Assessment of Critical Care Nurses' Knowledge and Practices of Emergency Triage

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Abstract:
Background: Nurses should be highly knowledgeable and qualified to care for patients in emergencies. Therefore, updating nurse's knowledge and practices of triage application has a significant role in the reduction of mortality rates within emergency departments. **The aim of the study:** Assessment of Critical care nurses' knowledge and practices of emergency triage. **Design:** A descriptive exploratory research design was used in the conduction of this study. **Setting:** This study will be carried out in emergency departments at Assuit University (Trauma Unit) and emergency departments at Hurgada General Hospital **Sample:** A convenient sample of all nurses in emergency departments was included in the study. **Tools:** The study tools were composed of mainly two tools: **Tool I:** Nurse's knowledge assessment questionnaire, which consists of two parts: **Part I:** Emergency nurse's sociodemographic data and **Part II:** Emergency Nurse's knowledge of triage system. **Tool II:** Emergency nurse's performance assessment checklist. **Method:** The researcher used the preparatory phase and assessment phase for the implementation of the study. **Results:** Results showed that Nurses lack of Knowledge (**56.7%**) and performance regarding the application of triage within emergency departments. **Conclusion:** Most of the nurses working within the emergency departments have almost low level of knowledge and practices regarding the implementation of triage within emergency departments, so different facilities should have a plan for upgrading the Nurse's knowledge and practices of triage application. **Recommendations:** Hospital management should focus on the importance of triage application in saving patient's lives and decreasing the workload of ER healthcare providers.

Keywords: Critical care nurses, ER department, Knowledge, Practices & Triage.

Introduction:
Emergency triage is a unique practice that deals with undiagnosed patients who are unexpectedly present in the emergency units within hospital settings. The emergency medical services should cover most of the provided services and provide the required medical assistance for patients in situations of acute illness, disasters, and emergency situations. Yet, hospitals should use the triage method for prioritization of patients according to the urgency of patients' need for care **(Parenti, et al. 2014)**.

Using a triage system will enhance the better outcome for patients who need critical care based on the urgency of the situation. It helps save the health of the population and manage crisis situations. So, for the hospitals to apply the triage system, hospitals should be occupied with trained healthcare providers who are able to apply the triage system in emergency situations. The need for prioritizing the patient is stressed by the considerable demand for emergency care. It also helps get over the emergency department's over-crowdedness and lack of resources. **(Parenti, et al. 2014).**

Emergency departments that perform correct assessment and classification of patients based on the triage system are associated with higher patient safety, morbidity, and mortality rates. Thus, the triage system needs to be more accurate and rapid to prioritize and identify patients based on the presence of critical conditions from the less urgent needs, with the least delay possible **(Salmeron, et al. 2021)**

Moreover, there are other challenges to the application of triage systems in hospitals as age, gender, disability, and racial or language barriers. So, to get over these problems to maintain the patient's safety and effectiveness of care, emergency departments must employ an educational system for the application of a triage system with well-trained healthcare providers to apply this system **(Castner, et al. 2019).** Furthermore, many studies have discovered the need for monitoring, quality improvement, and supervision to increase the accuracy of triage within emergency units **(Cetin, et al. 2021)**

Healthcare providers should follow a systematic approach in order to prioritize the care delivery for patients based on clinical urgency. Therefore, the application of triage systems within emergency departments will enhance patient outcomes, reduce the stress levels of healthcare providers, enhance cost-effectiveness, and decrease the mortality rates among patients in critical emergency situations. Based on previous literature, it is found that a lack of using a

triage system is associated with increased hospital admission rates and susceptibility to critical patient outcomes and complications (**El Baih, et al. 2022**). This reflects the importance of implementing triage systems within ER departments (especially in disasters) and the positive effect on patient outcomes as critical care nurses are part of the first line implementors of triage systems in ER departments (**Sciubba, et al. 2022**).

Significance of the study:

The application of Triage within emergency departments has a vital role in decreasing the mortality rate among patients within emergencies. Based on the literature review, lack of knowledge and application of triage increases the cost of care provided, work Overload, and patient outcomes (**Castner, et al. 2019**).

In the United States, a study was done on 1173 cases admitted to the emergency department at Buffalo General Hospital in New York, they found that 11% of the cases admitted to the Emergency department were assigned a triage acuity too low, and 16% were assigned to triage acuity too high (**WHO, 2022**).

Based on the statistical analysis of the World Health Organization between 2011-2020, Egypt reported the highest incidence of Road traffic accidents with an average of 12,295 deaths every year (30% Females, 70% Males). Moreover, Egypt reported almost 154,000 injuries related to road traffic accidents. There are many factors for the high incidence of mortality rates, one main factor is the failure to accurately apply triage within Emergency departments (**WHO, 2022**).

Based on an interview with the Trauma Unit Head nurse at Assuit University Hospital and patient records, at least 40 patients are admitted daily to the ER unit with different diagnoses, almost 15000 cases admitted per year, which puts a great work overload on healthcare providers (**Assuit University Hospital record 2021, 2022**).

Aim of the study:

Assessment of Critical care nurses' knowledge and practices of emergency triage.

Research design:

A descriptive exploratory research design is used in the conduction of this study.

Research questions:

1. What is the emergency unit nurse's knowledge of emergency triage?
2. What is the emergency unit nurse's practices of emergency triage?

Setting:

This study has been carried out in emergency departments including emergency departments at Assuit University (Trauma Unit), and the Emergency Department at Hurghada General Hospital. Both sittings contain almost 114 nurses with different qualifications (internship students, Nursing school, Nursing Diploma, bachelor's degree, & master's degree)

Subjects/sample:

A convenient sample of all nurses (60 nurses) in emergency departments has been included in the study. The sample size is accurately calculated based on the methodology of the study, inclusion, and exclusion criteria.

Inclusion criteria:

▪ Nurses who provide direct or indirect patient care in emergency departments (indirect care means nurses who work in intensive care units rather than ER departments)
▪ Nurses who have at least one year of experience in emergency departments

Exclusion criteria:

▪ Newly Graduated nurses who have less than one year of experience in ER departments

Tools of the study:

The tools have been developed by the researcher after reviewing the related literature (**Zhiting, et al. 2020 & Elsevier Clinical Key 2022/2023**) to assess the knowledge level of emergency nurses regarding emergency triage systems. The validity of the tools has been assessed by professors from the Department of Nursing Critical Care and Emergency at the Faculty of Nursing- Assuit University 2023.

Tool I: Nurse's knowledge assessment questionnaire:

It is developed by the researcher after reviewing the related literature (**Zhiting, et al. 2020**). This tool consists of a multiple-choice assessment questionnaire. This tool consists of 2 parts:

Part I: Emergency nurse's sociodemographic data: this includes personal information about the population of the study as code of participant (for data privacy), gender, age, years of employment, and level of education.

Part II: Emergency Nurse's knowledge of triage system: this includes 29 multiple-choice questions on triage. This included (definition of triage, levels of triage, advantages, types, qualifications of nurses for implementation of triage, and triage tag category)

Tool II: Emergency nurse's practices assessment checklist:

The observation checklist was developed by the researcher after reviewing the related literature (**Elsevier Clinical Key 2022/2023**) to assess the practical aspect of the basic nurse's procedure for the care of trauma patients in the emergency unit and consists of all steps of all procedures (within the primary and secondary survey of triage application). patient categorization based on triage knowledge as:

performance Of Airway, Breathing, Circulation, & Disability (how it is applied By Nurses) as, airway assessment, Oxygen therapy, vital signs, pain assessment, wound care, trauma score system, trauma scale, Glasco coma scale, IV management, assistant in patient intubation, ABG monitoring, and hemodynamic monitoring.

Scoring system

A scoring system has been provided within the study to help the interpretation of study results. The possible score ranked in percentage (out of 100%). Scores have been divided into the following based on the participant's percentage score in study tools that reflect the nurse's knowledge of the application of the triage system: very low knowledge (less than 14 questions correct = Less than 50%), Low knowledge (15-17 questions correct = 50-59%), satisfactory knowledge (18-19 questions = 60-69%), good knowledge (20-27 questions = 70-95%), and very good knowledge (more than 28 questions =100%).

Data collection:

Official approval is obtained from the Dean of the Nursing faculty to the director of the Trauma and Emergency Department at Assuit University for carrying out this study and explaining the purpose of the study.

The collection of data has been done under the complete supervision of the researcher and it is done in 3 phases:

Phase 1: What's app group has been created by the researcher that includes all population for contact with the study sample and to achieve communication between them and the researcher as it is the best way to achieve effective communication based on the population's recommendation.

Phase 2: A questionnaire survey has been sent to the What's App group to be filled out by the participants, it contains questions related to the study's aim, that is in the form of Multiple-Choice Questions to facilitate and enhance participant's responses.

Phase 3: A checklist has been conducted within the different departments to clarify the participant's ability to complete the triage phases. The researcher completed the checklist during the observation to be included in the data analysis. The observational checklist was designed by the researcher based on the literature review to assess the nurse's application of the triage system.

Pilot Study

A pilot study has been conducted on 10 % of the research population to assess the applicability and visibility of the tools and allow time for any necessary correction before running the research study

Ethical considerations:

- Research proposal has been approved from the Ethical Committee in the Faculty of Nursing
- Official approval has been received from the managers of the hospitals for the application of the research study; this is done by the researcher.
- Researcher conducted a verbal consent of all population to be included in the research.
- All data have been coded, and no personal information included in the study
- Only the researcher will have full accessibility to the data collected while running the study.
- Participants have the right to refuse or withdraw from the study at anytime without giving any rational.

Statistical Analysis:

Data analysis has been done using a thematic analysis approach. Coding and clustering of data based on the identified themes prepared by the researcher.

Results

Table (1): Distribution of Socio Demographic Data for Study Sample (n=60)

Item	n	%
Age		
20-25 years	28	46.7
26-35 years	25	41.7
36-45 years	6	10.0
46-60 years	1	1.7
Gender		
Male	19	31.7
Female	41	68.3
Marital Status		
Single	29	48.3
Married	29	48.3
Divorced	2	3.3
Current Work Hospital Name		
Assiut University Hospital	34	56.7
Hurgada General Hospital	26	43.3
Number of Years' Experience In ER Department		
Less than 5 years	35	58.3
5 years – 10 years	12	20.0
More than 10 years	13	21.7
Current Position		
Head nurse	33	55.0
Supervisor	21	35.0
Charge Nurse	4	6.7
Bedside Nurse	2	3.3
Qualifications		
Nursing School	3	5.0
Technical Diploma	24	40.0
Bachelor's degree	25	41.7
Master's Degree	4	6.7
Other	4	6.7

Table (2): Distribution of Total knowledge of Critical care nurses Knowledge on the application of the triage system For Study Sample (n=60)

Total Knowledge about critical care nurses' Knowledge of Emergency Triage	Max Score	No (n=60)	%
Very Low	<50%	13	21.7 %
Low	From 50-59%	21	35.0 %
Satisfactory	From 60- 69%	12	20.0 %
Good	From 70-95%	14	23.3 %
Very Good	From 95-100%	0	0.0 %
Mean±SD (range)	**28**	**15.93±4.32 (5-24)**	

Table (3): Correlation between total nurse's Knowledge about Emergency Triage with their Socio-demographic data for the study sample (n=60)

	Knowledge about critical care nurses' knowledge of Emergency Triage								X2	P. value
	Very Low (n=13)		Low (n=21)		Satisfactory (n=12)		Good (n=14)			
	No	%	No	%	No	%	No	%		
Age										
20- >26 years	7	53.8	12	57.1	4	33.3	5	35.7	11.21	0.262 **Ns**
26- >36 years	5	38.5	5	23.8	7	58.3	8	57.1		
36- >46 years	1	7.7	4	19.0	1	8.3	0	0.0		
46- 60 years	0	0.0	0	0.0	0	0.0	1	7.1		
Gender										
Male	3	23.1	8	38.1	2	16.7	6	42.9	2.90	0.407 **Ns**
Female	10	76.9	13	61.9	10	83.3	8	57.1		
Marital Status										
Single	5	38.5	14	66.7	5	41.7	5	35.7	6.28	0.393 **Ns**
Married	7	53.8	7	33.3	7	58.3	8	57.1		
Divorced	1	7.7	0	0.0	0	0.0	1	7.1		
Current Work Hospital Name										
Assuit University Hospital	11	84.6	12	57.1	6	50.0	5	35.7	6.86	0.077 **Ns**
Hurgada General Hospital	2	15.4	9	42.9	6	50.0	9	64.3		
Number of Years' Experience In ER Department										
Less than 5 years	5	38.5	17	81.0	6	50.0	7	50.0	13.36	0.038*
5 years – 10 years	3	23.1	0	0.0	5	41.7	4	28.6		
More than 10 years	5	38.5	4	19.0	1	8.3	3	21.4		
Current Position										
Head nurse	10	76.9	10	47.6	6	50.0	7	50.0	9.64	0.381 **Ns**
Supervisor	3	23.1	7	33.3	6	50.0	5	35.7		
Charge Nurse	0	0.0	2	9.5	0	0.0	2	14.3		
Bedside Nurse	0	0.0	2	9.5	0	0.0	0	0.0		
Qualifications										
Nursing School	2	15.4	0	0.0	1	8.3	0	0.0	28.93	0.004**
Technical Diploma	3	23.1	12	57.1	7	58.3	2	14.3		
Bachelor's degree	6	46.2	9	42.9	4	33.3	6	42.9		
Master's Degree	0	0.0	0	0.0	0	0.0	4	28.6		
Other	2	15.4	0	0.0	0	0.0	2	14.3		

Chi square test for qualitative data between the two groups,
Ns:- Not Significant

Table (4): Distribution of Total practices of Emergency Triage for Study Sample (n=60)

Total practice of Emergency Triage	No	%
Very Low	2	3.3
Low	35	58.3
Satisfactory	23	38.3
Good	0	0.0
Very Good	0	0.0
Mean±SD(range)	**92.22±7.41 (74-108)**	

Table (5): Correlation between Total practice of Emergency Triage with their Socio demographic data For Study Sample (n=60)

| | Total practice of Emergency Triage | | | | | | X^2 | P. value |
| | Very Low (n=2) | | Low (n=35) | | Satisfactory (n=23) | | | |
	No	%	No	%	No	%		
Age								
20- >26 years	0	0.0	16	45.7	12	52.2	5.65	0.464NS
26- >36 years	2	100.0	16	45.7	7	30.4		
36- >46 years	0	0.0	3	8.6	3	13.0		
46- 60 years	0	0.0	0	0.0	1	4.3		
Gender								
Male	1	50.0	14	40.0	4	17.4	3.60	0.165 NS
Female	1	50.0	21	60.0	19	82.6		
Marital Status								
Single	1	50.0	17	48.6	11	47.8	1.55	0.817 NS
Married	1	50.0	16	45.7	12	52.2		
Divorced	0	0.0	2	5.7	0	0.0		
Current Work Hospital Name								
Assuit University Hospital	1	50.0	18	51.4	15	65.2	1.11	0.573 NS
Hurgada General Hospital	1	50.0	17	48.6	8	34.8		
Number of Years' Experience In ER Department								
Less than 5 years	0	0.0	22	62.9	13	56.5	8.61	0.072 NS
5 years – 10 years	2	100.0	6	17.1	4	17.4		
More than 10 years	0	0.0	7	20.0	6	26.1		
Current Position								
Head nurse	0	0.0	20	57.1	13	56.5	9.03	0.172 NS
Supervisor	1	50.0	11	31.4	9	39.1		
Charge Nurse	1	50.0	3	8.6	0	0.0		
Bedside Nurse	0	0.0	1	2.9	1	4.3		
Qualifications								
Nursing School	0	0.0	3	8.6	0	0.0	7.58	0.475 NS
Technical Diploma	2	100.0	14	40.0	8	34.8		
Bachelor's degree	0	0.0	15	42.9	10	43.5		
Master's Degree	0	0.0	2	5.7	2	8.7		
Other	0	0.0	1	2.9	3	13.0		

Chi square test for qualitative data between the two groups,   Ns:- Not Significant

Table (6): Descriptive of Performance on the application of the triage system For Study Sample (n=60)

| Item	Mean±SD	Range	Mean%	Practice Level
Airway With Simultaneous Cervical Spine Stabilization and/or Immobilization	9.88±2	5-14	54.91	
Breathing	13.9±2.04	9-19	57.92	Low
Circulation	15.55±2.4	9-20	59.81	Low
Disability	3.58±1.36	0-6	59.72	Low
Identify Deformities	3.4±1.34	1-6	56.67	Low
Brief Pain Assessment	2.37±1.15	0-4	59.17	Low
Exposure and Environmental Control	3.48±1.21	1-6	58.06	Low
systematic process that aims to identify all injuries	11.65±1.98	7-16	58.25	Low
History and Head-to-Toe Assessment:	8±2.04	3-12	57.14	Low
Chest	5.8±1.33	2-8	58.00	Low
Abdomen and Flanks	5.57±2.03	2-9	55.67	Low
Pelvis and perineum	3.5±1.07	1-6	58.33	Low
Extremities	4.48±1.56	1-8	56.04	Low
Logroll and inspect and palpate back for deformity, bleeding, lacerations, bruises	1.05±0.79	0-2	52.50	Low
Total practice of Emergency Triage	**92.22±7.41**	**74-108**	**57.64**	**Low**
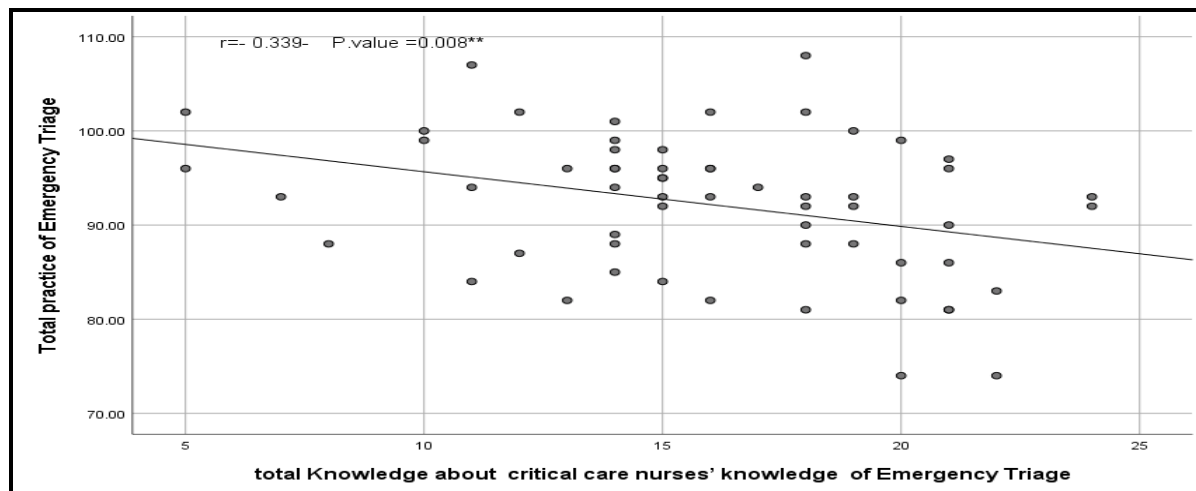
Figure (1): Total Knowledge about critical care Nurse's Knowledge of Emergency Triage

Table (1): Illustrates the demographic data of the assigned population for the study. It is clear that **88.3%** of the assigned sample is below 35 years old and only 11.7 above the age of 35 years old. The majority of the population was female with a percentage of **68.3%** while the male population percentage was **31.7%.** The availability of nursing staff eligible for the sample study is higher in Assuit University Hospital with a percentage of **56.7%** while participation of Hurgada General Hospital nurses was **43.3%,** and this has been identified before due to the large number of nursing staff in Assuit University compared to Hurgada general hospital. It is also clear that almost **58.3%** of the population have previous experience between 2-5 years working as a critical care nurse, while only **21.7%** have more than years of experience. The majority of the population's qualifications were technical diplomas with a percentage of **40%, 41.7%** were bachelor's degree nurses, and **18.1%** were other qualifications as nursing schools and master's degrees.

Table (2): Illustrates the total knowledge of critical care nurses regarding the application of triage within emergencies. It is clear that **35 %** of the population have a low knowledge level about the application of Triage within emergency situations, **20%** have a satisfactory level, **23%** have a good level of knowledge, and unfortunately **21.7%** have a very low knowledge level on triage application. **The Mean±SD range** was **15.93±4.32 (5-24)** for the maximum score of **28** for the questionnaire.

Table (3): Shows the correlation between the sociodemographic data and the level of knowledge that Nurses have. It is clear that P. Value for all the sociodemographic data was Ns (Not significant), which reflects that there is no clear relation between the sociodemographic data and the level of knowledge. For example, the result of the P. value for

the number of years of experience in ER departments was **0.164** which is not significant, which means that no obvious effect of the number of years of experience on the level of knowledge regarding the application of triage within ER departments. The majority of the population has a low level of knowledge regardless the age, gender, experience, or qualifications.

Tables (4): Identify a descriptive analysis of the application of triage system within emergency departments. The results show that all the population have a low level of performance in triage application with **a mean±SD of 92.22±7.41**.

Table (5): Shows the relation between the sociodemographic data and **the total practice of triage** that nurses implement within emergency departments. It is clear that P. Value for most of the socio-demographic data **was Ns (Not significant),** which indicates **that there is no clear relation between the sociodemographic data and the nurses' implementation of triage within ER departments**. This applied to all except the number of years' experience and qualifications. For example, the result of the P. value for the number of years of experience in ER departments was **0.038** which is significant, which means that; there are an obvious effect of the number of years of experience on the application of Triage within ER departments. This applied also for the qualifications as the results shows a significant relation between experience and level of knowledge.

Tables (6): Shows a descriptive analysis of the application of the triage system within emergency departments. The results show that almost all the population have a low level of performance in triage implementation with **a mean±SD of 92.22±7.41,** and a mean percentage score of **57.64%.**

Figure (1): Scatterplot illustrating a negative correlation: hypothetical data for the relationship between knowledge about emergency triage and nurse's performance in emergencies.

Discussion:

Application of triage:

The application of triage within emergencies is one of the main procedures that promote the safety and quality of patient care. Nurses should have enough knowledge and skills regarding triage to be correctly applied within healthcare settings **Abdel-Moaty, et al. (2021).** Critical care nurses have a vital role within emergency departments in the application of triage to maintain patient safety, provide the appropriate care, and decision making for patients. Critical care nurses who work in emergency departments experience potentially life-threatening health conditions, that require the ability of nurses to apply advanced nursing interventions for patients to survive and recover **Curtis, et al. (2023).** This study has been performed to assess the nurse's knowledge and application of triage systems within different healthcare settings.

The current study revealed that more than half of the nurses working in Hurghada General Hospital and Assiut University Hospital who were included in the study, almost more than half their ages were more than 25 Years old and less than or equal to 35 years old. It is clearly understood that most of the nurses included in the study graduated more than 4 years old. So, this reflects the nurse's (population's) experience in emergency departments and the high ability to tolerate the nature of the work environment of emergency Rooms. The total number of nurses recorded in 2018 and updated in 2022 by the World Health Organization (WHO), it is mentioned that the total number of nurses in Egypt was 189,579 Nurses in 2018 (published in 2023), less than a tenth were males, and the majority were females (**WHO, 2023**).

Factors affected nurse's knowledge:

Unsatisfactory knowledge regarding the application of triage due to many factors such as lack of orientation programs for the newly hired nurses, nurses' perception regarding their role in patient safety and saving patients' lives, and lack of job description. Many other factors could interfere with the results as the physician's perception or the hospital system's perception (especially private hospitals) about the role of nurses within emergency departments, as some hospitals see that triage application is only a physician's role. Contrary to the results of the current study, **Malak et al. (2022);** report in a study performed earlier that triage nurses have sufficient knowledge of triage application within emergencies. In opposition to the author, who should

provide the complete picture of the hospital nurses (population) and their perception of triage application, the accessibility of training programs, and work overload which reflected the lack of nurse's knowledge to apply patient triage within the emergencies.

Factors affected nurse's performance:

Concerning the nurse's performance regarding triage, the study showed that none of the study population got a good or very good level of application of triage. Almost thirty-eight percent of the population have a satisfactory level of application of triage within emergency departments. This may be attributed to a lack of critical nurses' knowledge which is well identified in their performance. This might be because of different factors such as inadequate training programs for nurses as only less than a quarter of the population received training for the application of triage, as well as a lack of the number of nursing staff. On the same line, based on a study performed in Ain Shams University Hospitals, most of the nurses have an unsatisfactory level of performance regarding triage application (**Mostafa, et al. 2019**).

Concerning the relation between the nurse's performance regarding triage and their qualifications, the study showed that there is an insignificant relation between their performance and qualifications. This result could be due to a lack of nurses' continuous learning and lack of self-development. Continuing professional development is a main competency of the nursing profession, it promotes occupational well-being as job satisfaction is connected to continuous learning (**Smith, et al. 2023**).

Moreover, the study shows that there was an insignificant relationship between nurse's knowledge and their personal characteristics; this might be due to the lack of hospital nursing staff, as most of the nurses in hospitals stay in the position for a long time ignoring the importance of self-development and lack of training programs. According to **Hussien, et al. (2019)**; critical care nurses could train in the application of triage and decision-making through experience working in ER departments. So, the author claims that most of the nursing skills can be learned through experience. These results **disagreed** with the author of this study, who found that most of the nurses in hospitals complete the patient's care considering only experience, but the experience should be supported with continuous reading and learning, as experience alone is not enough for identification of the best practice and providing high-quality care for patients.

Conclusion

Based on the study findings it could be concluded that almost more than **50%** of the population included in

the study has an unsatisfactory level of knowledge and application of triage within emergency departments. The low level of knowledge is reflected as well in the nurse's performance in the application of triage in ER departments.

Recommendations

So based on the study the following recommendations are provided for the improvement of the nurse's knowledge and application of triage:

- Include and Evaluation of students within the nursing study courses on the implementation of triage, as the triage practices are the most important practices that should be included in the curriculum of different nursing faculties, institutes, and schools. Not only inclusion but also regular evaluation of students within the nursing study course.
- Co-operation Protocol between The Ministry of Health and Population (MHAP) with the Ministry of Higher Education should be performed to provide regular practical courses for nurses within hospitals on the application of triage within emergencies.
- Provide hospitals with enough supplies for the ER departments that facilitate the application of triage.
- Regular evaluation on triage practices application should be performed by hospital management departments that focus on the importance of triage application in saving patient's lives and decreasing the workload of ER healthcare providers.
- Development of protocols and policies of the ER departments that include and highlight the importance of triage application.
- Annual individual practical review of the nurse's knowledge and application of triage is required for the nurse's allowance for joining the ER team.

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