

Effect of Video assisted Teaching Intervention on Nurses' Performance Regarding Venous Blood Sampling Withdrawal from Neonates

Rawia Abd El-ghany Mohamed¹, Ghada.A.Hassan², Hanan Elsayed Metwally³

¹ Assistant Professor of Pediatric Nursing, Faculty of Nursing, Benha University, Egypt.

² Assistant Professor of Pediatric Nursing, Faculty of Nursing, Menoufia University, Egypt.

³ Lecturer of Pediatric Nursing- Faculty of Nursing-Benha University, Egypt.

Abstract

Context: Venous blood sampling withdrawal is a common invasive procedure performed for neonates at neonatal intensive care unit. So, neonatal nurses should be trained effectively to prevent unnecessary risk and adverse events for neonates. **Aim:** To evaluate the effect of video assisted teaching intervention on nurses' performance regarding venous blood sampling withdrawal from neonates. **Methods:** The study was conducted using a quasi-experimental design. **Setting:** The study was carried out at the Benha Specialized Pediatric Hospital's NICUs and SNICU (Surgical Neonatal Intensive Care Unit) in Benha city. **Sampling:** A convenient sample of nurses (70) who work in NICUs and SNICU as well as a convenient sample of neonates (70) from the setting mentioned above, regardless of their personal characteristics. **Data collection Tools:** The following three tools were utilized for data collection; Tool 1: A structured interview questionnaire for assessing nurses' personal characteristics, knowledge of nurses about venous blood sampling withdrawal. Tool 2: An observation checklist for assessment of nurse practice towards venous blood sampling withdrawal. Tool 3: Nurses' attitude rating scale towards venous blood sampling. **Results:** There were highly statistically significant differences between total knowledge and total practice of the studied nurses pre and post-implementation of the training intervention. Also, the majority of the studied nurses had a positive attitude towards the venous blood sampling withdrawal procedure post video training intervention. **Conclusion:** Video assisted teaching intervention improved nurses' knowledge, practice, and attitude level towards venous blood sampling withdrawal from neonates. **Recommendation:** The study recommended that applying different types of electronic teaching in nursing education is an efficient method to improve performance of nurses, which reflected competence and safe neonatal care.

Keywords: Neonates, Nurses' performance, Venous blood sampling, Video assisted teaching.

Introduction

Collections of venous blood sampling are a complex task that is essential for the diagnosis and treatment of newborns. Nurses play an active role regarding venous blood sampling procedure. Unfortunately, pre-analytical errors frequently affect the collection of blood samples, which can negatively impact outcomes such as prolonged hospital stays, delayed diagnosis, and therapy (Hjelmgren *et al.*, 2021).

Hospitalized newborns frequently undergo blood sampling and the insertion of peripheral intravenous catheters, which necessitates skilled nursing. Although vascular access and vein puncture are considered core for skills of nurses, these skills can be challenging technical tasks that must be performed correctly in a short period of time. The venipuncture is significantly more difficult for neonates because of their unpredictable behavior,

high levels of activity, and small vessel diameters (Davis *et al.*, 2020).

A frequent procedure that occurs during hospital admission is venous blood collection. The blood draw for lab biochemistry tests is required for diagnostic purposes and an ongoing treatment plan. Finding and accessing an appropriate venipuncture site may be difficult, which may delay diagnosis and treating the condition, especially in an emergency (Davis *et al.*, 2020).

Venous blood sampling withdrawal is a painful procedure that could have lifelong consequences on neonates if not had proper management. Proper training for nurses, competency of insertion guidelines and steps, controlling and managing pain, procedural performance support, and proper access to vascular access specialists are needed in order to provide competency care for every neonate (Davis *et al.*, 2020).

Attempts to insert a needle repeatedly are uncomfortable, causing vein depletion and increased

risk of infection. An increase in the first insertion success reduces costs by limiting negative outcomes-related additional expenses. Better first-attempt chances of success also were linked to easier vascular access and increased efficiency for health care professionals (*Morrell, 2020*).

Difficult Peripheral Intravenous Cannulation (DPIVC) used for blood sampling withdrawal is associated with significant vascular access complications. Such complications could be avoided if risk factors facilitated early detection of potentially difficult circumstances. Knowledge and early awareness about the risk factors for DPIVC could avoid the puncture repetition and its negative consequences, assist in the choice of the appropriate vascular device, enhance the efficiency of IV therapy, and lower costs associated with complications and repetition, which are associated with long hospital stays (*Rodriguez-Calero et al., 2020*).

Pediatric nurses should have confidence in their skills. High nursing awareness and confidence in cannula insertion and maintenance were strongly predicted by training and experience, particularly in neonates. Thus, nurses play a vital role in monitoring and eliminating venous blood sampling complications. So, develop a customized and ongoing training program based on the identified nurses' needs to improve knowledge, skills, their confidence, and competency in neonatal care. (*Indarwati et al., 2022*).

In pediatric setting where essential factors as younger age, smaller veins and less staff cooperation can complicate withdrawal procedure, it becomes extremely difficult. As a result, it is critical for knowledgeable and confident nurses to be supported by the rationale for venous blood sampling use during catheter insertion and maintenance in order to improve successful placement of catheter, the ability of the nurse to identify and treat early signs of venous blood sampling complications, as well as ensuring patency and reducing premature catheter removal (*Kleidon et al., 2019*).

Central Venous catheters (CVCs) could be used for repeated blood sampling in highly intensive care units. Many complications include blood stream infection and sepsis. Sepsis is one of the complications of catheterization which accompanied by high mortality and morbidity rate (*Kolikof, 2020*).

Umbilical vein catheter (UVC) that used for venous blood sampling withdrawal is among the quickest and simplest ways to access a deep vein. It is well recognized that UVC has advantages in comparison to peripheral vein cannulas in newborns

including the elimination of stress and pain associated with repeated peripheral vein puncture (*Goh, 2021*).

The nurse should be aware of the complications that could result from errors in the procedures of venous blood sampling and withdrawal with any side effects. Pain may also be related to skin puncture, as evidenced by neonatal crying and limb resistance; hematoma at the puncture site due to venous trauma, as evidenced by swelling and cyanosis at the site; anaemia due to excessive blood sample withdrawal; and sepsis due to nurses failing to use aseptic techniques, particularly during central venous device insertion (*Ahlin, 2017*).

Video technology has become more prevalent in nursing education because it provides unique features that accurately and comprehensively capture nursing phenomena nature. Additionally, video technology is widely utilised in nursing as a teaching tool, and as a way to keep track of quality assurance requirements. The benefit of videotaping is that, it can offer multi-media, continuous and multimodal information regarding the topic and its branches (*Balasubramanian et al., 2018*).

Nurses are typically taught through a combination of lecture, demonstration, video assisted teaching, and many other modalities. Nowadays, advanced technology such as computers and video tapes is widely used, as these provide new learning opportunities for nurses, as well as the ability to repeat intended parts or the whole video more than once. So, video teaching seems to be more preferred and has emerged as one of the most effective teaching methods (*Awad, 2018*).

The educational videos method improves learning of nurses as it can use sound combined sights and motions to display simple, clear explanations of complex procedures' issues and topics. Additionally, it might transmit learning messages in a way that verbal description alone unable to convey. However, nurses with limited reading skills could learn more easily from the video (*Devi et al., 2019*).

Training intervention well known as a process convey learning and developing training need assessment, design, delivery of qualified skills and post training evaluation. Nursing is an advanced discipline with riches of complex information. The role of the nurse is to apply that knowledge in a cost-effective and efficient manner. Nurses must receive specialized training to update knowledge, assessment skills, and technical experience (*Pareek et al., 2018*).

Videos, simple virtual reality, podcasts and simulations via computers are instances of current

technology that are helpful for educators and motivating learning. Videos could be beneficial for a variety of learning styles and could also be easily accessed through the use of handheld multimedia technologies on a regular basis, which, when combined with basic clinical skill training could assist in maintaining high competence. Additionally, this might improve information acquisition by combining theory and practice and by fostering critical thinking, engagement, and deep learning (Yaquuddin et al., 2020).

Video technology is a common teaching mode used around the world to meet ever-increasing educational demands. Video is considered to be a rich model with various effects on cognitive benefits (such as learning and memorizing), psychological benefits (such as learning attitude and motivation), and knowledge visualization (Joel et al., 2020).

2. Significance of the Study

The collection of blood samples from neonates is a difficult and complex procedure, not only because of the puncture itself, but also the whole situation surrounding it. This means that the procedure necessitates special training and extra attention from health care personnel in order to deliver excellent neonatal care and high-quality blood sampling (Hjelmgren, 2021).

The incorporation of video in nursing education is a didactic method that can combine theory and application to connect theory to practice. It is now expected that nurses can use creative technologies to enhance workplace learning environment (Devi et al., 2019).

Aim of the study

The current study aimed to evaluate the effect of video assisted teaching intervention on nurses' performance regarding venous blood sampling withdrawal from neonates through:

- Assessing nurses' knowledge, practice, and attitude regarding venous blood sampling withdrawal.
- Designing and implementing video intervention regarding venous blood sampling withdrawal based on the actual learning needs of nurses.
- Evaluating the effect of video intervention on nurses' knowledge, practice, and attitude regarding venous blood sampling withdrawal.

Research hypotheses

- 1- Nurses who are subjected to video assisted teaching intervention are expected to have improvement in knowledge, practice and attitude towards venous blood sampling withdrawal post video assisted training intervention than pre training.
- 2- There will be a significant relation between the

total nurses' knowledge, practice, attitude and their personal characteristics.

4. Subject & Methods

Research design

The study was conducted by use of a quasi-experimental research design.

Research setting

This study was carried out at Neonatal Intensive Care Units (NICUs) and Surgical Neonatal Intensive Care Unit "SNICU" in Benha Specialized Pediatric Hospital which affiliated to the Egyptian Ministry of Health at Benha City, Egypt. The hospital has one NICU on the third floor of "A" building and a Surgical Neonatal Intensive Care Unit "SNICU" on the third floor "B." building. NICU present at the third floor contains two rooms: the first room has 31 incubators, the second room with 3 incubators. On the third floor of "B" building there are two rooms with 12 incubators.

Subject

All nurses (70) who work in the previous mentioned setting regardless their characteristics and have the will to participate in the study (All nurses participated).

Data collection Tools

This study had three data collection tools, which included the following:

Tool I: A structured interviewing questionnaire:

- It was developed by the researchers after review of the related literature, written in an Arabic language and divided into three parts. **Part (1):** Nurses' characteristics: Included age, gender, academic qualifications, experience years, and previous courses training about venous blood sampling withdrawal. **Part (2):** Neonates' characteristics: current age, gender, delivery type, gestational age, birth weight, medical diagnosis. **Part (3):** Included nurses' knowledge about venous blood sampling from neonates, based on *Yeates (2019) and Shelady & Peters, (2020)* It encompassed (30) multiple-choice questions and open end questions and partitioned into three categories: **First:** Nurses' knowledge about withdrawal of venous blood from peripheral veins (13 questions). **Second:** Nurses' knowledge about venous blood withdrawal from central venous catheter (9 questions). **Third:** Nurses' knowledge about venous sampling withdrawal from umbilical venous catheter (8 questions).

Scoring system for nurses' knowledge:

The nurses' knowledge checked with a key model answer. The correct answer scored (1mark), incorrect/don't know answers scored (0). The total score ranged from 0-30 (30 questions x 1). The total nurses' knowledge was classified into $\geq 75\%$ was considered satisfactory level of knowledge, and a score $> 75\%$ was considered unsatisfactory level of knowledge.

Tool II: An observational checklist:

It was designed by the researchers based on *Bowden & Greenberge, (2016)* and *Pejavar & Thakre (2021)* to assess:

(a) Nurses' practice towards neonates undergoing sampling withdrawal of venous blood. It comprised of 64 steps divided into three categories: venous blood withdrawal from peripheral veins (22 steps), sampling withdrawal from central venous catheter (25 steps), and blood withdrawal from umbilical venous catheter (17 steps).

(b) Nurses' attempts number of venous puncture and sampling withdrawal from neonate for successful first attempt, second attempt, three or more attempts.

Scoring system for nurses' practice:

A score of (1mark) for correctly done, a score of (0) for incorrectly done or not done.

The total score ranged from 0-64. Total practice's scores converted to percentage score. Practice score of $\geq 90\%$ considered a competent and a score $< 90\%$ considered incompetent nurses' practice.

Tool III: Nurses' attitude rating scale regarding venous blood sampling withdrawal.

This tool was used to assess nurses' attitude towards withdrawal of venous blood sampling. It was adapted by the researchers based on *WHO Guidelines on Drawing Blood, (2010)*, and translated into Arabic. It was composed of 10 items, including; (1) maintaining the neonate calm for at least 20 minutes before taking venous sampling, (2) positioning neonate properly prior to withdrawal is very important, (3) A supportive nursing staff team and effective communication are essential for withdrawal success, (4) The nurses may become frustrated due to unsuccessful blood sampling, (5) assessing the neonate's condition first to feel when sampling unnecessary, (6) Learning through practice and colleagues observation was the primary way of embracing knowledge and reflected on nurse own competence related to venous blood sampling, (7) Concept that Sampling can increase risk of hospital-acquired anemia, (8) The thought of it better to send the collected blood sample to the lab even uncertain whether it had been successfully follow collected

measures,(9) Nurses frequently expressed confidence of handling the samples (10) Nurses were confident in what and why pre-analytical errors which can occur for the specific tests sampling withdraw.

Scoring system for nurses' attitude:

A score (2) given for agree items, (1) score for uncertain items, and a score (0) for disagree items. The total score of attitudes was (0 - 20) degree.

Total scoring for nurses' attitude:

- Positive attitude for score of $\geq 80\%$.

- Negative attitude for $< 80\%$.

4.5 Procedures

Preparatory phase:

This phase included reviewing the local and international related literature and recent studies to get acquainted with numerous aspect of the study and develop the tools of study using books, periodicals, magazines of line reference and evidence-based articles. During this phase the researchers prepared the content that used for nurses' training based on their identified needs.

Tools validity and reliability:

The study tools' content validity was assessed and reviewed by a panel of three experts of pediatric nursing field in faculty of nursing; Benha University to test its applicability, relevance, sequence of items and clarity. Modification made according to their judgment. Cronbach's alpha was used to test the reliability of the study tools. The reliability score for knowledge, practices, and attitude were 0.842, 0.914, 0.801, respectively, indicates an internal consistency acceptable level.

Administrative design

An official letter from the Dean of the Faculty of Nursing at Benha University approved this study's permission to be conducted. The study's aim, as well as the expected outcomes, had been illustrated.

Ethical considerations:

Approval from the Ethical and Research Committee at Faculty of Nursing in Benha University was acquired. After presenting the nature and objectives of the research, each nurse had the withdrawal right from the study any time. Before conducting the study, all of the nurses were asked to give their verbal consent. Also, all the studied nurses assured about the privacy, confidentiality, safety of obtained data.

The pilot study was conducted on 10% of study subjects (7) nurses along one month (during February 2022), to test the applicability and clarity of tools and estimate the required time to fulfill the study tools. According to the findings of the pilot study, no radical modifications were made to the

study tools. Therefore, the subjects included in the pilot study were added to the sample of study.

Fieldwork: The study work actually done over six months (from the beginning of March 2022 to the end of August 2022). The researchers available in the study setting three days/ week (Saturday, Monday and Wednesday) by rotation during morning shift for gathering data through the previous data collection tools.

Assessment phase:

Each nurse was met by the researchers individually. The researchers introduced themselves and explained the study aim and duration and obtained nurses' oral and written consent to participate. Then, each nurse filled out the structured interview questionnaire sheet individually to obtain baseline data and to assess learning needs. The researchers fill the neonate's medical assessment tool (tool I). Also, nurses were observed by the researchers while practicing venous blood sampling withdrawal for neonates (tool II). Additionally the attitude rating scale was filled by the studied nurses in 15-20 minutes (tool III).

Average of 10-12 nurses were interviewed per day. Pre video intervention, the study tools filled out by the researchers as following:

Firstly, the questionnaire sheets had been distributed to all nurses individually to assess knowledge about venous blood sampling withdrawal. The researchers clarify and interpret any vague issues. The average time needed 10-20 minutes. The researcher observed practice of nurses towards withdrawal of venous blood sampling during their shifts by using an observational checklist. Each direct observation took an average of 15-20 minutes to complete.

Planning phase: The researchers constructed videos after concrete reviewing of the literature based on nurses' needs identified through assessment phase.

Phases of video production:

I- Pre videos production phase:

- a) Review of the relevant literature.
- b) Preparing and organizing the content.
- c) Prepping of the video script mapping by sequential manner and formatting.
- d) Research and allocate the videos parts.

II- Videos production phase:

- e) Recording the videos after preparing its parts.

III- Post videos production phase:

- f) Editing the videos contents.
- g) Videos illuminative evaluation.

Explanation of Phases of video production:

- a) **Review of the relevant literature:**

The researchers review the available literature in a particular area of interest. A literature review provides a valuable summary of the current study's topic. An extensive review of the literature on venous blood sampling withdrawal from neonates was conducted using periodicals, online sources, and textbooks to prepare the videos. Careful consideration was given to ensure accurate, clear, precise, updated, systematically organized, and simple contents were manipulated.

b) Preparing and organizing the content: The videos' content was prepared and organized under sub - headings based on the study objectives.

c) Prepping of the video script mapping by sequential manner and formatting: A script was created based on the prepared content. It included all scenes included in videos, such as the aim, objectives, principles, and steps of each procedure concerned with venous blood sampling withdrawal. Also, a video script is considered a blueprint and sort of map for contents of videos created.

d) Research and allocate the videos parts: The researchers asked nurses for their knowledge about care concerning venous blood sampling while conversing with them. Observe nurses during procedure and make a note about which area they need to be upgrading or lack in information.

e) Recording the videos after preparing its parts:
-The video was created by the researchers in the clinical lab for the practical part and power point video record for the theoretical part in accordance with the script.

-The theoretical and practical videos start by motivating the nurses and get their interest in a manner that meets the study objectives.

-The whole steps of venous blood sampling withdrawal procedure of the videos were presented in a simple manner and with precise using simple, clear and scientific terms language appropriate to the educational level of the nurses.

-The most important elements were organized and summarized by the end of video.

-The video has a section for breaks and another for titles.

-The video's technical quality seemed to be suitable.

-The duration and intensity of each video were appropriate for its content.

-The video is well-planned to meet the study objectives.

f) Editing the videos contents.

Videos were edited by altering and rearranging video shots. The editing goals were to remove the undesirable shots, choose the best shot, create a proper ideas flow, as well as add effects as graphics, pace the video notes. There were titles, sound

editing, color grading, and effects added. Video experts edited the prepared videos.

g) Videos illuminative evaluation:

Three experts in pediatric nursing reviewed the videos. The researchers modified videos based on their criticism, suggestions, viewpoints and recommendations regarding the content, presentation and technical aspects.

The general objectives of video intervention were to improve nurses' performance towards venous blood sampling withdrawal from neonates.

Specific objectives:

At the end of educational video intervention, nurses were able to:

- Mention component of the blood and its function.
- Enumerate indications and contraindications of venous blood sampling withdrawal.
- List preferred sites selected for peripheral venous blood sampling withdrawal.
- Illustrate factors associated with peripheral venous blood sampling withdrawal first time insertion success.
- Explain vascular access device selection.
- Discuss the insertion process technique.
- Understand mistakes occur during venous blood sampling withdrawal.
- Explain causes of complications which occur after venous blood sampling withdrawal.
- Mention the new technology used for enhancement of venous blood sampling withdrawal during the first-time insertion success.
- Demonstrate the steps of venous blood sampling withdrawal.
- Apply infection control measures regarding venous sampling withdrawal.

Implementation phase:

The implementation phase was completed in five video sessions containing the study objectives (Three videos for theoretical part) and (two videos for practical part). Session's implementation schedule was established to suit nurses work plan including date, time, place, topics, and duration of all video sessions. According to difficulty to involve all of the nurses simultaneously, they were divided into six groups each one includes from 10-12 nurses for each video session.

The duration of each theoretical and practical video session ranged from 45-50 minutes for three days per week (Sunday, Tuesday, and Thursday) in the morning shift. The theoretical video sessions focused on knowledge about definition of venous blood sampling withdrawal, indications, contraindications, preferred sites, mistakes occur during venous blood sampling withdrawal, nursing

role regarding venous blood sampling. The researcher answered any questions raised by nurses at the end of the session. The videos were displayed to the nurses via a laptop and data show.

The practical sessions cover the procedures related to venous blood sampling withdrawal.

Video sessions assist in the explanation of information in simple and clear language suitable for nurses. Encouragement during video sessions was utilized to improve sharing, during the current study.

Contents of educational videos sessions:

- First theoretical video session:

- Introduction about venous blood sampling withdrawal and purpose.
- Blood components and function.
- Vein anatomy.
- Indications and contraindications of the venous blood sampling withdrawal
- Preferred sites selected for peripheral venous blood sampling withdrawal.
- Factors associated with peripheral venous blood sampling withdrawal first time insertion success.
- Mistakes occur during venous blood sampling withdrawal.

- Second theoretical video session:

- Preferred method for venous blood sampling withdrawal in neonates.
- Vascular access device selection.
- Parts of IV catheter.
- Timing and neonate preparation for venous blood sampling withdrawal technique.
- How to assess the condition of a vein before venous blood sampling withdrawal.
- The insertion process technique.

- Third theoretical video session:

- Risk factors for failed first time insertion success.
- New technology used for enhancement of venous blood sampling withdrawal first time insertion success.
- Pain Management during venous sampling withdrawal.
- Causes of venous blood withdrawal failures.
- Complications which could occur after venous blood sampling withdrawal.
- Nurses' role for neonates undergoing venous sampling withdrawal.

- Fourth practical video session:

- Preparation for peripheral venous blood sampling withdrawal procedure.
- Aseptic precaution for venous blood sampling withdrawal procedure.
- Steps during and after peripheral venous blood sampling procedure.

- Preparation for umbilical venous blood sampling withdrawal procedure.
- Steps during and after central venous blood sampling withdrawal procedure.
- **Fifth practical video session:**
- Preparation for umbilical venous blood sampling withdrawal procedure.
- Steps during and after umbilical venous blood sampling withdrawal procedure.
- Measures to prevent infection during venous blood sampling,.
- Venous catheter care and removal steps.

After watching the practical video sessions, simulations of real-life situations practice to strengthen the video session learned skills. Also, the researchers encourage nurses in these simulation sessions. Furthermore, all videos were formally advertised, through WhatsApp to each nurse.

Evaluation Phase:

Posttest was completed immediately after video assisted training intervention. The post-tests were conducted using the same pretest data collection tools.

Data analysis

The data was gathered, statistically analyzed Statistical Package of Social Science (SPSS) version 22 where the following statistics were used. Qualitative data were presented in the form mean, standard deviation, numbers and percentages. In addition, chi-square was used to test the study hypothesis. Pearson correlation coefficient was used for correlation analysis and the degree of significance was identified. Highly statistically difference was considered at $P\text{-value} \leq 0.001$, a statistically significant difference was considered at $P\text{-value} < 0.05$, and no statistically significant difference was considered at $P\text{-value} > 0.05$.

Results

Table (1) showed the nurses' characteristics; it was found that, more than one quarter (28.6%) of the studied nurses were between the ages of 20 >25 years old with a mean age of 29.71 ± 3.91 years. According to level of education more than two fifth (41.4%) of them hold technical institute of nursing certificates. In reference to years of experience less than half of the studied nurses (42.8%) had $1 \geq 5$ years of experience with mean equal to 7.98 ± 4.09 years.

Figure (1) clarified that the majority (92.9%) of the studied nurses are females, while the vast minority (7.1%) of them were males.

Figure (2) showed that less than two thirds (65.7%) of the studied nurses not attended training

courses related to venous blood sampling withdrawal.

Table (2) portrayed neonates' characteristics. It was found that, most of the studied neonates (82.8%) were less than 7days old, and more than half (57.1%) of them were females. In reference to type of delivery more than two thirds of the studied neonates (68.6%) had been delivered by cesarean section. According to their gestational age, the majority of them (85.7%) had been delivered before 37 weeks of gestation. Also, this table showed that, less than half of them (48.6%) were $2000 \geq 2500$ grams of weight with mean equal to 2.79 ± 0.56 grams.

Figure (3) illustrated that; exactly half (50.0%) of the studied neonates diagnosed with respiratory distress syndrome.

Table (3) elaborated distribution of the studied nurses' total knowledge level regarding venous blood sampling withdrawal pre/post video intervention and indicated that, there was highly statistically significant difference with ($P < 0.001$) between the studied nurses' total knowledge pre/post video intervention.

Table (4) portrayed nurses' total practice regarding peripheral, central and umbilical venous blood sampling withdrawal procedures pre/post video intervention and showed that, the majority (82.8%, 88.6% & 85.7%) of the studied nurses had competent level of practice about peripheral, central and umbilical venous blood sampling withdrawal procedures respectively. Also, there was highly statistically significant difference with ($P < 0.001$) between nurses' total practice level pre/post video intervention.

Figure (4) portrayed nurses' attempt number regarding venous blood sampling withdrawal procedure pre/post video intervention. This figure clarified that, less than three quarters (74.2%) of the studied nurses had successful first-time attempt for venous blood sampling withdrawal post video intervention compared to more than one quarter (25.7%) pre video assisted training intervention.

Table (5) elaborated nurses' total practice regarding venous blood sampling withdrawal procedure pre/post video intervention. It was found that, there were highly statistically significant differences with ($P < 0.001$) between nurses' total practice level pre/post video intervention.

Figure (5) portrayed that, the majority (91.4%) of the studied nurses had positive attitude regarding venous blood sampling withdrawal procedure post video intervention and only 8.6% had negative attitude.

Table (6) showed the relation between nurses' total knowledge scores and their characteristics. This table clarified that, there was a statistically significant relation between the studied nurses' total knowledge scores and their characteristics with ($P<0.05^*$).

Table (7) revealed the relation between nurses' total practice scores and their characteristics. It was obvious that there was a statistically significant relation between the studied nurses' total practice scores and their characteristics with ($P<0.05^*$).

Table (8) revealed the relation between nurses' total attitude scores and their characteristics. It was found that there was a statistically significant relation between the studied nurses' total attitude scores and their characteristics with ($P<0.05^*$).

Table (9) clarified the correlation between total nurses' knowledge, total practice and total attitude score with their personal characteristics. It was found that there was positive correlation between studied nurses' total knowledge, total practice and total attitude scores at pre/post video intervention.

Table1. Distribution of the studied nurses according to their characteristics (n=70).

Characteristics of nurses	No.	%
Age in years		
< 20	9	12.9
20- >25	20	28.6
25- >30	14	20.0
30> 35	11	15.8
35>40	10	14.2
40 and more	6	8.5
Mean \pm SD	29.71 \pm 3.91	
Academic qualifications		
Diploma of secondary nursing school	26	37.2
Technical Institute of nursing	29	41.4
Bachelor of nursing sciences	15	21.4
Years of experience		
1->5	30	42.8
6->10	28	40.0
\geq 10	12	17.2
Mean \pm SD	7.98 \pm 4.09 years	

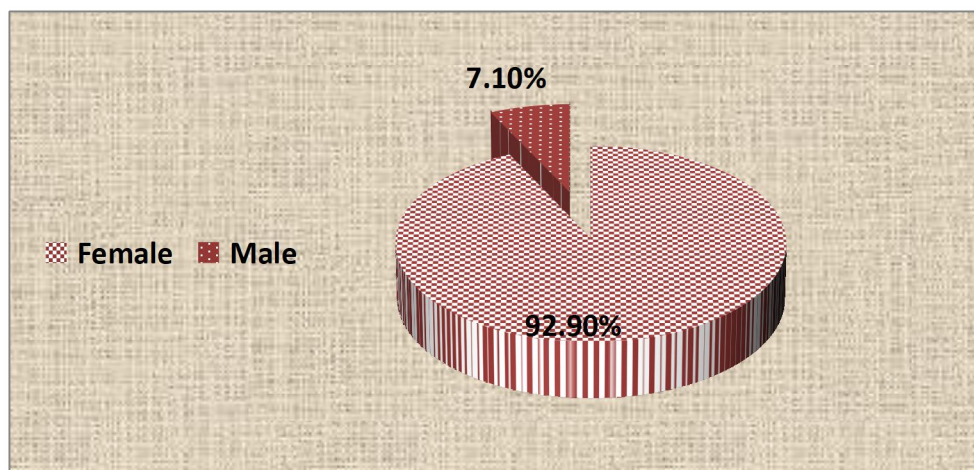


Figure1. Distribution of the studied nurses according to gender (n=70).

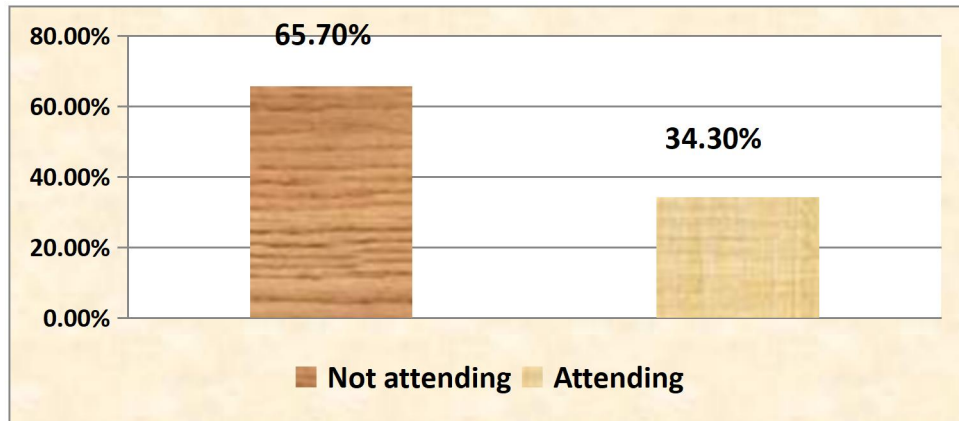


Figure2. Nurses' attendance to the training courses about withdrawal of venous blood sampling from neonates (n=70).

Table 2. Distribution of the studied neonates regarding their characteristics (n=70).

Characteristics of Neonates	No.	%
Current age in days		
Less than 7days	58	82.8
7 ≤ 14 days	12	17.2
Gender		
Male	30	42.9
Female	40	57.1
Delivery Type		
Normal vaginal delivery	22	31.4
Cesarean section	48	68.6
Gestational age in weeks		
Less than 37 weeks	60	85.7
37 ≤ 42 weeks	10	14.3
Birth weight in grams		
1500 < 2000	22	31.4
2000 ≤ 2500	34	48.6
More than 2500	14	20.0
Mean ± SD	2.79±0.56 grams	

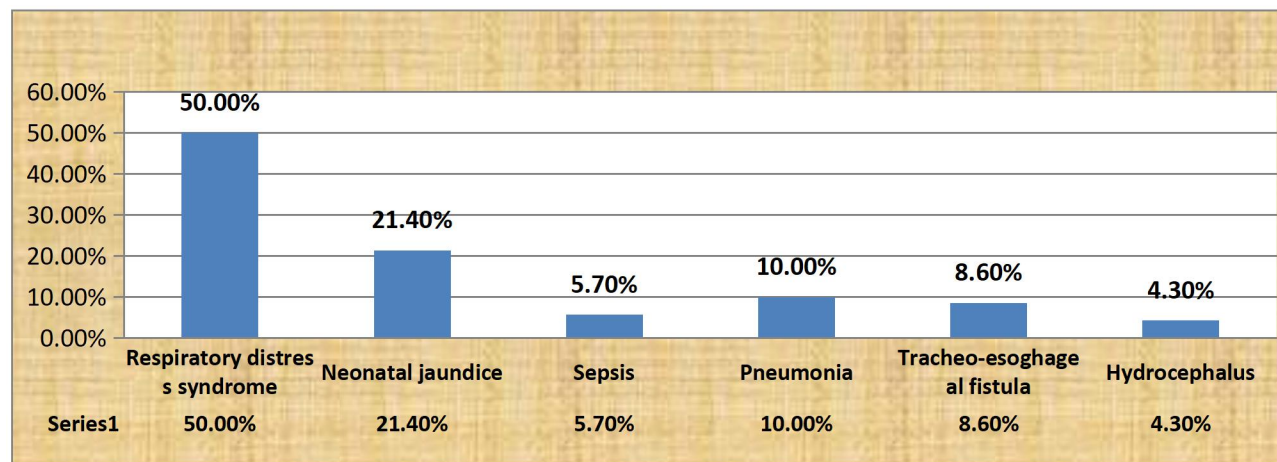


Figure 3. The studied neonates' medical diagnosis of (n= 70).

Table 3. Distribution of the studied nurses regarding their total knowledge level pre and post video intervention (n=70).

Items	Pre intervention (n=70)		Post intervention (n= 70)		X ²	P-value
	No	%	No	%		
Total knowledge level						
Satisfactory (≥ 75 %)	20	28.6	62	88.5	35.714	0.000**
Unsatisfactory (<75%)	50	71.4	8	11.5		

****Highly statistically significance at p value (p≤0.001)**

Table 4. Distribution of the studied nurses' total practice regarding peripheral, central, and umbilical venous blood sampling withdrawal procedures pre and post video intervention (n=70).

Practice Items	Pre intervention (n=70)				Post intervention (n=70)				X ²	P-value
	Competent		Incompetent		Competent		Incompetent			
	No	%	No	%	No	%	No	%		
Peripheral venous blood sampling withdrawal procedure	25	35.7	45	64.3	58	82.8	12	17.2	33.372	0.000**
Central venous blood sampling withdrawal procedure	33	47.2	37	52.8	62	88.6	8	11.4	29.407	0.000**
Umbilical venous blood sampling withdrawal procedure	22	31.5	48	68.5	60	85.7	10	14.3	32.961	0.000**

****Highly statistical significance at p value (p≤0.001)**

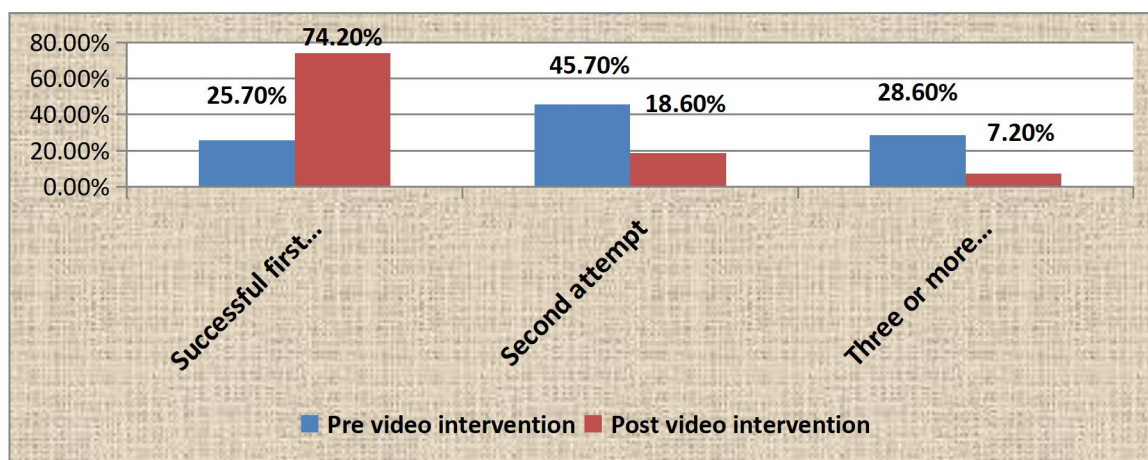


Figure 4. Nurses' attempt number regarding venous blood sampling withdrawal procedure pre and post video intervention (n= 70).

Table 5. Distribution of total practice of studied nurses towards venous blood sampling withdrawal procedure pre and post video intervention (n= 70).

Items	Pre intervention (n=70)		Post intervention (n=70)		X ²	P-value
	No	%	No	%		
Total practice level						
Competent practice (≥90%)	26	37.2	60	85.7	31.913	0.000**
Incompetent practice (<90%)	44	62.8	10	14.3		

****Highly statistical significance at P value (≤ 0.001).**

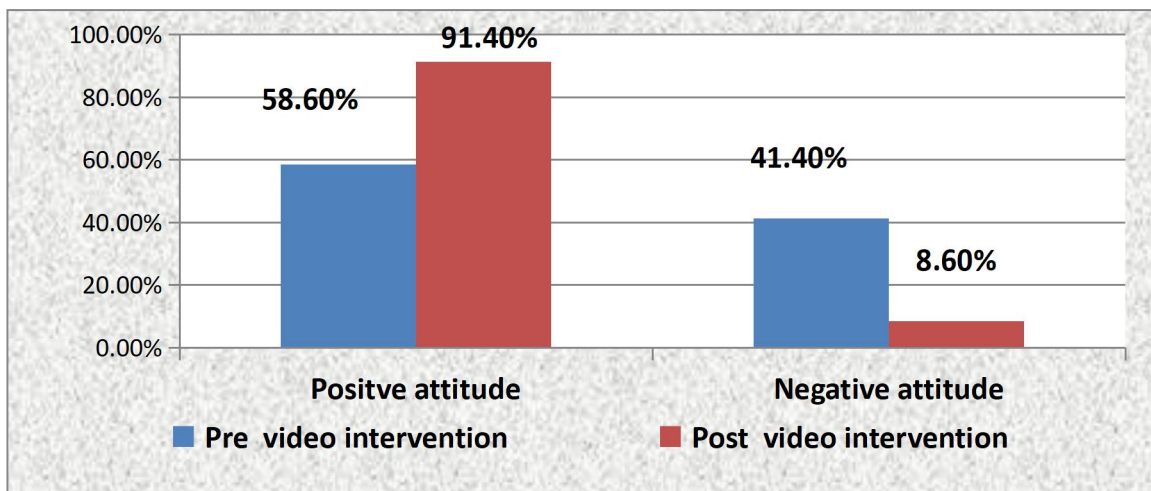


Figure 5. Nurses' attitude regarding venous blood sampling withdrawal procedure pre and post implementation of the video intervention (n=70).

Table 6. Relation between nurses' total knowledge scores and their personal characteristics pre and post video intervention (n= 70).

Total score of nurses' knowledge and their characteristics	Pre intervention (n=70)				Post intervention (n=70)				X ²	P-Value
	Satisfactory (n=20)		Un satisfactory (n=50)		Satisfactory (n=62)		Un satisfactory (n=8)			
	No	%	No	%	No	%	No	%		
Age/ Years										
Less than 20	0	0.0	9	18.0	7	11.3	2	25.0	29.7	P<0.05*
20-<25	0	0.0	20	40.0	16	25.8	4	50.0		
25-<30	3	15.0	11	22.0	13	21.0	1	12.5		
30<35	1	5.0	10	20.0	10	16.1	1	12.5		
35<40	10	50.0	0	0.0	10	16.1	0	0.0		
40 and more	6	30.0	0	0.0	6	9.7	0	0.0		
Academic qualifications										
Diploma of secondary nursing school	3	15.0	23	46.0	21	33.9	5	62.5	34.8	P<0.05*
Technical Institute of nursing	5	25.0	24	48.0	26	41.9	3	37.5		
Bachelor of nursing sciences	12	60.0	3	6.0	15	24.2	0	0.0		
Years of experience										
1->5	4	35.0	26	52.0	25	40.3	5	62.5	31.36	P<0.05*
6->10	6	30.0	22	44.0	25	40.3	3	37.5		
≥10	10	50.0	2	4.0	12	19.4	0	0.0		
Gender										
Male	0	0.0	5	10.0	5	8.1	0	0.0	11.3	P>0.05
Female	20	100.0	45	90.0	57	91.9	8	100.0		

*A statistical significance at p value (p< 0.05)

No statistical significance at p value (p> 0.05)

Table 7. Relation between nurses' total practice scores and their personal characteristics pre and post video intervention (n= 70).

Total score of nurses' practices and their characteristics	Pre intervention (n=70)				Post intervention (n=70)				X ²	P-Value
	Competent (n=26)		Incompetent (n=44)		Competent (n=60)		Incompetent (n=10)			
	No	%	No	%	No	%	No	%		
Age/ Years										
Less than 20	0	0.0	9	20.5	5	8.3	4	40.0	27.81	P<0.05*
20-<25	4	15.4	16	36.3	17	28.3	3	30.0		
25-<30	8	30.8	6	13.5	13	21.7	1	10.0		
30<35	6	23.1	5	11.5	9	15.0	2	20.0		
35<40	3	11.5	7	15.9	10	16.7	0	0.0		
40 and more	5	19.2	1	2.3	6	10.0	0	0.0		
Academic qualifications										
Diploma of secondary nursing school	7	26.9	19	43.1	20	33.3	6	60.0	34.65	P<0.05*
Technical Institute of nursing	9	34.6	20	45.4	25	41.7	4	40.0		
Bachelor of nursing sciences	10	38.5	5	11.5	15	25.0	0	0.0		
Years of experience										
1->5	5	19.2	25	56.9	23	38.3	7	70.0	33.83	P<0.05*
6->10	9	34.6	19	43.1	25	41.7	3	30.0		
≥10	12	46.2	0	0.0	12	20.0	0	0.0		
Gender										
Male	0	0.0	5	11.5	3	5.0	2	20.0	8.04	P>0.05
Female	26	100.0	39	88.5	57	95.0	8	80.0		

*A statistical significance at p value (p< 0.05)

No statistical significance at p value (p> 0.05)

Table 8. Relation between nurses' total attitude scores and their personal characteristics pre and post video intervention (n= 70).

Total score of nurses' attitude and their characteristics	Pre intervention (n=70)				Post intervention (n=70)				X ²	P-Value
	Positive attitude (n=41)		Negative attitude (n=29)		Positive attitude (n=64)		Negative attitude (n=6)			
	No	%	No	%	No	%	No	%		
Age/ Years										
Less than 20	2	4.9	7	24.1	7	10.9	2	33.3	15.62	P<0.05*
20-<25	11	26.8	9	31.0	19	29.7	1	16.7		
25-<30	8	19.5	6	20.7	12	18.8	2	33.3		
30<35	7	17.1	4	13.8	10	15.6	1	16.7		
35<40	7	17.1	3	10.4	10	15.6	0	0.0		
40 and more	6	14.6	0	0.0	6	9.4	0	0.0		
Academic qualifications										
Diploma of secondary nursing school	9	22.0	17	58.6	22	34.4	4	66.7	31.42	P<0.05*
Technical Institute of nursing	22	53.6	7	24.1	27	42.2	2	33.3		
Bachelor of nursing sciences	10	24.4	5	17.3	15	23.4	0	0.0		
Years of experience										
1->5	13	31.7	17	58.6	25	39.1	5	83.3	35.98	P<0.05*
6->10	20	48.8	8	27.6	27	42.2	1	16.7		
≥10	8	19.5	4	13.8	12	18.7	0	0.0		
Gender										
Male	4	9.8	1	3.4	5	7.8	0	0.0	10.45	P>0.05
Female	37	90.2	28	96.6	59	92.2	6	100.0		

*A statistically significant at p value (p<0.05)

No statistically significant at p value (p>0.05)

Table 9. Correlation between total knowledge, total practice and total attitude score of the studied nurses pre and post video intervention (n= 70).

Variables		Pearson correlation coefficient					
		Pre intervention (n=70)			Post intervention (n=70)		
		Total knowledge	Total practice	Total attitude	Total knowledge	Total practice	Total attitude
Total knowledge	r	1	.809	.513	1	.870	.105
	P-value		.000**	.008*		.000**	.013*
Total practice	r	.809	1	.628	.870	1	.119
	P-value	.000**		.005*	.000**		.013*
Total attitude	r	.513	.628	1	.105	.119	1
	P-value	.008*	.005*		.013*	.013*	

****Highly statistical significance at p value (p ≤ 0.001).**

***A statistically significance at p value (p< 0.05).**

Discussion

Venous blood sampling withdrawal is most communal and vital procedure among neonates, when performed correctly blood could be taken with minimal discomfort to neonates. Each step in the phlebotomy process affects the quality of the specimen so. It is important for preventing laboratory error and the occurrence of adverse events in the baby. So, nurses must take courses and have their practice supervised in order to be proficient and remain at a high level of competency on a regular basis (*Elbaqary, 2021*)

Video technology methods provide a flexible teaching option and are consider an effective and useful tool to improve the nurses' direct knowledge, and perceived confidence (*Armour et al., 2021*).

The current study was quasi-experimental and included 70 nurses working at NICUs and SNICUs at Benha Specialized Pediatric Hospital. This study aimed to evaluate the effect of video assisted teaching intervention on nurses' performance regarding venous blood sampling withdrawal from neonates.

Regarding the nurses' characteristics, the findings of the current study illustrated that the studied nurses' mean age was 29.71 ± 3.91 years old. This finding may be due to the appointment of new staff every year, including newly graduated nurses. This result agreed with *Ouda et al., (2019)* in a study done about

"Nurses' knowledge and practice regarding peripheral intravenous cannulation and blood sampling in a pediatric health care setting" who found that, the staff nurses' mean age was 24.44±4.30 years old. According to the researcher, young age nurses are currently undergoing a stressful transition into the workforce, so the perceptions and needs of young nurses must be considered in order to ensure effective planning.

Concerning the gender of the studied nurses, the current study found that, the majority of them were females. This result falls within the same context as *Domingo & Collantes, (2020)* who conducted a study regarding "A structured educational program and peripheral intravenous first time insertion rate in Saudi Arabia" and found that, the majority of staff nurses were female.

According to the academic qualifications of the nurses studied, the current study illustrated that more than one-third of them had diplomas from a secondary nursing school. This finding was parallel to *Atalla, (2018)* study entitled "Effectiveness of structured teaching program on knowledge and practice regarding blood specimen collection among nurses" which found that, nearly two fifths of the studied nurses had a secondary diploma in nursing.

Regarding the years of experience of the studied nurses, the current study showed that, more than two-fifths of the nurses had 1>5

years of experience. This result is most likely due to the young age of the studied nurses. Nurses' years of experience are decreasing, which has a negative impact on the care they provide for neonates in NICUs. The current study finding is incompatible with *Abd-Elbaky et al., (2018)*, who studied "Impact of a simulated education program on nurses' performance of invasive procedures at intensive care units", and found that, the majority of the nurses who were studied had less than five years of experience.

According to the current study, less than two-thirds of the nurses studied did not attend venous blood sampling withdrawal training courses. This result disagreed with *Indarwati et al., (2022)*, who revealed that only one third of the studied sample had formal training on intravenous catheter insertion.

Regarding the total knowledge of the studied nurses about venous blood sampling withdrawal, the current study showed that, more than one quarter of them had satisfactory knowledge level pre video intervention, compared to most of the studied nurses had satisfactory knowledge level post video intervention. This finding was in accordance with *Ahlin et al., (2017)* who studied "Assessing nursing knowledge and skills in performing venipuncture and inserting peripheral venous catheters in Sweden", and their results indicated that the sample had an adequate knowledge level regarding preparation and performance of the venipuncture procedures.

On the other hand, this finding is incongruent with *Ouda et al., (2019)*, who reported in their descriptive study that half of the studied nurses' had satisfactory knowledge level regarding peripheral intravenous cannulation and blood sampling.

As regards nurses' total practice regarding, venous blood sampling withdrawal, the present study portrayed that most of the studied nurses had competent level post video intervention. This finding could be attributed to relevant scientific and technological advancements as video intervention lead professional skills to become obsolete in a

short period of time. Therefore, complete and accurate basic professional preparation for nurses is no longer sufficient. This finding was corroborated by *Carr et al., (2018)*, who studied "Factors associated with peripheral intravenous cannulation first time insertion success in the emergency department", and showed that, nurses performing this skill consistently had been attributed to very high FTIS rates of 98%–99% in the post test phase. Considering the rapid advancement of training techniques, nursing education must be up to date and efficient.

In the same context, *Morrell, (2020)*, who studied "Reducing risks and improving vascular access outcomes" and stated that, significant improvement has been observed in first-insertion success, catheter dwell time, and documenting the catheter insertion attempts for nurses.

Concerning the relation between nurses' total knowledge, practice and attitude scores with their characteristics. The current study found a significant relationship between the identified variables. This finding was consistent with *Tayag et al., (2021)*, in a study entitled " Influence of postural change during venous blood collection: A knowledge, attitude, and practices survey on patient preparation practices of selected healthcare Professionals in Bataan, Philippines", who found that scores on knowledge, practices, and attitudes, were correlated with the demographic characteristics of the respondents to find significant relationship that may have existed between the identified variables.

Conclusion

Based on the present study results, it could be concluded that video assisted teaching intervention improved nurses' knowledge, practice, and attitude level towards venous blood sampling withdrawal from neonates.

Recommendations

Based on the study findings, the following recommendations could be suggested:

- Applying different types of electronic teaching in nursing education is an efficient method to improve nurses' performance, which reflects competence and safe neonatal care.
- Developing periodic technology-based training programs for nurses on the care of neonates undergoing venous blood sampling withdrawal to update nurses' knowledge.
- Conducting an orientation program for new employed nurses, in NICUs regarding venous blood sampling withdrawal.
- Further studies are suggested regarding the implementation of different electronic learning methods for nurses caring for neonates in different health care settings.

References

1. **Abd-Elbaky M.M., Mohamed E.A. & Nagib R.M., (2018):** Impact of simulated education program on nurses' performance of invasive procedure at intensive care units: Evidence based practice, *International Journal of Nursing Didactics*, 8: (12), DOI: 10.15520/.v8i12.2392.
2. **Ahlin C., Klang-Soderkvist B., Johansson E., Bjorkholm M. & Lofmark, A., (2017):** Assessing Nursing Students' Knowledge and Skills in Performing Venepuncture and Inserting Peripheral Venous Catheters. *Nurse Education in Practice*, 23: 8-14, available at: <https://pubmed.ncbi.nlm.nih.gov/28171853>.
3. **Armour M., Brady S., Williamson-LinkK., McGovern L. & Struchil K., (2021):** Supported Communication Video Training for the Nursing Department in an Inpatient Rehabilitation Hospital, *Rehabilitation Nursing*, 46(5): 289–296.
4. **Atalla, H. R. A., Hendy, W., M., (2018):** Effectiveness of Structured Teaching Program on Knowledge and Practice Regarding Blood Specimen Collection among Nurses *IOSR Journal of Nursing and Health Science (IOSR-JNHS)*e-ISSN: 23207(1)), PP 15-23.
5. **Awad H., (2018):** Effectiveness of video assist teaching module on fourth years nurses student practice about nasogastric tube feeding - faculty of nursing science Shendi University 2018, *Advance Research Journal of Multi-Disciplinary Discoveries*, Vol. 27.0, Issue. I ISSN NO : 2456-1045.
6. **Balasubramanian P., Shetty O.P. & Rao S., (2018):** Video Assisted Teaching Module (VATM): developed for primary caregivers on home care of schizophrenic patient, *Nursing & Care Open Access Journal*, Volume 5, Issue 6, 337-341.
7. **Bowden V.R. & Greenberge C. S. (2016):** *Pediatric nursing procedures*, 4th ed., Wolters Kluwer Company, China, PP. 142 -143.
8. **Carr P.J., Rippey J.C., Cooke M.L., Trevenen M.L., Higgins N.S., Foale A.S. & Rickard C.M., (2018):** Factors associated with peripheral intravenous cannulation first-time insertion success in the emergency department. A multicentre prospective cohort analysis of patient, clinician and product characteristics, *BMJ Journal*, s. *BMJ Open* 2019;9:e022278. doi:10.1136/bmjopen-2018-022278.
9. **Davies H., Coventry L., Jacob A., Stoneman L. & Jacob E., (2020):** Blood sampling through peripheral intravenous cannulas: A look at current practice in Australia, *ScienceDirect, Elsevier B.V*, Volume 27, Issue 2, April 2020, Pages 219-225.
10. **Davis M.P.H., Takashima M., Girgenti C. & Ullman A.J., (2020):** An international survey of pediatric and neonatal clinicians' vascular access practice: PediSIG assessment of vascular access, education, and support (PAVES) catheter selection, *British Journal of Nursing*, DOI: <https://doi.org/10.12968/bjon.2020.29.14.S40>.
11. **Devi B., Khandelwal B. & Da M., (2019):** Comparison of the effectiveness of video-assisted teaching program and traditional demonstration on nursing students learning skills of performing obstetrical palpation, *Iranian Journal of Nursing and Midwifery Research*, 24(2): 118–123.
12. **Domingo & Collantes, (2020):** Structured educational program and peripheral intravenous first-time insertion rate in Saudi Arabia, *Indonesian Research Journal in Education*, Vol. (4), No. (2).
13. **Elbaqary M.E., El-Sayed Z.F. & Sadek B.N., (2021):** Assessment of Nurses' knowledge and Practice for Caring of Children

Undergoing Blood Products Transfusion, Egyptian Journal of Health Care, Article 103, Volume 12, Issue 3, Page 1653-1663.

14. **Goh S. S. M., Kan S. Y., Bharadwaj S., & Poon W. B., (2021).** A review of umbilical venous catheter-related complications at a tertiary neonatal unit in Singapore. Singapore medical journal, 62(1), 29.
15. **Hjelmgren H., Ygge B., Nordlund B. & Andersson N., (2021):** Nurses' experiences of blood sample collection from children: A qualitative study from Swedish Paediatric Hospital Care, Creative Commons Attribution 4.0 International License, BMC Nursing, DOI: <https://doi.org/10.21203/rs.3.rs-144185/v1>.
16. **Indarwati F., Munday J. & Keogh S., (2022):** Nurse knowledge and confidence on peripheral intravenous catheter insertion and maintenance in pediatric patients: A multicentre cross-sectional study, Journal of Pediatric Nursing, Volume 62, January 2022, Pages 10-16.
17. **Joel M.H., Ashipala D.O. & Kamenye E., (2020):** Interactive video technology as a mode of teaching: A Qualitative analysis of nursing students' experiences at a higher education institution in Namibia, International Journal of Higher Education, Vol. 10, No. 2.
18. **Kleidon T.M., Cattanach P., Mihala G. & Ullman A.J., (2019):** Implementation of a paediatric peripheral intravenous catheter care bundle: A quality improvement initiative, Journal of Paediatrics and Child Health, 55 (10) (2019), pp. 1214-12231., 2019).
19. **Kolikof ,J., Peterson, K., & Baker, A. M. (2020).** Central Venous Catheter. StatPearls. Treasure Island (FL), PMID: 32491730.
20. **Morrell, (2020):** Reducing risks and improving vascular access outcomes, Journal of Infusion Nursing, 2020 Jul; 43(4): 222–228.
21. **Ouda W.E., Mahmoud M.F., KafI R.H. & Soliman H.H., (2019):** Nurses' knowledge and practice regarding peripheral intravenous cannulation and blood sampling in pediatric health care setting, Port Said Scientific Journal of Nursing, Vol.6, No. 3, 50-67.
22. **Pareek A., Kausik N.K., Jangir G. & Pareek S., (2018):** The Effectiveness of planned teaching program regarding knowledge on selected venous access device care among B.Sc Nursing final year student: A quasi-experimental study, Asian Journal of Nursing Education and Research, 8(4).
23. **Pejavar R.K. & Thakre R., (2021):** Textbook of clinical neonatology, procedures in neonatal intensive care units, Jaypee Brothers Medical Publisher, India.
24. **Rodriguez-Calero M.A., Pedro-Gomez J.E., Molero-Ballester L.J. & Fernandez I.F., (2020):** Risk Factors for Difficult Peripheral Intravenous Cannulation. The PIVV2 Multicentre Case-Control Study, Journal of Clinical Medicine, 9(3), 799; https://doi.org/10.3390/j_cm903079.
25. **Tayag S.G., Villamin A.B., Villamin S.C., Vendivil Y.F.,... (2021):** Influence of postural change during venous blood collection: a knowledge, attitude, and practices (KAP) survey on patient preparation practices of selected healthcare professionals in Bataan, Philippines, International Journal of Progressive Research in Science and Engineering, vol.2, no.8.
26. **WHO Guidelines on Drawing Blood., (2010):** Best Practices in Phlebotomy, Paediatric and neonatal blood sampling. Geneva: Available at: <https://www.ncbi.nlm.nih.gov/books/NBK138647/>; 2010.
27. **Yaqinuddin A., Kashir J., Al Kattan W., AlKattan K., (2020):** Applying integrated video assisted learning approaches for medical clerkship – potential adaptations in the post-COVID-19 era, Journal of Medical Education and Curricular Development, vol. 7, First Published October 26, 2020.
28. **Yeates A.L., (2019):** Thames Valley & Wessex Operational Delivery Networks, Phlebotomy and Cannulation Workbook, Neonatal Operational Delivery Network, Final v2 August 2019 Ratified Sept 2019. Available at: <https://southodns.nhs.uk/ournetworks/neonatal>.