Effect of Video-Assisted Educational Guidelines on Nurses' Performance Regarding Infection Control Measures for Children undergoing Hemodialysis.

Nagwa Ramadan Esmail Magor [1], Nabila Hassan Aly Abdella [2], Azza El-Sayed Ali Hegazy [3] and Manal Mohamed Ahmed Ayed [4]

[1]Lecturer of Pediatric Nursing, Faculty of Nursing, Tanta University.

[2]Assistant Professor of Pediatric Nursing, Faculty of Nursing, Port Said University.

[3]Assistant Professor of Pediatric Nursing, Faculty of Nursing, Fayoum University.

[4]Assistant Professor of Pediatric Nursing, Faculty of Nursing, Sohag University.

Abstract

Background: Chronic kidney disease is a condition related to irreversible kidney damage that can further progress to end stage renal disease that treated with hemodialysis. **Aim**: To explore the effect of video-assisted educational guidelines on nurses' performance regarding infection control measures for children undergoing hemodialysis. **Design**: A quasi-experimental research design was used to achieve the aim of the present study. **Settings**: The study was conducted at the Pediatric Hemodialysis Unit affiliated to Sohag University Hospital. **Subjects**: A convenient sample of 50 nurses who worked in the previously mentioned settings. **Tools:** Two tools were used for data collection. **Tool 1:** A structured interviewing questionnaire, it consisted of four parts; part 1: Nurses' personal characteristics, part 2: Nurses' knowledge regarding chronic kidney disease, part 3: Nurses' knowledge regarding hemodialysis, and part 4: Nurses' knowledge regarding infection control measures during nursing care of children undergoing hemodialysis; and **Tool II:** Observational checklist sheet to assess nurses' practice regarding infection control measures for children undergoing hemodialysis. **Results**: The present study was found that video-assisted educational guidelines resulted in a significant improvement in nurses' total knowledge and practices about infection control measures for children undergoing hemodialysis. **Conclusion**: It was concluded that there were statistically significant improvements in nurses' knowledge and practices regarding infection control measures for children undergoing hemodialysis post-video-assisted educational guidelines than pre-intervention. **Recommendation**: The study suggested that nurses caring for children undergoing hemodialysis use video-assisted training guidelines to enhance and improve their knowledge and assure a competent level of practice.

Keywords: Infection control measures, Educational guidelines. Hemodialysis, Nurses' performance, Video-Assisted.

Introduction

Chronic kidney disease (CKD) is defined as kidney damage that lasts longer than three months and is characterised by structural or functional abnormalities of the kidney, with or without a decrease in glomerular filtration rate (GFR) less than 60 ml/minute/1.73 m^2. It has subdivided into five stages. The fifth stage known as end-stage renal disease (ESRD) which described as a complete loss of kidney function and is a widespread problem worldwide. [1,2].

Congenital anomalies of the kidney and urinary tract constitute the most common causes of pediatric CKD in 50%, followed by the hereditary nephropathies and the glomerulonephritis CKD occurs when a disease or condition inhibits kidney function, causing kidney damage such as; diabetes, hypertension, kidney disorders, exposure to

some toxins, overuse of certain medications such as nonsteroidal anti-inflammatory drugs (NSAIDs) and kidney injury. The most common consequences of chronic kidney disease are anemia, hypertension, cardiovascular difficulties, anorexia, vomiting, and poor appetite [3].

Prevalence and incidence of CKD may be underestimated by epidemiologic data because it usually asymptomatic, especially in early stages. Globally, 18.5-58.3 per million children had CKD stage II or lower. Moreover, previous studies reported a prevalence of CKD between 15–74.7 per million children with a prevalence range from 6% in Europe and North American countries to 18.7% in Japan while, the exact incidence and prevalence of pediatrics CKD in Egypt is unknown because of absence of a national registry [4,5].

Age of 20, around 70% of children with chronic renal disease develop ESRD. Despite of survival in the pediatric end stage renal disease has improved. Nonetheless, mortality remains at least 30 times higher than that of their healthy peers. The leading cause of death among children and adults treated with dialysis has been attributed to cardiovascular disease and infections [6,7].

Chronic kidney disease can be treated by hemodialysis, peritoneal dialysis, or a kidney transplant. Hemodialysis involves the use of a machine to filter blood outside the body. It described as a medical procedure that involves the extracorporeal elimination of waste products such as creatinine and urea, as well as free water, from the blood when the kidneys are failing. Many factors, including exposure to invasive devices, immunosuppression, the lack of physical barriers between patients in HD settings, and frequent contact with healthcare workers during procedures and care, make HD patients uniquely vulnerable to the

development of healthcare-associated infections (HAIs) [8,9].

Addition, patients during the process of hemodialysis require vascular access for prolonged periods, repeated opportunities exist for person-to-person transmission of infectious agents, directly or indirectly via contaminated devices, equipment and supplies, environmental surfaces, or hands of personnel and they also require frequent hospitalizations and surgery, which increases their chances of contracting HAIs. [10]

With the developments in technology, a new educational strategies as virtual reality, simulators, self-learning and video assisting education are now used to develop practical skills in nursing education and to increase knowledge. Video described as the electronic collection, recording, storage, transmission, and the reconstruction of a series of images showing moving scenes [11]. video assisted education helps nurses to learn more effectively as it employs sight, sound, and motion to provide simple explanations of difficult topics and concepts. In addition, unlike verbal descriptions or speech it can give knowledge. So, it is one of the most significant new technologies for nurses, particularly those performing complex procedures [12,13].

Utilization of video-assisted educational methods helps in developing nurse's awareness and improving their knowledge and skills in dealing with life threatening situations. So, the application of video-assisted education in training nurses staff would assist them to polish their existing practical skills that leading to improvement in care quality. Moreover, because nurses work varied shifts and have neither the opportunity nor the time to engage in face-to-face educational sessions with their needs for continuing education and updating their knowledge and practice. As a result, video-

assisted educational has emerged as innovative methods for providing education to nurses [14,15].

The impact of technology on the demand for improved nursing teaching and learning methodologies has been enormous. Video based education is considered an effective teaching method in which the presenter's voice can be heard which is an advantage of video-based education. There are also figures, gestures, photographs, and demonstrations displayed. Moreover, the use of technological facilities such as video assisted education is a complementary strategy for the teaching process because it favors the acquisition of knowledge and practice and is also a social media tool that affects in a positive way the learning process in nursing education [16].

Nurses has an important role for children undergoing hemodialysis, generally provide front-line care and contact with patients on a daily basis, completing critical tasks such as inserting and changing intravenous catheters and giving medications, talking with hemodialysis patients and their parents, and preserving patient hygiene. Nurses must apply standard precautions which defined as a set of guidelines of infection control practices which characterize the most recent and complete guidelines for the inhibition of infectious risk. Because of the increased risk of contact with blood and bloodborne viruses such as Human Immune Deficiency Virus, and hepatitis B, C virus in hemodialysis settings, extra stringent precautions are required in addition to routine precautions. Furthermore, bloodstream access is required during dialysis sessions so, the danger of exposure is elevated [17,18]. The nurse's role is critical in interrupting the cycle of infection. She can accomplish this by using correct infection control measures to avoid the spread of microorganisms by preventing infection

from spreading from one link in the chain to the next [19,20].

Nurses are the first point of contact between the pediatric hemodialysis settings and their parents. So, they must have a variety of abilities that enable them to interact and collaborate with parents whose assist in the early prevention of social, physical, and psychological disorders in their children. Children undergoing hemodialysis require special nursing care, that includes the formation of a therapeutic and interpersonal relationship, the treatment of physical symptoms, attention to functional restrictions, mental illnesses, and educational needs. Also, the nursing role toward prevent and control infection at hemodialysis settings includes: hand hygiene, personal protective equipment (PPE), cleaning and disinfection, handling of disposable supplies and water treatment purity and testing. In addition to their most crucial role is to recognize the children's critical care needs [21,22].

Significance of the study

End-stage renal disease is the stage 5 of chronic kidney disease in which dialysis becomes necessary for sustaining of life. Since the development of dialysis methods, the lifespan and outcome of children with ESRD have improved. However, it is estimated that the mortality rate of children on hemodialysis is 30-150 times higher than that of the general pediatric population. [22]. The burden of CKD has increased by 36% in Egypt, with CKD ranking fifth in leading causes of death from 2009 to 2019. Moreover, the annual incidence of end-stage renal disease is estimated to be around 74/million, with a total frequency of children on dialysis of 264/million. Furthermore, the annual incidence of chronic renal failure among pediatric hemodialysis patients is roughly 15 per million [23,24].

Children undergoing hemodialysis are more likely to get a viral infection. In developed countries, the reported prevalence of HCV infection among dialysis patients ranges from 3.6 to 20%, with greater rates in poorer countries and in Egypt at Al Gharbiyah Governorate it was be 42.2%. Therefore, the establishing an infection control measures that comprises a set of consistent methods and treatments will lower the risk of infection for both health care personnel and patients [7,26].

In nursing education, the use of video teaching methods provides a simple and innovative means of engaging today's nursing staff. Video assisting educational interventions are simple to implement in nursing training at any level moreover, are regarded as an essential component of nursing education that merges theory and practice. Nurses are now required to use cutting-edge technologies to improve the learning environment [27]. So, the current study was conducted to explore the effect of a video-assisted teaching intervention on nurses' performance regarding infection control measures for children undergoing hemodialysis.

Operational definitions

Nurses' performance is included knowledge and practice which defined as the action, achievement, or fulfillment of nurses' responsibilities based on their tasks that have been assigned to them.

Aim of the study

The current study aimed to explore the effect of video-assisted educational guidelines on nurses' performance regarding infection control measures for children undergoing hemodialysis through:

1. Assessing nurses' knowledge and practice regarding infection control measures for children undergoing hemodialysis.
2. Designing and implementing video-assisted educational guidelines regarding infection control measures based on the nurses' actual needs.

3. Evaluating the effect of video-assisted educational guidelines on nurses' performance regarding infection control measures for children undergoing hemodialysis

Research hypotheses

H1: Nurses who received video-assisted educational guidelines are expected to improve their knowledge regarding infection control measures post-intervention than pre-intervention.

H2: Nurses who are exposed to video-assisted educational guidelines are expected to improve their practices regarding infection control measures post-intervention than pre-intervention.

Subjects and Method

Research design

A quasi-experimental research design (one group pre and post) was used to achieve the aim of the current study.

Settings

The study was conducted at Pediatric Hemodialysis Unit affiliated to Sohag University Hospital which is located on the second floor of the building. There was a waiting area for pediatric patients and a lecture room that included an adequate number of seats, and data show where the researchers interviewed the recruited nurses. They consist of four rooms. The first room included (6) beds, the second room included (8) beds, the third room included (4) beds, and the fourth room comprised (4) beds. This unit provides diagnostic and therapeutic services from Saturday to Wednesday, from 9 a.m. to 1 p.m. These settings were selected because of the high prevalence of children suffering from chronic kidney diseases undergoing HD and they also serve the biggest region of the population from both rural and urban areas.

Subjects

A convenient sample of 50 nurses who worked at the previously mentioned settings was included.

Sample size

This study contained a convenient sample of (50) nurses working in the previously indicated study settings. The sample size was computed using the following assumptions: Z1 (95% CI) = 1.96, Z2 (80% test power) = 0.85, S = standard deviation score estimation for each variable, and d = 0.60.

Tools of data collection

Tool I: A structured interviewing questionnaire was designed by the researchers after reviewing the related literature and translated in simple Arabic language [1,2,28]; it consisted of four parts;

 Part 1: It included data related to nurses' personal characteristics such as age, gender, academic qualifications, years of experience, and previous training.

Part 2: It included data related to nurses' knowledge regarding chronic kidney disease pre and post-intervention (eight questions) such as definition, causes, clinical manifestations, diagnostic evaluation, complications, and management.

Part 3: It included items related to nurses' knowledge regarding hemodialysis pre and post-intervention (nine questions); such as definition, indications, complications, and management of children undergoing HD.

Part 4: It included items related to nurses' knowledge regarding infection control measures during nursing care of children undergoing hemodialysis pre and post-intervention (60 questions) including hand washing (16), putting on overshoes (2), wearing a cap (5), wearing a mask (8), wearing sterile gloves (16) items, and wearing sterile gown (13) items.

Scoring system: Each correct answer received a score of one, while each incorrect answer received a score of zero. Those who scored less than 70% were considered to have an unsatisfactory level of knowledge, while those who scored 70 to 100% were considered to have a satisfactory level of knowledge.

Tool II: Observational checklist sheet: It was developed by the researchers to assess nurses' practice regarding infection control measures for children undergoing hemodialysis pre and post-intervention, it was designed by the researchers after reviewing the recent literature and translated in simple Arabic language [29,30].

It included the following items. (1) General infection control measures for children receiving HD care, which included six items (hand-washing, wearing gloves, removal of gloves promptly, wearing gowns, wearing a mask, and eye protection). (2) Specific infection control measures to minimise infection during HD, which included the insertion and care of a vascular catheter, the start of a dialysis session, the care of a vascular catheter's exit site, skin cleansing steps for a vascular catheter, skin preparation technique for subcutaneous arteriovenous accesses, and patient care equipment. (3) Use of infection control measures such as handling sharp objects, dealing with blood, body secretions, and fluids, keeping a clean environment, and using safe injection techniques.

Scoring system

Each item was observed, classified, and scored as 'done correctly' (a score of one) or 'not done' (a score of zero) (a score of zero). Those who received less than 70% were considered as having an incompetent practice level those who obtained from 70 to 100% were considered to have a competent practice level.

Procedures

Preparatory phase

The researchers utilized books, evidence-based papers and articles, periodicals, and magazines of line reference to review local and international related literature related to

infection control measures and develop these study and designing videos that were used for study intervention. This phase took time from the beginning of October 2021 to the end of November 2021.

Validity of the tools: Content validity of the study tools was assessed and ascertained by a panel of five experts including three in the pediatric nursing field and two in the pediatric medical field to validate its format, layout, consistency, accuracy, and relevance. No modifications were made according to the panel judgment to ensure sentence clarity and content appropriateness. Examination of the validity index (CVI) showed that CVI = 89%.

Tools reliability

Internal consistency reliability of all items of the tools was assessed using Cronbach's Alpha test. It was 0.89 for the structured interview questionnaire and 0.88 for the observational checklists.

Ethical considerations

Official permission was obtained from directors of the previously mentioned settings before starting the study. All studied nurses gave their verbal consent before conducting the study to participate in the present study after being informed about the nature and aim of the study. Confidentiality was ensured throughout the study process and their data was used for research purposes only and had the right to withdraw from the study at any time.

Pilot study

The pilot study was carried out on 10% of the studied subject (5 nurses) over one month (from the beginning to the end of December 2021) to evaluate the clarity and applicability of the tools. Regarding the results of the pilot, no modifications to the study tools were made and pilot study subjects were included in the study sample.

Fieldwork

Data collection period was carried out for 6 months, from the beginning of January 2022 to the end of June 2022. The researchers were available three days per week (from Sunday to Tuesday) during the morning shift. The video-assisted educational guidelines were implemented through the following phases:

Assessment phase

This phase started with meeting the studied nurses, at the beginning of the interview the researchers introduced themselves to the studied nurses and explained the nature and aim of the study as well as the content of the video-assisted educational guidelines. Each nurse was interviewed individually to assess her knowledge regarding CKD, HD and infection control measures (pre-video-assisted educational guidelines) using the structured interviewing questionnaire (tool I). The average time required for completion of this tools was around 20-30 minutes. Meanwhile, studied nurses' practices regarding infection control measures were assessed by the researchers during their actual practices with children (tool II). Then studied nurses were divided into ten groups, each group consisting of 5 nurses. This period of pre-test (knowledge and practice) took one month (from the beginning to the end of January 2022).

Planning phase

The videos were created by the researchers after reviewing the literature and based on the studied nurses needs specified in the assessment phase. It was designed to improve nurses' knowledge and practices regarding infection control measures

The researchers used the following steps to create the videos in this study:

1- Literature review and data collecting
2- Content preparation and organizing.
3- Sequenced video script preparation.
4- The study research.
5- Video recording.

6. Video editing

7- Video evaluation.

1-   Literature review and data collecting

Prior to starting the video-assisted educational guidelines a comprehensive review of textbooks, journals, online sources, and periodicals was conducted on infection control measures to get the videos ready The literature review provides a critical overview of the subject of interest. In addition, careful consideration was given to ensuring that the content was accurate, up to date, logically organised, simple, and clear.

2- Content preparation and organizing

The content of the videos was created and organized under several headings in accordance with the study's objectives.

3- Sequenced video script preparation

A script was created based on the prepared contents. It included all of the scenes from the videos, such as the goal, objectives, principles, and steps of infection control measures. A video script is a sort of map, a blueprint of what will be in the videos.

4- The study research

The researchers interviewed nurses, noting their knowledge and practice of care while communicating with them through open-ended questions. Make a note of the areas where they are lacking information.

5- Video recording

According to the prepared script, the video is suited by the researchers in the (clinical lab) setting for the practical part and the PowerPoint video record for the theoretical part.

- The theoretical and practical videos start off motivating and interesting, and they meet the study aims.

- In the videos, every step of the infection control measures was explained in a clear and accurate manner, using simple and clear language that appropriate for the educational level of the nurses.

- At the end of each video, the key points were summarized.

The video includes section breaks and section titles.

- The video's technical quality was adequate.

- Each video's length and pace are appropriate.

- The video meets the objectives of the study.

6- Video editing

The process of manipulating and rearranging video shots is known as video editing. The aims of editing are to remove unnecessary footage, select the best footage, and create a flow. Change the style, pace, or mood of the video by adding effects, graphics, and music, and then watch and take notes. There were titles, music, sound editing, color correction, and effects added. A video expert edited the prepared videos.

7- Video evaluating

Three experts in the field of pediatric nursing evaluated the videos. Their criticism, suggestion, viewpoint, and recommendation were all accepted and implemented.

The general objectives of the video-assisted educational guidelines were to improve nurses' knowledge and practice regarding infection control measures.

Specific objectives

At the end of video-assisted educational guidelines the studied nurses were able to:

- Define chronic kidney disease

- List causes of chronic kidney disease

- List clinical manifestations of chronic kidney disease

- Mention the diagnostic evaluation of chronic kidney disease

- Mention complications of chronic kidney disease

- Explain the management of chronic kidney disease

- Define hemodialysis

- Illustrate the importance of hemodialysis

- Recognize indication and contraindication for hemodyalisis
- Explain principles for hemodialysis
- Enumerate complications of hemodialysis
- Explain preparation for hemodialysis
- Demonstrate steps of the hemodialysis procedure
- Discuss the general precautions during nursing care for children undergoing HD

Implementation phase

This phase lasted four months and consisted of five sessions (February 2022 to the end of May 2022). Five videos containing the study objectives were completed in five video sessions (Two videos for the theoretical part and three videos for the practical part). In each video session, they were divided into ten groups of five nurses. A schedule for nurses was created, which included the date, time, location, topics, and duration of each video session. The duration of each theoretical and practical video session ranged from 40-45 minutes per day, three days per week (Sunday, Monday, and Tuesday) in the morning shift. The theoretical video sessions started from 11:00 AM to 11.45 AM, that focused on knowledge about CKD such as definition, causes, clinical manifestations, diagnostic evaluation, complications, and management, and knowledge regarding HD such as definition, indications, complications, and management of children undergoing HD, and nurses' knowledge about general precautions during nursing care for children undergoing HD.

The researchers continued to reinforce the learned knowledge, responding to any raised questions, and provide feedback. The videos were projected to the nurses using a laptop and data show. The practical sessions were started on the same 3 days from 12.30 PM to 1.15 PM. The following items are covered in the practical parts: (1) General infection control measures for children receiving HD care, which included six items (hand-washing, wearing gloves, removal of gloves promptly, wearing gowns, wearing a mask, and eye protection). (2) Specific infection control measures to reduce infection during HD, which composed of the insertion and care of a vascular catheter, the start of a dialysis session, the care of a vascular catheter's exit site, skin cleansing steps for a vascular catheter, skin preparation technique for subcutaneous arteriovenous accesses, and patient care equipment. (3) Use of infection control measures such as handling sharp objects, dealing with blood, body secretions, and fluids, keeping a clean environment, and using safe injection techniques.

A video-assisted educational guidelines aid in clarifying complex information in simple and easily understood language for nurses Also, when necessary, provide the nurses with the information they require in an interactive format. In this study, motivation and reinforcement during video sessions were implemented to increase participating.

Contents of each video in all sessions: -

The first theoretical video session includes the following:

- Introduction about chronic kidney disease
- Definition of chronic kidney disease
- Causes of chronic kidney disease
- Clinical manifestations of chronic kidney disease
- Diagnostic evaluation of chronic kidney disease
- Complications of chronic kidney disease
- Management of chronic kidney disease

The second theoretical video session focused on:

- Introduction about hemodialysis
- Definition of hemodialysis
- Importance of hemodialysis
- Indication and contraindication of hemodialysis
- Principles for hemodialysis

- Complications of hemodialysis
- Preparation for hemodialysis
- List steps of the hemodialysis procedure

The third practical video session focused on:

•Six items were included in general infection control measures for children undergoing HD care (hand-washing, wearing gloves, removal of gloves promptly, wearing gowns, wearing a mask, and eye protection).

The fourth practical video session focused on:

•Specific infection control measures to minimize infection during HD included vascular catheter insertion and care, dialysis session initiation, care of vascular catheter exit site, steps of skin cleansing of a vascular catheter, skin preparation technique for subcutaneous arteriovenous accesses, and patient care equipment.

The fifth practical video session focused on:

• Infection control measures include handling sharp objects, dealing with blood, body secretions, and fluids, keeping a clean environment, and using safe injection techniques.

After a video-based demonstration and practice, to reinforce the skills taught during the video session, real-life simulations were done while watching sessions. Nurses also learned the value of teamwork and coordination during these simulation sessions. All videos were provided to nurses on a flash drive. The video is also formally advertised via email to each nurse.

Evaluation phase

Following the implementation of video-assisted educational guidelines sessions, the nurses' knowledge and practices were evaluated. This phase took about one month (June 2022) and reevaluates the studied nurses using the same tools to evaluate the effect of video-assisted educational guidelines on nurses' knowledge and practices regarding infection control measures during the care of children undergoing HD.

Administrative design

Administrative permission was obtained through an issued letter from the Dean of Faculty of Nursing, Sohag University to the Directors of the Pediatric Hemodialysis Unit affiliated with Sohag University Hospital to achieve this study.

Statistical analysis

Data obtained from the studied nurses were organized, revised, coded, and entered using a personal computer. The Statistical Package for Social Sciences (SPSS version 20.0) was used for data analysis. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means & standard deviations for quantitative variables. Quantitative continuous data were compared by using a t-test to test significant differences between the mean scores of the studied nurses' knowledge and practices pre-and post-implementation of video-assisted teaching intervention. Pearson correlation analysis was used for assessing the correlation between the studied nurses' knowledge and practices and their characteristics. Chisquare is used to test the study hypotheses. A statistically significant difference was considered at p-value < 0.001, a statistical significant difference was considered at p-value < 0.05, and no statistically significant difference was considered at p-value > 0.05.

Results

Table 1. Illustrates the nurses' personal characteristics; it was noticed that the mean age of the studied nurses was 26.7 ±4.6 years old, 84% of them were females, and 54% of them graduated from the technical institute of nursing. Also, it was observed that 48% of them had experience from 3 to less than 6 years.

Table 2. Illustrates that the studied nurses had the high mean scores of nurses' knowledge post-video-assisted educational guidelines compared to pre-intervention as regards all knowledge aspects of CKD, HD and infection control measures during care of children undergoing HD with a high statistical significance difference between pre/post phases of the video- educational guidelines at P<0.05.

Figure 1. Portrays the percentage distribution of the studied nurses' total knowledge regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines, it was found that 52% of the studied nurses had an unsatisfactory level of knowledge of pre-video-assisted educational guidelines, while 96% of them had a satisfactory level of knowledge of post-video-assisted educational guidelines intervention.

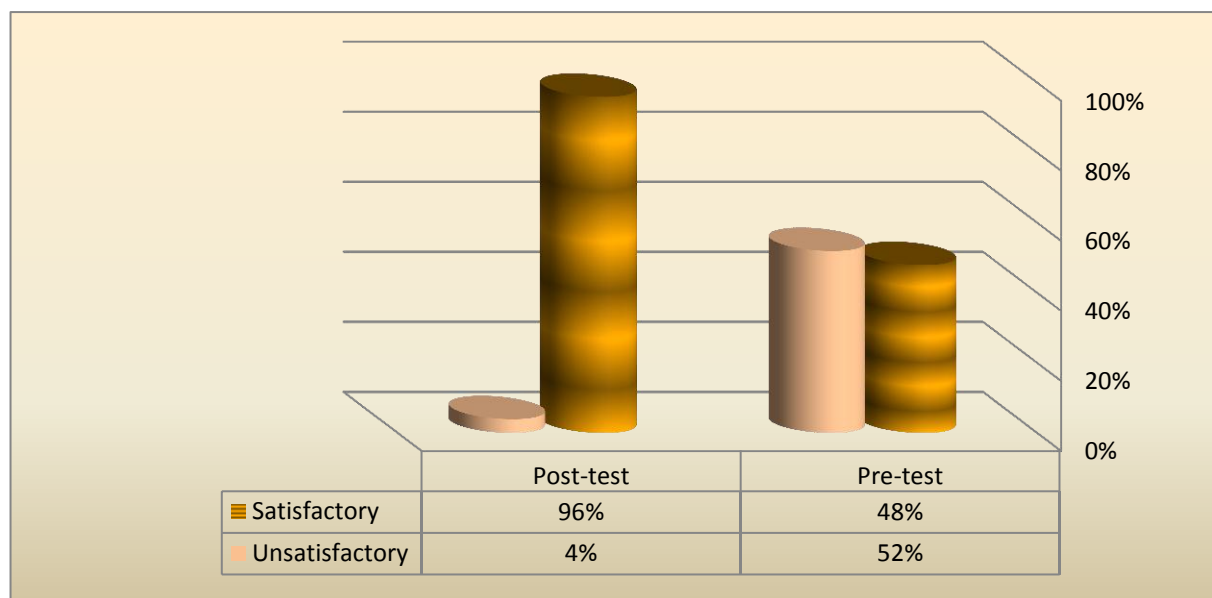**Table 3.** Shows that, the studied nurses had the high mean scores of practices regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines as regards all practices of HD and infection control measures with a statistical significance difference between pre/post phases of video-assisted teaching intervention at P<0.05.

Figure 2. Shows nurses' total practices regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines and indicated that 72% of the studied nurses had an incompetent level of practice pre-video- assisted educational guidelines while 92% of them had a competent level of practice post-video-assisted educational guidelines.

Table 4. Shows that there was a positive statistically significant correlation between total scores of nurses' knowledge and their total practices' scores regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines at *P* < 0.05.

Table 1: Percentage distribution of the studied nurses regarding their personal characteristics (n=50)

Personal characteristics	No.	%
Age/ Year		
- < 20	13	26
- 20 < 30	27	54
- 30 ≥ 40	10	20
M± SD	**26.7 ±4.6**	
Gender		
- Male	8	16
-Female	42	84
Academic qualifications		
- Diploma in Nursing	9	18
- Technical institute in nursing	27	54
- Bachelor in nursing science	14	28
Years of experience		
- < 3	16	32
- 3 < 6	24	48
- ≥ 6	10	20

Table 2: Mean scores of the studied nurses' knowledge regarding chronic kidney disease, hemodialysis and infection control measures during care of children (n=50)

Item	Pre-video-assisted educational guidelines Mean ±SD	Post-video-assisted educational guidelines Mean ±SD	Significance	
			t-test	P-value
Definition of CKD	2.68±1.14	4.85±1.24	10.67	.005**
Causes of CKD	3.63±2.35	6.09±2.06	13.25	.001**
Clinical manifestations of CKD	6.36±2.49	12.54±4.17	14.48	.000**
Diagnostic evaluation of CKD	7.08±3.68	13.06±3.65	12.91	.001**
Management of CKD	2.02±0.94	3.27±1.04	7.55	.015*
Complications of CKD	1.56±0.47	2.45±0.64	8.45	.021*
Definition of hemodialysis	1.44±0.73	2.36±0.77	13.37	.003**
Importance of hemodialysis	7.06±3.68	13.04±3.66	11.81	.001**
Indication and contraindication of hemodialysis	2.00±0.94	3.23±1.04	9.55	.000**
Principles of management of hemodialysis	1.57±0.47	2.43±0.64	8.45	.001**
Complications of hemodialysis	1.38±0.56	2.62±0.83	7.32	.001**
Infection control measures during care of children undergoing HD	1.44±0.73	2.32±0.78	15.32	.001**

	Post-test	Pre-test
Satisfactory	96%	48%
Unsatisfactory	4%	52%

*P-value<0.05   statistically significant

X^2= 37.393   P value= P<0.05*   *A statistically significant at P value P<0.05.
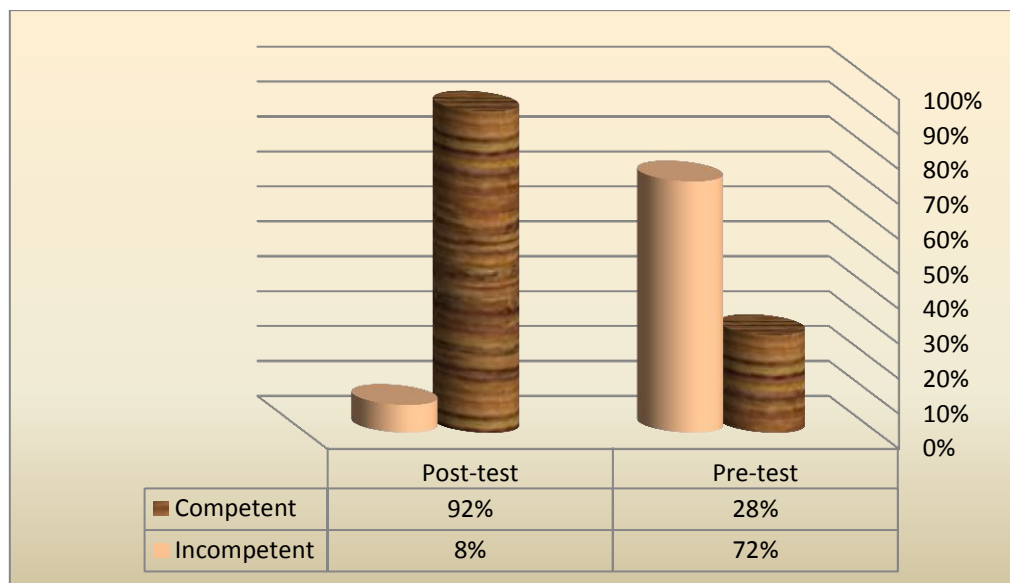
Figure 1: Percentage distribution of the studied nurses' total knowledge of infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines (n=50)

Table 3: Mean scores of the studied nurses' practice pre- and post-video-assisted educational guidelines (n=50)

Nurses' practice	Pre- video-assisted educational guidelines Mean ±SD	Post-video-assisted educational guidelines Mean ±SD	Significance	
			T	P-value
Preparation for hemodialysis	5.24±3.03	9.56±2.19	13.603	.001**
Steps of the hemodialysis procedure	2.88±1.92	4.72±2.13	9.016	.005**
General infection control measures during care of children under HD	3.06±1.42	7.98±1.12	10.203	.003**
Specific infection control measures to minimize infection during HD	7.58±3.37	9.52±4.36	8.312	.011*
Application of infection control measures includes dealing with sharp objects, dealing with blood, body secretions, and fluids, and maintaining a clean environment and safe injection practices.	6.98±4.17	11.65±3.82	12.242	.001**

P-value<0.05   ** highly statistically significant

	Post-test	Pre-test
Competent	92%	28%
Incompetent	8%	72%

X^2= 45.345   P value=0.000**   **Highly statistically significant at P value <0.001.

Figure 2: Percentage distribution of the studied nurses' total practice regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines(n=50)

Table 4: Correlation between studied nurses' total mean scores of knowledge and practice regarding infection control measures during care of children undergoing HD pre/post- video-assisted educational guidelines (n=50)

| Items | Total mean scores of knowledge | | | |
| | Pre-video-assisted educational guidelines | | Post-video-assisted educational guidelines | |
	r	*P*-value	R	*P*-value
Total mean scores of practice pre	0.289	0.05*		
Total mean scores of practice post			0.436	0.001*

٭ P-value <0.05 ---------------------- statistically significance

Discussion

Infection is the second leading cause of mortality among hemodialysis patients, after cardiovascular disease. HD patients are vulnerable to various types of infection, which include bloodstream infections and localized infections. The Center for Disease Control and Prevention (CDC) strongly recommends several infection control precautions such as practice of hand hygiene, appropriate catheter care, use of antiseptic agents, checklists, and provide staff and patient education which, intended to prevent dissemination of a wide range of pathogens in HAIs. So, implementing these precautions is strongly recommended for preventing infections. Due to its unique capabilities, video technology is more widely used to capture nursing phenomena. Furthermore, it provides continuous multi-media, multisensory data about the topic and its context. Hence, the current study aimed to explore the effect of video-assisted educational guidelines on nurses' performance regarding infection control measures for children undergoing hemodialysis [21,31,32].

The current study found that the studied nurses' average age was 26.7 ±4.6 years old. These findings are similar to those of **Yousef et al., (2019)** [33]**,** who evaluated "The effect of nursing educational program on knowledge and practice of nurses regarding infection control measures for children under hemodialysis "and reported that nurses aged 20–30 years old. From the researchers' point of view; Young nurses are currently undergoing a stressful transition into the workforce; thus it is important to take into account their perspectives and requirements during succession planning.

The present study revealed that the studied nurses had high mean scores of knowledge regarding infection control measures during care of children undergoing HD post-video-assisted educational guidelines compared to pre-intervention. In agreement with this result, **Ismailoglu et al., (2020)** [34] who conducted a study entitled "Comparison of the effectiveness of the virtual simulator and video-assisted teaching on intravenous catheter insertion

skills and self-confidence: A quasi-experimental study" and found that post-test knowledge scores of nursing students were higher than pretest knowledge scores for both groups. These findings could be related to the nurses' lack of ongoing training and education, as well as a lack of knowledge and nursing care norms.

This finding is also consistent with **Kaur and Charan, (2018)** [35] who implemented a study, titled "Effectiveness of structured teaching program on knowledge and practice regarding arterial blood gases among intensive care unit nurses," discovered that the vast majority of nurses had adequate knowledge and practice regarding arterial blood puncture after the implementation of the program-based learning. From the researcher's point of view, it indicated that the video-assisted educational guidelines are effective in enhancing the nurses' knowledge.

In a similar line, **Rocque et al., (2019)** [36] conducted a comparative study to compare the effectiveness of video-assisted versus lecture and demonstration methods of teaching bag technique among second-year BSc nursing students at a selected nursing colleague in Mangalore, and concluded that the video-assisted teaching module was a more effective method for nurses' education.

Results of the current study highlighted that more than half of the studied nurses had an unsatisfactory level of knowledge of pre-video-assisted educational guidelines. From the perspective of the researcher, the lack of awareness about infection control measures for children with hemodialysis may be due to an absence of ongoing educational programs or sessions about this topic, and a lack of funds for workshops, While, most of them had a satisfactory level of knowledge post-video-assisted teaching intervention, this

reflected the positive effect of using video-assisted educational guidelines in improving knowledge among the studied nurses. Similarly, **Chau et al., (2010)** [37] referred to a Hong Kong government study that found hospital infection control standards to be inadequate and thus in need of auditing, development, and implementation Furthermore, hospital personnel required infection control training.

In this regard, **Isara and Ofili (2010)** [38,] both from Nigeria, highlighted the importance of intensive education program to educate healthcare workers on various aspects of standard precautions and infection control program and policies. Also, this demonstrates the need of adopting video-assisted educational guidelines implementation for nurses to improve their expertise. Also, the favorable effects of post- video-assisted educational guidelines implementation were reflected.

Concerning studied nurses' practices, the study results revealed that nurses had the high mean scores of practices regarding infection control measures during care of children undergoing HD with a statistical significance difference between pre/post phases of video-assisted educational guidelines. From the researchers' point of view, this related to the importance and effectiveness of educational guidelines implementation that is commonly associated with improving practices and a better understanding of the research topic.

As regards nurses' total practices of infection control measures during care of children undergoing HD, the study results indicated that less than three-quarters of the studied nurses had an incompetent level of practice pre-video-assisted educational guidelines. According to the researcher, the lack of practice is attributable to a knowledge gap as well as a lack of

education. And it reflected the positive impact of the video-assisted educational guidelines in improving nurses' total practices. These confirmed the effective modifications in their practice and the success of the main goals of the implementation of the video-assisted educational guidelines.

In agreement with these results, **Chuang et al., (2019)** [39] examined the "Effects of a skill demonstration video delivered by smartphone on facilitating nursing students' skill competencies and self-confidence" found that students' knowledge and skills were improved by apply this intervention. The result of this study also, supported by **Madampage (2020)** [40] who concluded that video modeling and feedback shortened time to intravenous skill completion, reduced complications, and improved satisfaction in novice medical students.

The findings of the present study revealed that there was a positive statistically significant correlation between total scores of nurses' knowledge and their total practices' scores regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines. From the researchers' point of view, this association is explained by the improvement in knowledge reflected in the improvement in practice. Also, mean when the studied nurses had sufficient knowledge they can practice well. Consequently, this reflected the success of the video-assisted educational guidelines and their positive effect. These results suggested that skills may be easily enhanced, particularly if they were connected with their relevant scientific base of knowledge. These findings matched with those of **Mohamed et al.,** [41] who documented that there was a positive significant correlation between nurses' knowledge and their performance level regarding caring for patients with spinal

cord injury pre and post-video-assisted teaching program.

In the same context, this result supported by **Young (2019)** [42] who found a significant increase in knowledge and infection control performance in the experimental group of caregivers after implementing video based infection control educational program. These findings highlight the fact that information influences practice, and without correct, sufficient knowledge, nurses' practices will become more inefficient. Furthermore, **Ahmed et al., (2019)** [43] who conducted a study about "The effect of educational program about infection control precautions for nurses in pediatric hemodialysis units" concluded that there were statistical significant differences between nurses' knowledge and practices at pre and post- program.

As the researchers provided videos to the nurses' e-mail, this might be ascribed to the nurses having more time for HD and infection control measures education, which could help them improve their knowledge and ability to operate efficiently. This finding was corroborated by **Shinde (2021)** [28] who found that video assisted teaching program was effective in increasing the knowledge of staff nurses regarding care of children on ventilator in pediatric intensive care unit. Nursing education should be updated and efficient in light of the constant advancement of training methodologies. Moreover, **Abd Elaziz et al., (2021)** [44] found in a study titled 'Effect of Video-Assisted Teaching Intervention on Nurses' Knowledge and Practice Regarding Arterial Blood Gases Sampling for Ventilated Children at Pediatric Intensive Care Units' that there is an improvement in nurses' knowledge and practice level after implementing video assisted intervention, demonstrating the

effectiveness of the video-assisted teaching intervention.

Conclusion

Based on the results of the present study, it can be concluded that there were statistically significant improvements in nurses' knowledge and practices regarding infection control measures for children undergoing hemodialysis post-video-assisted educational guidelines than pre-intervention. Also, there was statistically significant correlation between total scores of nurses' knowledge and their total practices' scores regarding infection control measures during care of children undergoing HD pre- and post-video-assisted educational guidelines.

Recommendations

The following recommendations can be made, based on the findings of the current study:

- The study suggested that nurses caring for children undergoing hemodialysis use video-assisted training guidelines to enhance and improve their knowledge and assure a competent level of practice.

- Educational guidelines in Arabic should be organized and made available to nurses to help them deal with children undergoing hemodialysis.

- Standard precautions for infection control should be available in writing form in the HD unit.

- Nurses should receive periodic training and updating courses to improve their knowledge, which will reflect in their performance and reduce the risk of infection transmission.

- Replication of the current study with a larger sample of nurses in different settings is required for generalizing the results.

References

1. Khamis S., Zahran A., Hegazy N. Prevalence of chronic kidney disease in patients with cardiovascular disease. Journal of Nephrology. 2020;10(3): 227-40.

2. Becherucci F., Reperto R., Materassi M. Chronic kidney disease in children. Clinical kidney Journal. 2016; 9(4): 583–91.

3. Tasic V., Janchevska A., Abazi N. Chronic kidney disease pediatric risk factors. Prilozi Research Gate Journal. 2016; 37(1):10 -13. Available at: https://www.researchgate.net/journal/Prilozi -0350-1914

4. Assadi F. The epidemic of pediatric chronic kidney disease: the danger of skepticism. Journal of Nephropathology. 2012;1 (2): 61-64.
DOI: 10.5812/nephropathol.7445

5. Darwish M., Hassan S., Taha S. Health-related quality of life in children with chronic kidney disease in Assiut, Egypt. Egyptian Journal of Community Medicine. 2021; 39 (2):46-58.

6. Chesnaye N., Stralen V., Bonthuis K. Survival in children requiring chronic kidney replacement therapy. Journal of Pediatric Nephrology. 2018; 33(4):585-94.

7. McCulloch K., Ahearn C., Mitsnefes M. (2020). Trends in cardiovascular mortality among a cohort of children and young adults starting dialysis in 1995 to 2015. Journal of American Medical Association (JAMA network open).2020; 3(9): 23 -30. Available at:
https://doi.org/10.1001/jamanetworkopen.20 20.16197

8. Kaspar R., Bholah E. A Review of Pediatric Chronic Kidney Disease. Blood Purification journal. 2016; 41(1):211–217
DOI: 10.1159/000441737

9. Abbasi S., Aftab R., Chua S. Risk factors associated with nosocomial infections among end stage renal disease patients undergoing hemodialysis: A systematic review. Journal of PLOS ONE. 2020; 1596): 1-18. Available at:

https://doi.org/10.1371/journal.pone.023437
6 June 22, 2020

10. Almond P., Emran, S., Koehler S. Seminars in Pediatric Surgery journal. 2021;30 (6): 121-51 https://www.sciencedirect.com/science/article/pii/S1055858621001098

11. Balasubramanian P., Shetty O., Rao S. Video-assisted teaching module: developed for primary caregivers on home care of schizophrenic patient. Nursing and Care Open Access Journal. 2018; 6(5): 337-41.

12. Devi B., Khandelwal B. 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. 2019; 24(2): 118–23.

13. Hassan G. Effect of virtual reality technology on pain during dressing change among children with burn injuries. Journal of nursing and health science 2019; 8(6): 37-46. Available at: www.iosrjournals.org

14. Kavitha T. A Study to evaluate the effectiveness of video-assisted teaching on knowledge regarding BLS among II Year GNM Students in Shri Anand School of Nursing at Rajkot Dist, International Journal of Nursing Education and Research. 2016; 4(4):   429-30. Doi:10.5958/24542660.2016.00078.8.

15. Safwat A., and Khorais A. Effectiveness of a computer-based learning module on arterial blood gas interpretation among staff nurses in critical care units. Innovative Journal of Medical and Health Science. 2018; 8 (3): 31- 40.

16. Forbes H., Downer T., Philip N. Use of videos to support teaching and learning of clinical skills in nursing education: A review. Journal of Nurse Education Today. 2016; 42(1): 53-6
DOI: 10.1016/j.nedt.2016.04.010

17. MohamedR., El-Sayed N., Ashour H. Nurses' Compliance with Infection Control Standard Precautions in Dialysis Units. Assiut Scientific Nursing Journal 2021; 23 (1): 2021: 116-26.

18. Association for Professionals in Infection Control and Epidemiology. Guide to the elimination of infections in hemodialysis. 2020.

19. Gallagher R., Turner S. Infection Prevention and Control Commissioning Toolkit. 2019. 3rd ed. Published by Royal College of Nursing.

20. Bayoumi M., Ahmed A., Hussein H. Nurses practices toward applying of infection control measures using notice checklists at Dialysis Unit. Journal of Health Science. 2019; 13(5):1-10

21. Morkes S., Abozead M., Azer S. Effect of Educational Program on Nurses Performance About Infection Control for Patients Undergoing Hemodialysis. Assiut Scientific Nursing Journal. 2018; 6 (15): 162-168

22. Sharaf A., Moursy A. Vascular Access Care at Hemodialysis Unit; nurses' compliance to Infection prevention and Control Practices. Journal of Nursing and Health Science. 2017; 6(2):61-9.

23. Maleki M, Mortazavi F. Management and outcome of children with end-stage renal disease in northwest Iran. Indian Journal of Nephrology. 2012; 22(2): 94-7.

24. Frage Y, El Sayed E. Global Dialysis Perspective: Egypt. Journal of kidney 360. 2022; 3(7): 1263–268

25. El-Arbagy R., Yassin S., Boshra, B. Study of prevalence of end-stage renal disease in Assiut governorate, upper Egypt. Menoufia Medical Journal. 2016; 29(2): 222.

26. Khodir S., Alghateb M., Okasha K., Shalaby S. Prevalence of HCV infections among hemodialysis patients in Al Gharbiyah Governorate, Egypt. Journal of

Arab Nephrology Transplantation. (2012). 5(6):145–147.

27. Devi B., Khandelwal B. 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.2019;24(2):118–23.

28. Shinde S., Madhale M., Panari M. Effectiveness of Video Assisted Teaching Programme on Knowledge Regarding Care of Children on Mechanical Ventilator among Staff Nurses Working in Pediatric Intensive Care Units of Selected Hospitals at Belgaum. Annals of Romanian Society for Cell Biology. 2021; 25(4): 7420 –36.

29. American Nephrology Nurses' Association (ANNA). Creating nephrology nurse externships and internships: Task force recommendations. Reprinted from Nephrology Nursing Journal 2005; 32 (6):633-58.

30. Center for Disease control and Prevention recommended practices for infection prevention in hemodialysis facilities. Audit Tools and Checklists available at: https://www.cdc.gov/dialysis/prevention-tools/audit-tools.html

31. Viavan A., Boyce J. 100% Use of infection control procedures in hemodialysis facilities. Clinical Journal of American Society of Nephrology. 2018; 13 (4): 671-73.

32. Odhah M., Ahmed A., Anwer M. Impact of Video Assisted Teaching Intervention on Critical Care Nurses Knowledge Regarding Extracorporeal Membrane Oxygenation. International Journal of Novel Research in Healthcare and Nursing. 2021;8(2):384-95

33. Yousef A, Usama M, Mahmoud R, Maghraby A. The effect of nursing educational program on knowledge and practice of nurses regarding infection control measures for children under hemodialysis. Egyptian Nursing Journal. 2019;16(1): 1-9.

34. Ismailoglu E., Orkun N., Zybak A. Comparison of the effectiveness of the virtual simulator and video-assisted teaching on intravenous catheter insertion skills and self-confidence: A quasi-experimental study. Journal of Nurse Education Today. 2020; 95(12): 1-16. DOI:10.1016/j.nedt.2020.104596

35. Kaur A., and Charan G. A study to assess the effectiveness of structured teaching programme on knowledge and practice regarding ABGs among intensive care unit nurses in selected hospitals at Jalandhar Punjab. International Journal of Health Sciences and Research. 2018; 8(8):182-88.

36. Rocque R., Raut D., Bagde P. A comparative study to assess the effect of video-assisted versus lecture cum demonstration method of teaching on bag technique among second-year BSc nursing students in a selected nursing colleague. Asian Journal of of Nursing Education and Research.2019;9(2):166-68.

37. Chau D., Thompson b, Lee F. Infection control practices among hospital health and support workers in Hong Kong. Journal of Hospital Infection.2010; 75 (1): 299–303

38. Isara R, Ofili N. Knowledge and practice of standard precautions among health care workers in the Federal Medical Centre, Asaba, Delta State, Nigeria. Nigerian Postgraduate Medical Journal 2010; 17(3):204–9.

39. Chuang Y., Lai F., Chang C. Effects of a skill demonstration video delivered by smartphone on facilitating nursing students' skill competencies and self-confidence: A randomized controlled trial study. Journal of Nurses Education Today. 2018; 66 (1):63-8.

40. Madampage C., Bajwa J., Olszynski Video Modeling and Video Feedback to

Reduce Time to Perform Intravenous Cannulation in Medical Students: A Randomized Controlled Mixed-Methods Study. Canadian Journal of anaesthesia. 2020; 67(2):715–25
DOI: 10.1007/s12630-020-01570-2

41. Mohammed B., Ahmed H., Ahmed W. Effect of video assisted teaching program on nurses' performance regarding the care of patients with spinal cord injury. Egyptian Journal of Health Care. 2022; 3(1): 335-48.

42. Young C. Effects of a Video-Based Infection Control Education Program Applying the Social Cognitive Theory on Caregivers. International Journal of Contents. 2019; 15(2): 20-8.

43. Ahmed S., Mohamed A., Ahmed S. The effect of educational program about infection control precautions for nurses in pediatric hemodialysis units. Minia Scientific Nursing Journal. 2019; 5(1): 77-88.

44. Abd Elaziz S., Hassan G., Mohamed E. Effect of video-assisted teaching intervention on nurses' knowledge and practice regarding arterial blood gases sampling for ventilated children at pediatric intensive care units. International Journal of Novel Research in Healthcare and Nursing 2021; 8(1):607-23.