 5(1), 9-12.

Treas, L. S., & Latinis Bridges, B. (1992). Efficacy of heparin in peripheral venous infusion in neonates. **Journal of Obstetrical and Gynacological Nursing,** 21(3), 214-9.

Whitta, et al. (2006). Comparison of normal saline or heparinized saline flushing on function of arterial lines. **Critical Care Resuscitation,** 8(3), 205-8.

APPENDIX I

LETTER SEEKING PERMISSION TO CONDUCT THE STUDY

Apollo College of Nursing

(Recognised by the Indian Nursing Council and Affiliated to the Tamil Nadu Dr. M.G.R. Medical University, Chennai)

CO/0304/12 ***11.06.12***

To,

The Nursing Superintendent,
Apollo Speciality Hospitals,
320, Anna Salai,
Nandanam, Tenampet,
Chennai – 600 010.

Respected Madam,

Sub.: *To request permission for research study – Reg.*

Greetings! *As part of the curriculum requirement our 2nd year M. Sc. (N) student Ms.V.Uma Maheswari has selected the following title for her research study.*

"An experimental study to assess the effectiveness of normal saline flush and heplock flush in maintaining the patency of peripheral intravenous lines among patient receiving IV medications at selected hospitals , Chennai."

So I kindly request your goodselves to permit her to conduct study in your esteemed institution.

Thanking You,

Dr. LATHA VENKATESAN
PRINCIPAL

IS/ISO 9001:2000

Vanagaram to Ambattur Main Road, Ayanambakkam, Chennai - 600 095.
Ph. : 044 - 2653 4387 Tele fax : 044 - 2653 4923 / 044- 2653 4386

13/6/12

13/6/12

APPENDIX II

ETHICAL COMMITTEE CLEARANCE LETTER

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

30th August 2012

To,

Ms. Uma Maheswari.V
2nd Year M.Sc (Nursing),
Department of Medical Surgical Nursing,
Apollo College of Nursing,
Chennai.

Ref: Effectiveness of normal saline flush and heparinized flush upon intravenous line patency.

Sub: Approval of the above referenced project and its related documents.

Dear Ms. Uma Maheswari.V,

Ethics Committee-Apollo Hospitals has received the following document submitted by you related to the conduct of the above-referenced study.

- Project proposal.
- Participant consent form.

The Ethics Committee-Apollo Hospitals reviewed and discussed the study proposal documents submitted by you related to the conduct of the above referenced study at its meeting held on 29th August 2012.

The following Ethics Committee Members were present at the meeting held on 29th August 2012.

Name	Profession	Position in the committee
Mr. S. S. Narayanan	Ethicist	Chairman
Dr. Rema Menon	Clinician	Member Secretary
Dr. Radha Rajagopalan	Clinician	EC-Member
Dr. Krishnakumar	Clinician	EC-Member
Dr. Vijaya Kumar	Clinician	EC-Member
Dr. Clive Fernandes	Consultant Clinical Pharmacologist	Basic Medical Scientist
Dr. Nalini Roa	Social Worker	EC-Member

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006
Tel : 91 - 44 - 2829 3333 Extn : 6008, 91 - 44 - 2829 5465 Extn : 6639 Fax : 91 - 44 - 2829 4449
E - Mail : ecapollochennai@gmail.com

Ethics Committee

Apollo HOSPITALS
TOUCHING LIVES

Ms. N. Suseela	Retired English Teacher	Layperson
Ms. Maimoona Badsha	Lawyer	Lawyer
Dr. Paul Dilipkumar	Clinician	EC-Member
Dr. V. Balaji	Clinician	EC-Member
Dr. M. A. Raja	Consultant Medical Oncologist	EC-Member

After due ethical and scientific consideration, the Ethics Committee has approved the above presentation submitted by you.

The EC review and approval of the report is only to meet their academic requirement and will not amount to any approval of their conclusions / recommendations as conclusive, deserving adoption and implementation, in any form, in any healthcare institution.

The Ethics Committee is constituted and works as per ICH-GCP, ICMR and revised Schedule Y guidelines.

With Regards,

Date:
30/8/12

Rema Menon

Dr. Rema Menon,
Ethics Committee-Member Secretary,
Apollo Hospitals, Chennai,
Tamil Nadu, India.

Dr. REMA MENON
MEMBER SECRETARY
ETHICS COMMITTEE, APOLLO HOSPITALS
APOLLO HOSPITALS ENTERPRISE LIMITED
CHENNAI-600 006, TAMILNADU

Apollo Hospitals Enterprise Limited
21, Greams Lane, Off Greams Road, Chennai - 600 006
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E - Mail : ecapollochennai@gmail.com

APPENDIX III

LETTER SEEKING PERMISSION FOR CONTENT VALIDITY

From
Ms. V. Uma Maheswari,
M.Sc(Nursing) Second Year,
Apollo College of Nursing,
Chennai – 600 095.

To
Forwarded Through:
Dr. Latha Venkatesan,
Principal,
Apollo College of Nursing.

Sub: **Requesting for opinions and suggestions of experts for establishing content validity for research tool**.

Respected Madam,

I am a postgraduate student of the Apollo College of Nursing. I have selected the below mentioned topic for research project to be submitted to The Tamil Nadu Dr. M.G.R Medical University, Chennai as a partial fulfillment of Masters of Nursing Degree.

TITLE OF THE TOPIC:

An experimental study to assess the effectiveness of normal saline flush and heplock flush in maintaining the patency of intravenous lines among patient receiving intravenous medication medications at Apollo hospitals, Chennai.

With regards may I kindly request you to validate my tool for its appropriateness and relevancy. I am enclosing the Background, Need for the study, Statement of the problem, Objectives of the study, Demographic Variable Proforma, Clinical Variable Proforma, Observation Checklist to assess the patency of intravenous line and rating scale on the satisfaction of nursing care. I would be highly obliged and remain thankful for your great help if you could validate and send it as soon as possible.

Thanking you,

Date: **Yours sincerely,**

Place: **(Uma Maheswari.V)**

APPENDIX IV

LIST OF EXPERTS

1. **Dr. Latha Venkatesan, M.Sc(N), M.Phil., Ph.D,**
   Principal and Professor in Maternity Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

2. **Prof. Lizy Sonia. A, M.Sc(N)., Ph.D(N),**
   Vice Principal and HOD of Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai-600 095

3. **Prof. K. Vijayalakshmi, M.Sc(N)., Ph.D(N),**
   HOD of Psychiatric Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

4. **Prof. Shobana, M. Sc(N),**
   HOD of Community Health Nursing,
   Apollo College of Nursing,
   Chennai-600 095

5. **Prof. Nesa Sathya Satchi, M.Sc(N),**
   HOD of Pediatric Nursing,
   Apollo College of Nursing,
   Chennai-600 095

6. **Mrs. Jaslina Gnana Rani .J, M.Sc(N),**
   Reader in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

7. **Mrs. Sasi Kala, M.Sc(N),**
   Reader in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai- 600 095

8. **Mrs. Kanchana, M.Sc (N)., M.Sc(Psy),**
   Reader in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai-600 095

9. **Mrs. Kasthuri, M.Sc (N),**
   Lecturer in Medical Surgical Nursing,
   Apollo College of Nursing,
   Chennai-600 095

APPENDIX V

CERTIFICATE FOR CONTENT VALIDITY TO WHOMSOEVER IT MAY CONCERN

This is to certify that tools and content for the research study developed by II year M.Sc. (Nursing) student of Apollo College of Nursing for her dissertation **"An experimental study to assess the effectiveness of normal saline flush and heparinized flush in maintaining the patency of intravenous lines among patient receiving IV medications at selected hospitals, Chennai."** was validated.

Signature of the Expert

APPENDIX VI

RESEARCH PARTICIPANT CONSENT FORM

Dear participant,

I am a M.Sc., Nursing student of Apollo College of Nursing, Chennai. As part of my study, a research on "**Effectiveness of normal saline flush upon intravenous line patency among patients receiving intravenous medication".** The findings of the study will be helpful in reducing the stress in elderly depressive clients .

I hereby seek your consent and co-operation to participate in the study. Please be frank and honest in your responses. The information collected will be kept confidential and anonymity will be maintained.

Signature of the researcher

I ……. Hereby consent to participate and undergo the study

Place:

Date: Signature of the participant

APPENDIX VII

RESEARCH PARTICIPANT CONSENT FORM

Dear participant,

I am a M.Sc., Nursing student of Apollo College of Nursing, Chennai. As part of my study, a research on "**Effectiveness of heparinized flush upon intravenous line patency among patients receiving intravenous medication".** The findings of the study will be helpful in reducing the stress in elderly depressive clients .

I hereby seek your consent and co-operation to participate in the study. Please be frank and honest in your responses. The information collected will be kept confidential and anonymity will be maintained.

Signature of the researcher

I ……. Hereby consent to participate and undergo the study

Place:

Date: Signature of the participant

APPENDIX VIII

CERTIFICATE FOR ENGLISH EDITING

TO WHOMSOEVER IT MAY CONCERN

This to certify that the dissertation **"An experimental study to assess the effectiveness of normal saline flush and heparinized flush in maintaining the patency of intravenous lines in patients receiving IV medication at selected hospitals, Chennai"** by Ms.Uma Maheswari V, II Year M.Sc. (N) student, Apollo College of Nursing, was edited for English language appropriateness.

Signature

Mr. G. GODSON BEDEIAH.
M.A; M.B.A; M.Phil,
ASSISTANT PROFESSOR,
DEPARTMENT OF ENGLISH,
VELAMMAL INSTITUTE OF
TECHNOLOGY

APPENDIX IX

PLAGIARISM DETECTOR ORIGINALITY REPORT

Plagiarism Detector - Originality Report

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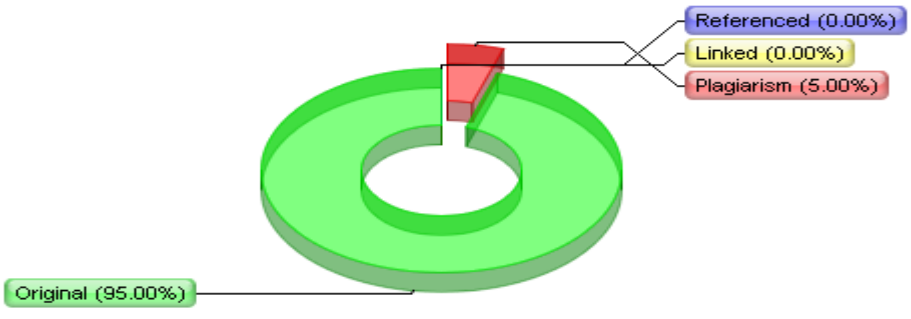

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Referenced 0% / Linked 0%

Original - 95% / **5% - Plagiarism**

APPENDIX X

DEMOGRAPHIC VARIABLE PROFORMA OF PATIENTS RECEIVING INTRAVENOUS MEDICATION

Purpose

This proforma is used to measure the demographic variables of patient such as age, sex, previous history of hospitalization and duration of hospitalization.

Instructions

The researcher collects the following information from the patient and records by asking question in the form of interview and observation. Please be frank and free in answering, it will be kept confidential and anonymity will be maintained.

Sample No: ☐

1. **Age in years**
   - 1.1. 20-30 ☐
   - 1.2. 31-40 ☐
   - 1.3. 41-50 ☐
   - 1.4. 51-60 ☐
2. **Sex**
   - 2.1. Male ☐
   - 2.2. Female ☐
3. **Residence**
   - 3.1. Urban ☐
   - 3.2. Sub urban ☐
   - 3.3. Rural ☐

4. Education

4.1. Illiterate ☐

4.2. Primary ☐

4.3. Secondary ☐

4.4. Higher secondary ☐

4.5. Graduates ☐

5. Income per month

5.1. Below Rs.5000 ☐

5.2. Rs.5000 – Rs.15000 ☐

5.3. Above 15000 ☐

6. Occupation

6.1. Professional ☐

6.2. Non professional ☐

7. Marital status

7.1. Married ☐

7.2. Unmarried ☐

7.3. Divorced ☐

7.4. Widow ☐

8. Previous history of hospitalization

8.1. Yes ☐

8.2. No ☐

9. Duration of hospitalization

9.1. 1 – 4 days ☐

9.2. 4 – 8 days ☐

9.3. 8 – 12 days ☐

9.4. > 12 days ☐

APPENDIX XI

CLINICAL VARIABLE PROFORMA FOR PATIENTS RECEIVING INTRAVENOUS MEDICATION

Purpose

This proforma is used to assess the clinical variables such as site of IV cannulation, type of IV cannula, type of fluid and other IV medication related informations.

Instructions

The researcher collects the following information from the records. the information will be filled by the researcher. Please be frank and free in answering. It will be kept confidential and anonymity will be maintained.

Sample no: ☐

1. **Diagnosis(specify)**
   - 1.1. Neurological disorders ☐
   - 1.2. Cardiovascular disorders ☐
   - 1.3. Respiratory disorders ☐
   - 1.4. Others ☐

2. **Reason for admission**
   - 2.1. Medical ☐
   - 2.2. Surgical ☐
   - 2.3. others ☐

3. Site		**Right arm**	**Left arm**
3.1.	Dorsum venous network	☐	☐
3.2.	Dorsal metacarpal vein	☐	☐
3.3.	Median cephalic vein	☐	☐
3.4.	Basilic vein	☐	☐
3.5.	Ulnar vein	☐	☐
3.6.	Anti cubital vein	☐	☐
3.7.	Radial vein	☐	☐
3.8.	Brachial vein	☐	☐

4. Size of IV Cannula

4.1.	16 G	☐
4.2.	18 G	☐
4.3.	20 G	☐
4.4.	22 G	☐

5. Type of IV fluid administered

5.1.	Blood	☐
5.2.	IV Fluids	☐
5.3.	Total parental nutrition	☐
5.4.	Drugs	☐

6. Rate of fluid flow

6.1.	Below 40 drops/min	☐
6.2.	Between 40 – 60 drops	☐
6.3.	Above 60 drops/ min	☐

7. The total volume of fluid received through one line per day

7.1. Less than 1000 ml ☐

7.2. 1000 – 2000 ml ☐

7.3. Above 2000 ml ☐

8. Duration of therapy

8.1. 24 – 48 hours ☐

8.2. More than 48 hours ☐

BLUE PRINT ON OBSERVATION CHECK LIST TO ASSESS THE EFFECTIVENESS OF NORMAL SALINE FLUSH AND HEPARINIZED FLUSH IN MAINTAINING IV LINE PATENCY

S.No	Categories	Items	Total Items	Percentage
1	Sign of IV line patency	1,11,13,14	4	26.7%
2	Sign of line disconnection	2,4,5,8	4	26.6%
3	Associated symptoms	3,6,9,10	4	26.7%
4	Sign of infection	7,12,15	3	20%
	Total	-	15	100%

APPENDIX XII

OBSERVATION CHECKLIST TO ASSESS THE INTRAVENOUS LINE PATENCY IN PATIENTS RECEIVING INTRAVENOUS MEDICATION

Purpose

This checklist provides information regarding the intravenous line patency before and after normal saline flush and heparinized flushes in patients receiving IV medications.

Instruction

This information will by filled by the researcher. Collected information will be kept confidential and anonymity will be maintained.

S.No	Item	Scores			
		1	2	3	4
1	**Patency of peripheral flow**	Fast free flow from saline pouch in drip set	Slow free flow from saline pouch in drip set	Flushes with difficulty	Complete resistance while flushing
2	**Level of Erythema around the IV cannula site**	Not present	Upto 1 cm around the site of insertion	>1 cm in proximal / distal area	> 2cm proximal/ distal area
3	**Tenderness around the IV insertion site**	Not present	Upto 2 cm around the site of insertion	>2cm – 4cm in proximal / distal area	>4cm in proximal/ distal area

4	**Swelling around the IV cannula site**	Not present	Upto 2 cm around the site	>2cm – 4cm in proximal/ distal area	>4cm in proximal/ distal area
5	**Leakage**	Not present	Leaks during IV infusion	Leaks and wets the dressing	Leaks obviously
6	**Hardness around the IV insertion**	Not present	Upto 2cm around the site of insertion	>2cm – 4cm in proximal/ distal area	>4cm proximal/ distal area
7	**Warmth**	Not present	Mild	moderate	Severe
8	**Colour around the insertion site**	No colour changes on the skin	Mild erythema	Erythema/ blanching	Paleness
9	**Pain around the IV Cannula site**	No pain	Experience of pain by touching	Experience of pain by movement	Experience of pain by when administering the flush
10	**Mobility of limb**	Normal range of motion	Normal with some restriction in activity	Minimal activity	No activity performed

11	**Backflow- elicited**	Back flow present with gravity	Backflow present when aspirated but not with gravity	Back flow present with some resistance when aspirated	No backflow Present during aspiration and to gravity
12	**Discharge**	No discharge	Watery discharge around the insertion site	Watery white discharge from and around the insertion site	Pus discharge from the insertion site
13	**Visible blood clot**	No visible blood clot	Few Small clots around the insertion site	Blood clots present in and around the insertion site	Blood clot in and around the site and present in the catheter also
14	**Need for change in line**	change of line after 72 hours	Change of line in 48 hours	Change of line in 24 hours	Line changed within few hours of insertion
15	**Hyperthermia**	No fever	Temperature 99* F	Temperature >101* F	Temperature >103* F

Scoring key:

Upto 15	:	No blockage
16– 30	:	Average blockage
31 – 45	:	Partial blockage
Above 45	:	Complete blockage

APPENDIX XIII

OBSERVATION CHECK LIST CODING SHEET

S.no	Items	Days	
		End of 2nd day (pre test)	End of 4th day (post test)
1	Patency of peripheral IV catheter		
2	Erythema around the IV cannula site		
3	Tenderness around the IV cannula site		
4	Swelling around the IV cannula site		
5	Leakage		
6	Hardness around the IV insertion site		
7	Warmth		
8	Colour around the insertion site		
9	Pain around the insertion site		
10	Mobility of limb		
11	Backflow- elicited		
12	Discharge		
13	Visible blood clot		
14	Need for change in line		
15	Hyperthermia		

BLUE PRINT ON RATING SCALE ON SATISFACTION OF NURSES ON EFFECTIVENESS OF NORMAL SALINE FLUSH & HEPARINIZED FLUSH IN MAINTAINING INTRAVENOUS LINE PATENCY

S.No	Content	Items	Total Items	Percentage
1.	Method of treatment	2,3,4,5	4	33.4%
2.	Benefit for patient	1,6,8,12	4	33.3%
3.	Characteristics of researcher	7,9,10,11	4	33.3%
	Total	**--**	**12**	**100%**

APPENDIX XIV

SATISFACTION SURVEY OF NURSES ON EFFECTIVENESS OF NORMAL SALINE FLUSH & HEPARINIZED FLUSH IN MAINTAINING INTRAVENOUS LINE PATENCY

Purpose

This rating scale is used to collect information on level of satisfaction by nurses on normal saline flush & heparinized flush in maintaining IV line patency among experimental group I & experimental group II.

Instructions

Respond to all questions listed below. Select one correct response & place tick mark in the respective bracket. Give your responses freely & frankly. Collected information will be kept confidential and anonymity will be maintained.

S.no	Item	Highly satisfied	Moderately Satisfied	Satisfied	Dissatisfied
1.	Are you satisfied with the bed side environment while doing procedure?				
2.	Whether you were satisfied with the method of intravenous flush?				
3.	Are you satisfied with the duration of the therapy?				
4.	Are you satisfied with the timing of the therapy?				

5.	Are you satisfied with the general cleanliness maintained during the therapy?				
6.	Are you satisfied with the outcome of patients?				
7.	Where you comfortable with the approach of the researcher?				
8.	Are you satisfied with the method flush used?				
9.	Are you satisfied with the method of communication by the researcher				
10.	Where the explanation given by the researcher about the therapy was satisfactory				
11.	Where are you satisfied with the method of evaluation by the researcher?				
12.	Are you satisfied with the cost effectiveness of the procedure?				

Scoring key:

Highly satisfied - > 75%

Moderately satisfied - 50% – 75%

Just satisfied - 25% - 50%

Dissatisfied - < 25%

APPENDIX XVII

DATA CODE SHEET

Experimental group I	**EG I**	**Diagnosis(specify)**	**DG**
Experimental group II	**EG II**	Neurological disorders	
Age in years	**AG**	Cardiovascular disorders	
20-30 yrs		Respiratory disorders	
31-40yrs		Others	
41-50yrs		**Reason for admission**	**RA**
51-60yrs		Medical	
Sex	**SX**	Surgical	
Male		Others	
Female		**Site**	**ST**
Residence	**RC**	Dorsum venous network	
Urban		Dorsal metacarpal vein	
Sub urban		Median cephalic vein	
Rural		Basilic vein	
Educational qualification	**EQ**	Ulnar vein	
Illiterate		Anti cubital vein	
Primary education		Radial vein	
Secondary education		Brachial vein	
Higher secondary education		**Size of IV Cannula**	**SC**
Graduate		16 G	
Income per month	**IC**	18 G	
Below Rs.5000		20 G	
Rs.5000 – Rs.15000		22 G	
Above Rs.15000		**Type of IV fluid administered**	**TIV**
Occupational status	**OS**	Blood	
Professional		IV Fluids	
Non professional		Total parental nutrition	
Marital status	**MS**	Drugs	
Married		**Rate of fluid flow**	**RF**
Unmarried		Below 40 drops/min	
Divorced		Between 40 – 60 drops	
Widow		Above 60 drops/ min	
Previous history of hospitalization	**PH**	**Total volume of fluid/ day**	**TV**
Yes		Less than 1000 ml	
No		1000 – 2000 ml	
Duration of hospitalization		Above 2000 ml	
1 – 4 days	**DH**	**Duration of therapy**	**DT**
4 – 8 days		24 – 48 hours	
8 – 12 days		More than 48 hours	
> 12 days			

APPENDIX - XVI

MASTER CODE SHEET

	EXPERIMENTAL GROUP I(NORMAL SALINE GROUP)																
	DEMOGRAPHIC VARIABLES									CLINICAL VARIABLES							
EG I	AG	SX	RC	EQ	IC	OS	MS	PH	DH	DG	RA	ST	SC	TIV	RF	TV	DT
1	1.2	2.2	3.1	4.5	5.1	6.2	7.2	8.1	9.1	1.1	2.3	3.2	4.2	5.2	6.1	7.1	8.2
2	1.1	2.2	3.1	4.2	5.2	6.2	7.1	8.2	9.1	1.1	2.1	3.2	4.2	5.2	6.1	7.2	8.2
3	1.3	2.2	3.2	4.4	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.2	5.1	6.1	7.3	8.2
4	1.4	2.2	3.3	4.4	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.1	6.1	7.1	8.2
5	1.1	2.1	3.1	4.5	5.1	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.2	6.1	7.1	8.2
6	1.1	2.1	3.1	4.4	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.2	5.2	6.2	7.1	8.2
7	1.2	2.1	3.1	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.3	6.2	7.1	8.4
8	1.1	2.2	3.1	4.2	5.2	6.2	7.1	8.2	9.2	1.1	2.3	3.1	4.3	5.3	6.1	7.3	8.1
9	1.1	2.1	3.1	4.1	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.3	6.2	7.1	8.2
10	1.2	2.1	3.2	4.4	5.1	6.2	7.2	8.3	9.2	1.2	2.2	3.2	4.1	5.1	6.1	7.1	8.4
11	1.2	2.1	3.2	4.4	5.2	6.2	7.2	8.2	9.1	1.1	2.1	3.2	4.2	5.2	6.1	7.1	8.4
12	1.2	2.1	3.1	4.5	5.1	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.1	7.3	8.2
13	1.2	2.1	3.1	4.5	5.1	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.2	7.1	8.4
14	1.2	2.1	3.1	4.5	5.2	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.3	6.1	7.3	8.2
15	1.2	2.1	3.2	4.5	5.2	6.2	7.2	8.2	9.2	1.2	2.2	3.2	4.2	5.3	6.2	7.1	8.2
16	1.2	2.1	3.1	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.2	3.2	4.1	5.1	6.2	7.1	8.1
17	1.1	2.2	3.1	4.3	5.2	6.2	7.1	8.2	9.1	1.1	2.3	3.2	4.3	5.1	6.1	7.1	8.2
18	1.1	2.1	3.1	4.5	5.2	6.2	7.3	8.1	9.2	1.1	2.3	3.2	4.3	5.2	6.2	7.1	8.2
19	1.2	2.2	3.1	4.3	5.2	6.2	7.1	8.2	9.2	1.2	2.2	3.2	4.1	5.1	6.2	7.2	8.4
20	1.2	2.2	3.1	4.3	5.2	6.2	7.2	8.2	9.1	1.1	2.3	3.2	4.2	5.2	6.2	7.1	8.2
21	1.2	2.1	3.2	4.3	5.2	6.2	7.1	8.2	9.2	1.1	2.2	3.2	4.1	5.2	6.1	7.3	8.2
22	1.2	2.2	3.2	4.2	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.2	6.2	7.1	8.3
23	1.2	2.1	3.2	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.1	7.1	8.2
24	1.2	2.2	3.2	4.5	5.1	6.2	7.2	8.2	9.1	1.1	2.3	3.2	4.2	5.2	6.2	7.3	8.2
25	1.1	2.1	3.1	4.2	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.1	5.2	6.1	7.1	8.2
26	1.2	2.2	3.3	4.2	5.2	6.2	7.1	8.2	9.1	1.1	2.3	3.2	4.1	5.2	6.2	7.1	8.2
27	1.1	2.1	3.1	4.3	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.2	5.1	6.1	7.2	8.2
28	1.2	2.2	3.3	4.3	5.2	6.1	7.1	8.2	9.1	1.1	2.3	3.3	4.2	5.1	6.1	7.3	8.2
29	1.1	2.1	3.3	4.3	5.2	6.2	7.2	8.1	9.2	1.1	2.2	3.2	4.1	5.3	6.1	7.1	8.2
30	1.2	2.2	3.1	4.2	5.2	6.1	7.1	8.2	9.1	1.1	2.2	3.2	4.3	5.1	6.1	7.3	8.2

	EXPERIMENTAL GROUP II(HEPARINIZED FLUSH)																
	DEMOGRAPHIC VARIABLES									CLINICAL VARIABLES							
EG II	AG	SX	RC	EQ	IC	OS	MS	PH	DH	DG	RA	SC	ST	TIV	RF	TV	DT
1	1.2	2.2	3.1	4.5	5.1	6.2	7.2	8.1	9.1	1.1	2.3	3.2	4.2	5.2	6.1	7.1	8.2
2	1.1	2.2	3.1	4.2	5.2	6.2	7.1	8.2	9.1	1.1	2.1	3.2	4.2	5.2	6.1	7.2	8.3
3	1.3	2.2	3.2	4.4	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.2	5.1	6.1	7.3	8.3
4	1.4	2.2	3.3	4.4	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.1	6.1	7.1	8.1
5	1.1	2.1	3.1	4.5	5.1	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.2	6.1	7.1	8.2
6	1.1	2.1	3.1	4.4	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.2	5.2	6.1	7.1	8.1
7	1.2	2.1	3.1	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.3	6.1	7.1	8.2
8	1.1	2.2	3.1	4.2	5.2	6.2	7.1	8.2	9.2	1.1	2.3	3.1	4.3	5.3	6.1	7.3	8.1
9	1.1	2.1	3.1	4.1	5.2	6.2	7.2	8.2	9.2	1.1	2.1	3.2	4.2	5.3	6.1	7.1	8.2
10	1.2	2.1	3.2	4.4	5.1	6.2	7.2	8.3	9.2	1.2	2.2	3.2	4.1	5.1	6.1	7.1	8.2
11	1.2	2.1	3.2	4.4	5.2	6.2	7.2	8.2	9.1	1.1	2.1	3.2	4.2	5.2	6.1	7.1	8.2
12	1.2	2.1	3.1	4.5	5.1	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.1	7.3	8.2
13	1.2	2.1	3.1	4.5	5.1	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.1	7.1	8.2
14	1.2	2.1	3.1	4.5	5.2	6.2	7.3	8.2	9.2	1.1	2.3	3.2	4.3	5.3	6.1	7.3	8.2
15	1.2	2.1	3.2	4.5	5.2	6.2	7.2	8.2	9.2	1.2	2.2	3.2	4.2	5.3	6.1	7.1	8.2
16	1.2	2.1	3.1	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.2	3.2	4.1	5.1	6.1	7.1	8.2
17	1.1	2.2	3.1	4.3	5.2	6.2	7.1	8.2	9.1	1.1	2.3	3.2	4.3	5.1	6.1	7.1	8.2
18	1.1	2.1	3.1	4.5	5.2	6.2	7.3	8.1	9.2	1.1	2.3	3.2	4.3	5.2	6.1	7.1	8.2
19	1.2	2.2	3.1	4.3	5.2	6.2	7.1	8.2	9.2	1.2	2.2	3.2	4.1	5.1	6.1	7.2	8.2
20	1.2	2.2	3.1	4.3	5.2	6.2	7.2	8.2	9.1	1.1	2.3	3.2	4.2	5.2	6.1	7.1	8.2
21	1.2	2.1	3.2	4.3	5.2	6.2	7.1	8.2	9.2	1.1	2.2	3.2	4.1	5.2	6.1	7.3	8.2
22	1.2	2.2	3.2	4.2	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.2	6.1	7.1	8.3
23	1.2	2.1	3.2	4.3	5.2	6.2	7.2	8.2	9.2	1.1	2.3	3.2	4.3	5.1	6.1	7.1	8.1
24	1.2	2.2	3.2	4.5	5.1	6.2	7.2	8.2	9.1	1.1	2.3	3.2	4.2	5.2	6.1	7.3	8.2
25	1.1	2.1	3.1	4.2	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.1	5.2	6.1	7.1	8.1
26	1.2	2.2	3.3	4.2	5.2	6.2	7.1	8.2	9.1	1.1	2.3	3.2	4.1	5.2	6.1	7.1	8.1
27	1.1	2.1	3.1	4.3	5.2	6.2	7.1	8.1	9.2	1.2	2.2	3.2	4.2	5.1	6.1	7.2	8.3
28	1.2	2.2	3.3	4.3	5.2	6.1	7.1	8.2	9.1	1.1	2.3	3.3	4.2	5.1	6.1	7.3	8.2
29	1.1	2.1	3.3	4.3	5.2	6.2	7.2	8.1	9.2	1.1	2.2	3.2	4.1	5.3	6.1	7.1	8.1
30	1.2	2.2	3.1	4.2	5.2	6.1	7.1	8.2	9.1	1.1	2.2	3.2	4.3	5.1	6.1	7.3	8.2

APPENDIX – XVII

PHOTOGRAPHS DURING ADMINISTRATION OF INTRAVENOUS FLUSH