

Emergency Department Nurses' Knowledge Regarding Triage

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Abstract

Mortality rate can be reduced considerably by implementation of triage in Emergency Department (ED). The triage nurse is typically the first person a patient encounter when presenting for emergency care in the ED. Triage knowledge among nurses is one of the key elements of supervision and decision making in ED, if it is not carried out at stander level; the outcomes of care of patients and efficiency of ED get compromised .Triage Registered Nurses (RNs) have a pivotal role in the implementation of streaming of ED patients, thereby helping in reducing the length of time patients stay in the ED (Kerie et al., 2018). The study aims to assess Emergency Department nurses' knowledge regarding triage.

Methodology: A comparative descriptive cross section hospital-based study design was conducted at the Emergency Departments of King Fahad University Hospital in AL Khobar and Dammam Medical Complex in Saudi Arabia, Eastern Province to determine the ED nurses' knowledge regarding triage.

Result: A statistically significant relationship was found between age and knowledge, which revealed ED nurse's knowledge level regarding triage increase when they become older among DMC ED nurses. Whereas, there was no statistically significant relationship was seen between age and knowledge in (KFUH) ED nurses. Moreover, a statistically significant relationship was also seen between years of experience and knowledge among (KFUH) ED nurses in comparison with DMC ED nurses, there was no statistically significant relationship between years of experience and knowledge. This means the knowledge increases by increasing years of work experience among KFUH ED nurses. Further, the ED nurses' gender, educational level and the training courses attended could not attain any statistical significance in both hospitals.

Conclusion: In the basis of results, it was concluded that (KFHU) emergency department nurses' level of knowledge concerning triage ranged between moderate level and high level of knowledge in comparison with DMC emergency department nurses' level of knowledge, it was noticed that three-quarter of them had low level and the rest of them is moderate level. While, very low percentage of the ED nurses in two hospitals (KFHU and DMC) reach very high level of knowledge.

In KFHU emergency department nurses' knowledge, regarding triage more than half had high and very high score compared with quarter of them in DMC. Moreover, overall the level of knowledge of nurses in KFHU emergency department was more than 70%, which is considered high score while the DMC emergency department nurses' level of knowledge is less than 70%, which considered moderate score.

Introduction

Triage is the process of deciding which patient should be treated first based on how sick or seriously injured they are. Triage is the one of the most important management and decision –making concepts in ED (Reisi et al., 2018). The triage process is used in different situations and separates it in three types including: military, disaster and Emergency department triage (Aljohani, 2011).

Triage systems were introduced worldwide to lower mortality rates, reduce the waiting time for patients who need critical care and improve patient flow in accident when they arrive at emergency rooms (Burgess et al., 2018). The triage system contains of scales. Those scales have suitable time of waiting from seconds up to hours based on the condition (Goldstein et al., 2017). The triage scales are Australian Triage Scale (ATS), Manchester Triage System (MTA) also called Emergency Severity Index (ESI) and Canadian Emergency Department Triage and Acuity scales (CTAS) (Ebrahimi et al., 2016) & (Rahmani et al.,2013).

The Australasian Triage Scale (ATS) is implemented by the Australasian College of Emergency Medicine (ACEM). It aims to provide a timely assessment and safely wait for medical assessment of all patients who present to the ED based on clinical criteria (Sorić et al., 2017). It includes five levels/categories of acuity: immediately life-threatening (Category 1), imminently life-threatening (Category 2),

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Potentially life-threatening or important time-critical treatment or severe pain (Category 3), potentially life-serious or situational urgency or significant complexity (Category 4) and less urgent (Category 5) (Hodge et al., 2013)

The MTA/ ESI aim to focus on continuous monitoring especially the patient in the waiting area because the condition can change before seen by doctors (Mackway-Jones, Marsden & Windle, 2014). It consists of three colors based on the initial assessment which is airway, breathing, circulation, and disability. The situations that need immediate intervention indicate the red color. The orange color means the condition that can wait from ten minutes up to one hour such as severe bleeding while the yellow color indicate to mild hemorrhage, mild hypoxia. It determines acuity based on the stability of vital functions (is this patient dying?) or is there a potential threat to life, limb or organ (is this a patient who should not wait?) (Worth, 2017).

The CTAS aims to use a complaint list and specific physiological modifiers to sort patients into triage levels based on an ideal maximum amount of time within which a patient should see a physician (Pooransingh et al., 2018). It contains of five levels/ categories from immediate that need resuscitation up to non-urgent that need primary care (Aljohani, 2011).

The triage scale in Saudi Arabia was adapted from the ministry of health (MOH) in the Kingdom of Saudi Arabia. It is composed of three levels/categories; the first level is emergent which indicates the patient needs aggressive resuscitation such as severe traumatic patient. The second level called urgent that means the patient in the acute phase and requires medical intervention within one hour or less. The third level known as non-urgent which included patients with chronic disease who's their condition can wait two hours (Qureshi, 2010).

However, the MOH triage scale is not used in all KSA hospital. Some hospitals use (CTAS) level because the Canadian scale is more accurate than MOH scale due to misperception in some cases to be sorted as urgent or non-urgent (Aljohani, 2011) & (Azadeh et al., 2016).

Emergency nurses are at the forefront of hospital service provision and are often the first to interact with and care for ill and injured patients. Also, they consider the main anchors of triage in hospitals (Dulandas & Brysiewicz., 2018). The triage nurse should always have rapid access or be in view of the registration and waiting areas . The triage nurse should follow a triage steps to meet the aim of the triage system and assist the triage nurse in deciding the suitable level. Those steps are: environmental safety for all health care sectors and patients, visual signs, chief complaints, focused assessment, assumption building, acuity determination and reassessment (Culley & Svendsen, 2014) & (Afaya et al., 2017) and Triage nurses' knowledge and experience have been cited as influential factors in triage decision-making. It is reflected in the assignment of a triage category indicating which patients should be seen first (Kerie et al., 2018). Triage nurse requires being a good decision maker because it will affect the outcome of triage. The over or under estimation of triage level reflect on quality of care, utilizing unnecessary resources, affect length of stay and could affect mortality rate. However, the correct triage decision indicates high quality of care, appropriate allocating patient and suitable time for care delivered by emergency triage nurse (Mohammed, 2017) & (Dulandas & Brysiewicz, 2018).

Triage nurse must have appropriate training and experience in emergency nursing triage, decision making and emergency nursing cares. Therefore, employing experienced and skilled nurses for the triage in emergency department, and teaching them how to properly perform triage can prevent many deaths, disabilities, and additional costs of treatment. Thus, formal training in triage improves the effectiveness of triage nurses and with improves confidence they will be prepared to perform more efficiently (Rahmati et al., 2013) and (Torres, 2016). The aim of this study was to produce good quality evidence on the triage nurses' knowledge in the Middle Eastern Nations.

Methodology

This comparative descriptive cross-sectional study was conducted in the Emergency Departments of King Fahad Hospital of the University (KFHU) in Al Khobar and Dammam Medical Complex (DMC) in Saudi Arabia, Eastern Province. A convenient sample of 138 ED nurses (69 from KFHU and DMC each) participated in this study. Nurses with at least six months experience in the ED were included in the study and nursing interns/students or newly appointed nurses with less than 3 months of experience in the ED were excluded from this study. A self-administered questionnaire that consisted of 24 questions was used in the study, the tool that used was developed by (Mohammed, 2017). where content validity and reliability testing took place. The overall purpose of the questionnaire is to assess ED nurse's knowledge regarding triage. First 6 questions of the questionnaire dealt with sociodemographic questions and the remaining 18 questions dealt with triage knowledge level, and assigning categories of care and waiting time limits. Ethical permission for the study was obtained from the Institutional Review Board (IRB) at Imam Abdulrahman Bin Faisal University. For collecting data, a total of 138 questionnaires were distributed among nurses from 5 March 2019 to 5 April 2019.

The results were manually entered into an SPSS database (Statistical Package for the Social Sciences) version 21. Association between the total score of each hospital and demographic variables was tested for significance by using ANOVA for more than two factors and independent t-test for two factors. P value less than 0.05 was considered as significant.

Review of literature

Triage is a fundamental part of clinical risk management in all departments when clinical load exceeds clinical availability. Triage is defined as prioritizing patients according to the seriousness of their conditions and providing the most appropriate clinical care to most people in the shortest possible time (Bijani et al., 2018).

Triage considers one of the strategies to improve patient throughput, improving the speed and appropriateness of treatment delivered in ED. Also, triage is the process of collecting pertinent information about patients who are seeking emergency care and initiating a decision-making procedure that uses a valid and reliable triage acuity scale (Varndell et al., 2019).

Emergency Triage promulgates a system that delivers a teachable, auditable method of assigning clinical priority in emergency settings. It is not designed to judge whether patients are appropriately in the emergency setting, but to ensure that those who need care receive it appropriately quickly. Furthermore, triage is a critical component of ED practice; affecting patient safety and access to emergency care (ANA, 2015). Triage assessment, defined as assigning acuity to patients to determine treatment priority, is the critical beginning of the treatment plan for ED patients (Andersen, 2019).

Satisfactory triage can decrease a patient's unreasonable expectations, allay a patient's and his/ her companions' worries about the clinical status of the patient, facilitate and expedite the circulation of patients in the emergency department, and create a sense of satisfaction in both the receivers and providers of emergency clinical care (Bijani et al., 2018).

There are many factors affecting triage nurse decision-making that may lead to errors should be explored as well. Some of these factors include ED crowding level, ED nurse shortage, patient anxiety level, family member presence, and nurses' personal factors. Because triage can be affected by so many outside influences, we must determine which factors have the biggest impact on patient care. The consequences of interruptions on the triage process requires a comprehensive assessment and evaluation to design interventions to effectively assist the nurse in managing interruptions (Johnson & Alhaj, 2017).

On the other hand, for triage decisions to be accurate and consistent, several factors are important: the education of emergency nurses; ongoing professional development of triage nurses; regular revision of the triage guidelines, updated triage scale and a quality framework to audit triage processes and outcomes (Carter et al., 2014).

The majority of patients who attend emergency departments (EDs) in Saudi Arabia have non-urgent problems, resulting in overcrowding, excessive waiting times and delayed care for more acutely ill patients. Multiple factors influence non-urgent visits to the ED in the Saudi context including insufficient community awareness of the role of the ED and perceived lack of access to primary healthcare services (Alyasin & Douglas, 2014).

Triage nurses play a key role in the prioritization of the needs of patients in critical conditions and in need of immediate attention, thus the necessity of studying and identifying ways of enhancing triage nurses' professional capability. If triage nurses are not capable enough, triage errors may occur, which in turn can cause such problems as: increase in the length of stay of patients, delays in transfer of patients to other hospital departments, overcrowding in the emergency department, decrease in the quality of care, and further complication of patients' conditions which in some cases leads to permanent damages or death (Bijani et al., 2018). The triage nurse needs to become accomplished at rapid assessment; this involves quick decision making and suitable delegation of tasks. Long conversations with patients should be avoided as should exhaustive history taking. Clinical observations such as temperature/pulse, etc. need to be delegated if they are not required to establish priority as they are too time consuming (Varley et al., 2016).

A triage assessment has to be made, and consists of interpretation of the clinical history and physiological assessment, allocation of an urgency code, and disposition to an appropriate treatment area within the ED. It is generally expected to take no more than five minutes; balancing speed and thoroughness to ensure the triage assessment itself does not impede access to necessary clinical intervention (Rahmat et al., 2013).

The triage nurse will often have to decide where to place the patients in the department. This will depend on departmental facilities and policies. Patients who are distressed, in pain, bleeding or at extremes of age may be best placed in observational room away from the general waiting room.

In addition, patients who need to be lying down for examination (for example those suffering from knee injuries, back complaints and abdominal pain) should be placed in an area where they can lie down. To achieve this, the triage nurse needs to be continuously aware of the occupancy of the department and the current disposition of patients (Varndell et al., 2019).

Moreover, the triage nurse needs to keep the occupants of the waiting room informed of the current approximate waiting time. Constant observation and reassessment are necessary in order to spot those patients whose condition is changing because the triage is a dynamic process and the patients often need regular reassessment. This might occur after an intervention e.g. the administration of analgesic, or after an appropriate length of time. Patients may be dropped into a lower category after pain relief or brought forward if they deteriorate. (Bijani et al., 2018). The process of triage is best carried out by registered nurses or nurse practitioners with emergency nursing expertise who have completed a triage-specific educational program. Because triage is a self-directed role predominantly conducted by trained emergency nurses. Competency is an ongoing validation process that is part of safe practice in the ED; it includes observation and chart review to ensure accurate clinical decision-making ("Triage Qualifications and Competency", 2017).

According to the meaning of teamwork skill in ED, the triage nurses must not only possess inter-professional communication skills, but also be adept at management and leading others (making inter-departmental arrangements, organizing and guiding the personnel), task assignment, and time management in teamwork (Bijani et al., 2018).

Furthermore, the triage nurse should keep the knowledge updated, follow clinical guidelines and consider evidence-based nursing during clinical decision-making. Also, she must be characterized by the following, being patience, flexible, able to adapt to the tough conditions which exist in the ED and tolerate hardships. In addition, she should have communication skills because patients appreciate knowing the waiting time, the probable time spent in the department, whether any investigations may be ordered and possible treatment (Rahmat et al., 2013).

As one of the major components of clinical competence of emergency nursing is having sufficient familiarity with pathophysiology of diseases, symptoms of diseases, and diagnostic tests, as well as nursing procedures in high-risk emergencies e.g. cardiac arrest, airway obstruction, shock, internal bleeding, trauma, and poisoning. Moreover, to having professional knowledge, triage nurses must possess clinical skill which includes technical skill and team work skill (Terry, 2014).

Collaborative observational assessment of triage competency has been increasingly suggested as an adjunct to didactic instruction. Some examples of observational assessment include real-time feedback by preceptors or charge nurses, or triage simulation experiences. Online courses and online case studies have also emerged as valid educational alternatives with which to evaluate triage competency (Jordi et al., 2015).

The ED leadership should ensure that registered nurses receive appropriate education, demonstrate the knowledge application and situational awareness required to successfully function the role of triage nurse according to professional and accreditation standards (Carter et al., 2014).

Results

The data was analyzed for socio-demographic characteristics, explored the percentage distribution of the knowledge score and total knowledge score, and studied the relationship of total knowledge scores with that of socio-demographic characteristics.

Table (1): Distribution of emergency department nurses according to their socio-demographic characteristics & work-related data.

Demographics	KFHU (n=69)		DMC (n=69)		P value
	N	%	N	%	
Age in years.					
20-25	6	8.7%	4	5.8%	Ch-square = 2.360 P =0.501
26-30	23	33.3%	26	37.7%	
31-35	23	33.3%	28	40.6%	
36 and above	17	24.6%	11	15.9%	
Gender					
Male	8	11.6%	6	8.7%	Ch-square = 0.318 P =0.573
Female	61	88.4%	63	91.3%	
Educational level					
Bachelor	62	89.9%	32	46.4%	Ch-square =35.776 P =<0.001*
Post graduate	0	0	3	4.3%	
Technical(high) diploma in nursing (3 yrs.)	4	4.3%	31	44.9%	
Other (diploma 2 yrs.)	4	5.8%	3	4.3%	
Experience in ED					
Less than 1 yrs.	1	1.4%	2	2.9%	Ch-square = 3.826 P =0.281
>1-3	12	17.4%	17	24.6%	
>3-5	26	37.7%	16	23.2%	
More than 5	30	43.5%	34	49.3%	
Training course					
• ACLS (Advance Cardiac Life Support).	52	75.4%	33	47.8%	Ch-square = 11.063 P = 0.004*
• Triage courses	17	24.6%	36	52.2%	
• BLS (Basic Life Support)	69	100%	69	100%	

* Statistically Significant

Table (1) shows the socio-demographic characteristics of the ED nurses. It shows the educational level which indicates that most of the nurses were with bachelor's degree (89.9%) from KFHU, comparing with (46.4%) of them in DMC. Whereas, nurses with technical diploma in nursing were constituted (44.9%) almost equal to the bachelor's degree holders in DMC, but they were far less in KFHU (4.3%). However, the education qualification demonstrated a very high statistical significance difference ($P < 0.001$).

In relation to the training courses, 75.4% of nurses from KFHU and 47.8% of nurses from DMC had undergone the Advanced Cardiac Life Support (ACLS) training. But the Triage courses were only 24.6% of participants in KFHU, whereas double the number of ED nurses (52.2%) of DMC undergone the triage courses. However, the groups demonstrated a high level of statistical significance ($P=0.004$). Other demographical factors were not significant.

Table (2a): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of triage.

Category	Correct answers	KFHU (n=69)		DMS (n=69)		P value	
		N	%	N	%		
1. Definition of Triage	Categorizing patient according to their need for medical care Regardless to other circumstances. (Correct answer).	67	97.1	65	94.2	Ch-square =0.697 P = 0.404	
	To see patient according to their turn.	2	2.9	1	1.4		
	To give priority for elder patient.	0	0	2	2.9		
	To see patient according to their time of arrival.	0	0	1	1.4		
2. Time limited	level 1	a. 0 second (Correct answer)	53	76.8	33	47.8	Ch-square =12.343 P =<0.001*
		b. 0 - 5 min	14	20.3	21	30.4	
		c. 15 min	1	1.4	5	7.2	
		d. not more than 10 min	1	1.4	10	14.5	
	level 2	a. 15 min (Correct answer)	35	50.7	32	46.4	Ch-square =0.261 P =0.609
		b. 0 - 5 min	23	33.3	18	26.1	
		c. 5 - 10 min	10	14.5	19	27.5	
		d. 20 min	1	1.4	0	0	
	level 3	a. 30 min (Correct answer)	53	76.8	42	60.9	Ch-square =4.088 P =0.043*
		b. 0 - 15 min	8	11.6	16	23.2	
		c. 0 - 20 min	5	7.2	6	8.7	
		d. One hour	3	4.3	5	7.2	
	level 4	a. two hours	20	28.9	22	31.9	Ch-square =2.421 P =0.120
		b. one hour (Correct answer)	33	47.8	24	34.8	
		c. A and D	11	15.9	18	26.1	
		d. Can be send back to be seen by family physician.	3	7.3	5	7.2	
Stages of the triage process	Assessment and nursing intervention. (Correct answer)	32	46.4	11	16.2	Ch-square =14.505 P = <0.001*	
	b. Assessment and admission.	8	11.6	5	7.2		
	c. Vital sign and blood test.	2	2.9	7	10.0		
	d. Physical examination and vital sign.	27	39.1	46	66.6		
4. Visual assessment	a. risk assessment	1	1.4	9	13.0	Ch-square = 7.424 P = 0.006*	
	b. pain assessment	5	7.2	1	1.4		
	c. Both a and b. (Correct answer)	57	82.6	42	61.8		
	d. Vital sign.	6	8.8	17	24.7		
5 Triage help nurses	a. Saves time.	8	11.6	4	5.8	Ch-square =1.220 P =0.269	
	b. Decreased mortality rate.	4	5.8	1	1.4		
	c. Reduces the admission rate.	2	2.9	5	7.2		
	All mentioned above. (Correct answer)	55	79.7	59	86.8		

* Statistically Significant

Table (2a) shows percentage distribution of correct answers responded by the ED nurses regarding their knowledge of triage. The awareness of triage was categorized under five sub-categories namely definition of triage, time limit, stages of triage process, visual assessment and how the triage help the nurses.

The second category looked into the time limit of triage under four levels and for the first level, the nurses' knowledge of both hospitals was dissimilar with 76.8% of nurses of KFHU gave correct answer, however only 47.8% of nurses from DMC responded correctly and there was a high statistical significance between the two groups with $p = <0.001$.

Whereas, for the second level 50.7% of KFHU ED nurses provided correct answer in compare with DMC ED nurses only 46.4% provided correct answer and it was not statistically significant. The third time limit level provided with a moderate level of awareness by the ED nurses of the two hospitals, 76.8% and 60.9% (KFHU and DMC) respectively with a low statistical significance difference ($p=0.043$). For the time management of level three triage around half of the KFHU ED nurses (47.8%) provided correct answer, whereas only 34.8% of DMC ED nurses had correct knowledge and there was not statistical significance ($P =0.120$). Nevertheless, the majority of nurses from both the hospitals are aware of the correct time management during triage.

In relation to Knowledge about the stages of triage process, it illustrates low level of knowledge among the nurses with 46.4% and 16.2% of correct answer by the ED nurses of KFUH and DMS and it was highly significant with p value of 0.001. Regarding to the visual assessment category for the management of triage the ED nurses of KFUH demonstrates a high level of knowledge (82.6%), in compare with DMS ED nurses had a moderate level of knowledge (61.8%) which provided a high statistical significance with a p value of 0.006.

In relation to the fifth category, "the triage helps the nurses on their work", it shows a high level of knowledge among the ED nurses, 79.7% and 86.8% respectively, but with a lower significance.

Table (2b): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of factor affecting triage.

Category	Correct answers	KFHU(n=69)		DMC (n=69)		P value
		N	%	N	%	
6.Factor affecting triage	The characteristic of the patient.	4	5.8	4	5.8	Ch-square =0.317 P =0.573
	The triage decision -maker.	2	2.9	5	7.2	
	The health care sitting.	1	1.4	1	1.4	
	All the above.	62	89.9	59	85.6	

No significant results obtained from the question asking about factors affecting triage (Table 2 (b))

Table (2c): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of triage goal.

Category	Correct answers	KFHU (n=69)		DMC (n=69)		P value
		N	%	N	%	
7.Goal of triage	To identify patients with urgent, life threatening condition	23	33.4	14	20.3	Ch-square = 4.263 P = 0.039*
	To decrease congestion in emergency treatment areas.	0	0	0	0	
	To reduce the admission rate.	1	1.4	0	0	
	All the above.	45	65.2	55	79.7	

Table (2c) shows percentage distribution of correct answers responded by the ED nurses regarding knowledge of triage goal. Regarding to seventh category "goal of triage", more than half of the ED nurses' responses correctly by 65.2% of KFHU nurses, however 79.7% of nurses from DMC are aware of the goal with a lower statistical significance difference ($P =0.039$).

Table (2d): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of characteristic of an efficient triage nurse.

Category	OPTION	KFHU (n=69)		DMC (n=69)		P value
		N	%	N	%	
8. Characteristic of an efficient triage nurse	Able to make quick decision.	11	15.9	10	14.5	Ch-square = 0.218 P = 0.640
	has high level of listening and communication skill	0	0	1	1.4	
	has extensive knowledge of warning sign & symptoms	2	2.9	5	7.2	
	All the above.	56	81.2	53	76.9	

Table (2d) shows percentage distribution of correct answers responded by the ED nurses regarding knowledge of characteristic of an efficient triage nurse. There was no statistical significance.

Table (2e): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of persons performing triage.

Category	Correct answers	KFHU (n=69)		DMC (n=69)		P value
		N	%	N	%	
9. triage process Done by	The nurse only (Correct answer).	8	11.6	2	2.9	Ch-square =0.218 P =0.640
	The doctors only	0	0	8	11.6	
	The registration personal only	58	84.1	57	82.6	
	All the above.	3	4.3	2	2.9	

Table (2e) shows percentage distribution of correct answers responded by the ED nurses regarding knowledge of Person performing Triage. There was no statistical significance.

Table (2f): Percentage distribution of the emergency department nurses regarding knowledge of the nurses' role in triaging patient.

Category	Options	KFHU (n=69)		DMC (n=69)		P value
		N	%	N	%	
10. Nurses role	Visual assessment	11	15.9	10	14.5	Ch-square =3.023 P =0.221
	Vital signs	0	0	1	1.4	Ch-square =0.000 P =0.988
	Perform differential diagnosis	2	2.9	5	7.2	Ch-square =0.072 P =0.788
	Categorize patients based on severity	56	81.2	53	76.9	Ch-square =5.937 P =0.015*
	Blood test	62	89.9	25	36.8	Ch-square =41.651 P ≤0.001*
	Nursing intervention	62	89.9	53	77.9	Ch-square =3.608 P =0.058
	A brief assessment & preoperative diagnosis is documented in patients' medical record before surgery for those emergency patients requiring surgery	41	59.4	31	45.6	Ch-square =2.628 P =0.105
	Documents limited relevant history	61	88.4	60	88.2	Ch-square =0.001 P =0.975
	Documents initial triage category allocated	68	98.6	60	88.2	Ch-square =5.937 P =0.015*
	Triage nurse will accompany and endorsed the patient to the specific area in emergency	69	100	57	83.8	Ch-square =12.136 P ≤0.001*

*Statistically Significant

Table (2f) shows percentage distribution of the emergency department nurses regarding knowledge of the nurse's role in triaging patient. In relation to tenth category "role of triage nurse", it is open-ended question and most of the answers were analyze. All ED nurses (100%) of KFUH wrote correct answer, "Triage nurse will accompany and endorsed the patient to the specific area in ED" compared with 83.8% of them in DMC with statistical significance difference $P < 0.001$. Where the majority of ED nurses in both hospitals wrote the other correct answers as "Triage nurse documents initial triage category allocated", (98.6 % and 88.2%) of nurses in KFHU and DMC respectively with statistically significant difference $P = 0.015$. "Triage nurse documents limited relevant history", "categorized patients based on severity" and "nursing intervention". Moreover, the majority of ED nurses in KFUH (89.9%) were wrote the correct answer of blood testing is the one of the nurse's role in

triaging patients compared with only 36.8% of them in DMC a statistical significance difference $P < 0.001$. On the other hand, few numbers of ED nurses in both hospitals wrote the following items are the “nurses’ role in triaging patient “visual assessment”, “vital signs” and” a brief assessment and preoperative diagnosis is documented in patients’ medical record before surgery for those emergency patients requiring surgery” with no statistical significance. However, (2.9% of ED nurses in KFHU and 7.2% of them in DMC), wrote wrong statement of the role of triage nurse, which is performing differential diagnosis.

Table (2g): Percentage distribution of correct answers responded by the emergency department nurses regarding knowledge of priority based on triage.

Category	Questions	Correct answers	KFHU (n=69)		DMC (n=69)		P value
			N	%	N	%	
11.priority	Patient comes to emergency department with severe bleeding in which category you will put?	1 (Correct answer).	24	34.8	28	40.6	Ch-square =0.595 P =0.441
		2	29	42.0	26	37.7	
		3	15	21.8	15	21.7	
		4.	1	1.4	0	0	
	Patient with non-cardiac chest pain will be treated as?	Urgent case (correct answer).	24	34.8	17	24.6	Ch-square =1.563 P =0.211
		critical case	15	21.7	19	27.5	
		emergent case	30	43.5	33	47.9	
		non urgent	0	0	0	0	
	Patient comes to emergency department at night time for suture removal how you will deal with him?	Asked him to come for family physicians day time (Correct answer).	62	89.9	50	72.5	Ch-square =6.119 P =0.013*
		remove the stitch quickly	1	1.4	1	1.4	
		let him wait for one hour	6	8.7	18	26.1	
	If you are the triage nurse and the emergency room is very congested which one you will do 1st, 2nd, 3rd and 4th?	visual assessment (1)	53	76.8	57	82.6	Ch-square =0.717 P =0.397
		Sends the patient to treatment area. (2)	32	46.4	23	33.3	Ch-square =2.449 P =0.118
		Suitable nursing intervention. (3)	33	47.8	30	43.5	Ch-square =0.263 P =0.608
		documentation (4)	50	72.5	34	49.3	Ch-square =7.788 P =0.005*

*Statistically Significant

Table (2g): shows the percentage distribution of correct answers responded by the ED nurses regarding knowledge of priority based on triage. For the cases for suture removal reporting at night sought a higher level of opinion among the participants from the both the hospitals with a response of 89.9% and 72.5% respectively (KFHU and DMC) and the data found to be statistically significant.

In relation to question of priority” If you are the triage nurse and the emergency room is very congested which one you will do 1st, 2nd, 3rd and 4th”, it shows most of nurses opined that they give the highest priority for visual assessment in both hospitals (KFHU=76.8% and DMS=82.6%). The second level of prioritization, sending the patient to treatment area was acknowledged by 46.4% ED nurses in (KFHU) compared with 33.3% ED nurses in (DMC) , suitable nursing intervention as third priority reported by 47.8% ED nurses in (KFHU) compared with 43.5% of ED nurses in (DMC), followed by documentation as the fourth priority acknowledged by 72.5% of ED nurses in (KFHU) and 49.3% of ED nurses in (DMC) with statistical significant difference.

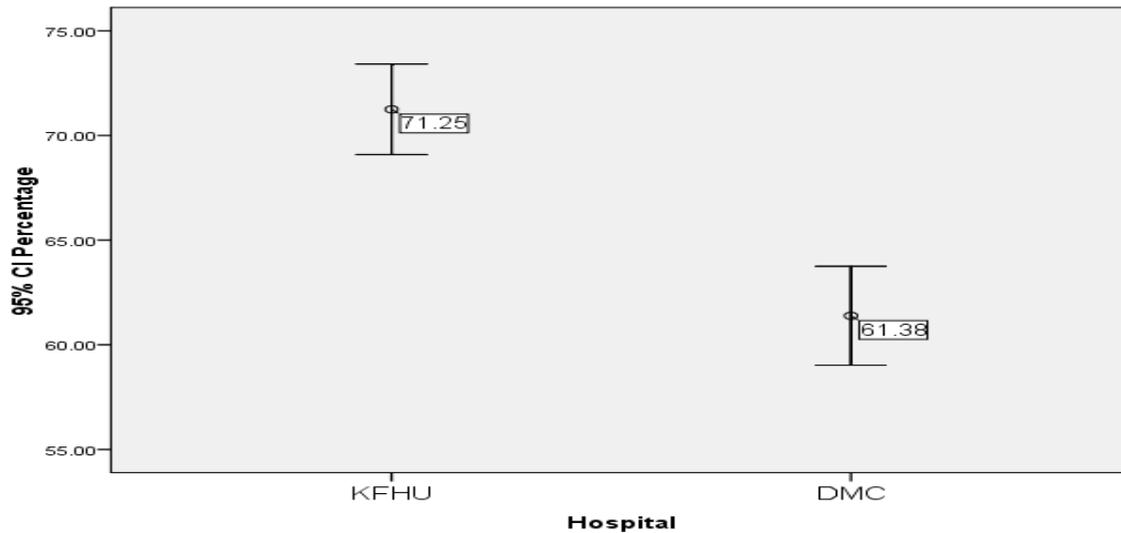


Figure (1): confidence interval of overall knowledge of nurses in two hospitals (KFHU and DMC)

Figure (1) shows the overall of emergency department nurses knowledge level in both hospitals (KFHU and DMC), the ED nurses from KFHU demonstrates a higher level of awareness of triage with 95% confidence interval percentage of 71.25%, whereas the knowledge level of DMC nurses was 61.38%.

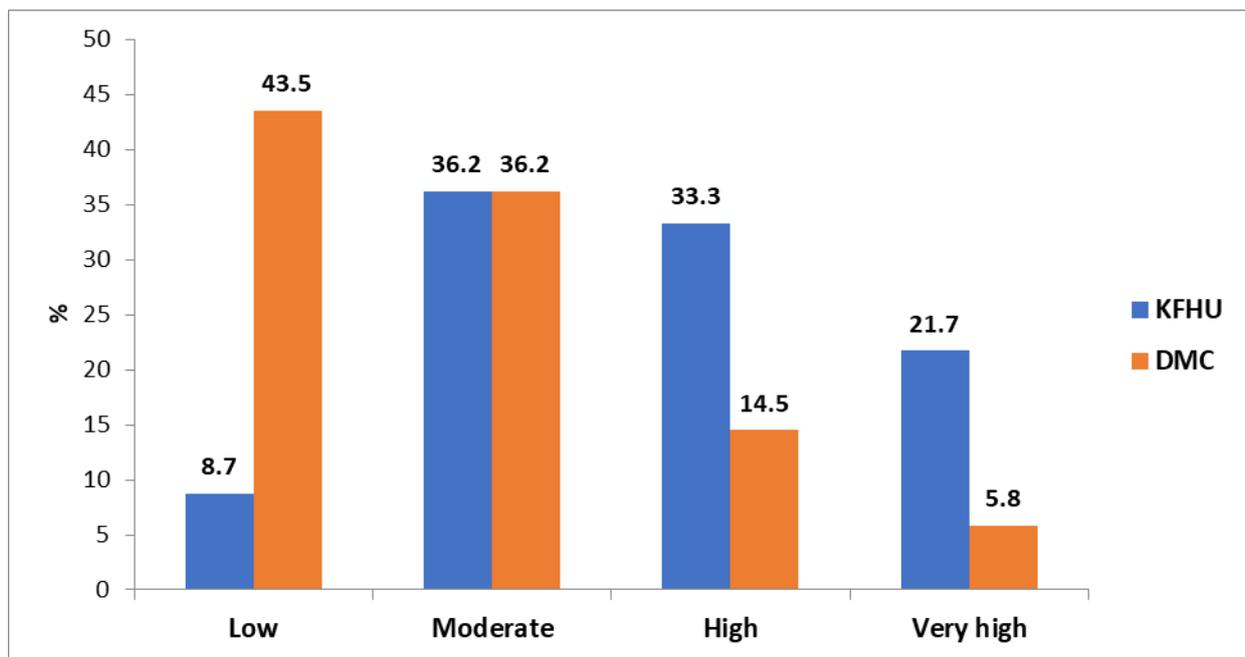


Figure (2): Percentage distribution of total knowledge score among emergency department nurses regarding triage in both (KFHU) and (DMC)

Figure (2) shows percentage distribution of total knowledge score among ED nurses regarding triage in both (KFHU) and (DMC), it illustrates that only 8.7% of the nurses in KFHU had low level in the overall triage awareness, whereas 43.5% of nurses from DMC had low in the triage knowledge assessment. However, 36.2% of nurses from both hospitals demonstrated a moderate level of knowledge, while high level of knowledge was demonstrated by only 33.3% nurses of KFHU, but comparatively lower level of high knowledge score (14.5%) was illustrated by DMC nurses. Nevertheless, a very less percentage of ‘very high’ knowledge was demonstrated by nurses from both the hospitals, but nurses of KFHU was comparatively better with 21.7%, while DMC was with only 5.8% level of very high knowledge. It is noticeable that not even a single nurse falls under the very high level of triage knowledge.

Scoring category:

Nurses who answered less than 60% correct = low

Nurses who answered 60% to less than 70% = moderate

Nurses who answered 70% to 80% = high

Nurses who answered more than 90% =very high

Table (3): Relationship between socio-demographic characteristics and work-related data of emergency department nurses and their total knowledge percentages score in (KFHU & DMC)

Demographics characteristics	KFHU(n=69)		DMC(n=69)	
	Mean \pm SD	P value	Mean \pm SD	P value
Age in years.				
20-25	69.9 \pm 5.6	F =0.543 P = 0.654	49.9 \pm 7.1	F=4.038 P=0.011*
26-30	71.5 \pm 9.9		61.9 \pm 9.3	
31-35	72.8 \pm 7.4		63.0 \pm 9.6	
36 and above	69.3 \pm 10.7		61.6 \pm 6.5	
Gender				
Male	65.7 \pm 6.7	t=1.880 P=0.065	56.4 \pm 13.2	t=1.292 P = 0.201
Female	71.9 \pm 9.1		61.8 \pm 9.4	
Educational level				
-Bachelor	70.7 \pm 9.1	F=0.901 P=0.411	63.9 \pm 10.9	F=2.025 P=0.119
-Post graduate	0.00		54.8 \pm 14.1	
-Technical diploma	75.2 \pm 6.7		59.0 \pm 8.0	
Others	75.8 \pm 7.7		65.6 \pm 1.8	
Experience in ED				
Less than 1 year	61.2 \pm 0	F=3.400 P=0.023*	46.7 \pm 11.4	F=1.767 P=0.162
1-3	72.3 \pm 8.3		63.4 \pm 10.6	
3-5	74.8 \pm 8.5		61.1 \pm 11.4	
More than 5 years	68.1 \pm 8.6		61.4 \pm 8.2	
Training course				
-ACLS (Advance Cardiac Life Support)	72.0 \pm 8.7	t=0.995 P=0.323	61.8 \pm 9.9	t=0.570 P=0.571
-Triage courses	69.5 \pm 9.0		60.5 \pm 9.7	

*Statistically significant

Table (3) shows the relationship between socio-demographic characteristics and work-related data of emergency department nurses their total knowledge score in (KFHU & DMC) were analyzed. It illustrated that the mean triage knowledge was around 70% across the age groups of KFHU nurses, ranging from 69.3 \pm 10.7 to 72.8 \pm 7.4, whereas it was around 60% (61.6 \pm 6.5 to 63.0 \pm 9.6) among DMC nurses, except for the age group 20-25 which provided a percentage mean value of 49.9 \pm 7.1. The age and level of triage knowledge of ED nurses illustrates statistical significance and hence there exists an association between each other. Further, the ED nurses' gender, educational level and the training courses attended could not attain any statistical significance. However, the experience of ED nurses from KFHU illustrates an association with a lower statistical significance (P=0.023), but there was no association for the DMC ED nurses, since it was found insignificant (P=0.571).

Discussion

Triage nurses play a pivotal role in the emergency department. Triage nurses' knowledge and experience have been cited as influential factors in triage decision-making (Ebrahimi et al., 2016). Awareness of triage methods in different situations and locations is one of the most important needs of the ED staff, especially due to the high number of patients, and is necessary for nurses in the ED (Reisi et al., 2018). Nurses are responsible for triaging patients, but there is little data on their knowledge in this regard. Therefore, this study was aimed to assess ED nurse's knowledge regarding triage.

Findings of the current study are almost similar to Ali and colleague. (2013) who found based on comparison in sight to professional qualification a significant difference was seen in the knowledge score among nurses.

With regards to training courses, the three quarters of KFHU nurses had ACLS course and half of DMC studied participants had triage course. It was observed that training courses was statistically significant among ED nurses. Similarly, Pouraghaei and colleague. (2017) reported that holding training courses regarding the significance, necessity, and procedure of triage have a great influence on improving their knowledge and performance of Environmental Management Systems (EMS) employees.

The respondents' knowledge regarding time limited for triage was 76.8% among nurses in KFHU regarding level one (resuscitation) while is approximately 47.8% of them in DMC. In addition, the huge differences in ratio especially for level one could be the miss understanding of the time limited either you will manage the patient immediately or you let the patient wait up to five minutes.

The findings of the present study are similar to Goransson and colleague. (2005) and Burr, Fry. (2001), findings who concluded that lacking knowledge on waiting time limits can potentially result in harmful delays in rendering timely emergency care and thus increase the risk of avoidable deaths and disabilities. These results were in contrast with those obtained by Cantor et al. (2012) findings who stated that almost half of the respondent had no knowledge on time limits for the triaged categories. The reason for performing triage in an emergency department is to ensure that each patient is treated in the order of clinical urgency and that the treatment is appropriate and timely (Lampi et al., 2018).

This can be explained by the fact that adequate knowledge about time limit for different cases will reduced patient waiting times and it can be used as an indicator of good quality care and better performance by the ED nurses. Lastly, the ED nurses need continuous educational session for the triage scale especially CTAS which is considering international tool used and have a high validity and reliability in worldwide (Ebrahimi et al., 2019).

In relation to benefits of triage the results of the current study further revealed that most of the ED nurses in both hospitals responded correctly regarding benefits of triage for nurses in both hospitals. These results are supported by Mohammed. (2017), and Stover-Baker and colleagues (2012), findings who illustrated more than half of studied participants were answer correct in relation to triage benefits.

In addition, this can be explained by the fact, one of the benefits of triage is knowing hours in advance of the potential admission could allow for more expeditious planning of bed use. Patients would be likely to be moved to an inpatient bed more quickly than in the current system. However, further studies are needed to determine whether nurses in other emergency departments are able to predict the need for admission and whether predicting admission at triage would actually decrease time to an inpatient bed (Stover-Baker et al., 2012).

In relation to triage process in the current study, it was observed that almost three-quarters in KFHU ED nurses responded correctly knowledge regarding triage process versus the correct responses among nurses in DMC with low and it was statistically significant difference. The findings of the current study were in contrast with Mohammed. (2017) and Johnson and colleagues. (2018) findings who showed that half of nurses were responded correctly regarding the triage process. In relation to characteristics of an efficient ED nurse and their ability to deal with different cases, in present study, the majority of the ED nurses' knowledge in both hospitals responded correctly. These results were not consistent with Mohammed. (2017) Cone and Murray. (2002) study findings which was conducted in the ED and showed less than half had knowledge regarding to characteristics of an efficient ED nurse.

Moreover, expert triage nurses discussed the characteristics that they deemed important in themselves and in those they worked with, such as intuition, assessment abilities, good communication, and critical thinking. The participants strongly verbalized the need for more formal education and emergency nursing experience for new triage nurses. Positive reinforcement from management for timely and accurate decision making was also an important topic (Cone KJ& Murray, 2002).

Regarding the nurse's knowledge about the person responsible for triage process, it was observed that less than quarter respond correctly in both hospitals. These results are in contrast with Esmailian and colleague (2014) findings who reported there are no differences between the triage carried out by nurses and those carried out by doctors, emphasizing the high precision of the nurses.

In relation to the ED nurse's knowledge about triage priority, the results of the present study further revealed that majority of the ED nurses know how to deal with cold cases and the data found to statistically significant in both hospitals. Similarly, Mirhaghi and Roudbari (2011) findings who reported that most of the participating nurses know how to deal with cold.

In the basis of results, it was concluded that KFHU emergency department nurses' level of knowledge concerning triage ranged between moderate level and high level of knowledge in comparative with DMC emergency department nurses' level of knowledge, it was noticed that three-quarter of them had low level and the rest of them is moderate level. While, very low percentage of the ED nurses in two hospitals (KFHU and DMC) reach very high level of knowledge. In KFHU emergency department nurse's knowledge, regarding triage more than half had high and very high score compared with quarter of them in DMC. Moreover, overall the level of knowledge of nurse in KFHU emergency department was more than 70%, which is considered high score while the DMC emergency department nurses' level of knowledge is less than 70%, which considered moderate score.

Moreover, overall the level of knowledge in KFHU emergency department nurses more than 70% which consider high score while the DMC emergency department nurses less than 70% which consider moderate score. Furthermore, this can be explained by fact that low level of triage knowledge among nurses reflect that there is a lack of proper training and educational programs and nursing curriculum for different nursing programs has no sufficient content of triage to prepare nurses for triage system in emergency units (Javadi et al.,2016). In addition, the low level of nursing awareness is not far from the mind, and it indicates that nurses' knowledge about triage has not been sufficient and requires retraining and continues education (Reisi et al., 2018).

In relation to age, the present study showed relationship between age and knowledge. The age and level of triage knowledge of nurses illustrates statistical significance and hence there exists an association between each other. This result is similar with those obtained by Reisi, and colleagues. (2017), who showed that triage knowledge associated with age. So that with increasing age, nurses' knowledge level increased and age of nurses' performance increased with age, which, contrary to the results of study by Aghababaeian and colleagues (2017), who reported there was no statistically significant relationship between age and knowledge and practice of nurses.

However, the present study was not able to obtain any significant association between gender and the total knowledge score of the studied participants. This result is similar to a study showed that there was no significant difference between nurses' sex and knowledge. This was consistent with the results of the present study only in the field of knowledge. Therefore, it seems that the increase in age in different groups, the number of units and the research environment will have different effects on the level of knowledge and performance (Reisi et al.,2017) and (Javadi et al.,2015).

In the present study, there is no association between educational level and the correct knowledge about triage among nurses. This may be due to the fact that an increase in educational level, training, and knowledge increases skill acquisition. When a nurse understands the urgency, severity, and outcome of the problem early, it is easy for them to triage patients immediately. Continues trainings and higher educational levels are directly a means to increase knowledge and skill of nurses in a diverse aspect of situations which prepare them psychologically as well as mentally to respond emergencies (Kerie et al., 2018).

Moreover, the results of the current study were similar to Fathoni and colleagues (2013), findings who stated that since many subjects graduated in diploma level, and less numbers had attended training or specific course to triage, their triage knowledge were low. In addition, the finding revealed that only 16.20 % of subjects currently work in triage room. It indicates that nurses' triage skills may be insufficient as a result of knowledge deficits. This suggests that triage knowledge should be provided and included as in-service education for ED nurses.

In the current study, there is relationship between the correct knowledge of triage with years of experience of the ED nursing staff, while the relationship between these items were found in the previous study which revealed connection between nurses' knowledge about triage and working experience in the ED. As the working years in the ED increased nurses' knowledge level about triage improved. This increase in knowledge about triage could be due to the work exposure (Afay et al., 2017).

In addition, contrary to what appeared in the study of Reisi and colleague. (2017) which conducted to study the level of awareness in the ED nurses about triage, where it showed that no significant statistical relationship between working experience and working time with awareness level. Work experience was not in line with increased awareness of the triage field, which was consistent with studies conducted by Pishgooie and Aliyari (2016) and RNC-TNP (2012) because they have concluded that the level of awareness is associated with an increase in the work experience.

Moreover, the increase in nurses work experience participants was in line with increased awareness of the triage field, which was consistent with studies conducted by Pishgooie and Aliyari (2016). Because they have concluded that the knowledge level of triage is associated with increase with work experience. However, inconsistency with studies conducted by Ajri-Khameslou and colleagues (2017) because they were concluded that increasing work experience significantly associated with improving awareness level.

The finding of the current study is in contrast with a study conducted by Mirhaghi & Roudbari. (2011) findings that reviewed work experience and triage knowledge showed that there was not significant correlation between work experience and obtained scores and it cannot be said that with increasing work experience, the triage knowledge would increase. Similarly of Mirhaghi & Roudbari. (2011) findings were in accordance with the study outcomes of Conisidine et al., (2007) that assumed knowledge has a more effective role in triage performance than work experience of the nurses. However, as Conisidine et al., (2007), said more studies were needed in this field.

So, in both hospitals have adequate years of experience in ED. It should be noted that in the present study, there was significant statistical relationship between years of experience and overall level of knowledge about triage only in KFUH studied participants. These results are supported by Sedaghat et al. (2012) that found a positive and significant relationship between work experiences in ED and triage.

This finding showed that stated qualifications for nursing triage might need more consideration so that accommodate nurses to have at least 6 months experience in the ED. Therefore, it is recommended that at least two years of work experience must be passed for ED as a nursing competency of the ED triage because the association between years of experience and nurses' knowledge was statically significant in KFHU participant but not significant in DMC.

In the present study, there is also no association between the training courses and triage knowledge. Furthermore, a study conducted in Iran using on the survey on knowledge and practice of emergency nurses in triage provided statistically significance relationship between Nurses' awareness of the principles of triage in nurses attending theaters and seminars related to the principles of triage and having more clinical experience were higher than academic content and personal studies (Reisi et al, 2017) .

According to Javadi and colleagues. (2015) findings who showed that nurses had the highest level of knowledge about the triage principles in the workshops, but there was no significant relationship between knowledge of triage and knowledge and practice of nurses. It seems that having nurses experience and clinical experience in addition to participating in workshops improves the level of knowledge and practice of nurses from the principles of triage, it is better to have experienced people along with more periodic training in position Critical Emergencies. It has been found that lack of training on triaging has a correlation with inaccurate triage decisions as triage knowledge has been identified as a key cause that influences accuracy of triage decisions in the ED (Afaya et al., 2017).

These results was in contrast with Javadi et al. (2016) that showed nurses had the highest level of knowledge about the triage principles in the workshops, but there was no significant relationship between knowledge of triage and practice of nurses .It seems that having nurses experience and clinical experience in addition to participating in workshops improves the level of knowledge and practice of nurses from the principles of triage, it is better to have experienced people along with more periodic training in position Critical Emergencies (Haghdoust et al., 2009).

Reisi et al., 2018 suggested that nursing directors provide continuing education courses such as seminars and short courses to better organize the nursing system with the aim of developing and improving the quality of clinical care and informing nurses about ideal care behaviors. In addition, with the appointment of experienced nurses in the management of hospital departments and in the field of clinical education, care for patients provides basic care for the patient. In this regard, it is necessary for authorities to allocate funds and facilities for improving the quality of care and nursing care (Reisi et al., 2018).

In any case, as other studies have suggested, the reason for this disagreement can be attributed to the difference in the study population, the study environment, and the number of participants. Similarly, there is a need for more research in the field of hospital triage awareness, and triage nurse needs at least one year of work experience in the relevant department (Reisi et al., 2018).

It is obvious that the formation of triage teams with proper physical strength and adequate knowledge about their performance in the emergency room, considering the proportion of the number of patients referring to the emergency department with the manpower employed in those departments and holding training courses to raise the awareness of these individuals will ultimately improve the quality of care provided in the emergency department of the hospital.

Conclusion

Based in the present study findings, it's concluded that there were statistically significance differences between nurses who received triage courses and their overall knowledge about triage, in addition to a different in the mean of overall knowledge between two hospitals were KFHU have a better knowledge 71.25 comparing with DMC had 61.38.

Recommendations

The author recommends that a periodic triage program for nurses should be emphasized including understanding of triage scale plus practical simulation for the ED patients' complaints and how to prioritize all condition. Moreover, continuing evaluation of the effectiveness of triage training programs on the perceptions, practice and knowledge of triage nurses. Future studies are recommended to explore the relationship between knowledge, practice and attitude in triage and to know the gap of triage knowledge among ED nurses in different healthcare settings.

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