Effect of an in-Service Training Program on Pediatric Nurses' Performance Regarding the Care of Children with Dehydration

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Abstract

Background: Nurses, especially those working in pediatric units, are responsible for the care of children with dehydration and are expected to possess a high level of knowledge and clinical competence to deliver safe, evidence-based interventions. The **aim** of the present study was to evaluate the effect of an in-service training program on pediatric nurses' performance regarding the care of children with dehydration. **Subjects and method:** this study was conducted at the pediatric rehydration unit in Assiut University Children's Hospital, and a quasi-experimental one-group pretest-posttest design was used. This trial involved a convenience sample of thirty pediatric nurses. Three tools were used to get the data of this study. **Tool I:** Demographic data of the studied pediatric nurses. **Tool II:** Pediatric nurses' knowledge questionnaire. **Tool III:** Observational checklists. The **results** of this study showed that a statistically significant difference (p-value of 0.001**) was seen between the same group before and after the training program in terms of the total level of knowledge and practices regarding the care of children with dehydration. The researchers **concluded** that receiving an in-service training program significantly improves pediatric nurses' knowledge and clinical practices related to the management of dehydration in children. Furthermore, a strong positive correlation between knowledge and practices underscores the vital role of education in enhancing clinical performance. Researchers **recommended** that providing regular in-service training and applying standard protocols and checklists during the care of children with dehydration

Keywords: Children, Dehydration, in-Service Training Program, Pediatric Nurses

Introduction

Water is necessary for the human body to maintain proper blood and other fluid levels. The body also requires electrolytes, which are salts that are normally present in blood, other fluids, and cells, in addition to fluids. Loss of water and salts from the body is known as dehydration **(World Health Organization, 2018).**

Dehydration, which is defined as a sudden decrease in the amount of plasma in the blood, can result from a number of pediatric disorders. It shows water loss from both internal and extracellular sources in addition to the most common indicators of elevated plasma sodium and osmolality. Dehydration and volume loss are still included in the wide term hypovolemia. Volume reduction is the intravascular space's loss of water and salt (**Burns et al., 2020).**

Dehydration in children is often caused by a viral infection that causes fever, vomiting, diarrhea, and a diminished capacity for eating or drinking. Rotavirus and adenovirus are related viral illnesses that cause diarrhea and vomiting **(Dadonaite et al., 2018).**

The assessment and treatment of dehydration would continue to address the degree of dehydration, restore fluid cravings, and deal with ongoing fluid losses. The following three groups may be largely involved in the dehydration processes: (increased fluid loss, decreased fluid intake, or combination of both) (**Santillanes & Rose, 2018).** In general, the pediatric nurse plays a vital role in providing care for children who are dehydrated and in documenting the clinical characteristics of dehydration, as well as the type, amount, and type of fluid that the children are receiving **(Olakunle et al., 2020).**

Pediatric nurses should be qualified during working in pediatric care units going on via their practice, which furthermore comprises specifics of useful processes for managing diverse grades of dehydration as well as, running IV fluid therapy. Pediatric nurses able to prove an ongoing specialized improvement in the field through attending native sessions, appropriate exercise sequences, and general gatherings **(Khider et al., 2018).**

Significance of the study

In Egypt, diarrhea is the second leading cause of death among under-5 children. Most diarrhea-related deaths in children are due to dehydration from loss of large quantities of water and electrolytes. Statistics show that 3,500 – 4,000 under-five children die of diarrhea every year **(world health report, 2020).** The researchers noted that pediatric nurses play an important role in treating children who suffer from dehydration, so the researchers conducted this study to evaluate the effect of an in-service training program on pediatric nurses' performance regarding the care of children with dehydration.

Aim of study

The aim of this study was to:

Evaluate the effect of an in-service training program on pediatric nurses' performance regarding the care of children with dehydration.

This aim was achieved through these objectives:

- To assess the baseline knowledge and clinical practices of pediatric nurses regarding the care of children with dehydration before the implementation of the in-service training program.
- To implement an in-service training program focused on evidence-based care for children with dehydration.
- To evaluate the post-training knowledge and clinical practices of pediatric nurses regarding the care of children with dehydration.
- To compare pre- and post-training knowledge and practices to determine the effect of the in-service training program.

Hypotheses of the study:

Hypothesis 0: The in-service training program has no significant effect on the overall performance (knowledge and practice) of pediatric nurses regarding dehydration.

Hypothesis I: Receiving in-service training program significantly raises the level of knowledge of pediatric nurses regarding dehydration.

Hypothesis II: Receiving in-service training program significantly improves the level of practice of pediatric nurses regarding care of children with dehydration.

Hypothesis III: There is a positive correlation between knowledge and practices.

Subjects and method

Research design:

A quasi experimental one group pretest-posttest design was used to evaluate the effect of the in-service training program on pediatric nurses' performance regarding care of children with dehydration.

Setting:

This study was conducted at the pediatric rehydration unit at Assiut university children hospital. This unit provides specialized care for children suffering from acute and severe dehydration, as well as various gastrointestinal conditions. It serves a large catchment area, receiving emergency and referred cases from Assiut Governorate and neighboring regions across Upper Egypt.

Subjects:

A Convenience sample of thirty pediatric nurses working at the pediatric rehydration unit. Pretest was conducted by using study tools before the in-service training program implementation. The researchers implemented the training sessions for the participants according to their available working time. The posttest was conducted after two weeks from the completion of the in-service training program to assess the retention of knowledge and the application of learned practices by pediatric nurses.

Inclusion criteria:

- Pediatric nurses who working at rehydration unit from both sex and desired to participate at this study.
- All different educational levels and different age groups.

Sample size:

Using power analysis (paired t-test, two-tailed), a sample size of 30 achieves 80% power to detect a moderate effect size (Cohen's d = 0.53) at a 5% significance level ($\alpha = 0.05$). This confirms that the sample size is statistically adequate for detecting meaningful differences before and after the intervention.

Tools:

Data was collected for the current study through the following three tools, which designed by the researchers based on reviewing the necessary literature:

Tool I: Demographic data of the studied pediatric nurses which consisted of age, sex, educational level, years of experience and attending previous training on dehydration.

Tool II: Pediatric nurses' knowledge questionnaire related to evaluating the nurses' knowledge regarding dehydration which consisted of (12 items), the items were open ended questions and the answers were evaluated by the researchers in which (correct answer) take one and (incorrect answer) take zero. The items were divided as the following:

a. Definition and pathophysiology of dehydration (2 questions).

b. Clinical signs and classification of dehydration (WHO guidelines) (2 questions).

c. Fluid resuscitation and management (3 questions).

d. Oral rehydration solution (ORS) and monitoring (3 questions).

e. Complications of dehydration and special considerations (2 questions) **(Shrestha et al., 2020).**

Scoring system for knowledge:

Total Score = 12

- 0-4 = Poor Knowledge (0%-33.3%)
- 5-8 = Moderate Knowledge (41.7%-66.7%)
- 9-12 = Good Knowledge (75%-100%)

Tool III: Observational checklists related to evaluating the nurses' practice regarding dehydration, which consisted of five checklists included initial assessment of dehydration severity (8 steps), IV fluid resuscitation and management (6 steps), oral rehydration solution (ORS) administration (4 steps), monitoring of dehydration and complications management (4 steps), documentation & communication (4 steps) with a total 26 step in which (done) step take one and (not done) take zero **(Farag et al., 2023).**

Scoring system for performance:

Total score = 26

- 0-9 = Poor performance (0%-34.6%)
- 10-17 = Moderate performance (38.5%- 65.4%)
- 18-26 = Good Performance (69.2%-100%)

Method

1. An official permission was obtained from the director of pediatric rehydration unit at Assiut university children hospital to collect the necessary data for this study.
2. A pilot study was carried out on 10% of pediatric nurses (3 nurses) to test the clarity and applicability of the sheet and to estimate time needed to fulfill each sheet and no modification was done and this sample was included in the total sample size of this study.
3. Tools of the study were developed by the researchers and were tested for its contents validity by 5 experts in both pediatric nursing and pediatric medicine fields and it was 97%.
4. Tools reliability was done using alpha Cronbach test and it was 0.967 for tool II and 0.957 for tool III.

Field of the work:

This study was conducted over a six-month period, beginning in October 2024 and ending in April 2025. The researchers were present at the hospital four times per week. Data were collected from the participating pediatric nurses using the designed tools, which were translated into Arabic. Nurses were allowed to answer the questions either in Arabic or English, according to their preference. This study was carried out in four consecutive phases: the assessment phase, the planning phase, the implementation phase and the evaluation phase.

Procedure for gathering data:

1. Assessment Phase

• The researchers were present at the hospital and collected the phone numbers of all participating pediatric nurses. A WhatsApp group was created to facilitate easier communication. In this group, the researchers explained the purpose of the study, clarified how the data would be collected, and arranged appointments with nurses based on their availability.

• Data were collected using Tool I (personal and demographic data, collected once) and Tool II (knowledge assessment regarding dehydration). The pretest was conducted face-to-face, in small groups (9 nurses per session), over a period of three days, based on the nurses' work shifts. The time required to complete the pretest ranged from 30 to 60 minutes, depending on each nurse's pace.

• The pediatric nurses' practices related to initial assessment of dehydration severity, IV fluid resuscitation and management, oral rehydration therapy (ORS) administration, monitoring of dehydration and complications management, documentation and communication were observed using Tool III. One nurse was observed per day. The observation phase (pretest for practices) extended over two months and served as a baseline for comparison with post-intervention performance.

2. Planning Phase

After reviewing the relevant literature, the researchers developed an educational booklet that covered all necessary knowledge and clinical practices related to dehydration. The content of the training sessions including PowerPoint presentations and instructional videos was also developed during this phase. The planning process took approximately one month.

3. Implementation Phase

Through prior arrangements made via WhatsApp group, pediatric nurses were divided into small groups (approximately 7 nurses per group) to facilitate discussion. The in-service training program aimed at improving pediatric nurses' performance in managing children with dehydration. It consisted of four sessions (two theoretical and two practical), conducted in the educational classroom at the first floor in Assiut University Children Hospital.

- **Session 1 (Day 1):**

A 60-minute session including a 45-minute theoretical PowerPoint presentation on the definition, pathophysiology, clinical signs, classification (WHO guidelines), and fluid resuscitation and management of dehydration, followed by 15 minutes for summary and discussion. The educational booklet was distributed during this session.

- **Session 2 (Day 2):**

A 60-minute theoretical session covering ORS and monitoring, complications of dehydration and special considerations including discussion.

- **Session 3 (Day 3):**

A two-hour practical session involving training on dehydration assessment and IV fluid resuscitation using a simulation manikin through demonstration, redemonstration and videos.

- **Session 4 (Day 4):**

A two-hour practical session on ORS administration, monitoring of dehydration and complications management, documentation and communication through demonstration and redemonstration supported by videos.

All sessions were repeated until all pediatric nurses had been covered, which took approximately one month.

4. Evaluation Phase

The evaluation phase was conducted two weeks after completing of the in-service training program to assess knowledge retention and application of learned practices. Pediatric nurses completed the posttest using Tool II, which was identical to the pretest questionnaire. Posttest assessments were completed over four days. Practice evaluation was also carried out using Tool III by observing nurses' performance, which took approximately two months.

Ethical Considerations:

The director of the pediatric rehydration unit at the Assuit University Children Hospital officially approved the study after it was reviewed and approved by the Ethics Committee of the Assiut University Faculty of Nursing under the number of 20240826. It was followed by the submission of a formal letter detailing the study's objectives. Next, make sure that every participant understands the aim, benefits, and methods of data collection of this study. It was explained to the participants that they can pause at any moment without incurring any penalties and that their participation was completely voluntary. Next, signed consent was requested from pediatric nurses included in this study. All data collected would be kept strictly confidential and used only to advance the objectives of this study.

Statistical analysis

Data entry and data analysis were done using statistical package for the social science (SPSS) version 23. Data were presented as number, percentage means and standard deviation. McNemar test and paired sample t-test was used to compare between variables. Also Pearson correlation between variables was employed.

Results:

Table (1): Shows demographic characteristics of the studied pediatric nurses. It was detected that half of the studied pediatric nurses (50%) were in the age group between 20 to less than 30 years old, more than three quarters of them (76.7%) were female, more than half of them graduated from school of nursing, less than half of them (43.4) had experience from 10 to less than 15 years and two third of them (66.7%) didn't attend previous training on dehydration.

Table (2): Clarifies pediatric nurses' knowledge regarding dehydration in pre and posttest, there was a significant improvement in all knowledge items after the training program. Definition & causes of dehydration improved from 66.7% to 93.3% (p-value = 0.008**). Pathophysiology of dehydration increased from 23.3% to 83.3% (p-value = 0.001**). Fluid bolus calculation rose from 33.3% to 73.3% (p-value = 0.001**). Management in neonates/malnourished children improved from 33.3% to 86.7% (p-value = 0.001**).

Figure (1): Presents the total level of pediatric nurses' knowledge regarding dehydration in pre and posttest. It was detected that the majority of the studied pediatric nurses (83.3%) had a good level of knowledge after the training program while (43.3%) of them had a good level of knowledge before the training program.

Table (3): Explores pediatric nurses' practices regarding initial assessment of dehydration severity in pre and posttest. There were statistically significant differences between before and after the training program (p-value less than 0.05*).

Table (4): Demonstrates pediatric nurses' practices regarding IV fluid resuscitation and management in pre and posttest. There were statistically significant differences between before and after the training program (p-value less than 0.05*).

Table (5): Highlights pediatric nurses' practices regarding oral rehydration solution (ORS) administration in pre and posttest. There were statistically significant differences between before and after the training program (p-value less than 0.05*).

Table (6): Shows pediatric nurses' practices regarding monitoring and complications management in pre and posttest. There were statistically significant differences between before and after the training program (p-value less than 0.05*).

Table (7): Demonstrates pediatric nurses' practices regarding documentation & communication in pre and posttest. There were statistically significant differences between before and after the training program (p-value less than 0.05*).

Figure (2): Shows total level of pediatric nurses' practices regarding dehydration in pre and posttest. It was detected that the majority of the studied pediatric nurses (80%) had a good level of practices while after the training program while less than half of them (46.7%) had a good level of practices before the training program.

Table (8): Clarifies correlation between the total knowledge and practices score in pre and posttest. It was observes a strong, statistically significant positive correlations between knowledge and practices, pretest (r = 0.929**) and posttest (r = 0.978**).

Table (1): Demographic characteristics of the studied pediatric nurses:

Demographic data	N(30)	%
Age group / years		
< 20 yrs.	3	10
20-<30 yrs.	15	50
30- > 40 yrs.	12	40
Age mean and SD	**28.07±3.8**	
Sex		
Male	7	23.3
Female	23	76.7
Educational level		
Nursing school	17	56.7
Nursing technical institute	11	36.7
Bachelor degree	2	6.6
Years of experience:		
Less than 5 years	10	33.3
5-<10 years	7	23.3
10->15 years	13	43.4
Attending previous training on dehydration		
Yes	10	33.3
No	20	66.7

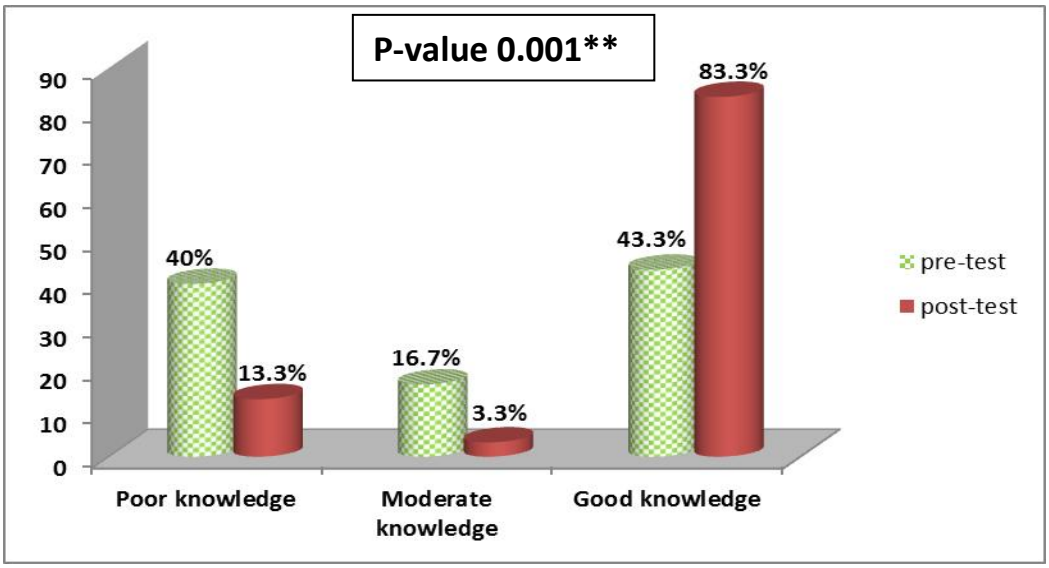
Table (2): Pediatric nurses' knowledge regarding dehydration in pre and posttest:

Knowledge regarding dehydration	Pretest		Posttest		p- value
	N(30)	%	N(30)	%	
1. Definition of dehydration and its causes in children					
correct answer	20	66.7	28	93.3	**0.008****
incorrect answer	10	33.3	2	6.7	
2. Pathophysiology of dehydration					
correct answer	7	23.3	25	83.3	**0.001****
incorrect answer	23	76.7	5	16.7	
3. Classification of dehydration severity					
correct answer	18	60	24	80	**0.031***
incorrect answer	12	40	6	20	
4. Clinical signs of severe dehydration					
correct answer	21	70	29	96.7	**0.008****
incorrect answer	9	30	1	3.3	
5. IV fluid type for severe dehydration					
correct answer	19	63.3	25	83.3	**0.031***
incorrect answer	11	36.7	5	16.7	
6. Fluid bolus calculation					
correct answer	10	33.3	22	73.3	**0.001****
incorrect answer	20	66.7	8	26.7	
7. Time of switching from IV fluids to ORS					
correct answer	17	56.7	26	86.7	**0.004****
incorrect answer	13	43.3	4	13.3	
8. ORS preparation and administration method					
correct answer	25	83.3	30	100	**0.063***
incorrect answer	5	16.7	0	0	
9. ORS dosage based on child's weight/age					
correct answer	13	43.3	24	80	**0.001****
incorrect answer	17	56.7	6	20	
10. Signs of over hydration or fluid overload					
correct answer	16	53.3	27	90	**0.002****
incorrect answer	14	46.7	3	10	
11. Warning signs of worsening dehydration					
correct answer	18	60	25	83.3	**0.016***
incorrect answer	12	40	5	16.7	
12. Special management in neonates/ infants and malnourished children					
correct answer	10	33.3	26	86.7	**0.001****
incorrect answer	20	66.7	4	13.3	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference



Paired sample t-test

Figue (1): Total level of pediatric nurses' knowledge regarding dehydration in pre and posttest (n=30)

Table (3): Pediatric nurses' practices regarding initial assessment of dehydration severity in pre and posttest:

A. Initial assessment of dehydration severity		Pretest		Posttest		p- value
		N(30)	%	N(30)	%	
1.Wash hands before assessment	•Done	14	46.7	25	83.3	**0.001****
	•Not done	16	53.3	5	16.7	
2. Checks child history (fluid loss, diarrhea, vomiting, feeding, urine output)	•Done	12	40	23	76.7	**0.001****
	•Not done	18	60	7	23.3	
3. Assessment of vital signs	•Done	21	70	26	86.7	**0.063***
	•Not done	9	30	4	13.3	
4. Inspects skin turgor (pinch test)	•Done	24	80	27	90	**0.025**
	•Not done	6	20	3	10	
5.Examination of mucous membranes (dryness of tongue/lips)	•Done	9	30	20	66.7	**0.001****
	•Not done	21	70	10	33.3	
6. Observation for sunken eyes & fontanel (if infant)	•Done	11	36.7	24	80	**0.001****
	•Not done	19	63.3	6	20	
7.Assesses urine output (asks caregiver, checks diaper if applicable)	•Done	9	30	22	73.3	**0.001****
	•Not done	21	70	8	26.7	
8.Classifies dehydration severity correctly	•Done	21	70	29	96.7	**0.008****
	•Not done	9	30	1	3.3	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference

Table (4): Pediatric nurses' practices regarding IV fluid resuscitation and management in pre and posttest

B. IV fluid resuscitation and management		Pretest		Posttest		p- value
		N(30)	%	N(30)	%	
1. Prepares IV fluid correctly (Ringer's Lactate/NS)	•Done	18	60	26	86.7	**0.008****
	•Not done	12	40	4	13.3	
2. Calculates and administers fluid bolus correctly (20 mL/kg IV over 30-60 min if shock)	•Done	10	33.3	22	73.3	**0.002****
	•Not done	20	66.7	8	26.7	
3. Monitors child's response during and after fluid administration	•Done	11	36.7	24	80	**0.001****
	•Not done	19	63.3	6	20	
4. Adjusts fluid rate as per child's condition	•Done	16	53.3	20	66.7	**0.219**
	•Not done	14	46.7	10	33.3	
5. Switch from IV fluids to ORS at the correct time	•Done	17	56.7	26	86.7	**0.004****
	•Not done	13	43.3	4	13.3	
6. Checks IV site for complications (infiltration, phlebitis)	•Done	15	50	21	70	**0.031***
	•Not done	15	50	9	30	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference

Table (5): Pediatric nurses' practices regarding oral rehydration solution (ORS) administration in pre and posttest

C. Oral rehydration solution (ORS) Administration		Pretest		Posttest		p- value
		N(30)	%	N(30)	%	
1. Prepares ORS correctly (mixing correct amount of water)	•Done	25	83.3	30	100.0	**0.063***
	•Not done	5	16.6	0	0.0	
2. Administers ORS in small, frequent amounts	•Done	20	66.7	28	93.3	**0.039***
	•Not done	10	33.3	2	6.7	
3. Encourages continued breastfeeding/feeding as appropriate	•Done	19	63.3	29	96.7	**0.002****
	•Not done	11	36.7	1	3.3	
4. Monitors tolerance to ORS (vomiting, acceptance)	•Done	18	60	24	80	**0.18**
	•Not done	12	40	6	20	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference

Table (6): Pediatric nurses' practices regarding monitoring and complications management in pre and posttest

D. Monitoring and complications management		Pretest		Posttest		p- value
		N(30)	%	N(30)	%	
1. Monitors and records fluid intake/output regularly	•Done	19	63.3	25	83.3	**0.031***
	•Not done	11	36.7	5	16.6	
2. Identifies signs of fluid overload (edema, respiratory distress)	•Done	17	56.7	26	86.7	**0.004****
	•Not done	13	43.3	4	13.3	
3. Recognizes and manages complications (electrolyte imbalance, seizures)	•Done	16	53.3	24	80	**0.008****
	•Not done	14	46.7	6	20	
4. Adjusts treatment plan based on child's response	•Done	18	60	23	76.7	**0.063***
	•Not done	12	40	7	23.3	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference

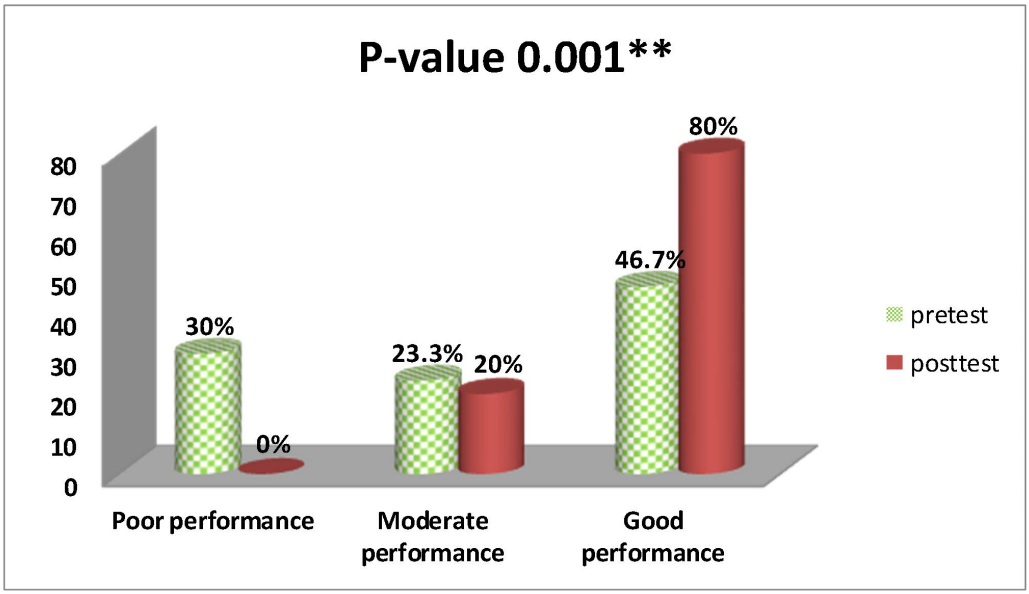
Table (7): Pediatric nurses' practices regarding documentation & communication in pre and posttest

E. Documentation & communication		Pretest		Posttest		p- value
		N(30)	%	N(30)	%	
1. Accurately documents fluid intake/output and vital signs	•Done	14	46.7	22	73.3	**0.008****
	•Not done	16	53.3	8	26.7	
2. Records IV fluid type, rate, and response	•Done	19	63.3	25	83.3	**0.031***
	•Not done	11	36.7	5	16.7	
3. Effectively educates parents/caregivers on home hydration	•Done	18	60	26	86.7	**0.008****
	•Not done	12	40	4	13.3	
4. Explains warning signs requiring urgent medical attention	•Done	20	66.7	27	90	**0.016***
	•Not done	10	33.3	3	10	

McNemar test

(**) highly statistical significant difference

(*) statistical significant difference



Paired sample t-test

Figure (2): Total level of pediatric nurses' practices regarding dehydration in pre and posttest (n=30)

Table (8): Correlation between the total knowledge and practices score in pre and posttest

		Practices		Knowledge	
		Pre-test	Post-test	Pre-test	Post-test
Total practices pretest	Pearson Correlation	1	0.779**	0.929**	0.730**
	Sig. (2-tailed)		0.000	0.000	0.000
Total practices post test	Pearson Correlation	0.779**	1	0.691**	0.978**
	Sig. (2-tailed)	0.000		0.000	0.000
Total knowledge pretest	Pearson Correlation	0.929**	0.691**	1	0.663**
	Sig. (2-tailed)	0.000	0.000		0.000
Total knowledge posttest	Pearson Correlation	0.730**	0.978**	0.663**	1
	Sig. (2-tailed)	0.000	0.000	0.000	

**Correlation is significant at the 0.01 level (2-tailed).

Discussion:

Dehydration is a major contributor to morbidity and mortality among children worldwide, particularly in low- and middle-income countries, where diarrheal illnesses remain prevalent **(WHO, 2022)**. Effective management of dehydration in pediatric populations requires timely assessment, accurate classification of severity, and the appropriate administration of fluids either oral or intravenous depending on the child's condition **(Leung et al., 2021).** Nurses, especially those working in pediatric units, are at the forefront of this care and are expected to possess a high level of knowledge and clinical competence to deliver safe, evidence-based interventions.

Despite the critical role nurses play, several studies have identified substantial gaps in nurses' knowledge and clinical practice regarding dehydration management **(Tesema et al., 2024; Abdelhady et al., 2021).** These gaps may lead to delayed recognition, improper fluid therapy, and poor communication with caregivers ultimately increasing the risk of complications such as electrolyte imbalances and fluid overload. In-service training programs have been shown to effectively address such deficiencies, particularly when they integrate theoretical instruction with hands-on skill development **(Shrestha et al., 2020; Das et al., 2024).** So, this study was conducted this study to evaluate the effect of an in-service training program on pediatric nurses' performance regarding the care of children with dehydration.

This study revealed a statistically significant improvement in pediatric nurses' knowledge regarding dehydration after the in-service training program. The most improved areas included the pathophysiology of dehydration, fluid bolus calculation, and specific care for neonates and malnourished children. This improvement reflects the training program's success in addressing critical knowledge gaps, particularly in technical or complex areas. Structured training based on clinical guidelines and interactive learning was essential for facilitating cognitive understanding. This finding supported the researchers' first hypothesis.

These results were in the similar line with **Abdelhady et al., 2021** in their study about effect of an educational program on nurses' performance regarding dehydration management in children who found significant improvement in pediatric nurses' knowledge after structured training on dehydration management. **Das et al., 2024** in their study about knowledge and practice towards intravenous fluid therapy in children among nurses in the pediatric emergency departments of selected public hospitals in Ethiopia found that, nurses who received IV fluid therapy training had four times better knowledge than those without. **Shrestha et al., 2020** in their study about effectiveness of educational intervention on knowledge and practice regarding dehydration among nurses also detected that short courses based on WHO guidelines improved nurses' understanding of dehydration classifications. In addition to **Mohammed & Younis, 2023** in their study about the impact of targeted education on pediatric nurses' awareness of dehydration and fluid imbalance that highlighted the role of targeted education in increasing awareness of fluid imbalance and pediatric dehydration care.

The training also significantly improved practical skills, including dehydration assessment (e.g., checking mucous membranes, sunken eyes), IV fluid preparation, bolus administration, and ORS administration. Practical skills were likely enhanced due to the training's integration of both theoretical knowledge and hands-on practice. The use of simulation and direct observation reinforced skill retention. This finding supported the researchers' second hypothesis.

These findings were consistent with **Tesema et al., 2024** in their study about in-service training improves nurses' management of pediatric dehydration who reached that structured practice sessions improved nurses' dehydration management skills by over 50% also, **Ibrahim & Hassan, 2023** in their study about the effect of an educational training program on pediatric nurses' performance related to fluid therapy explored that training improved early identification and response to dehydration severity.

This study found a very strong positive correlation between nurses' knowledge and practice after the intervention. This indicates that improved theoretical understanding translated directly into improved clinical behavior, confirming that knowledge is foundational to safe and effective pediatric nursing practices. This finding supported the researchers' third hypothesis.

This finding was concurrent with **Ebrahem & Salama, 2021** in their study about pediatric nurses' knowledge and practices regarding fluid therapy who reported that a strong correlation between pediatric nurses' knowledge and practice after dehydration training. **Elhady et al., 2023** in their study about the effect of dehydration knowledge on nurses' performance in pediatric care units showed that higher knowledge levels resulted in significantly better clinical performance. **Shrestha et al., 2020** demonstrated that improved knowledge led to better classification and intervention for dehydration. Finally, **Ghareeb et al., 2020** in their study about nurses' knowledge and practice regarding intravenous fluid therapy in pediatric units detected that nurses with high knowledge scores showed significantly better assessment and intervention skills.

Conclusion:

This study concluded that receiving an in-service training program significantly improves pediatric nurses' knowledge and clinical practices related to the management of dehydration in children. Furthermore, a strong positive correlation between knowledge and practice underscores the vital role of education in enhancing clinical performance.

Recommendations:

1. Provide regular in-service training on dehydration management.
2. Use simulation to improve nurses' practical skills.
3. Apply standard protocols and checklists during care of children with dehydration.
4. Assess nurses' knowledge and practice periodically.

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