Routine Replacement versus Clinically Indicated Replacement of Peripheral Venous Catheters through Assessment of Incidences and Grades of Phlebitis in Patients with IV Cannula at a Tertiary Care Hospital, Mumbai

Bhavnani Namrata¹, Ahire Neha¹*, Prakash Kalke¹ and Shrikrishna Dhale¹

¹Symbiosis Institute of Health Sciences, Symbiosis International (Deemed University), Pune, India.

Authors’ contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Background: The current study assesses the incidences and grades of phlebitis among patients with IV cannula to determine the association of grades of phlebitis. The purpose of the study was to study the feasibility of Routine replacement versus Clinically indicated replacement of peripheral venous catheters. The study observes the incidences of removing peripheral intravenous catheters when clinically indicated compared with removing and re-siting the catheter routinely.

Methods: An observational study was conducted in the tertiary care private hospital of Mumbai, India. The study was conducted over 5 weeks from May -June 2020. Purposive sampling was considered during the collection of data. The sample size of the study was 117 patients admitted having peripheral venous catheters. The standard visual infusion phlebitis (VIP) score was used as a tool for data collection. Descriptive analysis was done.

Results: Out of 117 patients (VIP score 0 -56, Score 1- 49, Score -12 no cases with score 3, 4, and 5). Routine replacement of IV cannula after every 5 days is judiciously followed, 45 healthy
lines were replaced at score 0; which is the major concern (Rs. 633/- the total cost of replacing 1 PVC line).

**Conclusion:** Following the routine practice of IV cannula replacement based on VIP score to avoid phlebitis is equally good but simultaneously clinically indicated replacement of IV cannula is advisable to make it cost-effective and reduced number of a prick to the patients; this will help to improve patient satisfaction.

**Keywords:** Phlebitis; clinically indicated replacement; visual infusion phlebitis scale; Intravenous cannula; thrombophlebitis.

1. **INTRODUCTION**

In hospitals, up to 85% of patients receive IV therapy during their admission. The peripheral venous catheterization is a commonly used invasive procedure to administer medications, fluids, and bioproducts inside the body of the patients. However, phlebitis is the most common undesirable effect due to the placement of an intravenous cannula. Phlebitis means inflammation of a vein at the cannula access site and has been an important subject of investigation. So, the caregivers need to identify patients who are at risk of developing phlebitis. In turn, early recognition will enable prompt intervention, minimizing disruption to treatment. For the early detection of phlebitis, the nursing staff and the caregivers need to check the access site every shift of all patients with an intravenous access device [1].

Thrombophlebitis is a condition due to one or more blood clots in a vein that causes inflammation. The removal or recited of the cannula can resolve the early phlebitis at an intravenous site. Common complications like thrombosis, infection and recurrent superficial thrombophlebitis are rare but can occur [2].

It can be further classified as Superficial Thrombophlebitis and deep vein thrombosis – About 55% of all the patients receiving IV therapy develop superficial thrombophlebitis. It is of minor significance and can be treated with anti-inflammatory agents and warm compression. Deep Thrombophlebitis (DVT) – About 5% of surgical patients develop deep vein thrombophlebitis. This is of greater significance and can result in embolism of thrombi from deep veins to the lungs. This can be serious and can result in prolonged hospitalization [2].

There are several predicaments including thrombophlebitis, phlebitis, invasion, and diseases that are related to IV treatment. The medical attendants assume a significant job according to information and experience of embedding cannula in forestalling these complexities. The most successive intricacy of PIV insertion is phlebitis which happens at a rate as high as 75% in patients having irresistible illnesses [3]. The event rate in patients who don't have diabetes requirements for critical addition of catheters is roughly 20%. Several hazard factors have been ensnared in the advancement of phlebitis [4].

The primary sites of insertion are cephalic or basilic veins of the lower arms situated as the rear of the hand. The other piece of the body that can be cannulated in the veins of lower appendages. These are to be maintained at a strategic distance as they are associated with a higher danger of disease. The danger of contamination and phlebitis can be limited by thinking about the general state of a vein, shirking of the purpose of flexion and size of cannula and vein, and the length of treatment [5].

It is considered that clinical factors along with the site of vein, kind of liquid, stream rate, number of days on stream had a noteworthy association with the development of phlebitis. An improper aseptic method, contribution of elbow joint ruining were found to be the most significant hazard factors for the advancement of phlebitis [5].

Various studies conducted have provided the framework for the development of tools and the structured questionnaire. “The two most commonly used tools for assessment are Phlebitis Scale and the Visual Infusion Phlebitis (VIP) scale.”VIP scale has remained the most reliable scale for determining when an intravenous catheter should be removed and has been recommended in Infusion Nursing Standards of Practice”. (6).

The introduction of assessment tool –“The Visual Infusion Phlebitis (VIP) score tool for assessment of the early signs of phlebitis, along
with prompt removal of the peripheral intravenous cannula has been very successful in reducing the incidence below the 5% and achieving this goal depends on strict compliance with guidelines for cannula insertion, documentation, and assessment using the VIP score tool [6]. Any nurse who commences a prescribed infusion as a part of her daily clinical practices must have undertaken specialist training and assessment of competence in line with the organization protocol to minimize the risk. (Nursing Standards of Practice, INS, 2011). Appropriate clinical practices are also important from the patient safety point of view [7]. The study was conducted to assess the incidences and grades of phlebitis among patients with IV cannula and to determine the association of grades of phlebitis and evaluation of the feasibility of switching from routine to clinically indicated replacement of IV cannula.

2. METHODS

An observational study was conducted in a tertiary care private hospital of Mumbai, Maharashtra, India. The study was conducted over 5 weeks from May -June 2020. Purposive sampling was used. IPD Patients with peripheral intravenous cannula who had verbally consented to be participants of this study. A sample size of 117 patients was included in this study. Jackson’s Visual Infusion Phlebitis Scale a standardized tool developed by Andrew Jackson consists of 0 to 5 grades according to sign and symptoms of phlebitis were used. Observe the patients with IV lines and grading the observation using the VIP (Visual Infusion Phlebitis) Score Scale (0 to 5). Routine PIV cannula changes were recorded for all patients and crosschecked with individual patients’ files for confirmation. Collected data was analyzed with descriptive-analytical tools to record the frequency of incidences of phlebitis. For analysis MS excel and SPSS version 21 was used. For checking the feasibility of routine to clinically indicated replacement following formula was used. Patients in which IV cannula get replaced as routine practices at VIP score 0 multiply by MRP of IV cannula.

3. RESULTS

Due to routine nursing practices of peripheral IV cannula checking had worked shown that approximately 48% of patients IV site appears normal, approximately 42% of patients IV site shows redness near IV site, and approximately 10 % of patients had complained about erythema, swelling or pain at the IV site. None of the patients had shown any symptoms related to scoring 3, 4, and 5. As a routine practice the replacement of IV cannula was done on every 5th day for all the patients irrespective of the VIP score . The hospital is not following the VIP scores for replacement. Also, IV cannula is recited before 5 days for any clinical indications. The practice of replacement after 5days is causing the replacement of the healthy catheters as well which is not required considering the VIP scores. This is causing extra burden financially as well.

Out of all patients 45 (38%) patients, peripheral IV cannula was replaced as a part of routine procedure on the fifth day at VIP score 0. Looking into the score it was not required and necessary as per clinically indicated replacement protocol. So the cost of following the VIP score is INR 28485/- at maximum retail price for 45 IV cannula. If we consider 38% of one year patients this cost may get escalated further.

4. DISCUSSION

The study assesses the incidences and grades of phlebitis among patients with IV line at a tertiary care hospital. Visual Infusion Phlebitis (VIP) tool was used to study the grades of phlebitis. PIVC insertion, maintenance, and removal is a painful and stressful experience for the patients and the experience needs to be improved and aligned with the best practice guidelines for its insertion and care. There is a need to provide education and training for the vascular access clinicians to ensure the best practices and high-quality care of the patients. It is seen that the hospitals follow a standard protocol of changing the cannula on 5th day on insertion without actually assessing the need of changing clinically. Catheter insertion is an unpleasant experience for patients and replacement may be unnecessary if the catheter remains functional and there are no signs of inflammation or infection. Costs associated with routine replacement also needs to be considered. Advantages of using VIP score and clinical indications to replace the cannula would lead to better patient outcomes and save on unnecessary cost of changing the catheters.
Table 1. Represents the Incidence of each VIP score, where the total denominator was 117

<table>
<thead>
<tr>
<th>VIP Score</th>
<th>Number of patients (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score 0</td>
<td>56 (47.86%)</td>
</tr>
<tr>
<td>Score 1</td>
<td>49 (41.88%)</td>
</tr>
<tr>
<td>Score 2</td>
<td>12 (10.25%)</td>
</tr>
<tr>
<td>Score 3</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Score 4</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>Score 5</td>
<td>0 (0%)</td>
</tr>
</tbody>
</table>

Hospital is a busy environment thus the nursing staff and caregivers need to be aware of the clinical indications and newer evidence-based practices to optimize working conditions and minimize the potential for harm to the patients. The introduction of the VIP score in the clinical care pathways would lead to better clinical decisions. Studies have advocated a significant reduction in incidences of phlebitis after the usage of VIP tools and compliance with PVC documentation. (8-9) For successful outcomes, important considerations are the involvement of all ward staff nurses and doctors, regular PVC audits with feedback. This is not only going to benefit clinically but also financially. The study indicates that 56% of the patients had score 0 whereas 61% had a score of 1-2. This strongly advocates substitution for the routine replacement to clinically indicated replacement. (10-11)

Thus, Clinically indicated replacement protocol should be an alternative of the current practice of routine replacement that brings saving of huge amounts of costs and reduces the no. of pricks for patients ensuring improved patient satisfaction.

6. LIMITATIONS AND SCOPE FOR FUTURE

The sample size was limited to 117 patients looking at time constraints. The study was limited to one hospital, for better generalization, this study can be conducted with larger sample size. A comparative study can be carried out to compare the knowledge of the nurses regarding IV cannulation and its complication among staff nurses working in Government & Private Hospitals.

CONSENT AND ETHICAL APPROVAL

Hospital Management and Nursing head had permitted to conduct this study in the IPD of the hospital. No personal details were asked or recorded on the data collection sheet to avoid violation of personal information sharing policy.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES


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