Nurses Knowledge Practice and Perceived Barriers during Outbreak of COVID-19 and its Relation to their Intention to Leave

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Abstract:

Background: The world is affected by the spread of Covid-19 especially nurses. A good knowledge of the infection process and control would support the willingness and commitment of nurses to perform their duties. **Aim:** To determine the relationship between nurses' knowledge, practice and barriers they perceived during outbreak of COVID-19 and their intention to leave. **Design:** A cross-sectional descriptive design was used. **Subjects:** It is a purposive sample of 254 nurses who had at least 6 months of experience who work in Medical, Surgical, Obstetrics & Gynecological, Pediatric, Operations, Emergency and ICUs units at Qena University Hospitals. **Tools:** Four tools were used for data collection; nurses knowledge questionnaire, nurses practice questionnaire, nurses perceived barriers questionnaire and staff nurses' intention to leave scale**. Results:** The majority of nurses had good knowledge and satisfactory level of practice towards COVID-19. The mean score of nurses' intention to leave was 76.64 illustrated is it high intention to leave. There were highly positive statistically significant correlation between nurses' knowledge and their practice towards covid19, and between nurse's intention to leave and barriers as perceived by them. There were highly negative statistically significant correlation between nurses' practice and barriers. **Conclusion:** The majority of studied nurses had good level of knowledge about COVID-19 and they had satisfactory level of practice towards COVID-19, barriers as perceived by nurses during COVID-19 outbreak were highly effective in nurses' intention to leave. **Recommendations:** Nursing managers should be providing comprehensive training program for nurses during and after the outbreak to ensure their knowledge and practice.

Introduction:

Coronavirus disease 2019 also known as COVID-19 is a rapidly growing pandemic caused by a new human corona virus (SARS-COV-2) previously known as 2019-nCov**.** It was first described in December 2019 between patients with viral pneumonia symptoms in Wuhan, China. In Egypt, the first COVID-19 case was discovered in February 2020, the most vulnerable group affected was the health care providers (HCPs) including nurses, especially those working in public hospitals, where resources are relatively inadequate and protective equipment is not always sufficient **(Lu et al., 2020 and Zhu et al., 2020, & Egyptian. Medical. Syndicate, 2022).**

The COVID-19 disease can be transmitted from a person to another mainly through close contact with an infected person via respiratory droplets during coughing or sneezing and vomiting or when touching a surface or thing that is contaminated with the virus and touching one's eyes, nose or mouth **(WHO, 2020 & Centers for Disease Control and Prevention (CDC), 2020).** The clinical symptoms of COVID-19 include fever, cough, fatigue, malaise, and shortness

of breath. International concerns about the virus have increased due to its high spread ability, which may be coupled with morbidity and mortality. The elderly and patients with comorbidities are more likely to be infected and are additionally more predisposed to serious complications, which may be linked with acute respiratory distress syndrome (ARDS) and cytokine storm **(Guo, et al. , 2020, Cascella et al., 2020 & Huang. et al., 2020).**

In spite of, that there is a vaccine and a protocol for the treatment against SARS-CoV-2, a strong infection control measures are consider the main intervention to decrease the spread of the virus in both health care settings and the community. Nurses' knowledge of dealing with highly infectious diseases and their practice plays a vital role in controlling the spread of the infection where health systems have, at best, the moderate capacity to respond to outbreaks. The deficiency of appropriate protective measures jeopardizes HCPs over the world and represents a major cause of their concern. Accordingly, availability and correct use of personal protective equipment are essential to protect HCPs especially nurses during their coping with the COVID-19

pandemic **(Bhagavathula et al., & 2020, Li et al., 2020).**

Nurses all over the world have played a major role during disaster and emergency situations, including disease outbreaks. They were involved in caring for patients with this highly transmittable pathogen. COVID-19 has presented various challenges to nurses that could impact their commitment to nursing profession and work performance. Much worse, nurses are risking their lives in order to carry out their duties, causing strong fear of being infected or unknowingly infecting others. All this consider main cause for nurses to think leave nursing profession **(ICN, 2020 & Wang et al., 2020).**

Intention to leave is influenced by the commitment and personal and structural factors. It is a critical dimension in health systems due to the shortage of professionals and the potential impact on the quality of care. It defined as one's behavioral attitude to leave the institution. It is also defined as a nurse's plan of tendency to leave the current working institute to find an alternative job in the near future **Ayalew & Workineh, (2020).** This study will conduct to identify nurses' knowledge, practice and perceived barriers during current outbreak of COVID-19 and its relation to their intention to leave at Qena University Hospitals.

Significance of the study

COVID-19 has posed serious occupational health risks to nurses due to their frequent exposure to infected patients. Nurses are very strained during the course of any pandemic because of their main role in response to a pandemic. They are the chief sector that have contact with patients and are prone to exposure to infected cases in healthcare settings. By their professional obligation, they must be at their workplaces even if their health is at risk. Nevertheless, they should also protect their health while they are treating patients. Also the level of knowledge directly affects the individual of susceptibility to a disease and lack of knowledge about the COVID-19 disease would be a mediating element in the increase of cases infected by the virus. Knowledge of the infection process and its precautions would strengthen nurses' willingness to perform their duties. There is scarcity of studies were done related to nurses' knowledge, practice, perceived barriers during current outbreak of COVID-19 and its relation to their intention to leave in our setting. Therefore the researchers choose Qena University Hospitals to conduct this study.

Aim of the study

To determine the relationship between nurses' knowledge, practice and barriers they perceived during outbreak of COVID-19 and their intention to leave.

Specific objectives: To

- Identify the current levels of knowledge and practice of nurses during current outbreak of COVID-19 at Qena University Hospitals.
- Determine barriers that face nurses during current outbreak of COVID-19
- Explore relationship between knowledge and practice of nurses during current outbreak of COVID-19, intention to leave and their Socio-demographic.

Research Questions

 1. What is the level of nurses' knowledge about COVID-19 at Qena University Hospitals?
 2. What is the level of nurses' practice during current outbreak of COVID-19 at Qena University Hospitals?
 3. 3- What is the nurses' perception about barriers they perceived during current outbreak of COVID-19 at Qena University Hospitals?
 4. 4-Is there is relationship between nurses knowledge, practice and perceived barriers during current outbreak of COVID-19 and their intention to leave?

Subject and Method

Technical design: This design involved the study design, the study setting, the study subject and tools of data collection.

Study design: A cross-sectional descriptive design was used.

Setting: This study was conducted in medical, surgical, obstetrics & gynecological, pediatric, Operations, Emergency and ICUs units at Qena University Hospitals.

Study Duration: The present study took about one year from March 2021 until February 2022.

Subjects: Subjects of the study were a purposive sample of 254 nurses represents all available nurses who are on duty in all selected study settings during data collection, nurses were recruited based on the following inclusion criteria; staff nurses had at least six months of experience in their working place at the time of study.

Tools:

The data required for the study was collected using self–administered questionnaire, it comprised of four tools;

First tool: Nurses knowledge questionnaire, adapted with due acknowledgement from **(Bahrey et al., 2020).** It was used to assess the nurses' knowledge about COVID-19. This questionnaire included two parts:

**First parts*:* Including (6) questions about personal data sheet such as; (age, gender, marital status,

educational level, years of experience in nursing, and work units).

Second parts: contained (23) questions in the form of multiple choices and correct and incorrect; It is divided into three dimensions; methods of COVID-19 spread (7questions), common symptoms (7questions), and measures to prevent spread of COVID-19 (9 questions).

The scoring system of the nurses' knowledge questionnaire was scored (1) for correct answer and (0) for false answer. The sum of the scores in the three dimensions were collected and then transformed into a percent. A score of 0- 65% was considered as "poor level of knowledge and a score of ≥ 65% was considered as good level of knowledge.

Second tool: Nurses practice questionnaire, developed by **Saqlain et al., (2020).** It contained (10) questions. The responses were 2 for yes answer, 1 for sometimes and zero for no answer. The sums of the scores were combined to create total practice. A score of < 75% was considered as "un satisfactory level of practice and a score of ≥ 75% was considered as satisfactory level of practice.

Third tool: Nurses perceived barriers questionnaire was developed by **Abdel hafiz et al., (2020).** It includes (9) questions. It was used to assess the nurses' practice towards COVID-19. The responses were recorded on a five-point Likert scale ranged from strongly disagree to strongly agree, the scoring accordingly from one to five. The total scores of the perceived barriers were based on the sum of positive answers.

Fourth tool: staff nurses' intention to leave the nursing profession scale it was adopted from **Mohamed & Mohamed, (2013).** It contained two subscales. The first subscale is the intention to leave the hospital section, which is a three-item scale asking respondents how likely they are to stay in their current position or leave. The second subscale asks the participants about the tendency to leave the nursing profession using the same three responses. The responses were yes, uncertain and no, the soring were 2, 1, and 0 respectively. A higher score meant a higher intention to leave and a lower score meant lower intention to leave.

Administrative design

Official permission were obtained from the responsible authorities of Qena University Hospitals. The researchers met departments' supervisors to explain study aim to them, to obtain their agreement and support, and to organize the nurses' contribution based on the nature of work on each department.

Operational design: This design explains the steps of actual implementation of the study, including the preparatory phase, pilot study and field work.

Preparatory phase

It took about two months from March to April 2021 which included reviewed the available literature concerning the study topic, study tools prepared, and translated into Arabic and retranslated into English for correctness.

Pilot study

A pilot study were conducted on a sample of 10 % of study subjects their number were 26 to test the applicability, reliability, clarity of the tools, and to estimate the time needed to answer it. Data obtained from the pilot study were analyzed, no alterations were done, so, contained within the number of study sample.

Validity and reliability of the study tools:

The draft of the questionnaires reviewed for its content coverage, clarity, wording, length, format and overall appearance by five experts (1 professor, 1 assistant professor and 3 lecturers) in the field of nursing administration from faculties of nursing at Qena and Assiut universities (to test comprehension of study tools.

The study tools reliability were measured during pilot study using Cronbach's test. The Cronbach's test values were as follows; 0.865 for Nurses knowledge about Covid 19, 0.880 for practice during Covid 19, 0.890 for barriers during Covid 19 and 0.865 for intention to leave. This means that Cronbach's Alpha coefficient value is accepted and highly reliable.

Field Work:

After guaranteeing the simplicity and suitability of study tool, researchers was began data collection by met with the potential research participants and explained the purpose and nature of the study and obtained oral consent for contribution. The questionnaire was handed to participants individually at their work. Data were collected in different shifts based on work schedule of each unit. The self-administered questionnaire took about 20 minutes for each participant to be filled. Data collection stage took about two months started in May 2021 until the end of June 2021.Three days /week. Questionnaire were distributed on participants and collected from them at the same day.

Ethical consideration: Research proposal was approved by the nursing administration department and ethical committee .in the Faculty of Nursing at Assiut University, Egypt. The study was following common ethical principles in research. There is no risk for the study subjects during application of the research**.** The purpose of this study was explained to all participants and oral agreement was taken from them. Confidentiality of gathered information and privacy of the participants was assured and participants had the right to refuse to share or drawing from the study without any rational at any time.

Statistical design

Collected data were confirmed prior to computerized data entry and analysis by using statistical software package for social sciences (SPSS-22). Data were presented using descriptive statistics in the form frequencies and percentages. Quantitative variables were presented in the form of means and standard deviation. Qualitative variables were compared using T-test and (ANOVA test) were used to examine the association between scores was considered statistically significance difference (P <0.05).

Results

Table (1): Socio-demographic Characteristics of the Studied Nurses (n = 254).

Items	No	%
Age group		
Less than 25 year	132	**52.0**
From 25-30 year	80	31.5
More than 30 year	42	16.5
Mean ±SD(range)	**26.52±4.95(20-55)**	
Gender		
Male	63	24.8
Female	191	**75.2**
Social status:		
Single	108	42.5
Married	137	**53.9**
Divorced	9	3.6
Educational level:		
Nursing secondary school diploma.	57	22.4
Nursing secondary school diploma with specialty	13	5.1
Technical institute of nursing	151	**59.4**
Nursing Bachelor	33	13
Years of experience in nursing:		
Less than 1 year	25	9.8
From 1-3 year	62	24.4
from 3-5 year	57	22.4
from 5-10 year	63	**24.8**
More than 10 years	47	18.5
Mean ±SD (range)	**6.62±5.56(0.2-35)**	
Work settings:		
Medical	71	**28.0**
Surgical	38	15.0
Obstetrics	25	9.8
Pediatric	34	13.4
Operations	45	17.7
Emergency	15	5.9
ICU	26	10.2

Table (2): Knowledge about COVID-19 of Studied Nurses (n = 254)

Items	Incorrect		Correct	
	No	%	No	%
Methods of COVID-19 spread				
1. Droplets of infected person (with cough or expiration)	19	7.5	235	**92.5**
2. Surfaces touched by affected person	28	11.0	226	**89.0**
3. Touching coins and banknotes	48	18.9	206	81.1
4. Dealing with pets	185	72.8	69	27.2
5. Stool (e.g. in public toilets)	152	59.8	102	40.2
6. Goods imported from China	139	54.7	115	45.3
7. The disease could be transmitted from asymptomatic person	43	16.9	211	**83.1**
Symptoms of COVID-19				
8. Fever	11	4.3	243	**95.7**
9. Dry cough	19	7.5	235	**92.5**
10. Body aches	12	4.7	242	**95.3**
11. Difficulty in breathing	10	3.9	244	**96.1**
12. Vomiting	109	42.9	145	57.1
13. The virus may be more dangerous for the elderly	19	7.5	235	92.5
14. The virus may be more dangerous in patients with chronic diseases	21	8.3	233	91.7
Measures to prevent spread of the disease				
15. Proper hand wash	4	1.6	250	**98.4**
16. Maintaining an appropriate distance between yourself and anyone with symptoms	10	3.9	244	**96.1**
17. Avoiding touching eyes, nose and mouth	21	8.3	233	**91.7**
18. Putting on facemasks in public places	35	13.8	219	86.2
19. Taking antibiotics	150	59.1	104	40.9
20. Eating garlic	87	34.3	167	65.7
21. An effective vaccine against the virus is currently available	162	63.8	92	36.2
22. An effective treatment against the virus is currently available	191	75.2	63	24.8
23. Antibiotics can treat the disease	176	69.3	78	30.7

Table (3): Mean Scores of Studied Nurses Knowledge about COVID-19 (n = 254)

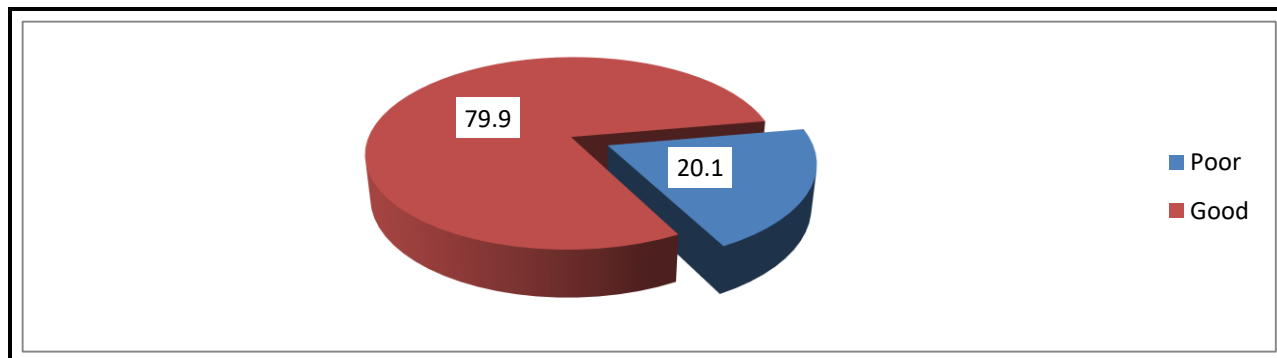| Items	Max Score	Mean ±SD	Range	Mean%
• Methods of COVID-19 spread	7	**4.58±1.45**	0-7	65.47
• Symptoms of COVID-19	7	**6.21±1.13**	0-7	88.70
• Measures to prevent spread of the disease	9	5.71±1.73	0-9	63.43
• Total Knowledge about covid19	23	16.5±3.22	0-23	71.74

Figure (1): levels of knowledge regarding to COVID-19 of studied nurses (n=254)

Table (4): Frequency distribution of Studied Nurses Practice towards COVID-19 (n = 254)

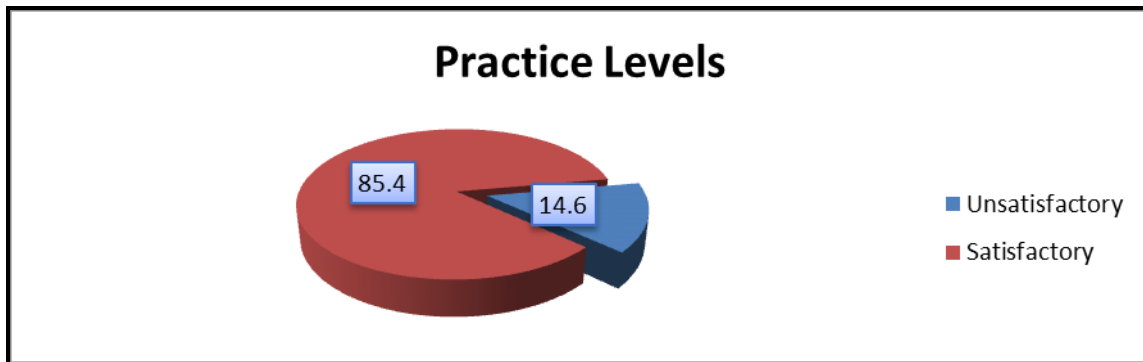| Items	No		Sometimes		Yes	
	No	%	No	%	No	%
1. Do you educate your patient about the disease	7	2.8	41	16.1	206	81.1
2. Do you wear a mask when in contact with patients	2	0.8	18	7.1	234	**92.1**
3. Do you use face mask in crowds	15	5.9	30	11.8	209	82.3
4. Do you refrain from shaking hands	46	18.1	79	31.1	129	**50.8**
5. Do you wash your hands before and after handling each patient?	7	2.8	26	10.2	221	**87**
6. Do you use soap or hand sanitizer to wash your hands continuously?	6	2.4	27	10.6	221	**87**
7. Do you avoided your patients with signs and symptoms suggestive of COVID-19	20	7.9	45	17.7	189	74.4
8. Do you avoid touching your eyes, nose or mouth as far as you can?	13	5.1	43	16.9	198	78
9. Do you throw the used tissue in the trash	6	2.4	21	8.3	227	**89.4**
10. Do you cover your nose and mouth with a tissue during sneezing or coughing	5	2	38	15	211	83.1

Figure (2): Practice levels of studied nurses (n=254)

Table (5): Barriers during COVID-19 as perceived by Studied Nurses (n = 254)

Items	Strongly disagree		Disagree		Undecided		Agree		Strongly agree	
	No	%	No	%	No	%	No	%	No	%
1. Deficiency of knowledge about the mode of transmission of the disease COVID-19	37	14.6	29	11.4	36	14.2	75	**29.5**	77	**30.3**
2. Not wearing mask while contact with the patient	45	17.7	46	18.1	47	18.5	81	31.9	35	13.8
3. Insufficient training in infection control measurements	116	**45.7**	35	13.8	27	10.6	39	15.4	37	14.6
4. No hand washing after examines or contact with the patient	73	28.7	56	22	38	15	49	19.3	38	15
5. Lack of policy and Procedures of infection control Practice	59	23.2	50	19.7	40	15.7	50	19.7	55	21.7
6. limitation of infection control material	32	12.6	43	16.9	56	22	71	28	52	20.5
7. Less commitment of health care workers to the policies and procedures	26	10.2	22	8.7	20	7.9	87	**34.3**	99	**39**
8. Overcrowding in emergency unit	51	20.1	33	13	43	16.9	60	**23.6**	67	**26.4**
9. Don't keeping an appropriate distance between health provider and anyone	106	**41.7**	33	13	18	7.1	46	18.1	51	20.1

Table 6: Percentage Distribution of Nurses' Intention to leave (n=254)

Items	No	%
Intention to leave the hospital		
Preference of nurses to continue working in the hospital		
I prefer to work here	15	5.9
I do not express any interest	119	46.9
I prefer not to work here	120	**47.2**
Period nurses prefer to stay in the hospital		
Prefer to stay longer	18	7.1
Prefer to stay for a short period of time	117	46.1
Prefer to leave as soon as possible	119	**46.9**
Return to work in the hospital after leaving for a certain period		
Yes, it is possible to return	40	15.7
Maybe	113	**44.5**
No, probably not come back	101	39.8
Intention to leave the profession		
Preference of nurses to continue working as a nurse		
Prefer to work as a nurse	58	22.8
Don't express any interest	86	33.9
Prefer not to work as a nurse	110	**43.3**
Period for which nurses prefer to work as a nurse		
Prefer to stay for a longer period	39	15.4
Prefer to stay for a short time	98	38.6
Prefer to leave as soon as possible	117	**46.1**
Return to nursing profession after leaving for a certain period		
Yes, certainly I will be back	44	17.3
Maybe	107	42.1
Certainly I will not come back	103	**40.6**

Table (7): Mean Score of Nurses Intention to Leave (n=254)

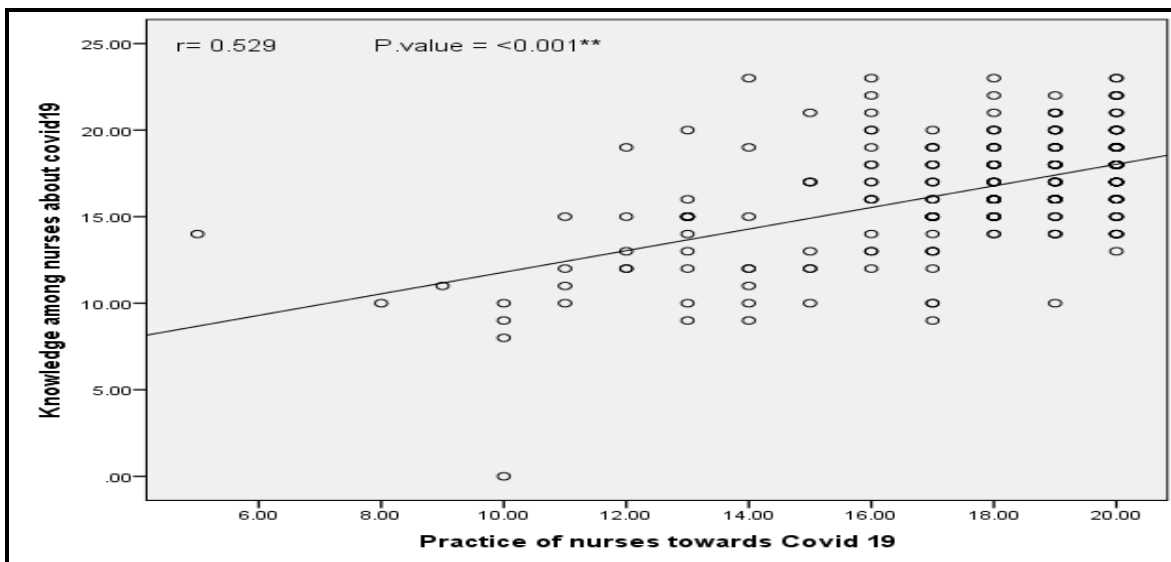|	Max Score	Mean ±SD	Range	Mean%
Intention to leave the hospital	**9**	**7.05±1.24**	4-9	78.35
Intention to leave the profession	9	6.74±1.44	3-9	74.93
Total Intention to leave	18	13.8±2.34	7-18	76.64

Figure (3): Correlation between nurses sample knowledge about covid 19 and their practice toward covid19 (n=254)
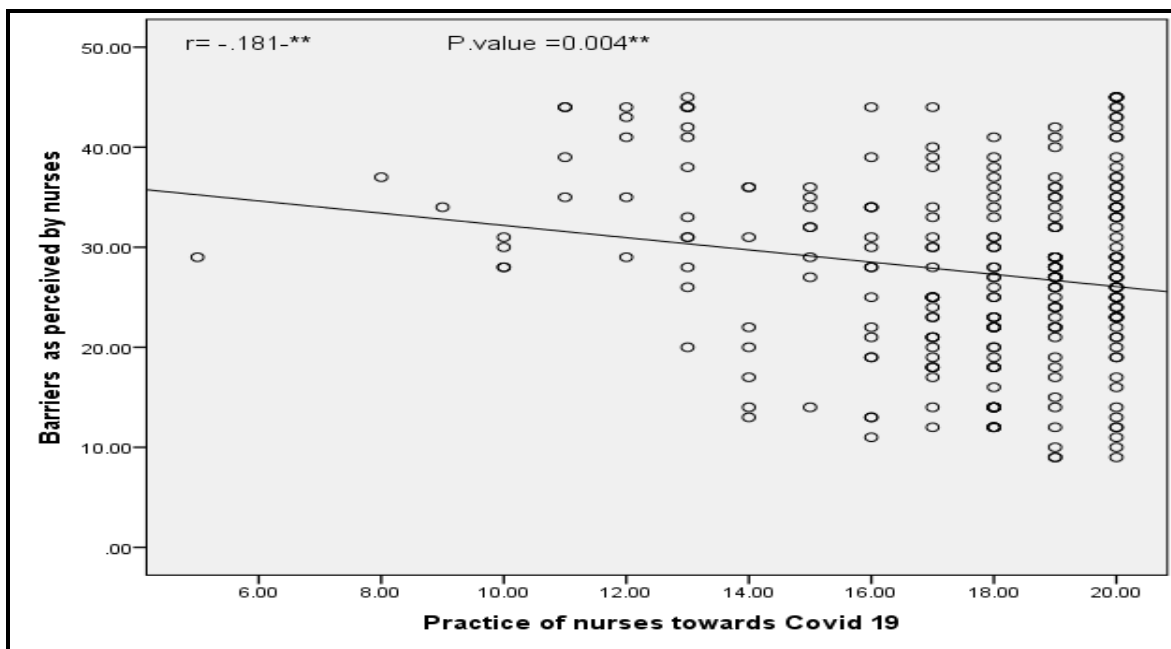
Figure (4): Correlation between nurses sample knowledge about covid 19 and their practice toward covid19 (n=254)
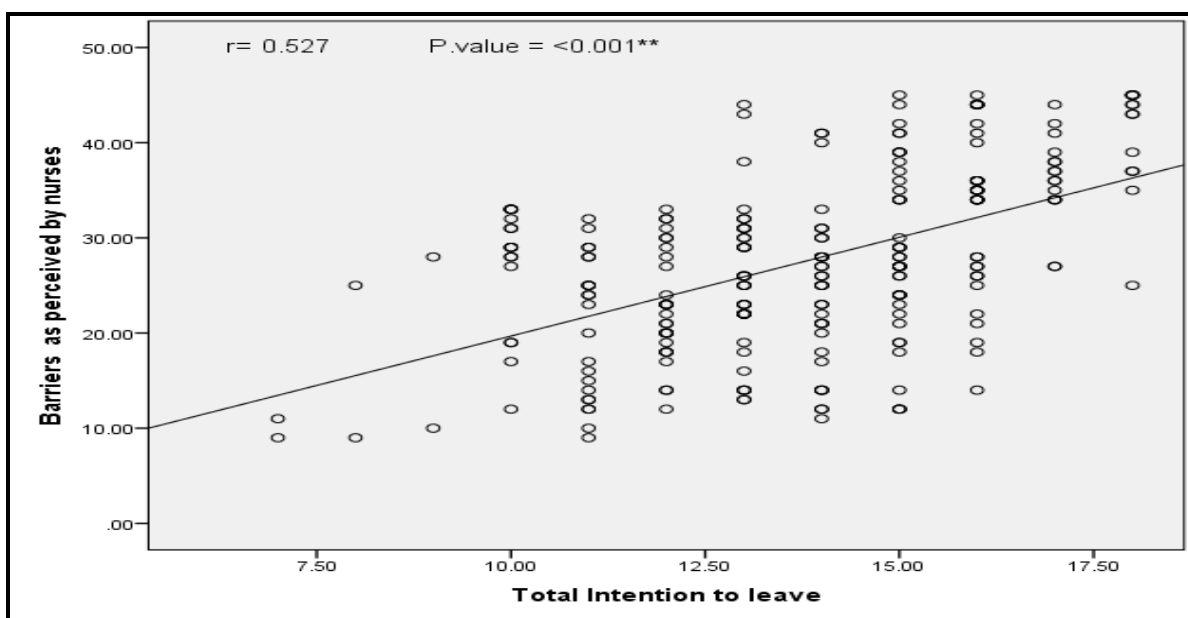

Figure (5): Correlation between barriers as perceived by nurses sample and their intention to leave (n=254)

Table (8): Relation between Knowledge about covid19, Practice towards covid19, Barriers perceived by nurses, Intention to leave and socio demographic (n = 254).

	N	Knowledge about covid19		Practice towards covid19		Barriers perceived by studied nurses		Intention to leave	
		Mean± SD	Range	Mean± SD	Range	Mean± SD	Range	Mean± SD	Range
Age group									
Less than 25 year	132	16.58±3.02	8-23	17.45±2.85	5-20	26.92±9.59	9-45	13.49±2.38	7-18
From 25-30 year	80	16.16±3.64	0-23	17.53±2.77	10-20	28.73±8.81	9-45	14.3±2.15	8-18
More than 30 year	42	16.9±2.96	9-23	17.93±2.26	11-20	27.38±8.7	10-45	13.79±2.43	8-18
F Statistics – P. value		**0.81**	**0.446**	**0.50**	**0.608**	**0.97**	**0.381**	**3.02**	**0.051**
Gender									
Male	63	17.03±2.68	10-23	17.95±2.27	11-20	28.73±9.52	9-45	14.05±2.5	7-18
Female	191	16.32±3.36	0-23	17.42±2.86	5-20	27.18±9.1	9-45	13.71±2.28	7-18
T test – P. value		**2.30**	**0.130**	**1.82**	**0.179**	**1.35**	**0.247**	**0.98**	**0.324**
Social status									
Single	108	16.72±2.89	10-23	17.73±2.74	5-20	27.04±9.62	9-45	13.65±2.46	7-18
Married	137	16.27±3.39	0-23	17.44±2.75	9-20	27.94±8.71	9-45	13.85±2.2	8-18
Divorced	9	17.33±4.18	10-23	17.11±2.52	14-20	28.11±12.21	14-45	14.78±2.86	8-18
F Statistics – P. value		**0.91**	**0.404**	**0.47**	**0.626**	**0.31**	**0.737**	**1.04**	**0.354**
Educational level									
Diploma nursing	57	16.42±3.92	0-23	17.95±2.36	10-20	27.4±8.47	10-45	13.84±2.33	8-18
Nursing Bachelor	33	17.09±3.01	9-23	17.61±2.66	11-20	26.85±9.68	9-45	14.09±2.04	10-18
Diploma nursing with specialty	13	16.69±2.87	10-21	18.31±2.02	13-20	30.85±4.93	22-39	14.15±2.73	10-17
Technical institute of nursing	151	16.38±3	8-23	17.32±2.92	5-20	27.5±9.66	9-45	13.68±2.38	7-18
F Statistics – P. value		**0.46**	**0.710**	**1.09**	**0.356**	**0.62**	**0.601**	**0.40**	**0.753**
Years of experience in nursing									
Less than 1 year	25	17.44±2.53	9-22	18.4±1.66	14-20	25.6±7.7	11-44	13.76±2.03	10-18
From 1-3 year	62	16.48±2.87	10-23	17.79±3.01	5-20	25.5±9.15	9-45	12.98±2.37	7-18
from 3-5 year	57	16.54±3.22	8-23	16.74±3	10-20	30.53±9.89	9-45	14.12±2.35	9-18
from 5-10 year	63	15.87±3.69	0-22	17.54±2.6	10-20	27.59±9.53	9-45	14.22±2.28	8-18
More than 10 years	47	16.81±3.23	9-23	17.79±2.47	10-20	27.7±8.02	10-45	13.91±2.34	8-18
F Statistics – P. value		**1.25**	**0.291**	**2.12**	**0.079**	**2.60**	**0.036***	**2.78**	**0.027***
Work setting									
Emergency	15	16.4±2.53	12-21	17.73±2.079	13-20	28.27±10.01	13-45	13.6±2.72	10-18
ICU	26	15.88±3.81	8-22	16.85±3.2	9-20	23.5±7.21	11-35	13.58±1.75	10-16
Medical	71	16.62±2.85	9-23	17.7±2.6	10-20	28.75±9.96	9-45	13.96±2.25	10-18
Obestatric	25	17.12±3.03	10-23	18.08±2.4	12-20	28±8.74	9-41	14.2±3.11	7-18
Operating	45	17.13±2.68	10-22	18.33±2.58	5-20	26.49±8.74	9-44	13.4±2.52	7-18
Pediatric	34	15.26±3.37	9-23	16.35±2.87	11-20	31.09±10.26	12-45	13.76±2.36	10-18
Surgical	38	16.68±4.01	0-23	17.47±2.83	8-20	25.68±7.34	10-41	13.95±1.94	9-17
F Statistics – P. value		**1.50**	**0.179**	**2.27**	**0.037***	**2.33**	**0.033***	**0.47**	**0.828**

Independent T-test quantitative data between the two groups
Oneway Anova test   quantitative data between the three groups or more   *statistically Significant difference at P. value <0.05*

Table (1): Demonstrated that the studied nurses were 254, more than half **(52.0 %)** of them had their age less than 25 years. while only about **(16.5 %)** of them had their age more than 25 years, more than two third (75.2 %) of them were female while, only about (24.8 %) of them were male. About **(53.9**%) of them were married, more than half (**59.4**) of them had technical Institute of nursing. about (**24.8**%) of them had from 5-10 year of experience in nursing. It was noticed that about (**28.0**%) of them working in, medical department.

Table (2): Revealed that in relation to methods of COVID-19 spread, the majority of studied nurses knew that COVID-19 is spread by droplets of affected person (with cough or expiration), surfaces touched by affected person and the disease could be transmitted from asymptomatic person **(92.5%, 89.0% and 83.1% respectively)**. In relation to symptoms of COVID-19, the majority of participants knew that symptoms; difficulty in breathing, fever, body aches and dry cough **(96.1%, 95.7%, 95.3and 92.5%, respectively).** As regard measures to prevent spread of the disease; it was observed that the majority of participants knew that among measures, proper hand wash, maintaining an appropriate distance between yourself and anyone with symptoms and avoiding touching eyes, nose and mouth cough (**98.4**%, **96.1%, and 91.7%, respectively).**

Table (3): Declared that high mean score and standard deviation of studied nurses knowledge about COVID-19 was related to symptoms (6.21±1.13) while, the low mean score was related to methods of COVID-19 spread (4.58±1.45).With mean knowledge score of 71.74%.

Figure (1): Displayed that about (79.9%) of studied nurses have had good level Knowledge while 20. 1 % have poor level Knowledge**.**

Table (4): Displayed that the majority of studied nurses had satisfactory practice concerning each item with highest practice showed among wear a mask when in contact with patients, throw the used tissue in the trash, wash your hands before and after handling each patient and use soap or hand sanitizer to wash your hands continuously (92.1%, 89.4%, 87% and 87% receptively). A lower percentage of unsatisfactory practice was observed among them in refrain from shaking hands (50.8%).

Figure (2): Demonstrated that the majority (85.4%) of the studied nurses had satisfactory level of practice while, only 14.6 had unsatisfactory level.

Table (5): Illustrated that studied nurses strongly agreed that most common barriers were; less commitment of health care workers to the policies and procedures, deficiency of knowledge about the mode of transmission of the disease COVID-19 and overcrowding in emergency unit (**39**%, **30.3%** and **26.4% respectively**).

It was observed that about **(45.7%)** and **(41.7%)** strongly disagreed that insufficient training in infection control measurements and don't keeping an appropriate distance between health providers and anyone were not any barriers.

Table (6): Revealed that concerning to intention to leave the hospital. slightly less than half **(47.2%)** of participants did not prefer continuing to work in their hospital, about **(46.9%)** of them preferred to leave as soon as possible and about (**44.5**%) of them reported that they would not return to the hospital if they left. As regard to intention to leave the profession, about (**46.1%**) of nurses reported that they prefer to leave as soon as possible, about (**43.3%**) of them prefer not to work as a nurse and (**40.6%**) of them reported that certainly they not come back.

Table (7): Explained that intention to leave the hospital more than the profession (7.05±1.24and 6.74±1.44, respectively).

Figure (3): Revealed that there were highly positive statistically significant correlation between nurses sample knowledge about covid 19 and their practice toward covid19 (r=0.529 and p. value =0.001**).

Figure (4): Indicated that there were highly negative statistically significant correlation between nurses sample practice towards covid 19 and barriers as perceived by them (r = - .181 and p. value =0.004**).

Figure (5): Indicated that there were highly positive statistically significant correlation between nurses sample intention to leave and barriers as perceived by them (r =.527 and p. value = 0.001**).

Table (8): Demonstrated that there were statistically significance difference between barriers as perceived by nurses, intention to leave and years of experience in nursing with (p value = 0.036* and 0.027*) respectively. It was observed that there were statistically significance difference between **practice towards covid19,** barriers as perceived by nurse and work setting with (p value **0.037* and 0.033*)** respectively.

Discussion

Corona virus disease (COVID-19) epidemic is a universal public health concern and the most current topic of discussion across every facet of life, especially among the HCPs and patients. This study conducted in an attempt to determine the relationship between nurses' knowledge, practice and barriers they perceived during outbreak of COVID-19 and its relation to their intention to leave. The participants of study were 254 staff nurses from medical, surgical, obstetrics & gynecological, pediatric, operations, emergency and ICUs units at Qena University Hospitals.

According to results in (table 2), in general the majority of studied nurses were aware and had good

knowledge about ways of spread, common symptoms and measures to prevent the spread of COVID-19. This may attributed to that nurses use social media to seek information about COVID-19 as a result to Egyptian Ministry of Health efforts to educate public that using different means of communication, such as, television and street ads, mobile messages and face book. This result in contrast with study finding by **Bhagvathula et al., (2020)** who found that HCPs had insufficient knowledge about COVID-19 pandemic. This difference may be due to the different sample size, nature of the studies and geographical variations of the two studies. In the same line, **Giao et al., (2020)** stated that 88.4% of participants had sufficient knowledge regarding COVID-19. Also, **Raymond et al., (2022)** mentioned that personal knowledge and awareness of the COVID-19 disease is of great importance to reduce the spread of the infection.

In relation to methods of COVID-19 spread (Table 2), the study result revealed that the majority of participants agreed that, the COVID-19 can be spread through droplets of infected person (with cough or expiration), surfaces touched by affected person and from asymptomatic person. In agreement with this finding **Rothe et al., (2022)** mentioned that COVID-19 can be transmitted via human-to-human transmission methods includes droplet inhalation through coughing and sneezing, as well as contact transmission, including nasal, and eye mucous membrane contacts and virus transmission can occur during the incubation period in asymptomatic patients.

Regarding to knowledge of symptoms of COVID-19 (Table 2), the majority of studied nurses agreed that symptoms of COVID-19 were fever, dry cough, body aches and difficulty in breathing. This in the same line with **WHO, (2020)** reported that Covid-19 patient presents with symptoms of severe pneumonia, including fatigue, dry cough, and respiratory distress with fever and cough being the most common affecting almost 70% of infected patients. Also, **Lei et al., (2020)** asserted that the main manifestations of COVID-19 are fever, dry cough, dyspnea, myalgia, fatigue, hypolymphaemia, and radiographic evidence of pneumonia.

With regard to knowledge of measures to prevent spread of the disease (Table 2)**,** the findings of the study revealed that the majority of participants agreed that measures where; proper hand wash, maintaining an appropriate distance between yourself and anyone with symptoms and avoiding touching eyes, nose and mouth. This finding consistent with **chang et al., (2020)** found that the majority of participants recognized hospital overcrowding, poor hand hygiene and mask use, lack of knowledge about the mode of transmission, a lack of policies and procedures,

contributed to the risk of spread. Also, **Wu & McGoogan, (2019)** asserted that transmission of the disease among nurses was associated with overcrowding, absence of isolation room facilities, and environmental contamination. In addition, **Hasab Allah et al., (2022)** found that more than two third of the study subject aware that COVID 19 can be prevented by washing hands for 20 seconds.

The present study indicated that the highest mean scores of studied nurses knowledge about OVID-19 were related to symptoms of COVID-19 while, low mean scores was related to methods of COVID-19 spread (table 3). This may be due to that nurses had good knowledge about symptoms of COVID-19 from the nature of their work in the hospital and direct contact with patients with COVID-19. In agreement **Nemati et al., (2020)** found that the majority of participants had good knowledge regarding the symptoms, transmission and preventive measures of COVID-19. Also, **Ogolodom. et al., (2020)** reported that the greater percent of participants aware and high knowledgeable about COVID-19 symptoms.

According to the present study findings more than two thirds of studied nurses had good level of knowledge regarding methods of spread, common symptoms and measures to prevent spread of the COVID-19 (figure 1). Our study findings supports previous finding of **Bahrey et al., (2020)** they concluded that more than two thirds of studied nurses had good knowledge and favorable attitude regarding Coronavirus outbreaks. In the same line finding of **Ghaderi, et.al, (2021)** found that more than half of studied subject had adequate knowledge about COVID-19.

As regarding to practice of nurses towards COVID-19 (table 4), the study results showed that the majority of participants had satisfactory practice regarding each item with highest practice presented among studied nurses towards wear a mask when in contact with patients (**92.1%**) while, unsatisfactory practice was observed among studied nurses in refrain from shaking hands (50.8%). In agreement, **Feng, (2020)** found that HCPs have good practice in following guidelines recommendations especially wearing of face mask as it is evident that use of personal protective equipment. Also, **Saqlain, et al. (2020)** found that majority of HCPs have good practice in following precautionary measures.

Our study results declared that the majority of participants had satisfactory level of practice (figure 2)**.** These findings are consistent with the results of **Zhong, (2020)** who found that majority of participants were knowledgeable, and followed appropriate practices to prevent the spread of COVID- 19. Also, **Abdelhafiz et al. (2020)** concluded that Egyptians participants had good

knowledge about COVID-19, and a positive attitude towards using protective measures.

Current study findings revealed that the majority of studied nurses perceived that less commitment of health care workers (HCWs,) to the policies and procedures, deficiency of knowledge about the mode of transmission of the COVID-19, overcrowding in emergency unit and limitation of infection control material are the major barriers in infection control practice (table 5). This due to that most people, comprising HCWs, have miss conception about the disease and the contagiousness, In agreement **Mersha et al., (2021)** found that negligence and unawareness among HCWs were the most risked factor in the practice of preventive measures for the COVID-19. Also, **Omrani & Shalhoub, (2015)** mentioned that lack of knowledge and misunderstanding among HCPs leads to delayed diagnosis, spread of disease and poor infection control practice. In the same context, **Saqlain, et al. (2020)** concluded that lack of authentic sources of infection control affects knowledge and reflected in attitude and practice. In addition, **Schutz & Shattell (2020)** stated that personal protective equipment were the most prevalent resource required for nurses and other healthcare personnel, and nurses became fearful of the potential deficiency of masks, gowns, shoe covers, and head covering.

In relation to intention to leave results of the study pointed that, the majority of studied nurses prefer to leave the hospital and the profession as soon as possible and the total mean score of intention to leave was high among studied nurses, which means that nurses had a high level of intention to leave the hospital and the profession. The mean score of intention to leave the hospital more than the profession, meaning that studied nurses' intention to leave the hospital more than the profession (Table 6, 7). This my due to nurses experienced increased workload and great stress, putting them at risk to leave their jobs and they fear due to their job environment danger, and they worried about taking the virus home to family members. This finding was agreement with **Tummers et al., (2013),** who found that studied nurses had a high intention to leave nursing profession. In the same line, **Salaree et al., (2021)** found that during the outbreak of infectious diseases, this outbreak affects perception, and ability to make workplace decisions, productivity, reduced efficiency, increased burnout, turnover, and ultimately the tendency to leave the profession in nurses**.** In addition, **Ariapooran & Amirimanesh, (2021)** found that the tendency to leave service during the COVID-19 epidemic was reported to be higher in nurses. In contrast findings of **Mohamed & Mohamed (2013),** that the mean score of nurses'

retention in their units and the profession was high, meaning that nurses had higher willingness to stay in their units, hospitals, and the profession in general.

Results in (figure 3) indicated that there was a highly positive statistically significant correlation between studied nurses' knowledge about covid 19 and their practice toward covid19. This means that nurses with good knowledge reflected by good practices. In agreement, with **Hasab et al., (2022)** concluded that a strong positive statistically significant correlation between knowledge, attitudes and practices among participants. Also, **McEachan & Taylor (2016)** stated that knowledge of disease can influence nurses' attitudes and practices and improper attitudes and practices directly increase the danger of infection. In addition, **Ilesanmi & Alele, (2016)** reported that lack of knowledge about the COVID-19 disease would be a facilitating component in the increase of cases infected by the virus. Knowledge of the infection process and its precautions would change behavioral pattern and strengthen HCWs willingness to perform their duties.

Results revealed that there were highly negative statistically significant correlation between nurses' practice towards covid 19 and barriers as perceived by them (figure 4). This means that practice decrease as barriers increase. Similar finding was found by **Mersha et al., (2022)** that barriers such as absence of hand sanitizer, shortage of alcohol, facemasks, affects the HCPs practice of preventive measures for the COVID-19 pandemic. Our results confirm what was mentioned by **Al-Ashwal et al., (2020)** several barriers that HCWs met in carrying infection prevention control practices, including poor hand hygiene compliance, insufficient infection prevention control training, overcrowding, and shortage staff in health care facilities.

Moreover, the study findings declared that there were highly positive statistically significant correlation between studied nurses' intention to leave and barriers as perceived by them (figure 5). This indicated that nurses who had more barriers at their work had higher consideration to leaving nursing. These findings was congruent with **Liang et al., (2020)** showed that the barriers such as, lack of personal protective equipment causes nurses to spread COVID-19 and distance from the workplace and ultimately intention to leave the profession. In the same line, **Chen et al., (2020)** mentioned hat barriers such as; lack of personal protective equipment and inadequate staffing within hospitals directly impacted RNs' intent to leave.

The findings of the present study revealed that there were positive statistically significant relation between barriers as perceived by studied nurses during covid 19 and years of experience in nursing whereas nurses

who had 3 to 5 years of experiences in nursing were perceived barriers more (table 8). This might be due to a higher work assignment for younger nurses and a greater outbreak of COVID-19. Which was consistent with **Razu et al., (2021)** mentioned that most barriers met nurses during Covis19 were workload and it affected younger nurses more. Also, there were positive statistically significant relation between intention to leave and years of experience in nursing and studied nurses who had 5 to 10 years experiences in nursing were had more mean scores (table 8). This may explained by the fact that nurses perceived threat to their own health or to the health of their families and may indicated to the risk of losing experienced nurses in the current pandemic. In the same line **Nashwan et al., (2021)** found that nurses who had five to ten years of work experience are more at risk of intention to leave. In contrast, **Lavoie et al., (2021)** found that less experienced nurses are more prone to turnover intention.

In addition the results of our study indicated that there were positive statistically significant relations between practice towards Covid 19 and work settings and studied nurses who working in operating unit had more mean scores (table 8). In agreement with **Arsat et al., (2022)** stated that work setting with adequate support, which is consistent with the professional structure, empowers nurses to practice to the full scope of their knowledge, competencies and skills in patient care and such setting can determine the quality and safety of patient care. Also, **Leone et al., (2015)** mentioned that a quality practice setting fosters professional development and promotes the delivery of nursing quality care asserted significant impact of the nursing practice environment on nurses' job outcomes

Moreover the results pointed that there were positive statistically significant relation between barriers as perceived by studied nurses and work settings and (table 8). In contrast, **Sakr et al., (2021)** concluded that overcrowding in hospitals increased clinical workloads and insufficient infection control supplies were all shown as main barriers to controlling the SARS-CoV-2 pandemic.

Lastly our study results don't showed any statistically significant relation between knowledge about covid19, practice towards covid19, barriers perceived by nurses, intention to leave and age, gender, educational level (table 8). Which was consistent with **Tolksdorf et al., (2022)** found age does not seem to be an associated factor of nurses' turnover intention in the COVID-19 pandemic and male nurses reported lower levels of turnover intention than female. In addition, **Chan et al., (2021)** found that male nurses are more likely to be prone to turnover intention in some countries outside of pandemic situations. In

contrast, **Sakr et al., (2021)** conducted study about knowledge, practice, and perception of barriers regarding COVID-19 among Egyptian HCWs and found that knowledge has been shown to be significantly correlated with age groups above 40.

Conclusion

- The majority of studied nurses had good level of knowledge of methods of COVID-19 spread, symptoms and measures to prevent spread, they had satisfactory level of practice towards COVID-19 and they had a high level of intention to leave the hospital and the profession.
- The most common barriers that affect nurses practice during COVID-19 outbreak were; less commitment of HCWs to the policies and procedures, deficiency of knowledge about the mode of transmission of the COVID-19 and overcrowding in emergency unit.
- Nurses' knowledge about covid19 was positively linked to their practice towards covid19 while, nurse's practice negatively linked to barriers as perceived by them.
- Intention to leave was positively linked to barriers as perceived by nurses.
- Years of experience in nursing and work setting were factors linked to, barriers as perceived by nurses and they intention to leave. While, age, gender and educational level did not significantly associated with knowledge and practice towards covid19, barriers perceived by nurses and intention to leave.

Recommendations

1. Nursing managers at Qena University Hospitals should be providing comprehensive training program for nurses during and after the outbreak to ensure their knowledge and practice.
2. Nursing managers must be understand the causes of intention to leave, monitor sources of job satisfaction provided to nurses to reduce their intention to leave.
3. Nursing educators must providing nurses with further education and training them, especially in the use of personal protective equipment to enhance their knowledge and practice of using this equipment.
4. Policy makers will be develop strategies for adequate infection control measures as well as provision of personal insurance policies will increase the nurses' readiness to efficiently perform their duties in relation to COVID-19 pandemic.
5. Health care authorities should be develop a long-term policies and strategies to achieve sustainable healthcare systems with knowledgeable and

skilled nurses in infection management and advanced human resources planning are crucial for respond properly to any future health emergencies.

References

- **Abdelhafiz A**., **Mohammed Z**., **Ibrahim M**., **Ziady H**., **Alorabi M**., **Ayyad6 M**., **& Sultan E**., **(2020):** Knowledge, Perceptions, and Attitude of Egyptians Towards the Novel Coronavirus Disease (COVID-19). Springer Science+Business Media, LLC, Part of Springer Nature 2020. Journal of Community Health https://doi.org/10.1007/s10900-020-00827-7

- **Al-Ashwal F., Kubas M., Zawiah M., Bitar A., & Saeed R. (2020):** Health Care Workers' Knowledge, Preparedness, Counseling Practices, and Perceived Barriers to Confront COVID-19: A cross-sectional Study from a War-torn Country, Yemen. PloS one 2020; 15: e0243962.

- **Arsat N., Chua B., Wider W. & Dasan N. (2022):** The Impact of Working Environment on Nurses' Caring Behavior in Sabah, Malaysia. Front. Public Health 10:858144. doi: 10.3389/fpubh.2022.858144

- **Ariapooran S., & Amirimanesh M. (2021):** Turnover Intention of Nurses in the Outbreak of COVID-19: The Role of Compassion Fatigue, Compassion Satisfaction and Burnout. Q J Nurs. Manage. (2021) 10: Pp.80–93. Available online at: http://ijnv.ir/article-1-811-en.html.

- **Ayalew E., & Workineh Y. (2020):** Nurses' Intention to Leave their Job and Associated Factors in Bahir Dar, Amhara. BMC Nursing (2020), 19: P.46. https://doi.org/10.1186/s12912-020-00439-5.

- **Bahrey T., Gebrewahd G., & Demoz G. (2020):** Knowledge, Attitude, Practice and Psychological Response toward COVID-19 among Nurses during the COVID-19 Outbreak in Northern Ethiopia. Research Square.

- **Bhagavathula A., Aldhaleei W., Rahmani J., Mahabadi M., & Bandari D. (2020):** Novel coronavirus (COVID-19) knowledge and perceptions: a survey on healthcare workers. Med Rxiv 2020. https://doi.org/10.1101/2020.03.09.20033381.

- **Cascella M., Rajnik M., & Cuomo A. (2020):** Features, Evaluation and Treatment Coronavirus (COVID-19), in Stat Pearls. Treasure Island, FL: Stat Pearls Publishing LLC.

- **CDC (2020):** Interim Infection Prevention and Control Recommendations for Patients with Suspected Coronavirus Disease 2019 (COVID-19) in Healthcare Settings. In.; 2020.

- **Chang J., Yuan S., Kok K., Chu H., & Yang J.** (2020): A familial Cluster of Pneumonia Associated with the 2019 Novel Coronavirus Indicating Person-to-Person Transmission: A study of a Family Cluster. Lancet. (2020) 395:514–23. doi: 10.1016/S0140-6736(20)30154-9.

- **Chen, S., Lai, Y., & Tsay, S. (2020):** Nursing **perspectives** on the impacts of COVID-19. The Journal of Nursing Research, 28 (3), 1-5. https://doi. 10.1097/jnr.0000000000000389

- **Feng S., Shen C., Xia N., Song W., Fan M., & Cowling B. (2020):** Rational Use **of** Face Masks in the COVID-19 Pandemic. Lancet Respire Med 2020; 2: 2019–20. https://doi.org/10.1016/s2213-2600(20)30134-x.

- **Ghaderi E., Mahmoodi, H., Saqqezi, P., Ghanei Gheshlagh, R., Moradi, G., Shokri, A., & Ahmadi, A. (2021):** Knowledge, Attitudes, Practices and Fear of COVID-19 among Iranians: A quick Online Survey. Health & Social Care in the Community.

- G**iao H., Han N., Khanh T., Ngan V., & Tam V. (2021):** Knowledge and Attitude toward COVID-19 among Healthcare Workers at District 2 Hospital, Ho Chi Minh City. Asian Pac J Trop Med 2020; 13: Pp.1-6.

- **Guo, Y., Cao Q., & Hong S. (2020):** The Origin, Transmission and Clinical Therapies on Coronavirus Disease 2019 (COVID-19) Outbreak-An update on the Status. Military Medical Research, 7 (1), P.11.

- **Hasab Allah M., Aminn., & kamel N. (2022):** Knowledge, Attitudes and Practice Regarding COVID-19 amongst Nursing Students at Minia University. International Egyptian Journal of Nursing Sciences and Research (IEJNSR).

- Huang **C., Wang Y., & Li, X. (2020):** Clinical features of patients infected with 2019 novel coronavirus in Wuhan China. The Lancet, 395(10223), 497–506.

- **ICN, (2020): calls** for data on healthcare worker infection rates and deaths. https://www.icn.ch/news/icncalls-data-healthcare-worker-infection-rates-and-deaths

- **Ilesanmi O., & Alele F. (2016):** Knowledge, Attitude and Perception of Ebola Virus Disease among Secondary School Students in Ondo State, Nigeria, October, 2016. PLoS Curr.

- **Lavoie M., Gelinas C., Aube T., Tchouaket E., Tremblay D, & Gagnon M.(2021):** Influence of Caring for COVID-19 Patients on Nurse's Turnover, Work Satisfaction and Quality of Care. J Nurs Manag. 2021;30 (1):33–43. https://doi.org/10.1111/jonm.13462.

- **Lei S., Jiang F., Su W., Chen C., Chen J., & Mei W. (2020):** Clinical Characteristics and **Outcomes** of Patients Undergoing Surgeries during the Incubation Period of COVID-19 Infection. E

Clinical Medicine. 2020; 000: 100331. https://doi.org/10.1016/j.eclinm.2020.100331.

- **Li, J. Y., You, Z., & Wang, Q., (2020).** The Epidemic of **2019**-Novel-Coronavirus (2019-nCoV) Pneumonia and Insights for Emerging Infectious Diseases in the Future. Microbes and Infection, 22(2), Pp.80–85.

- **Liang Y., Wu K., Zhou Y., Huang X., Zhou Y., & Liu Z. (2020): Mental** Health in Frontline Medical Workers during the 2019 Novel Coronavirus Disease Epidemic in China: a Comparison with the General Population. Int. J. Environ Res Public Health. (2020) Pp. 17:6550. doi: 10.3390/ijerph17186550.

- **Leone C., Bruyneel L., Anderson J., Murrells T., Dussault G., de Jesus É. & Rafferty A. (2015):** Work Environment Issues and Intention-to-Leave in Portuguese Nurses: A cross-Sectional Study. Health Policy, 119 (12), Pp. 1584-1592**.**

- **Lu H., Stratton C., & Tang Y. (2020):** Outbreak of Pneumonia of Unknown Etiology in Wuhan, China: the Mystery and the Miracle. J Med Virol. (2020) Pp.92:401–2. doi: 10.1002/jmv.25678.

- **McEachan R., Taylor N., Harrison R., Lawton R., & Gardner P. (2016):** Conner M. Meta-Analysis of the Reasoned Action Approach (RAA) to Understanding Health Behaviors. Ann Behav Med. 2016; 50 (4): Pp.592–612. doi: 10.1007/s12160-016-9798-4.

- **Medical Syndicate** Support for **HCPs** to combat the pandemic, Egyptian Medical Syndicate Official Page| Facebook. (n.d.). Retrieved December 26, 2021, from https://www.facebook.com/Egyptian.Medical.Syndicate/photos/a.318736581481090/2991957567492298/

- **Mersha A., Shibiru1S., GirmaM., Ayele G., BanteA., KassaM., Abebe S., & Shewangizaw M. (2021):** Perceived Barriers to the Practice of Preventive mMeasures for COVID-19 Pandemic among Health Professionals in Public Health Facilities of the Gamo zone, Southern Ethiopia: a phenomenological study. BMC Public Health.

- **Mohamed N, & Mohamed SS (2013):** Impact of Job Demand and Control on Nurses Intention to Leave Obstetrics and Gynecology Department. Life Sci J 10:223–229.new Nurses, University of Toronto, Unpublished dissertation.

- **Nashwan A., Abujaber A., Villar R., Nazarene A., and Al-Jabry M., & Fradelos E. (2021):** Comparing the Impact of COVID-19 on Nurses' Turnover Intentions before and during the Pandemic in Qatar. J Pers Med. 2021; 11 (6). https://doi.org/10.3390/jpm11060456

- **Nemati M., Ebrahimi B., & Nemati F. (2020): Assessment** of Iranian nurses' knowledge and

anxiety toward COVID-19 during the current outbreak in Iran. Arch Clin Infect Dis 2020. https://doi.org/10.5812/ archcid.102848

- **Ogolodom M., Mbaba A., Alazigha N., Erondu O., & Egbe N. (2020):** Knowledge, Attitudes and Fears of HealthCare Workers towards the Corona Virus Disease (COVID-19) Pandemic in South-South, Nigeria. Health Sci. J. Sp. Iss 1: 002.

- **Omrani A., & Shalhoub S., (2015):** Middle East Respiratory Syndrome Coronavirus (MERS-CoV): What Lessons Can We Learn? J Hosp. Infect 2015; 91: Pp. 188–96.

- **Razu S., Yasmin T., Arif T., Islam M., Islam S., Gesesew H., & Ward P. (2021):** Challenges Faced by Healthcare Professionals **During** the COVID-19 Pandemic: A Qualitative Inquiry From Bangladesh. Front. Public Health 9:647315. doi: 10.3389/fpubh.2021.647315

- **Raymond T., Ellinga H., Behnkea N., Tsekac J., Kafanikhaled H., Mofoloc I., Hoffmane I., & Cronk R (2022):** A qualitative Study of Barriers and Facilitators to Adequate Environmental Health Conditions and Infection Control for Healthcare Workers in Malawi. H2Open Journal Vol 5, No 1: P.5

- **Rothe C., Schunk M., Sothmann P., Bretzel G., & Froeschl G., (2022):** Transmission of 2019-nCoV Infection from an Asymptomatic Contact in Germany. N Engl J Med 382: Pp. 970-971.

- **Sakr M., Sharfeldin A., Sakr A., & Kasemy Z. (2021):** Knowledge, Practice, and Perception of Barriers Regarding COVID-19 among Egyptian Health care Workers. Egyptian Journal of Medical Microbiology Volume 30 / No.3 / July 2021 163-171 Online ISSN: 2537-0979

- **Salaree M., Rahmati F., & Parandeh A. (2021):** Comparison of sleep Quality and its Related Factors in Nurses before and at the Same Time with the COVID-19 Epidemic. J Mil Med. (2021) 23: Pp.395–403. doi: 10.30491/jmm.23.5.395

- **Saqlain M., Mashhood M. , Tahir A. , Ahmed Z. , Naz s. , Gulzar A. , Rehman s. , & Munir M. (2020):** Knowledge, Attitude **and** Practice among Healthcare Professionals Regarding COVID-19: A cross-sectional survey from Pakistan doi: https://doi.org/10.1101/2020.04.13.20063198 medRxiv preprint Sciences, 16 (10), 1745–1752.

- **Schutz, V., & Shattell, M. (2020):** Impact of COVID-19; What Does it Mean for Nurses and Health Systems? Journal of Psychosocial Nursing, 58(8), 2-3. https://doi:10.3928/02793695-20200707-01

- **Tolksdorf H., Tischler U., & Heinrichs k. (2022):** Correlates of Turnover Intention among Nursing Staff in the COVID-19 Pandemic: A systematic Review. Research square.

- **Tummers L., Groeneveld S., & Lankhaar M. (2013):** Why Do Nurses Intend to Leave their Organization? A large Scale Analysis in Long Term Care. J Adv. Nurs. 69: Pp. 2826–2838.

- **Wang D., Hu B., Zhu F., Liu X., Zhang J., Xiang H., & Cheng Z. (2020):** Clinical Characteristics of 138 Hospitalized Patients with 2019 Novel Coronavirus–Infected Pneumonia in Wuhan, China. Jama 2020, 323 (11): Pp.1061-1069.

- **WHO Coronavirus disease 2019 (COVID-19) Situation Report - 51. Geneva: WHO. (2020**). Available online at: www.who.int/ emergencies/diseases/novel-coronavirus-2019/situation-reports (accessed March 18, 2020).

- **Wu Z., & McGoogan J. (2020):** Characteristics of and Important Lessons from the Coronavirus Disease 2019 (COVID-19) Outbreak in China: Summary of a Report of 72 314 Cases from the Chinese Center for Disease Control and Prevention [published online ahead of print, 2020 Feb 24]. JAMA. 2020;10.1001/jama.2020.2648. doi:10.1001/jama.2020.2648.

- **Zhong, B., Luo, W., & Li, H., (2020):** Knowledge, Attitudes, and Practices towards COVID-19 among **Chinese** Residents during the Rapid Rise Period of the COVID-19 Outbreak: A quick Online Cross-Sectional Survey. International Journal of Biological Sciences, 16 (10), 1745–1752.

- **Zhu N., Zhang D., Wang W., Li X., Yang B., & Song J. (2020):** A novel **Coronavirus** from Patients with Pneumonia in China, 2019. N Engl. J Med. (2020); 382: Pp. 727– 3. doi: 10.1056/NEJMoa2001017