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Efficacy of START Triage Algorithm Scenario-Based Education on Nursing Students' Knowledge, Attitude, Competencies, and Clinical Judgment

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Abstract: *Triage nurse immediate sorting capabilities, her knowledge, performance, and accurate clinical decision-making are the most important factor affecting immediate lifesaving, clinical outcomes, and quality of care for patients in emergencies; therefore, most universities in the world seek to find student-centered educational methods which can lead to improvement of the clinical decision-making of the students.* ***The study*** *aims to determine the efficacy of START Triage algorithm scenario-based education for adults on faculty nursing students' knowledge, attitude, competencies, and clinical judgment in multi-causality situations****Materials and Methods*** *a quasi-experimental research design was utilized in this study. This study was conducted at the Faculty of Nursing at Tanta University. A convenience sample of 400 students were included in this study the educational intervention carried out on two phases* ***phase I****: pre-intervention phase (initial assessment) and* ***phase II*** *interventional phase in which the students were randomly divided into two studied groups as follows group I (lecture and role play) and group II (self-directing group)two tools were used for data collection* ***Tool (1):*** *A structured knowledge students' questionnaire tool****Tool (2****) Students 'performance checklist tool* ***The main results*** *of this study revealed that there were a highly statistically significant differences between studied students' knowledge, performance and accurate clinical decision making among the phases of the study Pre-intervention (phase I), and post-intervention (Phase II) in which in phase I the students' were had been the lowest and poor performance score and poor clinical decision making versus phase II the students' were having a positive gain and enhancement in knowledge, performance, and clinical judgment compared with phase II. Moreover, there was a significant difference between two educational methods lecture combined with role-playing, versus self-directing group) in which The total correct knowledge, performance and accurate clinical judgment scores of the lecture and role-play were higher than those of the self-directing group as (p < 0.001). Also, the results revealed a positive correlation relationship between knowledge, performance, and accurate clinical judgment. As r=0.524,0.612, 0.540 respectively p= (0.000)****conclusion****: scenario-based education by lecture combined with role-playing and self-directing educational method for START Triage algorithm and disaster management has a positive impact on improving nursing students' knowledge, competencies, that has also affected effectively on their accurate clinical decision making regarding different emergencies and multi-causality situations.* ***It was recommended that*** *essential provision and establishment, of triage algorithms and emergency management strategies in faculty of nursing curriculums and nursing faculties, must provide continuous education and training in actual clinical areas and expose the students to deal with different emergencies and working in stressful situations to enhance their capabilities and progress their psychomotor and cognitive skills.*

Keywords: *Scenario, START triage algorithm, Disaster management, Clinical judgment. Triage competencies*

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I. Introduction

Incidence and magnitude of disasters have increased dramatically over the last 30 years, a trend that is expected to continue. Factors such as overpopulation and increased urbanization, climate change, and the ongoing threat of terrorism magnify the susceptibility to and effects of disaster situations, this challenging issue runs a strong impetus to the faculty of nursing and health organization to prioritize and improve health system preparedness and response capacities. [1]

Triage is defined as sorting patients' (prioritization) at admission and treatment in emergency departments, according to their life saving medical conditions and regarding existent resources available. Thus, improvement in triage is the aim of hospitals to improve clinical outcomes, especially in resource-limited settings and for providing the best care for many patients saving their life and improve their outcomes.[2, 3] Furthermore, a rapid accurate triage, and better-quality resource usage. For patients in emergencies and multi causality situations is the key to reduced fatalities, saving patients' life reduced mortality rate and improve

patients' outcomes, therefore, triage skills education is one of the imperative aspects of the preparedness of nurses for different emergencies.[4]

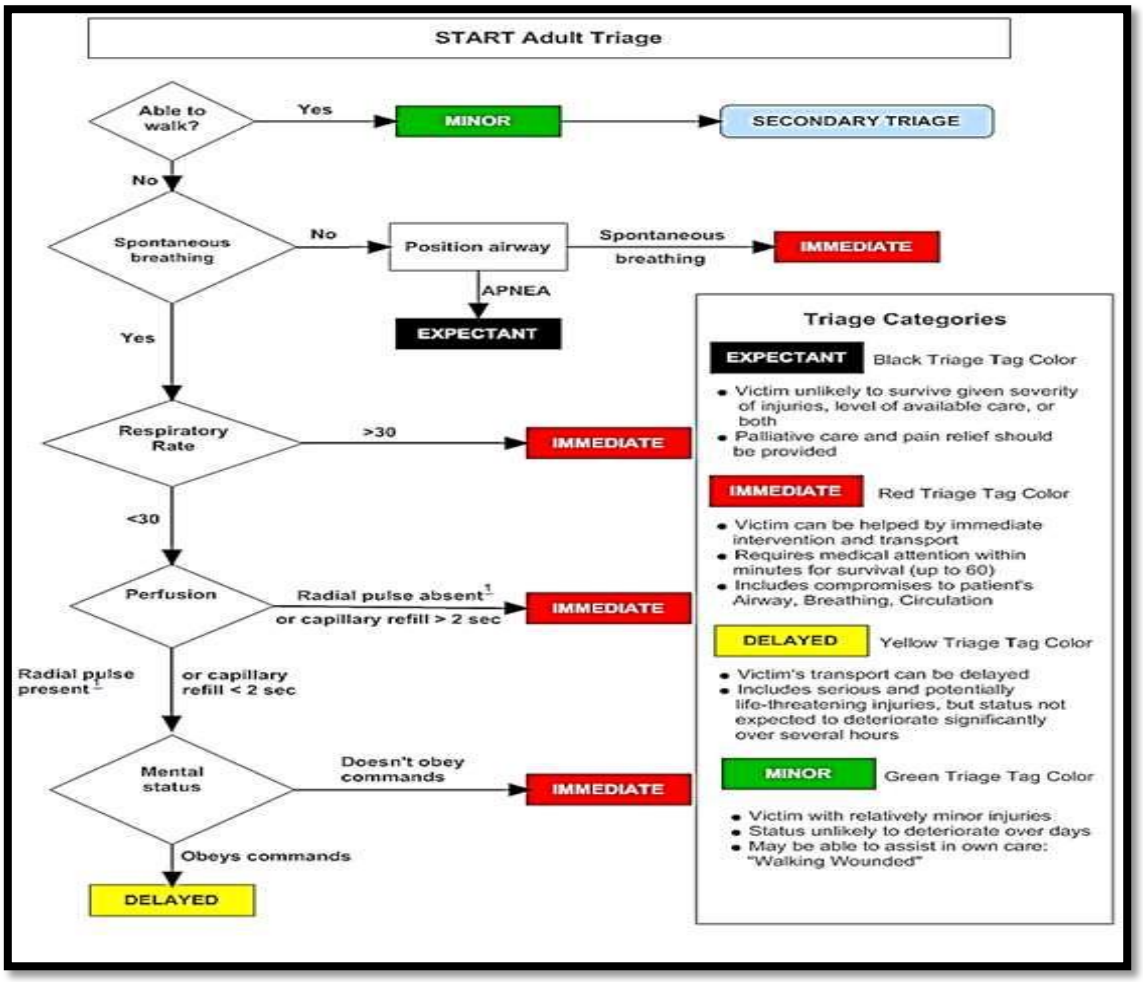
The Joint Commission (2006).[4] and several preceding studies [10,11] have found that validate a persistent gap in education, training, and leadership at all levels regarding knowledge and equipped for all competency's comprehension, application, analysis, synthesis, and evaluation and accurate clinical decision making of nurses in disaster situations most of them were not adequately prepared for disaster response. Subsequently, they encounter spotting the need for further enhancement in health system curriculums, capability for undergraduate students, to be equipped with knowledge and skills and critical thinking approaches for triage and disaster management to mitigate the consequences of disaster reduction death tolls and enforce accurate respond in a disasters situation. Confidently it must be starting early from their basic training and reinforcement in their job continuing training. [5,6]

Simple triage and rapid treatment (START) algorithm is a triage method used by first responders to speedily classify victims throughout a mass casualty incident (MCI) based on the severity of their injury. First responders using START appraising victims and allocate them to one of the following four categories deceased/expectant (black), Immediate (red), Delayed (yellow), walking wounded/minor (green). [7, 8]the colors correspond to triage tags, which are used by some agencies to designate each victim's status. [8, 9]

Responders arriving at the scene of a mass casualty incident may first ask that any victim who can walk relocate to a certain area, thereby identifying the ambulatory, or walking wounded, patients. Non-ambulatory patients are at that moment assessed. The only medical intervention used before declaring a patient deceased is an attempt to open the airway. Any patient who is not breathing after this attempt is classified as deceased and given a black tag. No further interventions or therapies are attempted on deceased patients until all other patients have been treated. Patients who are breathing and have any of the subsequent conditions are classified as immediate: Respiratory rate greater than 30 per minute; the radial pulse is absent, or capillary refill is over 2 seconds; Unable to follow simple commands. [8,9]

All other patients are classified as delayed. After all, patients have been evaluated; responders use the START classifications to determine priorities for treatment or evacuation to a hospital. The most basic way to use the START classifications is to transport victims in a fixed priority manner immediate victim, followed by delayed victims, followed by the walking wounded. More detailed secondary triage systems such as SAVE may also be used: in this case, the START classifications are used to determine the order in which victims should undergo secondary triage.

Nevertheless, disaster nursing core competencies specific to general nurses were limited or not verified. Further effort must be made and directed toward the development of an accepted and adapted framework of competency for universal disaster nursing education this study adopted the framework of disaster nursing and key competencies delineated by the International Council for Nurses and the World Health Organization. [11, 12]therefore, the present study aimed to evaluate the efficacy of the START triage algorithm and disaster management scenario-based education for adults on faculty nursing students' knowledge, attitude, competencies, and clinical judgment in multi-causality situations. [10, 11]



Operational definition:

Nurses Competencies: defined as a level of performance demonstrating the effective application of knowledge, skill, and judgment" (WHO 2009). [11]

Disaster: A natural or man-made event needing resources outside of the local community to respond to the event (World Health Organization These scarce resources often include both, supplies and personnel needed to deliver health care (WHO), 2009). [12]

A mass casualty incident (MCI) resulting in a response beyond that of the local community [10]

Student competence refers to a demonstrated ability to integrate knowledge, skills, abilities, and judgment based on scientific knowledge and expectations for nursing practice in mass-casualty incidents (MCIs) response

1.1 Aim of the study:

1- To determine the efficacy of START Triage algorithm scenario-based education on nursing students' knowledge, attitude, competencies, and their clinical judgment.

2- Compare the effect of START Triage algorithm scenario-based education by lecture and role-playscenario-based triage education versus self-directing method on nursing students' knowledge, attitude, competencies, and the accuracy of their clinical judgment in multi causality situations.

1.2. Research hypothesis:

1- Lecture and role play scenario-based triage education more effective than the self-directing method on nursing students' knowledge, attitude, competencies, and the accuracy of their clinical decision in disasters situations

2- Lecture and role play scenario-based triage education not effective and had no impact on nursing students' knowledge, competencies, and the accuracy of their clinical decision in disaster situations.

II. Subjects and Methods

The study was carried out on fourth-grade nursing students at the Faculty of Nursing Tanta University from September 2018-to February 2019.

Subjects

2.1 Study Design: A quasi-experimental research design was utilized by the researcher.

2.2 Setting: this study was conducted at the Faculty of Nursing at Tanta University

2.3 Subjects: the sample of this study consisted of a convenience sample of 400 students,level four nursing students fulfilling the following inclusive criteria:

- Level four nursing students (those students will be prepared for ending the academic years of nursing science and starting for internship year at different clinical sectors, they will stay longhours in different clinical areas and multiple health zones. Furthermore, they will be in direct contact with different patients in different emergencies who needs triage and prioritizing their condition according to the severity of their clinical condition also the selection of fourth-year students because they will have a high opportunity for dealing with multi-causality situations rather than other student levels.
- Take their clinical training at Tanta Emergency hospitals

- The students included in this study were randomly divided into two groups as follows:

Group I A lecture and role-playscenario-based triage education group:

This group consisted of 200 students fulfilling the same inclusive criteria in which they have used a lecture and role-play Scenario-based educationmethod of teaching regarding the START Triage.Algorithm

Group IIA self-directed method of teaching group:

This group consisted of other 200 students fulfilling the same inclusive criteria in which a self-directed method was used for learning START Triage algorithm.

2.4 Data collection tools: Two tools used for data collection developed by the researchers based on reviewing the relevant literature.

Tool (1): A structured knowledge students' questionnaire tool: this tool comprises three parts:

Part I: Demographic characteristics of students such as student code, age, gender, and previous clinical experience in ER department,university average score for the previous three years, previous education about triage, previous self-learning about triage, and training experiences courses: triage workshops and if there are education courses among the faculty program about crisis management

Part (2) Students' Knowledge related to START triage algorithm (pre-& posttest) the researcher settled this part, after reviewing the relevant literature [4, 5, 10, 12.] for collection of baseline data and assess students' knowledge about START Triage Algorithm and disaster management, their barriers to control clinical decision making and in multi causality situations, different types of questions were used including 57 open & closed-ended questions. It was enclosed in the following five sections:

Section I: questions regarding the primary survey and rapid assessment

Section II: questions concerning triage level and patient sorting (categorization of patients)

Section III: question about patient tag and allocation

Section IV: questions related to triage decision making (Cognitive skills)

Section V: questions confined to barriers to clinical decision making in triage.

Part III: Students' attitude regarding their accurate clinical judgment: this part concerned with students attitudes that reflect their cognitive skills and their accurate clinical judgment and decision making in multi causality situations

Scoring system of student knowledge questionnaire regarding section I, II and III, the questionnaire sheet contained a closed-ended questions and the students asked to respond to each one with only one answer, for the student incorrect and no response " did not give any answer" was scored (0) and a correct one was scored (1) for each area of knowledge the score of each section is summed up and converted to total score percentage, the mean, median and stander deviation of each section were calculated. Moreover, section IV and V clarifies the attitude of the students that reflect the cognitive skills of the students regarding their accurate clinical judgment and decision make in a multi causality situations and also in section V that clarify their opinions regarding the barriers to clinical decision making in triage: the student answer was categorized as four categorized scales Strongly disagree (0) Disagree (1) Agree (2) strongly agree (3).The knowledge score of each section is summed up and converted to a total score percentage, the mean, median and stander deviation of each section were calculated. Levels of total knowledge of the studied students related to START algorithm and disaster management were considered as fair ≤ 50 %, good > 50%-65, very good > 65-< 85%, excellent > 85%.

Tool (2) Students 'performance checklisttool:the researcher developed this tool after reviewing the relevant literature it was used as a monitoring and as an evaluative tool for students related to START triage competencies it was allocated to the following eight competencies:
Competency 1 in which it contributes to ensuring safety, communication, and the care process
Competency 2 aimed to help the patient to comply with the treatment and to participate
Competency 3 that allocated to primary patient assessmentUsing AVPU score
Competency 4 that contribute to ensuring lifesaving, and the care process
Competency 5 is concerned with triage patient category
Competency 6 it enclosed to patient tagging
Competency 7 it was concerned with the patient allocation and evacuation
Competency 8 it enrolled to work as a team and adapt to a changing environment
Scoring system of student performance checklist: Each competency includes sub-competencies or procedures that translated into activities and steps the student's performance ranked as follows:
Performance category Description score
Not done = the step or task not performed Score 0
Needs improvement = step or task is performed incorrectly or out of sequence or sequence is completely omitted Score 1
Competently performed =step or task is performed correctly and in proper sequence, but the participant does not progress from step to step efficiently Score 2
Proficiently performed = step or task performed efficiently precisely and in proper sequence Score 3
The score of each competency and sub-competencies steps were summed up and converted into total score percent and the total score of all competency's category was summed up and converted into total score percent not done ≤ 30%, need improvement >30%-65%, competent >65% -< 80% and proficient ≥80%.

Method

- Administrative process: a written approval to conduct the study was obtained from the Dean and Vice Dean for Student Affairs of the faculty of nursing at Tanta University.
- Informed consent: students' informed consent was obtained after explanation of the purpose of this study to participate in the study, confidentiality will assure.
- Tool development: three tools were used for data collection after a review of the relevant literature.
- Content validity: the tools of the study were tested for content validity
- Ethical consideration: the anonymity and confidentiality of responses of student's voluntary participation and the right to refuse to participate in the study were emphasized to subjects.
- The researcher explained to the students that they have the right to withdraw when they want without any constraints.
- **The assessment phase:**
- **(Pre-intervention phase)** the initial assessment was carried out by the researcher for all 400 level four nursing students*a pretest* was given to all students equally using a tool I and II during this phase, a pre-test for all students regarding their knowledge, performance and their clinical judgment in multi-causality situations were assessed. The final version of the questionnaire contains demographic data and about 57 questions covering the following four sections a) primary survey and rabid assessment, b) patient categorization c) triage level and START approach d) patient tagging and allocation. The students' knowledge was assessed by two choices: True answers scored (1) and false one scored (0); the minimum score was 0, and the maximum score was 57. A score < 50% was considered poor, a score between 50%–75% was considered moderate, and a score above 75% was considered good the performance checklist part included eight competencies ≤ 30% was considered poor performance > 30-65% Needs improvement > 65-< 80% was considered Competent and ≥ 80% was considered Proficiently performed

The implementation phase (Interventional phase): in this phase, the students divided randomly into equal two group 200 student each as follows:
- Group I: (lecture and role playscenario-based triage education): It consisted of 200 students in which students taught by lecture and role-play regarding the START triage algorism
-Group II: (self-directed): It consisted of the other 200 students in which students used self-directed (self-learning) method to teach themselves about START triage algorism and accurate clinical judgment in multi causality situations

Regarding group I: (lecture and role-playscenario-based triage education) it consisted of 200 students they taught by a lecture and role-play regarding different scenarios and finally role-play performance for these scenarios at different emergency triage and multiple mass-casualty situations.

The education was presented by the researcher as follow:

- Preparation of the suitable educational aids used to cover the three domains of education it was included the following:
- The workshop total duration **of 14 hours through 3 days**:
- **Day 1:** a lecture and role-play (a theoretical part) for **3 hours** were given using PowerPoint slide presentation about triage meaning, the aim of triage, primary survey, a brief, focused assessment sorting patient and, priority system according to (ABCDE) approach, triage category, the START algorism of adult triage, patient tagging and patients allocations and Multiple, emergency scenarios. after the presentation
- Video presentation for **2 hour**s for the previous triage and multi-causality scenarios such as (**ACS, poly-trauma patient, acute Abdominal pain, fracture, atypical chest pain, psychogenic chest pain, typical chest pain, cardiac arrest, open wounds, shock….**etc).
- **Day 2:** Role-play for **3-hour** role-playing for about 30 triage scenarios by researcher and number of the students in the role-playing group, the students were subjected to the scenarios using role-playing in which the other first-semester nursing students played the role of the patients in the scenario, and they were trained to play the role accurately. Scenarios adapted from the fourth edition of the guideline on emergency severity index (ESI) (Gilboy et al., 2012) [(14)] nursing students played the role of the patients in the scenario, and they were trained to play the role accurately.
- **Day 3:** Remonstration for3 hours
- Formulate a rapid response team and triage team from the student
- Students re demonstrate their role and application and takes clinical decisions regarding different emergencies.
- a simulated 3 hours drill for a multi-causality disaster situation students were given opportunities to demonstrate their skills through role-play and simulation lab practice.
- Finally, A soft copy of the presentation was given to each nurse student

Regarding group II (self-directing group): the researcher work as a guidance, get students to believe in themselves, teach students to pull themselves out of negative mindset, allow the students to fail, teach students how to manage their goals, strengthen students confidence directing, student for self-learning using the available learning channels as (textbooks, interment websites, peer group asking ….) about triage (meaning, levels, patient tagging, patient categorization, patient allocation and transferee and using START triage algorithm an accurate clinical judgment in multi causality situations) give current enforcement and frequent feedback.

The evaluative phase:

- Evaluation for both groups using a tool (I part II and tool II) to evaluate START triage algorithm scenario-based education for adults on nursing students' knowledge, competencies, and their clinical judgment in multi-causality situations knowledge and performance using a post-test in two separate rooms.
- After conducting a study on 400 nursing students, the reliability of the questionnaire was determined to be between 81% and 94% for the subgroups of the questionnaire (Rabid assessment 0.81, patient categorization 0.87, triage and start approach 0.863, patient tagging 0.94%. by using the Cronbach alpha coefficient.

Limitation of the study:

- There were no emergency syllabuses or any theme concerning triage and /or emergency management at catastrophe situations involved in the faculty nursing curriculum through four academic years, just only first aid was given for those students at first year
- No disaster plan or triage zones present at the areas of their clinical training
- There was no any triage zones design in ER departments as well as no disaster plan at the clinical areas that students receive their clinical training at Tanta university hospital.

III. Result

Table (1): Distribution of the studied students regarding their socio-demographiccharacteristics.

Socio-demographic data		N (400)	%
- Gender	Male	165	41.3
	Female	235	58.8
- Age:	21-25 years	350	87.5
	26-30 years	50	12.5
- Previous clinical experience in ER department	Yes	100	25.0
	No	300	75.0
- Years of experience in ER	No experience	300	75.0

	1-3 months	**60**	**15.0**
	4-6 months	**23**	**5.75**
	11-12 months	**11**	**2.75**
	> 12-24 month	**6**	**1.5**
	Range	**0-4**	
	Mean+ SD	**0.48±0.92**	
- **University score**	**Acceptable**	**115**	**28.7**
	Good	**132**	**33.0**
	very good	**105**	**26.3**
	Excellent	**48**	**12.0**
	Range	**1-4**	
	Mean+ SD	**2.21±0.99**	
- **Previous education about triage**	**No**	**400**	**100.0**
- **Previous self-learning about triage**	**No**	**400**	**100.0**
- **Faculty program about crisis management**	**No**	**400**	**100.0**
- **Training courses related to triage or ER procedures** - **BLS** - **ACLS** - **TALS**	**No**	**400**	**100.0**

Table (1) represents the distribution of the studied students regarding their socio-demographiccharacteristics. regarding their age, majority of students (87.5%) had age ranged from (21-26) years and three-quarters of them (75%) had no previous clinical experience in ER department, years of experience ranges from 0-4 years with mean duration of their experiences in ER Mean+ SD 0.48±0.92 regarding their university score about one-third of them (33%) have good to score they with range from 1-4 and Mean+ SD 2.21±0.99 Also, all students (100%) did not receive any previous education or training courses about triage, in ER, no preceding self-learning, about triage and no Faculty program about crisis management.

Table (2) Comparisons between studied groups' knowledge regarding rapid assessment and primary survey categories throughout the study phases

		Study phases							
Knowledge item related to rabid assessment and primary survey		**Pre-intervention phase**		**Interventional phase**					
		Pre-interventions (phase I) N=400		**Group I (Lecture and role play) N=200**		**Group II (Self-directing) N=200**			
		N	**%**	**N**	**%**	**N**	**%**		
The primary goal of triage systems	**True**	**117**	**29.3%**	**192**	**96.0%**	**189**	**94.5%**	**370.82**	**<0.001 *****
	False	**283**	**70.80%**	**8**	**4.00%**	**11**	**5.50%**		
primary survey	**True**	**12**	**3.00%**	**181**	**90.50%**	**175**	**87.50%**	**595.85**	**<0.001*****
	False	**388**	**97.00%**	**19**	**9.50%**	**25**	**12.50%**		
ABCDE approach	**True**	**149**	**37.30%**	**179**	**89.50%**	**179**	**89.50%**	**235.23**	**<0.001 *****
	False	**251**	**62.70%**	**21**	**10.50%**	**21**	**10.50%**		
The first step of the primary, rapid assessment	**True**	**127**	**31.80%**	**179**	**89.50%**	**179**	**89.50%**	**279.42**	**<0.001*****
	False	**273**	**68.30%**	**21**	**10.50%**	**21**	**10.50%**		
Primary survey for, assessing patient 's airway patency	**True**	**210**	**52.50%**	**164**	**82.00%**	**164**	**82.00%**	**61.07**	**<0.001*****
	False	**190**	**47.50%**	**36**	**18.00%**	**36**	**18.00%**		
Primary survey for assessing patient 's breathing	**True**	**304**	**76.00%**	**47**	**23.50%**	**47**	**76.50%**	**183.42**	**<0.001 *****
	False	**96**	**24.00%**	**153**	**76.50%**	**153**			
Primary survey for assessing patient 's circulation	**True**	**6**	**1.5 %**	**190**	**95%**	**110**	**55 %**	**494.75**	**<0.001*****
	False	**394**	**98.50%**	**10**	**5%**	**90**	**45 %**		

*****= Highly significant at p value ≤ 0.001**

Table (2) revealed comparisons between studied groups' knowledge regarding rapid assessment and primary survey categories throughout the study phases, it clarify a highly statistically significant difference between pre-intervention phase (Phase I) versus post-intervention phase (phase II) and between-group I (lecture and role-play) the students had a highest correct knowledge score regarding Knowledge item of rapid and primary survey categories more than scores of group II students (self- directing) as ($p \leq 0.001$).

Table (3) Comparison between students' correct knowledge related totriage levelthroughout study phases

patient categorization		Study phases						Chi-square	P-value
		Pre-intervention		Interventional phase					
		Pre-intervention phase N=400		Group 1 Lecture and role play N=200		Group 2 Self-directing N=200			
		N	%	N	%	N	%		
Immediate (resuscitative category means	True	5	1.3 %	180	90 %	70	35 %	605.92	<0.001 ***
	False	395	98.8%	20	10 %	130	65 %		
Emergent category means	True	121	30.3%	170	85 %	43	21.5%	216.99	<0.001***
	False	279	69.8%	30	15 %	157	78.5%		
Urgent category means	True	117	29.3%	159	79.5%	43	21.5%	199.40	<0.001***
	False	283	70.8%	41	20 %	157	78.5%		
Non-urgent category mean	True	132	33 %	170	85 %	165	82.5%	212.25	<0.001***
	False	268	67 %	30	15 %	35	17.5%		
Emergency category situations	True	182	45.5%	169	84.5%	152	76 %	106.56	<0.001***
	False	218	54.5%	31	15.5%	48	24 %		
Non-emergency situations	True	4	1.00%	156	78 %	131	65.5%	439.31	<0.001***
	False	396	99 %	44	22 %	69	34.5%		
Non urgent situations	True	341	85.3%	166	83 %	156	78 %	4.94	0.085 ns
	False	59	14.8 %	34	17 %	44	22 %		
Timing and duration for triage for each patient	True	5	1.3 %	141	70.5%	117	58.5%	369.10	<0.001***
	False	395	98.8%	59	29.5%	83	41.5%		
Primary survey- scale	True	100	25 %	146	73 %	115	57.5%	140.55	<0.001 ***
	False	300	75 %	54	27 %	85	42.5%		
triage level for a patient who needs treatment within 30 minutes	True	82	20.5%	154	77 %	133	66.5%	215.83	<0.001***
	False	318	79.5%	46	23 %	67	33.5%		
triage level would you take for a patient with an open fracture	True	39	9.8 %	153	76.5%	130	65 %	314.94	<0.001 ***
	False	361	90.3%	47	23.5%	70	35 %		
triage level would you take for a patient whose treatment can be delayed more than 2 hours	True	128	32 %	159	79.5%	142	71 %	153.34	<0.001***
	False	272	68 %	41	20.5%	58	29 %		
injury receives care first During a mass casualty	True	76	19 %	140	70 %	101	50.5%	158.14	<0.001 ***
	False	324	81 %	60	30 %	99	49.5%		
triage level for a patient with maxillofacial injury and occluded airway	true	93	23.3 %	166	83 %	150	75 %	251.33	<0.001 ***
	False	307	76.8%	34	17 %	50	25 %		

NS=non- significant at p value > 0.05, *= Highly significant at p value ≤ 0.001**

Table (3)comparison between students' correct knowledge related to triage level throughout study phases it revealed that there is a highly statistically significant difference between student Knowledge about triage level of the studied groups among phases of the intervention as ($p \leq 0.001$), as well as their knowledge regarding different patient scenarios for each category.

Table (4) Students' correct knowledge related toSTART algorithm in mass causality situationsamong studied groups

Triage and start approach		Study phases						Chi-square	P-value
		Pre-intervention phase		Intervention phases					
		Pre-intervention N=400		Group 1 Lecture and role play N= 200		Group 2 Self-directing N=200			
		N	%	N	%	N	%		
What does	True	6	1.50%	147	73.50%	60	30.00%	425.76	<0.001***

START stand for	**False**	**394**	**98.50%**	**53**	**26.50%**	**140**	**70.00%**		
The first step of START triage algorithm	**True**	**6**	**1.50%**	**160**	**80.00%**	**55**	**27.50%**	**472.65**	**<0.001*** **
	False	**394**	**98.50%**	**40**	**20.00%**	**145**	**72.50%**		
Physiological parameters that are assessed according to START triage	**True**	**6**	**1.50%**	**156**	**78.00%**	**58**	**29.00%**	**454.45**	**<0.001*** **
	False	**394**	**98.50%**	**44**	**22.00%**	**142**	**71.00%**		
Timing should START triage take per patient	**True**	**30**	**7.50%**	**150**	**75.00%**	**124**	**62.00%**	**323.04**	**<0.001*** **
	False	**370**	**92.50%**	**50**	**25.00%**	**76**	**38.00%**		
Mass causality disaster START triage algorithm sequence	**True**	**6**	**1.50%**	**180**	**90.00%**	**31**	**15.50%**	**597.01**	**<0.001*** **
	False	**394**	**98.50%**	**20**	**10.00%**	**169**	**84.50%**		

*****= Highly significant at p-value ≤ 0.001**

This table illustrates a comparison of knowledge regarding to START algorithm in mass causality situations among studied groups It revealed highly statistically significant difference between studied groups group I and group II in which the student correct knowledge score in lecture and role-play group have the highest knowledge score compared with self-directed and as p-value ≤ 0.001 Moreover, in Pre-intervention group students. (Phase I initial assessment phase) the students' knowledge score was the lowermost score compared with phase II (post-intervention) self-directed and lecture and role-play groupas ($p \leq 0.001$)

Table (5)Comparison of students' knowledge regarding patients tag and accurate clinical decision-making in different scenarios of triage among studied groupsthroughout study phases

patient categorization		**Study phases**						**Chi-square**	**P-value**
		Pre-intervention Phase I		**Intervention phases (phase II)**					
		Phase I N= 400		**Group I Lecture and role play N=200**		**Group II Self-directing N=200**			
		N	**%**	**N**	**%**	**N**	**%**		
Black Tag applied for which patient	**True**	**128**	**32 %**	**140**	**70 %**	**77**	**38.5%**	**94.06**	**< 0.001*** **
	False	**272**	**68 %**	**60**	**30 %**	**123**	**61.5%**		
What color would you take a patient who needs treatment within 30 minutes to 2 hours?	**True**	**82**	**20.50%**	**154**	**77 %**	**67**	**33.5%**	**215.83**	**< 0.001*** **
	False	**318**	**79.50%**	**46**	**23 %**	**133**	**66.5%**		
What color would you take a patient with an open fracture?	**True**	**39**	**9.80%**	**153**	**76.50%**	**70**	**35 %**	**314.94**	**< 0.001 *** **
	False	**361**	**90.30%**	**47**	**23.50%**	**130**	**65 %**		
What color would you check a patient whose treatment can be delayed for more than 2 hours?	**True**	**128**	**32 %**	**159**	**79.50%**	**58**	**29 %**	**153.34**	**< 0.001*** **
	False	**272**	**68 %**	**41**	**20.50%**	**142**	**71 %**		
During a mass casualty, which injury receives care first	**True**	**76**	**19 %**	**140**	**70 %**	**101**	**50.50%**	**158.14**	**< 0.001 *** **
	False	**324**	**81 %**	**60**	**30 %**	**99**	**49.50%**		
The patient is having difficulty maintaining their airway. What color tag is this pt assigned?	**true**	**93**	**23.3%**	**166**	**83 %**	**50**	**25 %**	**251.33**	**< 0.001 *** **
	False	**307**	**76.8%**	**34**	**17 %**	**150**	**75 %**		
What color would you take for a patient with airway obstruction	**True**	**73**	**18.30%**	**174**	**87 %**	**37**	**18.50%**	**349.90**	**< 0.001 *** **
	False	**327**	**81.80%**	**26**	**13 %**	**163**	**81.50%**		

What color would you take the walking wounded?	**True**	**30**	**7.50%**	**156**	**78 %**	**79**	**39.50%**	**335.42**	**< 0.001 *****
	False	**370**	**92.50%**	**44**	**22.00%**	**121**	**60.50%**		
What color would you tag someone who requires immediate attention?	**True**	**4**	**1.00%**	**170**	**85 %**	**43**	**21.50%**	**539.38**	**< 0.001 *****
	False	**396**	**99 %**	**30**	**15 %**	**157**	**78.50%**		
Tag color for patients with a closed fracture?	**True**	**32**	**8.00%**	**168**	**84 %**	**51**	**25.50%**	**416.50**	**< 0.001 *****
	False	**368**	**92 %**	**32**	**16 %**	**149**	**74.50%**		
What color would you take a patient in shock?	**True**	**31**	**7.80%**	**163**	**81.50%**	**47**	**23.50%**	**414.40**	**< 0.001 *****
	False	**369**	**92.30%**	**37**	**18.50%**	**153**	**76.50%**		
What color would you tag a patient who is expected and allowed to die?	**True**	**86**	**21.5%**	**164**	**82 %**	**491**	**24.50%**	**263.89**	**< 0.001 *****
	False	**314**	**78.5%**	**36**	**18 %**	**51**	**75.5%**		
What color would you tag a patient with contusions?	**True**	**30**	**7.5%**	**151**	**75.50%**	**74**	**37 %**	**329.08**	**< 0.001 *****
	False	**370**	**92.5%**	**49**	**24.50%**	**126**	**63 %**		

NS=non- significant at p-value > 0.05, *= Highly significant at p-value ≤ 0.001**

Table (5)Comparison of students' knowledge regarding patient tag and accurate clinical decision making in different scenarios of the triage among studied groupsthroughout study phases:it showed that there was a highly statistically significant difference among studied groups (group I and group II). in which regarding accurate decision making in different scenarios of triage and sorting patient in different emergencies situations. as**p-value ≤ 0.001**, the majority of students in the lecture and role- playgroup has the extreme correct knowledge score versus self-directing group.

Table (6)Comparison of students' knowledge regarding START Triage algorithm and disaster management among studied groups

Knowledge of Triage in multi causality situations		**knowledge of students about triage**						**chi**	**P**
		Pre-intervention Phase		**Intervention phases**					
		Pre-intervention (n=400)		**Group I (Lecture and role play N=200)**		**Group II Self-directing (n=200)**			
		N	**%**	**N 200**	**%**	**N 200**	**%**		
Primary survey and rapid assessment	**Fair** **Good** **v.good** **excellent**	**400** **0** **0** **0**	**100%** **0%** **0%** **0%**	**0** **20** **80** **100**	**0%** **10%** **40 %** **50 %**	**100** **95** **5** **0**	**50%** **47.5%** **2.5 %** **0%**	**950.17**	**<0.001 *****
Patient categorization	**Fair** **Good** **v.good** **excellent**	**400** **0** **0** **0**	**100%** **0%** **0%** **0%**	**0** **20** **80** **100**	**0%** **10%** **40 %** **50 %**	**100** **95** **5** **0**	**50%** **47.5%** **2.5 %** **0%**	**950.17**	**<0.001 *****
START Triage approach	**Fair** **Good** **v.good** **excellent**	**400** **0** **0** **0**	**100%** **0%** **0%** **0%**	**0** **20** **80** **100**	**0%** **10%** **40 %** **50 %**	**100** **95** **5** **0**	**50%** **47.5%** **2.5 %** **0%**	**950.17**	**<0.001 *****
Patient tagging	**Fair** **Good** **v.good** **excellent**	**400** **0** **0** **0**	**100%** **0%** **0%** **0%**	**0** **20** **80** **100**	**0%** **10%** **40 %** **50 %**	**100** **95** **5** **0**	**50%** **47.5%** **2.5 %** **0%**	**950.17**	**<0.001 *****

HS = Highly significant at p-value ≤ 0.001

Table (6)Comparison of students' knowledge regarding START Triage algorithm and disaster management, among studied groups It revealed highly statistically significant difference between studied groups (Lecture and role play and Self-directing) among phases of the study regarding their knowledge about START Triage Algorithm and Disaster Management aspects (knowledge of triage in multi causality situations, rabid assessment, patient categorization, START triage approach, and patient tagging as ($p \leq 0.001$).respectively.

Likewise, half of the students (50%) in group I had an excellent knowledge score compared with 0% in group II regarding their knowledge about START Triage Algorithm and Disaster Management aspects (knowledge of triage in multi causality situations, rabid assessment, patient categorization, START triage approach, and patient tagging. Also, it was observed that half of student (50% and 47.5% 2.5%) respectively in

group II students their total knowledge score was fair and good and very good .while in group I no one has fair score and 10% and 40% respectively have a good and very good knowledge score versus pre-assessment while in phase II the most of the students (100%) their knowledge score was fair and no one was good, very good or excellent knowledge score.

Table (7)Comparison of students' knowledge regarding their attitude and accurate Triage decision-making (cognitive skills) through study phases

		Study phases						Chi-square	P-value
		Pre-intervention phase		Interventional phase (phase II					
		Phase I N=400		Group I (Lecture and role play) N=200		Group II (Self-directing) N=200			
		N	%	N	%	N	%		
I can sort and prioritize the immediate nursing action	StrAgr	0	0%	154	77 %	0	0%	201.25	<0.001***
	agree	0	0	46	23 %	63	31.5%		
	disagree	92	23 %	0	0	137	68.5%		
	Str dis	308	77 %	0	0%	0	0%		
Have capabilities to tag the seriously critical patient in multi causality situations	Stragee	0	0%	112	56 %	0	0%	145.89	<0.001***
	agree	42	10.5	88	44 %	76	38 %		
	disagree	0	0	0	0	124	62 %		
	Str dis	358	89.5%	0	0%	0	0%		
Have the competency to open the obstructed airway quickly and clear the mouth	Str agree	0	0%	133	66.50	0	0	231.78	<0.001***
	agree	33	8.30%	67	33.5%	94	47.00%		
	disagree	367	91.80%	0	0	106	53.00%		
	Str.dis	0	0%	0	0%	0	0		
Have the competency to deal with polytrauma patient	Str.agr	35	8.80%	145	72.50%	0	0.00%	339.71	<0.001***
	agree	90	22.50%	53	26.50%	22	11.00%		
	disagree	123	30.80%	2	1.00%	178	89.00%		
	Str. dis	152	38.00%	0	0.00%	0	0.00%		
I will know what I can do with arrested patient	Str. agr	16	4.00%	159	79.50%	0	0.00%	322.55	<0.001***
	agree	84	21.00%	39	19.5%	37	18.50		
	disagree	156	39.00%	2	1.00%	163	%81.50%		
	Strs dis	144	36.00%	0	0.00%	0	0.00%		
I am someone my coworkers count on to make good decisions	Str agree	48	12.00%	171	85.50%	0	0.00%	266.168	<0.001 ***
	agree	135	33.80%	27	13.50%	22	11.00%		
	disagree	115	28.70%	2	1.00%	178	89.00%		
	Str. dis	102	25.50%	0	0.00%	0	0.00%		
I am knowledgeable about assigning each patient to each area	Str agree	111	27.80%	166	83.00%	1	0.50%	229.18	<0.001 ***
	agree	153	38.30%	30	15.00%	175	87.50%		
	disagree	82	20.50%	0	0.00%	0	0.00%		
	Str dis	54	13.50%	4	2.00%	024	12.00%		
I can prioritize patient care and get the job done	Str agree	70	17.50%	171	1.50%	9	4.50%	287.17	<0.001 ***
	agree	115	28.70%	26	85.50%	15	7.50%		
	disagree	149	37.30%	3	13.00%	176	88.00%		
	Str dis	66	16.50%	0	0.00%	0	0.00%		

*****= Highly significant at p-value ≤ 0.001 str.agr= strongly agree str.dis= strongly disagree**

Table (7)Comparison of students' knowledge regarding their attitude and accurate triage decision-making (cognitive skills) through study phases It revealed a highly statistically significant difference between studied group(group I and group II) as ($p \leq 0.001$) regarding Students attitudes and accurate Triage decision-making skills moreover, most student in group I (lecture and role-play group) students had a strongly agree and agreed opinions that leading to accurate clinical triage decision making situations in multi causality situations versus students opinions in (Pre-intervention group) and group II the majority of them had a strongly disagree and disagree opinions and negativeattitudes and inappropriate decision-making skills regarding many aspects related to accurate clinical decision making in multi causality situations

Table (8)Comparison of students' knowledge regarding common barriers facing them in clinical decision making in triage and multi causality situations among studied groups

Barriers to clinical decision making in triage:		Study phases						Chi-square	P-value
		Pre-intervention		Intervention phase (phase II)					
		Phase I N= 400		Group I Lecture and role play N=200		Group II Self-directing N=200			
		N	%	N	%	N	%		
Interruptions	Strongly agree	213	53.30%	8	4.00%	14	7.00%	242.86	<0.001***
	Agree	186	46.50%	169	84.50%	159	79.50%		
	Disagree	1	0.30%	23	11.50%	27	13.50%		
	Strongly disagree	0	0.00%	0	0.00%	0	0.00%		
Lack of knowledge	Strongly agree	223	55.80%	15	7.50%	17	8.50%	217.72	<0.001 ***
	Agree	169	42.30%	163	81.50%	159	79.50%		
	Disagree	8	2.00%	22	11.00%	24	12.00%		
	Strongly disagree	0	0.00%	0	0.00%	0	0.00%		
Time constraints	Strongly agree	160	40.00%	17	8.50%	18	9.00%	136.035	<0.001***
	Agree	189	47.30%	170	85.00%	170	85.00%		
	Disagree	43	10.80%	13	6.50%	12	6.00%		
	Strongly disagree	8	2.00%	0	0.00%	0	0.00%		
Lack of experience	Strongly agree	173	43.30%	16	8.00%	16	8.00%	220.56	<0.001 ***
	Agree	147	36.80%	172	86.00%	177	88.50%		
	Disagree	63	15.80%	12	6.00%	7	3.50%		
	Strongly disagree	17	4.30%	0	0.00%	0	0.00%		

*****= Highly significant at p value ≤ 0.001**

Table (8)Comparison of students' knowledge regarding common barriers facing them in clinical decision making in triage and multi causality situations among studied groups it revealed a highly statistically significant difference between studied groups (group I and group II) regarding Knowledge items related to Barriers facing them in clinical decision making in triage and multi causality situations($p \leq 0.001$). Furthermore, all student in phase I strongly agreed and most of them in phase II (lecture and role-play and self-directing group) were agreed that frequent interruption, lack of knowledge time constraints and lack of experience were a common barrier facing them for accurate clinical decision making

Table (9) Comparison between total performance score regarding different triage scenarios in multi causality situations among studied groups

Levels of total performance	The total performance of the studied students					
	Pre-intervention phase		Intervention phase			
	Pre-intervention		Group I lecture and role play		Group II Self-directed	
	n=400	%	n=200	%	n =200	%
Poor and substandard performance	290	72.5%	0	0	160	80%
Needs improvement	110	27.5%	0	0	20	10%
Competent	0	0	60	30 %	15	7.5 %
Proficiently performed	0	0	140	70 %	5	2.5%
CHI SQUARE	745.174					
P-value	<0.001 HS					

HS = Highly significant at p-value ≤ 0.001

Table (9) Comparison between total performance among studied groups regarding different triage scenarios in multi causality situations it was revealed a highly statistically significant difference between studied groups group I (Lecture and role play) and group II(Self-directing) regarding their Levels of total performance as ($p \leq 0.001$) moreover it was observed that in phase 1 (Pre-intervention) more than half of them (72.5%) their performance score was poor performance score and less than one-third of them (27.5) their performance was needs improvement. While in group I (lecture and role-play group) more than half of them (70%) their

performance was proficiently performed and one-third of them their performance was competent While, in group II (self-directing group) most of them (80%) of them their performance was poor 10% of them their performance was needs improvement and only 7.5% was competent performance.

Table (10) Effect of START algorism education on studied student competencies regarding triage in multi causality situations

Competencies regarding triage in multi causality situations		Study phases						Chi-square	P-value
		Pre-intervention phase (n=400)		Intervention phase (phase II)					
				Lecture and role play (n=200)		Self-directing (n=200)			
		N	%	N	%	N	%		
Competency 1 Contribute to ensuring safety, communication,	**Poor performance**	**400**	**100.**	**0**	**0%**	**180**	**90%**	**740.888**	**<0.001 *****
	Needs improvement	**0**	**0%**	**10**	**5%**	**10**	**5%**		
	Competent	**0**	**0%**	**130**	**65%**	**10**	**5 %**		
	Proficiently performed	**0**	**0%**	**60**	**30%**	**0**	**0%**		
Competency 2 Helping the patient to comply with the treatment	**Poor performance**	**400**	**100.**	**0**	**0%**	**160**	**80%**	**737.242**	**<0.001 *****
	Needs improvement	**0**	**0%**	**5**	**2.5%**	**20**	**10%**		
	Competent	**0**	**0%**	**140**	**70%**	**15**	**7.5%**		
	Proficiently performed	**0**	**0%**	**55**	**27.5%**	**5**	**2.5%**		
Competency 3 Primary patient assessment	**Poor performance**	**400**	**100.**	**0**	**0%**	**160**	**80%**	**769.643**	**<0.001 *****
	Needs improvement	**0**	**0%**	**0**	**0%**	**20**	**10%**		
	Competent	**0**	**0%**	**125**	**62.5%**	**15**	**7.5%**		
	Proficiently performed	**0**	**0%**	**75**	**37.5%**	**5**	**2.5%**		
Competency 4 Contribute to ensuring lifesaving,	**Poor performance**	**400**	**100.**	**0**	**0%**	**160**	**80%**	**769.035**	**<0.001 *****
	Needs improvement	**0**	**0%**	**0**	**0%**	**20**	**10%**		
	Competent	**0**	**0%**	**138**	**69%**	**15**	**7.5%**		
	Proficiently performed	**0**	**0%**	**62**	**31%**	**5**	**2.5%**		
Competency 5 Triage Patient Category	**Poor performance**	**400**	**100.**	**0**	**0%**	**160**	**80%**	**769.270**	**<0.001 *****
	Needs improvement	**0**	**0%**	**0**	**0%**	**20**	**10%**		
	Competent	**0**	**0%**	**132**	**66%**	**15**	**7.5%**		
	Proficiently performed	**0**	**0%**	**68**	**34%**	**5**	**2.5%**		
Competency 6 Patient tagging	**Poor performance**	**400**	**100.**	**0**	**0%**	**156**	**78%**	**824.11**	**<0.001 *****
	Needs improvement	**0**	**0%**	**5**	**2.5%**	**35**	**17.5.%**		
	Competent	**0**	**0%**	**145**	**72.5%**	**4**	**2%**		
	Proficiently performed	**0**	**0%**	**50**	**25%**	**5**	**2.5%**		
Competency 7 Patient allocation and evacuation	**Poor performance**	**400**	**100.**	**0**	**0%**	**160**	**80%**	**769.035**	**<0.001 *****
	Needs improvement	**0**	**0%**	**0**	**0%**	**20**	**10%**		
	Competent	**0**	**0%**	**138**	**69%**	**15**	**7.5%**		
	Proficiently performed	**0**	**0%**	**62**	**31%**	**5**	**2.5%**		
Competency 8 Work as a team	**Poor performance**	**400**	**100.**	**0**	**0%**	**170**	**85%**	**809.544**	**<0.001 *****
	Needs improvement	**0**	**0%**	**0**	**0%**	**20**	**10%**		
	Competent	**0**	**0%**	**140**	**70%**	**10**	**5%**		
	Proficiently performed	**0**	**0%**	**60**	**30%**	**0**	**0%**		

***** = Highly significant at p value ≤ 0.001**

Table (10) It revealed a highly statistically significant difference between studied group (group I and group II) as regards all competencies categories regarding triage in multi causality situations as (p - 0.001) Furthermore, regarding all competencies categories (8 competencies) it was observed that all students in phase I (Pre-intervention group) their performance was poor compared with phase II post-intervention the student performance in group I (lecture and role-play group their performance score highly improved more than half (70%) of them their performance was competent and only one third (30%) their performance was proficiently performed. versus group II (self-directing group the majority of them their performance score was a poor performance and minimal of them in some competencies their performance score was competent and proficiently performed

Table (11) Correlation between knowledge, performance, and clinical judgment.

	competencies	
	R	**P**
knowledge	**0.524**	**0.000**
performance	**0.612**	**0.000**
clinical judgment	**0.540**	**0.000**

**. Correlation is significant at the 0.01

This tableshowed a statistically significant positive correlation between competencies and knowledge, performance, clinical judgment.

IV. Discussion

Triage in the multi causality situations is an autonomous nursing role and is a highly complex process that encompasses rapid clinical assessment, prioritization, the accurate clinical judgment regarding patients' tagging, and allocation of department resources. It's a crucial issue for the successful management of emergencies and ensuring the quality of care. Furthermore, triage skills education is one of the imperative aspects of the preparedness of student nurses for different disasters and emergencies. This study aimed to evaluate the efficacy of START triage algorithm and disaster management scenario-based education for adults on faculty nursing students' knowledge, competencies, and their clinical judgment in multi-causality situations. Aswell as to compare the effect through two educational methods traditional method (lecture and role-play) combined with role-playing versus self-directing. Based on the results of the present finding, it was found that

Concerning socio-demographic profiles and general characteristics of the studied students, the findings showed that about two-thirds of them were females and more than one third were males. This finding was in line with **Miller et.al, (2009)**.[15] and**Tohidi S (2019)**[16] who stated that the majority of the studied students were female and 9% were male, as well as one-third of them their university score was good, most of the students were in early adulthood stage as their age was ranged from 21-26 years old, these findings were in accordance with the **Tohidi S (2019)**[16] who reported that the mean (SD) age of the study participants was 18.80. also, their years of experience in general hospital mean ranged from 0-4. However, three-quarters of them had no previous experience in ER departments, this result settled with a study conducted by **Göransson** K &ClaesNilholm(2014) [17] in which it showed that nurses do not receive adequate education in the triage area in the emergency department.

Regarding their previous education about triage and multi causality management, it illustrated that all studied students had no previous education and /or the previous self-learning, about triage and multi causality situations. Moreover, they don't have any training courses related to triage or emergency procedures (BLS, ACLS, TALS), the results were in the same line with **Safari et al., (2015)**[3]. **Slepski L et.al,(2010) [18] and Dennis B et.al,(2011)** [19] stated that there has been a lack of triage education course and there is no formalized curriculum developed to prepare nursing students to respond to disasters. And Most undergraduate or new hire nursing orientation programs rarely provide adequate training to effectively prepare nurses also**Mirhaghi and Roudbari, 2011 [(20)]; Pishgooie and Aliyari, 2016 [21]; Slepski, L. A. (2007) [22] Seyedin et al., 2015)[23].** All of them have been acknowledged that there was a lack of education regarding triage by the most undergraduate or new hires nursing orientation programs rarely provide adequate training to effectively prepare nurses. But the results were contradicted with **HeinrichsW.L.et.al,(2010)** [24]who showed that almost half (50.8%) of the emergency nurses received special training on triage.

Regardingtotal knowledge score among students in a pre-intervention phase of all aspects of triage and multi causality emergencies management items: (rapid assessment and primary survey, triage levels, START algorithm using, patient tagging, accurate decision making in different scenarios of triage and patient allocation, and accurate transferee to accurate management areas). The present study showedthat the students' knowledge score was the lowermost score and all students their total knowledge score was fair this result was in line with **(Mirhaghi and Roudbari, 2011)[20] and(Fry and Burr, 2001).[25]**whoindicated that nurses do not have appropriate knowledge about triage, and they had not been educated effectively. This result agreed with **the WHO report (2007) [26] clarified that** persistent gaps in education, training, .(The results of a study in Australia showed that 42% of the nurses had not been trained for triage

Also, the study findings was in the same line with **Considine and Mitchell (2009) [27]** found in their study of emergency nurses preparedness perceptions that nurses believed that significant deficiencies existed in disaster training The authors identified a need for adequate staff training **Dennis B et al. (2011)[19]** state that the use of multimedia enhances the overall positive attitudes of the learners since they can benefit from it

As regards to total performance score among students in Pre-intervention phase competencies regarding START algorithm and triage management in multi causality situations (Competency 1 that contribute to ensuring safety, communication, and the care process (Competency 2 that helping the patient to comply with

the treatment and to participate in their care) (Competency 3 Primary patient assessment (Competency 4 Contribute to ensuring lifesaving, safety, and the care process) (Competency 5 Triage Patient Category (Competency 6 Patient tagging competency) (Competency 7 Patient allocation and evacuation) (Competency 8 Work as a team and adapt to a changing environment) the findings of the present study highlighted that majority of the student in Pre-intervention group had significantly exhibited the lowest performance score and their performance was poorly done and substandard. These findings were in line with **Sedaghat S et al (2012)[28]Tuyisenge L et.al, (2014** [29] they reported that the level of knowledge and performance of medical students and staff about triage is unsatisfactory **Aghababaeian H et.al, (2017**) [30] who stated that level of knowledge and performance of medical students and groups involved at the first line of treatment is often weak and unacceptable.

Compared with the self-directed studied group their total knowledge score become better than group I and only half of them have fair knowledge score and the remaining half of them their score was good and minimally had very good. Moreover, their total performance score regarding eight mentioned competencies regarding START algorithm and triage management in multi causality situations the majority of them their performance was poor performance and substandard but there are some student their performance become better to be competent and professionally performed rather than Pre-intervention group student no one of them was competent or professionally performed these results agreed with**TohidiSh et.al (2019)[31].** who stated that self-learning is useful in upgrading and enhancing students' clinical skills within the learning environment also the results were in agreement with **Aghababaeian H (2019)** [32] who indicated that self -learning could be as effective in the competency of nurses and could be useful in nursing education. Also, the results were in agreement with**VaccaniJ et.al, (2016)** [33]**,Hamidreza A et al (2017)** [(34)] **Fahey et al. (2015)** [(35)] they stated that there has been a significant difference between awareness and performance before and after training**. Also, the results were in line with** Lazzari M**(2009)** [36]suggested that learning increased and led to a better understanding oftheory and practical skills this result was in agreement with .(The results of a study in Australia showed that 42% of the nurses had not been trained for triage, and 14% did not have adequate preparation for doing triage despite participating in the triage education classes

While in lecture and role -play, they were having the highest knowledge, total score their score sharp higher than both control and self-directing score in which half of them were excellent and very good and remaining was good knowledge score.Also, the study findings were constant with**Golshiri P et al (2010)**[37] who have similarly compared the effect of lecture and role-play and self-learning on level knowledge and practice the results indicated more difference between the level of knowledge and practice in lecture and role-play than self-learning method

Moreover, concerning students' performance in this group the present study findings highlighted that the students had a sharply significant increase and enhancement of their performance score regarding all competencies regarding triage management in which the majority of the student their performance was proficiently performed and one-third of them their performance was competent performan**ce** and no one their performance was poor or substandard also there was a positive correlation relationship between students' knowledge and their performance. these results **may be attributed to** this phenomenon returned to the education by lecture and role-play followed by student demonstration through role-play is the most important teaching methods that are often used to stimulate learning in the cognitive, psychomotor domains skills also face to face, verbal and nonverbal communication also, role-play teaching method, is another method in which nurses play their role in an environment similar to the clinical environment and may help them to be prepared to face real cases in clinical settings; error, correction through demonstrations. Role-play offers the opportunity for participants to perform activities that facilitate memory formation also it heightened learning content and memory retention of disaster response, therefore, those methods are the most effective training established between the trainers and the trainee and this highly possible in this method.

The results were in the same aspects with WhittonD et.al, (2016) [38]and Thomas PA(2015)
[39]Daneshmandi M et al(2011) [40] Hassan Poor D et.al, (2006) [(41)] all of them stated that there is no doubt that lecture and role-play is one of the educational approaches playing a significant role in the efficacy of education system, also, Whitehair and O'Reilly, (2010) [42] who stated that lecture and role-play are an effective method in improving knowledge and skills.

The findings showed a significant difference between pre and posttest which were given to assess the students' perceived level of competencies demonstrated a significant gain in relevant knowledge and skills constituting the required competencies upon completion of the programdifferent it may be attributed to the positive effect of education sessions and demonstration of triage and multi causality situationsdifferent scenarios. This result was in agreement with **Fox and Timm (2008)**[43] and the International Nursing Coalition for Mass Casualty Education (2003). [11] They found that professional nurses had an improvement in test scores following pediatric disaster training the pre- and post-tests training program.

These findings were reversing with **Williams, et al (2008)**[44] found that the available evidence is insufficient to determine whether disaster-training interventions for health care providers are effective in improving knowledge and skills in disaster response. Also, these results were contradicting with **Aghababaeian H et al (2019)**[45] who stated that no significant difference was observed on knowledge and performance, either immediately or one month after training among nurses taught by a traditional method of teaching (lecture and role-play) method of education.

Also, the findings of the present study revealed that there was showed a statistically significant positive correlation between competencies and knowledge, performance, and clinical judgment. it's clear as the students in self-directing and Pre-intervention group has a more negative attitudes and poor clinical judgments compared with majority of students in lecture and role-play group they developed a high cognitive skill level and has the highest positive attitude toward many aspects of triage management situation compared with as they can sort and prioritize immediate nursing action needed according to patient emergency condition, they **have capabilities to tag the seriously critical patient condition in multi causality situations,** and have the competency to open the obstructed airway quickly and clear the mouth of any foreign matter, and re-evaluate respirations, **also they can deal effectively with arrested patient, have the abilities to make good clinical decisions**, they are knowledgeable about clinical areas and assigning each patient to each area according to their conditionand they have the capabilities to prioritize patient care and get the job done effectively.**Sedaghat S, (2012)**[28] and **Aghababaeian H (2012) [46]and**Kalludi**Set. al,(2015)[47]**People who have learned to manage crises regularly can control the flow of massive emergencies using their knowledge and problem-solving skills.

Furthermore, the findings of the present study revealed that there was showed a statistically significant positive correlation between barriers and knowledge, performance. All students in three studied groups agreed that frequent interruption, lack of knowledge time constraints and lack of experience were a barrier for accurate clinical decision making these findings in agreement with **(Khatiban et al., 2014). [48]andMirhaghi and Roudbari, 2011 [(20** who reported that low knowledge of nurses about triage is one of the main barriers to problem-solving and accurate clinical decision -making.

V. Conclusion

Conclusion and recommendation: scenario-based education by lecture and role-play combined with role-playing is better than self-directing as an educational method for START Triage algorithm both methods were has a positive impact on improving nursing students' knowledge, competencies, which has also affected effectively on their accurate clinical decision making regarding different emergencies and multi-causality situations.

VI. Recommendation

it was recommended that essential provision and establishment, of triage algorithms and emergencies management in faculty of nursing curriculums and nursing faculties, must provide continuous education and training on different emergencies in actual clinical areas and expose the nursing students to the critical situations to be prepared for the triage management. Viewing emergency and working in this stressful situation can facilitate the students' learning which can lead to an improvement in the clinical decision-making of the students.

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