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# "A Study to Assess the Effectiveness of Nursing Care Bundle on Risk of Superficial Thrombophlebitis Among Intravenous Cannulated Patients in Selected Hospitals, Krishnagiri"

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***Abstract***
***Background:***
*Intravenous (IV) therapy is a critical medical intervention, but it carries the risk of complications such as superficial thrombophlebitis. Evidence shows that a structured, evidence-based nursing care bundle can effectively reduce these complications and improve patient outcomes.*
***Objective:***
*This study aimed to assess the effectiveness of a Nursing Care Bundle on reducing the risk of superficial thrombophlebitis among intravenous cannulated patients admitted to selected hospitals in Krishnagiri.*
***Methods:***
*A true experimental posttest design was adopted. A total of 60 patients receiving IV therapy were randomly assigned into two groups: 30 patients in the study group and*
*30 in the control group. The study group received the Nursing Care Bundle intervention, consisting of six evidence-based practices: IV site assessment before insertion, selection of appropriate cannula size, aseptic site preparation, proximal massage with palm fisting exercises, proper cannula fixation, and continuous monitoring. The control group received routine care. Data were collected using structured questionnaires and the Visual Infusion Phlebitis (VIP) Scale. Post-test assessments were conducted on the third day of cannulation IV.*
***Results:***
*The findings revealed that in the study group, 53.3% of patients had no risk of thrombophlebitis post-intervention, compared to only 23.3% in the control group. Mild risk was present in 30% of the study group versus 56.7% in the control group. Moderate to severe risks were significantly higher in the control group. Statistical analysis using independent 't' tests showed a significant reduction in the risk of superficial thrombophlebitis in the study group ($p < 0.05$), supporting the hypothesis that the Nursing Care Bundle was effective. Additionally, associations were observed between risk levels and clinical variables such as duration of hospital stay, cannula size, and site of cannulation.*
***Conclusion:***
*The implementation of a Nursing Care Bundle significantly reduced the risk of superficial thrombophlebitis among IV cannulated patients. The study highlights the importance of incorporating structured nursing interventions into routine clinical practice to enhance patient safety, reduce complications, and improve the quality of care. Future research should focus on larger, multi-center studies to further validate these findings.*
***Keywords:***
*Nursing Care Bundle, Superficial Thrombophlebitis, IV Therapy, Patient Safety, Risk Reduction, Nursing Interventions.*

## I. INTRODUCTION

***"Massage is not luxury, It's a way to healthier happy Life"***

**Bobbie Shafer.**

Intravenous (IV) therapy is a cornerstone of modern healthcare, enabling the direct delivery of fluids, medications, nutrients, and blood products into the bloodstream. It is widely used for rapid drug administration in emergencies, fluid resuscitation, parenteral nutrition, and transfusion therapy, making it indispensable in clinical practice **(Martínez et.al., 2023).**

IV therapy requires the insertion of a cannula into a vein, either through central or peripheral access. Central

venous catheters are placed in large veins, while peripheral catheters are inserted into smaller veins of the extremities. The choice of catheter size and insertion site significantly influences patient outcomes. Using the smallest gauge catheter that meets therapeutic needs helps reduce vascular trauma, while larger, shorter catheters may be necessary when rapid infusion of fluids is required **(Robinson & Hayes, 2024).**

Successful venous access can be enhanced through methods such as applying a tourniquet, positioning the limb dependently, encouraging muscle contraction, or applying heat or topical vasodilators. Upper extremity veins are generally preferred due to accessibility and reduced risk of complications. Targeting straight venous segments or Y-shaped junctions further increases the likelihood of successful cannulation. Nearly 90% of hospitalized patients receive IV therapy, and about 20% encounter complications, highlighting the importance of early recognition and timely intervention to prevent adverse outcomes **(Nguyen et.al., 2023).**

The most common complications of peripheral IV therapy include phlebitis, infiltration, extravasation, and thrombophlebitis. Phlebitis manifests as localized pain, redness, and swelling, while infiltration results from non-vesicant fluid leakage into tissues, causing edema and discomfort. Extravasation, associated with vesicant agents, can lead to necrosis if untreated. Thrombophlebitis, a form of phlebitis with clot formation, may obstruct venous flow. Prevalence rates among cannulated patients vary widely, from 5% to 70%, with implications for patient safety, extended hospitalization, and healthcare costs **(Infusion Nurses Society, 2023).**

Certain solutions such as vasopressors, chemotherapy agents, and sclerosing drugs carry a high risk of tissue injury if administered peripherally due to extremes of pH (< 5 or > 9) or osmolarity (> 600 mOsm/L). These are best infused through central venous access, with peripheral use limited to emergencies. To reduce complications, evidence- based clinical bundles have been introduced, standardizing insertion and maintenance practices to enhance patient safety. Despite these advances, superficial thrombophlebitis continues to pose a challenge. Nurses play a critical role in prevention by adhering to best-practice protocols, which significantly reduce complication rates **(Silva & Turner, 2025).**

**NEED FOR THE STUDY:**

**Dos Santos et.al., (2023)** reported that the global incidence of phlebitis varies significantly, with rates of 17% in Australia, 18% in Saudi Arabia, 17.6% in Turkey, and 10% in Brazil. These variations were primarily associated with prolonged cannula dwell time and insertion near joints. They emphasized that standardization of insertion practices and surveillance protocols is essential to minimize global variability in phlebitis prevalence.

**Morales and Liang (2024)** stated that standardized nursing care bundles are highly effective in reducing IV-related complications by nearly 40%, particularly superficial thrombophlebitis. They highlighted that structured staff training, implementation of evidence-based protocols, regular auditing, and strong institutional leadership were critical success factors for sustained improvement.

**Fernanda et.al., (2022)** reported that the introduction of a structured five-element nursing bundle reduced thrombophlebitis rates from 22% to 8% within three months. The findings highlighted that simple and cost-effective interventions, when applied consistently, can drastically reduce the burden of IV therapy-related complications.

**Kedir Seid (2024)** reported from Ethiopia that the prevalence of phlebitis ranged between 27.9% and 70%. Inappropriate catheter size, lack of adequate training, prolonged dwell time, and absence of surveillance protocols were the strongest predictors of complications. Hospitals with stricter guidelines and timely cannula replacement practices reported significantly lower prevalence, highlighting the need for structured monitoring systems in resource-limited countries.

**Andree Zamunu (2023)** reported from Nepal that complication rates were as high as 83% when measured by patient assessment and 67% by cannula assessment. The infiltration, extravasation, and phlebitis were the most common complications, often linked to improper insertion techniques, poor securement, and inconsistent monitoring. It was emphasized that systematic surveillance and nurse education are urgently required to reduce the high burden of complications.

**Mona Sharma (2023)** reported in India that insufficient knowledge of aseptic techniques, poor cannulation skills, and inadequate site monitoring were directly associated with IV therapy complications. The geriatric and pediatric patients were more vulnerable due to fragile veins and comorbidities. The competency-based training and continuous professional development is to be incorporated to minimize preventable complications.

**Singh et.al., (2023)** reported that the prevalence of superficial thrombophlebitis in Indian hospitals ranged between 18% and 25%. Prolonged catheter dwell time, failure to replace cannulas on time, and non-adherence to aseptic protocols were the major risk factors. The superficial thrombophlebitis remains frequent but preventable if strict protocols are consistently followed.

**Patel and Reddy et.al., (2024)** stated that the implementation of care bundles in Indian hospitals led to a significant reduction in catheter-related bloodstream infections and thrombophlebitis. However, variations in protocol adherence and inconsistent nursing practices were barriers to achieving sustained results. It needs strict compliance, regular training, and reinforcement of evidence-based guidelines to ensure long-term benefits.

**Kraiwan Kaphen (2023)** reported that among IV cannulated patients in India, 2.41% of complications were classified as Grade 1 or Grade 2 phlebitis. The findings stated that patient age and drug type were significant determinants of phlebitis occurrence. It is emphasized that elderly patients require closer monitoring and that preventive measures must be tailored based on drug-related risk factors.
Emerging innovations, such as advanced vein visualization devices, antimicrobial catheters, and patient participation in cannula care, further strengthen vascular access safety. However, with limited studies focusing specifically on superficial thrombophlebitis, there remains a critical need to assess the effectiveness of nursing care bundles in preventing this complication. Guided by extensive literature and personal observation, the researcher seeks to evaluate a structured nursing intervention for IV cannulated patients admitted to selected hospitals.

**STATEMENT OF THE PROBLEM:**
A study to assess the effectiveness of Nursing care bundle on risk of superficial thrombophlebitis among intravenous cannulated patients admitted in selected hospitals, Krishnagiri.

**OBJECTIVES:**
- To assess the IV cannulation site for the risk of superficial thrombophlebitis among intravenous cannulated patients in the experimental group and the control group.
- To evaluate the effectiveness of Nursing care bundle on the risk of superficial thrombophlebitis among intravenous cannulated patients in the experimental group
- To find out the association between the risk of thrombophlebitis among intravenous cannulated patients with the selected demographic variables in the experimental group and control group.
- To find out the association between the risk of thrombophlebitis among intravenous cannulated patients with the selected clinical variables in the experimental group and control group.

**OPERATIONAL DEFINITIONS:**

**ASSESS:**
It refers to the measurement of the effect of a set of evidenced based nursing interventions on the level of risk for superficial thrombophlebitis among IV cannulated patients.

**EFFECTIVENESS:**
It refers to the expected positive change in the level of risk related to IV cannulation and its therapy with the implementation of the nursing care bundle.

**NURSING CARE BUNDLE:**

In this study it refers to the composite of six evidenced based nursing interventions formed by the researcher as a Nursing care bundle such as
- Assessment of the IV cannula site before insertion
- Selection of appropriate size of IV cannula
- Preparation of the site with aseptic techniques
- Proximal massage with palm fisting exercises
- Properly secure the IV cannula with transparent dressing.
- Health Education related to do's and dont's about IV therapy.

**RISK:**

It refers to the chance of developing the complications related to IV cannulation and its therapy. It is measured with Jackson's Visual Infusion Phlebitis scale and categorizes the level of risk into no risk, mild risk, moderate risk and severe risk.

**SUPERFICIAL THROMBOPHLEBITIS:**
It is the inflammation of the vein which is cannulated with IV cannula. It is presented as redness or erythema, pain, swelling, warmness, palpable venous cord along the IV site, Purulent discharge at the insertion site.
**INTRAVENOUS CANNULATED PATIENTS:**

It refers to the patients with IV cannulation for administration of fluids and drugs at the upper limbs for the medical treatment purpose.
**ASSUMPTIONS:**

- IV cannulation and IV therapy may have a varied level of risk for superficial thrombophlebitis.
- Nursing intervention may reduce the level of risk for superficial thrombophlebitis.

**HYPOTHESES:**

**H1:** There is a significant difference in the posttest level of risk for superficial thrombophlebitis among experimental group and control group with the implementation of Nursing care bundle.
**H2:** There is a significant association between the risk for developing thrombophlebitis with the selected demographic variables among the experimental group and control group.

**H3:** There is a significant association between the risk for developing thrombophlebitis with the selected clinical variables among the experimental group and control group.
**DELIMITATIONS:**

- The study is delimited to patients with IV cannulation.
- The study is delimited to 60 samples
- The study is delimited to 4 weeks period of data collection
- The study is delimited to selected Hospitals at Krishnagiri.

**PROJECTED OUTCOMES:**

- This study reveals the existing status of superficial thrombophlebitis among the patients with IV cannulation.
- This study would measure the effectiveness of nursing care bundles on risk of thrombophlebitis among the patients with IV cannulation.

## II. REVIEW OF LITERATURE

***"The literature review serves as a bridge, linking past research to current investigations and future possibilities."*** **(Brown & Davis, 2023)**
The **Review of Literature** is a critical component of any research study that provides a comprehensive summary of the existing body of knowledge on a particular topic. It involves an in-depth exploration and analysis of **previous research, theories, models**, and findings relevant to the research question or problem. A thorough search of databases, journals, and other relevant sources is conducted to gather all pertinent studies, books, articles, and reports related to the topic. **Review of literature related to various aspects of the study**
The review integrates the findings from various sources, showing connections, patterns, and relationships that literatures understanding of incidence, risk factors and nursing interventions related to IV therapy.
This chapter consists of three sections

**Section I:** Reviews related to the incidence of IV cannulation and its complications.
**Section II:** Reviews related to common risk factors related to IV cannulation and its complications.
**Section III:** Reviews related to nursing interventions and IV cannulation and its complications.
**Section I: Reviews related to the incidence of IV cannulation and its complications.**

**Jiménez-Martínez et.al., (2024)** conducted a retrospective cohort study on peripheral intravenous catheter failure, nurse staffing levels and care complexity individual factors All adult patients admitted to the hospitalization ward were included until the day of discharge. Patients were classified according to presence or

absence of PIVC failure of the 44,661 patients with a PIVC, catheter failure was recorded in 2,624 (5.9%) patients (2,577 [5.8%] phlebitis and 55 [0.1%] extravasation). PIVC failure was more frequent in female patients (42%), admitted to medical wards, unscheduled admissions, longer catheter dwell time (median 7.3 vs 2.2 days) and those with lower levels of nurse staffing coverage (mean 60.2 vs 71.5). About 6% of patients presented with PIVC failure during hospitalization. Several complex factors were associated with PIVC failure.

**Marsh N et.al., (2024)** conducted a systematic review and meta-analysis to determine the peripheral intravenous catheter related infections and failure rates globally. 69 observational studies and 28 randomized control trials were included from the database of Cochrane library, Pubmed, CINAHL and EMBASE. In these 478,568 PIVCs were studied as samples. The result proved that local infection was reported in 0.150 % of peripheral intravenous catheters (95 % CI: 0.047-0.479, 30 studies) with an incidence rate of 65.1 per 100,000 catheter-days (16 studies; 95 % CI: 49.2-86.2). Peripheral intravenous catheter failure before treatment completion occurred in 36.4 % of catheters (95 % CI: 31.7-41.3, 53 studies) with an overall incidence rate of 4.42 per 100 catheter days (78,891 catheter days; 19 studies; 95 % CI: 4.27-4.57).

**Noor Isnani et.al., (2024)** conducted a cross-sectional study in Hospital Tengku Ampuan Afzan and a random sample of hospital nurses was recruited. Totally 269 participants were involved in this study. All participants are required to answer socio- demographic background and perception on the risk factors of phlebitis that consist of ten multiple choice questions. The results showed majority of nurses, 75.8% (204), agreed that phlebitis is a significant problem, while 23.0% (62) thought phlebitis is a moderate problem, and only 1.1% (3) of nurses agreed that phlebitis is a minor problem. Nurses recognized some risk factors for phlebitis; however, more than half of the nurses were unaware that cannula material, size of the cannula, and the characteristics of fluid and drug can affect the development of phlebitis.

**Urbina et.al., (2024)** conducted a cross-sectional study to investigate the association between PIVC failure and care complexity factors in the emergency department. A total of 35 968 patients with one or more PVC inserted during their ED visit were included in the study. The period of study was from June 2021 to June 2022. All data were collected retrospectively from the electronic health records. A descriptive and inferential analysis was performed. The prevalence of PVC failure was 0.9% (n=316). The statistically significant CCIFs associated with PVC failure were incontinence, haemodynamic instability, transmissible infection, vascular fragility, anxiety and fear, impaired adaptation, consciousness disorders, lack of caregiver support and agitation.

**Silva EVC et.al., (2023)** conducted a randomized clinical trial to compare the incidence of phlebitis between patients with PICC and those with peripheral venous access catheter indwelling. Patients were randomized to PICC and control groups, with 40 patients in each group. The inclusion criteria were hospitalized patients with advanced heart failure, ejection fraction of <0.45, and platelet count of >50,000/mm3 and current use of continuous intravenous infusion of dobutamine. The patients were randomly assigned to receive a PICC or keep their peripheral venous access. Result stated that the median age was 61.5 years; ejection fraction, 0.24; and dobutamine dose, 7.73 μg/(kg min). Phlebitis occurred in 1 patient (2.5%) in the PICC group and in 38 patients (95.0%) in the control group, with an odds ratio of 0.10% (95% confidence interval: 0.01%-1.60%, $p < 0.001$).

**Yasuda et.al., (2022)** conducted a prospective multicenter cohort study about the risk factors for peripheral intravenous catheter phlebitis among the critically ill patients. A total of 1359 patients and 3429 PIVCs were included in the analysis population. The median dwell time was 46.2 h (95% confidence interval [CI], 21.3-82.9). Phlebitis occurred in 9.1% (95% CI, 8.2-10.1%) of catheters (3.5 cases/100 catheter days). The multivariate analysis revealed that the only factors that increased the risk of developing phlebitis were drugs administered intravenously. The analysis revealed that 4 drugs were associated with increased phlebitis: nicardipine (HR, 1.85; 95% CI, 1.29-2.66), noradrenaline (HR, 2.42; 95% CI, 1.40-4.20), amiodarone (HR, 3.67; 95% CI, 1.75-7.71) and levetiracetam (HR, 5.65; 95% CI, 2.80-11.4). Alternatively, factors significantly associated with a reduced risk of phlebitis were: standardized drug administration measures in the ICU (HR, 0.35; 95% CI, 0.17-0.76), 30≤ BMI (HR, 0.43; 95% CI, 0.20-
0.95), catheter inserted by a doctor as nurse reference (HR, 0.55; 95% CI, 0.32-0.94), and upper arm insertion site as forearm reference (HR, 0.52; 95% CI, 0.32-0.85). The nitroglycerin was associated with a reduced phlebitis risk (HR, 0.22; 95% CI, 0.05-0.92).

**Mitesh R Trivedi (2021)** reported that in Gujarat local complications significantly increased as the gauze of the vein flow increased in comparison to caliber of vein.

Complications like thrombophlebitis, redness and pain are 0.8 times less in peripheral catheter places over the forearm than compared to places at hand. Peripheral catheters have 0.8 times less risk of swelling and infiltration when served on forearm than hand. 40.92% of cases develop thrombophlebitis or redness or pain after 72 hours of peripheral catheter in situ. Swelling or infiltration observed in 27.02% cases after 72 hours of peripheral catheter in situ. 3 times cannulation on the same vein has higher risk of developing complications.

**Luyu LV et.al., (2020)** conducted meta-analysis to estimate the incidence of phlebitis with peripheral intravenous

catheter use and to identify risk factors for phlebitis development. Thirty-five studies were included (20,697 catheters used for 15,791 patients; age 57.1 years (95% confidence interval: 55.0, 59.2); 53.9% males (95%
confidence interval: 42.3, 65.5)). Incidence of phlebitis was 30.7 per 100 catheters (95% confidence interval: 27.2, 34.2). Incidence of severe phlebitis was 3.6% (95% confidence interval: 2.7%, 4.6%). Incidence of phlebitis was higher in non-intervened (30% (95% confidence interval: 27%, 33%)) than in intervened (21% (95% confidence interval: 15%, 27%)) groups, and with Teflon (33% (95% confidence interval: 25%, 41%)) than Vialon (27% (95% confidence interval: 21%, 32%)) cannula use. Odds of developing phlebitis was significantly higher in females (odds ratio = 1.42 (95% confidence interval: 1.05, 1.93); p = 0.02). Longer dwelling time, antibiotics infusion, female gender, forearm insertion, infectious disease, and Teflon catheter are important risk factors for phlebitis development identified by the included studies.

**Section II: Reviews related to common risk factors related to IV cannulation and its complications.**

**Ferraz-Torres M et al (2024)** conducted a randomized control trial Complications Related to the Securement Device in Peripheral Intravenous Catheters. A total of 281 patients requiring a peripheral intravenous catheter were randomized to receive partially reinforced dressings or fully reinforced dressings (dressings with integral catheter securement). Patients were followed throughout their entire catheter course, and complications included infection, occlusion, phlebitis, accidental dislodgement, extravasation, and medical adhesive-related skin injury. Results proved that the catheter outcome data were compared to determine whether statistically significant differences existed between the 2 groups. The groups had equivalent demographic characteristics and catheter indications. The average securement time with partially reinforced dressings was
2.72 days, and that for fully reinforced dressings was 2.64 days. However, catheters secured with fully reinforced dressings were associated with fewer total complications, such as infectious phlebitis (P = .043) and accidental dislodgement (P = .03). The fully reinforced securement device significantly reduced the rate of complications related to accidental dislodgement of the device and cases of infectious phlebitis.

**Kapan et.al., (2024)** conducted a cross-sectional descriptive study on the Prevalence and associated factors of Peripheral Intravenous Complications in a Thailand Hospital. The data were collected by 26 research assistants, who assessed the peripheral intravenous complications at 10 nursing sections at the Faculty of Medicine, Chiang Mai University, on December 17, 2021 using 3 data collection instruments. The study included a total of 441 patients treated in 10 nursing sections, with 497 peripheral IV catheter sites. Among them, 27.2021, ere patients with cancer, 38.0% had comorbidities, 55.5% were men, 43.3% were over the age of 60 years, and 5.6% were younger than 1 month. Phlebitis (level 1 and 2 only) was found at 2.41% of all sites; infiltration (level 1 and 2 only) occurred at 1.01% of all sites; and extravasation (mild and moderate only) was found at 0.60% of all sites.

**Kedir Seid et.al., (2024)** conducted a systematic review on incidence of peripheral intravenous cannula induced phlebitis and its determinants among the patients in Ethiopia. A literature survey was conducted using electronic databases (CINAHL, Embassy, Google Scholar, and PubMed), and 4 studies included. In that study, 1584 samples were present to know the incidence of phlebitis. Random effects meta-analyses were performed to obtain the overall and subgroup phlebitis incidence rates and odds ratio for phlebitis incidence. The incidence of phlebitis was 41 per 100 catheters (95% CI 0.22– 0.60). In the subgroup analysis, the incidence of phlebitis in neonatal and infant patients was 30% (95% CI 0.25–0.34), in pediatric patients was 34% (95% CI 0.29–0.38), and in adult patients was 50% (95% CI 0.11–0.89) respectively. Joint involvement in the PIVC (AOR: 2.44, 95% CI 1.67, 3.2), longer catheter dwell time (AOR = 3.96, 95% CI 1.59– 7.33), and drug and blood administration in one vein (AOR = 1.91, 95% CI 1.67–2.15) were the most common factors associated with the incidence of phlebitis in Ethiopia.

**Marsh N et.al., (2023)** conducted systematic review and meta-analysis about Peripheral intravenous catheter infection and failure. Our search retrieved 34,725 studies. Of these, 41 observational studies and 28 randomized controlled trials (478,586 peripheral intravenous catheters) met inclusion criteria. The pooled proportion of catheter-associated bloodstream infections was 0.028 % (95 % confidence interval (CI): 0.009-0.081), Local infection was reported in 0.150 % of peripheral intravenous catheters (95 % CI: 0.047-0.479, 30 studies) with an incidence rate of 65.1 per 100,000 catheter- days ( 95 % CI: 49.2-86.2). All cause peripheral intravenous catheter failure before treatment completion occurred in 36.4 % of catheters (95 % CI: 31.7-41.3,) with an overall incidence rate of 4.42 per 100 catheter days (78,891 catheter days; 95 % CI: 4.27- 4.57). It was concluded that Peripheral intravenous catheter failure is a significant worldwide problem, affecting one in three catheters.

**Masahiro et.al.,(2022)** conducted a post hoc analysis on risk factors for peripheral venous catheter related phlebitis stratified by BMI in critically ill patients at japan.A total of 1,357 patients and 3,425 PIVCs were included. The results showed that the mean BMI for all included patients was 22.8 (standard deviation 4.3) $kg/m^2$. Among the eligible PIVCs, 455; 2,041; and 929 were categorized as underweight, normal weight, and overweight/obese, respectively. In the underweight group, catheter size ≥ 18 G and amiodarone administration were independently associated with the incidence of phlebitis. Drug administration standardization was associated with the reduction of phlebitis. In the normal weight group, elective surgery as a reason for ICU admission, and nicardipine,

noradrenaline, and levetiracetam administration were independently associated with the incidence of phlebitis. Heparin administration was associated with the reduction of phlebitis. In the overweight/obese group, the Charlson comorbidity index, catheter size ≥ 18 G, and levetiracetam administration were independently associated with the incidence of phlebitis. Catheters made from PEU-Vialon (polyether urethane without leachable additives) and tetrafluoroethylene were associated with the reduction of phlebitis.

**Mohammad Suliman et,al., (2024)** conducted research on the Incidence of Peripheral Intravenous Catheter Phlebitis and Risk Factors among Pediatric Patients. An observational and cross-sectional design was used. Data such as the patient's demographics, medical diagnosis, place of admission, and other PIVC characteristics were recorded. In addition, observations of PIVC sites over 12-hour intervals were conducted to measure the complications using the Visual Infusion Phlebitis (VIP) scale. Over a period of six months, a sample consisting of 307 children from five governmental hospitals that are located in north and middle Jordan were targeted. The sample consists of patients under 12 years old with PIVCs who were hospitalized in pediatric departments.the result evidenced that PIVC catheterization has been associated with several complications such as phlebitis (*N* = 164; 53.4%), extravasation (*N* = 107, 34.9%), pain (*N* = 37; 12.1%), leakage (N = 37; 12.1%), and obstruction (*N* = 26; 8.5%). The main risk factors for phlebitis were children admitted to wards, PIVC inserted by novice nurses, catheter inserted in the lower limbs, and catheter with contaminated dressing.

**Nida Basheer et.al.(2024)** conducted a prospective cross-sectional study on incidence and associated risk factors for phlebitis among peripheral intravenous cannulation patients. 300 patients above 18 years of age with peripheral intravenous catheters (PIC) in place, were purposely selected from medical units, surgical units and intensive care units of SKIMS, Srinagar. Result showed that Incidence of phlebitis was found to be 25.33% in our study. The increased incidence rate of phlebitis was seen in the age group of 36->55 years, the female gender, IV drugs administration, large catheter size (18G), insertion in the dorsum of hand, catheters inserted in emergency situations, cannulation duration of 96 hours and family history of thrombophlebitis.

**Ngo Thanh Hai et.al.,(2024)** conducted a narrative review about the nursing management of patients with extravasation complications related to IV cannulation. Data were collected from PubMed, Cochrane Library, CINAHL, Scopus and Clinical practice guidelines developed by institutes, hospitals, associations, and cancer groups, based on systematic and evidence-based reviews. Results of the review stated that clinical practice guidelines have some similarities and differences in their scope, methods, recommendations, and quality. It provides evidence-based and standardized guidance for the prevention and management of extravasation, and to improve the quality and safety of intravenous therapy.

**Simoes et.al.,(2022)** conducted a post hoc analysis to identify risk factors for peripheral intravenous catheter-related phlebitis in adult patients.1,319 participants, 80 (6.1%) developed phlebitis. The following were associated with the occurrence of phlebitis among the samples. Reduced mobility ($p = 0.015$), family history of deep vein thrombosis ($p = 0.05$), catheterization of veins on the back of the hand ($p = 0.012$), pain ($p < 0.01$), Amoxicillin-Potassium Clavulanate ($p = 0.015$), and Omeprazole Sodium ($p = 0.029$).The study concluded that the risk factors for phlebitis involved intrinsic and extrinsic factors to the patient.

**Vivek Thakur et.al., (2021)** conducted research on incidence and risk factors for intravenous catheter related Thrombophlebitis. Totally 269 patients admitted to the Department of Medicine at IGMC Shimla, Himachal Pradesh were prospectively studied. Variables evaluated were age, gender, site and size of catheter, type of insertion and underlying medical conditions. Phlebitis was defined according to the grading scale (erythema, pain, tenderness, warmth, induration, palpable cord and swelling). Patients already suffering from thrombophlebitis at the time of admission, unconscious patients, patients with pre-existing septicemia, patients who were hemodynamically unstable, and patients who either cannulated in casualty or at periphery were excluded. All the study participants were examined for superficial thrombophlebitis every 24 hours, 48 hours, and at 72 hours.Phlebitis occurred in 53.09 percent of patients. There was no significant relationship between age, catheter bore size, other cannula related factors, hypertension, infections, and phlebitis. Related risk factors were male gender, diabetes mellitus, obesity, hyperlipidemia, smoking, alcohol intake and certain drugs like piperacillin +tazobactam, pantoprazole, mannitol, and D25

**Section III: Reviews related to nursing interventions and IV cannulation and its complications.**

**Xu et al. (2025)** conducted a research to evaluate the effectiveness of a multidisciplinary comprehensive nursing management approach for catheter-related bloodstream infections .A quality improvement team was established to implement various interventions, utilizing the FOCUS-PDCA continuous quality improvement model and fishbone diagram for analysis and improvement.After the interventions, operational indicators for catheter insertion, maintenance, and removal improved from 82.50% ± 1.15%, 83.60% ± 1.60%, and 81.60% ± 1.80-95.30% ± 1.00%, 96.20% ± 1.62%, and 97.25% ± 0.50%, respectively. Additionally, catheter dwell time decreased from 7.50 ± 0.85 days to 3.50 ± 0.75 days, and the quarterly infection rate was reduced from 2.328% ± 1.85-0.305% ± 0.95% following

the implementation of the intervention.

**Dobrescu A et.al., (2024)** conducted meta-analysis on effectiveness and Safety of Measures to Prevent Infections and Other Complications associated with Peripheral Intravenous Catheters. 105 studies were selected for the review. Results proved that wearing gloves reduced the risk of overall adverse events related to insertion compared with no gloves and catheter removal based on defined schedules potentially resulted in a lower phlebitis/thrombophlebitis incidence compared with clinically indicated removal in adults. In neonates, chlorhexidine reduced the phlebitis score compared with non- chlorhexidine-containing disinfection No statistically significant differences were found for other measures.

**Fernandez I et.al., (2024)** did a comparative review regarding Vascular access specialist teams (VAST) versus standard practice for catheter insertion and prevention of failure.The search strategy produced 3053 papers published between 1984 and 2020, from which 12 were selected for analysis. Results indicated that VAST is associated with a higher effectiveness in terms of first attempt insertions and insertion success rates, and a reduction in catheter-associated adverse events than routine practice. It is concluded that VASTS contributes to improving the health of patients during the administration of intravenous. VASTs seem to increase the effectiveness of VAD insertion and care and reduce complications.

**Mimoz O et.al., (2024)** had consensus about best practice in the use of peripheral venous catheters. A consensus process was applied to highlight the issues in need of increased awareness and to suggest possible improvements on General Statements, Indication, Preparation, Insertion, Maintenance, and Removal. An electronic survey was used to record agreement or disagreement; to expand the dataset, five additional French experts also answered the questions. Simplified, standardized, bundled solutions are needed to reduce avoidable harm from PIVCs.

**Alan N et.al., (2023)** conducted a prospective randomized control trial on Evaluation of Efficacy of Valsalva Maneuver During Peripheral Intravenous Cannulation on Pain. Total sample size was 110 allotted 55 for the experimental group and 55 for the control group by using blocked randomization to reduce bias and achieve balance according to age and gender. Pain was evaluated by using Numerical Rating Scale.

Systolic/diastolic blood pressure and heart rate before and after the PIVC placement was recorded. Valsalva maneuver provided to the experimental group and the routine care followed for the control group. The result proved that the patients in the intervention group had less severe pain during the PIVC insertion than the patients in the control group ($p < .001$). After PIVC placement, systolic blood pressure was significantly reduced in both groups ($p = .008$), no other variables changed significantly. No clinical complication related to the Valsalva maneuver occurred in the intervention group.It is suggested that the Valsalva maneuver can be used as a non-pharmacologic method to reduce pain during PIVC placement.

**Garcia-Expósito et.al., (2023)** conducted meta-analysis on Peripheral venous catheter-related phlebitis.The date of data collection was from December 2020 to May 2021. The selection criteria were based on the PICOS model. Twelve studies (726 patients) met the inclusion criteria. With respect to the decrease in the degree of phlebitis, ichthammol glycerine was found, followed by heparinoids. As for degree of pain, sesame oil obtained the most marked reduction. In terms of degree of infiltration, heparinoids and ichthammol glycerine were the only products to achieve a statistically significant reduction. The most important limitations are the low quantity and quality of the trials included. Insufficient data are available to draw valid conclusions about the efficacy of any treatment.

**Lima et.al., (2023)** scoping review to identify and analyze nursing interventions to prevent complications in adults with peripherally inserted central catheters (PICC).13 studies included after screening 170 articles. Data extraction focused on nursing interventions categorized into pre-procedure, during procedure, post-procedure, maintenance, and team management. The result emphasized the importance of standardized protocols, specialized training, and consistent patient education to prevent PICC-related complications.

**Pittiruti M et.al., (2023)** conducted a descriptive study about European recommendations on the proper indication and use of peripheral venous access devices. WoCoVA (World Conference on Vascular Access) have decided to adopt a systematic recommendations for clinical practice, covering every aspect of management of peripheral venous access devices in the adult patient: indication, insertion, maintenance, prevention and treatment of complications, removal.

**Santos-Costa P et.al., (2023)** did a scoping review on Implementation of evidence- based practice (EBP) to ensure high-quality nursing care based on the Joanna Briggs Institute recommendations, with a strategy adapted to different scientific databases/registers. In Portugal, nurses are responsible for care delivery to patients who require peripheral intravenous access Independent reviewers selected, extracted, and synthesized the data. Of the 2128 studies found, 26 were included in this review, published between 2010 and 2022. Result stated that though nurses are responsible for implementing EBP at an individual patient level, the studies conducted in Portugal reported that nonstandardized practices among professionals, with significant deviations.

**Corley A et.al., (2022)** did the review on Peripheral intravenous catheter securement. Nineteen studies met criteria, including 43,683 peripheral intravenous catheters. Non-Sterile tape was the most common intervention tested, alone or in multiproduct combinations. Non-Sterile tape directly over insertion sites was associated with

increased PIVC failure and complications. Sutureless securement devices potentially reduce failure and complications. Multiproduct combinations were very common.
Practice recommendations regarding other tapes and secondary securement products are challenging, due to conflicting, or lack of, evidence. Results confirmed that the nonsterile tape was associated with increased failure and complications. The results provide nurses with evidence of medical adhesive tapes and supplementary product effectiveness for peripheral intravenous catheter securement.
**Li J et.al., (2022)** conducted a multisite randomized clinical trial to compare the safety of replacing peripheral intravenous catheter as clinically indicated versus routine replacement on patient outcomes in the Chinese context. The 3050 participants from three hospitals in China were randomly assigned to clinically indicated or routine replacement groups. Patients in the clinically indicated group had the catheters kept in situ until any of the following clinical signs appeared: phlebitis, infiltration, occlusion, displacement, local infection and diagnosed catheter-related bloodstream infection. Patients in the routine replacement group had their peripheral intravenous catheters replaced every 96 hours. The outcomes of phlebitis, infiltration, occlusion, displacement; catheter-related bloodstream infection, all-cause bloodstream infection, and local infection were compared. A CONSORT checklist was used to guide the reporting of this RCT. The result proved that the risk phlebitis per 1000 catheter days, occlusion, dislodgement, all bloodstream infections, local infection and mortality between the two groups were not significantly different. The risk of infiltration was increased in the clinically indicated group (HR 1.29). There was no catheter-related bloodstream infection reported in either group. Patients' first peripheral intravenous catheter dwelling time and cumulative indwelling time of all peripheral intravenous catheters in the clinically indicated group were significantly longer than the routine replacement group.

**Atay S et.al., (2021)** did a randomized controlled prospective study aiming at investigating the effectiveness of use of transparent film dressing for peripheral intravenous catheter at the Internal Diseases clinic of a University Hospital in Turkey. Totally. 110 patients were included. The patient identification form, the peripheral venous catheter and treatment information form, and the visual infusion phlebitis identification scale were used to collect data. The samples in both the groups are comparable in terms of gender, having/not having a chronic disease, the site of peripheral intravenous catheter, use of antibiotics, intravenous fluid therapy, and mean age. The forms were completed by the investigators based on daily observations. The data were analyzed with the software SPSS 20.00. Results showed that there was a significant relationship between the dwell time for the catheter and development of any complications. It was suggested to use transparent film dressing for insertion of peripheral intravenous catheter as it increases the dwell time for the catheter and reduces incidence of complications.

## CONCEPTUAL FRAMEWORK

Conceptual framework is based on inter-related concepts that are assembled in the same rational scheme by virtue of their relevance to a common theme. Conceptual framework is a theoretical approach to the problem of the study that is scientifically faced and emphasizes the selection, arrangement and clarification of its sponsors. It states the functional relationship between events and is not limited to statistical relationships." The development of a conceptual framework is a fundamental process required before conducting actual research because It guides each stage of the process.
The conceptual framework selected for this study was based on **"Modified Imogene King's Goal Attainment Theory"** proposed by Imogene King in the year 1981. The Theory of goal attainment states that “Nursing is a process of action, reaction, and interaction by which nurse and client share information about their perception in a nursing situation” and “a process of human interactions between nurse and client whereby each perceives the other and the situation, and through communication, they set goals, explore means, and agree on means to achieve goals. The figure below represents a process of human interactions that lead to transactions: According to King, “The human process of interactions formed the basis for designing a model of transactions that depicted theoretical knowledge used by nurse researchers to help individuals and groups to attain goals.”

**Perception**

According to King, Perception is an important dimension of the personal system, and each person needs to have an accurate perception of his/her own and others' personal systems. In this present study both the nurse and the patient perceive the potential risk of superficial thrombophlebitis. This perception is shaped by the patient’s clinical history

(e.g., previous allergic reactions, current medical conditions) and the nurse’s assessment of the IV site and patient’s overall condition.

**Judgment**

Here the nurse researcher and the patient perceive and judge the situation based on the demographic and clinical variables. In this study

- **Demographic variables:**

Age, Gender, Educational status, Occupation, Religion, Socio Economic Status, Area of Residence.

- **Clinical Variables:**

Medical illness, Duration of Hospital Stay, History of Allergy, Nature of Drugs, Reason for IV therapy, Site of the IV Catheter, IV cannula Size.

**Action**

In King's theory, action involves a sequence of behaviors starting with mental actions (recognizing and understanding the problem) and then proceeding to physical actions (implementing interventions to address the problem). The nurse then takes action to reduce the risk of thrombophlebitis by implementing evidence-based practices of Nursing care Bundle. It includes the following set of interventions designed by the researcher.

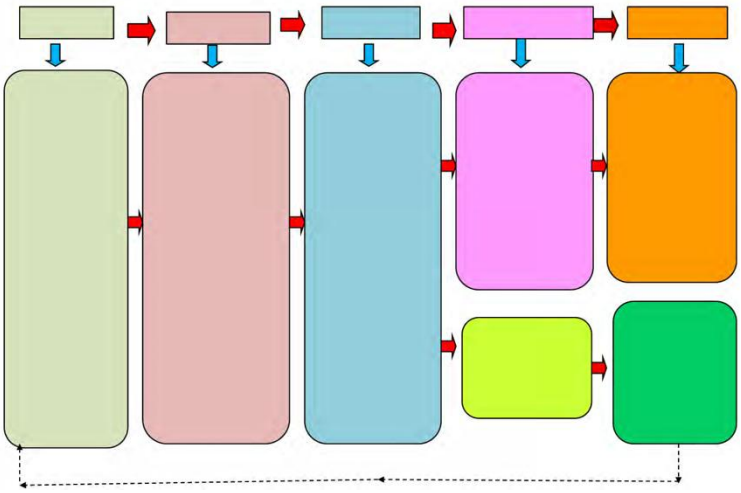
- Assessment of the IV cannula site before insertion
- Selection of appropriate size of IV cannula
- Preparation of the site with aseptic techniques
- Proximal massage with palm fisting exercises
- Properly secure the IV cannula in position
- Health Education related to do's and dont's of IV therapy.

**Interaction**

In the next stage, interaction, communication between a client and nurse researcher represented by verbal and nonverbal behaviors that are goal-directed happens. In the current study, after the nurse understands the level of risk, both interact in the nursing environment to set goals of action for attainment of the positive changes. Here in the study the nurse researcher and the client plan together to interact with each other to facilitate the implementation of the Nursing care bundle.

**Transaction**

Transaction ensues after interaction in which nurse researchers and clients work together in implementing the nursing intervention in their environment to achieve their goal and ascertain it. In this study it refers to actual implementation of nursing intervention for the experimental group and the control group received the routine care. The transaction also involves evaluation. In this study evaluation refers to the post-test assessment of level of risk for superficial thrombophlebitis with Jackson's Visual Infusion Phlebitis scale after the implementation of the nursing care bundle.



## III. RESEARCH METHODOLOGY

***"A rigorous methodology is the foundation upon which valid and reliable conclusions are built."*** **(Morris, 2022)**

Research methodology is a way to solve problems systematically. It indicates the general pattern of organizing the procedures for gathering valid and reliable data for the investigator. **(Polit and Beck, 2021)**

This chapter deals with a brief description of different steps which will be taken by Investigation for the study. It includes research approach, research design, variables, setting, population, sampling techniques, sampling size, description of tools and data collection procedure.

**RESEARCH APPROACH:**

A quantitative research approach was adopted for this study.

**RESEARCH DESIGN:**

Research design refers to an overall plan for obtaining answers to research questions and it spells out the strategies that the research adopts to develop information that is adequate, accurate, objective and interpretable**. (Polit,2013).**

Quasi experimental **posttest only design** was adopted for this study.

**X - Nursing care bundle O1 - Post test**

| ~~LEVEL OF TEST~~ | ~~INTERVENTIONS~~ | ~~POST TEST~~ |
|---|---|---|
| Experimental group | X | O1 |
| Control group | - | O1 |
| | | |

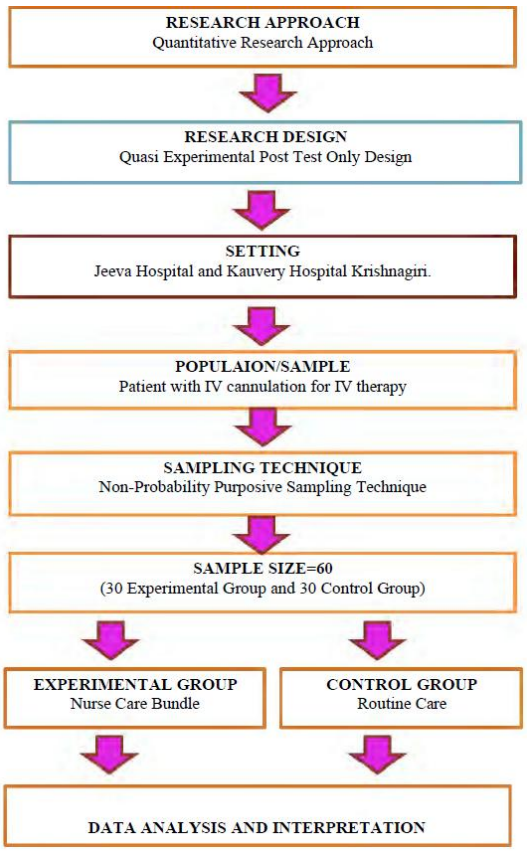



**FIG NO:3.1SCHEMATIC REPRESENTATION OF RESEARCH METHODOLOGY**

**SETTING:**

The study was conducted in Jeeva hospital and Kauvery hospital located at Krishnagiri. Jeeva Hospital is selected for the experimental setting. This hospital is a 200 bedded hospital with all specialization. Every month 200 inpatients get admitted for medical ailments. Around 110 patients get IV therapy for medications and fluid administration. Kauvery Hospital is selected for Control setting. Kauvery Hospital is a 150 bedded multispecialty hospital with Medical, Surgery, Paediatrics and OBG departments. Approximately 100 patients get IV therapy per month for varied medical purposes. The average length of hospital stay is 4-6 days. In both centres.

**POPULATION:**
Population is the set of people or entities to which the results of research are to be generalized (Suresh.K.Sharma). The population of the present study was patients with IV cannulation for IV therapies.
**Target Population:**

The target population is the entire population in which the researcher is interested and to whom they would like to generalize the research findings.The patients who were receiving IV therapy for medical treatment at selected hospitals in Krishnagiri was the target population in this study.

**Accessible Population:**

Accessible population is the aggregate of cases that conform to designated inclusion or exclusion criteria and that are accessible as subjects of the study. The study population comprises patients with IV cannulation for IV therapy who were admitted in Jeeva hospital and Kauvery hospital at Krishnagiri.

**SAMPLE:**

A sample may be defined as a representative unit of a target population , which is to be worked upon by researchers during their study. (Suresh .K. Sharma). The samples are patients with IV cannula for IV therapy in Jeeva Hospital and Kauvery Hospital and who fulfills the inclusion criteria.

**SAMPLING TECHNIQUE:**

The sample are patient the process of selecting a portion of the population to represent the entire population (polit and Hungler 1999). Non-Probability purposive sampling technique is adopted.
**SAMPLE SIZE:**

Sample size analyzed using power analysis with alpha = 0.05 and beta = 0.2. Power 80%

- The sample size was calculated to be 54, the value was rounded up to 60.
- Expecting the 10% attrition rate.
- The total sample size was 60. In those 30 samples for the experimental group and 30 samples for the control group.

**CRITERIA FOR SAMPLE SELECTION**: **INCLUSION CRITERIA**

- Patients between the age group of 30-40 years.
- Patients of both Gender
- Patients with Peripheral IV catheter on lower arms.
- Patients receiving IV drugs and Fluid Administration.
- The patient has a hospital stay for 3 days with IV cannulation.

**EXCLUSION CRITERIA**

- Patients with critical illness.
- Patients admitted for surgery

- Patients with vascular disorders.
- Patients receiving chemotherapy and blood transfusion.
- Patients with multiple comorbidities.

**VARIABLES INDEPENDENT VARIABLE:**
It is a presumed cause or stimulus or activity that is manipulated or varied by the researcher to create the effect on the dependent variable. In this study, the independent variable is Nursing care bundle includes assessment, appropriate selection of IV cannula, Aseptic insertion of cannula, Proximal massage with fist exercise, secure the cannula and health education.

**DEPENDENT VARIABLES**

It is a presumed effect or outcome or response due the effect of an exercise, which research wants to predict or explain. In the present study the dependent variable is risk of superficial thrombophlebitis among the patient with IV cannulation.

**DEVELOPMENT AND DESCRIPTION OF THE DATA COLLECTION INSTRUMENTS:**
The instruments for data collection consist of the following 3 sections as follows.

**TOOLS FOR DATA COLLECTION:**

**SECTION I** : Demographic Variables

**SECTION II** : Clinical Variables

**SECTION III** : Jackson's Visual Infusion Phlebitis (VIP) Scale

**DEVELOPMENT AND DESCRIPTION OF THE TOOL:**

The research instrument is developed in English after extensive review of literature and expert opinion. The investigator used structured demographic Questionnaire, Structured Clinical questionnaires and Standardized tool Jackson's Visual Infusion Phlebitis (VIP) Scale.
It consists of the Following 3 Sections:

**SECTION I** : Demographic Variables consists of demographic variables like Age, Gender, Education, Occupation, Religion, Socioeconomic Status and Residence
**SECTION II**: Clinical Variables consists of clinical questions like medical illness, Duration of Hospital Stay, History of Allergy, Nature of Drugs, Reason for IV therapy, Site of the IV catheter, IV cannula Size, Duration of IV cannulation,
**SECTION III: Jackson's Visual Infusion Phlebitis (VIP) Scale**. It is a proprietary clinical tool originally developed by Jackson. Open access tool. It consists of 0-5 scoring. It is used to assess the level of risk for the development of superficial thrombophlebitis at clinical settings.

**GRADING OF SCORES:** it consists of 5 scores.

| Grade | Clinical Criteria |
|---|---|
| 0 | No symptoms |
| 1 | Pain or Erythema at Intravenous site |
| 2 | Pain at Intravenous site with Erythema or Swelling |
| 3 | Pain at Intravenous site with Erythema and Swelling with palpable venous cord |
| 4 | Pain at Intravenous site with Erythema, Swelling and palpable venous cord >1cm |
| 5 | Purulent discharge at Intravenous site along with all signs of grade 4 thrombophlebitis |

**Grading Interpretation:**

| SCORE | INTERPRETATION |
|---|---|
| 0 | No Risk |
| 1-2 | Mild Risk |
| 3-4 | Moderate Risk |
| 5 | Severe Thrombophlebitis |

**ETHICAL CONSIDERATION:**

- Formal ethical clearance was obtained before collecting data in the institutional review committee and in study setting.
- Informed written consent was obtained from the study participants.
- Confidentiality, anonymity and safety of the patient was maintained throughout the study.
- The patients have the freedom to withdraw from study at any time.
- No physical and psychological harm was caused during the study.

**VALIDITY:**
Validity refers to the degree to which an instrument measures what it is supposed to measure (polit and Hungler 2013). Content validity was obtained from two experts in Medical Surgical Nursing. The tool was found adequate and minor suggestions regarding organization of questions were given by the experts after incorporating the suggestions the tool was finalized and used for the study

**RELIABILITY:**
Reliability refers to the consistency, stability, and dependability of a measurement tool, instrument, or test over time**.** The reliability of the research tool was verified by using Inter rater reliability method. The 'r' value of Jackson's Visual Infusion Phlebitis scale was 0.9. Hence the tool is highly reliable, and the tools can be used for the main study.

**PILOT STUDY**:
A pilot study is a small-scale, preliminary version of a full research study conducted to test the feasibility, design, methods, and instruments before the main study is carried out. Prior to data collection the written consent obtained from the authorities of the institution. The study was conducted in Om Sakthi Hospital, Krishnagiri for the experimental group, and TCR Hospital, Krishnagiri for the control group. Data collected from 11.11.2024 to 17.11.2024. The selection of samples was based on inclusion criteria. 10 samples were selected through purposive sampling techniques. Five samples from each Centre for the experimental and control group. Each individual subject was informed about the purpose of the study.
Informed consent obtained from the sample in written form. Demographic and clinical data were collected for both the experimental group and control group. A Nursing Care bundle was provided to the samples, and routine care was followed for the control group. Post test done on 3rd day with the Jackson's Visual Infusion Phlebitis scale. The result showed that the study and tool were feasible for the main study.

**DATA COLLECTION PROCEDURE:**

60 samples were selected by using Nonprobability Purposive sampling technique 30 in each group. Each sample was explained about the purpose of the study. Data was collected at JEEVA HOSPITAL and KAUVERY HOSPITAL KRISHNAGIRI from 09.12.2024 to 08.01.2025.

- 60 samples were selected by using Non probability Purposive sampling technique in two settings. 30 samples for the experimental group in Jeeva Hospitals Krishnagiri and another 30 samples for the control group in Kauvery Hospitals, Krishnagiri.
- Each sample was explained about the purpose of the study. Written consent obtained from each sample. Approximately 4 - 5 samples were selected per day.

- Get Introduced with the samples. Demographic and Clinical variables were assessed.
- Nursing care bundle intervention was provided to the experimental group for initiating IV therapy and followed for 3 days. Routine care was provided for the control group.

## 1. ASSESSMENT OF THE IV CANNULA SITE BEFORE INSERTION

❖ Screen for allergies to chlorhexidine/iodine/latex and for limb contraindications (e.g., lymphoedema, AV fistula, post-mastectomy, cellulitis).
❖ Review therapy requirements (pH, osmolarity, viscosity, rate, vesicant status) and patient factors (DIVA history, prior failed attempts).
❖ Inspect and palpate veins; prefer a healthy, straight, compressible vein in the distal forearm/hand; avoid areas of flexion if possible. If DIVA suspected, plan vascular- visualization (transilluminator or ultrasound) and escalate early.
❖ Position the limb dependent; apply a clean tourniquet 10–15 cm above the intended site; consider brief warming (3–5 min).

## 2. SELECTION OF APPROPRIATE SIZE OF IV CANNULA

❖ Use **the smallest gauge that safely accommodates the prescribed therapy** and anticipated flow (e.g., 22–24G for routine fluids/antibiotics; 18–20G for rapid infusions/blood products if clinically indicated).
❖ Match catheter length and site to vein quality and mobility; avoid oversizing relative to vein diameter. When available, use ultrasound to select a vein with adequate diameter.
❖ Aim for a low catheter-to-vein ratio; vascular-access literature commonly cites

**≤45%** as an upper threshold (strongly established for PICCs; principle applies to avoiding oversized PIVCs).

## 3. PREPARATION OF THE SITE WITH ASEPTIC TECHNIQUES

❖ Perform hand hygiene done with clean gloves use **aseptic non-touch technique (ANTT)**.
❖ Cleanse skin with **single-use applicator of 2% chlorhexidine in 70% isopropyl alcohol**; scrub with friction for 30 seconds and **allow to air-dry completely**.
❖ If CHG is contraindicated, use **70% alcohol** or **alcoholic povidone-iodine**, per guideline.
❖ After antisepsis, **do not replate** the site unless using sterile gloves.
❖ Maintain a clean field; keep all protective caps closed until use.

## 4. PROXIMAL MASSAGE WITH PALM FISTING EXERCISES (VEIN DILATION FACILITATION)

❖ With tourniquet applied and limb dependent, ask the patient to **open–close the first repeatedly for ~10 cycles**.
❖ Use **gentle distal-to-proximal stroking ("milking")** over the selected vein to encourage filling; **avoid tapping/slapping** (can cause vasoconstriction/tissue irritation).
❖ Consider brief **warmth** (3–5 min) if veins are poorly visible/palpable.

## 5. PROPERLY SECURE THE IV CANNULA IN POSITION

❖ Confirm flashback, advance catheter, release tourniquet, connect primed extension set **flush to confirm patency**.

❖ **Stabilize the hub** (avoid pitoning) and apply a **sterile, transparent semipermeable dressing** with the insertion site visible.
❖ Add **engineered stabilization device (ESD)** or bordered securement dressing if available; create a **strain-relief loop** and anchor tubing to skin.
❖ Label dressing (date/time/gauge/initials).
❖ Document insertion details, vein/site, attempts, patient tolerance, and education provided.

## 6. HEALTH EDUCATION: DO'S AND DON'TS OF IV THERAPY (PATIENT-FACING)

**Do's (teach the patient/caregiver)**

- **Keep the dressing clean, dry, and intact**; tell staff if it becomes wet, dirty, loose, or blood-stained.
- **Report immediately**: pain, burning, stinging, swelling, redness, leakage, coolness/warmth, or fever/rigors.
- **Protect the cannula from knocks/pulling**; wear watches/jewelry on the opposite hand/arm; use loose sleeves.
- Ask how to **wash/shower safely**; pat the dressing dry if splashed (don't soak).
- Notify staff if alarms sound or infusion seem slower/faster than expected.

**Don'ts**

- Don't **touch or pick** at the dressing or connectors; don't clamp/uncap lines yourself.
- Don't **sleep on** the cannulated arm or let children pull at lines.
- Don't try to **reinsert or remove** the cannula yourself if it dislodges—seek help.
- Post test done on 3rd day with the Jackson's Visual Infusion Phlebitis scale for both the groups.

**PLAN FOR DATA ANALYSIS:**
In this study descriptive & Inferential stat, Percentage, Frequency, and Standard deviation and inferential statistics such as Chi square, Correlation coefficient and 't' test were used for data analysis.

| S.No | DATA ANALYSIS | METHODS | REMARKS |
|---|---|---|---|
| 1 | Descriptive statistics | Frequency, Percentage distribution,Mean and Standard Deviation. | To describe the demographic variable and clinical variables |
| 2 | Inferential Statistics | Paired "t" test | To evaluate the effectiveness of Nursing care bundle on risk of superficial thrombophlebitis |
| | | Chi-square test | To find out the association between risk for superficial thrombophlebitis with the selected demographic and clinical variables . |

**SUMMARY:**
This chapter dealt with the methodology of the study. It consists of research approaches, research design, population, setting, sampling, variables, and description of the tool, validity and reliability, pilot study, method of data collection

## IV. DATA ANALYSIS AND INTERPRETATION

**"Sound interpretation transforms raw data into meaningful insights that drive credible conclusions."-Patel (2023)**
This chapter deals with analysis and interpretation of the data on effectiveness of Nursing care bundle on risk for superficial thrombophlebitis among the patients with IV cannulation.
Polit and Hungler (2006) states that statistical analysis helps the researcher to make sense of quantitative

information, Statistical Procedure enables researchers to summarize, evaluate, interpret and communicate numeric information.
The data collected through structured questionnaires and Jackson's VIP (Visual Infusion Phlebitis) scale were analyzed using descriptive and inferential statistics which are necessary to provide substantive summary by the results in relation to the objectives.

**PRESENTATION OF DATA:**
The data were organized and analyzed under the following section.

**SECTION A:**
Frequency and Percentage Distribution of samples according to the demographic and clinical variables.
**SECTION B:**
Comparison of posttest level of the risk for superficial thrombophlebitis among the experimental group and control group.

**SECTION C:**

**TESTING HYPOTHESES:**

a) Effectiveness of Nursing care bundle on risk for superficial thrombophlebitis among the patients admitted with IV cannulation.
**SECTION D:**

**TESTING HYPOTHESES:**

a) Find the association between the risk for superficial thrombophlebitis among the patients with IV cannulation with the selected demographic variables.
b) Find the association between the risk for superficial thrombophlebitis among the patients admitted with IV cannulation with the selected clinical variables.

**SECTION - A**

**Frequency and Percentage Distribution of samples according to the demographic and clinical variables.**
**Table 4.1:** The Frequency and Percentage Distribution of samples according to the demographic variables. **(N=60)**

| S.No | DEMOGRAPHIC VARIABLES | EXPERIMENTAL GROUP | | CONTROL GROUP | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| 1. | **AGE (in years)** | | | | |
| | a. 20-25 | 4 | 13.3 | 8 | 26.7 |
| | b. 26-30 | 16 | 53.3 | 14 | 46.7 |
| | c. 31-35 | 10 | 33.4 | 8 | 26.6 |

| | | | | | |
|---|---|---|---|---|---|
| **2.** | GENDER | | | | |
| | a. Male | **18** | **60** | **14** | **46.7** |
| | b. Female | **12** | **40** | **16** | **53.3** |
| **3.** | **EDUCATION** | | | | |
| | a. Illiterate | **5** | **16.7** | **5** | **16.7** |
| | b. Secondary | **6** | **20** | **5** | **16.7** |
| | c. Higher secondary | **5** | **16.7** | **8** | **26.6** |
| | d. Graduate | **10** | **33.3** | **9** | **30** |
| | e. Post graduate | **4** | **13.3** | **3** | **10** |
| **4.** | **OCCUPATION** | | | | |
| | a. Self employment | **7** | **23.3** | **9** | **30** |
| | b. Private employment | **14** | **46.7** | **13** | **43.3** |
| | c. Government employment | **9** | **30** | **8** | **26.7** |
| **5.** | **RELIGION** | | | | |
| | a. Hindu | **13** | **43.3** | **16** | **53.4** |
| | b. Muslim | **5** | **16.7** | **7** | **23.3** |
| | c. Christian | **12** | **40** | **7** | **23.3** |
| **6.** | **SOCIO ECONOMIC STATUS** | | | | |
| | a. Upper | **4** | **13.3** | **2** | **6.6** |
| | b. Middle | **16** | **53.4** | **17** | **56.7** |
| | c. Lower | **10** | **33.3** | **11** | **36.7** |
| **7.** | **AREA OF RESIDENCE** | | | | |
| | a. Urban | **5** | **16.7** | **7** | **23.3** |
| | b. Rural | **25** | **83.3** | **23** | **76.7** |

In the experimental group, most participants (53.3%) fell within the 26-30 age range, followed by 33.4% in the 31-35 age range, and 13.3% in the 20-25 age range. In the control group 46.7% in the 26-30 age range, and an equal proportion (26.7% and 26.6%) in the 20-25 and 31-35 age ranges, respectively.

Pertaining to Gender, among the experimental group 18 (60%) male, 12(40%) female and in control Group: 14(46.7%) male, 16(53.3%) female. With regard to education, both groups have diverse educational backgrounds. Graduates form the largest subgroup in experimental group 10 (33.3%) and in control group 9 (30%).

Regarding Occupation, private employment is most common in both groups, that is 14 (46.7%) experimental group and 13 (43.3%) control group. Related to Self- employment 7 (23.3%) in the experimental group and 9 (30%) in

the control group were doing business.
Regarding the religion among the experimental group 13 (43.3%) were Hindus, 5 (16.7%) were Muslims and 12 (40%) were Christians. Similarly majority 16 (53.4%)
were Hindus, 7 (23.3%) were Muslims and 7 (23.3%) were Christians.

Pertaining to Socioeconomic Status among the experimental group 4 (13.3%) were in the upper class,16 (53.4%) was middle class and 10 (33.3%) of them were in lower class. Similarly, among the control group 2(6.6%) were in the upper class,17(56.7%) was middle class and 11(36.7%) of them were in the lower class.
Regarding Area of Residence, rural residents form the majority in both groups 25(83.3%) in the experimental group and 23(76.7%) were in the control group. 5(16.7%) and 7(23.3%) were Urban residents belonging to the experimental group and control group respectively.

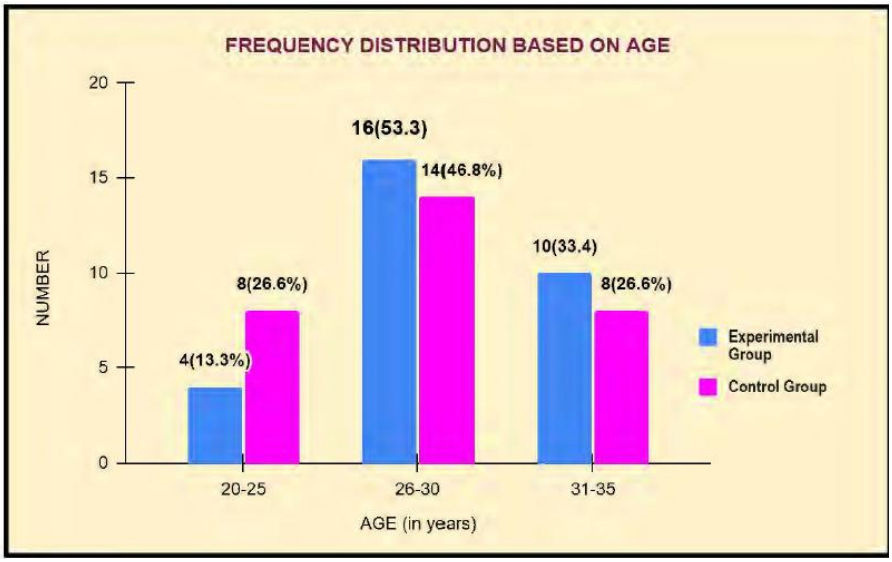



**Fig No.4.1: Frequency and Percentage distribution based on AGE**

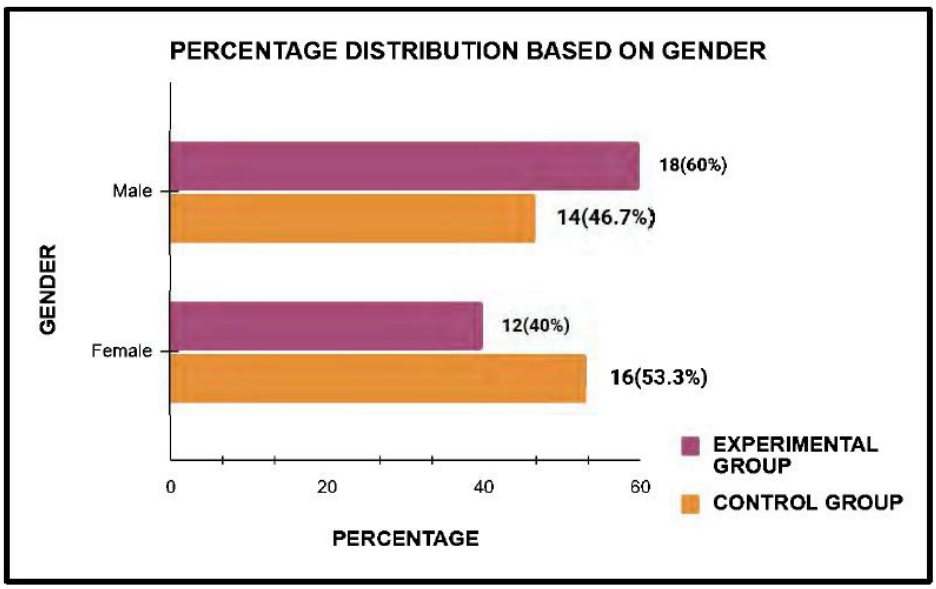



**Fig No.4.2: Frequency and Percentage distribution based on GENDER**

**Table 4.2: Frequency and Percentage Distribution of samples according to the clinical variables. (N=60)**

| S. NO | CLINICAL VARIABLES | EXPERIMENTAL GROUP | | CONTROL GROUP | |
|---|---|---|---|---|---|
| | | f | % | f | % |
| 1. | MEDICAL ILLNESS | | | | |
| | a. Yes | 30 | 100 | 30 | 100 |
| | b. No | 0 | 0 | 0 | 0 |
| 2. | DURATION OF HOSPITAL STAY | | | | |
| | a. 3-4 DAYS | 14 | 46.7 | 12 | 40 |
| | b. 4-5 DAYS | 9 | 30 | 10 | 33.3 |
| | c. >5 DAYS | 7 | 23.3 | 8 | 26.7 |
| 3. | HISTORY OF ALLERGY | | | | |
| | a. Yes | 6 | 20 | 3 | 10 |
| | b. No | 24 | 80 | 27 | 90 |
| 4. | NATURE OF DRUGS | | | | |
| | a. Irritable drugs | 2 | 6.7 | 2 | 6.7 |
| | b. Non Irritable drugs | 28 | 93.3 | 28 | 93.3 |
| 6. | SITE OF IV CATHETER PLACEMENT | | | | |
| | a. Dorsum of the hand | 3 | 10 | 5 | 16.7 |
| | b. Forearm | 27 | 90 | 25 | 83.3 |
| 7. | SIZE OF THE IV CANNULA | | | | |
| | a. 18 G | 3 | 10 | 4 | 13.3 |
| | b. 20 G | 27 | 90 | 26 | 86.7 |

This table compares various clinical variables between the experimental group and the Control Group. Regarding the Medical Illness, in the experimental group 30 (100%) were reported to have some form of medical illness. In the Control Group 30(100%) they have medical illness.

Pertaining to the Duration of Hospital Stay among the experimental group 14 (46.7%) stayed for 3-4 Days. whereas in control group 12 (40%) stayed for 3-4 days. 9 (30%) of the experimental group and control group 10 (33.3%) stayed in the hospital for 4-5 days. In experimental group 7 (23.3%), Control Group 8 (26.7%) stayed more than 5 days.

Related to the History of Allergy 6 (20%) of the participants in the experimental group and 6 (20%) stated Yes. whereas 24 (10%) in the experimental group and 27 (90%) in the control group stated NO.

With regard to Nature of Drugs, both the experimental group and control group (6.7%) received irritable drugs

and 28 (93.3%) received non irritable drugs.
About the Site of IV Catheter Placement 1(3.3%) of experimental group, 5(16.7%) of control group had IV cannulation over the dorsum of hand and remaining 27(99%) of the experimental group and 25(83.3%) of the control group had it over the forearm.
Regarding the Size of IV Cannula in the experimental group 3 (1%) and control group 4 (13.3%) had 18G size cannula. Similarly, 27(99%) and 26 (86.7%) had 20G cannula.

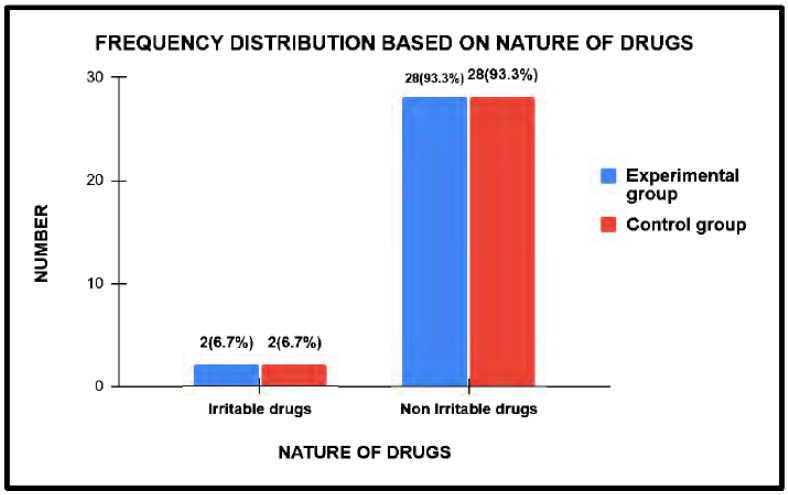



**Fig.No.4.3: Percentage distribution based on Nature of Drugs**

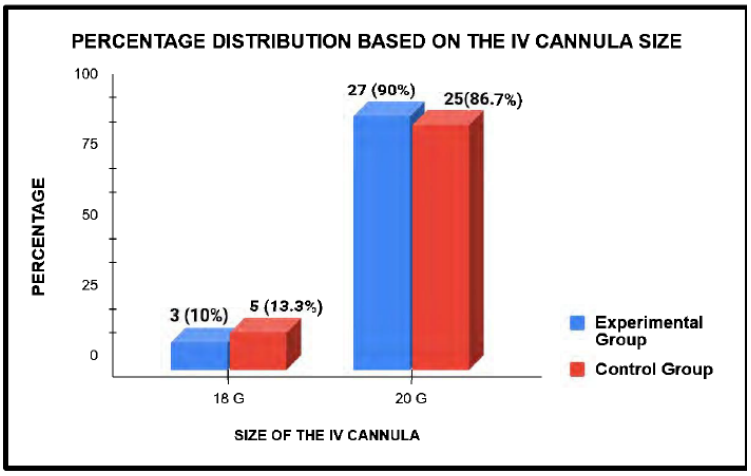



**Fig.No.4.4 : Percentage distribution based on IV Cannula Size**

**SECTION B:**
**Comparison of post test level of the risk for superficial thrombophlebitis among the experimental group and the control group.**
**4.3.** Post test level of the risk for superficial thrombophlebitis among the experimental group and control group. (N=60)

| Risk Category | POST TEST | | | |
|---|---|---|---|---|
| | Experimental group | | Control Group | |
| | f | % | f | % |
| No Risk | 16 | 53.3 | 7 | 23.3 |
| Mild Risk | 9 | 30 | 17 | 56.7 |
| Moderate risk | 3 | 10 | 4 | 13.3 |
| Severe risk | 2 | 6.7 | 2 | 6.7 |

The above table showed frequency and percentage distribution of the post test level of risk for superficial thrombophlebitis among the experimental group and control group. In the experimental group 16(53.3% ) of them had no risk. 9(30%) had mild risk, 3(10%) of them had moderate risk and 2(6.7% had severe risk. Whereas in the control group 7(23.3% ) of them had no risk.17(56.7%) had mild risk, 4(13.3%) of them had moderate risk and 2(6.7% had severe risk.

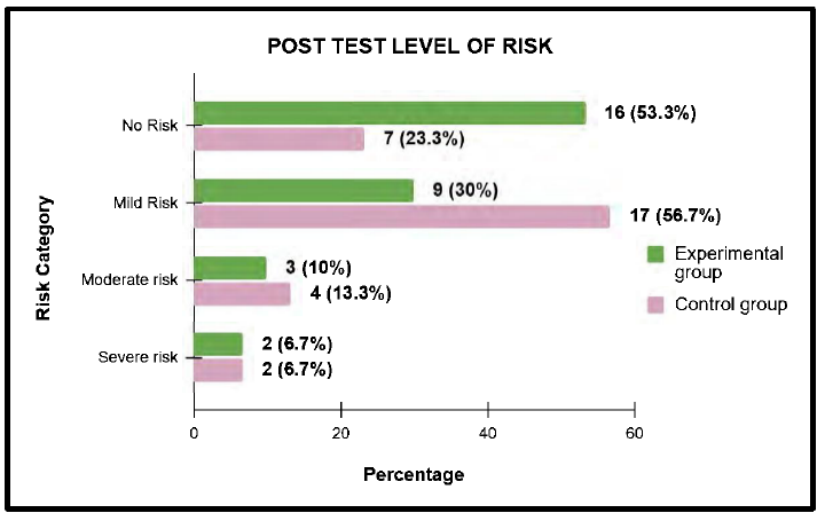



**Fig No.4.5 : Percentage distribution based on Risk Category**

**4.4. Mean, Standard Deviation, Mean percentage and Difference in mean percentage in the level of risk for superficial thrombophlebitis among the experimental group and control group.**
**(N=60)**

| GROUP | MEAN | SD | MEAN % | DF | Mean Percentage Difference |
|---|---|---|---|---|---|
| EXPERIMENTAL GROUP | 0.93 | 1.436 | 18.67 | 58 | 1.04 |
| CONTROL GROUP | 1.97 | 1.4 | 39.33 | | |

The table result showed that the mean and standard deviation among the experimental group were 0.93 and 1.436 respectively with the mean percentage of 18.67. Whereas in the control group the mean was 1.97 and the Standard deviation was 1.4 with the mean percentage of 39.33. The overall mean difference between the experimental group and control group was 1.04( df=58).

**SECTION C:**

a) Effectiveness of Nursing care bundle on risk for superficial thrombophlebitis among the patients admitted with IV cannulation.

Table 4.5: Effectiveness of Nursing care bundle on risk for superficial thrombophlebitis among the patients admitted with IV cannulation.

| GROUP | MEAN | SD | UNPAIRED t TEST | TABLE VALUE | DF |
|---|---|---|---|---|---|
| EXPERIMENTAL GROUP | 0.93 | 1.436 | 2.79 | 1.67 | 58 |
| CONTROL GROUP | 1.97 | 1.4 | | | |

Significant at $p<0.05$

The above table showed that the calculated 't' value was 2.79, which was greater than table value 1.67. Hence the hypothesis **H1 was accepted.** It was evident that the Nursing care bundle is effective in reducing the risk for superficial thrombophlebitis.

**SECTION D: Association between the risk for superficial thrombophlebitis among the patients admitted with IV cannulation with the demographic variables.**

4.6. Association between the risk for superficial thrombophlebitis among the patients admitted with IV cannulation with the demographic variables.

**(N=60)**

| S.NO | DEMOGRAPHIC VARIABLES | EXPERIMENTAL GROUP | | | CONTROL GROUP | | |
|---|---|---|---|---|---|---|---|
| | | Df | X2 | Table value | Df | X2 | Table value |
| 1. | AGE (in years) | 3 | 5.1875 | 0.0227 | 3 | 7.102* | 0.0077 |
| 2. | GENDER | 1 | 0.2545 | 0.6139. | 1 | 0.5413 | 0.4619 |
| 3. | EDUCATION | 3 | 6.2639 | 0.0123 | 3 | 5.5331 | 0.0187 |
| 4. | OCCUPATION | 4 | 6.26 | 0.0123 | 4 | 10.957* | 0.0009 |
| 5. | RELIGION | 2 | 5.21 | 0.0224 | 2 | 3.69 | 0.0545 |
| 5. | SOCIO ECONOMIC STATUS | 2 | 5.03 | 0.0248 | 2 | 4.012 | 0.0452 |
| 6. | AREA OF RESIDENCE | 1 | 2.6 | 0.1069 | 1 | 3.76 | 0.0524 |

The above table showed the association between the posttest level of risk for superficial thrombophlebitis with the selected demographic variable among the experimental group and control group. It is proved that there

was no statistically significant association with any of the demographic variables with the risk for superficial thrombophlebitis among the experimental group. But there was significant association found with age and occupation among the control group.

Hence the hypothesis **H2 was accepted.**

**4.7. Association between the risk for superficial thrombophlebitis among the patients admitted with IV cannulation with the clinical variables.**
**(N=60)**

| S. NO | CLINICAL VARIABLES | EXPERIMENTAL GROUP | | | CONTROL GROUP | | |
|---|---|---|---|---|---|---|---|
| | | Df | X2 | Table value | Df | X2 | Table value |
| 1. | MEDICAL ILLNESS | 1 | 0 | 1.000 | 1 | 0 | 1.000 |
| 2. | DURATION OF HOSPITAL STAY | 2 | 3.18 | 0.074 | 2 | 3.115 | 0.077 |
| 3. | HISTORY OF ALLERGY | 1 | 6.214 | 0.012 | 1 | 4.46 | 0.034 |
| 4. | NATURE OF DRUGS | 1 | 6.89* | 0.008 | 1 | 6.89* | 0.008 |
| 6. | SITE OF IV CATHETER PLACEMENT | 1 | 4.15 | 0.041 | 1 | 2.112 | 0.14 |
| 7. | SIZE OF THE IV CANNULA | 1 | 6.620 | 0.010 | 1 | 2.298 | 0.084 |

The above table showed the association between the posttest level of risk for superficial thrombophlebitis with the selected clinical variable among the experimental group and control group. It is proved that there was no statistically significant association with any of the clinical variables with the risk for superficial thrombophlebitis among the experimental group and control group. Hence the hypothesis **H3 was rejected.**

## V. DISCUSSION

**"Collaborative discussions turn data into insights, broadening the collective vision." — Roberts, 2023**

A quasi-experimental posttest only design was conducted to assess the effectiveness of Nursing care bundles on risk of superficial thrombophlebitis among intravenous cannulated patients admitted in selected hospitals. Krishnagiri. The chapter deals with the discussion about the result findings derived from the statistical analysis of the data.

**Distribution of the samples based on the Demographic Variables:**

In the experimental group, the majority of participants (53.3%) fell within the 26-30 age range, followed by 33.4% in the 31-35 age range, and 13.3% in the 20-25 age range. In the control group 46.7% in the 26-30 age range, and an equal proportion (26.7% and 26.6%) in the 20-25 and 31-35 age ranges, respectively.
In the experimental group, the majority of participants (53.3%) fell within the 26-30 age range, followed by 33.4% in the 31-35 age range, and 13.3% in the 20-25 age range. In the control group 46.7% in the 26-30 age range, and

an equal proportion (26.7% and 26.6%) in the 20-25 and 31-35 age ranges, respectively.
Pertaining to Gender, among the experimental group 18(60%) male, 12(40%) female and in control Group: 14(46.7%) male, 16(53.3%) female.
With regard to education, both groups have diverse educational backgrounds. Graduates form the largest subgroup in experimental group 10(33.3%) and in control group 9(30%).
Regarding Occupation, private employment is most common in both groups, that is 14(46.7%) experimental group and 13(43.3%) control group. Related to Self employment 7(23.3%) in the experimental group and 9(30%) in the control group were doing business. 9(30%) in experimental group 8(23.3) were working as government employees.
Regarding the religion among the experimental group 13(43.3%) were Hindus, 5(16.7%) were Muslims and 12(40%) were Christians. Similarly majority 16(53.4%) were Hindus, 7(23.3%) were Muslims and 7(23.3%) were Christians
Pertaining to Socioeconomic Status among the experimental group 4(13.3%) were in the upper class,16(53.4%) were middle class and 10(33.3%) of them were in lower class. Similarly, among the control group 2(6.6%) were in the upper class,17(56.7%) were middle class and 11(36.7%) of them were in the lower class.
Regarding Area of Residence, Rural residents form the majority in both groups 25(83.3%) in the experimental group and 23 (76.7%) were in the control group. 5(16.7%) and 7(23.3%) were Urban residents belonging to the experimental group and control group respectively.

**Distribution of the samples based on the Clinical Variables:**

Regarding the Medical Illness, in the experimental group 30(100%) were reported of having some form of medical illness. In the Control Group 30(100%) having medical illness.
Pertaining to the Duration of Hospital Stay among the experimental group 14(46.7%) stayed for 3-4 Days. whereas in control group 12(40%) stayed for 3-4 days. 9 (30%) of the experimental group and control group 10( 33.3%) stayed in the hospital for 4-5 days. In experimental group 7 (23.3%) , Control Group 8(26.7%) stayed more than 5 days.
Related to the History of Allergy 6(20%) of the participants in the experimental group and 6(20%) stated Yes. whereas 24(10%) in the experimental group and 27(90%) in the control group stated NO.
With regard to Nature of Drugs, both the experimental group and control group 2(6.7%) received irritable drugs and 28(93.3%) received non irritable drugs.
About the Site of IV Catheter Placement 1(3.3%) of experimental group, 5(16.7%) of control group had IV cannulation over the dorsum of hand and remaining 27(99%) of the experimental group and 25(83.3%) of the control group had it over the forearm.
Regarding the Size of IV Cannula in the experimental group: 1 (3.3%) and control group: 4 (13.3%) had 18G size cannula and 27(99%) 26(86.7%) had 20G.

**The first objective of the study was to assess the IV cannulation site for the risk of superficial Thrombophlebitis.**
The frequency and percentage distribution of the post test level of risk for superficial thrombophlebitis among the experimental group was 16(53.3%) of them had no risk. 9(30%) had mild risk, 3(10%) of them had moderate risk and 2(6.7% had severe risk. Whereas in control group 7(23.3%) of them had no risk. 17(56.7%) had mild risk, 4(13.3%) of them had moderate risk and 2(6.7% had severe risk.
The result showed that the mean and standard deviation among the experimental group were 0.93 and 1.436 respectively with the mean percentage of
18.67. Whereas in the control group the mean was 1.97 and the Standard deviation was 1.4 with the mean percentage of 39.33. The overall mean difference between the study and control group was 1.04 ( Df=58).
Similarly **Masahiro (2022)** conducted research on risk for catheter related phlebitis among patients admitted at IC. The mean age was 69(59-77), among them 815 patients were male 380 (28%) were medical patients. Among them 105(7.7%) had phlebitis during the ICU stay. In the underweight group, catheter size ≥ 18 G and amiodarone administration were independently associated with the incidence of phlebitis. In the normal weight group, elective surgery as a reason for ICU admission, and nicardipine, noradrenaline, and levetiracetam administration were independently associated with the incidence of phlebitis. In the overweight/obese group, the Charlson comorbidity index, catheter size ≥ 18 G, and levetiracetam administration were independently associated with the incidence of phlebitis.

**The second objective of the study was to evaluate the effectiveness of the Nursing care bundle on the risk of superficial thrombophlebitis among intravenous cannulated patients in the experimental and the control group.**

The mean and standard deviation among the experimental group were

0.93 and 1.436 respectively and in the control group the mean was 1.97 and the standard deviation was 1.4. The calculated 't' value was 2.79, which was greater than table value 1.67. Hence the **hypothesis H1 was accepted**. It was evident that the Nursing care bundle is effective in reducing the risk for superficial thrombophlebitis.

**Aitana (2021)** conducted a Scoping Review from a Nursing Perspective with the available evidence on nursing interventions for the prevention and treatment of phlebitis secondary to the insertion of a peripheral venous catheter. The search took place between December 2020 and January 2021 with 52 studies found on various databases. Nursing interventions to prevent phlebitis and ensure a proper catheter use included those related to the maintenance of intravenous therapy, asepsis, and choosing the dressing. With regard to the nursing interventions to treat phlebitis, these were focused on vigilance and caring and also on the use of medical treatment protocols. For the prevention of phlebitis, the highest rated evidence regarding asepsis include the topical use of >0.5% chlorhexidine preparation with 70% alcohol or 2% aqueous chlorhexidine, a proper hygienic hand washing, and the use clean gloves to handle connections and devices.

**The third objective of the study was to find out the association between the risk of thrombophlebitis among intravenous cannulated patients with the selected demographic variables .**

The association between the posttest level of risk for superficial thrombophlebitis among the IV cannulated patients with the selected demographic variables proved that there was no statistically significant association with any of the demographic variables with the risk for superficial thrombophlebitis among the experimental group. But there was a significant association found with age and occupation among the control group. Hence the hypothesis **H2 was accepted.**

**Tadios Lidetu Bayeh et.al., (2023)** conducted a prospective observational study on time to develop phlebitis and its predictors among patients with peripheral intravenous cannula at Public Hospitals of Bahir Dar City, Ethiopia, 2022. Four hundred sixty-two patients with peripheral intravenous cannulas who were admitted to the medical ward were selected using a systematic random sampling technique. Jackson's Visual Infusion Phlebitis Scoring system was used to determine the presence of phlebitis.out of 462 patients 171 (37.01%) of them developed phlebitis. The median survival time of phlebitis was six days. Patients whose age group > 60 years had low probability to develop phlebitis (AHR = 0.49, 95% CI 0.29– 0.82), whereas chronic-diseases (AHR = 1.50, 95% CI 1.09– 2.07), drugs and blood administered in one vein (AHR = 2.03, 95% CI 1.44– 2.86), inappropriate cannula dressing (AHR = 1.81, 95% CI 1.31– 2.51), large cannula size (AHR = 1.52, 95% CI 1.08– 2.15) and longer cannula dwelling time (AHR = 7.39, 95% CI 4.12– 13.32) had high probability to develop phlebitis.

**The fourth objective of the study was to find the association between the risk of thrombophlebitis among intravenous cannulated patients with the selected clinical variables in the experimental group and the control group.**

The association between the posttest level of risk for superficial thrombophlebitis with the selected clinical variable proved that there was no statistically significant association with any of the clinical variables with the risk for superficial thrombophlebitis among the experimental group and control group. Hence the hypothesis **H3 was rejected.**

**Andriana (2022)** conducted a post hoc analysis on risk factors for peripheral intravenous catheter related phlebitis in adult patients. Totally 1319 patients were selected. Of these 80 (6.1%) developed phlebitis. The variables associated with the risk were Reduced mobility ($p = 0.015$), family history of deep vein thrombosis ($p = 0.05$), catheterization of veins on the back of the hand ($p = 0.012$), pain ($p < 0.01$), Amoxicillin-Potassium Clavulanate ($p = 0.015$), and Omeprazole Sodium ($p = 0.029$).

## VI. SUMMARY, CONCLUSION, IMPLICATIONS AND RECOMMENDATIONS

***"A concise summary distills the essence of research, guiding future discourse."***
**(Miller & Harris, 2023)**

This chapter consists of four sections. In the first two sections, the summary and conclusion are presented. In the last two sections, the implications for nursing practice, nursing education, nursing administration, nursing research and recommendations for further study.

### SUMMARY OF THE STUDY

A true experimental posttest design was used to assess the effectiveness of Nursing care bundles on risk of superficial thrombophlebitis among intravenous cannulated patients admitted in selected hospitals, Krishnagiri. The study was conducted at Jeeva hospital and Kauvery Hospital Krishnagiri. 60 samples were selected based on

the inclusion criteria. The data was collected using the self-structured questionnaire for demographic and clinical variables. The risk for thrombophlebitis was assessed with the Jackson's Visual Infusion phlebitis scale. The data was analyzed using descriptive and inferential statistics.

**FINDINGS OF THE STUDY**

In the experimental group, the majority of participants (53.3%) fell within the 26-30 age range, followed by 33.4% in the 31-35 age range, and 13.3% in the 20-25 age range. In the control group 46.7% in the 26-30 age range, and an equal proportion (26.7% and 26.6%) in the 20-25 and 31-35 age ranges, respectively.
In the experimental group, the majority of participants (53.3%) fell within the 26-30 age range, followed by 33.4% in the 31-35 age range, and 13.3% in the 20-25 age range. In the control group 46.7% in the 26-30 age range, and an equal proportion (26.7% and 26.6%) in the 20-25 and 31-35 age ranges, respectively.
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Regarding Occupation, private employment is most common in both groups, that is 14(46.7%) experimental group and 13(43.3%) control group. Related to Self- employment 7(23.3%) in the experimental group and 9(30%) in the control group were doing business. 9(30%) in experimental group 8(23.3) were working as government employees.
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Regarding the Size of IV Cannula in the experimental group 1 (3.3%) and control group 4 (13.3%) had 18G size cannula and 27(99%) 26(86.7%) had 20G size IV cannula.
The frequency and percentage distribution of the posttest level of risk for superficial thrombophlebitis the experimental group 16(53.3% ) of them had no risk. 9(30%) had mild risk, 3(10%) of them had moderate risk and 2(6.7% had severe risk. Whereas in the control group 7(23.3% ) of them had no risk.17(56.7%) had mild risk, 4(13.3%) of them had moderate risk and 2(6.7% ) had severe risk.
The mean and standard deviation among the experimental group were 0.93 and 1.436 respectively with the mean percentage of 18.67. Whereas in the control group the mean was 1.97 and the Standard deviation was 1.4 with the mean percentage of 39.33. The overall mean difference between the experimental group and control group was 1.04 (df=58). The calculated 't' value was 2.79, which was greater than table value 1.67. Hence the hypothesis **H1 was accepted.** . It was evident that the Nursing care bundle is effective in reducing the risk for superficial thrombophlebitis.
There was no statistically significant association with any of the demographic variables with the risk for superficial thrombophlebitis among the experimental group. But there was significant association found with age and occupation among the control group. Hence the hypothesis **H2 was accepted.**
There was no statistically significant association with any of the clinical variables with the risk for superficial thrombophlebitis among the experimental group and control group. Hence the hypothesis **H3 was rejected.**

**CONCLUSION:**

The study aims to assess the effectiveness of the nursing care bundle in reducing the risk of superficial thrombophlebitis at Jeeva Hospital and Kauvery Hospital at Krishnagiri. The result revealed that in the post test assessment of the experimental group who received the research interventions majority remained without risk and few had a minimal level of superficial thrombophlebitis. In the control group the majority of the samples developed symptoms of superficial thrombophlebitis and scored as moderate risk. The nursing care bundle was effective in reducing the risk for superficial thrombophlebitis among the patients with IV cannulation.

**IMPLICATIONS:**
The study findings can be implemented in four core aspects of the nursing profession viz Nursing practice, Nursing Education, Nursing Administration and Nursing Research.

**NURSING PRACTICE:**
- Nurses can utilize these research findings while providing care to the patients with IV cannula and undergoing IV therapy.
- Nurses can utilize massage techniques to reduce the complications associated with IV cannulation.
- Senior Nurses can impart this practice in concern ward to improve the quality of care in respective clinical areas.
- Nurses can monitor the IV site periodically using this scale to identify thrombophlebitis as earlier.

**NURSING EDUCATION:**
- Nurse educators can utilize these findings in training the nursing students for starting IV cannulation.
- Reinforcement sessions can be provided to nursing students for proper implementation of these findings into real settings.
- Nursing Curriculum can be updated with the newer interventions related to IV therapy and role and responsibilities of nurses in IV therapy to reduce the complications.

**NURSING ADMINISTRATION:**
- Nurse administrators can formulate nursing care protocols with the incorporation of these research findings to bring down the incidence of IV therapy related complications.
- Nurse administrators can organize CNE periodically to sensitize all the nurses about the IV therapy protocols.
- Nurse administrators can frame the checklist based on the findings to monitor the practice of Nurses in a work setting

**NURSING RESEARCH:**
- The researchers can utilize these findings as a base for future research concerned with IV cannulation and IV therapy.
- Translational research utilization of findings at real hospital settings to make evidence-based practice.
- The researcher should conduct periodic review of research findings and disseminate the findings through conference, seminars, and publications in journals and the WorldWide Web.

**RECOMMENDATIONS:**
- A similar study can be conducted with larger sample sizes to generalize the finding.
- A similar study can be conducted with patients receiving irritable IV drugs.
- A similar study can be done with children. Selected Nursing intervention effects
- A similar study can be replicated with objective Physiological parameters like ultrasonic guidance devices and CRP levels.

**Summary:**
This chapter dealt with summary, conclusion, implication, limitation and recommendation for future research.

## BIBLIOGRAPHY

1. **Aitana Guanche et al.(2021)**, "Prevention and Treatment of Phlebitis Secondary to the Insertion of a Peripheral Venous Catheter: A Scoping Review from a Nursing Perspective"*Healthcare* 2021, *9*(5), 611; https://doi.org/10.3390/healthcare9050611
2. **Andreina et al.(2022), "**Risk factors for peripheral intravenous catheter-related phlebitis in adult patients",Revista Da Esc Enferm USP, 2022 June 10:56:e20210398. doi 10.1590/1980- 220X-REEUSP-2021-0398en
3. **Atay S et al(2021)**"Effectiveness of transparent film dressing for peripheral intravenous catheter",J Vasc Access. 2021 Jan;22(1):135-140. doi: 10.1177/1129729820927238. Epub 2020 Jun 12.
4. **Blanco-Mavillard I et al.(2021)**'"Multimodal intervention for preventing peripheral intravenous catheter failure in adults (PREBACP): a multicentre, cluster-randomised, controlled trial" Lancet Haematol. 2021 Sep;8(9):e637-e647. doi: 10.1016/S2352- 3026(21)00206-4.
5. **Corley A et al (2022)**,"Peripheral intravenous catheter securement: An integrative review of contemporary literature around medical adhesive tapes and supplementary securement products",J Clin Nurs.

2023 May;32(9-10):1841-1857. doi: 10.1111/jocn.16237. Epub 2022 Feb **3.**
6. **Dobrescu A et al.(2024), "**Effectiveness and Safety of Measures to Prevent Infections and Other Complications Associated With Peripheral Intravenous Catheters: A Systematic Review and Meta-analysis", Clinical Infectious Disease. 2024 Jun 14;78(6):1640-1655. doi: 10.1093/cid/ciae195.
7. **Fernandez I et al.(2024)**,"Vascular access specialist teams versus standard practice for catheter insertion and prevention of failure: a systematic review", BMJ Open. 2024 Jul 5;14(7):e082631. doi: 10.1136/bmjopen-2023-082631.
8. **Ferraz-Torres M et al (2024)**.'"Complications Related to the Securement Device in Peripheral Intravenous Catheters: A Randomized Study"'J Infus Nurs. 2024 Nov-Dec 01;47(6):391-396. doi: 10.1097/NAN.0000000000000561. Epub 2024 Oct 30.
9. **Garcia-Expósito et al. (2023)**, "Peripheral venous catheter-related phlebitis: A meta-analysis of topical treatment",Nurs Open. 2023 Mar;10(3):1270-1280. doi: 10.1002/nop2.1449. Epub 2022 Nov 6
10. **Indarwari et al.(2020)"**Incidence of peripheral intravenous catheter failure and complications in paediatric patients: Systematic review and meta analysis" International Journal of Nursing Study. 2020 Feb:102:103488. doi: 10.1016/j.ijnurstu.2019.103488. Epub 2019 Nov 26.
11. **Joseph, M., Harris, R., & Levin, P. (2022).** *Impact of nursing care bundles on catheter- associated complications.* Nursing Research and Practice, 12(1), 12-19.
12. **Jiménez-Martínez et al. (2024)**,"Peripheral intravenous catheter failure, nurse staffing levels and care complexity individual factors: A retrospective multicentre cohort study"PLoS One. 2024 May 9;19(5):e0303152. doi: 10.1371/journal.pone.0303152. eCollection 2024.
13. **Kapan et al.(2024),"**The Prevalence and Associated Factors of Peripheral Intravenous Complications in a Thai Hospital" , Journal of Infusion Nursing 47(2):p 120-131, March/April 2024. | DOI: 10.1097/NAN.0000000000000538.
14. **Kedir Seid et al.(2024)**, "Incidence of peripheral intravenous cannula induced phlebitis and its determinants among admitted patients in Ethiopia: systematic review and meta analysis, 2024" ,Research, 28 October 2024,Volume 1, article number 89.
15. **Kowalski, D., Ramirez, S., & Zhou, Y. (2023). "***Thrombophlebitis in hospitalized patients: A current perspective".* Clinical Nursing Studies, 11(3), 33–39.
16. Krishto G et al.(2024), Management of superficial venous thrombophlebitis associated with peripheral venous catheters: A review. *Glob J Surg Case Rep*. Published online June 3, 2024. doi:10.5281/zenodo.14838429
17. **Lidetu Beyah et al.(2023)**, "Time to Develop Phlebitis and Its Predictors Among Patients with Peripheral Intravenous Cannula at Public Hospitals of Bahir Dar City, Amhara, Ethiopia, 2022: A Prospective Observational Study",Nursing: Research and Reviews,51-60, DOI: 10.2147/NRR.S414331
18. **Li J et al(2022),**"Routine replacement versus replacement as clinical indicated of peripheral intravenous catheters: A multisite randomised controlled trial".J Clin Nurs. 2022 Oct;31(19- 20):2959-2970. doi: 10.1111/jocn.16129. Epub 2021 Nov 14.
19. **Lima et al. (2023**),"Nursing Interventions to Prevent Complications in Patients with Peripherally Inserted Central Catheters",Journal of Clinical Medicine. 2024 Dec 27;14(1):89. doi: 10.3390/jcm14010089.
20. **Luyu Lv et al.(2020),** "The incidence and risk of infusion phlebitis with peripheral intravenous catheters: A meta-analysis" Journal of Vascular Access, May;21(3):342-349. doi: 10.1177/1129729819877323. Epub 2019 Sep 23.

**WEB REFERENCES:**

- https://nursestudy.net/thrombophlebitis-nursing-diagnosis/18.02.2025
- www.https://www.medicalnewstoday.com/articles/iv-therapy
- https://www.ncbi.nlm.nih.gov/books/NBK594499/
- https://www.ivteam.com/
- https://elsevier.health/en-US/preview/iv-infusion-therapy
- https://www.who.int/publications/i/item/9789241597906?utm_source=chatgpt.comss
- https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5110a1.htm?utm_source=chatgpt.com