Effect of Educational Program on Nurses' Performance regarding Intensive Care Units Induced Diarrhea among Critically Ill Patients

Sara S, Mohammed [1], Seham A. Abd El- Hay [2] and Fatma A. Mohammed [3].

[1]Nursing specialist at Al-Minshawi General Hospital in Tanta .

[2] Professor of MedicalSurgical Nursing, Faculty of Nursing, Tanta University, Egypt.

[3] Assistant Professor of Medical Surgical Nursing, Faculty of Nursing, Tanta University, Egypt.

E-mail: [1] Ssg13977@gmail.com, [2] drsehamahmed@yahoo.com, [3]fatma.salim@nursing.tanta.edu.eg

Abstract

Background Acute diarrhea is described as the acute onset of three or more loose or watery stools a day lasting for 14 days or less. **The study aimed** to evaluate the effect of educational program on nurses' performance regarding intensive care units induced diarrhea among critically ill patient. **Design**: A quasi- experimental design was utilized in this study. **Subjects and method** A convenience sampling of (50) nurses participated in the study. The study was conducted at the Medical Intensive Care Unit and Cardio Care Unit of El-Menshawy General Hospital affiliated to Ministry of Health. **Tools of the study** were used for data collection **Tool (I)** Structural Interviewing Questionnaire. **Tool (II)** observational checklist regarding nurses' practice. **Results** The main results revealed that there was statistical significant improvement in total knowledge and practical level among studied nurses post implementation of educational program at p<0.05 about induced diarrhea in intensive care units. **Conclusion** The implementation of educational programme had positive effect on nurses' knowledge and practice regarding intensive care units induced diarrhea among critically ill patient. **Recommendation** It recommended that ongoing learning protocol of care must be designed regarding proper hygienic care, perineal care, and skin care during induced diarrhea and implemented for nurses at ICU& CCU for the importance of maintaining checkup.

Keywords Educational program, nurses' performance, intensive care units, induced Diarrhea.

Introduction

Gastrointestinal tract has many important functions among critically ill patients especially to maintains immunological functions, decreases infection and promotes better survival rate. Gastrointestinal motility disorders are common among critical ill patients that are commonly observed in the intensive care units, which are occurring mainly due to physiological responses that are resulted from severe disease, enteral nutrition intolerance, use of medications, infection, and immunosuppression [1,2,3]. Bowel management is essential for the future wellbeing for critically ill patients in the intensive care units because of regular bowel movements interfere with an patient's quality of life [4,5].

Intensive care units induced diarrhea is the most frequent gastrointestinal complication that are observed among intensive care unit patients [6]. The reported incidence of intensive care units induced diarrhea varies widely in the literature, ranged from 2 to 95% depending on the criteria that are used

to define and quantify bowel movements [7,8]. The World Health Organization defines diarrhea as the passage of three or more episodes of liquid or loose stools per day. Usually, this definition is easier to apply in practice and compatible with the daily routine of the health care professional team in the intensive care units [9,10].

Intensive care units induced diarrhea is one of the leading clinical symptoms that are observed in intensive care units. The causes of diarrhea are divided into infectious and noninfectious that includes recent abdominal surgery, infection, decreased gastrointestinal perfusion, and administration of antibiotics [11]. Other factors include alterations in the colonic response, microbial contamination of enteral nutrition formulas, low-fiber diet, hypoalbuminemia, and disturbances of the intestinal flora, increased use of concurrent drug therapy, and Clostridium difficile infection. Furthermore, disease severity, and comorbidities may contribute to the onset of diarrhea among critically ill patients[12,13,14].

Critically ill patients are different from other patients; they have a life threatening problems that may inhibit starting feeding early, affect feeding route or type. These patients may suffer from dehydration, electrolyte disturbance that may affect gastrointestinal perfusion and motility [15, 16,17]. Developing and implementinga bowel management program is vital for individuals at risk for these conditions [18]. Critical care nurses provide care to these patients in a holistic approach. They formulate nursing care plan for them concentrating on interventions of life threatening problems as a priority and neglect problems regarding patients" elimination unless result in vigorous fluid or electrolyte disturbance[19].

Nursing care for intensive care units induced diarrhea for critically ill patients is aimed to enable the patients to be in control of his bowel function independently, promote his reintegration into society, achieve regular and predictable emptying of the bowel at a socially acceptable time and place, and maintain short and long term gastrointestinal health [20]. Critical care nurses in the intensive care units are in a key position to maintain patients' bowel status at an optimal level [21,22], establish appropriate interventions, perform initial assessment, clinical examination and management of diarrhea[23,24], ensure that timely treatment or intervention is performed, and minimize complications, with initial evaluations demonstrating a reduction in diarrhea that portion of the care pathway which is crucial [25,26].

Management of intensive care units induced diarrhea includes; perform hygiene care for patients (Perineal and sacral skin care), infection control measures and decontamination of the patient environment, emotional support, nutritional practices as (assess and management of dehydration and fluid and electrolyte disturbance, enteral nutrition) and preventing skin breakdown [27]. So critical care nurses are required to ensure that their knowledge and practice is up-to-date and informed by the latest evidence and address all areas of patient care post admission to intensive care units regarding intensive care units induced diarrhea.

Significance of the study

The level of knowledge and practice of intensive care units nurses are reflected on the critically ill patient care and their prognosis especially regarding serious issues like acute diarrhea. On the other hand insufficient understanding about management of intensive care units induced

diarrhea has led to the lack of detection methods and less clinical care for patients, So, developing of nursing educational training program regarding acute diarrhea is necessary to improve nurses' knowledge and practice, promoting quality of care and decreasing incidence of complications thereby patient outcomes[27]. So this study will be done to evaluate the effect of educational program on nurses' performance regarding intensive care units induced diarrhea among critically ill patients.

Aim of the Study

Evaluate the effect of educational program on nurses' performance regarding intensive care units induced diarrhea among critically ill patients.

Research design

A quasi- experimental research design was used

Setting

The study was conducted at the Medical Intensive Care Unit and Cardio Care Unit of El-Menshawy General Hospital affiliated to ministry of health.

Subjects

A convenience sampling of (50) nurses in the above previously mentioned settings. The sample size was calculated based on Epidemiological Information Program, based on the total nurses per year according to review of Tanta Main El_Menshawy General Hospital Statistical Records. They were divided into two groups; groups were consisted of (20) from CCU and (30) nurses from ICU as following:

Inclusion criteria

- Nurses both sexes.
- Working as fulltime nurse in ICU
- At least one year of experience

Research Hypothesis

Knowledge and Practice scores of critical care nurses are expected to improve post

implementation of educational program regarding intensive care units induced diarrhea among critically ill patients.

Tools of the study

Two tools were used to evaluate the effect of educational program on nurses' performance regarding intensive care unit induced diarrhea among critically ill patients, which includes the following:

Tool (I): Structural Interviewing Questionnaire

It was comprised of two parts:-

Part (1): Socio-demographic data of nurses: which included; nurses code, age, sex, marital status, level of educational, Place of work, occupation, years of experience and previous training about ICU induced diarrhea management.

Part (2): Nurse's knowledge assessment sheet: It was developed by the researcher based on literature review [29-31], to gather nurses' knowledge pre, immediate and 2-months later post implementation of educational program regarding intensive care units induced diarrhea.

Three level of scoring for the questions it was scored as the following

Correct and complete answer scored (2)
Correct and incomplete answer scored (1)
Don't' know or incorrect answer scored (0)

The total scoring system of nurses' knowledge will be calculated (96) and classifiedas the following:

-More than 75% will be high level of knowledge.

-More than or equal 60% until 75% will be considered moderate level of knowledge.

-Less than 60% will be considered low level of knowledge.

Tool (II) An observational checklist regarding nurses' practice

This tool was developed by the researcher

based on literatures review [34-37] It was used for assess nurses' practice pre, immediate and 2 months later post implementation of educational program regarding intensive care units induced diarrhea; it was including the following:

- **Bowel assessment**; which included (14 steps)

- Patients assessment; which included (18 steps)

- **Application of stool charts care pathways** which includes (Bristol Stool Chart, King's Stool chart), food and fluid charts.

_ **Managing the effects of diarrhea**; which included (88steps)

Scoring system of practice

- Two levels of scoring for questions were used as the following:

- Done practice take (1)

- Not done practice takes (0)

The total scoring system of nurses' knowledge will be calculated (88) and classifiedas the following

- More than 75% will be high level of knowledge.

- More than or equal 60% until 75% will be considered moderate level of knowledge.

- Less than 60% will be considered low level of knowledge

Ethical consideration

An official permission was obtained from the Faculty of Nursing Dean and head of the Orthopedic Department of Tanta Main University Hospital to conduct the study. Informed consent was taken from every nurse to participate in the study and included the right to withdrawal at any time. Confidentiality was taken into consideration regarding data collection. A code number was used instead of names.

Methods of data collection

1-Tool development

Tool (I) and tool (II) of the study were developed by the researcher after reviewing relevant literatures [31-33-34-37] and used to collect data

2-Validity of Tools

All tools were tested by content validity by (5) experts in the field of Medical Surgical Nursing, Critical Care Nursing and Medical Biostatistics and accordingly needed modifications were done, it was calculated and found to be = (98%).

3- Reliability of the tool

The reliability of the study tools was calculated by Cronbach's alpha test; it was 0,845 for tool (I) and 0.728 for tool (II).

4- A pilot study

A pilot study was conducted before the actual study on (10%) of the total sample **(50 nurses)** in pervious mentioned setting to test the feasibility and applicability of the different items of the tools to determinate any obstacles that may encounter during the period of data collection, modification were done by the researcher before the main study and they were excluded and not included in the current study.

5-Data Collection

Data were collected over a period of 8 months, started from May, 2020 to December, 2020.

6- Educational program

The present study was carried out through four phases (assessment, planning, implementation, evaluation)

A. **Assessment phase**

Part (A): Assessment of nurses' knowledge related to patients about induced diarrhea in ICU was used three times pre, immediately and two month post implementation of educational program by using tool (I).

Part (B): Assessment of nurses' practice: Nurses was observed three times pre, immediately and two month post

implementation of educational program by using tool (II).

B. Planning phase

The nursing educational program was designed by the researcher to all nurses included in the study by dividing the nurses into 30 from CCU and 20 from ICU divided into five groups, each group will contain (10) nurses.

C. Implementation phase

The educational training program was presented to all nurses included in the study in five sessions and the duration of each sessions were 30 minutes per day for five consecutive days. Training included nurses in El_Manshawy General Hospital. The content of sessions was divided into two theoretical and three practical sessions as follows:

The theoretical part: included two sessions

The practical part: included three session

Time taken for sessions; 30 min

The teaching method used; power point presentation and video**,** booklet, group discussion

D. Evaluation phase

Evaluation was done for both theoretical and practical part three times pre, immediately after teaching and training.

6-After data collection, data was coded, analyzed then tabulated under the direction of a statistician to obtain results for testing the research hypotheses.

Statistical analysis, after completion of data collection, all questions in interview questionnaire sheet was coded, organized and categorized then the data was tabulated and presented into frequency distribution tables

Results

Table (1) shows the distribution of the studied nurses according to Their Socio–Demographic Characteristics. Concerning

to age, the table illustrated that nearly more than one third (48%) of the nurses were in the age group (25- > 30) years, where (12%) of them were in the age group (35 or more) years. Regarding to sex and marital status, all of the studied nurses were females and about (90%) of them were married. In relation to educational level, the table showed that (50%) of the nurses had Baccalaureate degree nursing. Moreover, the majority (72%) of nurses were bed side nurse (critical nurse).

In addition to; it was found that more than one third (44%) of the studied nurses had (1-5) years of experience. According to their previous training regarding management of diarrhea, the majority of the studied nurses (78%) did not have previous training regarding diarrhea.

Table (2) shows the distribution of the studied nurses according to their knowledge about assessment of ICU induced diarrhea through all periods of the study. The table revealed that there was a highly statistically significant improvement of knowledge about ICU induced diarrhea among nurses throughout all intervention periods of the study at (p-value <0.001).

Table (3) shows the distribution of the studied nurses according to their knowledge about Management of ICU induced diarrhea Pre and Post Nursing Educational Program (n=50).

The table revealed that there was a statistically significant improvement in the knowledge about management of ICU induced diarrhea pre and post program among nurses throughout all intervention periods of the study at p value = (<0.001*)

Figure (1) Distribution of ICU & CCU nurses regarding to total level of knowledge pre and post nursing educational program. This figure showed that there was a statistically significant improvement

regarding nurses' knowledge where (46%) of the studied nurses had poor level of knowledge pre nursing intervention program, where (84%) of them had scored good level of knowledge post implementation of nursing educational program and about (82%) of them had scored high level of knowledge post 2 month of implementation of nursing educational program.

Table (4) shows the distribution of the studied ICU & CCU nurses according to their practice of patient assessment during induced diarrhea pre, post and 2 months after immediate educational program.

This table revealed that there was a statistically significant improvement in the practice of patient assessment during induced diarrhea pre and post nursing educational program among nurses throughout intervention periods of the study at (p value <0.001).

Table (5) shows distribution of the studied ICU & CCU nurses according to their practice regarding infection control measures during induced diarrhea pre and post and Post 2-month nursing intervention program. The table revealed that there was statistically significant improvement in the nurses' practice regarding infection control measures pre, post immediate and after 2-month nursing educational program at (p value <0.001).

Figure (2) Distribution of the studied ICU & CCU nurses according to their total practice domains levels throughout periods of study This figure illustrated that there were highly statistically significant improvement in the level of the nurses practice where (38%) of the studied ICU & CCU nurses had poor level of practice pre nursing educational program, whereas about (88%) of them had scored good level of practice post implementation of nursing educational program, in addition to(84%) of them had scored good level of practice post 2 month implementation of nursing educational program

Table (6) shows relation between socio demographic characteristics of studied ICU & CCU nurses' data and their total level of practice score throughout periods of study. There was highly statistically significant relation between total level of practice Pre, Post Immediate with age, educational level and years of experience when p-value <0.001. Statistically significant deference between total practice Post 2 months with age and Educational level when (p-value <0.05). Also, there was a statistically significant relation between total practice pre-Immediate, post and Post 2 months with Occupational level when (p-value <0.05). Also, statistically significant relation between total level of practice Post with training course when (p-value <0.05).

Table (1): Distribution of the studied nurses according to their Socio–demographic data in ICU& CCU

Socio–demographic data in ICU& CCU (n=50)	N	%
Age (years)		
<25	11	22
25- <30	24	48
30- <35	9	18
35 or more	6	12
Mean±SD	27.94±4.37	
Sex		
Female	48	96
Male	2	4
Marital Status		
Married	45	90
Divorced	3	6
Single	2	4
Widow	0	0
Educational Level		
Diploma in nursing	8	16
Technical health institute	17	34
Bachelor degree	25	50
Post graduate (master or doctoral degree)	0	0
Occupational level		
Bed side Nurse	36	72
Nurse supervisor	6	12
Head nurse	8	16
Years of experience		
<1 years	17	34
1-5 years.	22	44
>5 years	11	22
Previous training course about Induced Diarrhea Management forcritically ill patient		
No	39	78
Yes	11	22
Duration of training course		
Mean±SD	2.77±2.36	

Table (2): Distribution of the studied ICU&CCU nurses according to their knowledge about assessment of ICU induced diarrhea through all periodsof the study

Nurses knowledge about ICU induced diarrhea		The studied (50) nurses						Chi-square	
		Correct& complete		Correct& incomplete		Incorrect			
		N	%	N	%	N	%	x^2	P-value
Aim of management of ICUinduced diarrhea	Pre	8	16	32	64	10	20		
	Post Immediate	32	64	12	24	6	12	24.491	<0.001 *

	After 2 mon.	27	54	13	26	10	20	1.464	0.481
Definition of Bowel care	Pre	24	48	22	44	4	8		
	Post Immediate	34	68	11	22	5	10	5.502	0.064
	After 2 mon.	26	52	13	26	11	22	3.483	0.175
Bowel management for diarrhea include the following	Pre	21	42	20	40	9	18		
	Post Immediate	30	60	10	20	10	20	4.974	0.083
	After 2 mon.	24	48	14	28	12	24	1.515	0.469
Primary Assessment of ICUinduced diarrhea	Pre	18	36	25	50	7	14		
	Post Immediate	32	64	9	18	9	18	11.699	0.003*
	After 2 mon.	25	50	12	24	13	26	2.015	0.365
Problems which determinedduring ICU duration	Pre	20	40	21	42	9	18		
	Post Immediate	34	68	9	18	7	14	8.680	0.013
	After 2 mon.	31	62	9	18	10	20	0.668	0.716
During assessment of patient with diarrhea, it is necessary to determine the following Symptoms	Pre	16	32	23	46	11	22		
	Post Immediate	35	70	10	20	5	10	14.450	<0.001*
	After 2 mon.	35	70	7	14	8	16	1.222	0.543
Pay attention regarding changes during ICU diarrhea as the following	Pre	15	30	25	50	10	20		
	Post Immediate	26	52	11	22	13	26	8.787	0.012*
	After 2 mon.	31	62	8	16	11	22	1.079	0.583
Physical examination for induced diarrhea	Pre	22	44	26	52	2	4		
	Post Immediate	35	70	5	10	10	20	22.524	<0.001*
	After 2 mon.	30	60	10	20	10	20	2.051	0.359
Importance of abdominal examination due to induceddiarrhea	Pre	16	32	25	50	9	18		
	Post Immediate	36	72	7	14	7	14	18.067	<0.001*
	After 2 mon.	34	68	10	20	6	12	0.663	0.718
Importance of rectal examination	Pre	15	30	26	52	9	18		
	Post Immediate	32	64	12	24	6	12	11.907	0.003*
	After 2 mon.	32	64	11	22	7	14	0.120	0.942
General diagnostic tests for Icudiarrhea	Pre	10	20	24	48	16	32		
	Post Immediate	30	60	6	12	14	28	20.933	<0.001*
	After 2 mon.	26	52	9	18	15	30	0.920	0.631
Specific diagnostic test for ICUdiarrhea	Pre	9	18	28	56	13	26		
	Post Immediate	34	68	4	8	12	24	32.575	<0.001*
	After 2 mon.	37	74	9	18	4	8	6.050	0.053

P1= Pre e& Post Immediate, P2= Post& Post 2 months, p value = (<0.001*)

Table (3): Distribution of the studied ICU&CCU nurses regardingknowledge about management of ICU induced diarrhea throughout allperiods of the study

Management of ICU induced diarrhea		The studied (50) nurses						Chi-square	
		Correct & complete		Correct & incomplete		Incorrect			
		N	%	N	%	N	%	x^2	P-value
Purpose of bowel carefor ICU diarrhea	Pre	16	32	27	54	7	14		
	Post Immediate	32	64	12	24	6	12	11.179	0.004*
	After 2 mon.	32	64	13	26	5	10	0.131	0.937
General management ofICU diarrhea included	Pre	20	40	27	54	3	6		
	Post Immediate	32	64	8	16	10	20	16.853	<0.001*
	After 2 mon.	31	62	9	18	10	20	0.075	0.963
Management of ICU induced diarrhea startedwith	Pre	15	30	31	62	4	8		
	Post Immediate	31	62	10	20	9	18	18.244	<0.001*
	After 2 mon.	35	70	11	22	4	8	2.213	0.331
Treatment of non-infective ICU diarrhea	Pre	9	18	32	64	9	18		
	Post Immediate	36	72	9	18	5	10	30.245	<0.001*
	After 2 mon.	34	68	10	20	6	12	0.201	0.905
Treatment of infectiveICU diarrhea	Pre	16	32	30	60	4	8		
	Post Immediate	32	64	13	26	5	10	12.165	0.002*
	After 2 mon.	31	62	14	28	5	10	0.053	0.974
Protection of integrity ofperianal skin include	Pre	18	36	26	52	6	12		
	Post Immediate	28	56	8	16	14	28	14.903	<0.001*
	After 2 mon.	37	74	9	18	4	8	6.861	0.053
Protection of neuro patients for perianal skin	Pre	12	24	28	56	10	20		
	Post Immediate	31	62	8	16	11	22	19.554	<0.001*
	After 2 mon.	34	68	10	20	6	12	1.831	0.400
Signs and symptoms ofdehydration included	Pre	18	36	24	48	8	16		
	Post Immediate	28	56	10	20	12	24	8.739	0.013*
	After 2 mon.	32	64	8	16	10	20	0.671	0.715
Nursing care of dehydration included	Pre	19	38	25	50	6	12		
	Post Immediate	34	68	12	24	4	8	9.213	0.010*
	After 2 mon.	36	72	10	20	4	8	0.239	0.887
Nursing care for electrolyte disturbance	Pre	18	36	26	52	6	12		
	Post Immediate	35	70	7	14	8	16	16.678	<0.001*
	After 2 mon.	29	58	9	18	12	24	1.613	0.447
The nurse control breaksdown around perianal area through	Pre	12	24	26	52	12	24		
	Post Immediate	36	72	8	16	6	12	23.529	<0.001*
	After 2 mon.	31	62	10	20	9	18	1.195	0.550
The nurse clean perianalarea through	Pre	11	22	32	64	7	14		
	Post Immediate	31	62	11	22	8	16	19.846	<0.001*
	After 2 mon.	33	66	12	24	5	10	0.798	0.671
Role of nurse to prevent infection in perianal area	Pre	18	36	29	58	3	6		
	Post Immediate	30	60	13	26	7	14	10.695	0.005*
	After 2 mon.	32	64	9	18	9	18	1.042	0.594
Prevention of diarrheathrough	Pre	20	40	24	48	6	12		
	Post Immediate	37	74	10	20	3	6	11.835	0.003*
	After 2 mon.	35	70	11	22	4	8	0.246	0.884

P1= Pre e& Post Immediate, P2= Post& Post 2 months, p value = (<0.001*)

Figure (1): Distribution of ICU & CCU nurses regarding to total level of knowledge pre and post nursing educational program
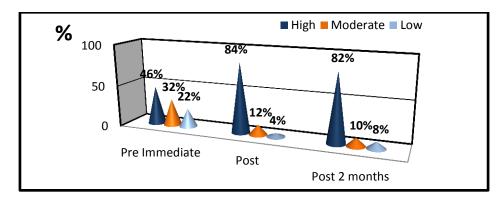

Table (4): Distribution of the studied ICU &CCU nurses according to their practice about patient assessment during induced diarrhea pre and post nursing educational program.

Patients' assessmentduring ICU diarrhea	The studied (50) nurses												Chi-square			
	Pre				Post Immediate				Post 2 month of program				P1		P2	
	Done		Not done		Done		Not done		Done		Not done		X2	P-value	X2	P-value
	N	%	N	%	N	%	N	%	N	%	N	%				
1. Assess general appearance of the patient	21	42	29	58	47	94	3	6	45	90	5	10	31.066	<0.001*	0.543	0.461
2. Assess sign and symptoms of diarrhea	16	32	34	68	43	86	7	14	42	84	8	16	30.136	<0.001*	0.078	0.779
3. Monitor vital signs:	18	36	32	64	44	88	6	12	43	86	7	14	28.693	<0.001*	0.088	0.766
4.Assess presence of pain during diarrhea	19	38	31	62	42	84	8	16	40	80	10	20	22.236	<0.001*	0.271	0.603
5.Assess severity of pain	18	36	32	64	40	80	10	20	39	78	11	22	19.869	<0.001*	0.060	0.806
6.Assess presence of bleeding	21	42	29	58	41	82	9	18	40	80	10	20	16.978	<0.001*	0.065	0.799
8.Assess change in intake and out put	20	40	30	60	44	88	6	12	43	86	7	14	25.000	<0.001*	0.088	0.766
9.Assess contributing factor of diarrhea	29	58	21	42	45	90	5	10	42	84	8	16	13.306	<0.001*	0.796	0.372
10.Assess hydration status of patient	17	34	33	66	41	82	9	18	40	80	10	20	23.645	<0.001*	0.065	0.799
11.Assess skin integrity around anus	26	52	24	48	43	86	7	14	41	82	9	18	13.511	<0.001*	0.298	0.585
12.Assess presence of cramping	23	46	27	54	44	88	6	12	43	86	7	14	19.946	<0.001*	0.088	0.766

	Done N	%	Not done N	%	Done N	%	Not done N	%	Done N	%	Not done N	%	P1 X2	P1 P-value	P2 X2	P2 P-value
13.Assess nutritional status for patient	26	52	24	48	41	82	9	18	40	80	10	20	10.176	<0.001*	0.065	0.799
14.Assess sign &symptoms of dehydration	20	40	30	60	45	90	5	10	43	86	7	14	27.473	<0.001*	0.379	0.538
15.Monitor presence of inflammatorybowel disease	21	42	29	58	44	88	6	12	41	82	9	18	23.253	<0.001*	0.706	0.401
16.Assess abdomen for any tenderness	18	36	32	64	46	92	4	8	43	86	7	14	34.028	<0.001*	0.919	0.338
17.Assess intake of medication that affect muscle tone	20	40	30	60	47	94	3	6	44	88	6	12	32.972	<0.001*	1.099	0.295

P1= Pre e& Post Immediate, P2= Post& Post 2 months, p value = (<0.001*)

Table (5): Distribution of the studied ICU &CCU nurses according to their practice regarding infection control measures during induced diarrhea pre, post Immediate and after 2-month nursing educational program.

Infection Control Measures	The studied (50) nurses												Chi-square			
	Pre				Post Immediate program				Post 2 month of program				P1		P2	
	Done		Not done		Done		Not done		Done		Not done					
	N	%	N	%	N	%	N	%	N	%	N	%	X2	P-value	X2	P-Value
1.Assess risk patient for infection in ICU	22	44	28	56	43	86	7	14	42	84	8	16	19.385	<0.001*	0.078	0.779
2.Wash Hands before and after deal with patient	21	42	29	58	45	90	5	10	44	88	6	12	25.668	<0.001*	0.102	0.749
3.Wear disposable gloves and Plastic apron whencontact with patients	11	22	39	78	47	94	3	6	43	86	7	14	53.202	<0.001*	1.778	0.182
4. Use proper towels to soak up excess liquid	21	42	29	58	46	92	4	8	44	88	6	12	28.268	<0.001*	0.444	0.505
5.Transfer any solid matterdirectly into a clinical waste bag	15	30	35	70	45	90	5	10	42	84	8	16	37.500	<0.001*	0.796	0.372
6.Clean the soiled area withdetergent (Dettol) and hot water, using a disposablecloth	21	42	29	58	43	86	7	14	41	82	9	18	21.007	<0.001*	0.298	0.585
7. Clean environment by using appropriate disinfectants	12	24	38	76	44	88	6	12	43	86	7	14	41.558	<0.001*	0.088	0.766

(chlorhexidine5%)																
8.Implement control measures for all patients with respiratory infectionin ICU	15	30	35	70	48	96	2	4	45	90	5	10	46.718	<0.001*	1.382	0.240
9.use separate equipment for every patient in ICU	12	24	38	76	46	92	4	8	44	88	6	12	47.455	<0.001*	0.444	0.505
10.Clean, disinfect reusableequipment appropriately before use with another Patients	15	30	35	70	43	86	7	14	42	84	8	16	32.184	<0.001*	0.078	0.779
11.Ensure safe waste management	24	48	26	52	46	92	4	8	45	90	5	10	23.048	<0.001*	0.122	0.727
12.Cover the nose and mouth when coughing, sneezing with mask	27	54	23	46	45	90	5	10	43	86	7	14	16.071	<0.001*	0.379	0.538

Figure (2): Distribution of the studied ICU &CCU nurses according to their total practice domains levels throughout periods of study
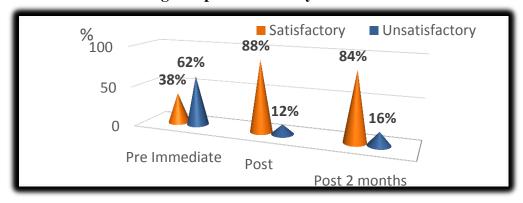

Table (6): Relation between socio demographic data of Studied ICU&CCU nurses' data and their total level of practice score throughout periods of study

Sociodemographic data	Total level practice score The Studied nurses (n=50)									
	Pre-Immediate			Post			Post 2 months		Tests	
	Mean	SD	P-value	Mean	SD	P-value	Mean	SD	t/ f	P-value
Age (years)										
<25	18.64	1.75		24.73	1.42		23.09	4.25		
25- <30	24.08	4.69	<0.001*	33.46	6.35	<0.001*	28.67	6.35	5.262	0.003*
30- <35	25.00	5.00		33.56	6.17		30.78	5.21		
35 or more	29.17	2.93		38.50	1.38		33.83	7.03		
Sex										
Female	23.67	5.17	0.964	32.25	6.66	0.644	28.44	6.66	0.013	0.990

Male	23.50	0.71		30.00	8.49		28.50	4.95		
Marital Status										
Married	23.51	5.20		32.00	6.80		28.58	6.55		
Divorced	26.00	5.00	0.720	36.00	1.73	0.549	26.33	9.71	0.159	0.854
Single	23.50	0.71		30.00	8.49		28.50	4.95		
Educational Level										
Diploma in nursing	19.00	2.62		25.50	2.14		22.88	3.44		
Technical health institute	21.00	3.51	<0.001*	29.38	4.87	<0.001*	28.88	3.91	3.872	0.028*
Baccalaureate degree	25.38	4.91		34.38	6.48		29.65	7.01		
Occupational level										
Bed side Nurse	22.56	4.55		30.56	6.01		27.61	5.84		
Nurse Supervisor	30.17	1.17	0.002*	39.50	1.05	0.005*	35.00	5.02	3.804	0.029*
Head Nurse	23.75	5.73		33.88	8.11		27.25	8.45		
Years of experience										
<1	20.41	3.08		26.71	3.57		25.53	5.70		
1-5 yrs.	24.64	4.92	0.002*	34.23	5.87	<0.001*	29.36	6.15	3.014	0.059
>5	26.73	5.42		36.45	6.62		31.09	7.48		

Discussion

Diarrhea continues to plague the developing world resulting in more than 3 million deaths annually. Diarrheal infections are the fifth leading cause of death worldwide**.** Critically ill patients, tend to be more susceptible to volume depletion as a result of vomiting, diarrhea, or increases in insensible water losses. Significant fluid losses may occur rapidly. Volume depletion is a common complication of illness observed in critically ill patients presenting to the emergency department. Early recognition and intervention are important to prevent progression to shock and cardiovascular collapse. [28,29]

The main role of nurses working at ICUs is 24-h monitoring of patients vital functions, nutritional management to prevent the development of malnutrition in unconscious patients, ensuring proper personal hygiene, and keeping records of hospitalized patients so the present study evaluate the effect of educational program on nurses' performance regarding intensive care units induced diarrhea among critically ill patients. [30]

Also, this finding were supported by **Anim-Larbi (2017)** who found that the majority of the nurses had a good knowledge about shock related diarrhea diagnosis and its prevention post-implementation of the study training program.[32]

Also, this finding was supported by **Anim-Larbi (2017)** who studied knowledge of nurses in management of diarrhea, and found that the majority of the nurses in ICU had a good knowledge about shock related diarrhea diagnosis and its prevention post-implementation of the study training program. [32]

Moreover, these results were in the same line with **Guddeti et al., (2019)** who found that most of nurse who are working in ICU were unaware of diarrhea (as bowel assessment and management of patients) and have poor skills preprogram which improved post- program. [35] These results were similar to results of **Shah et al. (2017)** who do study in India titled with home-based management of acute diarrheal

disease in an urban slum of Aligarh and found post providing structured education program to population, KAP toward diarrhea were significantly improved. [36]

This result was supported by **Babiker et al., (2019)** who showed that, most of nurses in ICU didn't use control precaution while this percent improved to all of nurses use infection control precaution during care of patients with induced diarrhea post nursing intervention. [33]

The current study result's revealed that there was a highly statistically significant improvement in the nurses practice regarding food and fluid management, prevent skin breakdown to the patient pre and post 2-month nursing intervention program. This may be due to increase the nurse awareness about the important patients care, and detecting the defects in their practice and identifying their responsibilities. This interpretation was supported by **Mohammed et al., (2021)** who revealed that, there was a statistically significant difference between nurses practice sub items scores regarding food &fluid management & skin care for patient with diarrhea before and after implementation of health education. [37]

Also, it was supported by **El-Sayed et al., (2018**) regarding care of ICU patients with diarrhea. Who illustrated that there was a marked improvement in the nurses' total practices regarding management of hypovolemic shock related to sever diarrhea pre- and post- implementation of the training guidelines. A statistically significant difference was detected in this current study because most of the

Conclusion

Based on the findings of the current study, it can be concluded that:

The implementation of educational program

participants' nurses demonstrated all procedures (practical skills) competently immediately post- implementation of the training on educational program compared to only one third of them pre-implementation of the educational program.[31]

Furthermore, this finding was supported with **Carson et al., (2017**) who carried out a study about evaluation of a nurse initiated acute gastroenteritis pathway in emergency department and found a highly statistically significant association between ICU nurses' knowledge and their practice in pre- and post- program implementation phases about management of ICU diarrhea. From the researchers' point of view, this finding proven that high level of nurses' scores of knowledges is usually associated with increased level of competent clinical performance. [38]

Also, this result was supported by **Bayoumi (2017)** and **O'Leary (2019)** who found that there were significant relationships between nurses' level of knowledge, and Practices and Their education level, workplace experience years, and previous attendance of training programs. [31,40] It's important to focus on the critical care nurses sense of competence is an important determinate of delaying institution allegation of the patient. [40]The present results documented an improvement in knowledge and practice skills of ICU induced diarrhea that support the hypotheses of educational program intervention.so that more attention needs to be given to effect of antibiotic resistance medication and infection control measures in ICU. [41]

had an effect on improving the nurse's knowledge level induced diarrhea in ICU in addition to improve their practice level. Post program nurse's expressed a wide

variety of expectations regarding to cope with induced diarrhea in ICU and give full performance for patients care which might have implications for patients satisfaction and delivery of the care. The impact of the disease on individuals and the society canbe minimized by early detection and appropriate therapeutic intervention.

Recommendations

- Nurses should be encourage to attend workshop and seminars held about induced diarrhea in ICU to be acquainted with the most common complications, recent advances and skills in the field.

- Acting as a resource, teacher, educationalist, researcher and mentor. Supporting visually impaired people and promoting their wellbeing.

- Ongoing learning protocol must be designed and implemented for nurses at ICU& CCU for the importance of maintaining checkup.

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