

'To Assess the Incidence of Thrombophlebitis associated with the use of IV Drugs through peripheral IV catheter and following catheter removal'

Dissertation Submitted to



The IIHMR University, Jaipur

for the partial fulfilment for the award of the degree of

Master of Business Administration (MBA)

in

Hospital and Health Management

Submitted by-Dr. Divya Rathi

Roll No.-1094

Under the Supervision and Guidance of

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2022

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2022

Certificate by college

Certificate by organization



Date: 18.06.2022

Certificate

This is to certify that **Dr. Divya Rathi** in partial fulfillment of the requirements for the award of the degree of MBA (Hospital and health management) from the IIHMR University, Jaipur has successfully completed her internship at **Medanta Super Specialty Hospital, Indore** (A unit of Global Health Ltd.) during **March 21, 2022 to June 18, 2022**.

Place: Indore

Date: 18/06/2022

Medanta-Indore
Super Specialty Hospital
Plot No.8, PU4, Scheme. No.54,
Vijay Nagar Square, A.B. Road, Indore (M.P.)


Dr. Sanjay Geed
Medical Superintendent
Medanta Super Specialty
Hospital, Indore

Accredited by



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ABBREVIATIONS

IV Cannula	Intravenous Cannula
VIP Score	Visual Infusion Phlebitis Score
ICU	Intensive Care Unit
PIVC	Peripheral Intravenous Catheters
CDC	Centre for Disease Control and Prevention
CRBSI	Cannula related blood stream infection
IP Pharmacy	Intellectual property
KCl	Potassium chloride
NTG	Nitro-glycerine

ABSTRACT

Background: Peripheral venous cannulation is indispensable in the practice of modern medicine. This study aims at 'to Assess the Incidence of Thrombophlebitis associated with the use of Drugs, peripheral IV catheter and following catheter removal'.

Methods: This Prospective Observational study was conducted on 550 patients aged above 18 years admitted All patients receiving high concentrated drugs and Peripheral IV cannula patients over a 2-month period. These patients were visited daily for 2 months after the and examined for signs of thrombophlebitis: warmth, erythema, tenderness, swelling, palpable venous cord. The risk factors studied in this research were patient age, gender, comorbidities like hypertension, diabetes mellitus, hyperlipidaemia, smoking, duration of cannulation, cannula size and IV medications used. Thrombophlebitis was graded using VIP Score checklist on CDC guidelines.

Results: In total, 550 patients were recruited with incidence rate of thrombophlebitis of 50%. Among those who developed thrombophlebitis 85 patients had Grade 1, 52 had Grade 2 thrombophlebitis, 6 patients had Grade 3, and 2 had grade 4, grade 5 were not found. Results showed that the risk factors considered significantly influence the incidence of thrombophlebitis.

Conclusion: Phlebitis is still an important ongoing problem in medical practice. We recommend daily examination of catheters for signs of thrombophlebitis by some health care personnel. Future studies are to be made to improve the understanding of risk factors for thrombophlebitis.

Keywords: Intravenous cannula, Thrombophlebitis, Visual Infusion Phlebitis Score (VIP Score)

ACKNOWLEDGEMENT

It was a wonderful opportunity for learning and career growth to have an internship with Medanta Super Specialty Hospital in Indore. The opportunity to meet so many fantastic people and experts who guided me through this dissertation period makes me grateful as well.

In spite of being incredibly busy with their duties, **Dr. C. P. Sharma Sir, Dr. Sonal Sharma, Quality Head, and Jyoti Sehgal, Assistant Quality Manager, and Dr. Sehgal, Clinical Head**, took the time to listen to me, guide me, and keep me on the right track. They also set up all the necessary resources to make my internship successful and allowed me to complete my project at this prestigious organization. I want to thank him or her for their contribution right now.

It is with great pleasure that I express my heartfelt thanks to Shalu Mam, the clinical pharmacist at Medanta Hospital in Indore, as well as Dr. Viren, the operations manager, and the entire support staff for their careful and priceless guidance. Both theoretically and practically, this guidance was extremely helpful for my study.

I also want to convey my sincere gratitude to my **Mentor, Dr. Piyusha Majumdar** for supporting me throughout the dissertation period, for her guidance.

I would also thanks to my family and friends for their support through the journey.

In terms of my professional development, I view this opportunity as a significant turning point. To the best of my ability, I will try to apply the knowledge and abilities I have acquired.

Sincerely,

Dr. Divya Rathi

CHAPTER 1

INTRODUCTION

Thrombophlebitis in the hospital is a common occurrence that can cause considerable distress to patients. This condition can be associated with a thrombus or infection as well most clinical presentations are not complicated and consists of pain redness in duration the degree of the symptoms is variable the incidence of thrombophlebitis is said to be unclear but studies show it lies between 3 to 11% however this incidence maybe under reported. Thrombophlebitis can be minimised with observation of certain procedure on the ward.

Phlebitis can be split into four types:

1. Mechanical- when movement of the cannula inside the vein causes friction and inflammation, or when the cannula is too wide for the vein.
2. Chemical phlebitis-caused by the drug or fluid infused through the catheter, where factors such as pH and osmolality can significantly impact the incidence of phlebitis.
3. Bacterial-when bacteria penetrate the vein, starting as an inflammatory response to catheter insertion and subsequent colonization of the site by bacteria. Bacterial phlebitis can create serious complications due to the potential for the development of systemic sepsis.
4. Post-infusion phlebitis -normally appears 48 to 96 hours after the catheter is removed. Incidence is related especially to catheter material and the length of time the catheter remained in the patient's vein

V. I. P. Score (Visual Infusion Phlebitis Score)

VIP score should be evaluated during each shift and documented on the observation chart

I.V. site appears healthy	0	No signs of phlebitis ☐ OBSERVE CANNULA
One of the following is evident: ● Slight pain near I.V. site or slight redness near I.V. site	1	Possible first signs of phlebitis ☐ OBSERVE CANNULA
Two of the following are evident: ● Pain near I.V. site ● Erythema ● Swelling	2	Early stage of phlebitis ☐ RESITE CANNULA
ALL of the following are evident: ● Pain along path of cannula ● Erythema ● Induration	3	Medium stage of phlebitis ☐ RESITE CANNULA ☐ CONSIDER TREATMENT
All of the following are evident & extensive: ● Pain along path of cannula ● Erythema ● Induration ● Palpable venous cord	4	Advanced stage of phlebitis or start of thrombophlebitis ☐ RESITE CANNULA ☐ CONSIDER TREATMENT
All of the following are evident & extensive: ● Pain along path of cannula ● Erythema ● Induration ● Palpable venous cord ● Pyrexia	5	Advanced stage of thrombophlebitis ☐ INITIATE TREATMENT ☐ RESITE CANNULA

The incidence of phlebitis in the literature varies quite a bit, with reports ranging from 61.2% to 1.3%. The acceptable rate in any given population of patients is at most 5%. Thus, this study is justified due to the need to monitor and track the incidence of phlebitis.

By analysing the aspects above, we found gaps in the knowledge of the incidence of phlebitis, especially post-infusion phlebitis. Given the need for research on this topic and its importance as an indicator of the quality of nursing care, the goal of this study is to investigate the incidence of phlebitis and the association between risk factors and the incidence of phlebitis while using and following the removal of PIC (post-infusion phlebitis) in hospitalized adults.

WHAT INSPIRED OUR STUDY

- Peripheral IV cannulation is commonly performed for rapid and accurate administration of medications.
- Phlebitis is one of the commonest complications that develop after intravenous catheter application.

CHAPTER 2

REVIEW OF LITERATURE

A prospective, observational study on the prevalence of peripheral intravenous catheter phlebitis and its causative variables among hospitalised patients was conducted. 384 people in total participated in the study. The age range of the study participants was 19 to 96, with a mean age of 46. Seventy percent of the study participants had phlebitis. Patients with mid-stage (grade 3) or advanced-stage (grade 4) phlebitis were represented by 136/268 (51%) and 89/268 (33%), respectively. Patients with catheter-in situ > 96 h had a two-fold increased risk of developing phlebitis compared to those with a 72 h catheter dwell period. (AOR = 2.261, 95% confidence interval [CI]: 1.087–4.702, P-value = 0.029). (AOR = 0.293, 95 percent CI 0.031-0.626, P-value = 0.002) Seventy percent of the patients were female. patients who are less likely than men to have phlebitis. Phlebitis was 53 percent less likely to occur in patients who had infusions than in those who did not (AOR = 0.472, 95 percent CI 0.280-0.796, P-value = 0.005).

This study conducted. 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.

this observational study On The Incidence of Thrombophlebitis Following the Use of Peripheral Intravenous Cannula in Post-Operative Patients, Final M.B.B.S. Student, M.O.S.C. Medical College An Observational Prospective Study Between July and August 2014, 82 patients over the age of 18 were admitted postoperatively to the surgical ward of a tertiary care facility. These individuals were After the operation, the patient was seen every day for three days while being checked for thrombophlebitis symptoms like warmth, erythema, soreness, swelling, and a palpable venous cord. Patient age, gender, comorbidities such hypertension, diabetes mellitus, hyperlipidaemia, smoking, duration of cannulation, cannula size, and IV medication use were all examined as risk variables in this study. The Visual Infusion Phlebitis Score recommended by the Infusion Nurses Society was used to rate thrombophlebitis.

This study addresses the growing problem of intravenous related phlebitis in hospitalised patients. Literature on various types of phlebitis, clinical indicator and severity of VIP scores and complications of phlebitis are examined. Awareness of such factors is considered instrumental and minimising the incidence of intravenous phlebitis. In this study we will present 90 patients from in patient department which was conducted to determine the incidence and severity of

intravenous related associated complication and related length of hospitals stay. There implications of the result for current and future nursing care of Asian receiving therapy will be discussed and recommendations for the safe practice will be made. an estimated 2.5 million patient enter the health service each year and receive infusion therapy via peripheral Venous access.

Approximately 50% this devices fail to deliver the prescribed IV therapy cost one of the most common reason being phlebitis the incidence of phlebitis in hospitalise patients receiving IV therapy has been reported to be as high as 80%. Review literature on the subject suggest that phlebitis rate in most hospitals are much higher than this acceptable rate ranging from 20 - 80%. One might therefore expect that major advances would have been made in the reduction of peripheral IV infusion related phlebitis.

The model of this study is a quantitative one, that is, it is a systematic investigation concerning thrombophlebitis, and the final objective is to apply the analysis of collected data for making a definitive statement regarding the risk factors, both patient and health administration related

CHAPTER 3

BACKGROUND

The most frequent procedure carried out in hospitals is the insertion of peripheral intravenous catheters (PIVC). Pain, erythema, swelling, a palpable venous cord, and copious discharge at the catheter site are all clinical signs of phlebitis. Phlebitis is known to be complicated by cannula-related blood stream infection (CRBSI). The VIP Score method assesses the presence and severity of phlebitis.

Phlebitis has negative effects on patients, including discomfort, a longer hospital stay, and increased healthcare costs. Mechanical, chemical, biological, patient, and health practice-related factors are among the causes of phlebitis.

Phlebitis is predisposed by big cannula size, near-joint catheter placement, and catheter dwell times of more than 96 hours. Chemical considerations include the nature of intravenous medications (irritant, vesicant), as well as solution properties (PH+, osmolality).

Phlebitis is brought on by vascular endothelial injury brought on by irritant intravenous medications and hyperosmolar infusate solutions.

Bacterial colonisation, biofilm development, and infection are all biological variables. Age, gender, nutritional condition, immunosuppression, and co-occurring comorbidities are all considered patient-related factors.

Phlebitis is more likely to affect those who are malnourished, immunosuppressed, have co-morbid conditions, or are elderly (>65 years old). The most commonly mentioned factors relating to health practises are the use of aseptic precautions and the expertise of health professionals in catheter securement. One of the listed causes of phlebitis is faulty cannula securing and poor aseptic procedures.

Peripheral venous cannulation is indispensable in the practice of modern medicine. This study aims to investigate the To Assess the Incidence of Thrombophlebitis associated with the use of Drugs, peripheral IV catheter and following catheter removal

CHAPTER 4

RESEARCH METHODOLOGY

4.1.AIM OF THE STUDY

- To study and investigate the cause of incidence of phlebitis and to evaluate factors contributing to the development of Phlebitis.

4.2 RESEARCH QUESTION

1. What is the incidence rate of Thrombophlebitis in ICU and Wards?
2. What is the root cause of peripheral IV infusion related phlebitis?

4.3 OBJECTIVE

4.3.1 General Objective –

To look at the incidence of Thrombophlebitis in the hospital and compliance of measure taken in the hospital to prevent this condition.

4.3.2 Specific Objective –

1. To investigate the incidence of phlebitis and its association with risk factors when using peripheral IV catheters (PIC) and following their removal - (post-infusion phlebitis) in hospitalized adults.
2. To identify the reasons for drug induced thrombophlebitis within 2 months in Medanta Hospital, Indore.
3. To assess current level of Thrombophlebitis from 1ST April 2022 – 1ST June 2022

4.4 Study design – A prospective observational study was conducted in Medanta Hospital, Indore.

4.5 Setting- This study was conducted in the wards and ICU of Medanta Hospital, Indore.

4.6 Study Population – The study population includes all the patients who were admitted in the hospital from 1st April – 1st June 2022 i.e. 550 patients were undergone All patients admitted to emergency unit, medical and surgical wards during the study period were considered as study population.

4.7. Inclusion Criteria –

- All the phlebitis notified patients from ICU and Wards were analysed and formulated
- Drug induced phlebitis has been included in audit
- Post infusion phlebitis has been included in the audit

4.8 Exclusion criteria –

- Initial dose of high concentrated drugs which has been started through central line has been excluded from the study.
- Patients those who have history of allergy to intravenous cannula, or those are not willing to give consent were excluded from the study.

4.9 Study variables

4.9.1 Dependent variables: Peripheral intravenous catheter (PIVC) phlebitis.

4.9.2Independent variables:

Patient with Socio-demographic characteristics include age, gender, occupation, marital status, educational level, income level, residence and religion

Clinical characteristics include admission diagnosis, duration of hospital stay, cannula insertion site, catheter size (gauge), catheter dwell time and intravenous drugs use

4.10 Study tools-

- VIP Score Sheet
- High concentrated drugs audit checklist
- Thrombophlebitis documentation checklist

4.11 Duration of Study –

This study is a prospective observational study in which we have covered the phase one which was framed for a period of 2 months from 1st April 2022-1st June 2022?

4.12. Sample Size – Around550 patients were under observation for this study in the period of 2 months i.e. from 1st April – 1st June 2022.

4.10 . Sampling Technique – Convenient Sampling method

4.14. Operational Definitions - Thrombophlebitis is an inflammation of a vein just below the surface of the skin, which results from a blood clot. This condition may occur after recently using an IV line, or after trauma to the vein.

Intravenous (IV) cannulation is a technique in which a cannula is placed inside a vein to provide venous access. Venous access allows sampling of blood, as well as administration of fluids, medications, parenteral nutrition, chemotherapy, and blood products

4.15 Methodology –

- All patients receiving high concentrated drugs over a 2-month period were included in the audit.
- All patients having such drugs were visited daily on the ward to check for evidence of Thrombophlebitis.
- VIP Score check list was collected on these patients.
- Surveillance check list of all patients was audited.
- All the above measurements and documents were analysed, reviewed and results obtained.
- Total number of patients audited were 600
- Receiving list of high concentrated drugs from IP Pharmacy.
- Daily visit and assessment of patients who are under highly concentrated medications (peripheral line – Inj Amiodarone, Dobutamine, KCL, NTG, Mannitol, 3 % NACL, Noradrenaline 25% Dextrose).
- Collecting VIP Scores checklist for above mentioned patients.
- Filling the surveillance checklist for each patient from drug starting time to stopping time.
- Analysing the parameters mentioned in the check list.
- **4.16 DATA ANALYSIS PLAN –**

550 patients were audited who were on peripheral IV cannula.

First the data for induced drug of interest was taken from IP Pharmacy

After that I have started looking for Cannulation Monitoring Chart in the patient IPD file.

Then I have personally visited each and every patient of the Hospital so that no Cannulated patient can be missed out

After that I have filled my checklist according to the patient condition.

ETHICAL CONSIDERATION –

Prior to the beginning of study consent was taken from all the patients and their attendees which were induced drugs by cannula, their identity was kept anonymous.

IMPICATION OF RESEARCH –

Through this study we were able to find out the root cause of Thrombophlebitis.

Awareness was spread so that the rate of Thrombophlebitis can be decreased.

CHAPTER 5

RESULTS AND INTERPRETATIONS

The following are the results and interpretation of the study carried for 550 Inpatients were audited. Data gathered through checklist and cannulation chart were presented below.

RATE OF THROMBOPLEBITIS -

- TOTAL NUMBER OF IDENTIFIED PLEBITIS PATIENTS *100

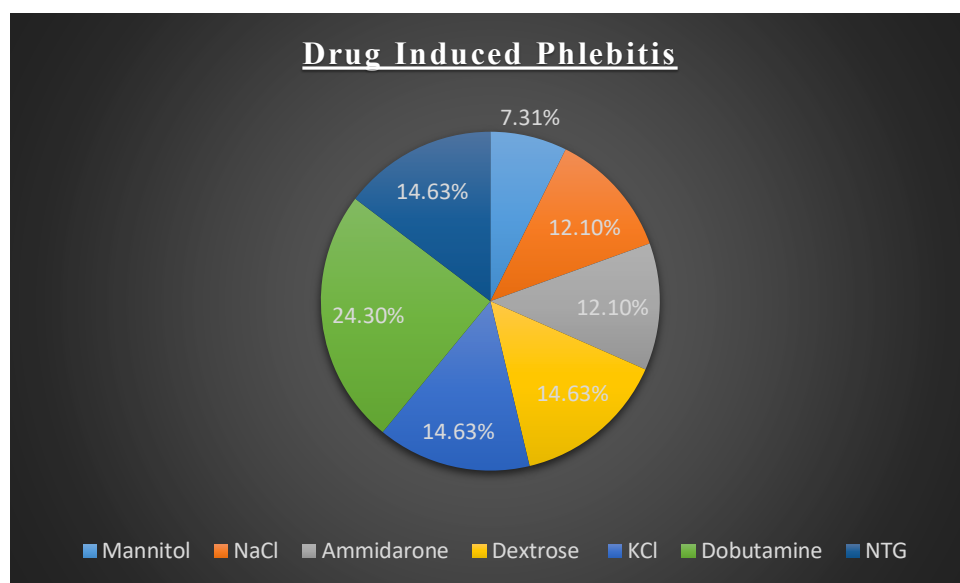
TOTAL NUMBER OF OBSERVED PERIPHERAL IV CANNULATED PATIENTS

Figure-1 Drug Induced Phlebitis

N= 550 sample size

145 PHLEBITIS patient

Out of which 41 patients are drug induced i.e. 28.27% patients are drug induced.

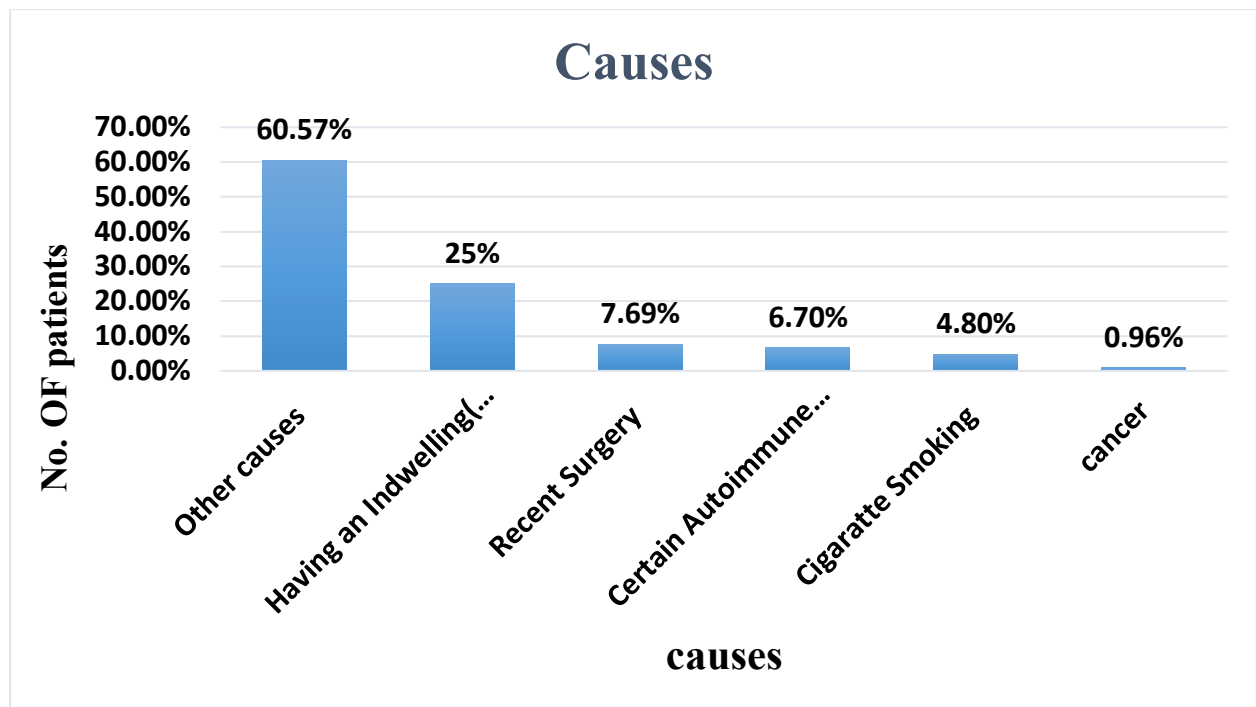


Inference – The above Pie-Chart shows that out of 550 patients were on drugs **i.e. 28.27% patients are drug induced** in which 7.31% patients were on mannitol, 12.10% patients were on NaCl, 12.10% patients were on Ammidarone, 14.63% patients were on dextrose, 14.63% patients on KCl, 24.30% patients on Dobutamine, 14.63% patients on NTG.

Figure-2 Causes of Phlebitis

N= 550 patients were on IV peripheral cannula

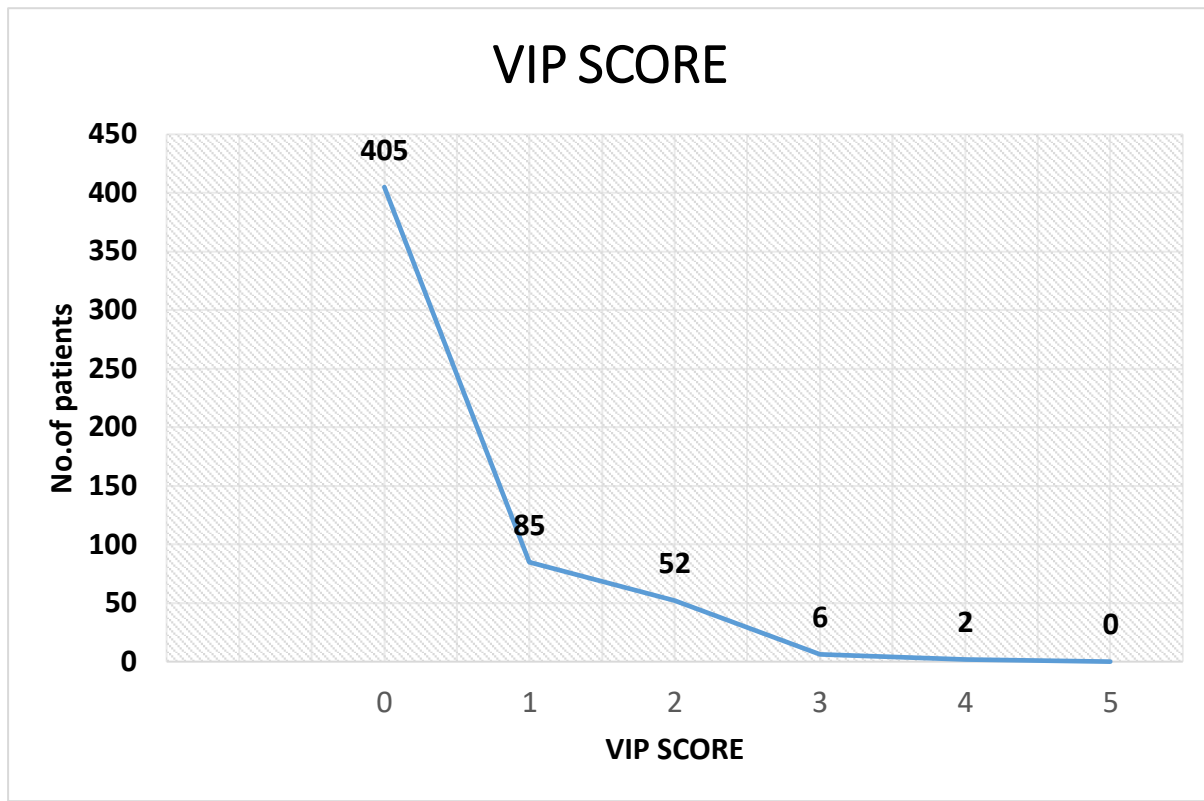
145 Phlebitis patients out of which 104 patients are having other causes of phlebitis other drug induced, i.e. 71.72%



Inference- The above graph shows that 0.96% patient is suffering from cancer, 4.80% patients suffering from cigarette smoking, 6.70% patients suffering from certain autoimmune disorders, 7.69% patients had recent surgery, and 25% patients were having long term indwelling time and 60.57% have other causes like alcohol consumption, size of catheter, site of catheter etc.

Figure 3 No. Of Patient on the basis of VIP Score

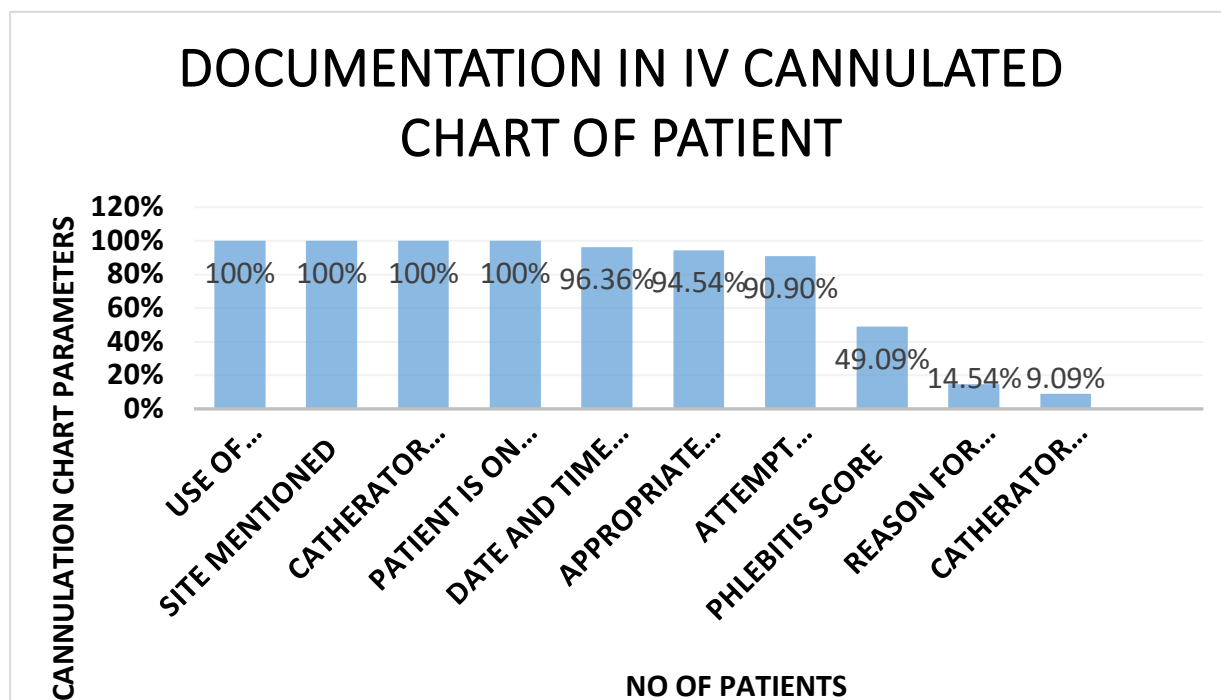
N= 550 patients were audited



Inference- The above graph signifies that out of 550 patients who were on peripheral IV cannula 405 patients have 0 score ,85 patients have 1 score ,52 patients with 2 VIP score ,6 patients have 3 score ,2 patients have 4 VIP score.

Figure 4 Documentation in IV Cannula chart of Patient

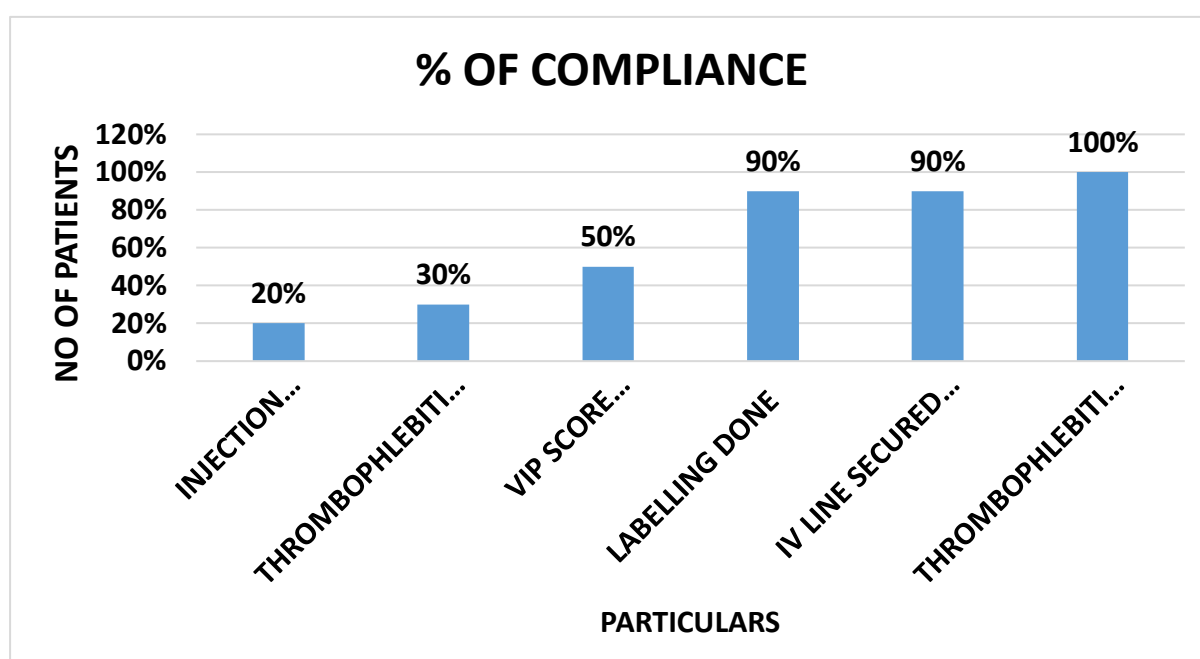
N=550 patients were audited



Inference - The above graph shows that 550 patients who were on Peripheral IV Cannula have proper documentation of transparent dressing, site mentioned, catheter insertion, 96.36% patients have time present on cannulation chart, 94.54% patients have their site and device properly mentioned, 90.90% patients have their attempts record mentioned, 49.09% patients have their proper phlebitis score mentioned in cannulation chart, 14.54% patients have their reason for removal and 9.09% patients have catheter removal reason correctly mentioned.

Figure 5 % of Compliance

N=550 patients



Inference –The above graph shows that 20% patients were observed to get continue their injection continue on same side ,30% patients with thrombophlebitis,50%patients with VIP score followed,90% with proper labelling done on their dressing ,90% with IV catheter secured with proper transparent dressing and 100% patients have injection properly diluted injected in Peripheral IV catheter.

CHAPTER 6

DISCUSSION –

- After the completion of the Study, a meeting was set with the concerned department Heads in which I have discussed my findings for the root cause of the study and after considering their opinions a common outcome was formulated so that the prevention of the cause can be implemented and the rate of Thrombophlebitis can be decreased. The department Heads consists of the following people i.e. Quality Manager, Other Managers, Floor in charge, ICU in charge.
- The most frequent issue with intravenous catheters is thrombophlebitis, which can cause a lot of issues and raise costs. It is now known that thrombophlebitis has a complex aetiology. In our study, thrombophlebitis was observed to occur 30% of the time.
- When the peripheral venous catheter is inserted, the peripheral vein is traumatised. This initial damage plus the presence of a foreign body in the vein causes an inflammatory reaction that puts thrombus and thromboembolism at risk out of 550 patients who were on peripheral IV cannula 405 patients have 0 score ,85 patients have 1 score ,52 patients with 2 VIP score ,6 patients have 3 score ,2 patients have 4 VIP score.
- It was discovered that thrombophlebitis occurred equally frequently in men and women.
- In our investigation, post-operative patients using 22-gauge cannula had a very slight increase in the incidence of thrombophlebitis. However, there was no statistically significant difference between those with 18 gauge or 20-gauge cannula and the patients.
- Our research indicates that there is a statistically significant difference between catheter dwell time and thrombophlebitis. However, it was discovered that most thrombophlebitis cases were recorded 12 hours or more after insertion.
- After 12 hours, the incidence of thrombophlebitis may be influenced by drug-induced phlebitis. This may have been influenced by the medications' pH and osmolarity. The majority of research advise changing the cannula every 72 hours.
- According to certain research, the length of time the cannula is left in place¹³ increases the likelihood of developing phlebitis. Therefore, it has been advised to replace the IV cannula on a timetable. However, recent studies found that when the period was extended up to 96 hours, there was no increase in cannula-related problems. However, the cannula must be examined every day, and if any signs of phlebitis or infection are found, they must be withdrawn right away
- But it was found that incidence of developing thrombophlebitis is 40% more in diabetics than in non-diabetics. These risk factors were evaluated only in few studies. A higher incidence in diabetic patients may be due to the endothelial damage induced by diabetes mellitus. Half the patients with hyperlipidaemia developed thrombophlebitis, however as the numbers were small it was a non-significant risk factors. Smoking was also found to be a no significant risk factor.
- Our study had certain limitations such as small study sample, Cannula was inserted by different groups of people, IV fluids and IV aesthetic agents administered during the surgery were not considered.

CHAPTER 7

CONCLUSION

- The study shows that the incidence of phlebitis caused by above mentioned drug induced are 41.3% and from other causes are 58.6% similarly Phlebitis caused.
- Most of the high concentrated drugs initial doses are administered through small Gauge peripheral lines.
- Changing of the peripheral line to External Juglar vein, bigger and large IV cannula is being done after observing the signs and symptoms of phlebitis.
- Two or more high concentrated drugs are in continuous flow at same time through same peripheral lines.

CHAPTER 7

RECOMMENDATION

- SOP has to be prepared for selection of the lines for infusing high concentrated drugs based on the osmolality.
- Training should be provided for proper site selection to insert peripheral iv cannula.
- Proper documentation of drug induced peripheral iv cannula phlebitis should be made.
- If pricked one or two times and pain occurs or any other symptom related phlebitis occurs, then expert staff should handle the patient in that case.
- Proper training sessions of staff regarding drug induced phlebitis through peripheral iv cannula should be held from timely
- Patients attendees should be educated regarding phlebitis.
- Proper monitoring and evaluation should be done of drug induced peripheral iv cannula patients timely.

CHAPTER 9

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ANNEXURES

[illegible]

CLINICAL AUDIT ON PREVENTION AND REDUCTION OF THROMBOEMBOLIC PHLEBITIS

V. P. SODRE

1. V.P. SODRE, ADVANCE DENTISTRY

2. HOSPITAL/CLINIC/INSTITUTION

3. DATE OF STUDY

4. DATE OF REPORT

5. NAME OF SUPERVISOR

6. NAME OF COLLEGE

7. NAME OF DEPARTMENT

8. NAME OF INSTITUTE

9. NAME OF HOSPITAL

10. NAME OF CLINIC

11. NAME OF INSTITUTE

12. NAME OF HOSPITAL

13. NAME OF CLINIC

14. NAME OF INSTITUTE

15. NAME OF HOSPITAL

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19. NAME OF CLINIC

20. NAME OF INSTITUTE

21. NAME OF HOSPITAL

22. NAME OF CLINIC

23. NAME OF INSTITUTE

24. NAME OF HOSPITAL

25. NAME OF CLINIC

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