Triage Skills in COVID-19 Disaster for Community Health Nurses in Primary Health Care Centers

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Abstract

Background: The current pandemic of COVID-19 has led to a substantial increase in the demands on health care services, the clinical demands will exceed the ability to deliver basic critical care. Triage system enable to best allocate available critical care resources to meet severe surge to maximize benefit for the greatest number of people. ***Aim:*** This study aimed to assess triage skills in Covid-19 disaster for community health nurses in primary health care center***. Research design:*** Descriptive analytical study was utilized to conduct the study. ***Setting:*** The study was conduct at 33unites of Primary Health Care units, Maternal and Child Health Care Centers and Family Health Centers in Cairo Governorate***. Sampling:*** A purposive sample composed of 112 nurse chosen randomly. ***Tools:*** Different tools were used for data collection of study include, first tool: self-administration questionnaire to assess sociodemographic characteristics, knowledge and factors affecting triage skills of the study sample, second tool: An observational check list to assess nurse's triage practice***. Results:*** The study revealed that 78.6% of nurses had unsatisfactory knowledge about triage skills and 68.7% of them had inadequate practices. The administrative factors were the main factors affecting triage skills according to nurses response for 92.9%. ***Conclusions:*** There was highly significant relation between nurses' total knowledge about triage and their years of experience and practice. Also there was significant relation between nurses practice and factors affecting triage skills as suitability of triage clinic with P value 0.05. ***Recommendation:*** Further intervention studies should be conducted to improve nurses' knowledge and practices about triage for proper care of large number of patients during disaster period.

Keywords: COVID-19, Triage skills, Community health nurses, Disaster

Introduction

The coronavirus disease 2019 (COVID-19) pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has been globally fatal ***(Safadi et al., 2022).*** It belongs to the Coronaviridae family. These are the viruses causing the simple common cold disease to severe illnesses like Middle East Respiratory Syndrome (MERS-CoV), Severe Acute Respiratory Syndrome **(SARS-CoV)** ***(Ali & Alharbi 2020).***

A number of risk factors have been identified to have a potential impact on increasing the morbidity of COVID-19 in adults, including old age, male sex, pre-existing comorbidities, and racial/ethnic disparities ***(Zhang et al., 2022).***

Older age and comorbidities including asthma, cancer, chronic obstructive pulmonary disease (COPD), diabetes, and heart and renal disease are associated with severe COVID-19 ***(Zerbo et al., 2022).*** Infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) can cause asymptomatic or symptomatic coronavirus disease 2019 (COVID-19) ***(Cervia et al., 2022).***

The symptoms of COVID-19 may arise within 2 to 14 days after the infection ***(Ali & Alharbi, 2020).*** Symptoms include fever, fatigue, myalgia, weakness, headache, rhinorrhea, dry cough, shortness of breath (dyspnea), change in smell or taste, nausea, vomiting, and diarrhea ***(Cervia et al., 2022).***

According to WHO, the COVID-19 virus (SARS-CoV-2) is transmitted through large droplets, airborne particles, and surface contact. Droplet transmission refers to the direct inhalation of the virus exhaled by an infected person when a susceptible person is close to the infected person. Airborne transmission is the inhalation of small aerosol droplets exhaled by an infected person who is meters or tens of meters away. Contact transmission is the contact depo-

sition of viruses on the surface of an object ***(Zhao et al., 2022).***

Triage is an important component of emergency department care. It is designed to help identify and prioritize undifferentiated patients based on severity and risk into categories from emergent to non-urgent. It begins upon entry to the emergency department and needs to be reevaluated as the patient waits or moves through the system, to ensure the appropriate speed and level of care is being provided reliably and safely ***(Bahlibi et al., 2022).*** Triage nurse in pandemic situations plays a crucial role in identifying high-risk populations ***(Mulyadi et al., 2022).***

Under-triage (underestimation of patient severity) may lead to increased patient morbidity and mortality, while over-triage (overestimation of patient urgency) may have consequences in terms of spending limited resources on patients who are not really in need ***(Zaboli et al., 2023).***

A disaster can be defined as an occurrence that threatens and disrupts people's lives and means of subsistence caused by natural, non-natural, and human factors, resulting in loss of life, environmental damage, loss of property, and psychological consequences ***(Putra et al., 2022)***. The goal of medical disaster triage at both the prehospital and in-hospital level is to maximize resources and optimize patient outcomes ***(Franc et al., 2022).***

During the global COVID-19 pandemic crisis, most COVID-19 cases are managed at the community level has required the Community Health Center (CHC) to play a role in improving the prevention of the disease transmission and controlling infections at the community level up to the optimum level. This emphasizes the importance of the Community Health Nurses (CHNs) with the purpose of improving health and reducing health inequality in the community ***(Akbar et al., 2022).***

Community health nurses provide primary healthcare services to community residents for disease prevention and health promotion ***(Kim et al., 2022).*** CHNs have the duty to provide nursing care to each group in the community with the intention to improve the community's quality of life in dealing with various problems that cause vulnerability to health problems and health risks ***(Akbar et al., 2022).***

Significance of the study

On 14 December 2020, globally there are about 72.168.829 positive cases identified and 1.61.401 deaths ***(WHO, 2020).*** In Africa there are about 2.361.271 and 55.989 deaths. The most affected region is the Southern region with 957.601 Confirmed cases and 24,839 deaths (Africa CDC, 2020). Also, Egypt has reported 121.575 of COVID-19 and 6.920 death ***(WHO, 2020).***

During pandemic disaster situation, the Primary health care nurses play a vital role in triage people in the community to maintain health through education around infection control and promoting access to ongoing health services in the community including preventative activities as vaccination and chronic disease management. Without this continuation of care, there is likely to be secondary mortality and morbidity related to health service disruption and delayed access to care ***(Halcomb et al., 2020).***

Aim Of The Work

This study aims to assess triage skills in Covid-19 disaster for community health nurses in primary health care center through:

1. Assessing nurse's triage knowledge regarding to Covid-19 disaster.
2. Assessing nurse's triage practices regarding to Covid-19 disaster.
3. Assessing factors affecting on total skill level of triage skills in Primary Health Care centers.

Research question

1- What is the relation between nurse's experience of primary health care centers and total knowledge of triage skills regarding COVID-19?

2- What is the relation between total knowledge about triage and total level of practices related to triage?

3- What is the relation between factors affecting total skill level of triage and total level of triage practices regarding COVID-19?

SUBJECT AND METHODS

Subjects and methods for this study were portrayed under the four main designs as the following:

- Technical design.
- Operational design.
- Administrative design.
- Statistical design.

1-Technical Design:

The technical design includes research design, setting, subjects and tools of data collection used in this study.

Research design

A descriptive analytic design was utilized in order to assess triage skills in Covid-19 disaster for community health nurses in primary health care centers through:

Setting:

The study was conducted at Primary Health Care units (PHC), Maternal and Child Health Care Centers (MCH) and Family Health Centers (FHC) in Cairo Governorate. Cairo Governorate consisted of 34 directors which include 66 PHC, (MCH) and (FHC) by using systematic random sampling selected 50% which equal 33 unites, according to the instructions of Ministry of Health the number of nurses supposed in these units from 8:15 nurses. The health care centers provide maternal and child-care, emergency, compulsory vaccinations for children, family planning, dental services and some of these nurses working in the COVID-19 pandemic.

Subjects:

A purposive sample was used in this study which consisted of 112 nurses, from previously mentioned Primary Health Care units (PHC), Maternal and Child Health Care Centers (MCH) and Family Health Centers (FHC) in Cairo Governorate and according to the following criteria the sample was chosen randomly.

Inclusion criteria:

- Nurses who participated in triage group of COVID-19 pandemic.
- Nurses must be on-job now and at last two years (through pandemic).
- Include female or male nurses.

Tools of data collection:

The data were collected using the following two tools:

It was developed by the investigator, based on reviewing related literatures, magazines and expert's opinions, written in simple Arabic and English language to assess triage skills in Covid-19 disaster for community health nurses in primary health care centers.

First tool: An interviewing questionnaire: This included the following four parts.

Part (I): Nurses socio-demographic characteristics:

It was used to assess socio- demographic characteristics of nurses who working in PHC. This part included 8 closed ended questions such as nurses genders, ages, marital status, income, education, experience years, training courses and its type.

Part (II): Nurses Knowledge about triage and classification assessment questionnaire :

It was used to assess nurse's knowledge about triage which consisted of 7 closed and open ended questions such as triage definition, aim, process, levels, color coded.

Scoring system

The score ranged from zero to one, for incorrect (unsatisfactory knowledge)="(0)" and for correct items (satisfactory knowledge) take "(1)".

The total score for all items related to knowledge about triage was 19points are summed up and categorized into two levels as followings:

- Unsatisfactory knowledge <75% or from 1 to 14.
- Satisfactory knowledge ≥ 75% or from 15 to 19.

Part (III): Nurses Knowledge about COVID-19 pandemic questionnaire:

It was used to assess nurse's knowledge about COVID-19 pandemic which consisted of 22 closed ended questions such as definition, high risk people, quarantine period, clinical symptoms, ways of spreading COVID-19 virus, diagnostic measures, treatment, safe period after infection, management of COVID-19 patients, complication, general precautionary measures for community and medical team to prevent infection.

Scoring system

The score ranged from zero to one, for incorrect (unsatisfactory knowledge) ="(0)" and for correct items (satisfactory knowledge) take "(1)".

The total score for all items related to knowledge about COVID -19 was 85 points are summed up and categorized into two levels as followings:

- Unsatisfactory knowledge <75% or from 1 to 64.

• Satisfactory knowledge ≥ 75% or from 65 to 85.

Part (IV): Factors affecting the level of classification skills during the COVID-19 pandemic:

It was used to assess factors affecting the level of classification skills during COVID-19 pandemic which consisted of divided into 3 parts as follow:

(1) Triage clinic environment, this part includes 5 closed ended questions such as separate registration office for patients with respiratory symptoms, respiratory waiting area, Characters of respiratory waiting area, Patients are separated from each other and triage area supplies.

(2) Personal factors, this part consists of 6 closed ended questions such as worrying about getting infected, the family and medical staff with the COVID-19 virus, fear of seeing the suffering of patients, frequent absences of the medical staff and redistribution of medical staff to new places due to the pandemic.

(3) Administrative factors this part consists of 5 closed ended questions such as availability of all PPE for nurses, preparing a specialized triage staff and training for classification procedures, training on the symptoms of the emerging corona virus and an additional financial rewarding.

Scoring system of factors affecting the skill of triage:

The score ranged from zero to two, for unsuitable ="(0)", need improvement take "(1)", and suitable factor take (2) score. The total score for all factors affecting triage skills is summed up and categorized into two levels as followings:

• Unsuitable factors <60%

• Suitable factors ≥ 60%

The second tool: An observational check list to evaluate the performance of nurses during classification:

It aimed to assess nurses' practices regarding COVID-19 patients' classification which divided to five parts as follow:

(I) Triage process this part included 8 closed ended questions such as evaluation for respiratory symptoms, usage of triage algorithm/questionnaire, patient isolation/separation and application of health and safety roles.

(2) Apply comprehensive precautions for infection control measures in dealing with COVID-19 patients which consisted of 7 closed ended questions such as comply with PPE, wearing and taking off PPE, availability of separate area & posters for PPE donning and doffing, hand washing.

(3) Applying the physical examination for COVID-19 patients which consisted of 8 closed ended questions such as assessment of patients′ vital signs, complaint, signs and symptoms, categorization and determine the patient′s triage stages according to the color code.

(4) Implementation of nursing care which consisted of 13 closed ended questions such as nursing intervention, administer needed medical laboratory tests, transferring patient to the hospital if the situation requires and recording of case assessment results.

(5) Registration and evaluation which consisted of 12 closed ended questions such as patient's identification, availability of triage cards and registration documents, recording of doctor's prescription and nurse's notes, application of infection control standards, Patient safety, and transferring of patient.

Scoring system of practices:

A scoring system for each of practical items as checked by investigators each of the items scored "1" marks for "done" response, "0" mark for "not done" response for all items. All items of practices were summed up and changed into percentage. The total score for all items related to nurses' triage practices was 50 points and categorized into two levels as followings:

• Inadequate triage practices =<60% or from 1 to 30

• Adequate triage practices =≥60% or from 31 to 50

Validity and Reliability:

Content and face validity were performed by 3 professors of the community health nursing department and two professors from the Community health specialty of Faculty of Medicine, all experts were affiliated to Ain Shams University, Egypt who reviewed the tools for content accuracy. The developed tools were tested for reliability on a sample of 50 subjects. The reliability test of translated version was established by using the Cronbach alpha and Pearson correlation which showed good internal

consistency construct validity Cronbach alpha =(0.887).

2-Operational Design:

Preparatory Phase:

A review of literature was done regarding current and past available literature, covering the various aspects of the problem, using textbooks, articles, magazines, and internet sites through research gate. This was necessary for the investigator to get acquainted with, and oriented about aspects of the research problems, as well as to assist in development of data collection tools.

Ethical consideration:

All ethical considerations were considered for ensuring the nurses' privacy and confidentiality of the collected data during the study. Firstly, the study protocol took agreement of Ethical Committee affiliated to Faculty of Nursing Ain Shams University. Secondly the purpose and nature of the study were explained for the participants and written consent was taken to gain their participation after explain the purpose of the study and being informed that each study subject is free to withdrawal at any time through the study. Finally, all selected study sample agreed to participate in the study and they were assured that the study would posed no risks or hazards on their social, psychological or physical health.

Pilot Study:

A pilot study was conducted at the beginning of the study for 11 cases (10% of the total sample) to investigate the feasibility of data collection tools, their content, validity, clarity, and simplicity. It was carried out during July 2022. Subjects included in the pilot study were included in the actual study sample.

Field work:

The actual process of data collection was carried out in three months consequently the period from the beginning of July 2022 until the end of September 2022, three days /weekly nearly about 4 hours /daily (Sunday, Monday, and Wednesdays) in order to collect the total sample of 112 nurse. This was done through the working hours 9 am to 1 Am in which met about 4:5 nurses daily for 3 days/ week who apply to inclusion criteria of the study. The investigator introduced herself to the previously mentioned setting directors and the nurse supervisors and the other health team workers. The investigator explained the aim of the study to all of them and then distributed the questionnaire sheet after clear explaining the way to fill it out. The interviewing tools took about maximum 30 minutes for every nurse. The observation check list took about 15 minutes.

3-Administrative Design:

Formal letter from the Dean of the Faculty of Nursing, Ain Shams University directed to the Directorate of Health Affairs in Cairo Government and approvals was taken to directors of the previously mentioned primary health care centers.

Statistical design:

Data was analyzed and tabulated using the Statistical Package for Social Science (SPSS) version 23. Qualitative data was presented as number, percentage, mean, and standard deviation. Relations between different qualitative variables were tested using Chi-square test ($\chi 2$), ANOVA test, and correlation coefficient (r). Probability (p- value)

- $P \geq 0.05$ was considered insignificant
- $P < 0.05$ was considered significant

$P < 0.001$ was considered highly significant.

Results

Table (1) shows that, 96.4 % of the study sample of nurses are female while little of sample (3.6%) are male and 46.4% of them their age ranged from 40 < 50 years, while the mean ± S. D = 41.0 ± 2.5 years, however, 57.1% of them were married with not enough family income for 70.5% of them. Also, 82.1% of them were diploma nurse and 68.8% of them had experience from 5 years to 10 years and all of them (100%) engaged in training program as triage management, COVID-19 disease for 303% and 178% respectively while, 87.5% of them trained about infection control courses.

Figure (1) illustrates that 78.6% of study samples of nurses in primary health care centers had unsatisfactory knowledge about triage while 21.4% had satisfactory knowledge about it.

Figure (2) illustrates that 91.1% of study sample of nurses in primary health care centers had satisfactory knowledge about COVID-19 while only 8.9% of them had unsatisfactory knowledge.

Figure (3) illustrates that 68.7% of nurses in health care centers had inadequate practices level of triage skills while 31.3% of them had adequate practices of it.

Figure (4) it shows that the majority of nurses (92.9%) stated that the factors affecting triage skills were administrative factors, followed by the environment of triage clinics, with a rate of 63.4%, which was unsuitable.

Table (2) shows that there was significant relation between total knowledge about triage and the nurses' experience years with F=7.738 and p value < 0.001. While insignificant relation between total knowledge about COVID-19 and nurses' experience years where p value 0.765.

Table (3) proved that there was highly significant relation between nurses' total knowledge about triage and their practices level with F= 3.044, p value < 0.001. While significant relation between their total knowledge about COVID-19 and practices of triage with F= 2.160 and p value < 0.05.

Table (4) proved that the highest level of nurses had inadequate practices of triage who reported unsuitability factors of respiratory clinic 42%, triage clinic 49.1%, personal factors for 33.9%, and administrative factors for 63.4%. While there was significant relation between nurses' practices of triage and suitability of triage clinic with χ^2 = 6.856, and P value 0.009

Table (1): Distribution of the study sample of nurses according to their socio-demographic characteristics (n=112).

Items	No	%
Sex:		
Male	**4**	**3.6**
Female	**108**	**96.4**
Age		
20: <30	**1**	**0.9**
30:< 40	**47**	**42.0**
40: <50	**52**	**46.4**
≥ 50	**12**	**10.7**
Mean ± S. D	**41.0 ± 2.5 years**	
Social status		
Single	**11**	**9.8**
Married	**64**	**57.1**
Divorced	**20**	**17.9**
Widow/widower	**17**	**15.2**
Family income		
Not enough	**79**	**70.5**
Enough	**27**	**24.1**
Enough and over	**6**	**5.4**
Educational grade		
Diploma	**92**	**82.1**
Nursing technician	**18**	**16.1**
Bachelor of nursing	**2**	**1.8**
Experience (year)		
< One year	**3**	**2.7**
1 year: < 3 years	**2**	**1.8**
3 years: <5 years	**30**	**26.8**
5 years: 10 years	**77**	**68.8**
Have nursing training course:	**112**	**100.0**
*The types of courses have taken:		
Training about triage management	**34**	**30.3**
Training about COVID-19 disease	**20**	**17.8**
Infection control courses	**98**	**87.5**
Other courses (family planning- vaccination)	**85**	**75.9**

**Not mutually exclusive*

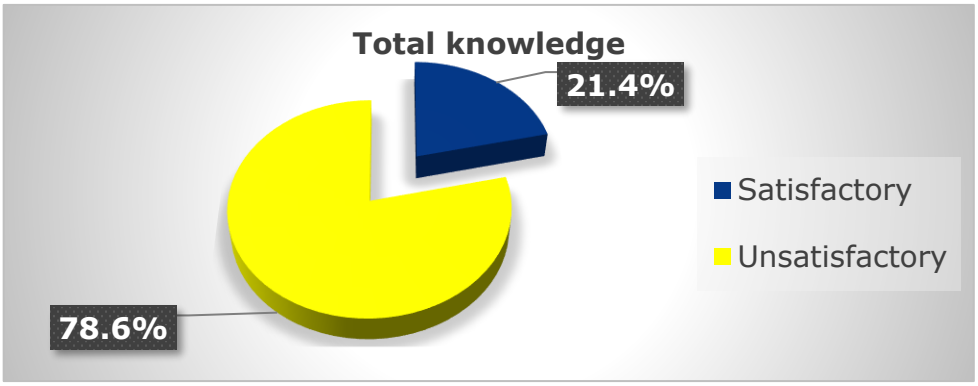

Figure (1): Distribution of the study sample of nurses of primary health care centers according to their total knowledge level about triage (n=112).

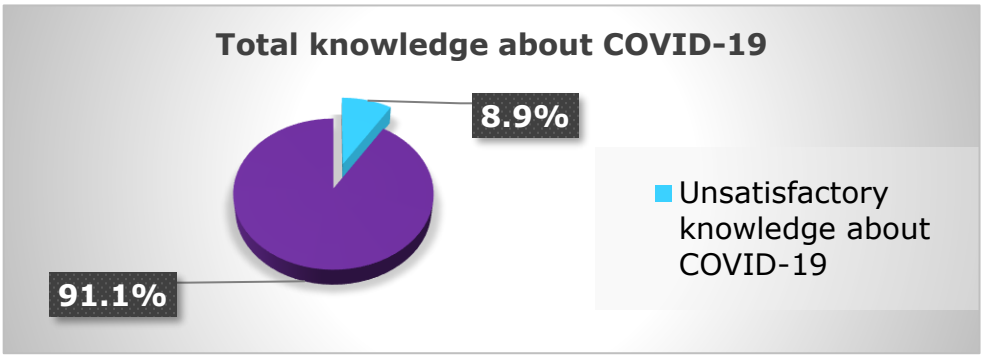

Figure (2): Distribution of the study sample of nurses of primary health care centers according to their total knowledge level about COVID-19 (n=112).

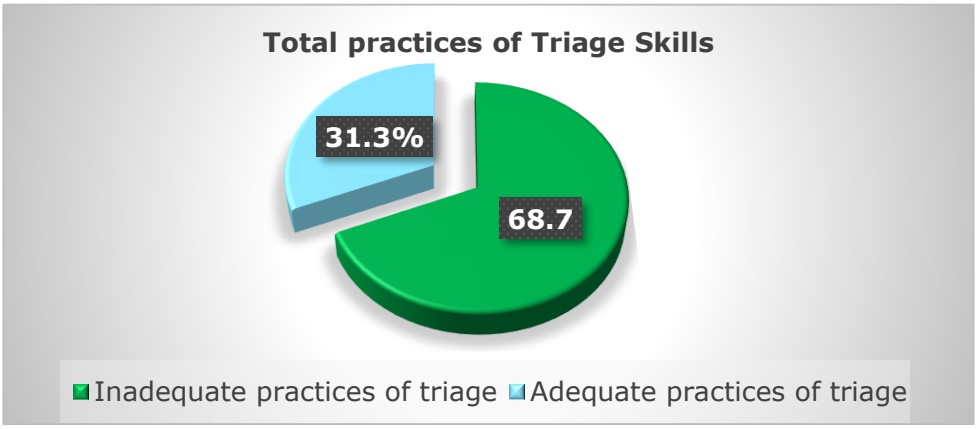

Figure (3): Distribution of the study sample of nurses according to their total practices triage skills in Covid-19 disaster (n=112).

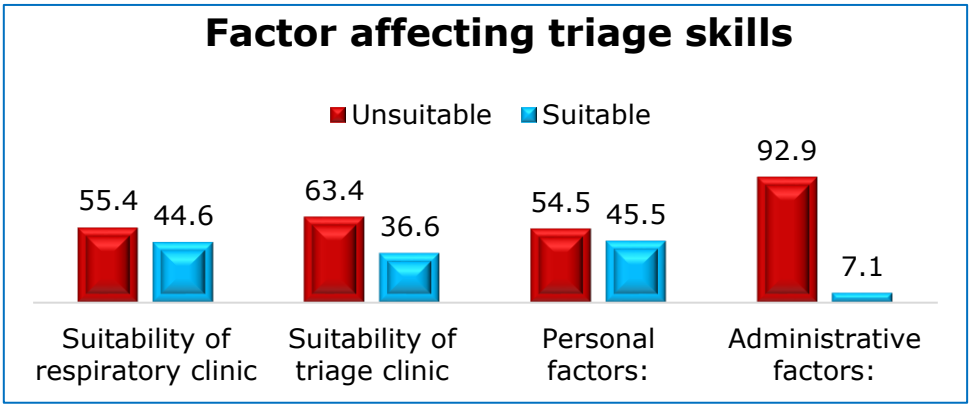

Figure (4): Distribution of the study sample of nurses according to the total factors affecting the skill of triage (n=112).

Table (2): The relation between nurse's experience of primary health care centers and total knowledge of triage skills regarding COVID-19 (n=112).

Nurse's experience	Total knowledge about triage		Total knowledge about COVID-19	
	Mean	Std. Deviation	Mean	Std. Deviation
< One year	10.33	0.577	70.00	3.000
1 year: < 3 years	3.50	0.707	72.00	1.414
3 years: <5 years	7.10	2.468	69.43	2.144
5 years: 10 years	9.71	3.268	69.49	3.782
ANOVA Test (F)	7.738		0.384	
Significant (P value)	0.000**		0.765	

** Highly significant

Table (3): The relation between nurse's total knowledge of triage skills regarding COVID-19 and total level of triage practices (n=112).

	Total knowledge about triage		Total knowledge about COVID-19	
	Mean	Std. Deviation	Mean	Std. Deviation
Total nurses' practices of triage	8.92	3.291	69.54	3.361
ANOVA Test (F)	3.044		2.160	
Significant (P value)	0.000**		0.007*	

** Highly significant * Significant

Table (4): The relation between factors affecting total skill level of triage and total level of triage practices regarding COVID-19 (n=112).

	Inadequate practices of triage		**Adequate practices of triage**		**Chi square**	
	No	%	N0	%	χ^2	P
Suitability of respiratory clinic						
Unsuitable	47	42.0	15	13.4	3.219	0.073
Suitable	30	26.8	20	17.9		
Suitability of triage clinic						
Unsuitable	55	49.1	16	14.3	6.856	0.009*
Suitable	22	19.6	19	17.0		
Personal factors:						
Unsuitable	38	33.9	23	20.5	2.598	0.107
Suitable	39	34.8	12	10.7		
Administrative factors:						
Unsuitable	71	63.4	33	29.5	0.157	0.692
Suitable	6	5.4	2	1.8		

Discussion

The development of a quick triage system and strong triage knowledge among nurses is essential for providing the best possible treatment in emergency circumstances. A systematic triage approach in primary health care centers might have a significant influence on patient care quality and the absence of adequate training is reflected in the low triage knowledge commonly among nurse interns ***(Mbombi & Mothiba, 2020).*** The present study was carried out to assess triage skills in Covid-19 disaster for community health nurses in primary health care center.

Regarding distribution of the study sample of nurses of primary health care centers according to their total knowledge level about triage, the current study revealed that more than three quarters of study samples of nurses in primary health care centers had unsatisfactory knowledge about triage **(Figure:1).**

On the same line with the result of ***Gandhi & Jothimani, (2019)*** who conducted their study to evaluate effectiveness of triaging the triage: reducing waiting time to triage in the command post to emergency department in selected hospitals, found that the majority of sample had unsatisfactory knowledge regarding triage.

Also, this result agrees with **Faheim et al. (2019)** who studied Effect of triage education on nurses' performance in diverse emergency departments and found that the majority of their participant had unsatisfactory knowledge about triage. While disagreeing with **Asgari et al., (2018)** who studied evaluating disaster triage knowledge of nurses' personnel in public hospital in ilam and found that more than half of participant had moderate knowledge regarding triage.

On inconsistent, the result of ***Ahmed, (2021)*** who studied Triage training program and its effect on nurses decision making ability and found that was majority of studied sample have unsatisfactory knowledge about triage priorities, also inconsistent with those result of ***Sedky et al., (2019),*** who conducted a study entitled effect of triage education on nurses' performance in diverse emergency. evidence based nursing research and found that the majority of study sample had unsatisfactory knowledge about triage priorities.

The current study revealed that the majority of study sample of nurses in primary health care centers had satisfactory knowledge about COVID-19 **(Figure:2).** This might be due to frequent training programs and sessions for nurses about COVID-19 and compliance with preventive measures to prevent COVID-19.

This result is supported by ***Hua et al., (2020)*** and also, ***Sahu et al., (2020)*** who found that majority of study sample had satisfactory knowledge about COVID-19.

On the same line, the result reported by ***Hua et al., (2020)*** who studied COVID -19 Related Experience, Knowledge, Attitude, and Behaviors among Orthontists, Orthodontic Residents, and Nurses in China. Also, this result supported with Bhagvathula, et al., (2020), who carried out a study entitled Knowledge and Perceptions of COVID- 19 among Health care workers: A cross- sectional study" found more than two thirds of sample were high level of knowledge regarding protective measures from COVID-19.

Regarding distribution of the study sample of nurses according to their total practices triage skills in Covid-19 disaster, the current study revealed that more than two thirds of nurses in primary health care centers had inadequate practices level of triage skills **(Figure: 3).**

On point of view of investigator this result due to staff needs more training and educational program related to triage and interdepartmental coordination as the primary elements of improve nurses' teamwork skills, interprofessional communication skills and time management that's affect positively in quality of care.

This result on the same line ***(Rahmati et al., 2013)*** who conduct the study entitled by effects of triage education on knowledge, practice, and qualitative index of emergency room staff: found many factors effect of triage such as education on knowledge, practice and qualitative index of emergency room staff and found that majority of participant had inadequate practices level of triage skills. While, disagreed with ***Mirhaghi & Roudbari, (2010)*** who evaluate a survey on knowledge level of the nurses about hospital triage and found majority of participant had adequate practices level of triage skills.

Regarding distribution of the study sample of nurses according to the total factors affecting the skill of triage, the finding of the current study revealed that majority of nurses stated that the factors affecting triage skills were administrative factors, followed by the environment of triage clinics **(Figure:4).**

These results were disagreement with ***Afaya et al., (2017)*** who conducted a study about Perceptions and Knowledge on Triage of Nurses Working in Emergency Departments of Hospitals in the Tamale and consider that the personal factors are essential factors affecting on triage skills.

On the same line with ***Rahmati et al., (2013)*** who conduct the study entitled by effects of triage education on knowledge, practice and qualitative index of emergency room staff: found many factors effect of triage such as education on knowledge, practice and qualitative index of emergency room staff: found around half of sample affected by that education has a positive effect on increasing the knowledge and skill of nurses regarding the triage of patients.

Regarding the relation between nurse's experience of primary health care centers and total knowledge of triage skills regarding COVID-19, there was a statistically significant relation between total knowledge about triage and the nurses' experience years. While insignificant relation between total knowledge about COVID-19 and nurses' experience years **(Table: 2).**

These results were disagreed with ***Duko et al., (2019),*** who concluded that there was no substantial relationship between experience and triage decision making in triage skill. Also, this result was consistent with ***Sadhu et al., (2020),*** who found insignificant relation between total knowledge about COVID-19 and nurses' experience years.

Regarding the relation between nurses' total knowledge of triage skills regarding COVID-19 and total level of triage practices, there was highly significant relation between nurses' total knowledge about triage and their practices level with. While significant relation between their total knowledge about COVID-19 and practices of triage **(Table: 3).**

This result indicated that the nurses have adequate knowledge from different workshops or training sessions about triage and covid-19 that's effect on their performance and quality of work.

This finding is supported by ***El-Guindy, El-Shahate & Mohamed,*** **(2021)** in a study entitled "Enhancing Nurse Interns` Knowledge and Practice Regarding Triage at Emergency Units during COVID 19 Pandemic". Also, on the agreement with study conducted by ***Erfani et al., (2020)*** whose study aimed to assess Knowledge, Attitude and Practice toward the Novel Coronavirus (COVID-19) Outbreak and found that there were significant relations between total knowledge about COVID-19 and practices of triage.

Regarding the relation between factors affecting total skill level of triage and total level of triage practices regarding COVID-19, the current study presented that highest level of nurses had inadequate practices of triage who reported unsuitability factors of administrative factors for more than two thirds of sample. While there was significant relation between nurses' practices of triage and suitability of triage clinic **(Table: 4).**

From point of view this result might be due to staff needs more administrative support and restricted supervision to ensure applying effective triage process, colour codes and communication, teamwork during disaster.

These results were agreed with ***(Halcomb et al., 2020).*** Who conducted a study about the experiences of primary healthcare nurses during the COVID19 pandemic in Australia and found there were significant relation between nurses' practices of triage and suitability of triage clinic.

Conclusion

The current study findings concluded as the following:

There was a highly significant relation between nurses' total knowledge about triage and their years of experience and practice. Also, there was significant relation between nurses practice and factors affecting triage skills as suitability of triage clinic with P value < 0.05. While more than three quarters of the study sample of nurses had unsatisfactory knowledge about triage while most of them had satisfactory level about COVID-19 in addition to inadequate practices for more than two thirds of them.

Recommendation

In the light of the study findings, the following recommendations were suggested:

- On-job training programs should be designed and prepared to train the nurses in primary care center in order to improve their performance toward triage skills.
- Designing a poster and brochures about triage stages, color code and triage priority for all primary health care centers.
- Improving administrative, environmental factors and infrastructure of triage clinics to allow nurses to perform their role perfectly.
- Further intervention studies should be conducted to improve nurse's knowledge and practices about triage skills for proper care of large number of patients during disaster periods.

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