

# **A COMPARATIVE STUDY OF TRADITIONAL INSTRUCTION & VIRTUAL REALITY SIMULATION ON INTRAVENOUS CANNULATION TRAINING AMONG NURSING STUDENTS IN NAGPUR**

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## **ABSTRACT**

Virtual Reality Simulation (VRS) is an educational tool that allows learners to engage in realistic patient scenarios without exposing actual patients to the risks associated with training. This method is versatile and can be applied to a wide range of clinical topics. The study was conducted is "A Comparative Study of Traditional Instruction & Virtual Reality Simulation on Intravenous Cannulation Training among Nursing Students in Nagpur. The Objective of study are 1. To assess the knowledge and practice of the student nurses on Intravenous cannulation by Traditional Training Instruction & Virtual Reality Simulation. 2. To assess the effectiveness of the Intravenous cannulation by Traditional Training Instruction 3. To assess the effectiveness of the Intravenous cannulation by Virtual Reality Simulation 4. To find out Association between Traditional Training Instruction Vs Virtual Reality Simulation among the students. Non experimental Comparative Research Design is used in this study. It is conducted over 60 nursing students. (Group – I 30: - will be taught by traditional instruction, Group -II 30 will be taught by virtual reality simulation) by using non-probability convenience sampling technique. Assessment is done by using Structured Knowledge questionnaire on demographic variables and on Knowledge regarding intravenous cannulation. And Checklist for assessing the practice regarding Intravenous cannulation. The finding reveals that 70% of nursing students in traditional technique had poor level of knowledge and practice, 30% in traditional technique and 10% in IV cannula

technique had average level of knowledge score and 90% of nursing students in cannula technique had good level of knowledge score.

Minimum knowledge and practice score in traditional technique was 14 and in IV cannula technique it was 14 and maximum knowledge and practice score in traditional technique was 11 and in IV cannula technique it was 22. Mean knowledge and practice score in traditional technique was  $6.56 \pm 1.47$  and in IV cannula technique it was  $18.60 \pm 2.97$ . There is no significance association between demographic variables.

### **Key Notes: Traditional Instruction, Virtual Reality Simulation, Intravenous Cannulation**

#### **INTRODUCTION**

Virtual Reality Simulation( VRS) is pedagogical fit that permits learners to witness real patient deals without placing patients to the threats essential in learner learning and is adaptable to cases involving a wide variety of clinical content. VRS is a approach, not a technology that uses innovative ways to educate and make scholars learn by furnishing hands- on gests in a variety of ways. The present decade has illustrated the necessity of VRS within the nursing profession too. It's attentively the formal strategy for bridging the gap between hypothesis and practice. The traditional lecture strategy is the system that the instructors conduct knowledge to scholars through oral language. Lecture strategy includes describing system, interpretation system, speak pronunciation and speech system. instructors use all kinds of tutoring styles in tutoring substantially accompanied with tutoring system.<sup>1</sup>

Lecture-based instructional approach refers to a traditional classroom teaching model, where the instructor delivers lecture verbally in combination with a projector, visual display surface and writing surface (e.g. a chalkboard or dry-erase whiteboard). This is generally considered as an instructor-centred and content-oriented approach. In other words, Traditional lecture-based instruction is designed to promote learning through practice questions and exercise drills that

typically engenders less classroom interaction between the instructor and students, and between students themselves.<sup>2</sup>

Intravenous (IV) cannulation is a method in which a cannula is placed inside a vein to give venous access. Venous access allows sample of blood, as well as administration of fluids, drugs, parenteral nutrition, chemotherapy, and blood products.<sup>3</sup>

Despite its benefits and frequent use, intravenous cannulation has complications that can seriously hang patient safety similar as clotting, occlusion, leakage, infiltration, extravasation, phlebitis, and infection.

To maintain a high level of proficiency in intravenous cannulation, it is essential to practice this skill regularly. This is crucial for achieving quick and effective IV access when needed. IV catheter insertion into peripheral veins is one of the most frequently performed invasive procedures in hospitals. However, it can sometimes be challenging, requiring multiple attempts and causing discomfort to patients. The high success rates of nurses in IV cannulation are attributed to their frequent practice of the procedure. Globally, the failure rate for first-attempt peripheral IV cannulation has been found to be 34.83% (132.4 cases).<sup>4</sup>

Intravenous (IV) therapy plays a vital role in modern medicine, with millions of patients receiving infusion treatments for life-saving purposes and to correct metabolic disorders through medications, nutrition, solutions, and blood products. Hospitals rely heavily on IV catheters as essential tools to access intravenous sites. Despite being a crucial procedure in nearly every healthcare department, IV cannulation has its disadvantages if not properly managed. Complications from vascular access devices can include IV phlebitis, thrombophlebitis, catheter embolism, bleeding, nerve, tendon or ligament damage, needle stick injuries, and sepsis.<sup>5</sup>

Patient safety is a growing concern for healthcare providers. Nursing professionals face the challenge of delivering the best possible care, as they are primarily responsible for patient care in hospitals. They must be capable of determining the appropriate care for their patients and ensuring that both they and their patients are protected from the complications and hazards associated with IV devices. IV device insertion is so common across all healthcare settings that it is often perceived as routine, leading to the assumption that it is free from clinical issues. However, inserting IV

catheters into peripheral veins remains one of the most frequently performed invasive medical procedures in hospitals. This procedure can sometimes be challenging, requiring multiple attempts and causing significant discomfort to patients.<sup>6</sup>

### **NEED OF THE STUDY:**

In April 2012, a study was published about a Continuing Education Course on Intravenous (IV) Catheter Insertion for experienced registered nurses in Villanova, USA. The course aimed to enhance the confidence, expertise, and knowledge of nurses regarding IV catheter insertion, maintenance, and infection prevention. Despite prior training with a phlebotomist and designated time with the IV team, many experienced nurses lacked confidence in their IV catheter skills.

The one-day continuing education program was attended by 33 experienced nurses. Findings revealed that the course significantly improved the nurses' knowledge and skills. Knowledge enhancement was evident immediately after the course and sustained 8 to 12 weeks later. Improvements in skills related to infection prevention and adherence to policies were also observed. The study concluded that nurses' confidence levels increased following the formal IV course. It suggested that further studies with larger sample sizes should be conducted to validate these results.

The ability to gain peripheral intravenous access is an essential skill for all nurses. While considered one of the simplest invasive procedures, mastering this potentially lifesaving intervention requires refined skills and experience.

Nowhere has the change in content delivery and clinical education methods been more apparent than in the clinical aspects of nursing education (Bodily, 2012). The challenge for nurse instructors is to use simulation and traditional methods as educational tools and to design testing strategies focusing on assessing practices which are supposed the best. Virtual reality and the traditional system for phlebotomy training both have their benefits and drawbacks. Nurse instructors have the ultimate responsibility to examine these educational tools for further effective outgrowth measures geared towards the enhancement of patient safety and care.<sup>7</sup>

### **PROBLEM STATEMENT**

## **“A Comparative Study of Traditional Instruction & Virtual Reality Simulation on Intravenous cannulation Training among Nursing Students in Nagpur”**

### **OBJECTIVE OF THE STUDY**

1. To assess the knowledge and practice of the student nurses on Intravenous cannulation by Traditional Training Instruction & Virtual Reality Simulation.
2. To assess the effectiveness of the Intravenous cannulation by Traditional Training Instruction
3. To assess the effectiveness of the Intravenous cannulation by Virtual Reality Simulation
4. To find out Association between Traditional Training Instruction Vs Virtual reality Simulation among the students.

### **METHODOLOGY**

**Research design:** Comparative Research Design

**Target population:** Nursing Students

**Accessible population:** - 2<sup>nd</sup> year Nursing Students

**Setting of study:** - Nursing Students in Nagpur city”

**Sample size:** - 60 nursing students. ( Group – I 30 :- will be taught by traditional instruction Group -II 30 will be taught by virtual reality simulation )

**Sampling technique:** Nonprobability convenience sampling technique

#### **Variable of the Study:**

- **Independent Variable:** Teaching regarding Intravenous insertions by traditional instruction & virtual reality simulation
- **Dependent variable:** Improvement in knowledge and practice score regarding iv insertion training among students

**Sample criteria :-**

The sample was selected with the following set of criteria.

**Inclusion criteria:**

- Nursing students willing to participate in study.
- Both male and female nursing students.
- Nursing students who are available during the period of data collection.

**Exclusion criteria**

- Nursing students who are in leave at the time of study.

**Tools for Data Collection:**

**1. Structured Knowledge questionnaire consist of 2 sections:**

**Section A:** consist of demographic variables of the staff nurses to be participated in the study. Eg: age, Age (In years), Gender, Did you practiced iv insertion, If yes mode of practice , If yes mode of practice, Availability of simulators in your college

**Section B:** It comprises of 5 questions on Knowledge regarding intravenous cannulation.

**2. Checklist for assessing the practice regarding Intravenous cannulation.**

**RESULTS**

## SECTION I

Table 1: Percentage wise distribution of Nursing Students according to their demographic characteristics.

n=30

<b>Demographic Variables</b>	<b>No. of nursing students</b>	<b>Percentage(%)</b>
<b>Age(yrs)</b>		
18-20 yrs	12	40
20-22 yrs	18	60
22-24 yrs	0	0
>24 yrs	0	0
<b>Gender</b>		
Male	0	0
Female	30	100
Others	0	0
<b>Taught by intravenous insertion</b>		
Yes	15	50
No	15	50
<b>Mode of practice</b>		
Traditional Method	17	56.7
Virtual Reality Simulation	13	43.3
<b>Availability of simulators in your college</b>		
Yes	3	10
No	27	90

## SECTION II

**Assessment of level of knowledge and practice regarding intravenous cannulation training of traditional instruction versus reality simulation among nursing students in Nagpur city.**

**Table 2: Assessment with level of knowledge and practice score**

n= 30

Level of knowledge and practice score	Score Range	Level of Knowledge and Practice Score	
		Traditional Technique	IV Cannula Technique
Poor	0-7	21(70%)	0(0%)
Average	8-14	9(30%)	3(10%)
Good	15-23	0(0%)	27(90%)
Minimum score		4	14
Maximum score		11	22
Mean knowledge score		6.56 ± 1.47	18.60±2.97
Mean % Knowledge Score		28.55 ± 6.42	80.86±12.94

The above table shows that 70% of nursing students in traditional technique had poor level of knowledge and practice, 30% in traditional technique and 10% in IV cannula technique had average level of knowledge score and 90% of nursing students in cannula technique had good level of knowledge score.

Minimum knowledge and practice score in traditional technique was 4 and in IV cannula technique it was 14 and maximum knowledge and practice score in traditional technique was 11 and in IV cannula technique it was 22.

**SECTION III**

**Comparison of knowledge and practice score regarding intravenous cannulation of traditional instruction versus virtual reality simulation among nursing students from selected nursing colleges in Nagpur city.**

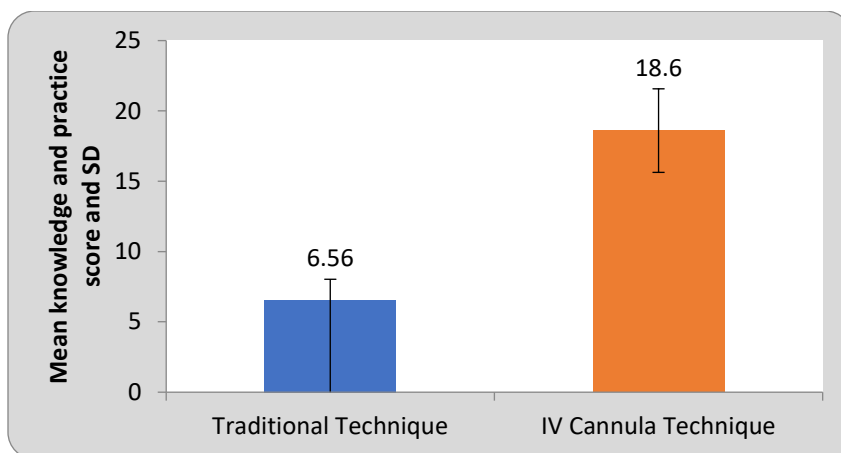
**Table 4 : Significance of difference between knowledge score among nursing students**  
n=30

Technique	Mean	SD	Mean Difference	t-value	p-value
Traditional Technique	6.56	1.47	12.03±0.60	19.82	0.0001 S,p<0.05
IV Cannula Technique	18.60	2.97			

This table shows the comparison of knowledge and practice scores of nursing students regarding intravenous cannulation. Mean, standard deviation and mean difference values are compared and student's unpaired 't' test is applied at 5% level of significance. The tabulated value for  $n=30+30-2$  i.e. 58 degrees of freedom was 2.00. The calculated 't' value i.e. 19.82 are much higher than the tabulated value at 5% level of significance for overall knowledge and practice score of nursing students from selected nursing colleges of the city which is statistically acceptable level of significance. Hence it is statistically interpreted that the Intravenous Cannulation on knowledge and practice regarding intravenous cannulation training among nursing students from selected nursing colleges of the city was effective. Thus the  $H_1$  is accepted.

Mean knowledge and practice score in traditional technique was  $6.56 \pm 1.47$  and in IV cannula technique it was  $18.60 \pm 2.97$ .

**Graph: Significance of difference between knowledge score among nursing students**



### SECTION D.1

Association of level of knowledge and practice score regarding intravenous cannulation in traditional instruction among nursing students in relation to their demographic variables

Demographic variable	Calculated value			Df	Table value	Level of significance	Significance
	t-value	F-value	p-value				
Age	0.05		0.96	28	2.05	p>0.05	NS
Taught by	0.12		0.90	28	2.05	p>0.05	NS
Intravenous Insertion							
Mode of Practice	0.58		0.56	28	2.05	p>0.05	NS
Availability of stimulators	0.12		0.90	28	2.05	p>0.05	NS

KEY: S - SIGNIFICANT

NS:- NON-SIGNIFICANT

### SECTION D.2

**Association of level of knowledge and practice score regarding intravenous cannulation in traditional instruction among nursing students in relation to their demographic variables**

Demographic variable	Calculated value			Df	Table value	Level of significance	Significance
	t-value	F-value	p-value				
Age	0.51		0.60	28	2.05	p>0.05	NS
Taught by Intravenous Insertion	1.23		0.22	28	2.05	p>0.05	NS
Mode of Practice	0.46		0.64	28	2.05	p>0.05	NS
Availability of stimulators	0.04		0.96	28	2.05	p>0.05	NS

KEY: S: - SIGNIFICANT

NS:- NON-SIGNIFICANT

**CONCLUSION**

After detailed analysis this study leads to following conclusion. The study reveals that 70% of nursing students in traditional technique had poor level of knowledge and practice, 30% in traditional technique and 10% in IV cannula technique had average level of knowledge score and 90% of nursing students in cannula technique had good level of knowledge score.

Minimum knowledge and practice score in traditional technique was 14 and in IV cannula technique it was 14 and maximum knowledge and practice score in traditional technique was 11 and in IV cannula technique it was 22.

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There is no significance association between demographic variables.

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