

# Effectiveness of an Educational Program on Practice Change of Nurses Regarding Children with Moderate-To-Severe Dehydration Under Five Years

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**Abstracts:** Dehydration is a major factor in both illness and mortality in children. Nurses play a vital role in managing dehydration. This study aimed to examine the effectiveness of an educational program on nurses' clinical practice on patients with moderate to severe dehydration. In this quasi-experimental study design, we divided 48 nurses into two groups equally: the experimental group was exposed to the educational program; the control group was not exposed to the educational program in Duhok and Zakho Cities/Iraqi Kurdistan (March 6, - June 12, 2022). The mean score of practice of the experimental group was significantly higher compared to the control group at the posttest step (27.71 vs. 20.29;  $P < 0.0001$ ) and the second follow-up (26.63 vs. 20.96;  $P < 0.0001$ ). The experimental group had a significantly higher correct practice of dehydration practice than the children at the post-test and the second follow-up. The study showed that the level of practice score was significantly increased from the pretest to the posttest (20.96 vs. 20.29;  $p = 0.0053$ ) and from the posttest to the second follow-up (20.96 vs. 20.29;  $P = 0.0174$ ) in the control group. However, the practice level was significantly increased from the baseline to the posttest and posttest 2 in the experimental groups. The nurses in the surgical and medical wards had significantly higher practice scores compared to those in the NICU; 28.0 and 27.71 vs. 24.67, respectively. The educational program is an effective method to increase the practice of nurses in caring the children with moderate-severe dehydration.

**Keywords:** Educational Program, Practice, Nurses, Children, Dehydration

## 1. INTRODUCTION

The human body desires water to sustain adequate blood and other fluids to function correctly. Besides the fluids, the body also requires electrolytes, which are salts that usually originate in blood, other fluids, and cells. Dehydration is the beating of water and salts from the body (World Health Organization, 2009). The United Nations Children's Fund and World Health Organization, 2009 mentioned that dehydration can furthermore happen if everybody does not consume or drink greatly throughout sickness otherwise if do not drink sufficiently during or later an energetic workout. While anybody can develop dehydration, individuals who converted dehydrated the greatest simply are kids of under-five ages. In, 2013 the European Hydration Institute (UHI) well-defined dehydration as isotonic (loss of liquid and sodium in equivalent quantities), hypertonic (liquid loss too much salt loss), or hypotonic (additional sodium missing than liquid) (World Health Organization, 2009).

Dehydration can happen through several infant diseases and is definite as an unusual decline in the capacity of circulating plasma. It indicates loss of water from together extracellular (intravascular and interstitial) and intracellular places besides the greatest frequent pointers to raised plasma sodium and osmolality. Hypovolemia remains a broad term including volume reduction and dehydration. Volume diminution is the loss of salt and water from the intravascular space (Burns et al., 2012; Canavan & Arant Jr, 2009). In children, dehydration exists frequently affected via a viral infection that reasons fever, diarrhea, vomiting, and a decreased ability to drink or eat. Related viral infections producing vomiting and diarrhea include rotavirus, Norwalk virus, and adenovirus. Occasionally sores in a teen's mouth (affected by a virus) create it hurts to eat or drink, which assistances to the origin or get worse dehydration. The temperature that frequently attends illness hurries the quantity of liquid that is gone over the skin (Dadonaite, Ritchie, & Roser, 2018). The greatest public problem of disease that is usually detected in pediatric patients awarded to the emergency department (ED) is dehydration. Initial recognition and involvement are significant to diminish the hazard of advance to hypovolemic shock and end-organ failure (Keeley, Wolf, Regul, & Jadwin, 2015).

Sorting dehydration into subcategories is a “crucial foundation” for suitable rehydration (Guarino et al., 2014). Dehydration possibly will be separated into three categories: mild with about 5% loss of pre-illness body weight, moderate being 10% and severe meaning 15% or more (for children less than 2 years). In aid of children more than 2 years, the ratios are 3, 6, and 9% for mild, moderate, and severe dehydration deferentially. Defining the cruelty of the kid’s state is key for computing fluid recovery totals (Burnette, Ramundo, Stevenson, & Beeson, 2009).

The diarrheal illness disturbs persons of whole ages, however, ensures the maximum severe outcome for teenagers lower than five ages. It can source serious complications of dehydration, which is an abnormal state in which the body cells are depressed with an acceptable quantity of liquid (Mumtaz, Zafar, & Mumtaz, 2014). Diarrhea remained considered the foremost reason of loss between whole ages (1•31 million deaths), furthermore, it was a public root of death amongst teenagers below (5) years old (Troeger et al., 2017). Dehydration of gastroenteritis remainders an important basis of death in emerging nations. In the United States, yearly there are around (220,000) hospitalizations for children under five years of age as a result of gastroenteritis and dehydration (Chen, Hsiao, Langan, Riera, & Santucci, 2010). Dehydration is a medicinal crisis, however in attendance is not any particular usual consideration to assess this one throughout the triage (Hendrickson, Zaremba, Wey, Gaillard, & Kharbanda, 2018).

The evaluation and management of dehydration would proceed addicted to concern the grade of dehydration, repairs fluid desires, in addition continuing fluid losses. The processes of dehydration can be largely alienated interested in (3) groups: (enlarged fluid loss, diminished fluid drinking, otherwise together (Santillanes & Rose, 2018). Generally, the nurse plays a dynamic character given that carefulness is intended for kids in any case of situation and causes accessible toward them, as well as documentation of dehydration clinical features, quantity, and sort of fluid nourishment to the baby, which are dynamic for pediatric existence (Olakunle, Valentine, Kamaldeen, & Buhari, 2012).

Rehydration through oral rehydration solution (ORS) is greatly sustained by (WHO, CDC, AAP, and ESPGAN, 2011) for kids with mild to moderate dehydration and preserving intravenous IV fluids for children with severe dehydration.

Nursing practices in managing dehydrated children are reflected in unique of the utmost encouraging and real improvements for essential and refining the excellence of carefulness. Though, their improvement, diffusion, and application in practice are hardly traditionally advancing. The usage of practices too identified as standup guidelines, progressive nursing interferences, and electronic instruction groups has been accepted as a process of attractive care while advancing pediatric patient care (Retezar, Bessman, Ding, Zeger, & McCarthy, 2011).

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 ORT and IV fluid therapy. Nurses complicated in pediatric care locations must be able to prove an ongoing specialized improvement in the field through attending native sessions, appropriate exercise sequences, and general gatherings (Khider, Ouda, & Tantawi, 2018).

### **1.1. Importance of the study**

1. Dehydration is a recurrent cause of emergency room appointments and touches a minimum of two million children yearly. Commonly, produced by gastroenteritis. It can outcome in serious morbidity and mortality. Gastroenteritis and dehydration are the explanation for (30%) of whole babies and preschool deaths universally, and about (300) deaths yearly in the United States (Pringle et al., 2011).

2. Dehydration is a major reason for infant disease and its demise throughout the world. Among children in the U.S., immediate diarrhea results in nearly (200,000) hospitalized and (300) losses each year. In emerging nations, dehydration from illness is a common cause of death in children less than five years of age, accounting for around (2) million deaths each year.

3. The nursing process in managing dehydrated kids is an institution-based approach that permits the nurse to

initiate diagnostic tests and interferences concerning a child suffering from dehydration, assessed by a healthcare worker. Initial implementation of nursing protocols for dehydration has been stated to reduce pediatric patients' span of stay in the emergency unit (Stauber, 2013).

## **1.2. Aim of study**

The current study aimed to assess and evaluate the changes in the practice of nurses for the dehydration of children under five years after the application of the educational program.

## **1.3. Objectives of the Study**

The exact objectives comprise the following:

- 1- To evaluate the nurses' clinical practices regarding nursing care of dehydration.
- 2- To identify the association between nurses' practice and their demographical characteristics include (age, gender, level of education, marital status, years of experience, years of experience, unit of work, participation in training courses regarding dehydration, and residential area).
- 3- To examine the effects of an educational program based on the WHO manual of treatment of diarrhea on changes in the practice of nurses to children with moderate to severe dehydration under five years.

## **2. SUBJECTS AND METHODS**

*Design of the study:* Quantitative research, a quasi-experimental study design was conducted to evaluate and improve nurses' practice concerning children with moderate-to-severe dehydration under five years.

*The setting of the study:* The study was implemented at two pediatric Hospitals (Hevi pediatric teaching hospital, and Bedar general hospital - pediatric department) in the Duhok City / Iraqi Kurdistan Region Government. The study was performed between the 3rd of February 2022 and the 12th of June 2022.

*Administrative arrangements:* Before conducting the study, the researcher obtained official approval consent permission by introducing the study proposal to the scientific and ethical committee of the University of Duhok (College of Nursing). Ethical approval was obtained from the Duhok General Directorate of Health based on the modified Declaration of Helsinki.

*Sampling:* Purposive non-probability participants of 48 nurses, employed in children's hospitals, were involved in the study. The samples were separated into two groups; the first group comprises 24 nurses for the study group who were exposed to the educational program, whereas the second group (24) nurses for the control group were not exposed to the involvement of the educational program. Every set had nearby similar features as probable.

### **2.1. Inclusion and exclusion criteria:**

#### *Inclusion criteria:*

1. Nurses who were working at children's hospitals.
2. Male and female nurses.
3. From different educational levels and different age groups.
4. The samples who accept to participate in the study.

#### *Exclusion criteria:*

1. Nurses who were working in the adult wards.

## 2.2. Nurses who refused to participate in the study.

*Study Instruments:* To assess the efficiency of the health education program earlier and after the running of the instructive program, the researcher constructs instruments for data gathering which comprises two parts.

*Part One:* Demographic characteristics: This part is linked to the samples named demographical characteristics which consist of age, gender, educational level, marital status, year of experience, unit of work, participation in training courses regarding dehydration, and residential area.

*Part two:* Related to evaluating the nurses' practice regarding moderate-to-severe dehydration children under five years, which consists of a list of 15 items.

*Construction of the educational program:* The educational program was constructed as well as through a review of literature review and studies concerning moderate-to-severe dehydration under five years. It aims to improve the nurses' practice to increase the quality of care.

*Validity:* The content validity for the educational program and practice checklist tool was recognized in conversation with 10 specialists in the different fields of medical, pediatric, and nursing. The experts were invited to review the educational program and the questionnaires to provide their views concerning the relevance, correctness, contents, and suitability of the items for additional modification. Ideas and commendations agreed upon by the experts were established and essential alterations were completed for altering the instruments and the educational program.

*Reliability:* The researcher determines the internal consistency by using a test-retest, within two weeks through the computation of the Pearson correlation coefficient of the scale. The results indicated that the correlation coefficient was  $r = (0.91, 0.89)$  at the level ( $p \leq 0.05$ ) for nurses' knowledge and practice, respectively. This means that the tools were sufficiently dependable.

The purposes of reliability were

1. To notice whether the tools of the study were perfect and relevant.
2. To recognize the interior stability.
3. To assess the series time required to respond to the questionnaires.

*Pilot study:* The pilot study was imitated before starting the data collection to conclude the reliability and validity of the educational program and the research questionnaires. It was conducted in the pediatric wards of the Bedar general hospital on a sample that consists of 5 nurses selected by using the "purposive sampling technique" during the period from the 3rd of February 2022 to the 24th of February, 2022. The samples for this study had equal features, however, they were not involved in the chief study samples.

The investigator collected data from the sample through interviews and indirect observation. The educational program was administered in 5 sessions. A post-test was completed by a similar survey after 14 days of the pre-test and information was collected. The data were investigated by using descriptive and inferential statistics.

## 2.3. Purpose of the pilot study

1. To find the obstacles that may be met throughout the data collection method.
2. To discover whether the subjects of the educational program and practice questionnaires were clear and comprehensible by the samples of the study or not.
3. To find out the time obligatory for collecting the data and responding to the questions.

4. To conclude the validity and reliability of the study questionnaire.

The results of the pilot study indicated that:

1. The study was achievable.
2. The participants were supportive.
3. The items of the tools were clear and understood.
4. The time obligatory to answer the substances of the practice test questionnaire was 20 minutes for indirect observation to assess nurses' practice.
5. The educational program was clear and relevant.

#### **2.4. Data collection**

The outcomes of the study were collected through a self-reported technique between the 6th of March, 2022, and the 12th of June, 2022.

Implementation of the educational program: The researcher prepared nurses for this program by dividing the sample into study and control groups. The study group was exposed to the educational program intervention only. The nurses in the study group who met the study criteria were formed to ensure their agreement with the study and to discuss the plan of the educational program and the collection of data. The application of the educational program which was presented comprised the following:

1. Demographical information was obtained from both the study and control groups.
3. The pre-practice checklist was conducted for the two groups.
4. Implementation of the educational program was designed and presented for the study group in nine sessions.

The education program was implemented by the researcher. But the outcomes of the study were measured by a trained nurse. The trained nurse was one other than the researcher of the study. The researcher trained a nurse to measure the outcomes of the study to avoid measurement bias because the researcher may intend to record the higher or lower scores for the nurses in the control and experimental groups. In addition, we recruited the nurses from two separate hospitals to avoid allocation bias.

The researcher divided the study group into three subgroups, and each of them took the same program lectures. The 1st subgroup took the lectures from the period 3-4-2022 to 10-4-2022, the 2nd subgroup started from 13-4- to 20-4-2022, while the 3rd subgroup started from 25-4 to 12-5-2022.

Each session was designed and scheduled for approximately 45-50 minutes and they were presented in Bedar Pediatric General Hospital. The lectures were about the background and definition of dehydration, causes of dehydration, and types of dehydration, signs, and symptoms of dehydration, clinical practice for skin turgor and mucous membranes, and vital signs. Other lectures were about dehydration (assessment and risk factors), management of dehydration, and fluid calculation according to the type of dehydration, ORS administration, and ORS preparation at home. The learning tools were performed by lecture and discussion, posters and pictures, and video.

Practice scoring system: Observational checklists were adopted for assessment of the nurse's level of skills in providing care for dehydrated children under five years, which included a frequency of 15 items. The items were recorded as correct and incorrect practices. The percentage of correct practice between the control and experimental groups was compared before and after the program. The total correct practice of the nurses in both study groups was calculated and the mean score of the two groups was compared between the two study groups.

The following items were included for the practice sessions.

No	Items
1-	Implemented true hand hygiene technique
2-	Document and monitor vital signs.
3-	Evaluate the skin turgor and mucous membranes
4-	Assessing the color and amount of urine output
5-	Monitor fluid loss from—Diarrhea –bleeding –vomiting.
6-	Reassure the patient to drink.
7-	Describe or teach the causes of fluid losses or decreased fluid intake.
8-	If not oral rehydration solution available teaches the mother how to prepare at home in case of mild or moderate.
9-	Instruct the mothers about how ORS administration.
10-	Checked medication chart for the IV. infusion prescription.
11-	Compute the drop rate and the infusion regulating an intravenous set.
12-	Confirmation of increasing and decreasing the amount or rate of infusion recommended by the pediatrician.
13-	Documented starting IV fluid infusion in the medication chart
14-	Check or reassess common complication during fluid therapy
15-	During treatment monitor closed for the sign of volume overload

## 2.5. Statistical Analyses

The general characteristics of nurses were presented in number and percentage. The comparisons of demographic characteristics between control and experimental nurse groups were examined in Pearson chi-squared tests. Also, the comparisons of practice frequencies between control and experimental nurse groups at baseline were examined in Pearson chi-squared tests. The comparisons of practice scores between control and experimental nurse groups at different times were examined in an independent t-test. The comparisons of practice scores between study steps in control and experimental nurse groups at different times were examined in Bonferroni correction. The associations of practice scores with demographic characteristics in the experimental groups at the second follow-up were examined in an independent t-test or ANOVA one-way. The pairwise comparisons were examined in a Tukey test. The significant level of difference was determined in a p-value <0.05. The statistical calculations were performed by JMP Pro 14.3.0 ([https://www.jmp.com/en\\_us/home.html](https://www.jmp.com/en_us/home.html)).

## 3. RESULTS

The study found that the nurses in the control and experimental groups were similar in age, gender, education, and other medical and socio-demographic characteristics; including marital status, experience in nursing, working unit, and residency ( $P>0.05$ ; Fig 1). The study showed that the control and experimental nurses were similar in correct and incorrect answers for all practice items. In addition, the control and experimental nurses had similar practice scores at baseline; 20.88 vs. 21.04 ( $P=0.6936$ ; Table 1 and Fig 2).

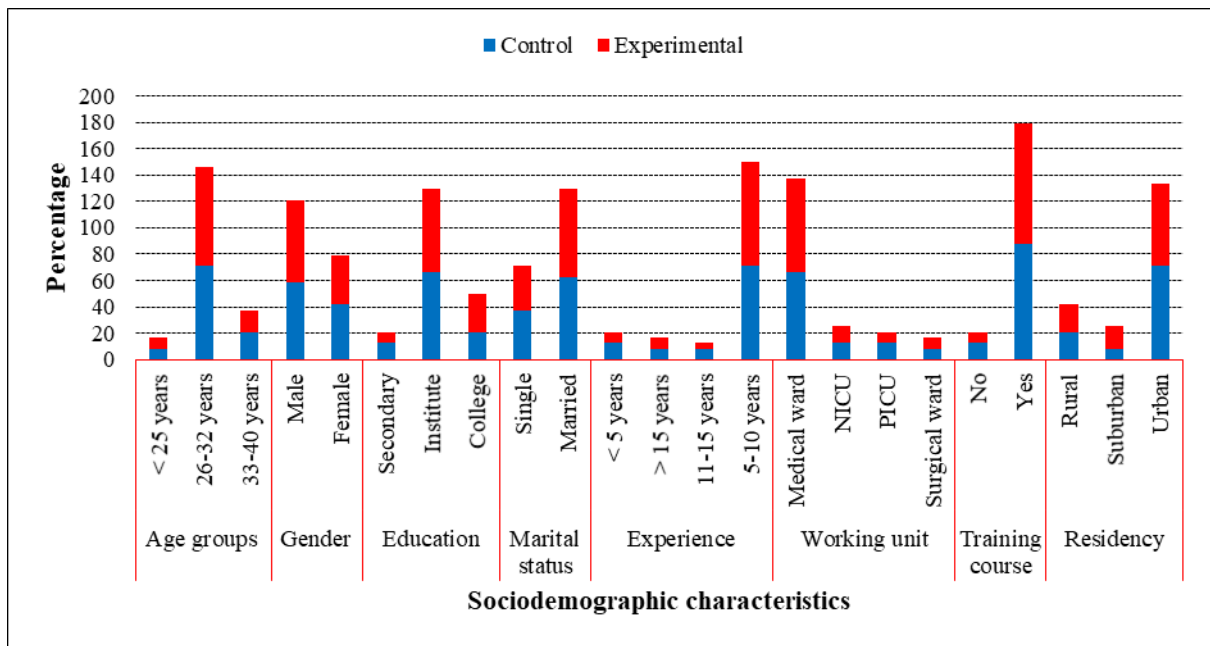


Figure 1: Comparisons of demographic characteristics between control and experimental nurse groups

Table 1. Comparisons of practice frequencies between control and experimental nurse groups at baseline.

Practice Items	Study groups								p-value (two-sided)
	Control				Experimental				
	Incorrect practice		Correct practice		Incorrect practice		Correct practice		
No	%	No	%	No	%	No	%		
Pre-practice 1	12	50.00	12	50.00	12	50.00	12	50.00	1.000
Pre-practice 2	16	66.67	8	33.33	15	62.50	9	37.50	0.7628
Pre-practice 3	17	70.83	7	29.17	17	70.83	7	29.17	1.000
Pre-practice 4	15	62.50	9	37.50	15	62.50	9	37.50	1.000
Pre-practice 5	18	75.00	6	25.00	16	66.67	8	33.33	0.5254
Pre-practice 6	15	62.50	9	37.50	14	58.33	10	41.67	0.7679
Pre-practice 7	14	58.33	10	41.67	13	54.17	11	45.83	0.7711
Pre-practice 8	16	66.67	8	33.33	17	70.83	7	29.17	0.7555
Pre-practice 9	15	62.50	9	37.50	11	45.83	13	54.17	0.2466
Pre-practice 10	14	58.33	10	41.67	14	58.33	10	41.67	1.000
Pre-practice 11	15	62.50	9	37.50	16	66.67	8	33.33	0.7628
Pre-practice 12	14	58.33	9	41.67	14	58.33	10	41.67	0.7679
Pre-practice 13	13	54.17	11	45.83	15	62.50	9	37.50	0.5582
Pre-practice 14	12	50.00	12	50.00	16	66.67	8	33.33	0.2416
Pre-practice 15	12	50.00	12	50.00	10	41.67	14	58.33	0.5623
Pre-practice score	Mean	20.88	SD	1.39	Mean	21.04	SD	1.52	0.6936*

\*An independent t-test was performed for statistical analyses.  
 Pearson chi-squared tests were performed for others.  
 The red bold numbers show the significant differences.

The study showed that the nurses in the experimental group had a higher percentage of correct practice items compared to the nurses in the control group except for item 1. In addition, the nurses in the experimental groups had significantly higher practice scores compared to the nurses in the control group, 27.71 vs. 20.29 ( $P < 0.0001$ ; see

Table 2 and Fig 3).

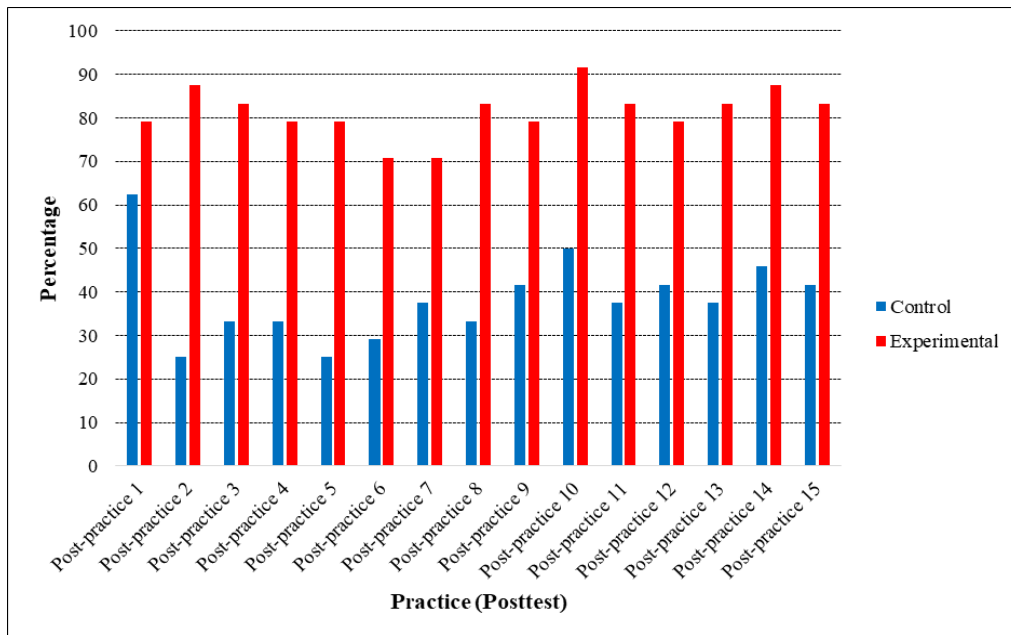
**Table 2.** Comparisons of practice and practice frequencies between control and experimental nurse study groups at the posttest step.

Practice and practice	Study groups								p-value (two-sided)
	Control				Experimental				
	Incorrect practice		Correct practice		Incorrect practice		Correct practice		
	No	%	no	%	no	%	no	%	
Post-practice 1	9	37.50	15	62.50	5	20.83	19	79.17	0.3412
Post-practice 2	18	75.00	6	25.00	3	12.50	21	87.50	<0.0001
Post-practice 3	16	66.67	8	33.33	4	16.67	20	83.33	0.0010
Post-practice 4	16	66.67	8	33.33	5	20.83	19	79.17	0.0032
Post-practice 5	18	75.00	6	25.00	5	20.83	19	79.17	0.0004
Post-practice 6	17	70.83	7	29.17	7	29.17	17	70.83	0.0039
Post-practice 7	15	62.50	9	37.50	7	29.17	17	70.83	0.0205
Post-practice 8	16	66.67	8	33.33	4	16.67	20	83.33	0.0010
Post-practice 9	14	58.33	10	41.67	5	20.83	19	79.17	0.0171
Post-practice 10	12	50.00	12	50.00	2	8.33	22	91.67	0.0034
Post-practice 11	15	62.50	9	37.50	4	16.67	20	83.33	0.0027
Post-practice 12	14	58.33	10	41.67	5	20.83	19	79.17	0.0171
Post-practice 13	15	62.50	9	37.50	4	16.67	20	83.33	0.0027
Post-practice 14	13	54.17	11	45.83	3	12.50	21	87.50	0.0050
Post-practice 15	14	58.33	10	41.67	4	16.67	20	83.33	0.0065
Post-practice score	Mean	20.29	SD	0.81	Mean	27.71	SD	0.81	<0.0001*

\*An independent t-test was performed for statistical analyses.

Pearson chi-squared test was performed for others.

The red numbers show the significant differences.



**Figure 3.** Correct practice of control and experimental groups at posttest.

A similar pattern as the posttest was found at the second follow-up time except for items 1, 10, and 15. The nurses in the experimental groups had a significantly higher percentage of correct practice items compared to the

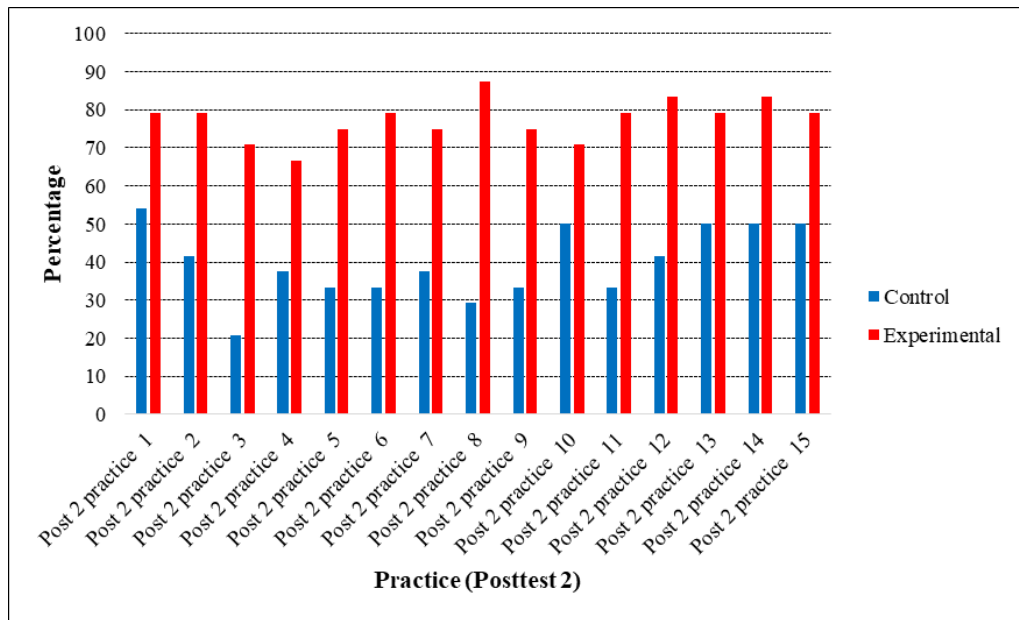


nurses in the control group. In addition, the nurses in the experimental groups had significantly higher practice scores compared to the nurses in the control group at the second follow-up time, 26.63 vs. 20.96 ( $P < 0.0001$ ; Table 3 and Fig 4).

**Table 3.** Comparisons of practice and practice scores between control and experimental nurse study groups at the second follow-up

Practice	Study groups								p-value (two-sided)
	Control				Experimental				
	Incorrect practice		Correct practice		Incorrect practice		Correct practice		
	no	%	no	%	no	%	no	%	
Post 2 practice 1	11	45.83	13	54.17	5	20.83	19	79.17	0.1246
Post 2 practice 2	14	58.33	10	41.67	5	20.83	19	79.17	0.0171
Post 2 practice 3	19	79.17	5	20.83	7	29.17	17	70.83	0.0012
Post 2 practice 4	15	62.50	9	37.50	8	33.33	16	66.67	0.0431
Post 2 practice 5	16	66.67	8	33.33	6	25.00	18	75.00	0.0038
Post 2 practice 6	16	66.67	8	33.33	5	20.83	19	79.17	0.0032
Post 2 practice 7	15	62.50	9	37.50	6	25.00	18	75.00	0.0088
Post 2 practice 8	17	70.83	7	29.17	3	12.50	21	87.50	<0.0001
Post 2 practice 9	16	66.67	8	33.33	6	25.00	18	75.00	0.0038
Post 2 practice 10	12	50.00	12	50.00	7	29.17	17	70.83	0.1400
Post 2 practice 11	16	66.67	8	33.33	5	20.83	19	79.17	0.0032
Post 2 practice 12	14	58.33	10	41.67	4	16.67	20	83.33	0.0065
Post 2 practice 13	12	50.00	12	50.00	5	20.83	19	79.17	0.0687
Post 2 practice 14	12	50.00	12	50.00	4	16.67	20	83.33	0.0305
Post 2 practice 15	12	50.00	12	50.00	5	20.83	19	79.17	0.0687
Post 2 practice score	Mean	20.96	SD	1.49	Mean	26.63	SD	1.97	<0.0001*

\*An independent t-test was performed for statistical analyses.  
 Pearson chi-squared test was performed for others.  
 The red numbers show the significant differences.

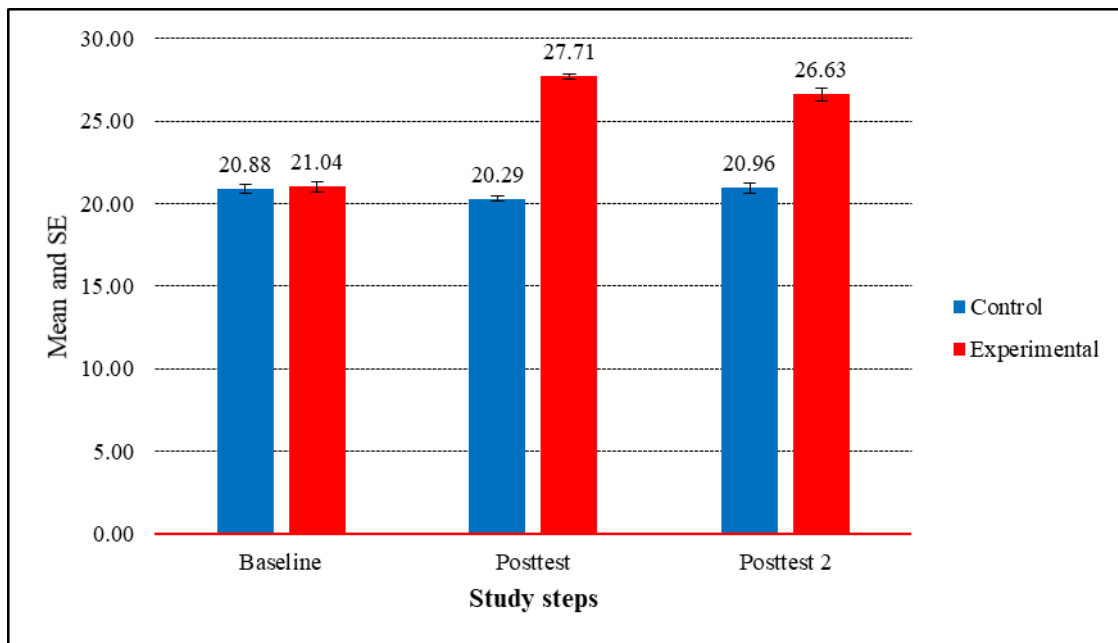


**Figure 4.** Correct practice of control and experimental groups at the second follow-up

The study showed that the level of practice score was significantly increased from the pretest to the posttest (20.96 vs. 20.29;  $p=0.0053$ ) and from the posttest to the second follow-up (20.96 vs. 20.29;  $P=0.0174$ ) in the control group. However, the practice level was significantly increased from the baseline to the posttest and posttest 2 in the experimental groups (Table 4 and Fig 5).

**Table 4.** Comparisons practice of pre and posttests steps in the controls.

Control	Posttest vs. pretest	Posttest 2 vs. pretest	Posttest 2 vs. posttest
<u>Practice score</u>			
Mean vs. mean (p-value)	20.29 vs. 20.88 ( $p=0.0053$ )	20.96 vs. 20.88 ( $p=0.8194$ )	20.96 vs. 20.29 ( $p=0.0174$ )
Mean diff (95% CI)	-0.58 (-0.98 to -0.19)	0.08 (-0.66 to 0.83)	0.67 (0.13 to 1.20)
Experimental	Posttest vs. pretest	Posttest 2 vs. pretest	Posttest 2 vs. posttest
<u>Practice score</u>			
Mean vs. mean (p-value)	27.71 vs. 21.04 ( $p<0.0001$ )	26.63 vs. 21.04 ( $p<0.0001$ )	26.63 vs. 27.71 ( $p=0.0041$ )
Mean diff (95% CI)	6.67 (5.98 to 7.36)	5.58 (4.51 to 6.66)	-1.08 (-1.79 to -0.38)
Bonferroni correction was performed for statistical analyses.			
The red numbers show the significant differences.			



**Figure 5:** Practice score of control and experimental groups at different steps

The study showed that the higher level of practice score in the experimental group is related to the working unit. The nurses who worked in the surgical and medical wards had significantly higher practice scores compared to those nurses who worked in the NICU; 28.0 and 27.71 vs. 24.67, respectively. The practice score was not associated with other demographic and medical characteristics of nurses in the experimental group (Table 5).

**Table 5.** Associations of practice score with demographic characteristics in the experimental groups at the second follow-up.

Demographic characteristics	Frequency distribution		p-value (two-sided)	Pairwise comparisons
	Mean	Std Dev		
Practice score				
< 25 years	25.50	3.54	0.0721	
26-32 years	27.71	0.83		
33-40 years	26.25	2.22		
Gender				
Male	26.33	2.13	0.1140	
Female	27.63	0.74		
Education				
Secondary	27.50	0.71	0.2072	
Institute	26.07	2.28		
College	27.57	0.79		
Marital status				
Single	27.13	2.36	0.3922	
Married	26.38	1.78		
Experience				
< 5 years	25.5	3.54	0.8051	
> 15 years	27.5	0.71		
11-15 years	27.0	.		
5-10 years	26.63	2.01		
Working unit				
Medical ward	27.71	0.83	0.0019	Surgical ward vs. NICU (p=0.0241 Medical ward vs. NICU (p=0.0030)
NICU	24.67	2.08		
PICU	25.5	2.12		
Surgical ward	28.0	0.0		
Training course				
No	27.5	0.71	0.5247	
Yes	26.55	2.04		
Residency				
Rural	27.6	0.55	0.4786	
Suburban	26.25	2.63		
Urban	26.4	2.10		
An independent t-test and b ANOVA one-way were performed for statistical analyses. The pairwise comparisons were examined in a Tukey test. The red numbers show the significant differences.				

#### 4. DISCUSSION

This study showed that participation in a nursing educational program is an effective way to increase the practice score of nurses working with moderate-to-severe dehydration under five years of patients. In addition, the higher practice score toward working to moderate-to-severe dehydration under five years patients was higher among nurses who worked in medical and surgical wards. However, the educational program was not effective to improve the true hand hygiene technique, checking medication charts for the IV infusion prescription, and monitoring the sign of volume overload.

These findings are consistent with the findings of the research conducted by Zanaty, Morsy, Elshamy, and Ali (2016) and (Chandra Shekar & Williams, 2018), who discovered that 96.0% of nurses had low practice ratings when it comes to infusion therapy. Also, Kanakalakshmi (2014) found that 37% of nurses' practices regarding fluid and electrolyte replacement therapy showed good practice, which is in contrast to the findings of this study. Similarly, our results don't agree with the findings of the study that was conducted by Aslam, Afzal, Kousar, Waqas, and Gilani (2017), which discovered that nurses had inadequate practices regarding the monitoring and administration of fluids and electrolytes among cardiac surgery patients. In contrast to Lamsal and Shrestha (2019), they discovered that only one-third of the nurses in their study of knowledge and practice regarding fluid and electrolytes administration among nurses working in a teaching hospital in Nepal had a sufficient level of knowledge, and one-third had good practice. The lack of nurses' interest in further education on the management of dehydration is suspect for these

findings. This may depend on the absence of nurses' autonomy in decision-making, but the workload may also be held responsible, as it may cause dissatisfaction and complacency with regard to further education.

The results revealed that there were no differences in nurses' practices between the pre-test, post-test1, and second follow-up for the control group. While, following the implementation of the educational program for the nurses in the experimental group, the findings exposed that their mean scores were 21.04, 27.71, and 26.63 for the pre-test, post-test, and second follow-up, respectively. This means that their practice was changed, improved, and the nurses had good practice levels during (the post-test and second follow-up). These results were strongly supported the findings of Deshmukh and Shinde (2014), who investigated the effect of structured education on nurses' knowledge and practice of caring for venous access devices in India, they found no significant correlation between nurses' knowledge and practice in the control group during pre-and post-tests, with p-values of 0.096 and 0.514, respectively.

The researcher observed that the practice of the nurses in the control group didn't alter between the pre-test, post-test, and second follow-up, but remained stable across all measures. This is an understandable and rational result that supports the previous finding and is easily comprehensible given that the participants were not actively involved in the instructional program. In support of the aforementioned explanations, the lack of a hospital-based program for ongoing education and the lack of supervision and continual feedback regarding the management of dehydration may be blamed for inadequate nursing practice.

On the other hand, the same tables showed that the nurses' practices in the experimental group differed significantly from those of the control group concerning the pre-test, post-test, and second follow-up. On general practice questions related to managing dehydration, nurses showed a very significant improvement in their post-test scores. It demonstrates how the teaching program significantly enhanced the nurses' performance in the experimental group. This study's findings are consistent with those of Imazu, Faria, Arruda, Sales, and Marcon (2015), who discovered that nurse practice in the experimental group had increased significance at (P-value=0.003), possibly as a result of having more time to discuss and perform practice in small groups more effectively. Similarly, the study found that the nurses in the video presentation group had poor practice 53.3% of the time during the pre-test, but that they had good practice 93.3% of the time during the post-test. Whereas in the second follow-up nurses, also had a good practice (86.7%), these findings suggested the improvement of nursing practice in the post-test, while this improvement slightly decreased in the second follow-up but was still significantly greater than in the pretest. These findings of this study were in the same line with the study done by Maria, Kaur, and Jaspal (2015) who found in their study comparing video-assisted teaching (VAT) versus self-instructional module (SIM) regarding the care of ventilated patients on knowledge and practices of staff nurses, that the mean of nurses knowledge and practice in pretest and increased in the posttest. In a similar, our research results corroborated the findings of Sheta and Mahmoud (2018). They discovered that the total nurses' knowledge and practice scores regarding body fluid balance assessment in pre-teaching program education was 6%, but it increased to 86.7% after the teaching program. Furthermore, it showed that nurses' knowledge and practice improved after participating in a structured educational program.

According to the findings of the current study, nurses who participated in the educational program gained high post-test scores and had better quality information regarding nursing care for patients experiencing dehydration. As a result, the level of care provided to patients will be of higher quality than it would have been had the nurses not participated in the program. The investigator emphasizes that the finding of the current study demonstrates that after the health education program was implemented, there were considerable changes in the nurses' practice scores. This improvement might be attributed to one or more causes, which include the complete content of the training program, nurses' enthusiasm and eagerness to learn and change, and the utilization of multimedia through a range of materials. All of these factors had a role in this improvement.

## **5. CONCLUSIONS AND RECOMMENDATIONS**

This study showed that an educational program is an effective way to increase the mean score of the practice of nurses towards the clinical management of children with moderate-severe dehydration. The nurses who worked in the medical or surgical wards had higher practice scores compared to the nurses who worked in the NICU ward.

It is suggested that the nurses who give care to children with moderate-severe dehydration be educated in different aspects of clinical management. The colleges of nursing can play an important role in educating these nurses in this region.

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### Contributions:

**Mohammed Ismael Ibrahim:** Concept, review, design, intervention, drafting, and analysis

**Nizar Bakir Yahya:** Review, supervision, follow-up, critical review, final approval

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