Assessment of Critical Care Nurses knowledge and Practice Regarding Triage System

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Abstract: **Triage in the emergency department and at the intensive care units is necessary to prioritize management according to the severity of a patient's condition, triage nurse is a critical member of the triage team, and their knowledge and practice directly affect triage process. Aim: This study aimed to assess critical care nurses' knowledge and practice regarding triage system. Design: A descriptive exploratory research design was utilized in this study. Sample: A convenient sample of (69) adult nurses from both genders working in the emergency department and the emergency intensive care units was involved in this study. Setting: Data were collected from emergency department and emergency intensive care department affiliated to Ain-Shams Specialized Hospital. Tools: three tools were used for data collection (I) Nurses knowledge assessment questionnaire, (II) Nurses' performance observational check list, (III) Questionnaire to assess Factors affecting critical care nurses regarding triage system. Results: This study revealed that (68.1%) of the studied subjects had satisfactory level of knowledge, while (65.2%) had satisfactory level of practice, and the high contributing factor was in the performance appraisal dimension with (92.8%) of them assured the need for hospital administration support for application of triage system Conclusion: this study concluded that about two third of the study subjects had satisfactory level of knowledge about triage system and two third of them had satisfactory level of practice regarding triage system, and There was a positive correlation between total level of knowledge scores and total level of practice scores. Recommendation: Planning for continuous training program to emergency health team regarding triage and triage process.**

Keywords: **Critical care nurses, Triage system, Knowledge, Practice.**

1. INTRODUCTION

Injuries caused by emergencies and accidents are increasing in the world. To prioritize patients to provide them with proper services and to optimally use the resources and facilities of the medical centers during accidents, the use of triage systems, which are one of the key principles of accident management, seems essential *(Bazyar, Farrokhi, and Khankeh, 2019).*

Triage is one of the key principles of the effective management of major emergencies *(Vassallo, et al., 2017).* Triage is derived from the French word "trier", which means separating, categorizing or classifying, and refers to the categorization, classification, and prioritization of patients and injured people, based on their urgent need for treatment. The triage system is used by individuals to determine which groups of the patients should receive treatment and care services based on their clinical status, the prognosis of disease and available resources *(Ciottone, et al., 2015).*

Triage nursing as a relatively new role for nurses is a challenging role in a dynamic environment which needs significant development to be practiced. Prioritizing is defined as the pivotal role of triage nurses. Comprehensive educational programs and developmental research are required to support diagnostic and therapeutic interventions in triage practice by nurses *(Ebrahimi, et al, 2016).*

Significance of the Study:

More than 6 million people present to emergency departments across the United States annually with symptoms of acute Myocardial Infarction (AMI). One of the million patients with AMI, 350,000 dies during the acute phase. Accurate emergency department triage can reduce mortality and morbidity, yet accuracy rates are low *(Sanders, and Devon, 2016).*

The Egyptian healthcare system is struggling to respond to the increasing patient numbers, while the dedicated resources to healthcare are very limited. Public hospitals are limited compared to patient load. Statistics in 2015 show that there are on average 1.57 beds and 5.75 physicians in public hospitals for every 1000 patients. The Egyptian healthcare system faces many challenges including (1) Low financial support: approximately 5.2% of the total state budget in the fiscal year 2015–2016. (2) The over crowdedness of public hospitals. According to the official records, Egypt has a total number of 660 public and 1002 private hospitals serving a total population of around 91 million *(Central Agency for Public Mobilization and Statistics (CAPMAS), 2017).*

Aim of the study:

This study aimed to assess critical care nurses' knowledge and practice regarding triage system.

Research questions

1. What are the level of critical care nurses knowledge & practice regarding triage system?

2.   What are the factors that affect critical care nurses knowledge and practice regarding triage system in emergency department/ ICU?

2.   SUBJECT AND METHODS

Technical design:

The technical design includes research design, setting, subject and tools for data collection.

Research design:

A descriptive exploratory research design will be utilized in this study

Setting:

The study was conducted at emergency and emergency ICU departments affiliated to Ain-Shams Specialized Hospital. The setting was changed after refusal of As-salam International hospital administration (because of the new administration team) to conduct the study in it.

Ain-Shams Specialized Hospital affiliated to Ain-Shams university. It has 3 rooms in emergency department, ER room had 7 beds, observation room had 4 beds and emergency ICU had 6 beds.

Subjects:

A convenient sample of (69) adult nurses from both genders working in emergency department and intensive care units was involved in this study from the above mentioned setting who accepted to participate in the study. The number of subjects was changed from 50 nurse (which written in the protocol) to 69 nurse (written in the thesis) after the setting changed.

Tools of data collection:

The data were collected through using 3 tools, namely   Self-Administered Interview Questionnaire (Knowledge assessment Questionnaire, Questionnaire to assess factors affecting on critical care nurses' knowledge and practice regarding triage system in emergency department/ emergency ICU), and nurses practice Observational checklist.

I.   Knowledge assessment questionnaire:

To assess the knowledge of critical care nurse regarding triage system, it was written in Arabic language and developed by the investigator based on **(Shaallan, et al., 2008, Tony, 2009, Ahmed, 2011, Khalil, 2014, and ISO paper from As-Salam international hospital, 2014.** It is consisted of 2 parts:

First part: it concerned with the nurse's characteristics as nurses' code, age, gender, marital status, years of experience and qualifications.

Second part: it includes 39 MCQ questions to assess nurses'level of knowledge regarding triage, it divided into 5 dimensions (general knowledge regarding triage, role of the nurse toward triage system, color coding in triage system, color coding in triage system according to patient condition, color coding in triage system according to real situation).

Scoring system:

The knowledge question was 39 questions, each knowledge question was scored by zero for « wrong» answer, while one score for «correct» answer, the correct answer presented in tables as satisfactory but I don't know and Wrong answer summed and presents as unsatisfactory. And (60% and above) considered satisfactory level of knowledge, but (<60%) considered unsatisfactory level of knowledge (The total knowledge scores ranged from 0-78, they were evaluated as follows:

Total score knowledge

➢ Poor less than 60% (0 – < 47)

➢ Average from 60 %:75% (> 47- <59)

➢ Good more than 75 % : 100 (>59-78).

II. Nurses practice observational check list (Appendix II):

This tool was adopted from (**Thelan, et al, 1998, shaallan et al., 2008, Ahmed, 2011, white et al, 2013, and ISO paper from As-Salam international hospital, 2014**).To assess practice of emergency nurses regarding triage.

The check list contains 109 items covering 5 basic phases of triage (assessment of triage, nursing diagnosis, nursing planning, nursing implementation, and nursing evaluation).

Scoring system:

109 practice questions, each question was scored by zero for a «not done» and one for a «done». The score practice ranged from 0-216, they were evaluated as follows:

➢ Satisfactory (60% and above) (0 :< 129)

➢ Unsatisfactory (<60%) (>129: 216).

III. Questionnaire to assess factors affecting critical care nurses regarding triage system (appendix III):

This questionnaire was developed by the investigator to assess factors affecting critical care nurses regarding triage system the tool contains 34 question covering 4 dimensions (Performance appraisal and utilization of results, Staff development, Workspace and environment and Commitment and satisfaction).

Scoring system:

34 factors questions, each question was scored by zero for a «no answer or I don't know» and one for a «no», while two for «yes». The Total factors score ranged from 0-68, they were evaluated as follows:

➢ Low contributing factor (0- < 60%) (0- < 41).

➢ High contributing factor (≥ 60% - 100%) (≥ 41 - 68).

IV. Operational design

The operational design included: preparatory phase, ethical consideration, and content validity, tools reliability, pilot study and field work.

A) The preparatory phase:

It included review of related literature and theoretical knowledge from various aspects of the study through the use of books, internet, periodicals, and journals.

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B) Ethical considerations:

Prior study conduction, approval was obtained from the scientific research ethical committee in Faculty of Nursing, Helwan University. In addition, an approval was obtained from the nursing director of Ain-Shams University Specialized Hospital for data collection. The nursing personnel were informed about the aim of the study to assess critical care nurses knowledge and practice regarding triage system. They assured that anonymity and confidentiality would be guaranteed and they informed that they allowed choosing to participate or not in the study and that they have the right to withdraw from the study at any time; ethics, values, culture and beliefs were respected.

C) Validity of the tools:

The three tools were translated into Arabic and tested by five experts in the field of the study for their content validity and translation through an opinion's questionnaire. Accordingly, the necessary modifications were done. The jury group of experts specialized in medical-surgical nursing from Helwan University.

Face validity:

Aimed at inspecting the items to determine whether the tools measure what supposed to measure.

Content validity:

The study tools were tested for content and face validity by jury test of five experts in the field of Medical Surgical Nursing to evaluate the individual items as well as the entire instrument as being relevant and appropriate to test what they wanted to measure. The face validity of the questionnaire was calculated based on experts' opinion after calculating content validity index (%) of its items and it was 96%.

The experts were asked to evaluate the individual items on the study tools in relation to its relevance and appropriateness in terms of the construct and if the items adequately measure all dimensions of the construct. The experts were asked to evaluate individual items and rate items on a 4-point scale as follows; not relevant scored (1), Little relevant scored (2), relevant scored (3) and very relevant (4).

D) Reliability of the tools:

The study tools were subjected to assessment of internal consistency reliability using Spearman-Brown Prophecy Formula $(r^1=2(3)/1+r)$, where r^1 estimated reliability of the entire test and r estimated correlation coefficient computed on the split halves.

To assess reliability, the study tool was tested by the pilot subjects at first session for calculating Cranach's Alpha (Knowledge questionnaire = 0.746, Practice questionnaire = 0.686 and Factors questionnaire = 0.804) for all tools = 0.896

Statistical equation of Cranach's Alpha reliability coefficient normally ranges between (0:1), more than (0.7) donates acceptable reliability.

E) Pilot study:

A pilot study was conducted on 10% of the study subjects of the total sample size (69). The aim of the pilot study was to determine clarity, understanding, and applicability of the tools and to estimate the time required for fulfilling the questionnaire assessment tool. Those participants in the pilot study were included in the main study sample. Based on the pilot study, no modifications were done and the final version was prepared for distributing to nursing personnel.

F) Field work:

The actual field work was started at the beginning of January 2018, and was completed by the end of July 2018. The investigator met the nursing director of the hospital to explain the aim of the study to gain the approval for data collection.

The investigator collected data by her through meeting each nurse who agrees to participate in the study prior to data collection, explaining the aim of the study and method of fulfilling out questionnaires and answer any questions.

The observational check list was used prior to administration of the questionnaire to ensure the maximal realistic observations of the nurses' performance& minimize the possibility of bias, the nurses' performance was assessed by the

investigator at first while, they assess availability of equipment, supplies, medications and records of emergency room and then while they caring for patients in emergency through how they deal with the patient, how they notifying supervisor and physician about patient conditions.

V. Administrative Design

An official letters were issued from the dean of the faculty of nursing Helwan University and the nursing director of Ain-Shams University Specialized Hospital to conduct the study in the hospital either medical or nursing for obtaining the permission for data collection. Individual oral consent was also obtained from each nurse personnel in the study.

VI. Statistical Design

The collected data were organized, tabulated and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 24, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated. For qualitative data, which describe a categorical set of data by frequency, percentage or proportion of each category, correlation between data variables was done using Chi-square test (χ^2). Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $P< 0.05$ for interpretation of results of tests of significance *(Dawson and Trapp, 2001)*.

3.   RESULTS

Table (1): Frequency and percentage of Socio-Demographic Characteristics of the Studied subjects, (n=69):

Variables	The studied subjects (N=69)	
	No.	%
●**Age:**		
- 20 - < 30	26	37.7
- ≥30 - < 40	20	29
- ≥ 40 - < 50	18	26.1
- ≥ 50 -	5	7.2
Mean ± SD	**34.6812 ± 9.75659**	
● **Qualification:**		
- Nursing diploma	44	63.8
- Diploma and specialty	2	2.9
- Technical institute	4	5.8
- Bachelor	19	27.5
●**Marital status**		
- Married	54	78.3
- Single	13	18.8
- Divorced	2	2.9

Table (1) shows that the age of the studied subjects were ranged from 20-60 years old and the more prevalent age group is 20-30 years representing about (37.7%) of the studied subjects. The mean age of the studied subjects is (34.6812 ± 9.75659). Most of the studied subjects were married (78.3%) and who have nursing diploma are (63.8 %).

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Figure (1): Total level of knowledge scores among the critical care nurses regarding triage system, (n=69):

	Poor level	Average levl	Good level
Total knowledge scores and level among the Critical Care Nurses Regarding triage system	2.9%	29.0%	68.1%
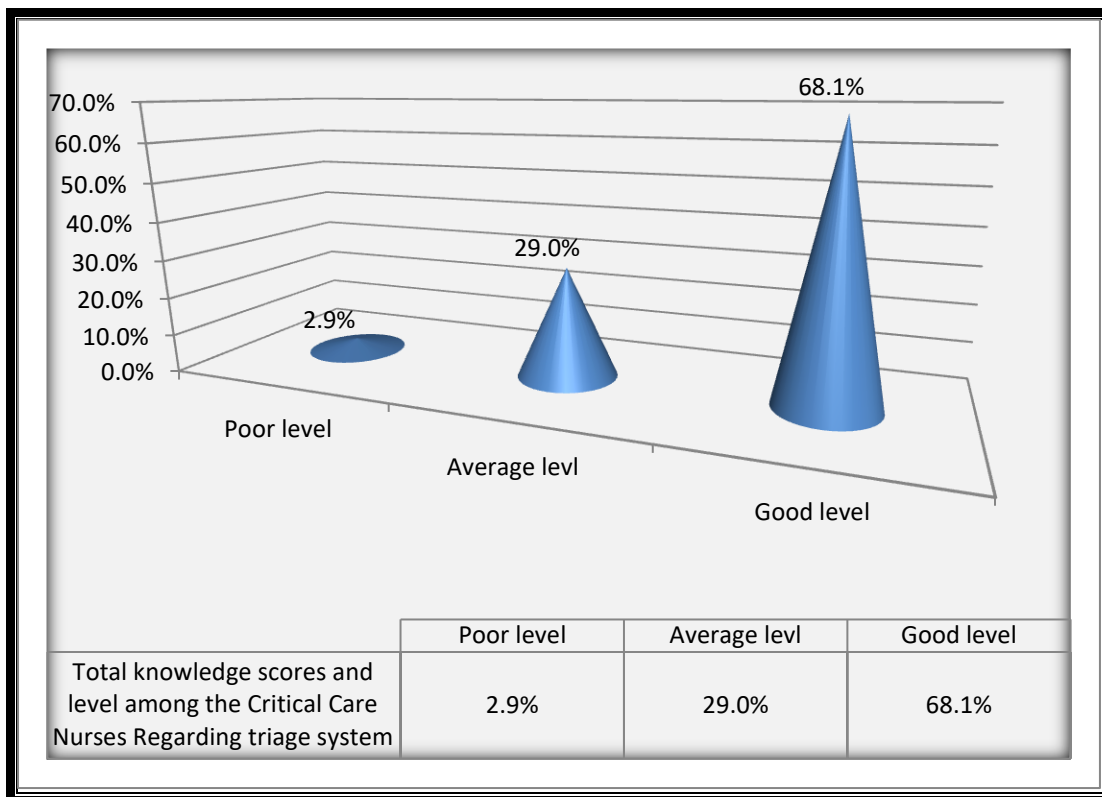
As regards the total knowledge level in (figure-1); (68.1%) of participants has good level of knowledge, while (2.9%) had poor level of knowledge.

Figure (2): Total level of practice among the critical care nurses regarding triage system, (n=69).

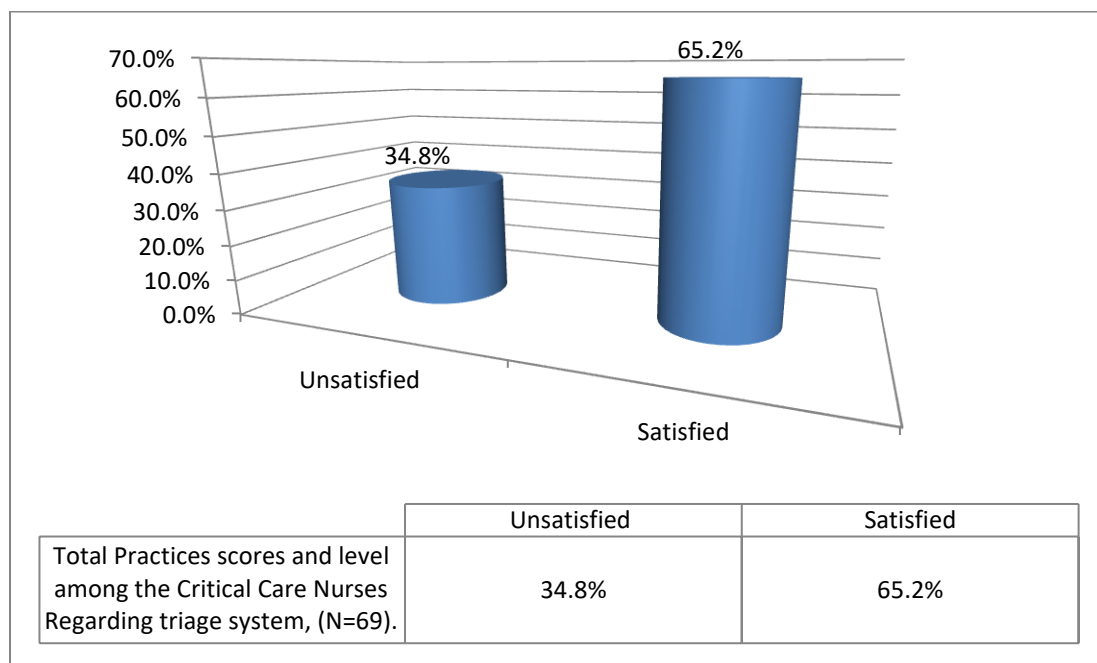|	Unsatisfied	Satisfied
Total Practices scores and level among the Critical Care Nurses Regarding triage system, (N=69).	34.8%	65.2%

Figure (2) shows that, (65.2%) of the studied nurses have satisfactory level of practice, but (34.8%) of them have unsatisfactory level of practice.

Figure (3): Total factors scores among the critical care nurses regarding triage system, (n=69).

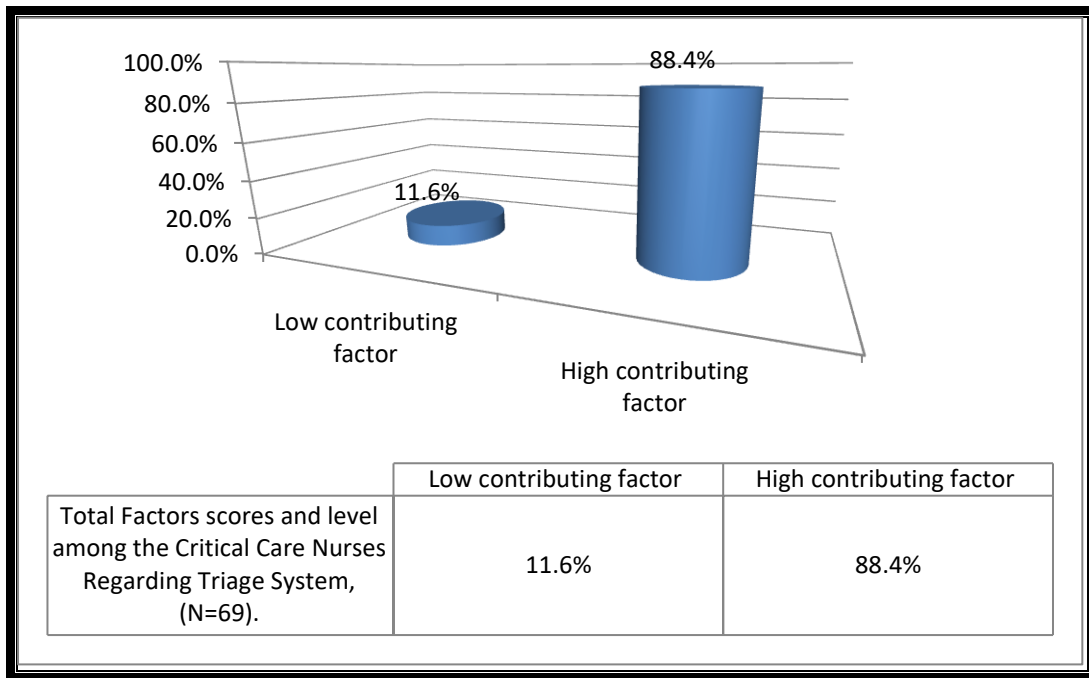|	Low contributing factor	High contributing factor
Total Factors scores and level among the Critical Care Nurses Regarding Triage System, (N=69).	11.6%	88.4%

Figure (3) illustrates that, (88.4%) of the studied subjects have a high contributing factors and (11.6%) of them have a low contributing factors.

Table (2) Mean total factors affecting critical care nurses level knowledge and Practice regarding triage system, (n=69).

Factors	Mean ± SD	Range
- Performance Appraisal	20.7536 ± 3.73539	21
- Staff Development Factors	8.1304 ± 3.06265	13
- Workspace and environment	10.4638 ± 1.73697	8
- Commitment and Satisfaction	5.5362 ± 0.94837	3
Total factors	44.8841 ± 8.17553	43

Table (2) shows that, the mean of performance appraisal is (20.7536 ± 3.73539), and the total factors mean is (44.8841 ± 8.17553).

Table (3): Correlation between total factors scores and total scores of knowledge level and total practice level of the study subject regarding triage system, (n=69).

Variable	Total factors scores	
	R	P
➤ **Total level of knowledge scores**	0.68	0.579
➤ **Total level of practice scores**	0.599	0.000*

*Significant (P<0.05)

r= Pearson Correlation Coefficient

Table (3) illustrates that, there is a positive correlation between total factors scores and total practice scores, also there is a positive correlation between total factors scores and total knowledge scores.

Table (4): Correlation between total scores of knowledge level and total score of practice level of the studied subject regarding triage system, (n=69).

Variables	Total knowledge scores	
	R	**P**
➢ **Total level of practice Scores**	0.455	0.000*

*Significant (P<0.05)

r= Pearson Correlation Coefficient

Table (4) illustrates that, there is a positive correlation between total level of knowledge scores and total level of practice scores.

4. DISCUSSION

Triage is very important step in today's emergency department (ED), while triage mainly focuses on prioritizing patients based on their medical conditions, this is also an effective management tool to organize, monitor and evaluate the ED patients and resources. *Kazi, et al., (2019).*Triage is a concept developed and refined on the battlefield, has been central to the practice of emergency medicine for more than half a century. As emergency departments (EDs) face escalating patient volumes, persistent crowding, and patient populations with more complex disease, the need for accurate and reliable triage has intensified **Hinson***, et al., (2018).*

Triage involves complex decisions that require balancing the potential risks and benefits for a specific patient while considering the implications for other potential patients when the number of beds and other resources are limited. Demand for intensive care unit (ICU) resources often exceeds supply, and shortages of ICU beds and staff are likely to remain significant. Ideally, all patients in whom mortality or morbidity would potentially decrease with ICU care in comparison with care on other wards would be admitted provided that they consent to life-supportive therapies *Blanch, et al. (2016).*

Demographic characteristics of the studied subjects:

The present study demonstrated that more than half of the studied subjects age was over 30years with a mean age (34.6812+9.75659), this explains that most of them were elderly graduated because more nursing qualification of them was secondary nursing diploma and they are old to tolerate the nature of the work in EDs, regarding their gender the current study found that less than three quarters of the study subjects were females, this result may be due to the most nursing schools were for female and also in the past there was a concept that is shame for the males to be a nurse.

This result is against *Maarouf, (2012)* whose thesis about "nurses' performance for patients with traumatic head injury during golden hours" who reported that most of nurses' experience years were less than 5 years so most of nurses were newly graduated and consequently have few years of experience.

Regarding their qualifications, the current study found that more than half of the studied subjects qualifications were diploma while only four of them technical institute, this result may be due to the most nurses not complete the studying in nursing institutes and faculties of nursing as a result of difficulties for taking master degree.

The current study illustrated that generally only about two third of the studied subjects had satisfactory level of knowledge regarding triage, while about one third of them had un satisfactory level of knowledge regarding it, these result may attribute to insufficient training programs regarding triage in nursing schools, faculties of nursing and also in the hospitals, this is disagreed with, *Mahmoud, (2017)* which about " Assessment of Staff Nurse's Knowledge and Performance Regading Triage" where more than half of the studied subjects had unsatisfactory level of knowledge regarding triage, and also disagreed with *Ahmed,(2011)* whose thesis was about "relationship between nurses' knowledge, practice and accuracy of the patients' triage acuity level in the emergency department" also reported that the study sample had unsatisfactory knowledge regarding triage.

The current study demonstrated that about one third of the study subjects have unsatisfactory level of knowledge (average and poor level of knowledge) regarding triage may be due to lack of orientation program for the newly nurses, lack of job description of triage nurse, perception of the nurses regarding their role in saving life of emergent patient and the physician in the responsible for life saving of patient and the nurse is assistance to physician, and also the perception of the physician regarding role of nurse in emergent situations is only assistant and carrying out their orders.

Concerning the practice of emergency nurses regarding triage, the present study results demonstrated that as regards emergency nurses's level of practice regarding checking triage room, the present study revealed that more than three quarters of the studied subjects checked availability of blood pressure apparatus and stethoscope. This result were in agreement with *Hosley et al, (2015)* from medical assistance book who stated that with emergency action plan, proper equipment and supplies should be available to be used at medical emergency and this equipment and supplies should be arranged, checked for working and also should be available for use to all staff. According to *Fuller And Ayers, (2015) from "health assessment, text book"* who mentioned that putting of equipment in right place and in good state is part of the right care of the patient who present to EDs and also emphasized that the nurse is the responsible person for checking equipment for assessment has been found to be a factor that causes delaying of triaging patient in ED. This may result in failure to properly, thoroughly, and effectively assess patients, thus leading to inaccurate decision making and improper prioritization of patient treatment which may result into avoidable disabilities or deaths.

As regards Factors affecting critical care nurses' knowledge and practice regarding triage system, the present study results illustrated that the majority of the studied subjects had high contributing factors, As regard performance appraisal, the current study showed that more than three quarters of the study subjects saw that the hospital administration support according to application of triage system is the most affected factor, this may be due to the essential role of hospital management, which in turn provides the necessary needs to facilitate work in the hospital and meet the needs of nurses, which helps to provide a comfortable work environment and increase the quality of hospital service.

According to staff development proximally three quarter of the study subjects saw that, in-service training adequately addresses the skill gap, This is probably due to the fact that the triage system is somewhat new in Egypt and that the hospital has been implementing it for a short time, so the sample used in the research needs ongoing training in order to provide the required service to it to the fullest extent.

Related to workplace and environment, the current result illustrated that the majority of study subjects clarified that the availability of antiseptic hand solution for protection of staff and patients is the most affected factor, this may be due to the lack of water basins in every room, which impedes washing hands constantly before and after each procedure, and is easy to use sterile solution for the hands of nurses and patients.

According to nurses satisfaction and commitment the majority of study subjects saw that seeking out for a new challenges at work is the most affected factor, this may be due to the nurses' ambition to upgrade of themselves and their continuous desire to promote and increase their income, making it one of the most important factors by which the nurse determines that it remains in the hospital or is transferred to another hospital.

5. CONCLUSION

Based on the results of the present study, the following can be concluded:

Knowledge assessment revealed that only two third of the study subjects had satisfactory level of knowledge about triage system and two third of the study subjects had satisfactory level of practice regarding triage system, according to factors which affect nurses knowledge and practice regarding triage system the current study clarified that, in the first dimension performance appraisal more than three quarters of the study subjects assured the need for hospital administration support for application of triage system, in second dimension staff development three quarters of them assert the need for In-service training adequately that addressed the skill gap, according to the third one workspace and environment the majority of them confirm the need for availability of antiseptic solution for protection, about the last dimension commitment and satisfaction more than two third of them confirm that seeking out new challenges at work was an important factor which affect their practice. There was a positive correlation between total level of knowledge scores and total level of practice scores.

6. RECOMMENDATION

Based upon results of the current study, the following recommendations will be provided to improve triage nurses' knowledge and practice:

• Development of standards, specifications and qualifications of triage nurse by the ministry of health.

• The hospital manager should have the protocols and policies of EDs to facilitate the triage system and triage nurse work.

• Planning for continuous training program to emergency health team regarding triage and triage process.

• Replication of the study over a large sample and in a different hospital setting is recommended for generalization of results.

• There is a need of further research regarding effect of knowledge and performance of triage on the percentage of morbidity and mortality rate in ED.

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