

Knowledge, Attitude, Practice Regarding COVID-19 and Perceived Barriers to Infection Control among Family Health Center and Hospital Nurses in Alexandria

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Abstract:

In the fight against the unique and potentially lethal Coronavirus 2019 (COVID-19) pandemic, nurses are at the forefront of the medical community. Inadequate information and inappropriate attitudes among nurses can directly impact behaviors, resulting in poor infection control and disease spread. **Aim of the research:** This research aimed to compare the knowledge, attitude, and practice toward COVID-19 and the observed difficulties toward infection control between nurses in Family Health Center and hospitals. **Setting:** The research was managed at Family Health Center, El-Me University Hospital, and El-Shatby University Hospital for Maternity and Child in Alexandria. **Multistage sample:** was used to choose the Family Health Center, 400 nurses agreed to contribute to the research from the above-selected settings. **Subjects and Methods:** A cross-sectional comparative research design technique was used in this research. Nurses' knowledge, attitude, and practice about COVID-19 disease were evaluated using a self-administered validated questionnaire. **Results:** The studied subjects in both groups (44%, 56% respectively) explained that social media was the main source of information regarding COVID-19. Majority of the studied subjects in Family Health Center had poor knowledge, practice, and attitude (66%, 58%, 52% respectively) while most of the studied subjects in hospitals had good knowledge, practice and attitude regarding COVID-19 (100%, 86%, 90% respectively), with highly statistically significant differences between the two groups ($P < 0.001$). The studied subjects in both groups perceived a number of barriers (68%, 16% respectively) to infection control practice toward COVID-19. **Conclusion:** Hospital nurses have better knowledge, practice, and attitude regarding COVID-19 related to those of Family Health Centers. **Recommendation:** Institute a comprehensive training program targeting Family Health Center nurses to enhance precautionary and preventive measures concerning COVID-19.

Keywords: Knowledge, Attitude, Practice, Perceived Barriers, Family Health Center, Hospital Nurses, COVID-19 & Nurses.

Introduction

Coronaviruses have been a significant hazard in recent years and cause human morbidity. On the 31st of December 2019, cases of unknown cause of pneumonia with the severe acute respiratory syndrome were noted in Wuhan, China. The virus reached Egypt in February 2020, and soon after, the WHO declared the COVID-19 as a global pandemic on March 11, 2020 (Carlos et al., 2020). A large group of viruses like Coronaviruses is widespread in the community. Evidence showed that it is transmitted through birds, and animals vulnerable to infection and transmission are particularly human beings (Dewald et al., 2019). Eighty percent of individuals with minor symptoms do not necessitate medical care. The COVID-19 virus incubation period of 2–14 days. COVID-19 has not yet been recommended for a particular antiviral therapy. Numerous vaccinations have been created and are widely administered to health care professionals and the general population (Maurya et al., 2021).

As nurses are always on the frontline in facing the emerging infectious disease outbreaks, they are subjected to significant risks e.g.; Depression, dishonor, and exhaustion. As being in direct contact with COVID-19 patients, nurses played an essential role in transmission chain. They also play an essential role in determining the causes, symptoms, and management of emerging infectious diseases. It is imperative to assess nurses' knowledge, attitude, and practice concerning COVID-19 to help prevent the spread of infection in intra-hospitals and Family Health Centers. Nurses have become the major vector for virus transmission since they are in close touch with affected persons. (Gan et al., 2021).

Family Health Centers are owned and operated by the Ministry of Health. They provide health care services to insured and non-insured clients and their children. These services include motherhood care, family planning, laboratory analyses, child immunizations, dental care, first-aid, and pharmaceutical services. In addition to specific services for COVID-19 as diagnosis and treatment of mild cases, severe cases

are referred to different hospitals and vaccinated. There are a lack of literature on the COVID-19 knowledge, attitudes, and practices (KAPs) among Family Health Center nurses. A study on Asian health care workers confirmed that 61% of medical students possessed inadequate awareness of COVID-19 transmission (Bhagavathula et al., 2020).

Literature reveals that a lack of awareness and misconceptions among nurses leads to delayed illness identification and an increase in the disease's transmission, resulting in inadequate infection control procedures. (Hoe et al., 2020). The germs transmission between nurses is influenced by hand disinfection, mask use, overcrowding, the absence of separate isolation rooms, and in addition to Nurses' insufficient knowledge of infection control techniques (Zunyou & Googan, 2020). Understanding nurses' knowledge, attitude, and practices (KAPs) facilitate identifying information gaps linked to the condition and the development of behavioral change initiatives. (McEachan et al., 2016) research in Uganda indicated that just 69% of hospital based HCWs had an adequate understanding of the illness, although a greater number (74 percent) reported adopting effective preventative methods (Olum, 2020). Another research in Pakistan revealed good practice by 89% and higher knowledge by 93% among HCW concerning COVID-19 (Saqlain et al., 2020).

Egypt is a populous nation in the Arabian world, Africa, and the Middle East. Egypt is one of the most populated nations in Africa, with approximately 100 million people. (The Central Agency for Public Mobilization and Statistics Website, 2020). A big population can relate to an increased risk of disease transmission and death, particularly among adults and persons with chronic conditions. Efforts have been made throughout the world to stop the virus from spreading. These initiatives involve political efforts by governments as well as individual attitudes and behaviors, which depend on public understanding of the disease. Between January 3, 2020, and June 1, 2021, 262,650 cases and over 15,096 fatalities were confirmed in Egypt.

In the same way, 51.7% of HCW were tested positive for COVID-19, according to the International Council of Nurses (ICN). Seven studies revealed an overall prevalence of comorbidities of 18.4% (Egyptian, 2021).

Hand sanitization has been a concern for the past 150 years; Healthcare workers should be concerned about the hand regular sanitization in the workplace. Health providers must be responsible for good hand hygiene, and hospitals must make efforts to prevent disease transmission (Abdulsalam et al., 2015).

According to community and hospital infection control association, head nurse considered to be the

backbone in health care and play a vital role in any medical setting including hospital and community setting. Head nurse should have updated information and practices about infection control measures regarding source, transmission, symptoms and preventive measures. She is the ultimate person responsible for coordinating training programs for both hospital and community nurses to have new and recent knowledge and skills. These activities will provide protection of HCWs and prevention of intra-hospital transmission of COVID-19 and this is an important part of epidemic response (World Health Organization, 2020).

Significance of the Study

Family Health Centers and hospitals are unique, diverse systems facing several complicated problems. Disease knowledge may affect the attitudes and practices of nurses, and wrong attitudes and practices raise the possibility of infection directly. This study is deemed significant in classifying the gaps in nurses' awareness and assessment (KAP) of COVID-19 and observed difficulties in controlling the infection. The findings can serve as a basis for aimed enhancement measures and reference for successive applicable training or policy-making to enhance clinical nursing traits and achieve high quality of service and a safe environment. This study aimed to compare the knowledge, attitude, practice, and perceived barriers to COVID19 infection control between nurses in FHCs and hospitals.

Aim of the study to:

Compare the knowledge, attitude, and practice towards COVID-19 and the perceived barriers to infection control among nurses in Family Health Centers and hospitals.

This aim will be fulfilled through the following objectives:

1. Determine knowledge level towards COVID-19 among nurses in Family Health Centers and hospitals.
2. Assess attitude towards COVID-19 and their practice among nurses in Family Health Centers and hospitals.
3. Assess the perceived barriers to infection control of COVID-19 between nurses in family health centers and hospitals.

Research Questions

1. What are the knowledge, attitude, and practice scores for COVID-19 between nurses in Family Health Centers and hospitals?
2. What are the perceived barriers to infection control of COVID-19 between nurses in Family Health Centers and hospitals?

3. Is there a significant difference in the knowledge, attitude, and practice level concerning COVID-19 between nurses in FHCs and hospitals?

Subjects and Methods

Study design:

A cross sectional comparative research design technique was used in this study.

Study setting:

This study was managed in two settings:

1. Family Health Centers in Alexandria.
2. El-Merry Main University Hospital and El-Shatby University Hospital for Maternity and Child in Alexandria.

Subjects:

A multistage sampling method was utilized to identify the family settings: Alexandria Governorate was divided into eight health zones, namely El-Montazah, composed of (12 centers), East (12 centers), West (9 centers), Middle (6 centers), El-Gomrok (6 centers), El-Agamy (9 centers), El-America (11 centers), and Borg El-Arab (8 centers). Eight of the biggest family health centers were randomly selected from each zone to carry out this study, namely El-Mandara, Baccos, Alkabbar, El-Manshia, Al-Gomrok, El-Agamy, Al-Amria, and Borg El Arab family health center sequentially. All nurses working in the selected Family Health Centers were entered in the research with a total of 200. In congruence to the number of nurses in family health centers, 200 nurses who agreed to contribute to the study were also selected from El-Merry main university hospital and El-Shatby university hospital for maternity and child in Alexandria.

Tools of data collection: Knowledge, attitude, practice and perceived barriers questionnaire about the COVID 19 was adopted from (Saqlain et al., 2020).

The study's data was collected using four different tools

Tool I: The researchers created a self-administered questionnaire based on a survey of the relevant literature. It is divided into two parts

Part A: To gather information on the nurse's traits. According to the researchers, they are as follows: gender, age, experience, and education. As well as questions about having received training on COVID-19 infection control and prevention concerning, do you have infection prevention and control guidelines in the department regarding COVID-19, do you think you are in danger of infection with COVID-19, and source of information about COVID-19.

Part B: Self-administered questionnaire to evaluate nurses' knowledge about COVID-19. The researchers adopted it from (Saqlain et al., 2020). The following sections of the questionnaire contained closed-ended

questions.: COVID-19 is a virus, corona virus infections can be lethal, and the incubation period for the virus is between 2 and 14 days. In addition, antibiotics are the first-line treatment, fever, cough, and shortness of breath are covid-19 symptoms, vaccination against corona virus disease is commercially available, polymerase chain reaction (PCR) can be used to diagnose COVID-19, and people with comorbidities such as diabetes and hypertension are more likely to be infected, and COVID-19 spreads through close contact such as caring for and/or living with infected individuals. This part also includes washing hands strongly with soap and water for 20 seconds aids in prevention/transmission of disease, COVID -19 patients show severe acute respiratory symptoms, the plant is considered as the main source of the virus, special attention must be taken if there is a person with COVID-19 symptoms travelled from an infected area, and the influenza vaccine also protects COVID-19. Cronbach's Alpha confirmed the 0.855 validity of the questionnaire

Total knowledge scoring system:

Knowledge items were performed by giving grade of one to the correct answer and grade of zero to the incorrect one. The average score for each knowledge area was calculated by adding the item scores and dividing by the number of items. The total number of knowledge points was 14. These scores were transformed into percentage scores. If the proportion was at least 60 percent, knowledge was supposed to be good.

Tool II: Nurses' self-report practice about COVID-19. Adopted from (Saqlain et al., 2020), it includes six steps, do you wash your hands frequently with soap or hand sanitizer, do you cover your nose and mouth with a tissue during sneezing or coughing, do you throw the used tissue in the trash, do you avoid touching your eyes, nose or mouth as far as you can, do you use face mask in crowds, do you inform your patient about the disease.

Total practice scoring system:

For self-report practice items, each item was answerable by 'yes' (1 point), 'no' (0 points). For each practice area, the item scores and their total were summed up and divided by the number of items, giving an average score for the part. The total practice points reached (6) points. These scores were converted to percent scores. Practice was considered done if the percentage was 60% or more and not done if it was less than 60%.

Tool (III): Nurses' attitudes about COVID-19 among nurses in Family Health Centers and hospitals. This tool adopted from (Saqlain et al., 2020), to ascertain nurses' attitudes toward COVID-19. Nurses were asked to choose one of five responses to each

statement: "1= strongly agree; 2= agree; 3= undecided; 4= disagree; 5= strongly disagree." Hence, the attitude scale was considered positive when the percentage was 60% or more and negative when it was less than 60%

Tool (IV): Nurses' perceived barriers to infection control practice about COVID-19 among nurses in Family Health Centers and hospitals. This tool adopted from (Saqlain et al., 2020). It contains eight items as; insufficient knowledge regarding the COVID19 mode of disease transmission, not using a mask during patient inspection or interaction, limitation of infection control materials, no hand washing after examination or contact with the patient, absence of policy and procedures for infection control practice, insufficient training in infection control measurements, less commitment of health care workers to the policies and procedures, overcrowding in emergency room is also a barrier in infection control practice, that evaluated perceived barriers to infection control practice about COVID-19 among nurses in Family Health Centers and hospitals were documented on a five-point Likert scale "1= strongly agree; 2= agree; 3= undecided; 4= disagree; 5= strongly disagree.

Scoring For Nurses' Attitudes & Perceived Barriers:

The attitude & perceived barriers scale was considered positive if the percentage was 60% or more and negative if it was less than 60%.

Tools Validity:

A jury of five experts in Community Health Nursing from the Faculty of Nursing and Faculty of Medicine at Alexandria University assessed all of the study's tools for content validity.

Content Reliability:

The reliability of proposed tools was performed by Cronbach's Alpha test statistic, which recorded 0.864, 0.964, 0.740, and 0.890 for the tools (I), (II), (III) and (IV) respectively.

Pilot study

Pilot study was conducted on 10% of the study individuals (40 participants). The pilot study aimed to test the questions for any ambiguity and assess the practicability and feasibility of the tools. It also helped the researchers estimate the time needed to fill in the forms. Those who shared in the pilot study were included from the main study sample due to there is no change in the main tools.

Fieldwork:

The researchers began preparing a data collection programmer after receiving approval to proceed with the study. The researchers started the collection of data through face-to-face interviews with each participant individually; the average time to complete the interview questionnaires ranged from 20-25

minutes. Work continued for three days per week: Sundays, Mondays, and Wednesdays from 9.00 a.m. to 12.00 noon. Data were collected through 4 months, starting from February 2021 to the end of May 2021.

Ethical Considerations:

Required permissions for conducting the study were obtained from the local authorities. Informed consent was acquired directly from registered nurses before data collection and after study aims were explained. All data collecting techniques were conducted in a confidential manner. Their search aims were explained to the nurses, and they were ensured that the participation was voluntary and anonymous. To promote a real decision, care was taken to convey facts about the research in a manner that was easily understood. No personal identifiable data were accessed, anonymity was ensured and applied.

Administrative Design: -

The Faculty of Nursing at the Alexandria University, which was responsible for establishing the researcher's identification, issued an official letter detailing the purpose of the study.

Statistical Analysis:

Data was evaluated and analysed using IBM-SPSS version 20.0 software (Armonk, NY: IBM Corp). Normality was verified using Kolmogorov-Smirnov to check whether data parametric or nonparametric. Non-parametric data were presented by frequency (n, %). Parametric data were presented in term of minimum, maximum, range, mean, standard deviation, and median. Significance was assessed at 0.05 level. **Chi-square test** was applied to compare between groups in nonparametric variables. **Monte Carlo correction:** Correction for chi-square when >20% of cells have expected count of <5.0. **Pearson correlation coefficient** was applied to evaluate the interrelationship between numeric variables. For comparing two groups of nonparametric variables, **Mann-Whitney test was applied, however, Kruskal Wallis test** to compare between more than two groups at 0.05 level.

Results:

Table (1): Demographic characteristics of the two Studied nurses' groups.

Demographic characteristics	Family centers (n = 200)		Hospitals (n = 200)		χ^2	p
	No.	%	No.	%		
Gender						
Male	0	0.0	64	32.0	76.190*	<0.001*
Female	200	100.0	136	68.0		
Age (in years)						
< 30	44	22.0	64	32.0	49.704*	<0.001*
31-<40	60	30.0	100	50.0		
40-<50	56	28.0	32	16.0		
50 +	40	20.0	4	2.0		
Experience (in years)						
< 1	24	12.0	16	8.0	2.759	0.430
1<3	52	26.0	46	23.0		
3-<5	60	30.0	65	32.5		
5 +	64	32.0	73	36.5		
Education						
Technical Secondary School Diploma in Nursing	40	20.0	16	8.0	55.517*	^{MC} p<0.001*
Diploma of Technical Institute on Nursing	68	34.0	24	12.0		
Bachelor of Nursing	92	46.0	152	76.0		
Master of Nursing	0	0.0	8	4.0		
Have you received infection prevention and control training about COVID-19?						
Yes	180	90.0	200	100.0	21.053*	<0.001*
No	20	10.0	0	0.0		
Do you have infection prevention and control guidelines in the department regarding COVID-19?						
Yes	200	100.0	200	100.0	-	-
No	0	0.0	0	0.0		
Do you think you are at risk of infection with COVID-19?						
Yes	200	100.0	200	100.0	-	-
No	0	0.0	0	0.0		

χ^2 : test MC: Monte Carlo
Statistically significant at $p \leq 0.05$.

p: p-value for comparing the studied groups
Highly significant $p < 0.001$

Table (2): Source of COVID19 information of the two studied groups of nurses.

Source of Information regarding COVID-19?	Family canterers (n = 200)		Hospitals (n = 200)		χ^2	p
	No.	%	No.	%		
Social media	88	44.0	112	56.0	10.234*	0.037*
Radio/TV	56	28.0	32	16.0		
Seminars/workshops	16	8.0	20	10.0		
Newspaper and magazines posters and brochures	16	8.0	16	8.0		
Other colleagues	24	12.0	20	10.0		

χ^2 : Chi-square: Statistically significant at $p \leq 0.05$

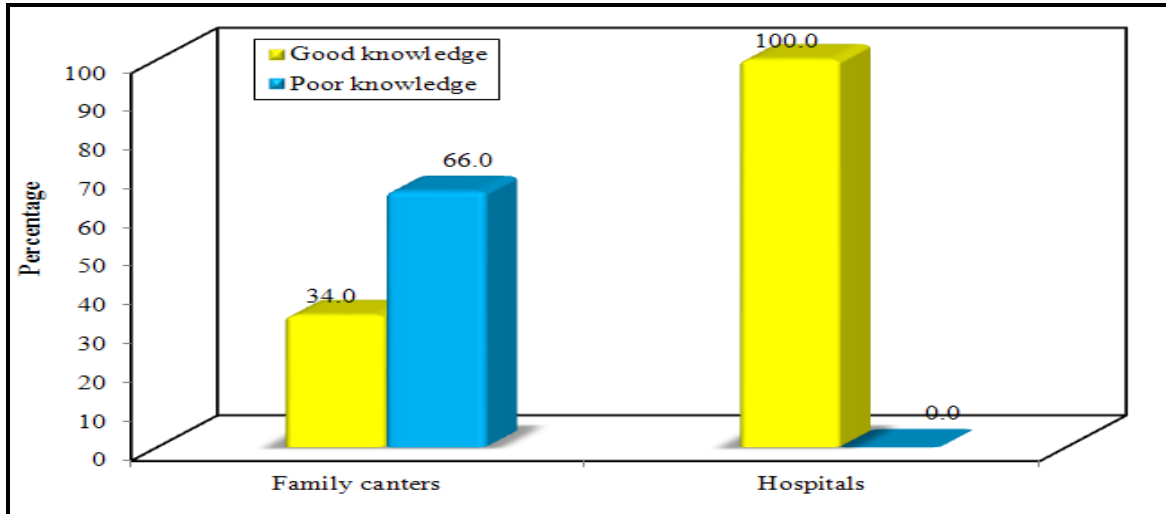


Figure (1): The Knowledge scores among studied groups of nurses healthcare professionals about COVID-19 in the two study groups.

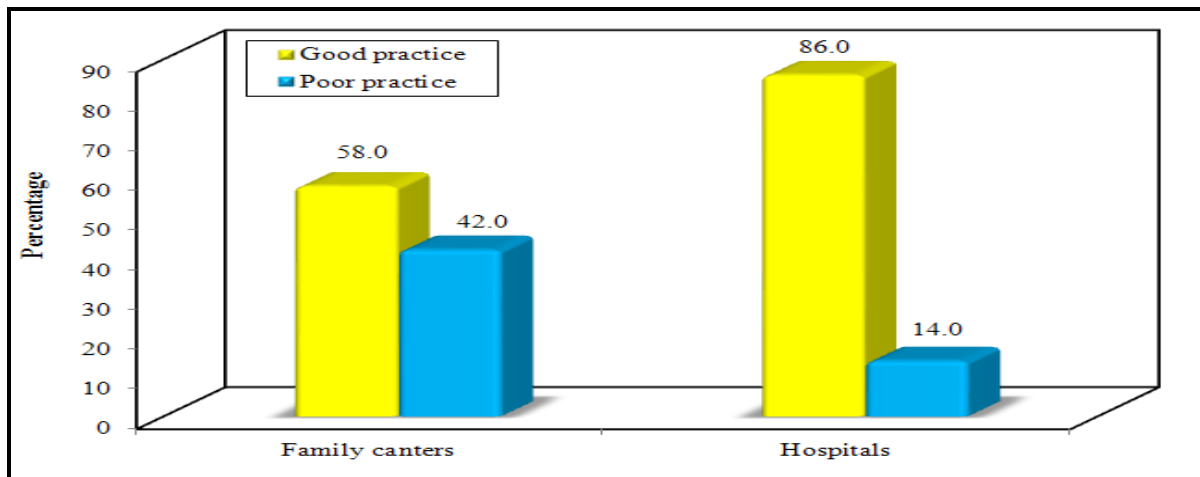


Figure (2): Scores of Practices of Health Care Professionals Toward COVID-19 in the two study groups.

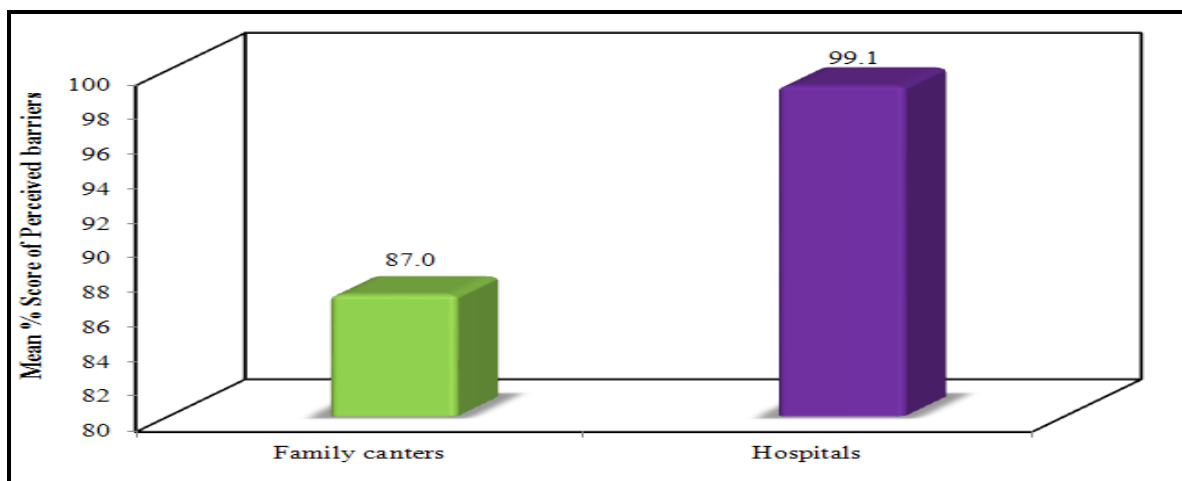


Figure (3): Score of Perceived Barriers to Infection Control Practice in the two Studied Group of Nurses.

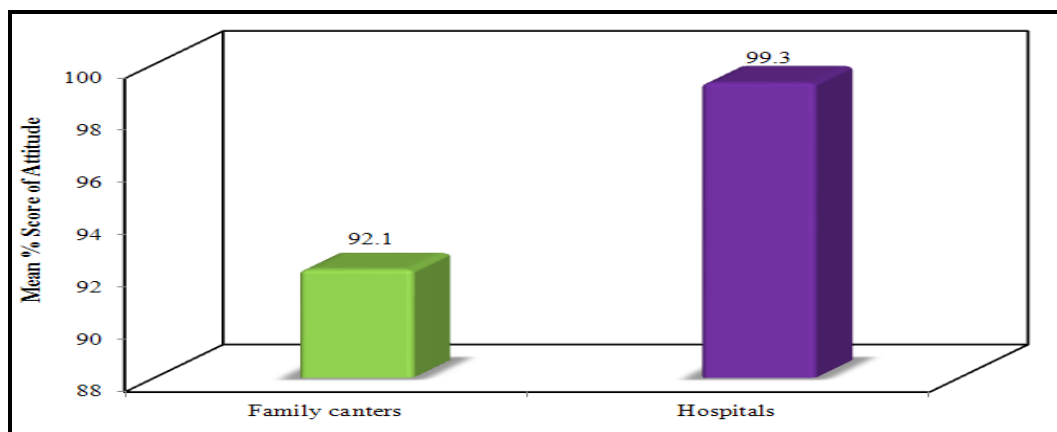


Figure (4): Comparison between the two studied subjects according to score of attitude among health care professionals toward COVID-19

Table (3): Correlation between Knowledge, Attitude, Practice and Perceived Barriers among Nurses Regarding COVID-19 in both groups of nurses

	Family canters (n = 200)		Hospitals (n = 200)	
	R	P	R	p
Knowledge vs. attitude	0.072	0.309	0.027	0.705
Knowledge vs. practice	-0.023	0.746	-0.034	0.637
Practice vs. attitude	0.321*	<0.001*	0.142*	0.046*
Knowledge vs. barriers	-0.167*	0.018*	0.266*	<0.001*
Practice vs. barriers	-0.303*	<0.001*	-0.108	0.127
Attitude vs. barriers	-0.176	0.013*	-0.020	0.778

r: Pearson coefficient;

*statistically highly significant at $p \leq 0.001$

Table (4a): Relations between Knowledge, attitude, practice among health care professionals regarding COVID-19 in family health centers (n = 200)

	Knowledge				χ^2	P	Attitude			Test of sig	p	Practice				χ^2	P
	Good (n = 68)		Poor (n = 132)				Mean	SD	Median			Good (n = 116)		Poor (n = 84)			
	No.	%	No.	%								No.	%	No.	%		
Gender																	
Male	0	0.0	0	0.0	-	-	-	-	-	-	-	0	0.0	0	0.0	-	-
Female	68	100.0	132	100.0			32.80	1.19	33.0			116	58.0	84	42.0		
Age (in years)																	
< 30	20	45.5	24	54.5	20.667*	<0.001*	32.55	1.32	33.0	H=	0.035*	16	36.4	28	63.6	18.786*	<0.001*
31-<40	16	26.7	44	73.3			32.67	0.95	33.0			32	53.3	28	46.7		
40-<50	28	50.0	28	50.0			32.93	0.97	33.0			44	78.6	12	21.4		
+ 50	4	10.0	36	90.0			33.10	1.53	34.0			24	60.0	16	40.0		
Experience (in years)																	
<1	8	33.3	16	66.7	3.739	0.296	32.83	0.92	32.50	H=	0.249	12	50.0	12	50.0	7.493	0.058
1-<3	20	38.5	32	61.5			32.50	1.28	33.0			23	44.2	29	55.8		
3-<5	24	40.0	36	60.0			32.87	1.0	33.0			40	66.7	20	33.3		
+5	16	25.0	48	75.0			32.97	1.33	33.0			41	64.1	23	35.9		
Education																	
Technical Secondary School Diploma in Nursing	4	10.0	36	90.0	21.660*	<0.001*	33.10	1.53	34.0	H=	0.013*	24	60.0	16	40.0	17.553*	<0.001*
Diploma of Technical Institute on Nursing	36	52.9	32	47.1			32.65	1.03	33.0			52	76.5	16	23.5		
Bachelor of Nursing	28	30.4	64	69.6			32.78	1.11	33.0			40	43.5	52	56.5		

Chi square test

H: H for Kruskal Wallis test

U: Mann Whitney test

SD: Standard deviation

Highly statistically significant at $p \leq 0.001$.

Table (4b): Relations between Knowledge, attitude, practice among health care professionals regarding COVID-19 in hospitals (n = 200)

	Knowledge				χ^2	P	Attitude			Test of sig	P	Practice				χ^2	P
	Good (n = 200)		Poor (n = 0)				Mean	SD	Median			Good (n = 172)		Poor (n = 28)			
	No.	%	No.	%								No.	%	No.	%		
Gender																	
Male	64	100.0	0	0.0	-	-	34.63	0.70	35.0	U= 3712.0*	0.008*	52	81.3	12	18.8	1.764	0.184
Female	136	100.0	0	0.0			34.88	0.32	35.0			120	88.2	16	11.8		
Age (in years)																	
< 30	64	32.0	0	0.0	-	-	34.75	0.56	35.0	H= 1.555	0.670	56	87.5	8	12.5	14.689*	MC p= 0.001*
31-<40	100	50.0	0	0.0			34.80	0.49	35.0			92	92.0	8	8.0		
40-<50	32	16.0	0	0.0			34.88	0.34	35.0			20	62.5	12	37.5		
+ 50	4	2.0	0	0.0			35.0	0.0	35.0			4	100.0	0	0.0		
Experience																	
< 1	16	8.0	0	0.0	-	-	34.50	0.89	35.0	H= 3.194	0.363	16	100.0	0	0.0	5.898	0.117
1-<3	46	23.0	0	0.0			34.87	0.34	35.0			38	82.6	8	17.4		
3-<5	65	32.5	0	0.0			34.85	0.44	35.0			59	90.8	6	9.2		
< 5	73	36.5	0	0.0			34.78	0.48	35.0			59	80.8	14	19.2		
Education																	
Technical Secondary School Diploma in Nursing	16	8.0	0	0.0	-	-	35.0	0.0	35.0	H= 5.237	0.155	8	50.0	8	50.0	14.789*	MC p= 0.001*
Diploma of Technical Institute on Nursing	24	12.0	0	0.0			34.83	0.38	35.0			20	83.3	4	16.7		
Bachelor of Nursing	152	76.0	0	0.0			34.76	0.54	35.0			136	89.5	16	10.5		
Master of Nursing	8	100.0	0	0.0			35.0	0.0	35.0			8	100.0	0	0.0		

χ^2 : test H: H for Kruskal Wallis test

U: Mann Whitney test

SD: Standard deviation;

* Statistically highly significant at $p \leq 0.001$

Table (1): Shows that the total number of the studied groups was 400 nurses divided equally between family health centers and hospitals. Concerning age, 30% in family health centers and 50% in hospitals lie between the age group of 30<40. All of the studied sample 100.0% in family health centers and 68% in hospitals, were females. Regarding education, 46% in family health centers and 76% had a Bachelor of Nursing degree with more than 5 years of experience (39% & 36.5%, respectively), showing statistically significant differences between the two groups for gender, age, and received infection intervention and control training about COVID-19 ($p < 0.001$).

Table (2): Explains that of the surveyed subjects in both groups, family health centers & hospitals, 44% and 56% respectively explained that social media was the principal information source regarding COVID-19, then Radio/TV, seminars/workshops, newspapers, magazines, posters, and brochures. There is a significant variation between two study groups ($p = 0.037$).

Figure (1): Illustrates that 66% of the studied subjects in family health centers had had poor knowledge, while all (100%) in hospitals had good Knowledge about COVID-19.

Figure (2): Illustrates that 58% of the studied subject in family health centers had good practice, while (86%) in hospitals had good practice about COVID-19.

Figure (3): Illustrates that 87% of the studied subject in family health centers, and 99.1% in hospitals had perceived a lot of barriers to infection control practiced regarding COVID 19.

Figure (4): Illustrates that 92% of the studied subjects in family health centers had positive attitudes, while 99.3% in hospitals had positive attitudes about COVID-19.

Table (3): Describes the Pearson's coefficient tests which revealed significant positive correlations regarding practice vs. attitude of the studied nurses in both groups and knowledge vs. barriers in hospital nurses only. There are significant negative correlations regarding practice vs. barriers and attitude vs. barriers in family health centers nurses only.

Table (4a): Demonstrates highly statistically significant differences between knowledge, attitude, practice and the age and education of the nurses working in family health centers. Regarding the hospital nurses, the table shows statistically significant differences between the gender and attitude as well as the age and practice ($P < 0.001$).

Table (4b): the table shows statistically significant differences between the gender and attitude as well as the age and practice ($p < 0.001$) among studied subjects working in hospitals.

Discussion

COVID-19 is a fast-spreading worldwide health emergency that affects all portions of the population, particularly healthcare workers. Knowledge about the illness among HCWs may favourably influence their attitudes and actions, which has a significant effect on preventing the disease's future spread (**Gan et al., 2021**). Therefore, the purpose of this research was to examine the knowledge, attitude, and practise about COVID-19 and perceived obstacles in infection control among 400 Alexandria nurses, evenly distributed across family health clinics and hospitals. This was in accordance with a study conducted in **Pakistan (Saqlain et al., 2020)**.

When investigating the source of information regarding COVID-19, the present study revealed that social media was the main source of information, followed by Radio/TV, seminars/workshops, and newspapers, magazines, posters and brochures. These findings are consistent with those of studies on healthcare workers in **MedRxiv & Ho Chi Minh City** which revealed that the majority of HCWs seek information about COVID-19 through social media (**Bhagavathula et al., 2020**), (**Giao et al., 2020**). These results also agree with those of another study carried out by **Alqahtani (2017)** among 418 health college students, in **Najran, Saudi Arabia**, which showed that nurses obtained their information through various media such as credible websites, WhatsApp, and TV. These results demonstrate that the media are a vital source of information that may be used to increase COVID-19 awareness.

One of the main research questions of this study was about assessing levels of knowledge, practice and attitude regarding COVID-19 among nurses in Family Health Centers and hospitals. In comparing the two studied groups in terms of their Knowledge about COVID-19, our results revealed that sixty six of the studied subjects in family health centers had poor knowledge, while all in hospitals had good Knowledge about COVID-19. The current study findings are in agreement with those of several studies conducted in **Pakistan** by **Saqlain et al. (2020)**, in **China** by **Zhou et al. (2020)**, and in **Venezuela** by **Luci et al. (2021)**.

Similarly, **Ugandan Olum et al. (2020)**, who conducted study in reported that 70% of their participants had adequate knowledge level especially regarding people with chronic diseases being of high risk of getting infected with COVID 19 than people without chronic disease. As well, in an **Iranian** study, by **Maleki et al. (2020)**, discovered that 99% of respondents had great knowledge of the infection transmission pathways, while only 86% had adequate understanding of the disease symptoms. However, the previous findings disagreed with those of other

studies conducted in the **United Arab Emirates** by **Bhagavathula et al. (2020)** and nursing students of University of **Palermo in Italia** which found poor knowledge about the disease transmission and the symptoms in a significant proportion of HCWs ($p=0.015$).

In the present study, all nurses in hospitals had good Knowledge about COVID-19. Similarly, the same findings were detected in a very recent study among nurses done in Zagazig Fever Hospital, Egypt, by **Mahmoud & Ibrahim (2021)**. The findings suggested an overall high degree of COVID-19 knowledge. These improvements may be attributable to their eagerness and enthusiasm in participating in the programme. Therefore, this training has been successful in enhancing the knowledge of COVID-19 among nurses. In addition, the government has made significant measures to train nurses and restrict the disease's spread. In Agreement with **Zhong et al. (2020)** in **China**, they found that 90% of respondents had a solid understanding of COVID-19's causes, indications, symptoms, mechanism of transmission, and preventative actions. These findings corroborate the findings of study done in Egypt by **Ahamed et al. (2018)**, who found a knowledge score of 82.4%, demonstrating that healthcare personnel had excellent knowledge.

Regarding the assessing the difference between two study groups concerning their practice toward COVID-19, our findings revealed that more than half of the studied subject in family health centers had good practice, while majority in hospitals had good practice about COVID-19. These findings go in accordance with those of a study conducted by **Gan et al. (2021)** among **Indian** HCWs, where 88.7% of Pharmacists were more likely than others to demonstrate excellent practise. HCWs. The same results were found by **Galal et al. (2021)** a study conducted in Egypt, wherein 87% of HCW respondents at Cairo university hospital had good practice regarding washing hands frequently with soap and water for at least 20 seconds and wearing of face mask when going outdoors (83%). However, the previous findings opposed to those of a study conducted among **Ethiopian** HCWs by **Roskem et al. (2021)**, which revealed poor practices of their participants aged more than 40 years compared with under age 40 years.

In the same context, the training and retraining of health professionals in the proper steps for hand washing should be encouraged, and they should be reminded of the importance of washing their hands prior to donning gloves and touching patients to reduce the risk of infection and transmission. In addition, basic hand washing has been shown to minimise the chance of developing a hospital

infection, particularly considering the current COVID-19 concerns. Significant contributions have been made by hospital-acquired infections to overall mortality, morbidity, and healthcare expenses. Similarly, **Zhong et al. (2020)** observed that 89.7 percent of respondents in China adhered to the right COVID-19 procedures. This result is reinforced by study undertaken in Egypt by **Ahamed et al. (2018)**, who found that nurses exhibited adequate hand-washing habits during the COVID-19 outbreak.

In terms of comparing the two nurses study groups according to their attitude toward COVID-19, current finding concluded that, the majority of nurses in family health centres and all of hospitals' nurses had positive attitude toward COVID-19. Patients should be isolated, all relevant information on COVID-19 should be distributed to healthcare professionals, and transmission of COVID-19 infection should be avoided by implementing the universal precautions recommended by WHO and CDC. This finding go in accordance with those of the studies of **Saqlain et al. (2020)** and **Zhou et al. (2020)**, which recognised a greatly positive attitude amongst HCWs to COVID-19, as well as with that of a very recent a study in **Egypt**, by **Galal et al. (2021)** revealing that nurses at Cairo university children hospital had a significantly higher positive attitude than doctors, and that good knowledge and practice were significantly associated with this positive attitude. These previous findings contradicted with that of a study conducted in **Oman (2021)**, which explained that most participants in many countries had a negative attitude which believed that COVID-19 is a fatal condition. Although the difference in attitude towards COVID-19 can vary from one culture to another, the attitude can be linked to the level of knowledge available among HCWs.

One of the main research questions of this study was about assessing the perceived barriers to infection control of COVID-19 among nurses in Family Health Centers and hospitals. In terms of the comparison between the two studied groups according to perceived barriers to infection control practice, the present study explained that the majority of the studied subjects in both groups perceived a number of barriers to infection control practice toward COVID-19. This study is in agreement with that of study of **Wang et al. (2020)**, Patients view insufficient availability of infection control items and congestion in emergency rooms as impediments to infection control practises that put them at a high risk for infection. In addition, a study conducted in **Egypt**, by **Galal et al. (2021)** reported that the most frequently mentioned barriers for employing hospital's infection control procedures in were overcrowding in healthcare facilities (78.2%), insufficient infection

control strategies and procedures (62.6%), and deficient infection control supplies (53.6%), unlike in the studies of **Saqlain et al. & Zhou et al. (2020)** who thought that not wearing a mask and not washing their hands were not obstacles to infection control.

When investigating the correlations among knowledge, attitude, practice and perceived barriers among nurses regarding COVID-19 by using Pearson coefficient test, the present study result revealed a significant positive correlation regarding practice vs. attitude of the studied subjects in both groups which means that the better the practices of the HCWs, the more positive is their attitude toward COVID-19. The significant positive correlation of knowledge vs. barriers in hospitals nurses only revealed that the higher their level of Knowledge about COVID-19, the more positive is their attitude toward it. However, there are a significant negative correlation regarding practice vs. barriers and attitude vs. barriers in family health centers nurses only which means that the poorer their practice and attitude toward COVID-19, the more barriers they will perceive. This disagrees with similar recent studies conducted by **Huang et al. (2020)** in **Wuhan, China** and by **Iheanacho et al. (2021)** in **Nigeria (2021)**, revealed that nurses had a favorable attitude toward personal safety and hand cleanliness, but a lack of medical supplies such as masks and protective equipment hindered their attempts to adopt conventional protective measures in some jobs.

Conclusion:

In the light of the current study results, it was concluded that the main source of information for nurse among both groups was social media. The findings also established that nurses were using less authentic information sources and the majority of them in family health centers had poor knowledge, practice, and attitude toward COVID-19 in comparison with hospitals' nurses who have good knowledge, practice, and attitude. The majority of the studied subjects in both groups perceived a number of barriers to infection control practice toward COVID-19.

Recommendations:

Based on current study results, these recommendations are proposed:

1. Provide a continuous comprehensive training program targeting family health centers nurses by head nurse.
2. Enhance precautionary and preventive measures of COVID-19 among nurses.
3. Cooperation should be encouraged between educational institutions and the Ministry of Health

to educate the nurses and raise their awareness about the pandemic prevention and control.

References

- **Abdelhafiz, A., Mohammed, Z., & Ibrahim, M. (2020):** Knowledge, perceptions, and attitude of Egyptians towards the novel corona virus disease (COVID-19). *Journal of Community Health*. 8(2). <https://doi.org/10.1007/s10900-020-00827-7>.
- **Abdulsalam, M., Ibrahim, A., Michael, G., & Mijinyawa, A. (2015):** Hand Washing Practices and Techniques among Health Professionals A Tertiary Hospital In Kano. *Journal of Medical Investigations and Practice*. Wolters Kluwer – Medknow .1(7).
- **Ahamed, A.W., Ali, S.A., & Mahmoud, SA. (2018):** Professional Ethics Practiced By Nurses Working In Hemodialysis Unit at Zagazig Hospitals. *Zagazig Nursing Journal*. 14(1). 221:234.
- **Alqahtani, AS. (2017):** Knowledge and attitude toward Middle East respiratory syndrome coronavirus among health colleges' students in Najran, Saudi Arabia. *Int J Commun Med Public Health*. 4(8). 2641. doi: 10.18203/2394-6040.ijcmph20173153.
- **Bhagavathula, AS., Aldhaleei, WA., Rahmani, J., Mahabadi, MA., & Bandari, DK. (2020):** Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. *JMIR public health and surveillance*. 6(2). 19160. doi: 10.2196/19160. PMID: 32320381; PMCID: PMC7193987.
- **Carlos, WG., Dela, CS., Cao, B., & ShaziaJamil, BP. (2020):** COVID-19 Disease due to SARS-CoV-2 (Novel Coronavirus) , *American Journal of Respiratory and Critical Care Medicine* 2020. 201(4). 7-8.
- **Dewald, S., Burtram, C., & Fielding, C. (2019):** Coronavirus envelope protein: Current knowledge. *Virology journal*, J 2019. 16(1). 69.
- **Galal, Y., Abuelhamd, W., Abdel Hamid, T., & Elsayed, N. (2021):** Coronavirus Disease 2019: Knowledge, Attitude, Practice, and Perceived Barriers among Health care Workers at Cairo University Children Hospital, Egypt. *Journal of Medical Sciences*. 9 (1). 80-8
- **Gan, WH., Lim, JW., & Koh, D. (2021):** Preventing intra-hospital infection and transmission of COVID-19 in health care workers. *Saf Health Work* 2020. 11. 241-3. <https://doi.org/10.1016/j.shaw.2020.03.001> PMID: 32292622
- **Giao, H., Han, NT., Khanh TV, Ngan VK, Tam VV, & An PL (2020):** Knowledge and attitude toward COVID-19 among healthcare workers at District Hospital, Ho Chi Minh City. *Asian Pac J Trop Med*. 13.1-6.

- **Hagavathula AS, Aldhaleei WA, Rahmani J, Mahabadi MA, & Bandari DK. (2020):** Knowledge and Perceptions of COVID-19 Among Health Care Workers: Cross-Sectional Study. *JMIR public health and surveillance*.6(2). 19160. Pmid.32320381. Available at on https://en.wikipedia.org/wiki/COVID-19_pandemic_in_Egypt
- **Huang, C., Wang, Y., Li, X., Ren, L., Zhao, J., & Hu, Y. (2020):** Knowledge, Attitude, and Practice of Nurses Towards the Prevention and Control of COVID-19 Wuhan China. *Lancet*. 2020. 6736(20). 30183-5.[https:// DOI:10.1016/S0140-3018\(20\)30183-5](https://doi.org/10.1016/S0140-3018(20)30183-5)
- **Iheanacho T, Stefanovics E ,Okoro U, Anyaehie U, Njoku P, Adimekwe A, & Ibediro K, (2021):** knowledge, attitude, practice and training related to COVID-19: a cross-sectional survey of frontline healthcare workers in Nigeria. *BMJ Open*.Original Research.11. 050138. doi:10.1136/bmjopen-2021-050138.
- **Lucia D, Millan M, Stevens F, Nessi C, & Daniel M, (2021):** Knowledge, Attitudes, and Practices Regarding COVID-19 Among Healthcare Workers in Venezuela: An Online Cross-Sectional Survey. *Occupational Health and Safety*, a section of the journal *Frontiers in Public Health*. 9. 633723. doi: 10.3389/fpubh.2021.633723.
- **Mahmoud, SF., & Ibrahim, ME. (2021):** “Effect of Educational Sessions about Coronavirus Disease 2019 (COVID-19) on Knowledge, Practice and Attitudes of Nurses in Zagazig Fever Hospital.” *American Journal of Nursing Research*,9(4). 133-142. doi: 10.12691/ajnr-9-4-5.
- **Maleki S, Najafi F, &Farhadi K, (2020):** Knowledge, attitude and behavior of health care workers in the prevention of COVID-19. *Iranian Study*.BMG Medical Education, under review. <https://doi.org/10.21203/rs.3.rs-23113/v1>.
- **Maurya, V.K. Upadhyay=V., Dubey, P., Shukla, S., & Chaturvedi, A. (2020):** Assessment of front-line healthcare workers’ Knowledge, Attitude and Practice after several months of COVID-19 pandemic, *Journal of Healthcare Quality Research*, 2021. Available at on line <https://doi.org/10.1016/j.jhqr.2021.07.004>
- **McEachan R., Taylor N., Harrison R., Lawton R., Gardner P., & Conner M. (2016):** Meta-analysis of the reasoned action approach (RAA) to understanding health behaviors. *Ann Behav Med*. 50. 592–612.
- **Olum R, Chekwech G, & Wekha G, (2020):** Coronavirus disease-2019: Knowledge, attitude, and practices of health care workers at MakerereUniversity Teaching Hospitals Uganda. *Frontiers in Public Health*. 8. 181.<https://doi.org/10.3389/fpubh.2020.00181>.
- **Provenzano S, Santangelo O, Armetta F, Pesco G, Allegro A, Lampasona M, Terranova A, Anna D, &Firenze A (2020):** COVID-19 infection: comparing the knowledge, attitude and practices in a sample of nursing students in Italia. Original article: *Nursing students’ population*. 91(1).10252.<https://doi.org/10.3889/oamjms.2021.5703>.
- **Rawajfah, AL., Al-Mugeed, O., Alaloul, K., Al-Rajaibi, F., & Al Omari, H. (2021):** COVID-19 knowledge, attitude, and precautionary practices among health professional students in Oman , *Nurse Education in Practice*. 52. 103041.
- **Roskem, J., Mondjimbaye, F., Nanbolngar, J., Modode, R., Rongar, R., Diba, F., Toglengar, M., Ongolo, J., &Virveda, C. (2021).**Knowledge, Attitudes and Practices Regarding COVID-19 in N’Djamena, Chad.*Journal of Community Health*. <https://doi.org/10.1007/s10900-021-00963-8>
- **Saqlain, MA., Munir, MM., Rehman, SU., Gulzar, AD., Naz, EZ., Ahmed, AH., &Tahir, AM. (2020):** Knowledge, attitude, practice and perceived barriers among healthcare workers regarding COVID-19: a crosssectional survey from Pakistan *Journal of Hospital Infection*. 105 .419-423.
- **The Central Agency for Public Mobilization and Statistics Website (2020):** Retrieved (April 4, 2020). From [https://www.Capmas.Gov](https://www.capmas.gov.eg). Egyptian PM. (2021): Egypt’s Coronavirus Figures Still Within Range. Retrieved (April 17, 2020(4).From:[https://www.Egypttoday.com/Article/2/83291/PMEgypt%E2%80%99s-Coronavirus-Fgur Es-Still-Within-Range](https://www.Egypttoday.com/Article/2/83291/PMEgypt%E2%80%99s-Coronavirus-Fgur-Es-Still-Within-Range).
- **Wang, J., Zhou, M., & Liu, F. (2020):** Reasons for healthcare workers becoming infected with novel coronavirus disease 2019.(COVID-19) in China. *Journal of Hospital Infection*.<https://doi.org/10.1016/j.jhin.2020.03.002>.
- **Wee, HG., John, WL., & David, K. (2020):** Preventing intra-hospital infection and transmission of COVID-19 in healthcare workers, *Safety and Health journal*.11 (2). 241-243
- **World Health Organization. (2020):** Emerging Respiratory Viruses, Including COVID-19: Methods for Detection, Prevention, Response, and Control URL: Available at on line web site: <https://openwho.org/courses/introduction-to-ncov>.
- **World Health Organization. (2020):** Emerging Respiratory Viruses, Including COVID-19: Methods For Detection, Prevention, Response, and Control URL.
- **Yasmine, SG., Walaa, A., Abdel Hamid, TA., &Elsayed, NR. (2021):** Coronavirus Disease 2019: Knowledge, Attitude, Practice, and Perceived

Barriers among Health care Workers at Cairo University Children Hospital. Egypt (2021).

- **Zhong, B.L., Luo, W., Li, H.M. (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.
- **Zhou, M., Tang, F., & Wang, Y., (2020):** Knowledge, attitude and practice regarding COVID-19 among health care. Journal of Community Health workers in Henan, China.Journal of Hospital Infection.45.1242–1251.
- **Zunyou, Wu., Jennifer, MD., & McGoogan, M. (2019):** Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China,JAMA journal (the Journal of the American Medical Association), JAMA. 2020.323(13).1239-1242.

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