Effect of Nursing Educational Program on Nurses′ Knowledge and Practices regarding Pandemic Covid-19 in Isolation Unit

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Abstract

Background: Coronavirus infection (COVID-19) is a pandemic illness that is especially common in health-care setting, nurses' educational institution must take efforts to protect themselves and others throughout the outbreak by preventing, isolating, and caring for infected Covid-19 patients. As a result, a high-quality nursing education program positive improve the quality of nursing care. **Aim**: To investigate effect of nursing educational program on Nurses′ knowledge and practices regarding pandemic Covid-19 in isolation Unit and chest department. **Study design**: Quasi-experimental research design was utilized in this study**. Setting**: The study was conducted in isolation unit and chest department at Assiut University Hospital**. Sample:** A convenience sample of all available nurses working in isolation unit and chest department (30 nurses). **Tools:** Two tools were used for data collection, **Tool (I):** Critical care nurses' knowledge assessment questionnaire sheet, **Tool (II).** Critical care nurse's practices observation checklist tool. **Results:** the two stated research hypotheses can be supported with (p value<0.001**), nurses' total knowledge and total practices respectively should an improvement post educational program implementation and a positive correlation were found between them with (r =0.370 p value =0.044**). **Conclusion**: Application of educational program had statistically significant effect on knowledge and practices of nurses regarding caring of covid-19 patient. **Recommendation**: In-service training program for nurses are needed to keep their knowledge and practices up to date on the management of covid-19 patients.

Keywords: Nursing educational program, Nurses` knowledge and practices, Pandemic Covid-19.

Introduction

Coronavirus illness (COVID-19) is a pandemic disease brought on by a novel coronavirus strain. Which was unknown before the Wuhan outbreak, China, in December 2019. **El Zowalaty & Järhult, (2020).** Inoculation of mucosal membranes with virus-containing droplets and contact with droplet-contaminated surfaces of various materials and objects, which can operate as live-virus reservoirs for hours to days, make this disease highly contagious **Murthy, et al;(2020)**.

COVID-19 infection is becoming more common in the African continent, particularly in Egypt. COVID-19 has caused around 382,600 confirmed cases, over 9700 fatalities, and around 147,000 recoveries across Africa as of June 29, 2020, with approximately 24 percent of these cases coming from Egypt alone **(Africa CDC, 2020).**

The most common symptoms of COVID-19 are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, or sore throat. These symptoms are usually mild and begin gradually most people (about 80%) recover from the disease without needing special treatment, and for the majority – especially for children and young adults – illness due to COVID-19 is generally minor. However, for some people it can cause serious illness **Cucinotta &Vanelli (2020).**

Healthcare personnel, who will be treating and assisting coronavirus patients at all hours of the day and night, are among the most vulnerable to infection. One of the top goals in the response to COVID19 outbreaks is to safeguard vulnerable members. So, in healthcare facilities, occupational health services play a critical role in assisting, supporting, and ensuring that workplaces are safe and healthy, as well as addressing health issues when they develop. WHO emphasizes

health professionals' rights and obligations, including defined standards for maintaining occupational safety and health **Pfaar, et al (2021).**

Misunderstandings among nurses about the virus, its manner of transmission, and the essential steps to avoid infection as a result of this novel have delayed efforts to offer critical treatment in some cases, resulting in the rapid spread of infection in hospitals and putting patients at risk **Elshenawie, et al (2020)**.

COVID-19 knowledge, attitudes, and practices (KAP) are important in determining a nurse's willingness to adopt change initiatives. As a result, studies on KAP give a starting point for determining the type of intervention that may be required to modify public perceptions of the virus. It would also be beneficial to gain a better understanding of the condition in order to design preventive methods and health promotion programs **Azlan, et al; (2020)**

Nurses are the first line of contact with patients and a major source of infection in health-care settings; as a result, nurses are assumed to be at a high risk of infection. The WHO and the Centers for Disease Control and Prevention (CDC) published COVID-19 prevention and control recommendations for HCWs at the end of January. The WHO has also launched a number of online COVID-19 training sessions and materials in a variety of languages to help boost prevention initiatives, such as increasing awareness and training nurses in preparedness activities **Bhagavathula, et al (2020)**

Significance of the study

Nurses, in particular, have frequent contact with infected patients and play a critical role in infection management; as a result, nurses must enhance their knowledge and practices on how to avoid infection and limit the spread of COVID19 **Lababidi, et al (2020)**. Knowledge is the foundation for behavior change, whereas belief and attitude are the driving factors of behavior change. One of the basic competencies for nurses is the ability to provide competent care for covid-19 patients and preventing infection transmission **Zhou, et al (2020)**. The number of patients who have been hospitalized to isolation unit of chest department and mechanically ventilated was 440 patients at 2020 **Assuit University Hospital records (2020-2021).**This study aimed to assess the effect of educational program on knowledge and practice of nurses caring for covid-19 patients.

Aim of the study: include

General objective: To investigate Effect of Nursing Educational Program on Nurses' Knowledge and Practices regarding Pandemic Covid-19 in isolation Unit

Research hypotheses:

To fulfill the aim of the study, the following research hypotheses were formulated:

- Critical care nurses caring for COVID-19 patients who are exposed to the nursing educational program will have a higher posttest mean knowledge scores than their pretest mean knowledge scores.

- Critical care nurses caring for COVID-19 patients who are exposed to the nursing educational program will have a higher posttest mean practices scores than their pretest mean practices scores.

- There will be a positive correlation between knowledge and practice scores nurses caring for COVID-19 patients after application of educational program.

Subjects and Method

Research design;

A quasi-experimental research design with a one-group pre – posttest technique was utilized to conduct this study.

Study variable: -

Independent variable: The nursing educational program about covid-19

Dependent variables: Nurse's level of knowledge and practices about covid-19.

Setting;

This research was carried out in intensive care isolation unit and chest department at Assiut University Hospitals which consists of (7 rooms intensive care isolation unit, rooms containing11 beds & chest department 9 rooms

containing 24 beds in additional seminar room and control room, for observed nurses) .

Subjects and population:

A convenience sample of all available nurses working in ICU isolation unit and chest department (30 nurses. Their ages ranged from 18 and 35 and had varying degrees of nursing education level.

Sample size:

A convenience sampling technique was used to select participants. The sample size was 30 nurses that calculated using EpiCalc-2000 based on the following assumption: the proportion of good Knowledge 50%, level of confidence 95% and precision 5%, and design effect 1 to be 384.Then the sample size increased by 5% to overcome non-response. Confidentiality precautions were ensured during the data collection process.

Study Tools:

Two tools were used in this study: -

Tool (I)

Tool I: Critical care Nurses' knowledge assessment questionnaire sheet, developed by the researchers and covers two main parts. The researcher created this tool based on national and international relevant literature reviews. This tool was translated into Arabic and included two parts:

Part (1) **Demographic characteristics of nurses** developed by the researchers after conducting an exhaustive assessment of related literature**.** It comprised of four items: covers age, sex, education, and years of experience**.**

Part (2): Critical care Nurses' knowledge assessment questionnaire sheet (pre and posttest) as regarding the care of covid-19 patients in isolation unit and chest department **Rathnayake et al (2021).** It consists of six basic components. These were 69 questions covered in total, and they were as follows:

- Q from 5-19 are related to Define of COVID-19 , Mode transmission, incubation period, symptoms, risk groups, Diagnostic tests, treatment, Safety &Preventive measures and control of COVID-19 etc….) these questions covered the following15 items.

- Q from 20-29 are related to personal protective equipment (PPE), these questions covered the following 10 items.

- Q from 3o-39 are related to appropriate doffing and disposal of infected supplies, these questions covers the following10 items.

- Q from 40-49are related to care of acute respiratory distress syndrome during Covid19 these questions cover the following10 items.

- Q from 50-56 are related to airborne precautions such as aspiration or oxygen therapy of respiratory tract specimens, oxygen therapy, noninvasive ventilation, high flow nasal cannula, delivery of nebulizers, and intubation, these questions cover the following7 items.

- Q from 57-69 are related to definition of Mechanical ventilation, modes, indications, complications and alarms. these questions cover the following13 items.

Scoring system:

Each question received two grades for a complete accurate response, one score for a non-complete answer, and zero for an incorrect answer with a total score 138. Those who received a score of 70% or higher were having a "satisfactory" knowledge level and less than 70% was deemed unsatisfactory.

Tool (II); Critical care nurse's practices observation checklist: -

The observation checklist was developed by the researcher based on review of literature **World Health Organization (2020)** to assess the practical aspects of the basic nurses' procedure about care of covid-19 patient. It consists of 108 item covering 8 main areas as following: -

- Applying Hand washing and personal protective equipment cover the following 8 items.

- Appropriate doffing and disposal of personal protect equipment cover the following 5items.

- Application of universal precautions and environmental precautions cover the following16 items.

- Applying daily care for oxygen therapy, noninvasive ventilation, high flow nasal cannula, and the intubated patient cover the following20 items.

- Caring for a patient suction and mechanical ventilator cover the following18 items.

- Implementing nursing care during nasogastric tube insertion cover the following15 items.

- Applying care of patients during arterial blood gas puncture. cover the following16 items.

- Implementing Central venous pressure monitoring cover the following10 items.

Scoring system: Each item, scored as following: two degrees for each step that was done correct, one degree for each step done but incorrect method and zero for step that was not done. with the total score138 for all the steps. that was less than (70%) were considered inadequate practices level. (70%) or above were considered adequate practice level.

Methods:

The study was conducted on three phases (preparatory phase, implementation phase and evaluation phase)

Preparatory phase

This phase involved:

- Preparation of the data collection tools which was developed by the researchers based on reviewing the relevant literature

- **A pilot study** was conducted with 10% of the nurses in the sample to ensure that the study tools were clear and understandable, as well as to make any required changes prior to data collection. The pilot study was done to estimate the amount of time it would take to complete the study tools

some modifications were done so the pilot study nurses were excluded from actually study sample.

- A group of nurses was removed from the study sample and replaced by another group of nurses.

- **Reliability** of the adapted tools had been done after reviewing literature using Cronbach´s coefficient alpha test (0.790)

- **Content validity:** was done by a jury of five in the fields of critical care nursing and medicine experts at Assiut University Hospital.

Ethical considerations: Research program was approved from ethical committee in the faculty of nursing and Assiut University Hospital. Written consent was obtained from nurses after explaining the nature and purpose of the study. Confidentiality and anonymity were assured.

The study nurses had the right to refuse to participate and/or withdraw from the study without any rationale at any time. Official permission was obtained from the Dean of Faculty of Nursing, Assiut University, and the Chairman of the isolation unit of chest department, Assiut University Hospital.

The nursing educational program, hand out, teaching material, power point video ,internet , journals were created after the researchers reviewed the literature and based on the needs identified by the nurses following the pre-test. It was written in a simple Arabic language and supplied with photos and illustration to help the nurses to understand the content. To create the program, the following procedures were taken:

- Outlining the program's overall and specialized goals.

- Program planning: the material of the program was divided into five sessions, plus a preliminary one.

The content of the program covered two parts related to Data collection tools

Theoretical part included:

- Definition of infection and covid-19, Causes, mode of Covid-19 transmission,

incubation period, symptoms, diagnostic method, Preventive measures and Treatment of Covid-19 infection.

- Applying Safety &Preventive measure for covid-19 include hand washing and types of protective precaution, wearing mask N95, coverall, gown and apron, internal and external gloves during care of patient, changing gloves between tasks and between patient

- Applying airborne precautions when performing aerosol-generating procedures (aspiration or suctioning of respiratory tract specimens, oxygen therapy, noninvasive ventilation, high flow nasal cannula, and the intubated patient, delivery of nebulizer.

- Appropriate doffing and disposal of personal protect equipment. External gloves are the initial step in removing protective equipment after the end of the shift, followed by apron, gown, and coverall. The interior gloves are then washed in diluted chlorine for the third phase. Remove the face shield, glasses, and helmet in the fourth step. Remove the internal gloves and hand cleaning at the end of the procedure, as well as the mask and hand washing.

- Care of acute respiratory distress syndrome during Covid19

- Mechanical ventilation definition, modes, indications, management, complications and alarms.

Practical part included; covered procedures

- care of acute respiratory distress syndrome covid-19 patients

- suctioning procedure

- C.V.P line measurement care.

- oral airway insertion procedure.

- nasogastric tube insertion.

- Nursing care of patients' pre, during and post endotracheal tube insertion

- Care of patients during arterial blood gases puncture and interpretation.

Learning environment:-

The program was conducted at the seminar room in educational program**.** It was written in a simple Arabic language and teaching supplied with photos, journals, hand out, videos.

Implementation phase:

- Once permission was granted to precede with the proposed study the researcher-initiated data collection.

- Data was collected from isolated unit and chest department at Assiut university hospital.

- At the beginning Interview of the researcher introduced initiated line of communication. Nurses were approached in small groups to filled out

- The Interview knowledge assessment test filled after the purpose of the study explained to the nurse before answering the question-using tool (I) "1st and 2nd parts".

- An observational checklist were filled out for each nurses during each procedures to carry out the preprogram practice test giving care for covid-19patients in the morning and afternoon shift tool using (II).

- Each nurse was involved in the study assessed for knowledge, using tool (I) and practice using tool (II) twice times each nurse during each procedure to pre and post program implementation.

The researchers schedule the sessions of the educational program. The nurses were divided into small groups according to suitable time and readiness to present session. Each group was consisted of 5-6 nurses. The educational program includes five sessions in addition to the preliminary one. Each session took 30-45 minutes.

This training program was carried out inside at intensive care unit the seminar room and control room.

The researcher observed nurses in the Control room of isolation, using camera with infection control team.

o **Preliminary session:** In this session, it contains orientation of the program and participants, distribute and fill the present sheet (30 minutes)

o **Session I include:** Definition of infection, covid-19, modes, incubation period and symptoms (30 minutes).

o **Session II include:** Demonstrate of nursing care of acute respiratory distress syndrome during Covid19 and all protective measures (30 minutes).

o **Session III include:** Demonstrate of arrangement removes of protective equipment (30 minutes).

o **Session IV include:** Nursing care of intubated patient; close suction, ABGs and ideal use of imbue bag, Different methods of Airway insertion, nasogastric tube insertion, endotracheal tube insertion preparation, (45 minutes).

o **Session V include:** Chest physiotherapy, C.V.P measurement and benefits of change patient's position (45 minutes)

• Group discussion was encouraged with continuous feedback to ensure understanding and achievement of specific objectives of the program.

• Picture and video clips about the procedures were used in sessions for demonstration.

• In the last session, the researcher summarized and emphasized the important points.

• After completion of the educational program, every nurse received a copy of the booklet and another copy given to the head nurse of chest departments and infection control team as a guide in these departments.

Evaluation phase

Every nurse included in the present study was evaluated by researcher through control room via camera twice daily, using tool (I) and tool (II) before the implementation of the educational program, immediately after

application of the program to test the effectiveness of the program on nurse's knowledge and practices.

The implementation of the program took 6 months from the start of data collection to its session's termination with the last participant.

Statistical analysis

The data were tested for normality using the Anderson-Darling test and for homogeneity variances prior to further statistical analysis. Categorical variables were described by **number and percent** (N, %), where continuous variables described by mean and standard deviation **(Mean, SD)**. **Chi-square test** and fisher exact test used to compare between categorical variables where compare between continuous variables by **t-test** \and **ANOVA TEST**. **A two-tailed p < 0.05** was considered statistically significant. We are used person Correlation to Appear the Association between scores. All analyses were performed with the **IBM SPSS 20.0** software.

Results

Table (1): According to the demographic data of the investigated nurses, 53.3 percent of them were under the age of 24 years, and 73.3 percent had a technical institute diploma, and 26.7 percent had a bachelor's degree in nursing, and the majority of the nurses (73.3 percent) were female. Furthermore, the majority of the nurses (60%) had fewer than five years of experience. Also, Sixty percent of the participants have already completed training courses.

Table (2): displays the knowledge of nurses about Covid19 before and after the education program. After completing the education program, participants' knowledge of Covid19 data improved significantly. In addition, the majority of nurses gave complete answers to questions

Table (3): displays the knowledge of nurses regarding safety preventive measure for coronavirus (covid-19) isolation precaution before and after the education program. After completing the education program, participants' knowledge of safety preventive measure for coronavirus (covid-19) data improved significantly.

Table (4): displays the knowledge of nurses regarding caring for covid-19 Patients with of acute respiratory distress syndrome before and after the education program. After completing the education program, participants' knowledge of Caring for covid-19 Patients with of acute respiratory distress syndrome improved significantly.

Table (5): illustrates that the total score for nurses' knowledge level in pre-test and post-test showed statistically significant differences between nurses' knowledge categories. majority of studied nurses 93.3% were satisfactory after the educational program compared to 13.3% satisfactory level only before the educational program, with statically significant differences (p <0.05).

Table (6): presents distribution observation checklist of nurse's Practice regarding to personal protective equipment in the isolated room before and after education program. After completing the education program, participants' practice of personal protective equipment in the isolated room improved significantly

Table (7): illustrates that the total score for nurses' practices level in pre-test and post-test showed statistically significant differences

between nurses' practices categories indicating adequate practice level after the educational program compared with practice before the educational program. Also the majority of studied nurses (83.3%) were adequate practices the skills during patients care after the educational program, compared to only 16.7% adequate practices level score before the educational program implementation with statistically significant differences (p <0.05).

Table (8) shows the correlation between total score of nurses' knowledge and practice before and after the educational program; there was a significant positive correlation between the score of knowledge and the score of practice with statically significant differences (p <0.05)

r= from 0.171 in pretest to 0.370 in post test

p= from 0.365in pretest to 0.044*in post test

Figure (1): shows the correlation between total scores of nurses' knowledge and practices before and after the educational program; there was a significant positive correlation between the scores of knowledge and the scores of practices with statistically significant differences with p value (0.044**)

Table (1): Demographic characteristics of the studied nurses (n=30)

Demographic characteristics of the studied nurses	No	%
Age		
18 ≤ 23 years	16	53.3
24- 35 years	14	46.7
Education		
Nursing technical institute	22	73.3
Nursing bachelor degree	8	26.7
Gender		
Female	22	73.3
Male	8	26.7
Years of experience:		
< 1	6	20.0
1 < 5	18	60.0
5 – 10	6	20.0

- Independent t-test   ** Significant difference at p. value<0.05

Table (2): Percentage distribution of nurse's knowledge about Covid19 before and after education program

Nurse's knowledge about Covid19	Pre		Post		P. value
	No	%	No	%	
Definition ofCovid-19					
Incorrect	8	26.7	4	13.3	
incomplete	16	53.3	8	26.7	0.007**
Complete correct	6	20.0	18	60.0	
Mode of Covid-19 transmission					
Incorrect	4	13.3	2	6.7	
incomplete Correct	22	73.3	14	46.7	0.018*
Complete correct	4	13.3	14	46.7	
Incubation period for Covid-19					
Incorrect	8	26.7	0	0.0	0.002**
Complete correct	22	73.3	30	100.0	
Symptoms of Covid-19 infection					
incomplete Correct	28	93.3	6	20.0	<0.001**
Complete correct	2	6.7	24	80.0	
Safety &Preventive measure for covid-19					
incomplete Correct	20	66.7	4	13.3	<0.001**
Complete correct	10	33.3	26	86.7	
Diagnostic method to detect (covid-19)					
Incorrect	4	13.3	0	0.0	
incomplete Correct	16	53.3	6	20.0	0.001**
Complete correct	10	33.3	24	80.0	
Management protocols of covid-19					
Incorrect	8	26.7	0	0.0	0.002**
Complete correct	22	73.3	30	100.0	
Total					
Incorrect	12	40.0	0	0.0	
incomplete Correct	12	40.0	0	0.0	<0.001**
Complete correct	6	20.0	30	100.0	

Chi-square test * Significant difference at p. value<0.05, ** Significant difference at p. value<0.01

Table (3): Percentage distribution of nurse's knowledge regarding safety preventive measure for coronavirus (covid-19) pre and post implementation of educational program

Items	Pre		Post		P. value
	No	%	No	%	
Types of protective precaution					
Incorrect	2		0		
incomplete Correct	15		3		<0.001**
Complete correct	13		27		-
Wearing mask N95 during work					
Incorrect	30	100.0	4	13.3	
incomplete Correct	0	0.0	6	20.0	<0.001**
Complete correct	0	0.0	20	66.7	
Wearing & removal coverall, gown , gloves and apron during work					
incomplete Correct	14	46.7	4	13.3	0.005**
Complete correct	16	53.3	26	86.7	
Wearing internal and external gloves during caring of patient					
incomplete Correct	14	46.7	4	13.3	0.005**
Complete correct	16	53.3	26	86.7	
Remove face shield , eye glasses and overhead , internal gloves and hand washing					
incomplete Correct	14	46.7	4	13.3	0.005**
Complete correct	16	53.3	26	86.7	
Total					
Incorrect	4	13.3	0	0.0	
incomplete Correct	16	53.3	2	6.7	<0.001**
Complete correct	10	33.3	28	93.3	

-Chi-square test * Significant difference at p. value<0.05, ** Significant difference at p. value<0.01,

Table (4): Distribution of nurse's knowledge Caring for covid-19 Patients with of acute respiratory distress syndrome (ARDS) before and after education program

Items	Pre		Post		P. value
	No	%	No	%	
Definition of ARDS					
Incorrect	20	66.7	4	13.3	<0.001**
Correct	10	33.3	26	86.7	
Signs &symptoms of ARDS					
Incorrect	20	66.7	6	20.0	0.001**
Correct	10	33.3	24	80.0	
Treatment of ARDS					
Incorrect	24	80.0	4	13.3	<0.001**
Correct	6	20.0	26	86.7	
Use of high flow nasal cannula control version is very important in treating covid19 ARDS					
Incorrect	16	53.3	6	20.0	0.007**
Correct	14	46.7	24	80.0	
Prone ventilation appears to be beneficial during covid19 ARDS					
Incorrect	14	46.7	6	20.0	0.028**
Correct	16	53.3	24	80.0	
Oxygen saturation by nasal cannula to achieve Spo2 >92%					
Incorrect	20	66.7	4	13.3	<0.001**
Correct	10	33.3	26	86.7	
Mechanical ventilation (definition, modes , complications and alarms)					0.038*
Incorrect	4	13.3	0	0.0	
Correct	26	86.7	30	100.0	
Total					
Incorrect	28	93.3	1	3.3	<0.001**
Correct	2	6.7	29	96.7	

Chi-square test * Significant difference at p. value<0.05, ** Significant difference at p. value<0.01,

Table (5): Comparison between nurse's knowledge score levels before and after implementation of educational program

Nurse's knowledge about Covid19	Pre		Post		P. value
	Mean ±SD	Knowledge Level	Mean ±SD	Knowledge Level	
Definition of infection, covid-19, modes, incubation period and symptoms)	10.73±2.45	Unsatisfactory	15.73±1.74	Satisfactory	<0.001**
Safety &Preventive measure for coronavirus disease (covid-19)isolation precaution	8.13±1.38	Unsatisfactory	10.93±1.36	Satisfactory	<0.001**
Removal & disposal of protective equipment	2.53±1.38	Unsatisfactory	4.13±0.78	Satisfactory	<0.001**
Care of ARDS during Covid19	2.8±1.3	Unsatisfactory	5.93±0.83	Satisfactory	<0.001**
Use of high flow nasal cannula mechanical ventilation	6.2±2.44	Unsatisfactory	11.07±1.8	Satisfactory	<0.001**
Total Knowledge Score	30.40±5.69	Unsatisfactory	47.80±3.33	Satisfactory	<0.001**

- Independent t-test **   Significant difference at p. value<0.01

Table (6): Distribution of nurse's practice before and after implementation of educational program regarding to personal protective equipment during caring of patients with covid19

Items	Pre		Post		P. value
	No	%	No	%	
Identify and gather the proper PPE to done.					
Not done correct	4	13.3	1	3.3	
incomplete done Correct	20	66.7	14	46.7	0.035*
Done correct	6	20.0	15	50.0	
Perform hand hygiene using hand sanitizer.					
Not done correct	10	33.3	3	10.0	
incomplete Correct	6	20.0	2	6.7	0.012*
Done correct	14	46.7	25	83.3	
Put & remove isolated gown					
Not done correct	14	46.7	4	13.3	
Incomplete done Correct	16	53.3	17	56.7	0.001**
Done correct	0	0.0	9	30.0	
put& remove mask N95					
Not done correct	16	53.3	7	23.3	
Incomplete done Correct	0	0.0	2	6.7	0.031*
Done correct	14	46.7	21	70.0	
Put & remove face shield or goggles.					
Not done correct	10	33.3	3	10.0	
Incomplete done Correct	18	60.0	18	60.0	0.016*
Done correct	2	6.7	9	30.0	
Put & remove gloves.					
Not done correct	13	43.3	4	13.3	
incomplete Correct	10	33.3	14	46.7	0.034*
Done correct	7	23.3	12	40.0	
Prepare equipment to provide patient care					
Not done correct	2	6.7	2	6.7	
Incomplete done Correct	24	80.0	15	50.0	0.033*
Done correct	4	13.3	13	43.3	
take prepare equipment and enter isolated room					
Incomplete done Correct	13	43.3	4	13.3	0.020*
Done correct	17	56.7	26	86.7	
Safe waste disposal					
Incomplete done Correct	17	56.7	5	16.7	<0.001**
Done correct	13	43.3	25	83.3	

-Chi-square test   * Significant difference at p. value<0.05,   **Significant difference at p. value<0.01,

**Table (7):** Comparison between nurse's practice score level before and after implementation of educational program

Items	Pre		Post	
	Achieved Points	Score Level of Practice	Achieved Points	Score Level of Practice
personal protective equipment	8.4(52.5%)	Inadequate	11(68.8%)	Inadequate
arrangement to remove personal protect equipment	26.4(62.9%)	Inadequate	34.8(82.9%)	Adequate
universal precautions	6.1(50.6%)	Inadequate	10(83.6%)	Adequate
Caring for a Patient on Mechanical Ventilator	20.3(72.5%)	Adequate	22.8(81.3%)	Adequate
Endotracheal suctioning:	23.3(64.7%)	Inadequate	28.4(79%)	Adequate
Nasogastric tube insertion	19.3(64.4%)	Inadequate	24.2(80.8%)	Adequate
Caring for respiratory distress syndrome covid-19 patients	4.6(57.1%)	Inadequate	7(87.1%)	Adequate
Oxygen therapy, noninvasive ventilation, high flow nasal cannula,	22(68.7%)	Inadequate	26.2(82%)	Adequate
Arterial puncture for blood gas analysis	26.5(66.3%)	Inadequate	33.2(83%)	Adequate
Central venous pressure monitoring:	16.4(82.2%)	Adequate	18.3(91.5%)	Adequate
Total Practice Scores	**146.8(65.5%)**	**Inadequate**	**182.8(81.6%)**	**Adequate**

- Independent t-test   **** Significant difference at p. value<0.**

Table (8): Correlation Co-efficient between knowledge Scores and Practice Scores before and after implementation of educational program.

Correlation	Practice Score Level	
	R	P
Knowledge Scores		
Before educational program	0.171	0.365
After educational program	0.370	0.044*
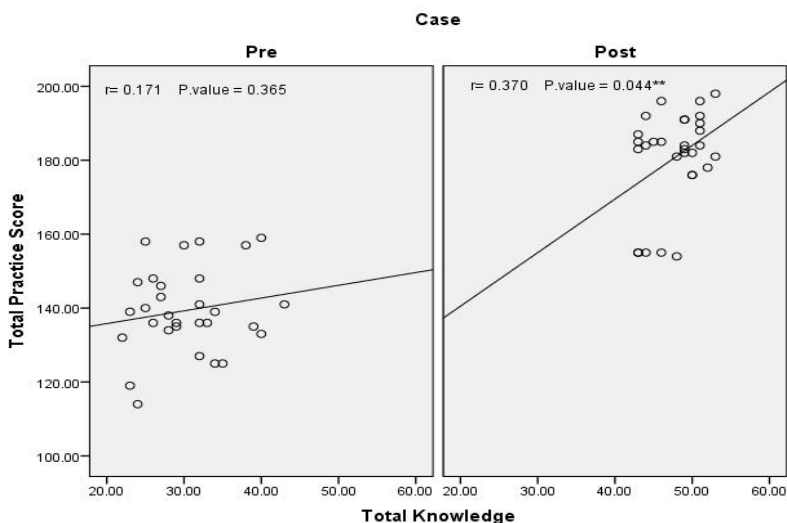
Figure (1): shows a positive correlation were found between them with total scores of nurses' knowledge and practices after the nursing educational program

Discussion

COVID-19's rapid spread poses a serious threat to human health and is having a significant influence on public health, global communications, and economic systems around the world. Nurses play an important role in healthcare teams that are tasked with controlling and preventing the spread of infectious diseases. Nurses also work on the front lines, providing direct care to COVID-19-infected people. **(Chen, et al 2020).** Teaching programs for nursing staff are critical in supporting staff nurses in developing and improving the skills they need to offer high-quality care to their patients. **(Slater et al., 2018)**

This discussion will cover the main result findings as follow:

Demographic characteristics of studied nurses:

More than half of the nurses investigated were under the age of 24, the majority had a technical institute diploma, and the majority of the nurses were female. Furthermore the majority of the nurses (60 percent) had less than five years of experience.

This is not the same as **Nemati et al (2020)** study, which showed nurses as participants. The bulk of the participants in the study were female. Majority of them were under the age of 40 years. In terms of educational attainment, more than half of them had associates or bachelor's degrees, while fewer had master's degrees. More than third of the participants had fewer than five years of job experience.

Saadeh and colleagues, (2020). Who researched "Knowledge, attitudes, and behaviors about the coronavirus disease 2019 (COVID19) among 311 nurses in Lebanon" found that about three-quarters of them were female, and the majority had a bachelor's or master's degree

Regarding nurse's knowledge about Covid19: The majority of result in regarding assessment nurse's knowledge about Covid19 had significant differences between pretest and post-test after educational program. The researcher suggest that inadequate pretest knowledge due to Covid19 was new pandemic disease

Our study in consistent with **Shabaan et al (2021)** who cleared that three-quarters of the study sample had a sufficient level of knowledge prior to the education program, while the entire study sample had a suitable level of knowledge after the training program, with a very significant difference.

These findings corroborate those of **Elgzar et al. (2020)** who found significant differences between control and intervention groups in their awareness and all health belief model variables related to COVID19 after the intervention.

Elshenawie et al (2020) illustrated the mea total score of Nurses Knowledge regarding care for patients with COVID-19 improved post implementing educational program with positive statistical significance difference.

But, disagreement with the study by **Nemati et al (2020**) titled "Assessment of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran". They reported that nurses had almost adequate knowledge related COVID-19 at pre assessment

Regarding nurse's knowledge about safety Preventive measure for (covid-19) isolation precaution:

In our Study, The majority of result in regarding to assess nurse's knowledge about Covid19 had significant differences between pretest and post-test after educational program. The researcher suggest that inadequate pretest knowledge due to familiar nursing precaution not new Preventive measure for (covid-19) isolation developed by WHO

As European Centre for Disease Prevention and Control **ECDC (2020)**. PPE for COVID is divided into four categories: respiratory, eye, body, and hand. Providers should wear a filtering face piece respirator when performing medical care. Cloth masks are not advised. Additionally, goggles that fit the user's face contours and are compatible with the respirator should be used. Finally, long-sleeved water-resistant gloves and a gown should be worn.

Elnadi et al (2019) reported that knowledge and practice study aids nurses in developing policies by providing a greater grasp of the existing situation, barriers, and solutions. The majority of respondents had a decent had a satisfactory knowledge level about the disease and how to prevent it. This is due to the fact that both countries have a highly educated populace (bachelor's and master's degree holders).

Elasrag and colleagues, (2021)The current study found that one tenth of the nurses studied had high knowledge and more than two-thirds had poor knowledge before intervention, while slightly more than three-quarters of them had good knowledge after intervention and fewer than one tenth had poor knowledge.

Regarding nurse's knowledge about disposal and removal of protective equipment:

Our study revealed that the majority of result in regarding to assess nurse's knowledge about disposal and removal of protective equipment had significant differences between pretest and post-test after educational program. The researcher suggest that inadequate pretest knowledge about disposal and removal of protective equipment due to Changing nurses every two weeks to fill the deficit in the ICU isolation unit.

According to Ugochukwu &Onyejinaka (2019) frequent training of health professionals on the proper use of personal protective equipment (PPE) will protect nurses and reduce infection spread.

Government of Canada. Infection Prevention and Control for covid19 (2020) mentioned that All PPE, except the N95 respirator (if used for an AGMP), should be removed before leaving the patient's room and discarded into a no-touch receptacle. The N95 respirator (if used) should be removed after leaving the patient's room and optimally discarded into a no-touch waste receptacle (see below for potential considerations for safely reusing N95 respirators). Hand hygiene should be performed after removing gloves and gowns, before removing facial protection, and upon exiting the patient's room and removing the N95 respirator (if used). Handling linen,

dishes, cutlery, and waste management require no special precautions beyond routine practice.

Regarding nurse's knowledge about care of acute respiratory distress syndrome during Covid19:

The majority of the results in regards to assessing nurses' knowledge of Covid19 had significant differences between pretest and post-test after educational program, according to our research.

Klaiman et al. (2021) identified five broad themes of determinants of evidence-based use of prone positioning for severe ARDS, as well as a number of particular interventions to address these issues. These measures may be feasible to deploy quickly in order to improve the usage of prone positioning for COVID-19-induced severe ARDS.

Regarding to nurse's Knowledge about mechanical ventilation (MV) before and after the educational program:

The pandemic of COVID-19 resulted in a large increase in the number of ventilated patients in hospitals around the world. Hospitalized mechanical ventilation management necessitates specialized skills, knowledge, and experience, which are often supplied by intensive care teams. As a result of this increase, there is an immediate need to increase the number of healthcare providers who are qualified to treat patients Sela, et al. (2020).

In this study, there were significant improvement regarding total levels of nurses' knowledge about mechanical ventilation after intervention of educational program when asking about definition, indication and complication. The researcher suggest that inadequate pretest knowledge about mechanical ventilation due to new protocol for mechanically ventilated Covid patient.

Nurses must be knowledgeable about the function and limitations of ventilator modes. It is essential that nurses thoroughly understand the basics of ventilator support, including ventilator modes, settings, and alarms. Only a brief review of commonly used ventilation modes and basic operation is provided; interested readers are referred elsewhere for

more in-depth information **Al-Gunaid, (2020).**

Skills assessment of the studied nurses

Slater et al., (2018) who reported that teaching programs for nursing staff play an important role in assist in staff nurses in developing and enhancing their skills needed to provide high standards of care to their patients. This agreed with the present study as nurse's knowledge and practice improved after implementation of the nursing educational program.

The present study showed that the total score for nurses' practices level in pre-test and post-test showed statistically significant differences between nurses' practices categories indicating adequate practice after the educational program compared with practice before the educational program. This was in the same line with **Koo et al., (2016) who** revealed that improvement in nurses' practice after the attendance of continuing nursing education sessions. Research findings indicated that nursing education programs improve knowledge, practice and attitudes.

Our study agree with the findings of **Elshenawie et al (2020)** who cleared that the mean total score of nurses practice regarding care for patients with COVID-19 significantly improved post implementing educational program compare with before

But not in the line with findings of the study titled "Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia" carried out by **Asemahagn (2020**) who reported that participants had good practices towards COVID-19

Regarding relationship between the total nurses' knowledge score and their practice scores:

The current study demonstrated that there was a highly statistical significant difference in knowledge and practice after giving the educational program. This study was in the line with **Ozekcin et al., (2015)** who expressed that the nursing care educational programs established to be effective in improving the

knowledge and practice among staff nurses. Moreover **Elasragand colleges (2021)** cleared that there was highly positive correlation between nurses' knowledge and practice

The current research finding was in agreement with **Saqlain et al. (2020),** in study about "Knowledge, attitude, practice and perceived barriers among health-care professionals regarding COVID-19" found a positive correlation between knowledge, attitude, and practice

Moreover, **Zhang et al. (2020)** who investigated Knowledge, attitude, and practice regarding COVID-19 among health-care workers in Henan, mentioned that knowledge affects the practice of preventive measures.

Our study agree with the findings of **Elshenawie et al (2020**) who showed the correlation between knowledge, attitude & practice of studied nurses regarding safety measures guidelines in caring patients with COVID-19 post-implementation phase after two months passed. There was a positive correlation between studied nurses' knowledge toward the safety measures guidelines and their practice

Also, agreement with the study done by **Wahed and colleges (2020)** who stated that there was positive correlation between knowledge and attitude scores when studied knowledge, attitudes, and perception of health care workers regarding COVID-19.

Finally, the findings of the present study supported the research hypothesis that nurses working emergency unit who are exposed to teaching program about Covid19 will show high score of knowledge and practice after test (posttest) than that before (pretest).

Conclusion

Based on the outcomes of the current research, it can be concluded that Nurses caring for COVID-19 patients who attend nursing educational should positive improvement more knowledge and practices than they did before.

Recommendations

- Continuous nursing education and in-service training programs of nurses should be organized within Assiut

University Hospital and equipped with the necessary educational facilities and materials necessary to upgrade the knowledge and practice of nurses, which will improve nursing care offered and patients' outcome.

- Reapplication on based study is recommended on a larger probability sample acquired from different geographical areas in Arabic republic Egypt .

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