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## Effect of Implementing Distance Learning on Nurses Knowledge and Practice Regarding Covid-19 Pandemic

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**Abstract:Background:**The global spread of COVID-19 is triggering public health responses and is affecting severely on economic systems and global communications. Nurses are the frontline healthcare professionals, providing direct care to individuals infected with COVID-19. In addition, E-learning tools are playing a crucial role during this pandemic. **Aim:**The aim of this study was to determine the effect of implementing distance learning on nurse's knowledge and practice regarding the COVID-19 pandemic. **Design:** Quiz experimental design was used to achieve the aim of the current study. **Setting:**The study was conducted at the emergency department, Intensive care unit and internal medicine department department at 15- May Hospital – Helwan governorate. **Sample:**A convenient sample of 50 nurses who are work in the previously mentioned settings. **Tools:**Five tools were used to collect data include I: Nurse's demographic characteristics data. II: Nurse's knowledge assessment sheet, III: Nurses practice observation sheet, IV: Hospital health services nurse's opinion assessment sheet, V: Distance learning assessment sheet. **Results:** high significant positive difference between pre and posttest which reveals improvement in study subject knowledge and practice regarding distance learning implantation at p-value 0.000\*\*. In addition, this study indicates the most of study subject agree with implementing distance learning. **Conclusion:** The finding of the study concluded that nurses' knowledge and practice was improved post-education than pre-education. **Recommendations:** Additional research using different training programs for nurses to be well prepared to provide patients with appropriate knowledge and practices about COVID-19 through verbal and written instructions.

**Keywords:**Covid-19 Pandemic, Distance learning.

### INTRODUCTION

COVID 19 is an emerging respiratory disease that caused by a novel coronavirus and detected in December 2019 in Wuhan, China. The disease is highly infectious (Zhong, 2020) it has spread rapidly to other countries via different ways such as airline traveling and now, COVID-19 is the world's pandemic problem. Coronavirus is transmitted from person-to-person by close contact with infected patients via respiratory (sneezes or coughs) or spread by touching an object that the virus on it. More than 80% of Coronavirus patients presented mild symptoms and improved without any medical intervention; about 20% of infected patients had a severe illness such as shortness of breath, septic shock, and multi-organ failure, and reported that 2% of cases are fatal. The risk of increased severity detected in people with chronic diseases and therefore the elderly (Giao, et al., 2020).

The transmission of COVID19 among health care workers is related to overcrowding, environmental contamination, and absence of isolation room facilities. The fact that nurses are at risk of infection in the epidemic chain is a serious issue because nurses are in close contact with the infected patients, they help in controlling the outbreak, and they are the core part of the infection transmission chain. Though, this is likely associated with the fact that nurses have insufficient awareness of infection prevention strategies (Wu &McGoogan, 2020). Knowledge of disease can influence nurses' practices, and incorrect practices directly

increase the risk of transmission of infection (Zhou, et al., 2020).

To date, no vaccine or antiviral treatment for COVID-19. Therefore, applying preventive strategies to control COVID-19 infection is the most serious intervention. Health care workers are the first sector in contact with patients and are a crucial source of exposure to infected cases in health care settings; thus, nurses are liable to be at high risk of infection. The WHO presented several online training sessions and materials on COVID-19 in different languages to reinforce preventive measures (such as N95 masks, surgical masks, goggles, and protective clothing) for raising awareness and training Health care workers in preparedness activities. That will be useful to ensure the safety of nurses during COVID-19 outbreaks as well as in the future (WHO, 2020) &(Bhagavathula, 2020).

Nurses are the frontline healthcare professionals who have multiple roles and functions during the COVID-19 pandemic, which include: 1) providing health education, screening services, and support for the public and individuals in high-risk groups (Jernigan & CDC COVID-19 Response Team, 2020). 2) Nosocomial infection prevention and surveillance, 3) Implementing standard precautions (hand hygiene, personal protective equipment, respiratory hygiene, medication storage, and injection safety); and educate, train patients, families, and healthcare workers (Patel, et al., 2020). 4) deliver direct life-sustaining care to patients with COVID-19 who are in an acute or critical condition. 5) Provide emotional and psychological

support to individuals required home quarantine restrictions (Liew, et al., 2020).

Technology is enhancing the ability of distance learning to succeed in both aspiring nursing students and professional nurses who want to advance their skills. Distance learning improves access to education and, in doing so, counters the nation's increasing shortage of nurses. Training of nurses continues to play an important role during the COVID-19 pandemic, So Distance learning allows nurses to continue to work by supporting them in the best way possible through training in donning and doffing personal protective equipment. Implement skills development training in donning and doffing personal protective equipment in a way that allows nurses to practice until confident and competent. This e-learning skill enables nurses to train effectively with minimal facilitators required. Self-paced distance learning on a mobile device, like a Smartphone, provides competency and maximum flexibility (Nguyen & Tuan, 2015).

#### *Significance of the study:*

**Globally**, there have been 755 786 confirmed deaths and 21 026 758 confirmed cases within the COVID-19 pandemic. (WHO, 2020). In Egypt, changes every day of life have been rapid, with virus outbreaks, and an increasing death rate. COVID-19 considered a pandemic in Egypt as part of an ongoing worldwide COVID-19 pandemic. The Ministry of Health and Population Egypt confirmed that the first case of COVID-19 in Egypt was on February 14, 2020. As of the evening of June 15, there were 46289 confirmed cases of Covid-19 and 1672 deaths in Egypt (Ministry of Health and Population Egypt, 2020).

**Worldwide**, there is no consistent record of the number of healthcare workers and nurses who have COVID19 infection. But the International Council of Nurses' analysis, depend on data from National Nursing Associations, media reports, and official figures from different countries, designates that more than 230,000 healthcare workers have constricted the disease, and more than 600 nurses have died from the virus. International Council of Nurses' analysis displays that on a regular 7% of all Covid-19 cases worldwide are among healthcare workers, which means that nurses are at great risk, and the patients they care for (International Council of Nurses, 2020).

#### *Aim of the study:*

The present study was conducted to fulfill the following aim:

To determine the effect of implementing distance learning on nurse's knowledge and practice regarding the COVID-19 pandemic through the following:

1. Assess nurses' knowledge and practice pre and post implementing distance learning.
2. Design and implement an educational material for nurses toward improving their knowledge and practice regarding the COVID-19 pandemic.
3. Evaluate the effect of implementing distance learning on nurse's knowledge and practice regarding the COVID-19 pandemic.
4. Assess nurses' opinions toward implementing distance learning.

#### **Research hypothesis :**

The current study hypothesized that :Implementing distance learning will have a positive effect on nurses' knowledge and practice toward improving their knowledge and practice regarding the COVID-19 pandemic

#### **SUBJECTS AND METHODS**

##### **Research Design:**

Quiz experimental design was used to achieve the aim of the current study.

Quasi-experiment design is effective because it uses "pre-post testing" and it has independent variables. Quasi-experimental research is a prospective or retrospective study in which patients self-select or are selected into one of some different treatment groups to compare the real effectiveness and safety of non-randomized treatments (Maciejewski, 2020).

##### **Setting:**

The study was conducted at the emergency department, Intensive care unit and internal medicine department at 15-May Hospital – Helwan governorate.

**Subject:** A convenient sample of 50 nurses who are work in the emergency department, Intensive care unit, chest intensive care unit, and chest department at 15- May Hospital

**Tools for data collection:** Five tools were used to collect data include:

**Tool .I: Nurse's demographic characteristics data:** This tool was developed by the researchers. It includes; age, gender, level of education, previous infection control training, and courses, and previous experience in dealing with serious infectious cases

**Tool II: Nurse's knowledge assessment sheet:** To assess nurse's knowledge toward improving their knowledge regarding the COVID-19 pandemic, It was developed by the researchers after reviewing the recent related literature; it consists of (Common signs & symptoms of COVID-19, less common sign & symptoms of COVID-19, high-risk group for COVID-19 infection, complications of COVID-19 and methods of infection transmission) (CDC, 2020). The Scoring system for this tool; tool contains 23 items each item scored as one for the correct answer and zero for the incorrect answer; yes = one grade while no = zero to become all question grade for correct answer = 23 grades. The satisfactory level is calculated as >80% satisfactory (19/23) while <80% unsatisfactory.

**Tool III: Nurses practice observation sheet:** To observe nurse's practice toward improving their practice regarding the COVID-19 pandemic, it was developed by the researchers after reviewing the recent related literature; it consists of (protective measures practices regarding COVID-19 pandemics) (CDC, 2020). The Scoring system for this tool is divided as the following, the tool contains 10 questions scored as one grade for done and zero for not done as well as done = one grade and not done = zero, to become the total score 10 grades for all questions. The satisfactory level is calculated as >80% satisfactory (8/10) while <80% unsatisfactory

**Tool IV: Hospital health services nurse's opinion assessment sheet:** To assess nurse's opinion toward, what are types of hospital health services during the peak of the COVID-19 pandemic. It was developed by researchers after

reviewing the recent related literature; it consists of (receiving all cases even at the peak of the pandemic, postponing surgeries, and no urgent cases until the peak of the pandemic subsides and classify cases and treat critical cases only) (CDC, 2020). There are three questions scored as yes and no, yes answer = one while no answer = zero.

**Tool V: Distance learning assessment sheet:** To assess nurse's opinions toward implementing distance learning, researchers developed it after reviewing recent related literature (Kaplan & Haenlein, 2016). This tool is ranged as 4= strongly agree, 3= agree, 2 = fair, and 1 = disagree.

## TOOL VALIDITY AND RELIABILITY

The validity of the tools was tested by offered to five academic expertise of medical surgical nursing from the Faculty of Nursing. To determine the relevance, clarity, completeness, and comprehensiveness of the tools, experts responses were either agree or disagree for the face validity. Then their opinions are reviewed and final tools were prepared and used. The reliability of the tools was measured through the computation of internal consistency using Cronbach's alpha coefficient (more than 0.7) which denote acceptable reliability as a measure of agreement between items.

## PILOT STUDY

A pilot study was practiced on 10% of nurses to investigate and ensure the feasibility, objectivity, and applicability of the study, in addition to clarity, adequacy, and internal consistency of the study tools to determine possible problems in the methodological approach or instruments. These tools were completed without difficulty, adding support to the validity of the instruments. Little modification was done e.g. rephrasing and rearrangements of some sentences. Nurses who were involved in the pilot study were excluded from the main study sample.

## FIELDWORK AND PROCEDURE

## RESULTS

**Administrative design:** To carry out the study, official permission from the Director of 15- May Hospital to conduct the study in their facilities. The study was carried out with full cooperation of the different levels of authority after official letters were issued from the nursing directors and nursing supervisors of the setting under the study, explaining the purpose and the methods of the data collection for the study.

### Fieldwork:

After obtaining official permission to carry out the study, the researchers were introduced themselves to the nurses and explained the purpose of the study. The oral consent was obtained from the participants. The data collection of the study was covered a period of five months from the beginning of March 2020 and to the end of July 2020 in the previously mentioned settings. The aim of this study was achieved through the following phases: 1. Assessment phase, the researchers explain the aim of the study and collect data to assess the nurse's knowledge and practice by using Google form questionnaires. 2. Design educational materials in the Arabic language after reviewing recent related literature and revise it based on the assessment phase. 3. The implementation phase, the educational designed materials (videos, pictures, brochures, PowerPoint & booklet) sent through; Messenger and Whatsapp by using Smartphone mobile for each nurse included in the study. 4. In the evaluation phase, this phase is accomplished by using Google form questionnaire for each nurse to evaluate his or her knowledge and practice.

## STATISTICAL DESIGN

The collected data were analyzed using (SPSS) version 20. Qualitative data were presented as number and percent, paired sample t-test. Relations between different qualitative variables were tested using the correlation coefficient (person correlation). Probability (p-value)  $\leq 0.05$  was considered significant and  $< 0.001$  was considered highly significant. While,  $> 0.05$  was considered non-significant.

**Table (1):** Sociodemographic characteristics of the study subject (N= 50)

Nurses demographic characteristics		No	%
1. Gender	A. Male	38	76.0
	B. Female	12	24.0
2. Level of education	A. Secondary nursing school	9	18.0
	B. Technical nursing institutes	12	24.0
	C. Bachelor nursing	20	40.0
	D. Post graduate nursing education	9	18
	B. No	29	58.0
3. Previous infection control training and courses	A. Yes	32	64.0
	B. No	18	36.0
4. Previous experience in dealing with serious infectious cases	A. Yes	21	42.0
	B. No	29	58.0

Regarding sociodemographic characteristics table (1): refers to the majority of the study sample were male 76.0 %, as well as (40.0 %), have bachelor nursing education, 64.0 % have previous training of infection control and 58.0 % of them with no previous experience in dealing with serious cases.

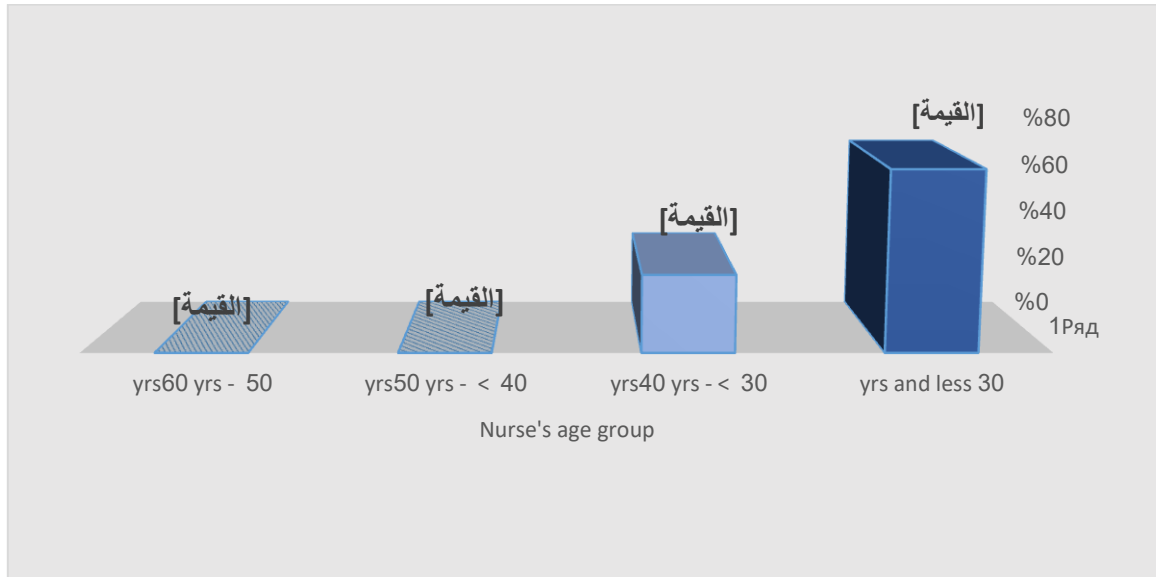


Figure (1): Age distribution of the study subject ( N= 50)

Regarding the age of the study subject, this figure shows that more than two thirds of them were 30 years and less (70%).

Table (2): Nurse's knowledge regarding signs and symptoms of covid19 pre and post-education (N= 50)

Nurses knowledge (part I)	Pre education				Post education				t- value	P-value
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
<b>1. Signs and symptoms of covid19</b>										
1.Fever	50	100	0	0	50	100	0	0	NC†	
2.Cough	38	76.0	12	24.0	45	90.0	5	10.0	2.18	0.033
3.Fatigue	24	48.0	26	52.0	41	82.0	9	18.0	4.87	0.000**
4.Dyspnea or difficult of breathing	47	94.0	3	6.0	50	100	0	0	1.76	0.083
5.Muscle ache	18	36.0	32	64.0	40	80.0	10	20.0	5.39	0.000**
6.Sore throat	35	70.0	15	30.0	42	84.0	8	16.0	2.45	0.018
7.Shivering	17	34.0	33	66.0	30	60.0	20	40.0	2.54	0.014
8.Smell and taste loss	35	70.0	15	30.0	47	94.0	3	6.0	3.28	0.002*
9.Headache	24	48.0	26	52.0	39	78.0	11	22.0	3.45	0.001*
<b>2. Less common signs and symptoms of covid19</b>										
1.Nausea	13	26.0	37	74.0	32	64.0	18	36.0	4.23	0.000**
2.Vomiting	29	58.0	21	42.0	40	80.0	10	20.0	2.19	0.033
3.Diarrhea	32	64.0	18	36.0	47	94.0	3	6.0	4.59	0.000**

\*: Significant at  $P \leq 0.05$ . \*\*: Highly significant at  $P < 0.001$  NC†: Not computed because the variable is constant

Regarding covid19 signs and symptoms nurses knowledge table (2) indicate that; highly statistically significant difference post-education than pre-education in most of the items at p-level  $\leq 0.05$  with t-value (4.87, 5.39, 3.28, 3.45, 4.23&4.59) respectively.

Table (3): Covid19 high-risk group and complications nurse's knowledge regarding pre and post-education (N= 50)

Nurses knowledge (part II)	Pre education				Post education				t- value	P-value
	Yes		No		Yes		No			
	No	%	No	%	No	%	No	%		
<b>1. High-risk groups for covid19 infection</b>										
1.Diabetic patient	35	70.0	15	30.0	48	96.0	2	4.0	3.78	0.000**
2.Cardiopulmonary diseases	29	58.0	21	42.0	50	100.0	0	0	5.96	0.000**
3.Renal diseases	9	18.0	41	82.0	30	60.0	20	40.0	4.83	0.000**
4.Obesity	12	24.0	38	76.0	40	80.0	10	20.0	7.33	0.000**
5.Chronic liver diseases	14	28.0	36	72.0	20	40.0	30	60.0	1.35	0.182
6.Immune disorders	35	70.0	15	30.0	50	100.0	0	0	4.58	0.000**
<b>2. Complications of covid19</b>										
1.Pneumonia and breathing disorders	41	82.0	9	18.0	48	96.0	2	4.0	2.45	0.018
2.Cardiac complications	21	42.0	29	58.0	45	90.0	5	10.0	5.53	0.000**
3.Blood clots	29	58.0	21	42.0	50	100.0	0	0	5.96	0.000**
4.Renal complications	9	18.0	41	82.0	25	50.0	25	50.0	3.47	0.001*
5.Additional viral and bacterial infection	12	24.0	38	76.0	30	60.0	20	40.0	4.53	0.000**

\*: Significant at  $P \leq 0.05$ . \*\*: Highly significant at  $P < 0.001$

Table (3) refers to a highly statistically significant improvement of nurse's knowledge post-education than pre-education in most items at p-level  $\leq 0.05$  with t value (3.78, 5.96, 4.83, 7.33, 4.58, 5.53, 5.96, 3.47 & 4.53) respectively.

**Table (4):** Total mean scores of nurse's knowledge regarding to covid19 (N= 50)

Nurses knowledge	Pre education	Post education	X <sup>2</sup> - value	P-value
	Mean ± Std. Deviation	Mean ± Std. Deviation		
1.Signs and symptoms of covid19	12.24 ± 1.04	10.32 ± 1.24	<b>9.91</b>	<b>0.000**</b>
2.Less common signs and symptoms of covid19	4.52 ± 0.71	3.62 ± 0.73	<b>6.03</b>	<b>0.000**</b>
3.High risk group for covid19 infection	9.32 ± 1.43	7.24 ± 0.79	<b>9.23</b>	<b>0.000**</b>
4.Complications of covid19	7.76 ± 1.12	6.04 ± 0.60	<b>9.64</b>	<b>0.000**</b>

**\*\*:** Highly significant at P < 0.001

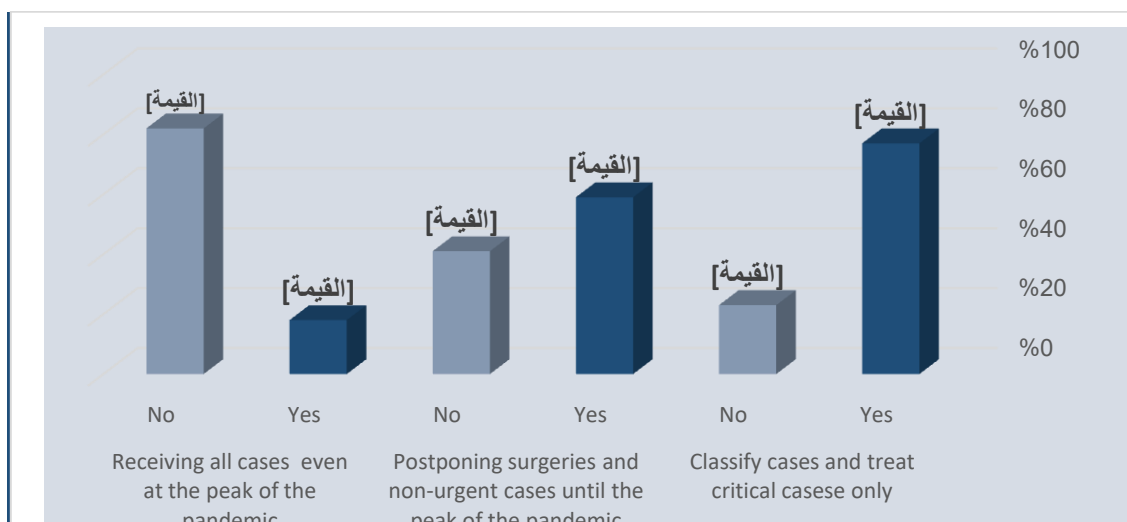
As regarding total mean scores of covid19 nurse's knowledge, this table explains that, highly statistically significant improvement in total nurses knowledge post-education than pre-education at p-level ≤ 0.05

**Table (5):** Covid19 nurses practice Mean ± Std. Deviation regarding Covid19 protective measures (N= 50)

Protective measures nurses practice	Pre education	Post education	X <sup>2</sup> - value	P-value
	Mean ± Std. Deviation	Mean ± Std. Deviation		
1. When you can perform hand wash?	3.94 ± 0.82	3.04 ± 0.19	<b>7.37</b>	<b>0.000**</b>
2.The best way to wash hands	5.12 ± 0.85	4.16 ± 0.37	<b>7.71</b>	<b>0.000**</b>
3. Where you can put indicative signs on how to wear personal protective wear?	2.32 ± 0.62	2.04 ± 0.19	<b>3.09</b>	<b>0.003*</b>
4. Where the patient's trash is can be placed?	1.40 ± 0.49	1.00 ± 0.00	<b>5.71</b>	<b>0.000**</b>
5.The best way of how to sneeze	1.12 ± 0.33	1.02 ± 0.14	<b>1.94</b>	<b>0.058</b>
6. Which of personal protective equipment you should wear when you work in quarantine hospital?	4.56 ± 0.64	4.24 ± 0.43	<b>3.05</b>	<b>0.004*</b>
7. Where the used PPE trash is can be placed?	1.64 ± 0.48	1.04 ± 0.19	<b>7.93</b>	<b>0.000**</b>
8. How to reduce health risks for health care providers?	4.06 ± 0.76	3.40 ± 0.57	<b>5.36</b>	<b>0.000**</b>
9. What are you wearing sequentially from PPE?	1.74 ± 0.44	1.18 ± 0.39	<b>7.32</b>	<b>0.000**</b>
10. What are you discard sequentially from PPE?	1.84 ± 0.37	1.04 ± 0.19	<b>14.00</b>	<b>0.000**</b>

**\*\*:** Highly significant at P < 0.001

Table (5) show highly statistically significant improvement in nurses practice post education than pre education in most items at p-level ≤ 0.05 with X<sup>2</sup>- value (7.37, 7.71, 3.09, 5.71, 3.05, 7.93, 5.36, 7.32&14.00) respectively.



**Figure (2):** Nurse's Opinion toward; what are the types of hospital health services during the peak of the epidemic?(N= 50)

Regarding nurses opinion toward the type of introduced health services this figure refers to majority of them in agreement with classify cases and treat critical cases only (77%)

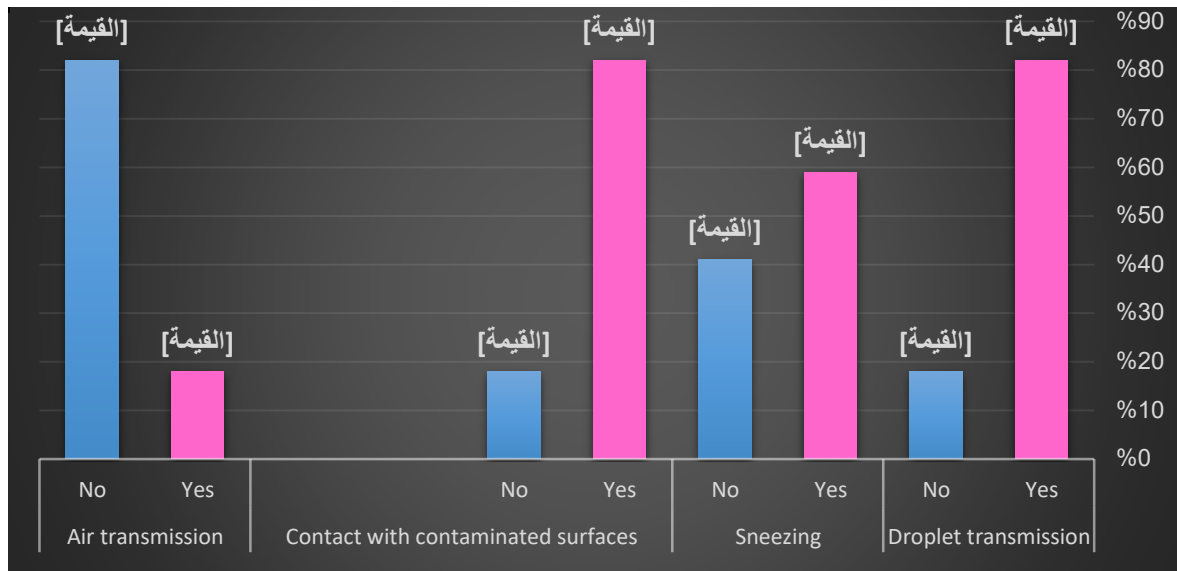


Figure (3): Covid-19 Mode of infection transmission

Figure (3) indicates that regarding covid19 mode of transmission majority of the study subject in agreement with droplet transmission and contact with contaminated surfaces (82%).

Table (6): Nurses opinion toward distance learning

Nurses opinion toward distance learning	Strongly agree		Agree		Fair		Don't agree	
	No	%	No	%	No	%	No	%
1. Satisfied with the scientific material presented via social media	8	16.0	25	50.0	12	24.0	5	10.0
<b>Mean ± Std. Deviation</b>	2.28 ± 0.86							
2. Distance learning is better than being in the classroom and training	9	18.0	18	36.0	16	32.0	7	14.0
<b>Mean ± Std. Deviation</b>	2.42 ± 0.95							
3. I interact well with colleagues and teachers through social media	4	8.0	25	50.0	18	36.0	3	6.0
<b>Mean ± Std. Deviation</b>	2.40 ± 0.73							
4. I learned well from the scientific material presented on the electronic media	9	18.0	18	36.0	21	42.0	2	4.0
<b>Mean ± Std. Deviation</b>	2.32 ± 0.82							
5. I really enjoy with distance education experience	2	4.0	23	46.0	21	42.0	4	8.0
<b>Mean ± Std. Deviation</b>	2.54 ± 0.71							
6. I can apply what I learn through different communication channels	0	0	25	50.0	21	42.0	4	8.0
<b>Mean ± Std. Deviation</b>	2.58 ± 0.64							
7. I feel comfortable studying at a distance because I am learning at my own pace and according to my abilities	9	18.0	12	24.0	20	40.0	9	18.0
<b>Mean ± Std. Deviation</b>	2.59 ± 0.991							

Regarding nurse's opinion toward distance learning, this table indicates that half of nurses are agree with distance learning of most questions while they don't agree with some items.

**DISCUSSION**

Concerning the age of the studied subjects, the results of the present study revealed that the majority of the studied nurses were 30 years and less. This result is consistent with **Saqlain et al., (2020)**, who identified the current status of knowledge, attitude, and practice regarding COVID-19 among health care workers in Pakistan, and denoted that the majority of the studied nurses were aged less than 30 years.

Regarding the gender, this study results showed that the majority of nurses were male. This result is congruent with **Saqlain et al., (2020)**, who reported that more than half of the nurses were male. Meanwhile, This result is in disagreement with **Semerci, Kudubes&Eşref (2020)**, who

assessed Turkish oncology nurses' knowledge regarding novel coronavirus (COVID-19) during the current outbreak in Turkey and reported that the most of the study sample was female.

Concerning level of education, the present study revealed that two-fifth of the study sample had a bachelor's degree. This result is incongruent with **Nemati, Ebrahimi&Nemati, (2020)**, who assessed the knowledge, attitude, and behavior of the nurses concerning COVID-19. and denoted that more than half of the study sample had a bachelor's degree.

As regards, previous infection control training and courses, more than two-thirds of the study sample had previous training of infection control. This result is congruent with **Shi, et al., (2020)**, who studied knowledge and attitudes of medical staff in two Chinese mental health centers during the COVID-19 outbreak and found that more than two-third of the nurses had training program about

infection control. In addition, this result goes in line with **Semerci, Kudubes&Eşref (2020)**, who reported that nearly half of the study sample had previous training of infection control.

Regarding the mode of transmission of COVID 19, the present study results showed that the majority of the study sample was agree, so that the transmission of COVID 19 is due to droplet transmission and contact with contaminated surfaces. This result is in agreement with **Giao et al., (2020)**, who assessed the knowledge and attitude toward coronavirus disease-2019 (COVID-19) among healthcare workers at District 2 Hospital in Ho Chi Minh City and declared that more than two-thirds of studied nurses knew that the transmission of COVID 19 was due to close contact with the infected person.

Also, this result is congruent with **Abdel Wahed et al., (2020)**, who assessed the knowledge, perception, and attitude of the Egyptian health care workers towards the COVID-19 disease, and found that the majority of nurses agree that the transmission of COVID 19 was due to droplet transmission.

Considering nurses' level of knowledge about signs and symptoms of COVID-19, the present study results revealed that the most of study sample had knowledge about fever, dyspnea, and cough that are the main clinical symptoms of COVID-19 pre and post-education. While, the majority of the study sample knew that diarrhea is the less common signs and symptoms of covid19. This result is congruent with **Olum et al., (2020)**, who studied knowledge, attitude, and practices of health care workers toward COVID-19 in Makerere University Teaching Hospitals in Uganda and denoted that most nurses had knowledge that fever and cough are the main clinical symptoms of COVID-19.

As regard nurses' level of knowledge about Complications of covid19, the present study results illustrated that the most of study sample had knowledge that pneumonia and breathing disorders are the most serious complication of COVID-19 pre and post-education. This result is in agreement with **Abdel Wahed et al., (2020)**, who found that the most of nurses had knowledge that pneumonia and respiratory failure are the most serious complication of COVID-19.

Considering nurses' level of knowledge about the high-risk group for covid19 infection, the present study results revealed that the majority of the study sample had knowledge that diabetic patients and immune disorders are high-risk groups for covid19 infection pre and post-education. This result is in agreement with **Saqlain et al., (2020)**, who declared that most of the nurses had knowledge that people with comorbidity like diabetes and hypertension are a high risk group for covid19 infection

As regard total mean scores of nurses' level of knowledge about COVID -19, the present study illustrated that there were high statistically significant improvement in total nurses' knowledge post-education than pre-education. This proves the effectiveness of distance learning on improving nurses' knowledge regarding COVID-19 and the booklet

which covered all identified needs and knowledge gaps about the topic among nurses. This finding is consistent with **Semerci, Kudubes&Eşref (2020)**, who found a statistically significant difference between the mean scores of nurses for their knowledge levels for COVID-19 in terms of receiving education on COVID-19.

Concerning nurses' level of practice about COVID 19, the present study illustrated that there were high statistically significant improvement in nurses' practice post-education than pre-education. This may be due to the effect of distance learning on enhancing nurses' performance regarding the COVID 19 pandemic. This finding is in accordance with **Ayed, Mahmoud & Kamal (2020)**, who evaluated the impact of a structured teaching program regarding COVID -19 on knowledge, attitudes, and practices of their study subject found a high statistically significant difference in total practice mean scores as pre/ post program implementation regarding COVID -19.

Regarding the nurse's opinion toward the type of introduced health services, the present study indicated that majority of them in agreement with classify cases and treat critical cases only. This may be due to COVID-19 is the world's pandemic, highly infectious, spread rapidly and also receiving all cases causing overload on health care provider and health setting as well as health services negatively affected.

Regarding nurses opinion toward distance learning, the present study indicated that nearly half of nurses agree with distance learning of most questions about (Satisfied with the scientific material presented via social media, interact well with colleagues and teachers through social media, enjoy with distance education experience, apply what I learn through different communication channels). This reflects the importance of the internet in promoting health, especially during infectious diseases and pandemics. Technology presence in these lock-down months plays an important role in providing knowledge and helps nurses continue their learning.

This finding is consistent with **Subedi et al., (2020)**, who assessed the impact of E-learning during the COVID-19 pandemic among Nursing students and teachers of Nepal. and found that most of the study sample were glad to be updated with digital technology used for taking class, also the majority of the study sample thought Online class saved time, they could involve in an online class as well as take care of their family at the same time, saved travel cost and decreased risk of an accident.

## CONCLUSION

There were high statistically significant improvement in total nurses' knowledge and practice post-education than pre-education. Also nearly half of nurses agree with implementing distance learning. The results of this study supported the hypothesis of the study that, implementing distance learning has a positive effect on nurses' knowledge and practice toward improving their knowledge and practice regarding COVID-19 pandemic.

## RECOMMENDATION

- This study results should be repeated with a larger probability sample size in a different geographic location to confirm the findings.
- Additional research using different training programs for nurses to be well prepared to provide patients with appropriate knowledge and practices about COVID-19 through verbal and written instructions.
- The Ministry of Health, hospital management, and nursing administration should support nurses with a comprehensive training curriculum comprising of a more structured approach to provide sufficient professional awareness of COVID-19.
- Nurses should follow evidence-based practices and guidelines regarding COVID-19 and these guidelines should be integrated into the patient's care

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