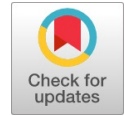


# Use of Vein Finder to Overcome Factor Affecting Peripheral Intravenous Cannulation, Venipuncture, IV Insertion, and Blood Draws

Shaambhavi Sharma



**Abstract:** To find a vein for intravenous insertion is quite difficult in most of the people. This difficulty is due to several factors, such as the demographic and clinical characteristics of the patients (age, sex, height, weight, ethnicity, IV drugs history, and medical history), health professional's experience, device characteristics, site of insertion, and vein characteristics. Many insertion attempts has to be done due to difficulty in intravenous insertion. This makes the patient uncomfortable and frustrated leading to challenge for the health workers. It is also an expensive affair for the health institutions. Therefore to avoid the above problems medical practitioners should use the Vein Finder to locate the vein for intravenous insertion.

**Keywords:** Demographic, Medical Practitioners, Characteristics, QBGJWTFM

## I. INTRODUCTION

As per the review given on the reports published it was observed that first time insertion failed in 30% of the cases. This failure rate ranges from 10%–40% as per other researches. The study conducted by Witting (2012), also reported 39% failure in first time insertion at intravenous cannulation [1,2][15][16]. There are many factors responsible for the failure of intravenous cannulation some of the associated factors are:- The individual risk factors associated with are age, gender, ethnicity, body mass index, health status, medical history, and vein characteristics of the patients [3, 4, 5, 6].

## II. AIMS AND OBJECTIVES

In this study we aimed to explore case studies concerning PVC learning, Venipuncture, IV insertion and Blood Draws and use of Vein Finder. By comparing who mastered the technical skill of the vein cannula, venipuncture, IV insertion and blood draws with the help of Vein Finder with other who did not used it. We aimed to describe in detail the factors that influenced PVC, venipuncture, IV insertion and blood draws and to overcome them with the help of Vein Finder on patients. This exploration may in turn afford an understanding of challenges that medical technicians encounter in their day to day processes and the importance of Vein Finder in overcoming them.

Because of challenges found in the implementation of the vein cannula, we have in the current research explored conditions influencing venipuncture, IV insertion and blood draws with and without use of Vein Finder. We formulated two research questions:

- (1) How do different conditions influence and use of Vein Finder affect the success in cannula implementation, venipuncture, IV insertion and blood draws?
- (2) How do the people experience without the use of Vein finder and its effect on the patient.

## III. METHODS

In present research data has been collected through extensive fieldwork covering many pathologies, blood collection and testing centres and hospitals. In order to compare the factors effecting intravenous insertion case studies were conducted. In order to find out the conditions influencing insertion, veinipuncture, IV insertion and blood draw in depth case studies were done. Cases were selected to study the ease of insertion by the use of Vein Finder. In this research semi-structured interviews and ad hoc conversation were carried out in extensive field work.

### A. Sample

This in-depth case study of 300 subjects from different Age group, Gender, Ethnic group, Body Mass Index, Patient health condition, Patient's medical history and Vein characteristic is conducted for this research work. The sample was further divided into the group of 25 to 75 as per the parameter under different factors.

### B. Data Collection

Semi-structured interviews and ad hoc conversations were conducted to generate knowledge and insight into subject's experiences and perspectives in vein cannulation [7][14]. All the attempts of PVC were performed on the veins of patients' hand and arm (basilica, cephalic, metacarpalis, and dorsalis).

## IV. RESULT AND DISCUSSION

Difficult venous access is characterized by non-visible and non-palpable veins and is caused by the various factors such as Age group, Gender, Ethnic group, Body Mass Index, Patient health condition, Patient's medical history and Vein characteristic. The affect of these factors on First Time Insertion Success (FTIS) directly and with the help of Vein Finder is as follows:

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## A. Age

The age of the individual effect the intravenous cannulation. With increasing age, the vein diameter expands, thereby increasing the visibility and palpability of the veins [5,8]. Therefore, it could be relatively difficult to determine the appropriate vein in neo-nates children and aged people.

**Table-1**

Age Group	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
0-10	25	(15) 60%	(18) 70%
11-20	50	(35) 70%	(40) 80%
21-30	50	(40) 80%	(45) 90%
31-40	50	(42) 84%	(47) 94%
41-50	50	(38) 76%	(43) 86%
51-60	50	(35) 70%	(40) 80%
61 Above	25	(16) 61%	(18) 70%

The highest percentage of FTIS 84% is among the age group 31-40 years and least 60% is among the children of age group 0-10 years.

## B. Gender

Studies have reported that gender is a risk factor for difficult venous access. Jacobson and Winslow (2005) reported that catheter insertion procedure is more difficult in women compared to men. This could be explained by the smaller caliber of peripheral veins in women [9][12][13].

**Table-2**

Gender	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Male	150	(128) 85%	(143) 95%
Female	150	(119) 79%	(134) 90%

The highest percentage of FTIS 85% is among the males whereas the females show a slight low percentage of 79%.

## C. Ethnicity

Individuals with different ethnicities may have different skin colors, and peripheral intravenous cannulation (PIVC) might be difficult in certain individuals of particular skin color. A narrative review published in 2010 by Sabri et al. reported an association between skin color and DIVA [10]. Jacobson and Winslow (2005) also reported that catheter insertion was more difficult in individuals with dark and/or tough skins [9].

**Table-3**

Complexion	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Very Light	50	(40) 80%	(45) 90%
Light	50	(38) 76%	(44) 87%
Medium	50	(36) 72%	(41) 82%
Darker	50	(35) 70%	(41) 81%
Dark	50	(33) 65%	(39) 77%
Black	50	(31) 61%	(35) 70%

The highest percentage of FTIS 80% is among the the people having Very Light Complexion and least 61% is among the people with Black Complexion.

## D. Body Mass Index

Body mass index (BMI) is a measure of body fat based on the height and weight of the individual. An increase in weight may cause an increase in the adipose tissue and, therefore, a decrease in the visibility of the veins, rendering the catheter insertion difficult [6,9]. Several studies have reported body mass index as a risk factor for difficult catheter insertion [3, 5, 6].

**Table-4**

BMI	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Under Wt. 18.5	75	(45) 60%	(54) 72%
Normal 8.5-24.9	75	(60) 80%	(67) 91%
Over Wt.25.0-29.9	75	(54) 72%	(63) 84%
Obesity 30.0-above	75	(46) 61%	(53) 70%

The highest percentage of FTIS 80% is among the people with normal body mass index and least 60% is among the people who are under weight which is followed by people with obesity

## E. Patient's Health Conditions

It is reported that the physiological and psychological conditions of the individuals exert an effect on their venous structure [4, 6]. It is elucidated that certain chronic diseases may cause the deterioration and hardening of the vascular structure, rendering the catheter placement process difficult. Cancer, diabetes mellitus, and vascular diseases are among the conditions that render vein access difficult [3,5,6]. Intravenous chemotherapy treatment or surgical procedure/dissection of the lymph nodes associated with breast cancer reduces the visibility and palpability of the veins.

**Table-5**

Health Condition	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Healthy	100	(82) 82%	(90) 90%
Mild Disease	100	(74) 74%	(86) 86%
Chronic Disease	100	(67) 67%	(77) 77%

The highest percentage of FTIS 82% is among the people with Healthy record and least 67% is among the those who are suffering from Chronic diseases.

## F. Patient's Medical History

Medical histories of the individuals, particularly the previous history of difficulty with punctures or insertion of catheters, may be the risk factors for DIVA due to their effect on the vascular structure [5, 6]

**Table-6**

History	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Earlier Punctures	150	(92) 61%	(105) 70%
Normal	150	(126) 84%	(120) 85%

The highest percentage of FTIS 84% is among the people who have undergone peripheral intravenous cannulation, venipuncture, iv insertion, and blood draws before and least 61% is among the people whose veins have been punctured many times before.

## G. Vein Characteristics

The vascular structure may differ from individual to individual. The diameter, visibility, palpability, and superficiality (or depth) of the vein are important factors to be considered when determining the appropriate vein for PIVC [11]. A vein with a wide diameter is easily visible and palpable.

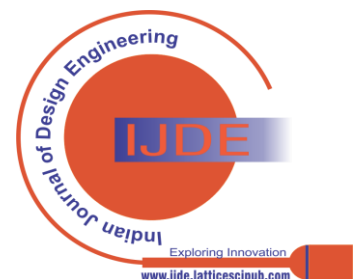


Table-7

Vein Characteristics	Sample Size	Percentage of FTIS Success	
		Directly	With Vein Finder
Wide Diameter Vein	75	(63) 84%	(71) 95%
Visible Vein	75	(61) 82%	(69) 92%
Palpable Vein	75	(60) 80%	(68) 91%
Superficial Vein	75	(65) 86%	(71) 95%

The highest percentage of FTIS 86% is among the people with Superficial Veins and least 80% is among the people who have Palpable veins.



Fig. 1: Highlighting Veins by Vein Finder

### V. CONCLUSION

This study aimed to identify risk factors for difficult intravenous cannulation in relation to characteristics of patients in First Time Insertion Success (FTIS). Many risk factors were identified, the overall success rate was very high with the use of Vein Finder. These findings can serve as a basis for future studies. Early identification of patients with difficult I.V. access will lead to better clinical care, preventing complications and reducing delays in starting treatment. The findings of the present study showed that near-infrared vein finder technology has the most favorable impact on the success rate of cannulation by reducing the procedural time and the number of attempts for cannulation. In addition, patient's age, gender, ethnicity, body mass index, health status, medical history, and vein characteristics of the patients have an independent and significant effect on the success rate of cannulation. According to the findings and conclusions in this research can be concluded that, since vein finder device shows a positive impact on physiologic responses of anxiety during IV insertion, it can be suggested as the proper, safe, effective, low-cost and tension free procedure which avoid repeated insertion attempts.



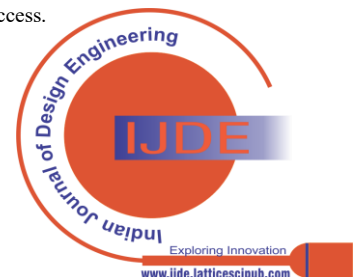
Fig. 2: Insertion of Needle with the Help of Vein Finder

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Authors Contributions	I am the sole author only.

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