

Assessment of Nursing Staff Preparedness during Critical Situations at Pediatric Emergency Units

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Abstract

Background: Pediatric emergency department nursing is one of the most challenging areas of nursing care where caring for pediatric patients in intensive care environments requires advanced training and experience and good preparedness because the clinical picture for critically ill children can change rapidly. **Aim of this study:** was to assess the preparedness of nursing staff during critical situations at pediatric emergency units. **Design:** A descriptive design was followed to achieve the aim of this study. **Setting:** The study was conducted at Pediatric Emergency Units at children hospital affiliated to Ain Shams University Hospitals and Al-Matarya educational Hospital. **Sample:** A convenient sample composed of 50 nurses working at the previously mentioned settings. **Tools of data collection:** Pre- designed questionnaire sheet to assess knowledge, nurse's Attitude Likert Scale to assess attitude and observational checklists to assess practice of nursing staff. **Results:** The results of this study showed that, more than half of the studied nurses had unsatisfactory knowledge, negative attitude and incompetent practice regarding preparedness during critical situations at pediatric emergency. Furthermore, there was a statistical significant correlation between total studied nurses' knowledge, total attitude and total practice. **Conclusion:** More than half of the studied nurses had unsatisfactory level of knowledge, negative attitude and incompetent practice regarding pediatric emergency preparedness during critical situations. Moreover, there was statistically significant correlation between studied nurses' total knowledge, attitude and practice. In addition, there was statistically significant correlation between studied nurses' total knowledge, attitude, practice and their demographic characteristics. **Recommendations:** The study recommended the importance of implementing an educational training program to improve nurses' performance regarding preparedness during critical situations at pediatric emergency units.

Keywords: Pediatric emergency, Critical situations, Assessment Nurses' preparedness

Introduction

Preparedness is the field of emergency management that can best defined as a state of readiness to respond to crisis or any type of emergency situation. It is not only a state of readiness, but also a theme throughout most aspects of emergency management (Haddow, Bullock & Coppola, 2017).

Emergency care is an essential public health service that ensures equal and adequate care for all community members, including children. There is lack of pediatric essential emergency equipment and disparities in Emergency Departments (EDs) pediatric preparedness as associated with healthcare structure and community characteristics (Dudley et al., 2015).

Overcrowding in hospital EDs is a growing problem that results in delayed or obstructed care and costs much each year. Access to a primary health care reduces EDs use, but it is needed to

determine how to best direct pediatric patients to primary care services and improve the quality of primary emergency care (Metcalf, Henley & Wilkin., 2012).

Annually, about 26 million children visit EDs for urgent or emergent care, and among these children, nearly 10% of these visits result in admission or referral to another facility for care (Athey et al., 2001).

Many EDs have deficiencies in equipment and preparation for treating acutely ill and injured children. In addition, lack of pediatric subspecialists in critical care and emergency medicine. These deficiencies in access to experienced staff, equipment, and pediatric specialty expertise may result in delayed diagnoses and inappropriate medical management of specific injuries or conditions, particularly for critically ill and injured children (Dharmar et al., 2013).

The Guidelines for Preparedness were developed to provide the ED with an essential list of emergency equipment necessary to care for critically ill or injured children. These guidelines were the first professional mandate to establish pediatric emergency service and equipment standards, and provided an innovative emergency care standard for children (Krug et al., 2012). The guidelines assist in everyday emergency responses by identifying the gaps in equipment and identifying hospitals compliance to preparedness (Emergency Nurse Association, 2015).

Updated knowledge, communication and procedural skills, trained medical and paramedical staff, necessary equipment and medications and appropriate practice organization are vital cornerstone of preparedness in order to provide optimal care which may even save lives of pediatric patients (Eppich, Adler & McGaghie, 2006).

Significance of the study:

A child progresses from injury or illness to death faster than an adult; the smaller the child, the more quickly progresses from serious illness and injury to death. Thus, children's emergency care requires not only specialized training and equipment but also requires efficiency in the emergency system to ensure that the proper level of emergency care can be provided efficiently in an organized and timely manner (Greene et al., 2002; Young et al., 2004).

Fifty thousand children die in the United States yearly with 70% of deaths occurring within a hospital. Sixty percent of the deaths of hospitalized children occur in the emergency and Pediatric Critical Care Unit (Thienprayoon, Campbell, & Winick, 2015). Despite advances in medical technology and pediatric treatment for critical illness and injury, children die. However, treatments and procedures do not always result in survival and recovery, and in 53.6% of cases, the child dies (Chang, MacLeod, & Drake, 2013).

Aim of the Study:

The present study was conducted to fulfill the following aim:

Assess the preparedness of nursing staff during critical situations at pediatric emergency units through the following:

- 1- Assess knowledge of nursing staff regarding pediatric emergency preparedness during critical situations.
- 2- Assess practice of nursing staff preparedness during critical situations.
- 3- Assess attitude of nursing staff toward preparedness during critical situations.

Research question:

- 1- What is the knowledge, attitude and practice of nursing staff about preparedness at pediatric emergency?
- 2- Is there a relationship between knowledge and attitude about preparedness and practice at pediatric emergency?

Subjects and Methods

I-Technical design:

A-Research design:

A descriptive design was conducted to achieve the aim of this study.

B-Setting:

The study was carried out at pediatric emergency units in Children Hospital affiliated to Ain Shams University Hospitals and Al-Matarya Educational Hospital. The first setting was consisting of two rooms, one of them for critical situations and has four beds and the other room for other emergencies. The second setting was consisting of one room with four beds for all pediatric emergencies.

C- Subject:

A convenient sample of all available nursing staff at the previously mentioned settings from different age groups, gender, qualifications and agreed to participate in this study. Their number was 50 nurses.

D-Tools of data collection

1- Pre- designed questionnaire sheet:

Developed by the researcher thorough relevant review of literature. It was translated into simple Arabic language, it consisted of three parts:

Part I: Demographic data: This part included data about certain relevant demographic characteristics of : a- studied nurses include

age, gender, qualifications, years of experience in general nursing, years of experience in pediatric emergency and attendance of pediatric emergency training courses b- studied children include age, gender, level of education, ranking in the family, diagnosis and medical history .

Part II: It used to assess nursing staff level of knowledge regarding the preparedness at pediatric emergency units. It developed by the researcher based on the related literature.

Scoring system:

Each correct answer was given one mark and the incorrect answer was given zero.

≥ 80% = Satisfactory level of knowledge

<80% = unsatisfactory level of knowledge.

Part III: Nurses' Attitude Likert scale: It was to assess nurses' attitude regarding preparedness during critical situations at pediatric emergency units.

Scoring system:

The scale consisted of 15 statements 10 positive statements and 5 negative statements. Nurses were asked to respond to statements on a 5 points Likert scale ranged from 0 (strongly disagree) to 5 (strongly agree) with total score 75 marks. The total score was categorized into three categories as the following:

- ≥ 75 % had positive attitude.
- From 60% to <75% had neutral attitude.
- < 60% had negative attitude.

2- **Observational checklists:** to assess nursing staff practice regarding critical situations at pediatric emergency units. It was adopted from: (**American heart association 2016**), and it included the following:

- CPR checklist for infant and child.
- Choking checklist for infant and child.
- Respiratory emergency skills checklist.
- Sepsis skills checklist.
- Arrhythmias skills checklist.
- Shock skills checklist.

Scoring system:

Each step of observational checklist was given (1) mark for done correctly and (0) for done incorrectly or not done. The total score for nurse's practice was categorized into competent or incompetent practice as the following:

≥ 85% was considered competent.

< 85% was considered incompetent

II- Operational design:

Tools validity and reliability

To achieve the criteria of trustworthiness of the tools of data collection in this study, the tools were tested and evaluated for their face and content validity. It was tested through a jury of 3 experts from pediatric nursing department, Ain Shams University. The experts reviewed tools for clarity, relevance, comprehensiveness, simplicity and applicability; minor modifications were done. Testing reliability of the proposed tools was done statistically by Alpha Cronbach, s test. The knowledge and practice tools had a good internal consistency and tests reached (0.87 & 0.90) indicating acceptable reliability.

• Pilot Study:

A pilot study was carried out at the previously mentioned settings and consisted of 10% of the subjects (5 nurses). There was no modifications on tools were done based after pilot study, so that the nurses who included in the pilot study were included in the study group.

Field Work:

An interview was conducted with head nurses` of the previous mentioned settings to inform them about the purpose of the study and request their assistance to facilitate the work.

Interview with nursing staff before starting data collection and explain the purpose of the study, the nurses informed about the privacy of their information, nature of the study, their right to withdraw and the confidentiality of the subject data.

Nursing staff practice assessed indirectly and recorded by using observational checklist to observe the nurses while dealing with critical situations at pediatric emergency units, and structured questionnaire used to assess nursing staff knowledge and attitude of dealing with critical situations at pediatric emergency units.

Data collected at morning and afternoon shifts 2days/week for each setting. It started from beginning of July to the end of October 2019. The researcher was available from 9 to 1 o'clock at morning shifts and from 4 to 9 o'clock at afternoon shifts. The nurses fulfilled the knowledge assessment sheet in 15-20 minutes.

III-Administrative Design:

An official permission obtained from Faculty of Nursing, Ain Shams University to pediatric emergency director and nursing director of the previously mentioned settings in which the study conducted, explaining the purpose of the study and requesting the permission for data collection.

Ethical Considerations:

- The research approval was obtained from the ethical committee of faculty of nursing before initiating the study work.
- The researcher clarified the objectives and aim of the study to nurses included in the study.
- The researcher assured maintaining anonymity and confidentiality of subjects' data.
- Nurses were informed that they allowed choosing to participate or not in the study and they had the right to withdraw from the study at any time without giving any reasons.
- A written approval was taken from the studied nurses during fulfilling their questionnaire sheet.

IV- Statistical Design:

The data obtained was synthesized, statistically analyzed and presented in numbers and percentages in tables, figures and diagrams as required and suitable statistical tests was used to test the significance of results obtained. Test of significance was considered as following:

- Non-significant at $p > 0.05$, Significant at $p < 0.05$, Highly significant at $p < 0.01$.

Results

Table 1 shows the distribution of the demographic characteristics of the studied nurses. It shows that, the mean age of the studied nurses are 26.6 ± 1.2 years. Regarding years of experience at pediatric emergency this table illustrates that more than half of studied nurses (60%) have $5 < 10$ years of experience and more than two thirds of them (70%) are attending pediatric emergency training courses.

Table 2 shows that more than two thirds of the studied nurses (76%, 70%) have unsatisfactory level of knowledge at definition of pediatric triangle and warning signs of a child in a critical situation respectively and more than half of the studied nurses (62%, 62%, 60%, 52%) have unsatisfactory level of knowledge at definition of pediatric emergency, elements of

pediatric triangle, classifications of pediatric emergency, and medical team of pediatric emergency respectively.

Table 3 shows that more than half of studied nurses (66%, 52%) have unsatisfactory level of knowledge regarding the meaning of preparedness during critical situations & nursing responsibilities in preparedness during critical situations respectively. Meanwhile more than half of the studied nurses (58%) have satisfactory level of knowledge regarding the importance of preparedness during critical situations.

Table 4 illustrates that, there are highly statistically significant differences between the studied nurses' total knowledge and their age and attendance of pediatric emergency training courses, $p < 0.01$, also there are statistically significant differences between the studied nurses' total knowledge and their qualifications and years of experience at pediatric emergency, $p < 0.05$.

Table 5 illustrates that, there are highly statistically significant differences between the studied nurses' total attitude and their qualifications, years of experience at pediatric emergency and attendance of pediatric emergency training courses, $p < 0.01$, also there are statistically significant differences between the studied nurses' total attitude and their age, $p < 0.05$.

Table 6 illustrates that, there are statistically significant differences between the studied nurses' total practice and their qualifications, years of experience in general nursing, years of experience at pediatric emergency and attendance of pediatric emergency training courses, $p < 0.05$.

Table 7 illustrates that, positive correlation between total knowledge and attitude of the studied nurses regarding pediatric emergency preparedness during critical situations ($r=0.67$) with statistically significant differences $p = 0.04$.

Table 8 illustrates that, positive correlation between total knowledge and practice of the studied nurses regarding pediatric emergency preparedness during critical situations ($r=0.74$) with statistically significant differences $p = 0.02$.

Table 9 illustrates that, positive correlation between total practice and attitude of the studied nurses regarding pediatric emergency preparedness during critical situations ($r=0.69$) with statistically significant differences $p = 0.03$.

Table (1): Distribution of the Demographic Characteristics of the Studied Nurses (no =50)

Items	No	%
Age in years		
18 < 30	30	60
30 < 40	15	30
≥ 40	5	10
Mean ±SD	26.6±1.2	
Years of experience in general nursing		
< 5	13	26
5 < 10	31	62
≥ 10	6	12
Mean ±SD	7.9±1.3	
Years of experience at pediatric emergency		
< 5	15	30
5 < 10	30	60
≥ 10	5	10
Mean ±SD	8.2±0.8	
Attendance of pediatric emergency training courses		
Yes	35	70
No	15	30

Table (2): Distribution of the Studied Nurses according to their Knowledge Regarding Pediatric Emergency & critical situations (No=50)

Item	satisfactory		unsatisfactory	
	No	%	No	%
Definition of pediatric emergency	19	38	31	62
Classifications of critical situations in pediatric emergency	20	40	30	60
Medical Team of pediatric emergency	24	48	26	52
Definition of pediatric assessment triangle	12	24	38	76
Elements of pediatric assessment triangle	19	38	31	62
Warning signs of a child in a critical situation	15	30	35	70

Table (3): Distribution of the Studied Nurses according to their Knowledge Regarding Pediatric Emergency Preparedness during Critical Situations (no=50)

Item	satisfactory		Unsatisfactory	
	No	%	No	%
Meaning of preparedness during critical situations	17	34	33	66
Important of preparedness during critical situations	29	58	21	42
Nursing responsibilities in preparedness during critical situations	22	44	28	52

Table (4): Relation between the Studied Nurses' Total Knowledge Regarding Pediatric Emergency Preparedness during critical situations and their Characteristics

Items	Knowledge level				X ²	P Value
	Satisfactory (no=22)		Unsatisfactory (no=28)			
	No	%	No	%		
Age in years						
• 18 < 30	6	27.3	24	85.7		
• 30 < 40	12	54.5	3	10.7	17.53	**0.0001
• ≥ 40	4	18.2	1	3.6		
Gender						
• Male	4	18.2	11	39.3	2.61	0.1
• Female	18	81.8	17	60.7		
Qualification						
• Bachelor	8	36.4	5	17.9		
• Technical institute	4	18.2	16	57.1	7.81	*0.02
• Diploma nurse	10	45.4	7	25.0		
Years of experience at general nursing						
• < 5	7	31.8	6	21.4	6.01	0.23
• 5 < 10	10	45.4	21	75.0		
• ≥ 10	5	22.8	1	3.6		
Years of experience in pediatric emergency						
• < 5	4	18.2	11	39.3	6.01	*0.04
• 5 < 10	16	72.7	14	50.0		
• ≥ 10	2	9.1	3	10.7		
Attendance of pediatric emergency training courses						
• Yes	20	90.9	15	53.6	8.17	**0.004
• No	2	9.1	13	46.4		

(*) Statistically significant at p < 0.05

(**) Highly Statistical significant difference at p < 0.01

Table (5): Relation between the Studied Nurses' Total Attitude Regarding Pediatric Emergency Preparedness during Critical Situations and their Characteristics

Items	Attitude level						X ²	P Value
	Positive (no=10)		Neutral (no=26)		Negative (no=14)			
	No	%	No	%	No	%		
Age in years								
• 18 <30	2	20.0	19	73.1	9	64.3		
• 30 < 40	7	70.0	6	23.1	2	14.3	13.16	*0.04
• ≥ 40	1	10.0	1	3.8	3	21.4		
Gender								
• Male	4	40.0	5	19.2	6	42.9	3.01	0.22
• Female	6	60.0	21	80.8	8	57.1		
Qualification								
• Bachelor	6	60.0	4	15.4	3	21.4		
• Technical institute	3	30.0	16	61.5	1	7.2	21.10	**0.0003
• Diploma nurse	1	10.0	6	23.1	10	71.4		
Years of experience in general nursing								
• < 5	1	10.0	4	15.4	8	57.1	0.98	0.8
• 5 < 10	5	50.0	21	80.8	5	35.7		
• ≥ 10	4	40.0	1	3.8	1	7.2		
Years of experience at pediatric emergency								
• < 5	3	30.0	9	34.6	3	21.4	18.85	**0.001
• 5 < 10	6	60.0	15	57.7	9	64.3		
• ≥ 10	1	10.0	2	7.7	2	14.3		
Attendance of pediatric emergency training courses								
• Yes	8	80.0	22	84.6	5	35.7	10.95	**0.004
• No	2	20.0	4	15.4	9	64.3		

(*)Statistically significant at p<0.05

(**) Highly Statistical significant difference at p<0.01

Table (6): Relation between the Studied Nurses' Total Practices Regarding Pediatric Emergency Preparedness during Critical Situations and their Characteristics

Items	Practices level				X ²	P Value
	Competent (no=19)		Incompetent (no=31)			
	No	%	No	%		
Age in years						
• 18 <30	10	52.6	20	64.5	0.76	0.6
• 30 < 40	7	36.8	8	25.8		
• ≥ 40	2	10.6	3	9.7		
Gender						
• Male	4	21.2	11	35.5	1.16	0.27
• Female	15	78.8	20	64.5		
Qualification						
• Bachelor	9	47.4	4	12.9		
• Technical institute	5	26.3	15	48.4	7.34	*0.02
• Diploma nurse	5	26.3	12	38.7		
Years of experience at general nursing						
• < 5	1	5.3	12	38.7	6.85	*0.03
• 5 < 10	15	78.9	16	51.6		
• ≥ 10	3	15.8	3	9.7		
Years of experience in pediatric emergency						
• < 5	2	10.6	13	41.9	6.11	*0.04
• 5 < 10	15	78.8	15	48.4		
• ≥ 10	2	10.6	3	9.7		
Attendance of pediatric emergency training courses						
• Yes	17	89.4	18	58.1	5.53	*0.02
• No	2	10.6	13	41.9		

(*)Statistically significant at p<0.05

Table (7): Correlation between the Studied Nurses' Total Knowledge and Attitude Regarding Pediatric Emergency Preparedness during Critical Situations

Item	Total Knowledge	
	r	P Value
Total Attitude	0.67	*0.04

(*) Statistically significant at $p < 0.05$

Table (8): Correlation between The Studied Nurses' Total Knowledge and total practices Regarding Pediatric Emergency Preparedness during Critical Situations

Item	Total Knowledge	
	r	P Value
Total Practices	0.74	*0.02

(*) Statistically significant at $p < 0.05$

Table (9): Correlation between the Studied Nurses, Total Practices and Attitude Regarding Pediatric Emergency Preparedness during Critical Situations

Item	Total Practices	
	r	P Value
Total Attitude	0.69	*0.03

(*) Statistically significant at $p < 0.05$

Discussion

Pediatric critical care nursing is a science as well as an art. Nursing interventions support the care of critically ill child and nurses are instruments in ensuring that developmental and educational needs of children are met. Pediatric critical care nurse must have special skills and should be gentle to touch and performance (Harmon and curley, 2017).

The current study aimed to assess the preparedness of nursing staff during critical situations at pediatric emergency units.

Regarding demographic characteristics of the studied nurses, the current study clarified that more than half of the studied nurses were in the age group 18 < 30 years with mean \pm SD (26.6 \pm 1.2) years. These results disagreed with Paden et al., (2014) who mentioned that the majority of studied sample aged from 20 years to 25 years old. Also this finding disagreed with Cardiff, (2009) who studied "a survey of registered nurses, knowledge and attitudes regarding pain assessment and management" and mentioned that half of the studied sample was in the age group 26-35 years. These results attributed to the sample of the study as this age is the ideal age that the nurses can deal with the emergency cases as it become active and take a good experience from their works.

On assessing the nurses, attendance for pediatric emergency training courses, the finding of current study cleared that, more than two thirds

of them attended pediatric emergency training courses. This finding agreed with the study of Levin and Melnyk, (2009) who studied "strategies for advancing evidence-based-practice in clinical settings" and mentioned that the majority of the studied sample take training courses, this may be due to the study setting in Europe that no nurse can work before trained on such specialty. This finding might be that nurses started to understand the importance of training courses in developing their knowledge and practice or might be due to they were young age with few experience and wanted to develop themselves and the new generations had a new mind to have more courses, increase their level of education and having more certificates.

Regarding gender of the studied nurses, the current study cleared that, more than two thirds of them were female. This finding agreed with Perry, (2018) in a study entitled "distress and caregiver appraisal in pediatric critical care unit nurses when withdrawing life-sustaining treatment" who found that the majority of studied nurses were female and also agreed with McNeill, (2016) in a study entitled "Self-Efficacy and select characteristics in nurses who respond to a pediatric emergency" who found that the majority of participants were female. This might be due to the greater segment of nurses in Egypt was female and also related to the studying of nursing in Egyptian universities was exclusive for females only till few years ago and now there are male graduated nurses

As regard qualifications of the studied nurses, the current study cleared that, more than one third of them were technical institute and diploma nurses and more than one quarter of them were bachelor nurses. This finding disagreed with the finding of **Chermont, et al., (2009)** who studied “skin-to-skin contact on/or oral 25% dextrose for procedural pain relief for infants” and mentioned that more than half of the studied nurses were highly school education. These differences in result might be related to different types of nursing recruitment.

The current study findings of demographic characteristics of the studied nurses collectively disagreed with **Saleh, (2017)** in a study entitled for “Nurses perception regarding hypovolemic shock in children” who found that more than half of the studied nurses were in the age group < 25 years with mean \pm SD (21.32 \pm 2.9) years, more than half of them < 5 years’ experience and less than one quarter of them attended training courses. Also these findings disagreed with **Zaky, (2016)** in a study entitled “Nurses perception regarding pain management at emergency room children” who found that less than half of studied nurses in the age group 30-40 years, less than two thirds of them attended training courses and more than half held diploma nurses.

Regarding demographic characteristics of the studied children, the results of the current study showed that, the mean age of them was 2.2 \pm 1.6 years, near to half of them ranked as the second child in the family, more than two thirds in nursery level, more than half were females, more than one quarter had pneumonia, near to one fifth had RDS and the majority of them have no allergic history.

These findings agreed with those of **Bazaraa et al., (2012)** in a study entitled “Profile of patients visiting the pediatric emergency service in an Egyptian university hospital” who found that, most of children visited the emergency care unit in hospitals in Egypt at the age of 2 years and the main presentation of children in emergency was respiratory diseases. On the other hand these results disagreed with **Dharmar, (2012)** in a study entitled “Assessing quality of care provided to pediatric patients in the emergency department” who found that about one third of children visited the emergency unit were <10<16 years and more than half of them were male.

These findings attributed to this age is the most critical age that the children exposed to diseases and critical emergency care and children in this stage are more active and want to experience new things and might be due to bad environmental conditions and poor sanitation so the children exposed to pneumonia and the other diseases as gastro-intestinal diseases and heart diseases.

Regarding to the studied nurses, knowledge about pediatric emergency & critical situations, the results of the current study showed that, more than two thirds of them had unsatisfactory level of knowledge at definition of pediatric triangle and warning signs of a child in a critical situation and more than half of them had unsatisfactory level of knowledge at definition of pediatric emergency, elements of pediatric triangle, classifications of pediatric emergency, and medical team of pediatric emergency.

These findings showed that there is a need to be knowledgeable about the PAT, as it is an important assessment tool at pediatric emergencies and this was supported by **(Horeczko et al., 2013)** in a study entitled “The pediatric assessment triangle: accuracy of its application by nurses in the triage of children” , who reported that, the Pediatric assessment Triangle (PAT) is a rapid evaluation tool that establishes a child’s clinical status and category of illness to direct initial management priorities. Recently the PAT has been incorporated widely into the pediatric resuscitation curriculum. Although intuitive, its performance characteristics have yet to be quantified.

As regard to the studied nurses, knowledge about cardiopulmonary arrest, the current study cleared that, near three quarter of them had unsatisfactory level of knowledge regarding causes of suddenly cardiac arrest, more than half of them had unsatisfactory level of knowledge regarding signs that confirm sudden cardiac arrest, goal of CPR and preparations for CPR in all shifts and more than two thirds of them had unsatisfactory level of knowledge regarding signs of airway obstruction. These findings attributed to the most of children can exposed to the problems of cardiac risks and it constituted as a major problems facing the emergency care in hospitals so the nurses should have a good knowledge about cardiac diseases and dealing with at

emergency care units. This was supported by **Brummell et al., (2016)** in a study entitled “Cardiopulmonary resuscitation decisions in the emergency department” who reported that, the nurses must be trained and have a good knowledge on cardiac diseases and cardiac arrest at pediatric emergency care unit.

Concerning to the studied nurses, knowledge about septicemia, the study cleared that, more than two thirds of them had unsatisfactory level of knowledge regarding signs of septicemia and more than half of them had unsatisfactory level of knowledge regarding interventions in case of septicemia. These results agreed with (**Rubulotta et al., 2009**) in a study entitled “Public awareness and perception of sepsis” who mentioned that sepsis and its related signs are among the most common causes of pediatric mortality worldwide.

Regarding to the studied nurses, knowledge about shock, the study results cleared that, more than two thirds of them had unsatisfactory level of knowledge regarding signs of shock and more than half of them had unsatisfactory level of knowledge regarding causes of shock. These findings agreed with **Saleh, (2017)** who found that more than half of studied nurses did not know clinical manifestations and risk factors.

These findings disagreed with **Pizarro et al., (2015)** who studied “absolute and relative adrenal insufficiency in children with septic shock” and mentioned that the majority of studied sample reported right answers about causes of shock and also **Abulebda et al., (2014)** who studied “post-ICU addition fluid balance and pediatric septic shock outcomes: A risk-stratified analysis” and mentioned that the majority of studied sample understand and identify manifestations of shock. Also, these findings were disagreed with **Pomerantz et al., (2016)** who studied “hypovolemic shock in children: initial evaluation and management” mentioned that the majority of studied sample had good knowledge regarding total knowledge of shock.

Regarding to the knowledge of the studied nurses according to pediatric emergency preparedness during critical situations, the study cleared that, more than half of studied nurses had unsatisfactory level of knowledge regarding the meaning of preparedness, importance of preparedness and nursing responsibilities in preparedness during critical situations. These

findings agreed with **Ibrahim, (2014)** in a study entitled “Nurses knowledge, attitudes, practices and familiarity regarding disaster and emergency preparedness” who found that more than one third of the sample was unfamiliar to emergency preparedness terms & activities and there is a need for more educational programs in the area of emergency preparedness.

The study findings showed that there is need for enhancing their knowledge, this is supported by **Mcglown, (2011)** who studied “anticipate, respond, recover: healthcare leadership and catastrophic events” and mentioned that nurses are the largest manpower group in the health care team they need to be trained to equip themselves with required competencies during emergencies to rescue life and safeguard the health victims and to be prepared with adequate knowledge in order to respond to emergencies effectively. This might be due to lack of effective training courses and educational programs about preparedness during critical situations, lack of awareness about importance of preparedness and nurses not participating in the medical care planes so it should be more training courses and education.

Regarding knowledge of the studied nurses according to supplies & equipments used in pediatric emergency, the current study showed that, more than two thirds of them had unsatisfactory level of knowledge regarding tools location on the top of the emergency cart and more than half had unsatisfactory level of knowledge regarding responsibility for opening emergency cart for inspection and methods of checking the equipment. Meanwhile more than half of them had a satisfactory level of knowledge regarding equipment used during children's emergency. These findings attributed to the nurses must be of good information about the equipment used in caring of children for obtaining good results in treating children.

Regarding knowledge of the studied nurses according to emergency box, the current study cleared that, near to three quarters of them had an unsatisfactory level of knowledge regarding uses of emergency box and more than half of them had unsatisfactory level of knowledge regarding presence of emergency box and responsibility for inspection of emergency box.

These findings attributed to the knowledge about the emergency box is very important for rapid treatment and curing of the patient children, this was supported by (**Louwers et al., 2012**) in a study entitled “facilitators and barriers to screening for child abuse in the emergency department” who mentioned that, the contents of emergency box is very important for treatment of children.

Regarding knowledge of the studied nurses according pediatric emergency medications, the current study cleared that, more than half of them had a satisfactory level of knowledge regarding medications used during emergency, about half of them had a satisfactory level of knowledge regarding dosage of medications. Meanwhile more than two thirds of them had an unsatisfactory level of knowledge regarding locations of the list of dosage instructions and more than half of them had unsatisfactory level of knowledge regarding contents of the list of dosage instructions and more than half of them had unsatisfactory level of knowledge regarding replacing and storage of medications.

These findings agreed with **Moustafa, (2017)** in a study entiteled “medication preparation errors among staff nurses at neonatal intensive care units” who mentioned that the majority of the studied nurses had incorrect answer regarding to medication storage, three quarters had incorrect answer regarding ordering medications and more than two thirds of them didn’t know information before medication administration. These findings agreed with **Muzio and Simone, (2016)** who studied “medication errors in intensive care units: nurses training needs” and stated that the studied nurses had inadequate knowledge about drug administration despite the importance of appropriate pharmacological knowledge, which is the basis of safety.

Concerning the total level of knowledge of the studied nurses regarding to pediatric emergency preparedness during critical situations, the current study showed that, more than half of them had unsatisfactory level of knowledge. This finding agreed with **Ibrahim, (2014)** as the study participants showed lack of their knowledge level in preparedness. This finding also agreed with **Burnock, (2014)** in a study entitled “educating nursing students on emergency preparedness: a pilot program” who found that

vast majority of the studied sample reported had not personal knowledge or plan about preparedness.

From the researcher point of view, this might be due to lack of effective training courses and educational programs about preparedness during critical situations, lack of awareness about importance of preparedness, the wide base of nurses, education in Egypt is diploma, high turnover of nurses and the authorized administrative staff didn’t give nurses the opportunity for participating in the medical care plans or motivating them for more studying and lack of enthusiasm to learn new skills and knowledge.

Concerning the studied nurses, attitude about pediatric emergency preparedness during critical situations, the current study findings cleared that, more than one quarter of them agreed that there should be knowledge about critical situations and preparedness, should conduct training program, should have the potential to solve problems and deal with unexpected events, the role of emergency pediatric nursing during critical situations is secondary, the most important is the doctor and more than one third of them agreed that it is not necessary to take precautions.

These findings disagreed with **Ibrahim, (2014)** who found that more than two thirds agreed to the need to knowledge about preparedness and should be adequately prepared, more than three quarters agreed to training is necessary and to know potential hazards should be identified and dealt with it, more than half agreed to emergency management is for all healthcare team.

While, the finding of the studied nurses according to the total attitude regarding pediatric emergency preparedness during critical situations cleared that, more than half of them have negative attitude. These findings attributed to the differences in experiences of the nurses in their awareness by the work that occurs in emergency departments, overloading of work and lack of motivation.

Regarding the studied nurses, practice about CPR for infant and child, the findings of the current study showed that, more than two thirds of them had incompetent level of practice regarding CPR for infant and more than half of them had

incompetent level of practice regarding CPR for child, this might be due to lack of continuous training courses and lack of time during critical situations.

These findings agreed with **Farag, (2018)** in a study entitled “competency of nursing care activities at neonatal intensive care units: an assessment study” who found that more than half of studied nurses were incompetent in resuscitation and disagreed with **Kim et al., (2013)** who mentioned in a study entitled “Assessing the capacity for newborn resuscitation and factors associated with providers, knowledge and skills: across sectional study in Afghanistan” that most of the nursing providers were excellent in resuscitation.

In the researcher point of view, resuscitation considered to be a strong predictor of providers, knowledge and practical skills and it is a high impact intervention that can reduce children’s deaths, so that continuous training (BLS) for all nurses is a very important step.

Concerning the studied nurses, practice for child with sepsis, the current study showed that, about one third of them had competent level of practice. This finding disagreed with **Farag, (2018)** in a study entitled “competency of nursing care activities at neonatal intensive care units: an assessment study” who found that less than one third of the studied nurses were competent in the care for sepsis. Also, this finding disagreed with **Saha and Padbury, (2014)** in a study entitled “Neonatal sepsis problem with new insights” who mentioned that only less than one third of the studied nurses were competent.

On assessing the studied nurses, practice for child with shock, the current study showed that, more than two thirds of them had incompetent level of practice. This might be due to not understanding the types of shock and differentiate between them and lack of continuous training courses. This finding agreed with **Saleh, (2017)** who found that about two third of the studied nurses could not manage shock and also agreed with **Brierley et al., (2009)** who studied “clinical practice parameters for hemodynamic support of pediatric and neonatal septic shock” and mentioned that the majority of study sample could not evaluate and manage the shock.

Concerning the studied nurses total practices regarding pediatric emergency preparedness during critical situations, the study showed that, more than half of them had incompetent level of practices. This finding disagreed with **Mirlashari et al., (2016)** who mentioned in a study entitled “clinical competence and its related factors of nurses in neonatal intensive care units” that more than two thirds of the total nurses were competent.

From the researcher point of view, emergency pediatric nurses should be with high practical skills and competent as the deterioration of children’s health is rapid and need professional care correct intervention, this is supported by **Wheeler, (2005)** who mentioned in a study “Pediatric nurses’ attitudes, practices, and barriers regarding the care of infants and children living with life-threatening conditions and their families” that there is critical need for competent nurses to serve children with life-threatening conditions.

Also, this finding attributed to the differences of experience of nurses about the health care precautions in emergency care units, also due to the presences of new technique used in health care units that, the knowledge about this new technique differ from nurse to another according to the experience of them, their qualifications and variance according to their level of knowledge.

Moreover, this might be due to that there is no orientation program before assigning work to pediatric emergency, shortage of staff which lead to work overload, guidelines books were unavailable, lack of supervision and continuous evaluation, most of nurses hadn’t interest and motivation in work, insufficient financial reward, lack of in-service training nurses complains of overlapping of the activities by non-nursing activities, poor management of their time and unknown job description.

Regarding the relation between the studied nurses, total knowledge and their characteristics, the present study findings revealed that, there were highly statistically significant differences between their total knowledge and their age and attendance of pediatric emergency training courses, $p < 0.01$, also there were statistically significant differences between their total knowledge and their qualifications and years of experience at pediatric emergency, $p < 0.05$.

These findings agreed with **McNeill, (2016)** in a study entitled “Self-Efficacy and select characteristics in nurses who respond to a pediatric emergency” who found that there was a positive correlation between knowledge and years of certification, years of experience, years of pediatric experience and qualifications. Also, these findings agreed with **Stanley and Pollard, (2013)** in a study entitled “Relationship between knowledge, attitudes, and self-efficacy of nurses in the management of pediatric pain” who found that a significant relationship between knowledge, years of pediatric nursing experience.

Pertaining to the relation between the studied nurses, total attitude and their characteristics, the present study revealed that, there were highly statistically significant differences between their total attitude and their qualifications, years of experience at pediatric emergency and attendance of pediatric emergency training courses, $p < 0.01$, also there were statistically significant differences between their total attitude and their age, $p < 0.05$.

These findings agreed with **van Schaik et al. (2011)** in a study entitled “Interprofessional team training in pediatric resuscitation; A low-cost, in situ simulation program that enhances self-efficacy among participants” who found that the nurses and the pediatric residents reported a significant increase in self-efficacy and attitude after the simulation program training.

Also, these findings agreed with **Cruz et al., (2013)** in a study entitled “Facilitating the career transition of second-career students into professional nursing” who found the self-efficacy scores increased when an internship was part of the program.

Pertaining to correlation between the studied nurses, total knowledge, total attitude and total practice, this study revealed that, positive correlation between total knowledge and attitude of the studied nurses ($r=0.67$) with statistically significant differences $p=0.04$, positive correlation between total knowledge and practice of the studied nurses ($r=0.74$) with statistically significant differences $p=0.02$ and positive correlation between total practice and attitude of the studied nurses regarding pediatric emergency preparedness during critical situations ($r=0.69$) with statistically significant differences $p=0.03$.

These findings disagreed with **Stanley and Pollard, (2013)** who found that there was no significant relationship between knowledge and attitude. These findings attributed to the good knowledge of nurses about practices and attitude regarding pediatric emergency preparedness during critical situations gave good results for handling children in emergency care conditions. As nurses who had satisfactory level of knowledge also had satisfactory level of practice and attitude.

This study showed that, the studied nurses had lack of knowledge, attitude and practice regarding preparedness during critical situations at pediatric emergency units and this is supported by **McNeill, (2016)** in a study entitled “Self-efficacy and select characteristics in nurses who respond to a pediatric emergency” who found that there is lack of nurses’ confidence in the practice of pediatric emergency skills, lack of confidence related to their ability to respond to pediatric emergencies and poor performance in pediatric emergency situations.

In summary; the findings of the present study revealed that there is a need to focus on the development of nursing staff knowledge, practice and attitude regarding preparedness during critical situations at pediatric emergency units, so the effort should be directed towards enhancing performance among nurses. The nurses must have access to updated information, learning resources and continuous educational opportunities.

Conclusion

Based on this study finding, it can be concluded that:

More than half of the studied nurses had unsatisfactory level of knowledge, negative attitude and incompetent practice regarding pediatric emergency preparedness during critical situations. Moreover, there was statistically significant correlation between studied nurses' total knowledge, attitude and practice. In addition, there was statistically significant correlation between studied nurses' total knowledge, attitude, practice and their demographic characteristics.

Recommendations

The result of this study projected the following recommendations:

- Implementing an educational Training program for nurses to improve their

performance regarding pediatric emergency preparedness during critical situations.

- Continuous training of nurses working at pediatric emergency units about proper use of supplies and equipment.
- Further study is recommended on a large sample to evaluate the reflection of educational training program regarding pediatric emergency preparedness during critical situations on nurses' performance and consequently on the patients outcomes.
- Close supervision & teaching on spot is needed to ensure that quality of care is provided by nurses while managing pediatric patients during critical situations at pediatric emergency units.
- Establishing protocols, policies and guidelines for preparedness during critical situations at pediatric emergency units in a simplified and comprehensive booklet.

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