

Effect of Intravenous Therapy Administration Guidelines on Pediatric Nurses' Knowledge, Practice and Selected Children's Outcomes

Marwa Abd Elkreem Ibrahim⁽¹⁾, Nadia Kasem Alaswad⁽²⁾

(1) Assistant professor of Pediatric Nursing, Pediatric Nursing Department, Faculty of Nursing, Cairo University

(2) Lecturer of Pediatric Nursing, Pediatric Nursing Department, Faculty of Nursing, Cairo University

alawadnadia@gmail.com

Abstract

Background: IV therapy is a commonly performed nursing procedure that involves the delivery of fluids, and occasionally medications, to a child who is unable to maintain a regular fluid balance through oral consumption. The choice of route, amount, and type of fluids administered are critical factors in effectively managing a child undergoing IV therapy. **The study aimed to** evaluate the effect of intravenous therapy administration guidelines on pediatric nurses' knowledge, practice, and selected child's outcomes at ICUs. One group pre-posttest quasi-experimental research design was utilized to achieve the aim of the current study. The study was conducted in Cardio-thoracic, Neurological Intensive Care Units (ICUs) and Neonatal Intensive Care Unit (NICU) at Cairo University Specialized Pediatric Hospital (CUSPH). A Convenient sample of 30 nurses who cared for children in ICUs in CUSPH. Four tools were used to collect data a structured interview questionnaire, Nurses' Knowledge Assessment Questionnaire, and Nurses' Practice Checklist and children's outcomes assessment checklist Results: the study revealed that there were statistically significant differences between total mean score of nurses' knowledge before and after receiving the IVT administration guidelines as well as, nurses who received the IVT administration guidelines had higher mean score of practice. Children who are provided with care by nurses who have received guidelines for intravenous therapy administration had better outcomes compared to children who are cared for by them after receiving the IVT administration guidelines. Conclusion: the current study concluded that nurses who receive the IVT administration guidelines had higher mean score of knowledge and higher mean score of practice than before. Better outcomes in children receiving care from nurses after IVT administration guidelines Recommendation: training programs about IVT administration guidelines recommended to improve outcomes of IVT administration.

Keywords: Pediatric nurses, intravenous therapy guidelines, Nurses' Knowledge and Practice, child's outcomes.

Introduction

Intravenous therapy IVT, which involves administering fluids and medications directly into the veins, is widely used in various medical specialties for different purposes such as anesthesia, rehydration, transfusion, drug delivery, and more (Maly et al., 2018). It is also utilized in pediatric care, but it is important to note that there have been instances of significant adverse outcomes associated with its use. Therefore, it is crucial to have a thorough understanding of the composition of the prescribed fluids and the appropriate infusion rate to ensure safe administration. Regular monitoring is also essential in order to maintain the safety and effectiveness of IVT in pediatric patients. Careful attention should be given to the prescription, administration, and

monitoring of intravenous maintenance hydration in children (McNab, 2016).

Recent literature has highlighted the importance of considering the context-specific use of intravenous therapy (IVT), emphasizing that it should be prescribed, ordered, dosed, and delivered with the same care as any other medication (Feld et al., 2018). When selecting a vascular access site for IVT, it is crucial to ensure adequate blood flow, as well as low rates of complications and good long-term survival (Aboalyzeed et al., 2017).

Vascular access-related infections have been identified as a significant cause of hospitalization and are associated with substantial morbidity and mortality (National Kidney Foundation, 2011; Gorski, 2017). Therefore, it is essential to monitor the hydration status of children receiving

intravenous fluids regularly and make appropriate adjustments to their fluid prescriptions. This includes monitoring weight, assessing input and output, conducting clinical assessments, and checking serum electrolyte levels (McNab, 2016).

Peripheral catheters used for IVT can lead to various adverse effects such as pain, redness, heat, swelling, hardened tissue, visible veins, purulent discharge, and slow infusion rates (Bitencourt et al., 2018). Complications like clotting, occlusion, leakage, infiltration, extravasation, phlebitis, and infection are also possible (Aboalyzeed et al., 2017). Studies have reported that complications associated with IVT can be influenced by factors such as the age of the child, underlying conditions like diabetes or cancer, the specific drugs or fluids used, the insertion site, the characteristics of the catheter (e.g., smaller gauge), the use of infusion pumps for medication administration, and the methods used to maintain and secure the peripheral venous catheter (PVC) (Ben Abdelaziz et al., 2017).

Infiltration, which occurs when the IV solution escapes from the vascular pathway, is a common complication of IVT. It can lead to pain, swelling, compartment syndrome, and in severe cases, tissue death or necrosis. Identifying and recognizing medications and solutions associated with tissue damage is crucial for reducing the risk of extravasation (Tailor et al., 2020). Reducing the incidence of complications and minimizing the need for multiple punctures is a significant challenge for the nursing team. Improving the quality of care and patient safety requires addressing these issues and ensuring that staff are properly trained in the placement and maintenance of peripheral venous catheters (Osti et al., 2017; Mudgal, 2018).

Considering the higher rates of IVT-related complications reported in the literature, a study aims to assess the prevalence of phlebitis associated with peripheral intravenous devices in children in a teaching hospital (Bitencourt et al., 2018). Nurses have important responsibilities in the application of intravenous catheters, including administering prescribed fluids, monitoring patients, and addressing complications. To fulfill these

responsibilities, nurses require a strong theoretical background, practical clinical experience, and up-to-date knowledge (Thabet Ahmed et al., 2013; Aboalyzeed et al., 2017). They play a vital role in preventing infections associated with IVT (Osti et al., 2017) and should have accurate knowledge of IV infusion preparation, administration, prevention, treatment, and management of complications (Arbaee, 2016).

Significance of the study:

It is estimated that more than 80% of hospitalized patients undergo intravenous therapy (IVT), which can lead to complications such as clotting, occlusion, leakage, infiltration, extravasation, phlebitis, and infection (Ben Abdelaziz et al., 2017).

In the pediatric population, IVT poses specific challenges due to factors such as greater capillary weakness, narrow and difficult-to-see venous network, increased adiposity, limited cooperation from children, and parental stress. These factors increase the complexity of procedures like venipuncture, making them more difficult and time-consuming. Additionally, appropriate fixation, use, and maintenance of peripheral intravenous devices (PIVD) become crucial. It is observed that younger children, especially those under one year of age, have a higher incidence of IVT-related complications compared to children over five years old.

Based on the researcher's empirical experience in pediatric hospitals, it was noticed that the majority of children experience adverse effects related to IVT during their treatment process. Therefore, the current study aims to raise awareness among pediatric nurses regarding the administration of IVT, promoting complete, safe, and accurate practices supported by evidence-based knowledge and practice.

The study also focuses on evaluating the effect of IVT administration guidelines on pediatric nurses' practice. By implementing evidence-based guidelines, nurses can improve their skills and competence in IVT, leading to better children's outcomes and minimizing the risk of complications. Therefore, the study aims to evaluate the impact of intravenous

therapy (IVT) administration guidelines on pediatric nurses' knowledge, practices and children's outcomes. By assessing the effectiveness of these guidelines, the study can contribute to enhancing nurses' understanding of best practices in IVT, ensuring they have the necessary knowledge to provide safe and effective care to pediatric patients.

Operational definition: -

IVT Administration guidelines: In the current study, the IVT guidelines considered all nursing activities or interventions planned and designed by the researcher after an extensive review of related literature. The IVT administration guidelines include knowledge about IVT in children, Functions, content of IVT system, types of solutions which used for IVT, steps of effective practice in form of preparatory, implementation and evaluation phases, precaution and follow up, and complications. In addition to providing instructions to improve the practice of pediatric nurses concerning IVT common adverse effects and how to overcome it. The IVT guidelines will be presented in the form of educational materials such as an illustrated Arabic booklet, educational videos, posters, and demonstrations, and redemonstration.

Selected child's outcomes: - in the current study the selected outcomes observed on the children because of proper care provided by nurses who received IVT administration guidelines as those children were free from Infiltration of I.V. Fluids, Extravasation, Phlebitis from I.V. Therapy, Hypersensitivity Reaction, or I.V Associated Infection

Aim of the study:

The aim of the current study was to evaluate the effect of intravenous therapy guidelines on pediatric nurses' knowledge, practice, and selected child's outcomes at PICUS.

Research hypotheses:

H1: Nurses who receive intravenous therapy administration guidelines will have higher mean score of knowledge than before.

H2: Nurses who receive intravenous therapy administration guidelines will have higher mean score of practice than before.

H3: Children who are provided with care by nurses who have received guidelines for intravenous therapy administration will have better outcomes compared to children who are cared for by nurses who have not received these guidelines.

Subjects and Methods

Research design:

Pre-posttest quasi-experimental research design was utilized to achieve the aim of the current study. A quasi-experimental design is one type of experimental design that is very similar to the true experimental design except there is lose one criterion as randomization (Burns, Grove, & Gray, 2017).

Setting:

The study was conducted in some Pediatric Intensive Care Units (PICUs) as Cardio-thoracic ICU at fifth floor of the hospital contain about 8-9 bed almost the unit full of cases postoperative cases, Neurological Intensive Care (ICUs) at fifth floor contain about 7 beds, and Neonatal Intensive Care Unit (NICU) at second floor contain about 20- 25 incubator according to cases in the unit all units are in Cairo University Specialized Pediatric Hospital (CUSPH).

Subjects:

A Convenient sample of 30 nurses who were provide care for children in ICUs in CUSPH were participated in the study regardless their age, gender, years of experience and exclude supervisors and nurses who receive IVT training as well as outcomes of 30 children receiving IVT for first time by nurses before receiving IVT administration guidelines considered as control group while outcomes of 30 children received IVT by nurses after they had been received IVT administration guidelines considered the study group.

Data collection tools:

The four required tools developed by researchers after reviewing the related literature through the following tools:

1- Structured interview questionnaire: It had five questions and included one part to assess personal data for the nurse as:

age, level of education, occupation, experience in years, and place of residence.

2- Nurses' Knowledge Assessment Questionnaire:

It had seven questions and included one part to assess nurses' knowledge about intravenous therapy administration regarding definition, functions, types, complications, component, precautions, and follow up.

3- Nurses' Practice Checklist Sheet:

It had eleven items and included one part to assess nurses' practice when intravenous therapy administration applied (steps of effective IVT administration practice in form of preparatory, implementation and evaluation phases, precaution and follow up).

4- Children's Outcomes Assessment Checklist:

It had five items and included one part to assess child's outcomes when intravenous therapy administrated, presence of Infiltration of I.V. Fluids, Extravasation, Phlebitis from I.V. Therapy, Hypersensitivity Reaction, or I.V Associated Infection.

Scoring system:

The score system for nurses' knowledge assessment questionnaire was fifty scores include nurse's knowledge about infection control measures. Each complete answer took two scores, incomplete one took one score and the wrong answer, or no response took zero. The total score converted to 100% (100 score), and then categorized as following: the total score of knowledge less than 60% (less than 60 score) was considered as inadequate while score of 60% and more (60 score) was considered as adequate level of knowledge.

The score for nurses' practice checklist was fifty scores, each complete answer took two scores, incomplete one took one score and the wrong answer, or no response took zero. The total score converted to 100% (100 score), and then categorized as following when total score of 75 % and more in checklist considered adequate and less than 75% considered inadequate level of practice.

Data collection procedure:

An official permission from CUSPH was obtained. Nurses who met the inclusion criteria

were invited to participate in the study. The purpose and the nature of study explained to each nurse individually or in a group of 2-3 nurses at a time. a consent obtained from each nurse to get acceptance and cooperation. As well as consent obtained from mothers of children who participated in this study.

The interview was conducted for all nurses to fill structured interview questionnaire (tool 1) which covered personal data about nurses: age, level of education, occupation, experience in years, and place of residence. At the same time, the researchers obtained nurses' knowledge about intravenous therapy administration by using (tool 2) as pretest, before receiving knowledge about intravenous therapy administration regarding to definition, functions, types, complications, component, support, and applications.

This interview took place in the break area in PICUs as a first interview (20 – 30 mins). Then, the researchers observed the participated nurse in PICUs to fill the nurses' practice checklist (tool 3) as a first time before receiving knowledge about intravenous therapy administration.

At the second (theoretical) and third visit (practical session), the researchers gave one session at each visit. The first one contained knowledge about intravenous therapy administration regarding definition, functions, types, complications, component, support, and applications for participated nurse (20 - 30mins). While the second session was for practices about intravenous therapy administration including equipment and procedure of administration. Also, it took about (30-40 mins) including demonstration and redemonstration.

Immediately after the two sessions given, the researchers filled the nurses' knowledge Assessment questionnaire (tool 2) as posttest from the participated nurse (30 – 45 minutes). The researchers observed the participated nurse in PICUs to fill the nurses' practice checklist (tool 3) as a posttest after receiving the practical session. Follow up and recording of observed complications in the site of IVT administration on the child done using tool IV during and after the administration procedure using (Tool 4) for both groups of children (who

received care from nurses before sessions of IVT administration and another group of children after provision of IVT administration for nurses).

The researchers prepared Arabic teaching instructions in form of a flyer and gave it to the nurses who participated in the study after finishing the data collection. It included simple information; to be suitable for different educational levels among nurses, about intravenous therapy administration regarding to definition, functions, types, complications, component, support, and applications. The Doll and other realistic and virtual computer-based materials and videos were used by the research investigator to perform the practical session for the nurses. The practical session was validated by re-demonstration by the nurses.

Content validity

To determine the extent to which the instruments measure what is intended to be measured, content validity was performed. A group of five professionals with expertise in pediatric nursing evaluated the tools. The substance of the tools was generally agreed upon by all of them, and only small linguistic adjustments were made to the Arabic to make it more mother friendly.

Reliability:

To determine how closely the tool's items assess the same notion and how closely they are correlated with one another, internal consistency was measured. According to Cronbach's Alpha, which was 0.77, internal consistency reliability was estimated for (tool II) and 0.65 for tool (III).

Ethical consideration:

Cairo University Specialized Pediatric Hospital (CUSPH) granted approval, which was received. Nurses who participated in the study and mothers of children (in the control and study groups) were asked for their oral informed permission after being fully informed of the study's aims and methodology in order to seek their cooperation. They were made aware of the fact that their participation in the study was voluntary and that they had the opportunity to quit at any moment. Nurses were also given

the assurance that all data collected would be kept private and used just for the investigation.

Pilot study

The study was implemented for 10 nurses to test the feasibility of the study tools, application of tools, clarify of sentences and estimate the time required to collect required data, unnecessary items were omitted and needed modifications were done.

Statistical analysis:

A compatible personal computer (PC) was used to store and analyze data. The Statistical Package for Social Studies (SPSS), version 21.0 was used. Data were coded and summarized using mean, standard deviation and crosstabs for quantitative variables, and percent for qualitative variables. The collected data tabulated and summarized. Data was computerized and analyzed using appropriate descriptive and inferential statistical tests. Qualitative data were expressed as frequency and percentage. A comparison between qualitative variables was carried out by using parametric Chi square test. Comparison of means was performed using paired-sample t-test. Correlation among variables was done using Pearson correlation coefficient. Level of significance at $p < 0.05$, 0.001 were used as the cut of value for statistical significance.

Results

Table (1) revealed that half (50 %) of nurses age was ranged from $30 \geq 40$ years old while fifth of nurses ranged between $20 \geq 30$ and ≤ 40 years (26.7%, 23.3 respectively) with mean \pm SD (33.7 ± 6.37). Also represent that most of nurses were females while about one fifth were males. Regarding residence, almost two thirds (63.3%) of nurses were from rural areas while about (36.6 %) of them were from urban areas. Concerning level of education two thirds of nurses were institution graduates while one third were secondary school graduates and only 10 % of them were University graduates. Also, half (50%) of nurses have $4 > 8$ years of experience while about one third (30%) have $1 > 4$ years' experience.

Table (2) shows that there were a statistically significance difference between

knowledge of nurses before and after receiving IVT guidelines in definition, application knowledge, complications, functions, and support.

Table (3) shows Nurses' level of Knowledge regarding IVT guidelines was significantly improved after receiving IVT guidelines compared with before receiving it. results (50.3±1.1) versus 58.3±2.9) with X^2 0.29 at $P < 0.05$.

Table (4) clarified that there were a statistically significance difference in nurses' adequate level of practice of IVT before and after guidelines administration with mean ± SD before receiving IVT guidelines results (50.1±1.1) versus 57.3±3.9) with X^2 0.23 at $P < 0.05$.

Table (5) illustrated that about two thirds 60 % of children in the before giving IVT guidelines group had infiltration from IV therapy while just one fifth 20% in the after administration of IVT guidelines group had infiltration. Regarding extravasation, more than half 53.3% of the before IVT group suffer from it while only 10 % of the after IVT group had it. As for phlebitis, half 50 % of the before IVT group had it while 13.3 % of the after IVT group suffered from it. Half of the before IVT group had mild to moderate hypersensitivity reactions while one fifth of the after IVT group had it. Almost two thirds of 63.3% of the before IVT group had infections associated with IV therapy while one fifth 23.3 % had infections from it.

Table (1): Distribution of the nurses according to personal data (n=30)

Personal data	Number	%
Nurses' age		
20≥30	8	26.7
30≥40	15	50
< 40	7	23.3
Mean ± SD	33.70 ± 6.37	
Gender		
Male	6	20
female	24	80
Place of residence:		
Rural	19	63.3
Urban	11	36.6
Education level		
Secondary school	9	30
Institute	18	60
University	3	10
Years of experience		
1<4	9	30
4<8	15	50
>8	6	20

Table (2): Comparison between mean scores of nurses' knowledge before and after receiving IVT administration guidelines (n=30).

Items	Before IVT administration	After IVT administration	t-test	P value
	Mean ± SD	Mean ± SD		
Definition (20 marks)	11.4±2.1	14.3±3.2	0.73	0.01*
Functions (20 marks)	9.1±1.7	11.2±1.2	0.61	0.02*
types (10 marks)	6.3±2.5	7.3±3.6	0.55	0.062
Complications (20 marks)	11.3±1.4	14.2±1.2	0.88	0.02*
Component (10 marks)	6.3±1.1	7.3±3.2	0.9	0.07
Follow up (10 marks)	3.9±1.7	7.2±1.4	0.56	0.02*
precautions (10 marks)	5.3±2.1	7.3±3.2	0.93	0.01*

* Statistically significant at $P \leq 0.05$

Table (3): Comparison between total nurses' level of knowledge before and after receiving IVT administration guidelines (n=30).

level of knowledge	Before IVT administration		After IVT administration		X ²	P value
	No	%	No	%		
Adequate	11	36.6	17	56.6	0.29	0.05*
	50.3+1.1		58.3+2.9			
inadequate	19	63.3	13	43.3	0.33	0.03*
	33.3+2.7		47.2+1.2			

* Statistically significant at $P \leq 0.05$

Table (4): Comparison between Nurses' level of Practice before and after Receiving IVT administration (n=30).

level of Nurses' Practice	Before IVT administration		After IVT administration		X ²	P value
	No	%	No	%		
adequate	4	13.3	10	33.3	0.23	0.05*
	50.1+1.1		57.3+3.9			
inadequate	26	86.6	20	66.6	0.73	0.03*
	27.3+2.7		43.2+1.2			

* Statistically significant at $P \leq 0.05$

Table (5): Comparison between children's outcomes before and after nurses receiving IVT administration guidelines (children study group n=30 and children control group n=30).

Items	children study group n=30 (After)		children control group n=30 (Before)		X ²	P value
	No	%	No	%		
Infiltration of I.V. Fluids	6	20	18	60	0.641	0.001
Extravasation	3	10	16	53.3	0.721	0.000
Phlebitis from I.V. Therapy	4	13.3	15	50	0.531	0.000
Hypersensitivity Reaction	7	23.3	15	50	0.633	0.002
I.V.-Associated Infection	7	23.3	19	63.3	0.499	0.002

Discussion:

The findings of this study emphasize the importance of implementing IV therapy administration guidelines and providing appropriate frequent training to pediatric nurses. The significant improvement in knowledge and practice observed in the studied group after administration suggests that such guidelines play a vital role in enhancing the quality and safety of IV therapy in pediatric care settings.

The findings of the study reveal the age distribution of the nurses participating in the study. It was observed that the majority of the nurses fell within the age range of 30 to 40 years, comprising 50% of the total sample. This indicates that a significant proportion of the nurses belonged to this age group. Furthermore, approximately one-fifth of the nurses fell into the age range of 20 to 30 years

and over 40 years respectively. This suggests that there was relatively equal representation of nurses in these two age brackets. This result agrees with the Al-Haroon, & Al-Qahtani, (2020) who was assess organizational commitment among nurses in Saudia Arabia. The mean age of the nurses was calculated to be 33.7 years, with a standard deviation of 6.37. This result aligns with Ibrahim, and Awad, (2019) in an Egyptian study investigating knowledge and practice of nurses after provision of safety guidelines.

The current study indicates that most of nurses participating in the research were females, while approximately one-fifth of the nurses were males. This suggests a gender disparity within the nursing profession in Egypt, with a significantly higher representation of female nurses compared to their male counterparts. This result agrees with

the result of a research conducted at Tanta University discussing the higher flow rate of females in nursing professions than in males' group by Rayan, Shazly, and Saad (2019).

The findings of the study reveal that a significant proportion of nurses working in intensive care units (ICUs) came from rural areas, with approximately two-thirds of the nurses falling into this category. On the other hand, around one-third of the nurses hailed from urban areas. This result agrees with Mahran, Taher, & Saleh (2017) who investigate challenges facing nurses in health settings. Also, this result is constant with a study conducted at Benha University by Abeda & Eldesouky., (2020) who were investigating practice of nurses of infection control measures.

The study results suggest that there was a statistically significant difference in the knowledge of nurses before and after receiving IVT guidelines. Which indicates that the knowledge of nurses improved in several areas after they received the guidelines. The areas in which the knowledge of nurses improved significantly include definition, application knowledge, complications, functions, and support related to IVT. This suggests that the guidelines had a positive impact on enhancing the nurses' understanding and knowledge in these specific areas. The result agrees with Ping Lim Wong et al., (2018) and Lamsal, & Shrestha, (2019) in their study about knowledge and practice of nurses regarding IVT who found that the significant difference after administration of their training in a teaching hospital.

The mean knowledge score of the nurses increased from 50.3 ± 1.1 before receiving the IVT guidelines to 58.3 ± 2.9 after receiving them. This difference in mean scores suggests that the guidelines had a positive impact on enhancing the nurses' knowledge in IVT. Further supports the conclusion that the improvement in knowledge was significant. The p-value indicates that the difference in knowledge scores between the two groups (before and after receiving the guidelines) is unlikely to have occurred by chance.

The statistically significant difference indicates that the improvement in knowledge

observed after the nurses received the guidelines was not due to chance. It suggests that the guidelines played a significant role in increasing the nurses' knowledge in the mentioned areas. Improving nurses' knowledge in IVT is crucial for ensuring safe and effective patient care. IVT is a complex procedure that requires precise knowledge and skills to prevent complications and provide appropriate care. By providing guidelines and educational interventions, healthcare organizations can enhance the knowledge and competence of nurses in this critical area.

Overall, these results suggest that implementing IVT guidelines can be an effective strategy to enhance nurses' knowledge in various aspects of IVT, leading to improved patient care and outcomes. Continued education, training, and adherence to guidelines are essential to ensure that nurses maintain and update their knowledge in this critical area of practice.

In conclusion, the study results demonstrate a significant improvement in nurses' knowledge regarding IVT guidelines after receiving them. This highlights the importance of providing nurses with evidence-based guidelines and educational interventions to enhance their knowledge and competency in IVT, ultimately leading to improved patient care outcomes.

The result of the study indicates that there was no statistically significant correlation between the total mean score of nurses, both before and after the administration of guidelines, and the nurses' age. This finding suggests that age does not play a significant role in determining the level of knowledge among nurses in relation to the guidelines.

The result of the study indicates that there was a statistically significant difference in nurses' level of practice of IVT before and after the administration of guidelines. The comparison between the nurses' level of practice before and after receiving the guidelines shows a notable improvement in their practice. The mean level of practice score of the nurses increased from 50.1 ± 1.1 before receiving the IVT guidelines to 57.3 ± 3.9 after receiving them.

This difference in mean scores suggests that the guidelines had a positive impact on enhancing the nurses' level of practice in IVT. The p-value indicates that the difference in practice scores between the two groups (before and after receiving the guidelines) is unlikely to have occurred by chance. This result agrees with Noronha, Williams, Rakesh, & Shashikumar, (2017) and Mudgal K., (2018) who stated the low level of nurses practice before training received regarding IVT.

The significant improvement in nurses' level of practice after receiving the IVT guidelines is promising and indicates the effectiveness of the guidelines in guiding and influencing their practice. It suggests that the guidelines successfully provided the necessary information and guidance for nurses to enhance their skills and competence in IVT.

By improving nurses' level of practice in IVT, healthcare organizations can ensure safer and more effective administration of intravenous therapies. Proper practice of IVT is crucial for preventing complications, ensuring accurate medication administration, and providing optimal care to patients.

In conclusion, the study results demonstrate a significant improvement in nurses' level of practice in IVT after receiving the guidelines. This highlights the importance of providing nurses with evidence-based guidelines and educational interventions to enhance their skills and competence in IVT, ultimately leading to improved patient care outcomes.

The results of the study indicate that there were significant differences between the control group and the studied group in terms of infiltration, extravasation, phlebitis, hypersensitivity reactions, and infections associated with IV therapy. In terms of infiltration, approximately two-thirds of children in the control group experienced infiltration from IV therapy, whereas only one-fifth of the studied group had infiltration. This suggests that the studied group had a lower incidence of infiltration compared to the control group. This result matches the result of Major and Huey (2016) in their application to decrease the infiltration resulting from IV therapy.

Regarding extravasation, more than half of the control group suffered from it, while only 10% of the studied group had extravasation. This indicates that the studied group had a significantly lower risk of experiencing extravasation compared to the control group. This results in constant with the result of Sherwood, and Nickel (2017) in their study about application of safety competencies to practice of IV therapy.

Phlebitis was also found to be more prevalent in the control group, with half of the children experiencing it. In contrast, only 13.3% of the studied group suffered from phlebitis. This demonstrates that the studied group had a lower incidence of phlebitis compared to the control group. The result agrees with a study conducted on Asian nurses measuring phlebitis scores (Büyükyılmaz, et al. 2019).

When it comes to hypersensitivity reactions, half of the control group had mild to moderate reactions, whereas one-fifth of the studied group experienced such reactions. Although the studied group had a lower incidence compared to the control group, it is still noteworthy that hypersensitivity reactions were present in both groups. This results in the same line as Nickel (2019) in their study about applying IV therapy standers to avoid complications and side effects.

In terms of infections associated with IV therapy, almost two-thirds of the control group had such infections, while one-fifth of the studied group had them. This indicates that the studied group had a significantly lower risk of developing infections associated with IV therapy compared to the control group. These results agree with Helm, et al. (2019) in their study investigating presence of complication results from IV therapy.

Overall, the results of the study highlight the effectiveness of the intervention or treatment provided to the studied group in reducing the incidence of infiltration, extravasation, phlebitis, hypersensitivity reactions, and infections associated with IV therapy. This suggests that the intervention or treatment has potential benefits in improving the safety and outcomes of IV therapy in children.

Conclusion:

The results of the current study concluded that nurses who received the IVT administration guidelines had higher mean score of knowledge and practice than before. Children who are provided with care by nurses who have received guidelines for intravenous therapy administration had better outcomes compared to children who are cared for by them after receiving the IVT administration guidelines.

Recommendations:

Based on the current study results, it recommended the following

- Implementing the IVT administration guidelines across all levels of nursing education and practice is essential. This means ensuring that these guidelines are taught and followed consistently in nursing schools and applied in real-world healthcare settings. By doing so, healthcare professionals can ensure that intravenous therapy is administered safely and effectively, minimizing the risk of complications, and optimizing patient outcomes. This also includes training nurses on the latest advancements and best practices in IVT administration, keeping them updated and knowledgeable in this critical area of patient care.
- To enhance the outcomes of children, it is important to increase nurses' awareness about the need to regularly update their knowledge and practices in IVT administration.
- Healthcare institutions should prioritize the training and ongoing education of nurses in IVT administration guidelines. This may involve incorporating the guidelines into nursing curricula, offering regular training sessions, and providing resources that facilitate continuous learning and skill development in this area.
- To ensure the study's validity and generalizability, it would be beneficial to include a diverse sample of pediatric nurses from various healthcare settings. Additionally, utilizing robust research methods, such as pre- and post-intervention

assessments, could provide valuable quantitative data to support the study's findings.

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