Nurse's Knowledge and Practice Regarding Care of Fluids and Electrolytes Imbalance among Critically Ill Patients

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Abstract

Background: Fluids and electrolytes and acid base balance are fundamental to the process of life. They are necessary to maintain health and function of all body system. Fluids are vital to all forms of life, they help maintain body temperature and cell shape, and they help transport nutrients, gases, and wastes. Electrolytes play a vital role in maintaining homeostasis within the body. The aim of this study: was to assess Nurses' Knowledge and Practice Regarding Care of Fluids and Electrolytes Imbalance among Critically Ill Patients. Design: A descriptive exploratory research design was used to conduct this study. Setting: This study was carried out at the ICU Medical and surgical units at El-Zagazig University Hospital. Subjects: A convenient sample of all available nurses (60) working in Critical Care Units at Emergency Hospital, Zagazig University who provide direct patient care, the available selected sample had different level of education. Tools: Data were collected through using two tools; I-Self-Administrated Interview Questionnaire. II-Observational Checklist. Results: two thirds of the studied nurses (66.7%) had unsatisfactory level of knowledge among studied nurses. On the other hand. 33% had satisfactory level of knowledge. Conclusion: The current study concluded that two thirds of the studied nurses had unsatisfactory level of knowledge regarding fluids and electrolytes imbalance. Additionally, more than half of them had competent practices regarding fluids and electrolytes imbalances. Recommendations: The necessity of providing critical care nurses with specialized training in fluids and electrolytes imbalance problems cannot be overstated. The study should be replicated on large sample and in different hospitals setting to generalize the results.

Keywords: *fluids, electrolytes, knowledge, homeostasis, nurses.*

INTRODUCTION

Fluids and electrolytes and acid base balance are fundamental to the process of life. They are necessary to maintain health and function of all body system. Fluids are vital to all forms of life, they help maintain body temperature and cell shape, and they help transport nutrients, gases, and wastes. Electrolytes play a vital role in maintaining homeostasis within the body. Help to regulate myocardial and neurological function, fluid balance, oxygen delivery, and acid base balance. The major electrolytes in our bodies are sodium, potassium and calcium (1).

Electrolyte imbalance, or water-electrolyte imbalance, is an abnormality in the concentration of electrolytes in the body. Electrolytes play a vital role in maintaining homeostasis in the body. They help to regulate heart and neurological function, fluid balance, oxygen delivery, acid–base balance and much more. Electrolyte imbalances can develop by consuming too little or too much electrolyte as well as excreting too little or too much electrolyte (2).

Fluid and electrolyte disorders are among the most common clinical problems encountered in the setting of intensive care. Critical disorders such as severe burns, trauma, sepsis, brain damage, and heart failure lead to disturbances in fluid and electrolyte homeostasis.

In addition, inappropriate administration of fluid and electrolytes should be considered in the diagnosis and treatment of fluid and electrolyte disturbances (3).

Critical illness is a life-threatening process that, in the absence of medical intervention, is expected to result in mortality or significant morbidity. It may be the product of one or more underlying pathophysiological processes; however, the end result is a multisystem progression that ultimately involves respiratory, cardiovascular and neurological compromise. Simple and preventative critical care is the most effective approach, considering that up to 40% of intensive care unit (ICU) admissions may be avoidable (4).

Significance of the Study Therefore this research was carried out in an attempt to assess the nurse's knowledge and practice regarding fluid and electrolyte imbalance among critically ill patients. Finding of this research might be beneficial in many ways: it will serve as a foundation or a data base for health professionals in this respect. It might aid in safe guarding such group of patients from these fatal complications. It could also help in planning and implementing care for those patients.

The aim of this study is to assess Nurses' Knowledge and Practice Regarding Care of Fluids and Electrolytes Imbalance among Critically Ill Patients.

SUBJECT AND METHODS

Descriptive exploratory research design was utilized in this study. This study was carried out at the ICU Medical and surgical units at El-Zagazig University Hospital. It is one of the largest hospitals in Egypt in this field, and it receives patients from all governorates of Egypt and other countries. It consists of 4 units.

First unit containing 24 beds: and the numbers of occupied beds not exceed 20beds/day. Total numbers of nurses are 39 bedside nurses. The second unit containing 5 beds: and the numbers of occupied beds not exceed 3beds/day. Total numbers of nurses are 3 bedside nurses. The third unit containing 6 beds: and the numbers of occupied beds not exceed 5 beds/day. Total numbers of nurses is 3 bedside nurses. The fourth unit containing 26 beds: and the numbers of occupied beds not exceed 23beds/day. Total numbers of nurses are 27 bedside nurses.

Subjects: Convenient sample about (60) of nurses working in critical care and surgical ICU units for more than 6 months, the available selected sample had different level of education.

Tools for data collection are: There are two tools were utilized to collect the data during the study:

Tool (I): Self-administered interview. It consists of two parts:

Part I: To assess nurse's demographic characteristics as age, gender, level of

education, marital status, years of experience in ICU.

Part II: Nurses knowledge regarding fluids and electrolytes imbalance.

This includes (29) questions about knowledge of nurses regarding fluids and electrolytes imbalance E.g. (Hypovolemia, Hypervolemia, Hyponatremia, Hypernatremia, Hypokalemia, hyperkalemia, Hypocalcemia, Hypercalcemia, Hypomagnesemia, Hypermagnesemia, Hypophosphatemia, Hyperphosphatemia).

Scoring system for tool I: assessment questions were scored as the following: Yes ` positive items ` = 1 grade and No ` negative items` = zero. Satisfactory knowledge score > 75%. Un Satisfactory knowledge score <75%

Tool (II) observational checklist: Observational checklist to assess nurse's practice regarding fluids and electrolytes imbalances. E.g. (checklist R/T fluid imbalances, checklist R/T sodium and chloride imbalances, checklist R/T potassium imbalances, checklist R/T calcium and phosphorus imbalances, checklist R/T magnesium imbalances.

Scoring system for tool II: for checklist about nurses practice regarding fluids and electrolytes imbalances questions were scored as the following: Done = 1 grade and Not done = zero.

Operational item: It includes the preparatory phase, content validity of the developed tool and reliability, pilot study and field work.

The preparatory phase: It includes reviewing of related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to develop tools for data collection. During this phase the investigator also visit the selected setting to get aquatinted with personal and the study setting.

Validity and reliability:

Reliability: is the consistency of the developed tools. The degree to which an instrument measures the same way each time it is used under the same condition. Validity: is whether or not the instrument measures what it is designed to measure. The study tools were tested face and content validity it was measured by a Jury of 5 experts. The following study tools were filled in and completed by the investigator throughout two stages: First stage: (interviewing questionnaire and knowledge assessment questionnaire were filled). It takes 15 – 20 minutes to fill. Second stage: (observational checklist and checklist about nurse's knowledge and practice regarding fluids and electrolytes imbalances). It takes 15 – 20 minutes to fill.

Interview questionnaire was designed to assess nurse's knowledge regarding fluids and electrolytes imbalances.

Observational checklist to assess nurse's level of practice regarding fluids and electrolytes imbalances.

Pilot study: A pilot study was carried out with 10% of the sample (6) nurses under study to test the applicability, clarity and efficiency of the tools. No modifications were done for used tool.

Field work: Study tools were filled in and completed by the investigator throughout two stages: First stage: (interviewing questionnaire and knowledge assessment questionnaire were filled). It takes 15 – 20 minutes to fill. Second stage: (observational checklist and checklist about nurse's knowledge and practice regarding fluids and electrolytes imbalances). It takes 15 – 20 minutes to fill.

Interview questionnaire was designed to assess nurse's knowledge regarding fluids and electrolytes imbalances.

Observational checklist to assess nurse's level of practice regarding fluids and electrolytes imbalances.

Administrative design: An official permission was obtained from the director of the Nasser Institute Hospital and Head of Intensive Care Units in which the study was conducted. A letter was issued to them from the faculty of Nursing, Helwan University explains the aim of the study for obtaining the permission for data collection.

Ethical consideration: An approval was obtained from the study subjects individually and scientific ethical committee of the faculty of nursing at Helwan University using a written informed consent obtained from each participant prior to data collection.

Results

Table (1): Demographic characteristics of the studied nurses (n=60)

Items		N	%
Age	18-25	24	40
	>25- 35	35	58.3
	More than 35	1	1.7
	Mean± SD	26.98 ±3.15	
Gender	**Male**	33	55.0
	Female	27	45.0
Educational level	Diploma of nursing	1	1.7
	Technical nursing institute	26	43.3
	Bachelor of nursing	33	55.0
	Master degree	0	0
	PHD	0	0
Marital status	Married	34	56.7
	Unmarried	26	43.3
Training courses related fluid & electrolyte balance	Yes	25	41.7
	No	35	58.3
Nursing Experience	Less than 1 year	1	1.7
	1 - <5 years	33	55.0
	5 - <10 years	20	33.3
	10 - 15 years	6	10.0
	Mean ± SD	5.45 ± 3.5	

Table (1) displays that more than half of the studied nurses (58.3%) were between >25- 35 years old with mean and standard deviation 26.98 ±3.15. similarly, 55% were male and had bachelor's degree of nursing. As well, 56.7% were married and 41.7% had attended training courses related fluid & electrolyte balance. Regarding nursing experience, 55% had 1 to less than 5 years old.

Figure (1) shows that two thirds of the studied nurses (66.7%) had unsatisfactory level of knowledge among studied nurses. On the other hand. 33% had satisfactory level of knowledge.

Figure (1): distribution of total knowledge among studied nurses

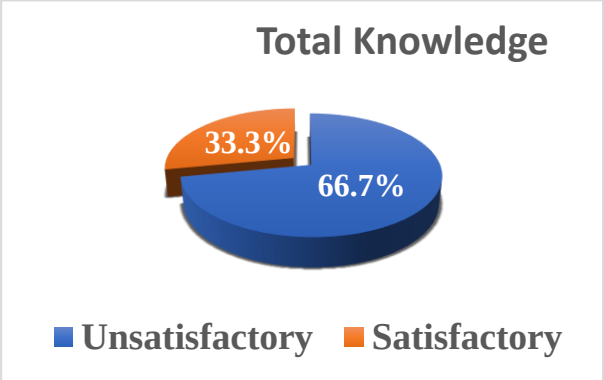

Figure (1) shows that two thirds of the studied nurses (66.7 %) had unsatisfactory level of knowledge among studied nurses. On the other hand (33 %) had unsatisfactory level of knowledge.

Figure (2): distribution of total practice among studied nurses

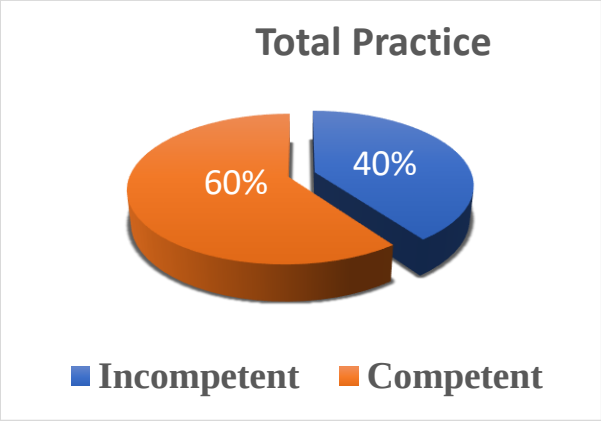

Figure (2) displays that more than half of the studied sample (60%) was competent and 40% were incompetent.

Table (2): Statistical Relation between total practice and total knowledge among studied nurses N=60

Items	Total Knowledge				X^2	P value	Sig.
	Unsatisfactory		Satisfactory				
	N	%	N	%			
Total practice							
Incompetent	24	60	0	0	20.0	0.000*	H.S
Competent	16	40	20	100			

>0.05 Not Significant ⩽0.05 Significant ⩽0.01 Highly Significant

Table (2) clarifies that there was highly statistically significant relation between total knowledge and total practice among studied nurses.

Table (3): Statistical Relation between total knowledge and Demographic characteristics among studied nurses n=60

Items		Total knowledge				X^2	P value
		Unsatisfactory N= 40		Satisfactory N=20			
		N	%	N	%		
Age	18-25	19	47.5	5	20	3.61	0.16
	>25- 35	20	50	15	75		
	More than 35	1	2.5	0	0		
Gender	**Male**	22	55	11	55	0.000	1
	Female	18	45	9	45		
Educational level	Diploma of nursing	1	2.5	0	0	1.98	0.37
	Technical nursing institute	15	37.5	11	55		
	Bachelor of nursing	24	60	9	45		
	Master degree	0	0	0	0		
	PHD	0	0	0	0		

Marital status	Married	22	55	12	60	0.13	0.71
	Unmarried	18	45	8	40		
Training courses related fluid & electrolyte balance	Yes	24	60	1	5	16.59	0.000**
	No	16	40	19	95		
Nursing Experience	Less than 1 year	0	0	1	5	6.68	0.08
	1 - <5 years	26	65	7	35		
	5 - <10 years	10	25	10	50		
	10 - 15 years	4	10	2	10		

P>0.05 Not Significant P ≤0.05 Significant P≤0.01 Highly Significant

Table (3) illustrates that there was highly statistically significant relation between total knowledge and training courses related fluid & electrolyte balance.

Table (4): Statistically Relationship between total practice and Demographic characteristics among studied nurses N=60

		Total practice				X^2	P value
		Competent N= 36		Incompetent N=24			
		N	%	N	%		
Age	18-25	12	50	12	33.3	2.14	0.34
	>25- 35	12	50	23	63.9		
	More than 35	0	0	1	2.8		
Gender	**Male**	13	54.2	20	55.6	0.01	0.91
	Female	11	45.8	16	44.4		
Educational level	Diploma of nursing	0	0	1	2.8	6.67	0.03*
	Technical nursing institute	6	25	20	55.6		
	Bachelor of nursing	18	75	15	41.7		
	Master degree	0	0	0	0		
	PHD	0	0	0	0		
Marital status	Married	15	62.5	19	52.8	0.55	0.45
	Unmarried	9	37.5	17	47.2		
Training courses related fluid & electrolyte balance	Yes	17	70.8	8	22.2	14.00	0.000**
	No	7	29.2	28	77.8		
Nursing Experience	Less than 1 year	0	0	1	2.8	6.81	0.07
	1 - <5 years	18	75	15	41.7		
	5 - <10 years	5	20.8	15	41.7		
	10 - 15 years	1	4.2	5	13.9		

P>0.05 Not Significant P ≤0.05 Significant P ≤0.01 Highly Significant

Table (4) represents that there was highly statistically significant relation between total practice and training courses related fluid & electrolyte balance. As well, there was statistically significant relation between total practice and educational level.

Table (5): Correlation between total practice and total knowledge among studied nurses

Items	R	P value
Knowledge & practice	0.577**	0.000

>0.05 Not Significant, ⩽0.05 Significant, ⩽ 0.01 Highly Significant

Table (5) demonstrates that there was positive correlation between total knowledge and total practice among studied nurses.

Discussion

Critical care nurses have a vital role in identifying and treating the physiologic stressors experienced by critically ill patients that disrupt homeostasis. The knowledge and practices of nurses about fluid monitoring and electrolytes administration is necessary to provide the good quality of patient care Hassan, (5).

The aim of the study was to assess nurses' knowledge and practice regarding care of fluids and electrolytes imbalance among critically ill patients.

As regard to age of the studied nurses, the result of current study showed that, more than half of the studied nurses were between 25- 35 years old with mean ± SD 26.98 ±3.15. From investigator point of view, young age might be due to the majority of nurses' work power that providing direct care for the patient in nursing field in our study are young while higher age category 'senior nurses' perform administrative role. This finding agreement with study done by Mohamed et al., (6) who conducted study about " developing nursing standard for maintaining fluid and electrolyte balance for critically Ill children at pediatric intensive care unit" and reported that less than half of the studied nurses their age range between 25 to 35 years old.

As regards to educational level, the result of current study showed that more than half of the studied nurses had bachelor's degree of nursing. From investigator point of view, this result might be due increase number of graduate from nursing faculties and new policies nurses had bachelor's degree of nursing worked at ICU. These results match with the results of the study done by Mohamed et al. (7), they revealed that the nurses′ knowledge regarding the assessment of fluid balance are found that the majority of the study group had high level regarding the fluid balance assessment post-educational program compared with pre-education. On other hand, this result disagreement with study by Hassan, (5) who conducted study about "assessment of nurses' knowledge and practice regarding fluids and electrolyte imbalance in critical care units" and showed that less than half of the studied nurses had secondary school diploma.

Concerning on nurses' answers related to fluids and electrolytes imbalance, the result of current study displayed that most of them had correct answer to fluids and electrolytes imbalance. From investigator point of view, this finding might be due to more than half of studied nurses had bachelor's degree of nursing. This finding in same line with study by Asfour, (8) who conducted study about "Fluid balance monitoring accuracy in intensive care units" and showed that most of the studied nurses had adequate knowledge related to fluids and electrolytes. On contrary, this finding disagreement Abd Elalem& Fouad, (9) who conducted study entitled "Effect of an instruction intervention about body fluid balance assessment on knowledge and practice among nurses in Intensive Care Unit" and represented that most of the studied nurses had unsatisfactory knowledge level regarding fluid balance monitoring.

As regards to nurses' practices regarding fluids and electrolytes imbalances , the result

of current finding displayed that about half of the studied nurses had done practices Measure of fluid intake and output/hour accurately". In addition, less than two thirds of them had done "auscultate chest sound" and more than three quarters had done “document the prescribed fluid on chart. From investigator point of view, these areas are of major importance in the prevention of fluid and electrolytes imbalance. This outcome in harmony with study by Eldsouky, et al., (10) who conducted study about "nurses’ knowledge and practice concerning fluid and electrolyte balance among patients with congestive heart failure" and report that majority of the nurses had adequate practices in the areas of assessment and documentation of patients’ vital signs, assessment of patient's care for patients receiving fluids.

Concerning on nurses’ practices regarding Monitoring an IV Site and Infusion, the result of present study revealed that majority of the studied nurses had done " Perform hand hygiene and put on PPE", and Check for bleeding at the site." on other hand, this result disagreement with study by Bayoumi, et al., (11) who conducted study about "changes in nurses' knowledge and clinical practice in managing local IV complications following an education intervention" and reported that most of the studied nurses had poor practices regarding Monitoring an IV Site and Infusion.

Regarding to total practice about fluids and electrolytes imbalances, the result of current study displayed that less than two thirds of the studied nurses were competent and rest of them were incompetent. From investigator point of view this may be due to increased level of qualification that help in improving nurses' skills regarding monitoring fluid intake and electrolyte levels and its related complications. This result agreement with study by Sheta, & Mahmoud, (12) that conducted study about "effectiveness of structured educational program on knowledge and practice among nurses regarding body fluid balance assessment for critically ill patients" and illustrated that most of the studied nurses had satisfactory practice about fluids and electrolytes balances.

The current study results revealed that there was highly statistically significant relation between total knowledge and training courses related fluid & electrolyte balance. from investigator point of view attending continuing nursing education courses and training programs have the benefits of keeping nurses up-to-date and refining their practices.

This finding was in harmony with study by Hosny, et al., (13) who conducted study about " assessment of nurses’ knowledge and performance regarding fluid and electrolyte management for cardiac surgery patients" and reported that there was highly statistically significant relation between total knowledge and training courses related fluid & electrolyte balance.

The present study revealed that there was positive correlation between total knowledge and "fluid parameters measurement, nursing interventions toward maintaining fluid balance, initiating a peripheral, venous access iv infusion, monitoring an I.V site and infusion and administering a blood transfusion". Similarly, there was positive correlation between total practice and "fluid parameters measurement, nursing interventions toward maintaining fluid balance, initiating a peripheral, venous access iv infusion, monitoring an I.V site and infusion and administering a blood transfusion". These findings matched with Elsayed& Saad, (14) who conducted study about “Effect of Hybrid Educational Program on Nurses' Performance regarding Caring of Patients with Fluid and Electrolytes Imbalance in Critical Care Units" and proved that there was positive correlation among items of knowledge and subscales of practice about Fluid and Electrolytes Imbalance.

Conclusion

In light of the current study, it can be concluded that, that two thirds of the studied nurses had unsatisfactory level of knowledge regarding fluids and electrolytes imbalance. Additionally, more than half of them had competent practices regarding fluids and electrolytes imbalances. So the study answered the research questions.

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