

Effect of an Educational Program on Emergency Nurses' Performance Regarding Advanced Care of Trauma patients

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ABSTRACT

Back ground: Emergency nurses around the world are responsible for providing essential care to trauma patients with the goal of reducing death and disability due to injury. Though their work is not often easy, they remain committed to using knowledge and experience to make a positive difference for patients, families, and communities. **Aim:** This study aimed to evaluate the effect of an educational program on emergency nurses' performance regarding advanced care of trauma patients. **Design:** A quasi-experimental research design was used. **Sample:** This study included a convenience sample of male and female nurses N (35) working at the Emergency department at Alaraby Hospital at Elmenofia city in Egypt, whom were accepted to be included in the study. **Setting:** Data were collected from the emergency department in El-Araby international Hospital. **Tools:** three tools were used for data collection, (I) Nurses' Demographic Characteristics Sheet, (II) knowledge Self- Administered Assessment Questionnaire, (III) Nurses' practice observational checklist. **Results:** This study represented that there were a highly statistically significant improvement post an educational program regarding studied nurses' performance toward advanced trauma care as the almost of the study subjects (91.4%) were having satisfactory level of knowledge as well as almost of them (97.1%) were having competent level of practice regarding care of advanced trauma patients. Furthermore there is highly statistically significant relation between nurses' total knowledge and total practice for care of patients with advanced trauma at post and follow up implementation of educational program ($p=0.001^{**}$ & $p=0.000^{**}$ respectively). **Conclusion:** It can be concluded that, implementation of the educational program has statistically significant affection on the level of emergency nurses' performance regarding advanced trauma care. **Recommendation:** The study recommended continuous educational programs should be planned on regular basis to nurses' caring of traumatic patients for enhancing emergency nurses' knowledge and practice to achieve high quality of care.

Keywords: Nurses' performance, Educational program, Advanced care, Trauma

Introduction

The trauma patient is unique because of the nature of the injuries, the suddenness of the traumatic event, and the multiplicity of health care professional required to organize and implement an effective plan of care from the scene of injury through reintegration into the community. The hope for survival and the physical and emotional recovery of the trauma patient depend on the collaborative efforts of the trauma nurses, providers, therapists, and others who constitute the trauma team. Coordination of care by a primary nurse, nurse practitioner, trauma coordinator, or other advanced practice nurse is an effective model for delivering efficient and high quality care to the trauma patients through collaborative practice (McQuillan & Makic, 2020).

According to the most current information from the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), more than nine people die every minute from injuries or violence, and 5.8 million people of all ages and economic groups die every year from unintentional injuries and violence. The burden of injury is even more significant, accounting for 18% of the world's total diseases. Motor vehicle crashes alone cause more than 1 million deaths annually and an estimated 20 million to 50 million significant injuries (**Centers for Disease Control and Prevention, 2018**).

The primary goals of trauma management are to rapidly assess injuries, determine management priorities, and provide quality care services. A strategy to reduce waiting and stay times in the emergency department is the use of early triage to provide patients with early, safe, and quality specialized service (**Wang et al., 2018**). The integral components of the prehospital report must be communicated and acknowledged to allow for careful preparation, triage, and planning for the patient's arrival prior to the initial assessment being completed. The assessment continues with the secondary survey once all life-threatening injuries and vital functions have been addressed. Delay in transferring any patient to perform an in-depth diagnostic evaluation, unless it is to enhance the ability to resuscitate, stabilize, and ensure the patient's safe transfer, should never occur (**American College of Surgeons, Committee on Trauma, 2017**).

The multiple trauma patients should be treated in rapidly and depending on the biomechanics of the trauma and the anatomic region that has been reached, the severity of the event causes great damage to their vital functions and it may cause, because of delayed care, irreversible sequels and even death (**Carla, Alexandre, Silva, Oliveira, & Barros, 2018**).

Accident and Emergency (A & E) nurses are usually the first hospital personnel to meet injured patients arriving from an accident scene. Skilled trauma nurses must swiftly and accurately assess the patient's injuries and decide upon the urgency with which they will be treated. A protocol is described which facilitates safe, prioritized assessment and nursing management of life-threatening injuries (**Muñiz, 2017**).

Nurses working in the acute trauma setting are an essential component of the trauma resuscitation team. Trauma nurses must use well-developed assessment, management, and team communication skills to provide optimal care to the critically ill trauma patient. Skilled communication in interdisciplinary teamwork is the cornerstone of safe, high-quality health care. Ineffective teamwork and communication failures account for a majority of health care errors in high-risk settings, particularly in the trauma resuscitation setting (**Institute of Medicine (US) Committee on Quality of Health Care in America, 2017**).

Aim of the study:

This study was carried out to determine the effect of an educational program on emergency nurses' performance regarding advanced care of trauma patients through:-

1. Assessment of emergency nurses' performance (knowledge& practice) regarding advanced care of trauma patients.
2. Develop and implement an educational program for emergency nurses' performance (knowledge& practice) regarding advanced care of trauma patients.
3. Evaluate the effect of the educational program on the nurses' level of performance (knowledge& practice) regarding advanced care of trauma patients

Research Hypothesis:

At the end of the study;

The level of knowledge and practice regarding advanced care of trauma patients will be higher among the studied nurses after implementation of the educational program than before implementation as measured by (**Tool II and Tool III**).

Operational definition

Nurses' performance: Refers to satisfactory level of knowledge and competent level of practice in the delivering care for traumatic patients as measured by (**Tool II and Tool III**).

Methodology:

Research design:

A Quasi-experimental one group pre-test, post-test design was used for this study.

Setting:

This study was conducted at the emergency department in El- Araby Hospital at Elmenofia governorate in Egypt.

Subjects:

A convenience sample that consisted of all available staff nurses (no.35) from both gender, who were present at the beginning of the study and working at the emergency department in El-Araby Hospital. The staff nurses have different qualification (diploma nursing, technical institute, and bachelor degree), with different age and years of experiences.

Tools for data collection:

Data were collected using the following tools

Tool I: Nurses' Demographic Characteristics Sheet:

This tool was developed by the researcher to cover the personal data and the characteristics of the studied nurses as (age, gender, marital status, qualification, job categories, and years of nursing experience in the emergency department and attendance of trauma care training courses.

Tool II: knowledge Self- Administered Assessment Questionnaire (pre, post & follow up tests) (Appendix II):-It was used to assess the nurses' knowledge regarding advanced trauma care in the emergency department, It consists of three parts:-

The first part: Preparation and Triage Assessment Questionnaire: It was developed by the researcher based on the review of related literature (**Society of Trauma Nurses, 2018**) to assess the emergency nurses' level of knowledge regarding preparation and triage for trauma patients.

The second part: Primary Survey Assessment Questionnaire: It was developed by the researcher based on the review of related literature (**Society of Trauma Nurses, 2018**) to assess

the emergency nurses' level of knowledge regarding the Assessment and Management Sequence of trauma patient.

The Third part: Secondary Survey Assessment Questionnaire: It was developed by the researcher based on the review of related literature (**Society of Trauma Nurses, 2018**) to assess the emergency nurses' level of knowledge regarding the Assessment and Management Sequence of trauma patient that include obtaining history about the mechanism of injury that can provides clues to anticipated injuries and complete physical examination.

Tool III: Nurses' practice observational checklist (pre, post & follow up tests): It was including three sections:

1st section: Preparation and Triage Observational Checklist: this tool was adapted from (**Student Course Manual for Advanced Trauma Care for Nurses, 2018**) to assess the actual nurses' practice in preparation and triage phase for receiving trauma patients, it consists of 12 items.

The second section: Primary Survey Observational Checklist: This tool was adapted from (**Student Course Manual for Advanced Trauma Care for Nurses, 2018**) to assess the actual nurses' practice during primary survey.

The third section: Secondary Survey Observational Checklist: This tool was adapted from (**Student Course Manual for Advanced Trauma Care for Nurses, 2018**) to assess the actual nurses' practice during secondary survey. it contains 2 main items as following; history taking and vital signs.

Scoring system

All questions was measured and divided by the number of questions to obtain the mean knowledge and practice of each nurse. Knowledge and practice below 80% was considered unsatisfactory while those equal to or above 80% was considered satisfactory.

Operational Design

The operational design of this study included preparatory phase, content validity, pilot study, and field work.

Preparatory Phase

It included reviews of current and post local and international related literatures, and theoretical knowledge of various aspects of the study using books, articles, and internet periodicals and magazines in order to develop the data collection tools .

Content Validity

It was ascertained by a Jury consisting of nine experts of professors and lecturers from the medical surgical department; Faculty of nursing and from medicine, surgery and neurology department Faculty of Medicine, Helwn University who revised the tools for clarity, relevance, comprehensiveness, understanding and ease for implementation, according to their opinion modifications were applied .

Pilot study

Pilot study had been undertaken before starting the data collection phase. It was carried out on 10% of participants to test the feasibility and applicability of the first and second tools and to estimate the time needed to complete the tools according to the pilot study necessary modifications were done. The subjects included in the pilot study were excluded from the study sample.

Field work description

Field study was conducted from the beginning of August (2018) to the end of August (2019). The study was carried out through the following phases :

I)Assessment phase

In this phase after finalization of the tools, the researcher assessed nurses' learning needs. The nurses practice observational checklist was used prior to administration of the knowledge questionnaire sheet to ensure the maximal realistic observation of nurses' practice and minimize the possibility of bias. Direct observation was conducted by the researcher to appraise nurses' practice level during initial assessment and management of trauma patients.

The program was applied at the day shift.it was carried out through a scheduled and specific days. The researcher was filling out the observational checklist and documented nurses practice related to preparation and triage for receiving trauma patients, their practice in primary survey and secondary survey.

II: The planning phase (The second phase):

According to the initial assessment, the content of the educational program was designed. The training program was developed by the researcher and the content was written in simple Arabic language and consistent with the related literatures. Moreover, met nurses' needs and their level of understanding. This program booklet covered the knowledge and practice related to advanced trauma care as well it is developed to be a guide and a reference for emergency nurses.

III. Implementation phase (The third phase)

The educational program was presented in theoretical and practical sessions. (35) subject was divided into small groups (the total number was 8 groups), Each group was included 5 nurses, each group obtained 6 sessions (4 theoretical session and 2 practical session) to become for all groups: 6 sessions \times 7 groups = 42 sessions. For theory (2hrs \times 4 \times 7 groups= 56hrs, for practice (3hrs \times 2 \times 7 groups= 42 hrs.), so the total hours: 56+42 = 98 hrs.

Evaluation phase:

- The effectiveness of the educational program on the emergency nurses' performance regarding advanced trauma care was evaluated by comparing the assessment tools of the

nurses' knowledge and practice. It was filled 3 times; pre the program implementation; immediately post the program implementation and after 3months later (1st follow up).

- The nurses' observational checklist was filled by the researcher through observing the nurses during their practice from receiving trauma patients till transferring to definitive unit as ICUs or operating rooms. The researcher observed each nurse at different occasion while performing each procedure. The observation of the researcher was no participation; maintain distance, no interaction, and concealing the role to avoid the bias of participation that could compromise the overall reliability of the data collected.
- The nurses' self-administered questionnaire was filled by nurses themselves. The time allowed for answers was 1.5 hour and then the researcher collected the sheet and checked for any unanswered questions.

- **Administrative Design:**

- The present study was approved by the scientific research committee of the faculty of Nursing – Helwan University. Approval permission the director of El Araby international Hospital to conduct the study was obtained from the based on the official letter after explanation the aim and nature of the study. Informed consents were obtained from the nurses before the beginning of the study after explanation of the purpose and nature of the study

- **Statistical analysis:**

- The data obtained were synthesized, analyzed, and presented in numbers; percentage in the form of tables, figures and diagram as required and suitable statistical tests were used to test the significance of results obtained using SPSS

- **Limitations of the study:**

- The small sample size and representation of one geographic area decrease the generalizability of the study findings.
- The related Arabic references are very limited, and no references in the hospitals.

- **Statistical design:**

Data were analyzed using Statistical Program for Social Science (SPSS) version 23

Data were expressed as frequency and percentage.

- **The following tests were done:**

- The **Chi Square** statistic is commonly used for testing relationships between categorical variables.
- **Cochran's Q test** is used to determine if there are differences on a dichotomous dependent variable e.g. ("pass" and "fail" & "low" and "high") between three or more related groups. It can be considered to be similar to the one-way repeated measures ANOVA, but for a dichotomous rather than a continuous dependent variable
- Spearman's is a non-parametric test used to measure the strength of association between two variables, where the value $r = 1$ means a perfect positive correlation and the value $r = -1$ means a perfect negative correlation.
- Probability (P-value)

- P-value ≤ 0.05 was considered significant.
- P-value ≤ 0.001 was considered as highly significant.
- P-value > 0.05 was considered not significant.

Results:

- **Table 1** shows that there was slightly less than two thirds 65.7% of the studied nurses were between 20-30 years with mean age 28.51 ± 7.74 years. As well as slightly more than three quarters 77.1% were males. As regards to marital status majority of the studied nurses 71.4 % were married. More than half 57.1% had technical institute and less than one third 31.4% had bachelor of nursing. Concerning years of experience more than on third had experienced more than 10 years with mean 4.95 ± 3.86 . Adding to that more than half 54.3% attended training course and 73.7% from nurses who attended training courses made use of from courses.
- **Figure 1** shows that less than half of the studied nurses 42.9% had satisfactory level of knowledge regarding nurses' total knowledge regarding advanced care of trauma patients at pre implementation that increased to 91.4% of the studied subjects at post implementation then decreased to 85.7% at follow up implementation of educational program.
- **Figure 2** shows that slightly more than half of the studied nurses 51.4% had competent level of total practice regarding advanced care of trauma patients at pre implementation that increased to 97.1% of the studied subjects at post implementation then decreased to 88.6% at follow up implementation of educational program.
- **Table 2** clarifies that there is a statistically significant relation between nurses' total level of knowledge and total level of practice for care of patients with advanced trauma at pre implementation of educational program ($\chi^2 = 8.57$, $p = 0.003^*$). While, there is highly statistically significant relation between nurses' total knowledge and total practice for care of patients with advanced trauma at post and follow up implementation of educational program ($\chi^2 = 10.98$, $p = 0.001^{**}$ & $\chi^2 = 27.09$, $p = 0.000^{**}$ respectively).
- **Table 3** shows that there is significant positive correlation between emergency nurses' total knowledge and total practice for care of patients with advanced trauma at pre, post and follow up implementation of educational program.
- **Table 4** reveals that there is highly statistically significant relation between age, marital status, level of education, years of experience, training courses and nurses knowledge regarding triage ($\chi^2 = 21.6$, $P = .000$ & $\chi^2 = 16.25$, $P = .000$ & $\chi^2 = 19.88$, $P = .000$ & $\chi^2 = 28.55$, $P = .000$ & $\chi^2 = 24.82$, $P = .000$ respectively) at pre implementation. Also, there is highly statistically significant relation between level of education, benefits from courses and nurses knowledge regarding triage ($\chi^2 = 27.24$, $P = .000$ & $\chi^2 = 19$, $P = .000$ respectively). As well as, there is statistically significant relation between years of experience, training courses and nurses knowledge regarding triage ($\chi^2 = 12.27$, $P = .002$

& $\chi^2 = 6.92$, $P = .008$ respectively) at post implementation. Whereas there is highly statistically significant relation between level of education, years of experience, training courses and nurses knowledge regarding triage ($\chi^2 = 14.42$, $P = .001$ & $\chi^2 = 30.54$, $P = .000$ & $\chi^2 = 16.62$, $P = .000$ respectively). Besides, there is statistically significant relation between age, marital status, benefits from training courses and nurses knowledge regarding triage ($\chi^2 = 7.30$, $P = .007$ & $\chi^2 = 5.60$, $P = .01$ & $\chi^2 = 6.10$, $P = .01$ respectively) at follow up implementation of educational courses.

- Table (1): **Frequency and Percentage Distribution of Demographic Characteristics of the Studied Nurses (n=35)**

Items	N	%
Age\		
20-30	23	65.7
31-40	12	34.3
Mean \pm SD	28.51 \pm 7.74	
Sex		
Male	27	77.1
Female	8	22.9
Marital status		
Single	10	28.6
Married	25	71.4
Widow	0	0.0
Divorced	0	0.0
Level of education		
Diploma	4	11.4
Technical institute	20	57.1
Bachelor of nursing	11	31.4
Others	0.0	0.0
Years of experience		
Less than 5	11	31.4
6-10	10	28.6
More than 10	14	40.0
Mean \pm SD	4.95 \pm 3.86	
Training courses		
Yes	19	54.3
No	16	45.7
Benefits from courses n=19		
Yes	14	73.7
No	5	26.3

Figure (1): Percentage Distribution of the Studied Nurses' Total level of Knowledge Regarding Advanced care of Trauma Patients

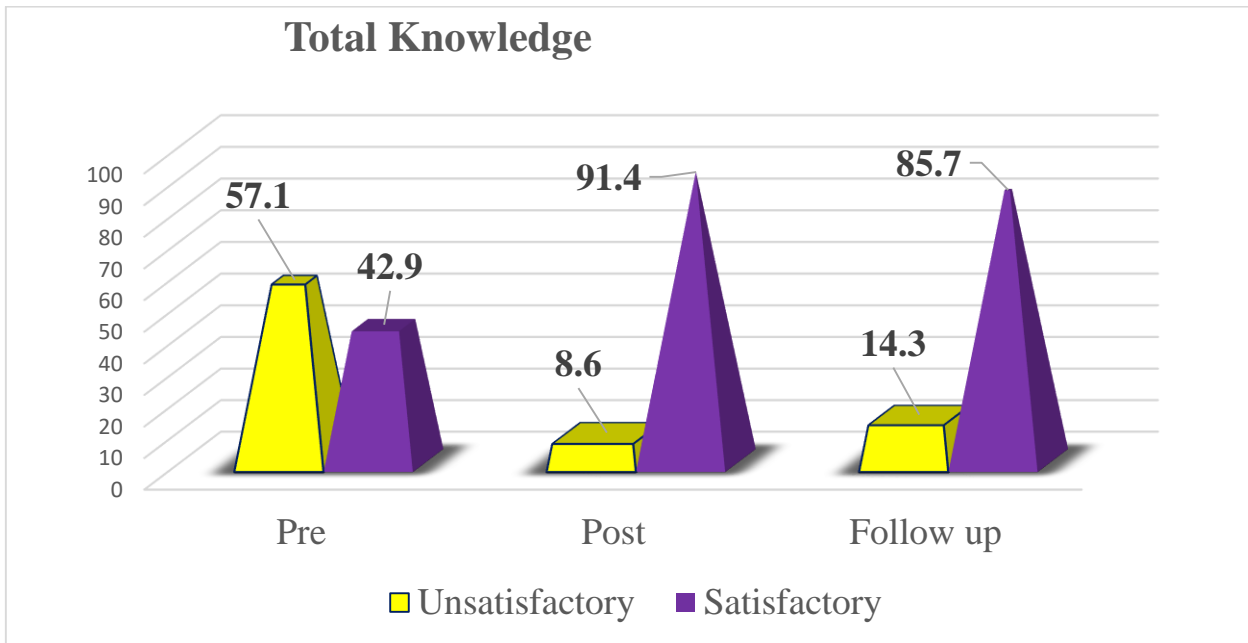


Figure (2): Percentage Distribution of the Studied nurses' Total level of practice regarding advanced care of trauma patient

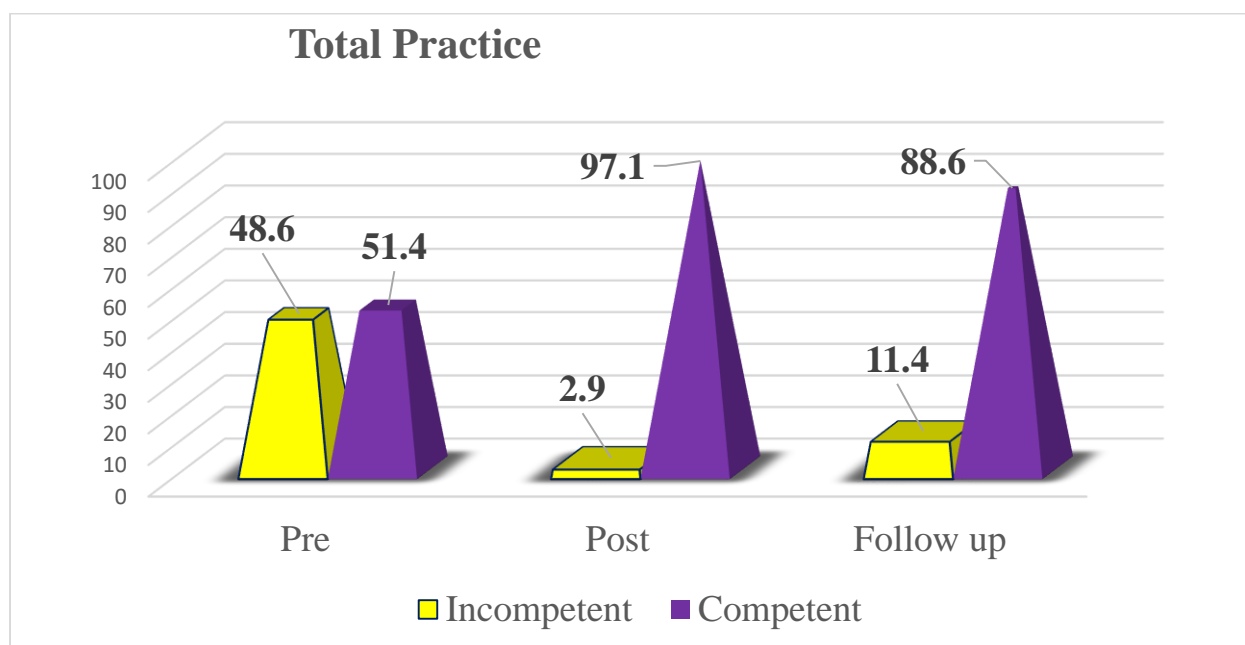


Table (2) Relation between nurses' total knowledge and total practice regarding advanced care of trauma patients among studied nurses

Total Practice	Total Knowledge		x ²	P value	Sig.
	Unsatisfactory	Satisfactory			
Pre	Pre		8.57	0.003**	S.
Incompetent	14 82.4%	3 17.6%			
Competent	6 33.3%	12 66.7%			
Post	Post		10.98	0.001**	H.S
Incompetent	1 100.0%	0 0.0%			
Competent	2 5.9%	32 94.1%			
Follow up	Follow up		27.09	0.000**	H.S
Incompetent	4 100.0%	0 0.0%			
Competent	1 3.2%	30 96.8%			

Not significant difference at P level > 0.05 *Significant ≤ 0.05 **highly Significant ≤ 0.001

Table (3): Correlation between nurses' total knowledge and total practice for care of patients with advanced trauma among studied nurses .

Total practice	Total knowledge					
	Pre		Post		Follow up	
	Spearman's coefficient	P	Spearman's coefficient	P	Spearman's coefficient	P
Pre	.842**	.000	.315	.065	.420*	.012
Post	.149	.394	.560**	.000	.420*	.012
Follow	.311	.069	.852**	.000	.880**	.000**

Not significant difference at P level > 0.05 *Significant ≤ 0.05 **highly Significant ≤ 0.001

Table 4: Relation between nurses knowledge regarding triage, preparation and sociodemographic characteristics of the studied throughout educational program phases

Items	Triage and preparation (Pre)		x ² P	Triage and preparation (Post)		x ² P	Triage and preparation (Follow up)		χ ² P
	Unsatisfactory	Satisfactory		Unsatisfactory	Satisfactory		Unsatisfactory	Satisfactory	
Age									
20-30	19 82.6%	4 17.4%	χ ² = 21.6 P = .000**	5 21.7%	18 78.3%	χ ² = 3.03 P = .08	10 43.5%	13 56.5%	χ ² = 7.30 P = .007*
31-40	0 0.0%	12 100.0%		0 0.0%	12 100.0%		0 0.0%	12 100.0%	
Sex									
Male	15 55.6%	12 44.4%	χ ² = .07 P = .78	4 14.8%	23 85.2%	χ ² = .02 P = .86	8 29.6%	19 70.4%	χ ² = .06 P = .79
Female	4 50.0%	4 50.0%		1 12.5%	7 87.5%		2 25.0%	6 75.0%	
Marital status									
Single	0 0.0%	10 100.0%	χ ² = 16.25 P = .000**	0 0.0%	10 100.0%	χ ² = 2.33 P = .12	0 0.0%	10 100.0%	χ ² = 5.60 P = .01*
Married	19 76.0%	6 24.0%		5 20.0%	20 80.0%		10 40.0%	15 60.0%	
Level of education									
Diploma	4 100.0%	0 0.0%	χ ² = 19.88	4 100.0%	0 0.0%	χ ² = 27.24	4 100.0%	0 0.0%	χ ² = 14.42

Technical institute	15 75.0%	5 25.0%	P = .000**	1 5.0%	19 95.0%	P = .000**	6 30.0%	14 70.0%	P = .001**
Bachelor of nursing	0 0.0%	11 100.0%		0 0.0%	11 100.0%		0 0.0%	11 100.0%	
Years of experience									
Less than 5	11 100.0%	0 0.0%	$\chi^2 = 28.55$ P = .000**	5 45.5%	6 54.5%	$\chi^2 = 12.27$ P = .002**	10 90.9%	1 9.1%	$\chi^2 = 30.54$ P = .000**
6-10	8 80.0%	2 20.0%		0 0.0%	10 100.0%		0 0.0%	10 100.0%	
More than 10	0 0.0%	14 100.0%		0 0.0%	14 100.0%		0 0.0%	14 100.0%	
Training courses									
Yes	3 15.8%	16 84.2%	$\chi^2 = 24.82$ P = .000**	0 0.0%	19 100.0%	$\chi^2 = 6.92$ P = .008**	0 0.0%	19 100.0%	$\chi^2 = 16.62$ P = .000**
No	16 100.0%	0 0.0%		5 31.3%	11 68.8%		10 62.5%	6 37.5%	
Benefits from courses n=19									
Yes	14 100.0%	0 0	NA	0 0.0%	14 100.0%	$\chi^2 = 19$ P = .000**	5 35.7%	9 64.3%	$\chi^2 = 6.10$ P = .01**
No	5 100.0%	0 0		5 100.0%	0 0.0%		5 100.0%	0 0.0%	

Not significant difference at P level > 0.05 *Significant ≤ 0.05 **highly Significant ≤ 0.001

Discussion

The trauma patient is unique because of the nature of the injuries, the suddenness of the traumatic event, and the multiplicity of health care professional required to organize and implement an effective plan of care from the scene of injury through reintegration into the community. The hope for survival and the physical and emotional recovery of the trauma patient depend on the collaborative efforts of the trauma nurses, providers, therapists, and others who constitute the trauma team. Coordination of care by a primary nurse, nurse practitioner, trauma coordinator, or other advanced practice nurse is an effective model for delivering efficient and high quality care to the trauma patients through collaborative practice (McQuillan et al., 2020).

Part I: Demographic Characteristics of the Studied Nurses:

Regarding demographic characteristics of the studied nurses, the present study stated that there was slightly less than two thirds of the studied nurses were between 20-30 years with mean age 28.51 ± 7.74 years. As well as slightly more than three quarters were males. As regards to marital status majority were married. More than half had technical institute and less than one third had bachelor of nursing. Concerning years of experience more than on third had experienced more than 10 years. Adding to that more than half attended training course and from nurses who attended training courses made use of from courses. This findings on the same line with **Ahmed, Taha & Zaton (2017)** in the study of Nurses' Knowledge and Practice of Trauma Patients during Golden Hours of Care reported that more than half of them were males, more than two third of the nurses were married but on the opposite line in some characteristics as mention that the majority of the nurses graduated from diploma nursing school, and more than two fifth of them had less than 5 years of experience in hospital, and slight more than half of them had years of experience in the ED less than 5 years.

Part II: Level of nurses' knowledge pre / post the educational program

The current study results clarify that, more than half of the studied nurses had an satisfactory level knowledge regarding advanced care of trauma patients at pre implementation while the almost of the studied nurses had satisfactory level of knowledge at post and follow up implementation of the educational program.

Furthermore the current study results stated that there is highly a statistically significant difference regarding effect of nurses' knowledge about preparation, triage, primary survey, secondary survey and total knowledge regarding advanced care of trauma patients at pre, post and follow implementation of educational program (Q= 15.10, p=0.001 & Q= 15.75, P= 0.000 & Q=18.30, P=0.000 and Q=22.52, P=0.000 respectively).

From the researcher point of view, this improvement means that the program had a positive impact on emergency nurses' knowledge regarding advanced care of trauma patients.

This study results consistent with **Seliman et al., (2014)** who develop designated head trauma nursing management protocol on critical care nurses' knowledge and practices at emergency hospital Mansoura university and mentioned that there was an obvious improvement in nurses' knowledge scores were documented post protocol implementation as compared to their pre protocol with highly significant statistically differences. This improvement might be related to the fact that majority of them are secondary school nurse, not receiving any previous training about head trauma nursing management. In addition to, the highly expressed need of nurses to learn more about head trauma nursing management.

On the same line **Sabry et al., (2018)** who indicated that there were high statistical significant differences in knowledge scores related to all items about initial care provided to traumatic brain injury patients' throughout the program intervention among studied nurses (p<0.001) and on the other hand, findings of this study reported a gradual decrement in nurses' knowledge by time over one and three months post program implementation.

The previous results was in accordance with **AL-gabril et al., (2019)** who reported that the great majority in the current study had unsatisfactory knowledge level about chest trauma in all items pre the implementation of the program and explained this is an expected finding may be due to lack of preparation during the basic education, lack of desire of nurses to acquire new knowledge, overload in the working situation and lack of continuing education courses related to the care of trauma patient

Part III: Level of Nurses' Practices pre / post the educational program

Concerning total nurses' level of practice, the study results demonstrated that there were improvements of the studied nurses' competent level of practice as following, half of the studied nurses had competent level regarding nurses' total practice at pre implementation that increased to almost of the studied had competent level of practice at post and follow up implementation of educational program. This is may be attributed to interpreting the reasons for nurses' inadequate practice to an absence of incorporation advanced trauma course in a nursing curriculum of the taught nursing program. Other relevant factor included lack of in-service training program regarding trauma care.

Furthermore there is highly a statistically significant difference regarding nurses' level of practice for preparation, triage, primary survey, secondary survey and nurses' total practice for care of advanced trauma patients at pre, post and follow implementation of educational program ($Q=28.50, p=0.001$ & $Q=25.33, P=0.000$ & $Q=18.08, P=0.000$ and $Q=24.11, P=0.000$ respectively). This could be attributed to the positive impact of the educational program on the emergency nurses' performance.

The previous results was in accordance with **Sabry et al., (2018)** who founded that it was clear that the significant difference was between the pre and all post program scores. The improvement of nurses' practices as a result of implementing a training program was well recognized and supported by many researchers around the world.

This study results was well- matched with **Ahmed et al., (2017)** who carried out the study Regarding the nursing intervention, related to trauma management in the golden hour, and mentioned that more than four fifth of the nurses have unsatisfactory total practice related to the assessment and basic nursing care for trauma patients during golden hour of care in pre implementation phase as well as **AL-gabril et al., (2019)** revealed from the study that the majority of the nurses were having unsatisfactory level regarding practical part about chest trauma and outcomes are dependent, lack of the availability of qualified nurses, and guidelines in nurses' work areas. Moreover, another possible explanation for that phenomenon is the lack of funding aimed at organizing nurses' regular workshops. Another factor for lack of nurses' practice in the current study was nurses' workload which made the delay of nurses' abilities and motives to acquire and update their knowledge and practice.

This result is congruent with **Garvey et al., (2016)** mentioned in A review of literature entitled "Trauma tactics: Rethinking Trauma education for professional nurses" revealed a lack of research on nursing-focused trauma education courses that is also agreement by **Rasouli et al., (2016)** who stated that methods of nursing education can be useful in improving practice skills and relationships of nurses in an emergency unit and the generic approach (the ABC approach) should be taught at an excellent level to be applicable in supporting injured patients, this results disagreement with **Curtis et al., (2012)** who published in the study of "Traumatic injury in Australia and New Zealand" that Errors in trauma management contribute significantly to preventable or potentially preventable morbidity and mortality. Implementing and maintaining principles of standardizing trauma care is vital to optimizing patient recovery and emergency nurses are to this process.

Part IV: Relations and Correlation between variables under study.

Concerning relation between demographic characteristics and emergency nurses' level of knowledge, the result of the current study revealed that reveals that there is highly statistically significant relation between age, marital status, level of education, years of experience, training courses and emergency nurses' level of knowledge regarding triage. As well as there is statistically significant relation between years of experience, training courses and nurses knowledge regarding triage.

Furthermore the results clarifies that there is a highly statistically significant relation between age, marital status, level of education, years of experience, training courses and nurses' knowledge regarding primary survey.

On the same line **Sabry et al., (2018)** reported that there is no significant relation between total knowledge and demographic data (age, education, and years of experience). In the opposite line **Rasouli, et al., (2016)** the results show that majority of participants had low level of knowledge about trauma and taking care of traumatic patients in both male and female staff and in both the results of the study represented that there was no significant difference in their level of knowledge in regard to their demographic characteristics. According to the epidemiology of trauma

Additionally **AL-gabril et al., (2019)** revealed that there were statistical significant difference only with the studied nurses' age. This study agreement by **Abd.** This study agreement by **El-hay, Ahmed, & Sharshor (2018)** who mentioned, that there was statistical significant positive correlation among nurses' knowledge and practice and their socio-demographic characteristic included; age, gender, level of education, and years of experience. Also, agreement with **Al-mawsheki, Ibrahim, & Taha, (2016)** who showed that there were a significant difference between nurse's knowledge scores and their age.

Regarding relation between total nurses' level of knowledge and total practice; the present study results illustrated that, there is a statistically significant relation between nurses' total knowledge and total practice for care of patients with advanced trauma at pre implementation of educational program ($\chi^2 = 8.57, p=0.003^*$). While, there is highly statistically significant relation between nurses' total knowledge and total practice for care of patients with advanced trauma at post and follow up implementation of educational program ($\chi^2 = 10.98, p=0.001^{**}$ & $\chi^2 = 27.09, p=0.000^{**}$)

The result also comparable to **AL-gabril et al., (2019)** who mentioned that there was statistical significant positive correlation among nurses' knowledge and practice and their socio-demographic characteristic included; age, gender, level of education, and years of experience and concerning the relationship between knowledge and practice and there was no a statistical significant difference between nurses Knowledge and practice. ($r=0.244$ $p=0.130$) and this study finding revealed that, there was a statistically significant correlation between the total score of nurses' knowledge and practice, which indicates the positive relation between knowledge and practice. This result refers to the level of practice influenced by the level of knowledge.

Conclusion:

On the light of the current study results, it can be concluded that, the studied nurses had an improvement in their level of performance (knowledge and practice), as there was a distinguished satisfactory level of emergency nurses' total level of knowledge. Furthermore, there was an improvement of the studied nurse' competent level of practice during care with trauma patients. Moreover the almost of the studied nurses had competent level of total practice and satisfactory level of knowledge after the educational program implementation. As well as there is a statistically significant

relation between nurses' total level of knowledge and total practice regarding advanced care of trauma patients at pre implementation of educational program ($\chi^2 = 8.57$, $p=0.003^*$). While, there is highly statistically significant relation between nurses' total knowledge and total practice for care of patients with advanced trauma at post and follow up implementation of educational program ($\chi^2 = 10.98$, $p=0.001^{**}$ & $\chi^2 = 27.09$, $p=0.000^{**}$ respectively).

Recommendations:

Based upon the results of the current study, the following recommendations are suggested:

1. Designing checklist competence about advanced trauma care for nurses be used as a reference guide in their practice.
2. Creating advanced trauma care for nurses' algorithm to be applied in clinical practice.
3. Improve and update nurses' knowledge and skills about advanced trauma care through attending national and international conferences and workshops.
4. Developing system of periodical nurses' evaluation to determine strategies for updating their knowledge and enhancing their practice.
5. Complete manual procedures should be developed in Arabic language, to be easily used and available to all nurses.

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