

Effect of Educational Protocol Regarding Accurate Monitoring Fluid Balance on Critical Care Nurses' Knowledge and Practice

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Abstract

Background: Fluid balance is among important measures because it has a great importance in managing and understanding patients' clinical status recorded in patients' daily observation sheet. Monitoring fluid balance is a part of the scope of nurses' practice. Aim of the study: to evaluate the effect of educational protocol regarding accurate monitoring of fluid balance on critical care nurses' knowledge and practice. Research design: Quasi - experimental research design will be utilized to fulfill the purpose of this study. Setting: This study was carried out at six critical care units affiliated to Minia University Hospitals (Intensive care unit, renal intensive care unit, neurosurgical intensive care unit, cardiac intensive care unit, chest intensive care unit, stroke unit). Subjects: A Purposive sample of all critical care nurses who are working in six critical care units at Minia University Hospitals that mentioned before and willing to participate in the study was included. Tools of data collection: Two tools were designed and used for collecting data for this study, First Tool: structured questionnaire sheet, Second Tool: Nurses' performance observational checklist sheet, Educational Protocol about accurate fluid monitoring. Results: There was a highly statistically significant difference in nurses' knowledge and practice pre and post educational protocol regarding monitoring fluid balance. Conclusion: results showed that there is a large wide gap between nurses' knowledge and their practice regarding monitoring of fluid balance pre and post-educational protocol. Recommendations: Greater attention should be given for observing nurses' performance during monitoring fluid balance. Replication of the study should be done on a large probability sample

Aim of the Study

Evaluate the effect of educational protocol regarding accurate monitoring of fluid balance on critical care nurses' knowledge and practice.

Research questions

What is the level of nurses' knowledge and practice regarding accurate monitoring of fluid balance in the critical care units pre & post educational protocol ?

What is the effect of educational protocol regarding accurate fluid balance monitoring on nurses □ Knowledge and practice?

Subjects and Methods:-

Study Design:

Quasi - experimental research design was utilized to fulfill the purpose of this study

Setting:

All Critical Care units affiliated to Minia University Hospital including intensive care unit – renal intensive care unit - neurosurgical intensive care unit – cardiac intensive care unit – chest intensive care unit and stroke unit.

Subjects:

A purposive sample of all available 60 critical care nurses who were working in a six Critical Care Units at Minia University Hospital at the time of conducting the study and willing to participate in the study was included.

Inclusion Criteria:-

- All nurses accept to participate in the study.
- Not attended previous training courses about fluid balance.

Study Duration:

The total data collection was collected for seven months from October 2017 to April 2018.

Tools for data collection

Two tools were designed and used for data collection. These tools were formulated by the researcher, after extensive literature review (Morton & Fontaine, 2013), (Hinds & Watson, 2008).

Bottom of Form

First Tool: “Knowledge assessment structured questionnaire” it includes two parts:

1st part: - Socio demographic data for nurses working in critical care units: It consists of (8) items as " code, age, gender, department of working, level of education, etc....."

2nd part: - knowledge assessment about monitoring fluid balance & imbalance and nursing intervention regarding the fluid imbalance:

Scoring System:

Each right answer takes one grade and the wrong answer takes zero grade with a total scores 58, so (• 60%) was considered unsatisfactory; (≥60) was considered satisfactory.

Second Tool: “Nurses' performance observational checklist”:

This tool consists of fifty (50) items for evaluating nurses' performance regarding monitoring fluid balance for critically ill patients in different critical care units.

Scoring System:

The score for each item was range from (0 to 2), not done take a score zero (0), done inaccurately take one score, done accurately take a score two (2), so (• 60%) was considered poor, (≥ 60-85%) was considered fair and more than (85%) was considered good practice scores.

Tools validity

The study tools were developed after reviewing the related literature, were tested by a Jury committee of five medical surgical-nursing and medicine experts

recommendations were followed: the questions that were not appropriate were taken out and some questions needed clarification and modifications was done.

Tools reliability

Tools were tested for content reliability using Alpha Cronbach’s test. It was (0.81) for tool one , (0.79) for tool two.

Pilot study

A pilot study was carried out on 6 nurses working in the Critical Care units who fulfilled the inclusion criteria to test the feasibility, objectivity, applicability of the study tools, and to estimate the needed time to fill the data collection. Based on the results of the pilot study, no refinement/ modifications were done for data collection instruments, nurses who shared in the pilot study were included in the actual study sample.

Ethical Considerations

An official permission to conduct the study was obtained from faculty ethical committee of research, dean of the faculty of nursing at Minia University, Research center affiliated to Egypt Ministry of Health, agreement from Egypt academic for the research center and technology and from directors of Critical Care Units at Minia University Hospital. Oral consents were obtained from each nurse after explanation of the nature and purpose of the study. Each head nurses who were on duty during study implementation and nurses were free to either participate or not in this study and had the right to withdraw from the study at any time without any rational; also, nurses were informed that data will not be included in any further researches without another new consent. Confidentiality and anonymity of each subject were assured through coding of all data.

Procedure

Once official permissions were granted, the pre-educational data (pre-test) collected through (four weeks) to test studied sample’ actual level of knowledge and practices regarding monitoring fluid balance. The researcher distributed the questionnaire appendix (A) to assess study sample’ actual level of knowledge after clearly explaining the way to fill out, then nurses’ performance observational checklist appendix (B) used by the researcher to assess study sample’ actual level of practice.

The study sample was divided into thirty classes each class consists of two participants. The appointment for

starting educational sessions was scheduled with the study sample according to their circumstances. The educational protocol was conducted as one session for knowledge teaching, two sessions for practice teaching for every class; each session took about 30- 45 minutes. At the end of teaching sessions (knowledge & practice).

The researcher gave the study participants a handout (booklet) as an educational protocol about accurate fluid monitoring: It was formulated by the researcher after extensive literature review, revised by experts in the field of critical care nursing (Hinds & Watson, 2008; Morton & Fontaine, 2013; Timby, 2009), and translated into the Arabic language with figures and diagrams for more clarification. It covered the following areas as: general knowledge about fluid balance, knowledge & practices about accurate monitoring, knowledge about the main fluid imbalance disorders, Knowledge and practice about nursing intervention for any fluid imbalance.

The researcher collect post educational evaluation (post-test) for knowledge through giving the sample (Appendix A) as an immediate posttest assessment, then follow up was done by the researcher after one month and three months by using appendix (B) to evaluate the effectiveness of the educational protocol regarding study sample’ practice.

Limitations of the study

Findings of this study were limited to a small sample size (60) as the study group. Therefore, it may not be necessarily representative of the general population of nurses in critical care units.

The scope of the study is also limited. It was restricted to those nurses who agreed to participate in the study, and who were actually available at the time of data collection.

Statistical analysis of data

Data obtained from the study tools were categorized, tabulated, analyzed and data entry was performed using the SPSS software (statistical package for social sciences version 22.0). Descriptive statistics were applied (e.g. mean, standard deviation, frequency, and percentage). Pearson's correlation coefficient was applied between quantitative variables. A significant level value was considered when $p < 0.05$. The smaller the P-value obtained, the more significant is the result (*), less than 0.001 was considered highly significant (**). The P- value is the probability of error of the conclusion.

Results

Table (1): Percentage distribution of the study group as regards socio-demographic data (n= 60).

Demographic data	No	%
Age categories		
20-25	24	40
25-29	27	45
≥30	9	15
Mean ± SD	26.76 ± 5.027 years	
Gender		
Male	24	40
female	36	60
Education Level		
Bachelor	22	36.7
Technical institute	30	50

Demographic data	No	%
Diploma & secondary school	8	13.3
Years of experience in working at critical units		
<5 years	37	61.7
≥ 5years	23	38.3
Mean ± SD	5.12 ± 3.405 years	
Previous workshop attendance regarding fluid balance monitoring		
Yes	7	11.7
No	53	88.3

Table (1) revealed that, the majority of the study group's age was between 25 -29 years and their Mean average age ± SD was (26.76 ± 5.027) years and the highest percentage constituted (60%) were females, as regards their educational level, results found that half of them had graduated from technical institute degree in nursing. On the other hand, half of the study group was married and the highest percentage of them constituted (61.7%) had less than five years of experience in working at critical units. Finally, as regards, previous workshop attendance regarding fluid balance monitoring results revealed that the majority of the study group constituted (88.3%) hadn't attended any previous workshop regarding fluid balance monitoring.

Figure (2): Overall total Knowledge Score levels of the Study group in relation to monitoring fluid balance pre-educational protocol (n= 60)

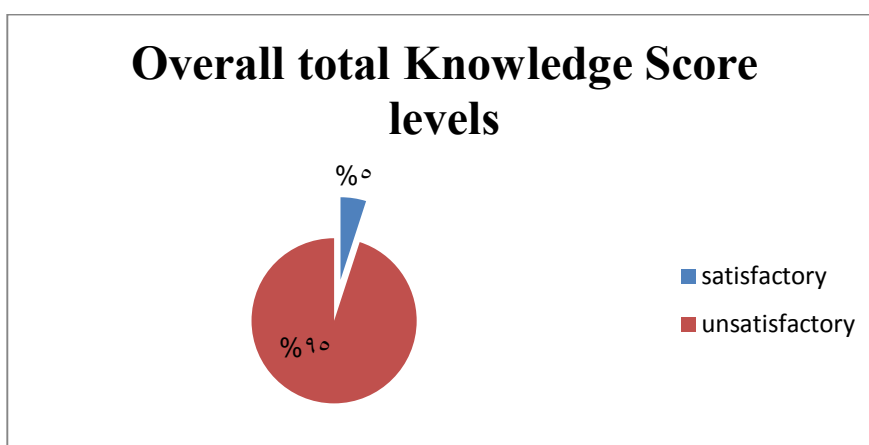


Figure (2) revealed that 95% of the study sample had unsatisfactory knowledge, while 5 % of them only had satisfactory knowledge level regarding monitoring fluid balance.

Table (2): Comparison of percentage distribution as regards accurate practice regarding monitoring fluid intake for study group pre & post educational protocol (one month, three months) (n= 60).

Monitoring fluid intake	Pre-education		Post-education				Test of significance	
			After (1) month		After (3) months			
	Done accurate		Done accurate		Done accurate		f	P-value
No	%	No	%	No	%			
Document the prescribed fluid type, amount.	56	93.3	60	100	53	88.3	15.368	.001**
Document the time started and the time ended.	0	0	10	16.7	10	16.7		
Record any additives which were added .	58	96.7	60	100	60	100.0		
Include IV medication volume and 0.9% Normal Saline flushes as input in patient chart.	0	0	31	51.7	21	35.0		
Record any fluids offered and syrup drugs.	0	0	48	80	23	38.3		
Use measuring cubs to estimate any fluid taken by mouth.	0	0	16	26.7	10	16.7		
Measure the amount printed on the labels for yogurt, ice cream, gelatin, packet or canned drinks.	0	0	28	46.7	31	51.7		

Monitoring fluid intake	Pre-education		Post-education				Test of significance
			After (1) month		After (3) months		
Record the amount of feeds through nasogastric tube.	0	0	46	76.7	24	40.0	
Record water amount used to flush the nasogastric tube.	0	0	34	56.7	9	15.0	
Document the solvent solution used in IM injection.	0	0	40	66.7	18	30.0	

NS= not significant * p = ≤.05 (statistical significance) ** p = ≤.01 (highly statistical significance)

Table (2) As regards monitoring fluid intake results revealed that highest percentage of the study group pre-educational protocol had only accurate practice regarding recording any additives which were added and documenting the prescribed fluid type constituted (93.3%, 96.7%) respectively, While the rest of table items had zero percent. Lastly, there were highly statistically significant differences among the same group pre & post education.

Table (3): Comparison of percentage distribution as regards accurate practice regarding monitoring fluid output for the study group pre & post educational protocol (one month, three months) (n= 60).

Monitoring fluid output	Pre-education		Post-education				Test of significance	
			After (1) month		After (3) months		f	P
Items:-	Done accurate		Done accurate		Done accurate			
	No	%	No	%	No	%		
Measure & record vomiting amount if present.	0	0	6	10	4	6.7	20	* .001*
Empty urinal or urinary catheter into graduated container.	0	0	27	45	10	16.7		
Check urine for amount and its nature	22	36.7	38	63.3	35	58.3		
Record amount of urine with date and time.	4	6.7	37	61.7	25	41.7		
Check feces amount and nature and document it.	0	0	0	0	0	0		
Document Nasogastric tube aspiration amount if done.	0	0	32	53.3	16	26.7		
Observe drainage if found and document its amount.	58	96.7	60	100	60	100		
Empty drainage tube or bedpan into graduated container for accurate calculation.	0	0	42	70	42	70		
Monitor insensible loss especially when the patient is feverish and document it in patient chart.	0	0	60	100	50	83.3		

NS= not significant * p = ≤.05 (statistical significance) ** p = ≤.01 (highly statistical significance)

Table (3) As regards monitoring fluid output results revealed that highest percentage of the study group pre- educational protocol had accurate practice regarding observing drainage if found and document its amount constituted (96.7%), while the rest of other items' results revealed (36.7%, 6.7%) and zero percentage. Lastly, there were highly statistically significant differences among the same group pre & post education (one month& three months).

Table (4): Overall accurate practice levels as regards monitoring fluid balance among study group pre & post educational protocol (one month, three months) (n= 60).

level	Pre - education		Post - education				X2	P-value
			After (1) month		After (3) months			
	No	%	No	%	No	%	152.370	.000**
Poor	52	86.7	0	0	0	0		
Fair	8	13.3	14	23	19	32		
Good	0	0	46	77	41	68		

NS= not significant * p = ≤.05 (statistical significance) ** p = ≤.01 (highly statistical significance)

Table (4) revealed that the majority of the study group had poor level constituted (86.7%) pre-educational protocol but more than three-quarter of them had good level constituted (77%) after one-month post educational protocol. lastly, There were highly statistically significant differences among both pre and post-educational protocol(one month & three months) with a p-value (0.000).

Table (7): Correlations between total knowledge score and total practice score among study sample pre& post educational protocol(one month, three months) according to accurate practice (n= 60).

Total Knowledge score	Total practice score	Pre - education		Post - education			
				After (1) month		After (3) months	
		r	p	r	p	r	p
Pre- education		-.006	.966	.002	.985	-.040	.760
Post education		-.148	.258	.043	.747	.038	.773

NS= not significant * p = ≤.05 (statistical significance) ** p = ≤.01 (highly statistical significance)

Table (7) showed that there was no statistical significance between total knowledge score at pre & post – educational protocol and total practice score pre and post –education (one month & three months).

Discussion

Results of the current study demonstrated that the mean average age of the study group was (26.76 ± 5.027) years; this may be due to the desire of university's hospitals to provide high-quality health care services, through employing new graduates of the faculty of nursing or nursing technical institute in critical units.

Results of the current study was compatible with (Aslam, Afzal, Kousar, Waqas, & Gilani, 2018) they conducted a study entitled the Assessment of Nurses' Knowledge and Practices about Fluid and Electrolytes Monitoring and Administration among Cardiac Surgery Patients: A Case of Punjab Institute of Cardiology and they found that the highest percentage of the study group' age was between 26-30 years (82 %). Also, results validated by (Vijayan, 2011) who stated that the majority of study sample' age of nurses (70%) belonged to the age group 23-35years.

Results of the current study also were supported by (AbdElalem and Fouad 2018), who discussed that more than half of studied sample from nurses at the age between 25 - 35 years old (67.1%) and only (6.3%) of the sample ' age was more than 35 years. On the other hand, (Diacon, 2012) found that the majority of the nurses (39 out of 58; 76%) were in the age group 35 to 55 years, with a peak of 13 nurses (22%) in the age group 45 to 50 years. The mean age was 42 years. Only 14 participating nurses (24%) were available in the age group of 20 to 35.

Findings of the present study showed that more than half of the total study group was female. These results may be explained by the fact that nursing is a universal feminine profession especially in Egyptian society culture as well as the enrolment of the male students in this profession was started in the late decades. These findings agreed with (Aslam et al., 2017) they conducted a study on critical care nurses and he stated that all study sample 100% of participants were females. Also, results validated by (Diacon, 2012) who found that 96% of study sample were female and only 4% were male. In addition to, (AbdElalem and Fouad 2018) they stated that about three - quarters of the sample were female (74.7%).

Concerning to educational level; the present study findings demonstrated that, half of the study sample graduated from a technical institute. This may be explained by a little number of faculty's graduates had employed in the university hospital and other work in schools or ministry of health hospital. This study results is similar to the study done by (Sheta, Mahmoud, 2018) and revealed that More than half of the nurses (53.3%) carrying a degree of the nursing technical institute, 28% are diploma in nursing. Also, a further validation by (Eldsouky, Taha, & Saleh, 2016) they

emphasized that near to half (44.3%) had a degree of the nursing technical institute of nursing education.

This result was contradicting with (Malekzadeh, Mazluom, Etezadi, & Tasseri, 2013) they found that most of participants (98.2%) held a baccalaureate degree in nursing. Moreover, other study done on critical care nurses by the Society of Critical Care Medicine and Lippincott Williams & Wilkins, (2013), stated that most of the nurses who are working in critical care units have a bachelor degree and their new involvement in the work field.

Study results displayed that, more than half of the study group had less than five years of experience in working at critical units because participants sample level were newly graduate. Study results were validated by (Vijayan, 2011) who found that (77.5%) of nurses have less than five years of critical care units' experience while only (22.5%) have more than 10 years of experience in working at ICU. Also, these findings was in accordance with a study done by (Eldsouky et al., 2016) they stated that about one third of the studied sample had experience from five to ten years. These results contradicting with (Aslam et al.) they stated that (36.54%) have 1-5 years of experience in critical care units and (37.02%) have 6-10 years of .

Study findings illustrated that, the majority of the study sample had not attended any previous workshop regarding fluid balance monitoring. This may be due to negliscance from in-service educational training unit in the hospital, no preparatory program for new staff and lack of interest from critical care nurses to attend any conferences or workshops.

These study findings agreed with (Bhagwanjee & Scribante, 2007), they illustrated that sixty percent of critical care nurses had no previous workshop attendance. In addition to, (Kanakalakshmi, 2014), whose results agreed with this study, the researcher conducted a study to assess the knowledge and practice regarding fluid and electrolyte replacement therapy for patient with burns among working nurses in Narayana Medical College & Hospital (NMCH) and she was agree with these finding and stated that (66.7%) of critical care nurses not attended any previous training workshop regarding fluid administration. Also, results validated by (Sheta, Mahmoud, 2018) they concluded that the majority of studied nurses (85%) did not participate in any previous training program.

Findings of the study represented that the majority of the study sample had unsatisfactory knowledge level regarding fluid balance monitoring pre- educational protocol. These results may be explained that they haven't attended any previous training regarding fluid balance. These results were agreed with (AbdElalem and Fouad 2018) who assess

critical care nurses' knowledge and practice regarding the assessment of fluid balance and she found that (60.8%) of the study group had poor level regarding the fluid balance assessment pre-educational program and only (17.7%) of them had a good level.

These results match with the results of the study done by (Mogileeswari and Ruth 2016) they conducted a study to assess nurses' knowledge and practice regarding fluid therapy at burn critical care units. The researchers found that 15% only from critical care nurses have adequate knowledge. This result in the same line with (Kol, İlaslan, & Turkay, 2017) who concluded that continuous in-service training for nurses is considered a very important concern that helps the professional nurse to be updated by a nursing science which enhances nursing practice.

In addition, (Scales & Pilsworth, 2008) stated that nurses' knowledge regarding fluid balance should be improved because nurses are the primary persons responsible for monitoring of the fluid balance. Contradicting this study, the study done by (Asfour, 2016) which revealed that the level of nurses' knowledge regarding fluid balance monitoring in ICUs was moderately adequate. Also, she concluded that nurses should have knowledge and skills for assessing and monitoring body fluid. Inaccurate assessment and documentation of body fluid can lead to severe problems in body homeostasis especially for critically ill patients who have serious health problems.

Regarding nurse role at monitoring fluid intake results revealed that the majority of the study sample had accurate practice post-educational practice (one month, three months), this may be due to lack of training and skills regarding monitoring fluid intake. This agreed with (Sheta, Mahmoud, 2018) they concluded that, there were highly significant differences between pre and post- program implementation in relation to total mean score of nurses' practices regarding to measuring fluid input for critically ill patients for all items of fluid input ($P < 0.001$).

Moreover, this results supported by (Eldsouky et al., 2016) who conducted a study in intensive care units and he mentioned that (27.8%) of study sample measure fluid intake (all drinks per mouth) pre educational program and increased to (72.2%) post-educational program. While this result was contradicting with the study's results of (Vijayan, 2011) who stated that about in about 91.67% of the situations the amount, type of fluid are checked against doctor's prescription. Only in 43.33% of the occasions, the flow rate is accurately adjusted. And in 71.67% of the situations, the prescribed fluid on the chart is documented.

Regarding nurse role at monitoring fluid output results revealed that the highest percentage of the study group pre- educational protocol had accurate practice regarding observing drainage if found and document its amount constituted, while the rest of other items' results revealed low and zero percentage, these results improved post-educational program (one month, three months).

These results validated by (Waqas, 2017) who conducted a study entitled the assessment of nurses' knowledge and practices about fluid and electrolytes monitoring and administration among cardiac surgery patients, he mentioned that highest percentage of study sample measure fluid output correctly in ICU. Also, these results supported by (Sheta, Mahmoud, 2018), they concluded that indicates that there was a highly statistically significant improvement in relation to total mean score of nurses' practices post- program implementation regarding to

measuring fluid output for critically ill patients' for all items of fluid output ($P < 0.001$).

This finding was also in the same line with (Perren et al., 2011) who found that fluid balance was inaccurate in one-third of a critically ill patient with incomplete recording ranging from -3606 mL to +2020 mL of fluid. Also, (Johnson & Monkhouse, 2009) found discrepancy between fluids administered and fluids documented in the patients' chart. (Diacon & Bell, 2014) who mentioned that monitoring of fluid balance chart for more than two - thirds of a critically ill patients illustrated increased more than 50 mL from the wanted balance.

On the other hand, these results disagreed with the study done by (Vincent et al., 2015) they performed an audit on fluid balance monitoring for 117 patients and it showed that less than half of fluid balance charts were fully completed because of incomplete documentation of fluid intake.

Regarding accurate practice levels, findings of the present study demonstrated that the majority of study participant had poor level pre-educational protocol, while about two - thirds of them had good level of practice post-educational protocol (one month- three months).

These findings validated by (AbdElalem and Fouad 2018) who stated that one hundred percent of the study sample had poor level regarding monitoring fluid balance pre- intervention; while post-intervention the majority of them had a good level.

As well, (Mogileeswari and Ruth 2016) conducted a study to assess nurses' knowledge and practice regarding fluid therapy. The researchers found that 37% of nurses had safe practice regarding fluid therapy, 42% had moderately safe practice and 21% of nurses their practice was considered unsafe. However, also, (Diacon, 2012) reported that critical care nurses are equipped with theoretical and practical knowledge about fluid balance monitoring.

This result was the same line with (Payen et al., 2008) who founded that nurse' knowledge and practices regarding fluid balance is low which affect in the quality of nursing care among the public hospitals. Moreover, (Asfour, 2016) concluded that critical care nurses had incompetent and incomplete nursing practice related to fluid balance monitoring accuracy in intensive care units.

Regarding Correlations between total knowledge and practice score among study sample pre & post educational protocol (one month, three months) results revealed that there was no statistical significance between total knowledge score at pre & post educational protocol and total practice score pre and post -education (one month & three months) .

These results disagreed with (Tina et al., 2001) they stated that decreasing knowledge level at the initial baseline data assessment for the nurses in ICU that also reflected in the nurses' practice at pre-intervention of the program that converted to a significant improvement of both knowledge and practice after the intervention.

Recommendations

Recommendations related to hospitals and nurses:

- Greater attention should be given to monitor and closely observe nurses performance during monitoring fluid balance.

- Educational needs should be assessed for staff and newly employed nurses working in intensive care units.
- Training program should be arranged for nurses working in intensive care units about fluid balance.

Recommendations for further researches:

- Replication of the study on a larger probability sample from different geographical areas in Egypt to obtain more generalizable data.
- Future studies have to be carried out in order to assess factors associated with poor level of practice regarding monitoring fluid balance pre-educational protocol.
- Encourage other researches to include patients in other studies to evaluate the effect of an educational protocol.

Acknowledgment

The researchers would like to acknowledge the contribution of all participants who kindly agreed to take part in the study. They generously gave their time and attention to conduct this study. This study would have been impossible without their generosity.

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