

Effect of Training Program About COVID-19 on Staff Nurses' Resilience

Salwa Ibrahim Mahmoud ¹, Fawzia M.M. Badran ², Heba Ali Hassan ³

⁽¹⁾ Assistant Professor of Nursing Administration, Faculty of Nursing, Banha University, Egypt. e-mail:

^(2,3) Assistant Professor of Nursing Administration, Faculty of Nursing, Ain Shams University, Egypt. e-mail:

Abstract

Background: Universally, nurses are a major force in the fight against COVID-19 which may have been reflected in nurses' resilience affects the quality and safety of the care for patients afflicted with the virus. **Aim:** This study aimed to evaluate the effect of a training program About COVID-19 on staff nurses' resilience. **Design:** A quasi-experimental one-group pretest-post-test design was conducted in this study. **Setting:** Banha University Hospital. **Subjects:** A simple random sample of 150 staff nurses. **Tools:** Data for this study were collected by using two tools, namely: knowledge, attitude, and practice (KAPs) concerning the COVID-19 questionnaire, and the resilience scale for nurses. **Results:** This study revealed that staff nurses' knowledge, attitude, and infection prevention practice regarding COVID-19 during the post- and follow-up interventions were improved. Also, the staff nurses' resilience level at the post- and follow-up intervention was increased. **Conclusion:** Implementation of the training program about COVID-19 will highly significant positively effect on nurses' resilience, through the program. **Recommendations:** Conduct continuous and updating training programs for staff nurses' and health care providers' knowledge, attitude, and practice during COVID-19 pandemic and evidence-based resilience interventions.

Keywords: COVID-19, Resilience, Staff Nurses, Training Program

Introduction

Coronavirus disease (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Most people infected with COVID-19 experience mild to seriously ill respiratory illness. COVID-19 is highly transmissible and deadly. (Guan et al., 2020). The World Health Organization (WHO) deemed COVID-19 to be a pandemic on March 11, 2020, citing the virus's high propensity for infection and dissemination (WHO, 2020).

Globally in healthcare settings, most healthcare professionals are nurses, who serve as the first point of contact with patients and play a vital role in the COVID-19 pandemic. Every nation views nursing as a primary priority and a skilled profession for both preventing illness and providing nursing care both during and after the treatment of COVID-19(WHO, 2020).

In the early stages of the pandemic nurses' lack of readiness, carelessness, and lack of knowledge were the main causes of the quick spread of infection. Thus, the nursing profession is facing challenges in coping with the pandemic which poses a health risk and impacts the cognitive, emotional, behavioural, and physical status of nurses. Also,

determining which interventions and tactics to meet the complex care needs of patients. (Zhang, 2020).

A further factor in the spread of COVID-19 is a lack of awareness regarding the risks and appropriate actions in response to infectious diseases impedes the effectiveness of response mechanisms (Dawson,2020, Ye, 2020).

Nurses involved in COVID-19 interventions are key players in stopping the pandemic with specific infection prevention practices by provision of protective gear and an adequate healthy work environment to manage the outbreak such as resilience, and mental health among nurses (Adams J., and Walls R, 2020, Chen X.,2020 and Fawaz M, et al.2020).

The knowledge, attitudes, and practices (KAP) of COVID-19 play a critical role in determining nurses' readiness to embrace change initiatives and adhere to infection control measures by evaluating the nurses' KAP related to the virus and developing educational programs for health promotion, preventive measures and improving the quality of nursing care related to complexity, misconceptions, modes of transmission, and preventive measures regarding the virus and

unpredictable work environment. Finally, alongside preparing for future pandemic waves (Abd Elaziz, M. et al. 2021, and Modi et al., 2020).

Universally, nurses are a major force in the fight against COVID-19 so, resilience, and mental health among nurses, in addition to, the quality and safety of nursing care may be influenced. (Afshari, Nourollahi-Darabad, &Chinisaz,2021). Resilience can be interpreted as the ability to challenge or adapt to the experience of adverse situations which makes health organizations develop the ability of nurses to adapt to changes and play a fundamental role in maintaining and progressively developing mental health. As well as mitigating the negative effects of nurses' stress by making as the part key to achieving organizational and personal success (Cai, et al.,2019; Lyu, et al.,2020)

The unpredictable situation impacts mental and emotional well-being (Zhang WR, et al.,2020) and increases stress and anxiety among nurses (Labrague LJ., and de Los Santos JAA,2021). In addition to, long working hours, limited availability of personal protective equipment, fear of transmitting the virus, and the stress of making ethical and moral decisions relating to prioritization of care. Continuous exposure to stressors may exceed nurses' coping skills and impose on work performance. Personal resilience is a crucial prerequisite for nurses' endurance in the same situations (Braquehais MD, et al. 2020 and Ruiz-Fernandez MD, et al., 2020).

At the peak of the crisis caused by the coronavirus, indicators revealed that nurses with adequate levels of resilience coped with the pandemic, resulting in lower levels of nurses' anxiety, post-traumatic stress, emotional exhaustion, and depression and finally, ultimately safety of patient care. As a result, many hospitals have enhanced training programs to gain knowledge develop positive attitudes toward work and improve nursing care practice to increase the level of nurses' resilience when providing health care (Zhang,2021).

Significance of the study:

Nurses recover from trauma during the COVID-19 pandemic by practicing resilience, which is the capacity to diminish the effects of a stressful event through anticipation and preparation. Nursing professionals' mental health can be protected, and resilience scores can rise with training to increase nurses' confidence and enhance the nurses' ability to do jobs. Managing nursing staff effectively by implementing practices to reduce stress and increase staff resilience, create a healthy work environment, improving nurses' skills and resilience in the face of increased patient demands, complex care, and emotional exhaustion—particularly during pandemics. (Ou et al., 2021; Jose, Dhandapani & Cyriac,2020).

A similar study reports that knowledge of infectious disease protocols, continuing education provided by the hospital, skills, and self-regulation during the pandemic were facilitators for increasing resilience and care security among the sample studied (Huang et al.,2021). From this perspective, the researchers are concerned with the increasing resilience of nurses during COVID-19 which has a great impact on direct patient care, nurses' quality of life, satisfaction, meaning of nurses' work, and the impact on costs with the turnover of less resilient professionals. Thus, the objective of this study was to evaluate the effect of the COVID-19 training program on resilience among staff nurses.

Aim of the Study

This study aims to evaluate the effect of training programs About COVID-19 on staff nurses' resilience through the following:

1. Investigate of knowledge, attitude, and practices (infection prevention) as reported by staff nurses toward the COVID- 19 through the program.
2. Investigate e the level of resilience among staff nurses through the program.
3. Design and implement about COVID-19 training program.

- Evaluating the effect of the training program about COVID-19 on staff nurses' resilience.

Research hypothesis:

This study hypothesized that:

- Implementation of the training program about COVID-19 will improve the knowledge of staff nurses.
- Implementation of the training program about COVID-19 will positively affect the attitude of staff nurses.
- Implementation of the training program about COVID-19 will improve practices (infection prevention measures) as reported by staff nurses.
- Implementation of the training program about COVID-19 will positively affect nurses' resilience.

Subjects & Methods

Research design:

A quasi-experimental one-group pretest-post-test design was conducted in this study.

Setting:

The study was conducted in Benha University Hospitals at Al-Qalubia Government with a total bed capacity of 546 beds. The current study was conducted in 14 inpatient general and specialty medical and surgical departments which included 25 units (15 units for medical departments and 10 units for surgical departments).

Subjects:

The total number of nurses who were working in the above-mentioned study setting during the study was 400 staff nurses. The study sample of 150 staff nurses selected by simple random sampling technique was distributed (100 nurses work in medical departments and 50 nurses work in surgical departments) after the sample size was estimated.

Sample size:

Depending on *Daniel (2020)* found the improvement and the difference range from

64.2% to 80% in knowledge, attitude, and practice assuming the power=0.95 and $\alpha=0.05$, and by using PASS 25th release the sample size (150 staff nurses). This calculator uses the following formula for the sample size: $n = N * X / (X + N - 1)$, where, $X = Z_{\alpha/2} * p * (1-p) / MOE^2$,

n and $Z_{\alpha/2}$ is the critical value of the normal distribution at $\alpha/2$ (e.g. for a confidence level of 95%, α is 0.05 and the critical value is 1.96), MOE is the margin of error, p is the sample proportion, and N is the population size. Note that a Finite Population Correction has been applied to the sample size formula.

Tools for data collection:

Data for this study were collected by using two tools, namely:

First tool: knowledge, attitude, and practice (KAPs) concerning COVID-19 questionnaire:

A self-administered structured questionnaire was developed by researchers guided by (European Centre for Disease Prevention and Control (ECDC),2020, The National Institute for Occupational Safety and Health (NIOSH), 2020 World Health Organization (WHO),2020) and further modification was carried out to fit the local context and research objective. It was used to collect the knowledge, attitude, and infection prevention practice, towards COVID-19. It consisted of four parts.

Part one: Demographic characteristics of the staff nurses:

It was concerned with collecting data about age, gender, marital status, work units, and attending previous training for COVID-19.

Part two: Staff Nurses' knowledge concerning COVID-19:

Questions on staff nurses' knowledge of COVID-19. It was measured using 18 questions such as (COVID-19 is a virus infection and COVID-19 vaccine is available in markets) and providing a numerical value for each question—1, Yes (correct); 0, No (incorrect answer).

Scoring system:

The knowledge score for the staff nurses varied between 0 (with no correct answer) and

18 (for all correct answers); a cut-off level of $\leq 50\%$ (≤ 9 score), was evaluated as unsatisfactory knowledge. While $> 50\%$ (> 9 scores) indicated satisfactory knowledge (Zhou, et al., 2020).

Part three: staff Nurses' attitudes concerning COVID-19:

Questions related to nurses' attitudes concerning COVID-19 were measured using 11 questions, such as (Do you agree that COVID-19 will finally be successfully controlled?)

Scoring system:

Nurse Responses were measured using a five-point Likert scale and by proving numerical value (1, strongly disagree; 2, disagree; 3, neutral; 4, agree and 5, strongly agree). A mean score > 33 (answering strongly agree or agree) was described as a positive attitude, and a score of 11 to 33 indicated a negative attitude (answering strongly disagree, disagree, or neutral). The total attitude was negative if obtained at ($< 60\%$), while the attitude was positive if obtained at ($\geq 60\%$) (Giao, 2020).

Part four: Infection prevention practice concerning COVID-19:

Questions related to infection prevention practices concerning COVID-19 were measured by 14 questions as (Do you always remove protective equipment carefully? Do you cover your mouth when coughing and sneezing in the past 14 days?).

Scoring system:

Nurse Responses were measured on a 5- 5-point Likert scale by proving numerical value (1, never; 2, occasionally; 3, sometimes; 4, most of the time; 5, always). A mean score > 42 (answering for always or most of the time or sometimes) was carried out as having good practice, and a score of 42 indicated poor practice (answering never or occasionally). The total poor practice was obtained at ($< 60\%$), while the total good practice was obtained at ($\geq 60\%$) (Zhou, et al., 2020).

The second tool: Resilience Scale for Nurses:

A self-administered scale was developed by (Park & Park, 2016) and was modified by the researchers. It aimed to assess resilience levels

among staff nurses. It contains 19 items classified into four Patterns as follows: Dispositional Pattern (6 items) as (I can do a new job or a difficult work), relational Pattern (4 items) as (I fully accept the advice of others), situational pattern (3 items) as (I know when I am not involved in the work or I am involved), philosophical pattern (6 items) as (I feel generally happy).

Scoring system:

Study subjects' responses were measured on a 5-point Likert scale ranging from (always =5, usually 4, sometimes =3, rarely =2, never =1). Study subjects had low resilience if the total score was less than 50 %. It is considered moderate if the score ranges from 50-75% and it is considered high if the total score is more than 75%. A total mean score is calculated by adding up each item score (ranging from 19 to 95) (Park & Park, 2016).

Validity and reliability:

Validity:

This tool of staff nurses KAPs concerning COVID-19 was reviewed by a panel of 5 experts (2 professors in nursing administration at Ain Shams University, 2 professors in nursing administration at Banha University, and 1 professor in the medical surgical nursing department, at Ain Shams University) to evaluate its face and content validity.

The experts reviewed the tool for its content, clarity, simplicity, relevance, comprehensiveness, appropriateness, and applicability. Minor adjustments were made based on the experts' valued comments as modifying some phrases to give the most appropriate meaning for the statement and then the final forms of the tools were established.

Reliability:

Testing the reliability of the purposed data collecting tools was done by Cronbach's Alpha Coefficient test, which was 0.82 for the knowledge, 0.93 for the practice tool, and 0.86 for the attitude, and the Resilience scale for nurses 0.851, these scores indicating a high degree of internal consistency.

Pilot study:

A pilot study was conducted in April 2021 and was carried out on 10% of the total number of study subjects (15 staff nurses) to test the applicability of the study and to test the clarity of the designed tools, as well as to estimate the time needed for each tool, no modifications were done for the used tools then the final form was developed. Staff nurses of the pilot study were excluded from the study's subjects.

Data Collection and Procedure:

The data collection and Procedure period of the research study was 12 months the beginning of started from August 2020 to the end of August 2021. The COVID-19 training program passed into four phases: the Preparatory phase, the implementation phase, and the evaluation and follow-up phase:

Preparatory phase:

This phase period was three months starting from the beginning of August 2020 to the end of October 2021. This phase involved extensive reviewing of the recent related literature to develop tools for data collection. The aim and objective of the study were explained by the researchers to the study subjects before data collection, as well as written approval to participate in the study, was obtained.

Assessment phase:

This phase period was three months which started from the beginning of November 2020 to the end of January 2021. Study questionnaires were administered before the intervention. The questionnaires were distributed to the nurses to complete in the presence of the researchers to assess nurses' knowledge, attitude, and infection prevention practice regarding COVID-19 to identify the nurses' learning needs. It took 30-45 minutes to fill out the questionnaires.

Planning phase:

This phase period was two months, from the beginning of February 2021 to the end of March 2021. The researchers developed the COVID-19 training program in the Arabic language. Developing the contents of the COVID-19 training program included

theoretical information and infection prevention practice, related to COVID-19, and resilience for nurses. The training program was revised for content validity by a group of five expert professors in the nursing administration department faculty of nursing -at Banha University and the final modifications were done based on jury opinions.

Implementation phase:

The Implementation lasted two months, from the first of April 2021 to the end of May 2021. The training program was applied to 150 staff nurses and was divided into five groups to be effective, and each group included 30 staff nurses.

The training program was implemented in 5 sessions for each group and two hours for each session and each session was conducted weekly. The total (10 hours) for each group. Teaching methods used in the intervention were lectures, group discussion, brainstorming, and scenario-based situations. Teaching aids were videos, PowerPoint, and soft handouts. The training program contents conducted in five sessions for each group as follows:

Program sessions:

In the first session, greeted the staff nurses and then provided a handout, explaining the intervention objectives and filling out the pretest (study questionnaires). The second session: give an introduction on COVID-19 according to the guidance of WHO advice for health workers providing care to COVID-19, ECDC healthcare facilities, and healthcare providers on infection prevention and control (IPC) measures for the management of possible and confirmed cases of COVID-19 infection in healthcare settings guidelines and carry out group discussion with staff nurses.

The third session: give theoretical information related to the COVID-19 pandemic isolation and complications of cases in Egypt and all over the world with videos. The fourth session: give theoretical and practical information related to COVID-19 waste management and infection control show scenario-based situations and carry out

brainstorming to solve problems associated with the COVID-19 pandemic. The fifth session covers staff nurses' response to dealing with patients infected with Coronavirus and emotional reactions toward this critical period of their lives and how to cope effectively with it.

Evaluation phase:

Using the same data collection tools were filled in again immediately (post-training) at the end of the last session in a post-test (study questionnaires) and at the end of the three-month post-program (follow-up) in August 2021 to evaluate the effect of the training program was done by comparing the results of staff nurses' knowledge, attitude, and infection prevention practice as well as resilience pre-, post, and follow-up.

Ethical consideration:

The Research Unit of the Nursing Faculty at Banha University provided approval for the study, the dean of the faculty of nursing Benha university and delivered to the director of Benha university hospital to obtain the approval for conducting the study. Before starting the study, the researchers gave the participants a clear explanation of the study's objectives and purpose. To guarantee willingness to participate in the study, nurses were asked to sign a written consent. The confidentiality and anonymity of the participant's data were maintained by researchers. The study allowed staff nurses to leave at any time and without consequence.

Statistical analysis:

The statistical software package SPSS 25.0 version was used for data analysis. For qualitative variables, data were presented as frequencies and percentages; for quantitative variables, means, standard deviations, and medians were used for descriptive statistics. To evaluate the scale's internal consistency and dependability, the Cronbach alpha coefficient was computed. The non-parametric Kruskal Wallis Test was used to compare quantitative continuous data. We

used the chi-square test to compare qualitative categorical variables.

The evaluation of the connections between ranked and quantitative variables was done using Spearman rank correlation. Multiple linear regression analysis and analysis of variance for the full regression models were used to determine the independent predictors of the leadership perception score. P-values less than 0.05 were used to determine statistical significance. and highly statistically significant at $p \leq 0.001$.

Results:

Table 1 shows the distribution and percentage of the studied staff nurses according to their demographic characteristics. As indicated in the table 53.8% of the nurses had an age less than 30 years old with Mean \pm SD (37.45 \pm 9.93), and 56% of them were married. While only 6.6% were aged more than 40 years and 62.8% of nurses were female. Furthermore, 62% of nurses had experienced years less than 15 years with mean \pm SD (14.38 \pm 9.61).

Figure 1 describes the distribution of nurses in the study sample by work units. It represents 32% of studied nurses work in emergency units and 31% work in critical care units.

Figure 2 describes the distribution of nurses in the study sample by attending COVID-19 training courses. It represents most of the studied nurses 86.5% not attended COVID-19 training courses. While only 13.5% of them attended training courses.

Table 2 illustrates that there was a highly statistically significant improvement in studied staff nurses' total satisfactory knowledge regarding COVID-19 ($p < 0.001$) with 90% at the follow-up phase as compared to 84.1% at the post-intervention phase, and 64.7% at the pre-intervention phase.

Table 3 shows that there was a highly statistically significant improvement in studied staff nurses' positive attitude towards COVID-19 in the post phase with 91.1% of nurses and the follow-up phase with 90% of

them $p < 0.001$ as compared to the pre-intervention phase 57.8%.

Table 4 shows that there was a highly statistically significant improvement in studied staff nurses' good infection prevention Practice regarding COVID-19 with 88.9% at the post and the follow-up phases $p < 0.001$ as compared to the pre-intervention phase with 51.7%.

Table 5 compares the resilience dimensions of studied staff nurses

throughout the intervention phases. It shows that the post-phase and follow-up phases demonstrated highly statistically significant $p < 0.001$ improvements in all dimensions of resilience and total resilience among studied staff nurses.

Table 6 shows that there was a positive strong statistically significant correlation $p < 0.001$ between knowledge, attitude, infection prevention practice, and total resilience scores.

Table 1: Percentage distribution of demographic characteristics of studied staff nurses (N=150)

Characteristics	No.	Percent
Age:		
<30	81	53.8
30≥40	59	39.6
<40	10	6.6
Mean ± SD	37.45±9.93	
Gender:		
Female	94	62.8
Male	56	37.2
Qualification:		
Nursing Diploma	50	33
Technical	45	30
Bachelor	55	37
Marital Status:		
Married	84	56
Unmarried	66	44
Years of Experience:		
<15	93	62
15≥25	42	28
<25	15	10
Mean ± SD	14.38 ±9.61	

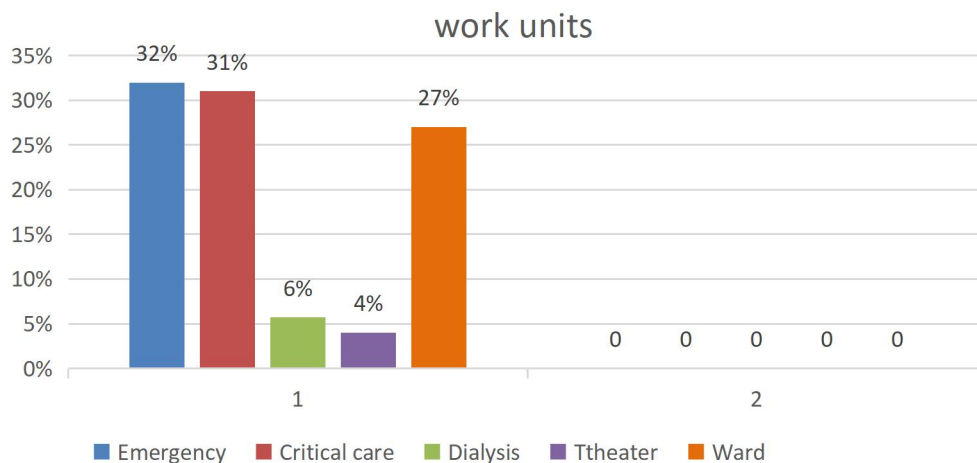


Figure 1: Distribution of staff nurses in the study sample by work units (n=150)

Attended training courses

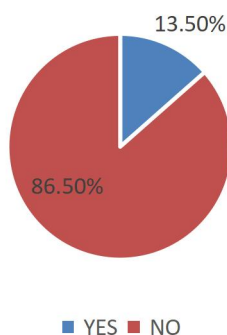


Figure 2: Distribution of staff nurses by attended training program (n=150)

Table 2: Number and percentage of staff nurses' knowledge concerning COVID-19 throughout program phases (n=150)

Total knowledge of COVID-19	Time						x ² (p-value) Pre-post	x ² (p-value) Pre-follow-up
	Pre		Post		Follow Up			
	No	%	No	%	No	%		
Satisfactory (≥50%)	97	64.7	111	84.1	130	90	26.28 (<0.001**)	24.22 (<0.001**)
Unsatisfactory (<50%)	53	35.3	39	25.9	20	10		

(**) highly statistically significant p≤0.001

Table 3: Staff Nurses' attitudes towards COVID-19 throughout program phases (n=150)

Total Attitude towards COVID-19	Time						x ² (p-value) Pre-post	x ² (p-value) Pre-follow-up
	Pre		Post		Follow Up			
	No	%	No	%	No	%		
Positive attitude (≥60%)	87	57.8	137	91.1	135	90.0	26.28 (<0.001**)	24.22 (<0.001**)
Negative attitude (<60%)	63	42.2	13	8.9	15	10.0		

(**) Highly statistically significant $p \leq 0.001$

Table 4: Number and percentage of staff nurses' infection prevention Practice related to COVID-19 throughout the program phases (n=150)

Total infection prevention Practice	Time						x ² (p-value) Pre-post	x ² (p-value) Pre-follow-up
	Pre		Post		Follow Up			
	No	%	No	%	No	%		
Good practice (≥60%)	77	51.7	133	88.9	133	88.9	23.41 (<0.001**)	29.12 (<0.001**)
Poor practice (<60%)	73	48.3	17	11.1	17	11.1		

(**) Highly statistically significant $p \leq 0.001$

Table 5: Mean scores of staff nurses according to their level of resilience throughout program phases

Resilience patterns	Phases (scores: max=5)						Kruskal Wallis Test	p-value
	Pre		Post		Follow up			
	Mean± SD	Median	Mean± SD	Median	Mean± SD	Median		
philosophical	1.00±0.36	1.50	3.00±0.48	2.00	4.00±0.51	3.00	25.87	0.001**
Rational	2.00±0.41	2.00	3.00±0.61	3.00	4.00±0.67	3.00	20.12	0.001**
Situational	1.96±0.18	2.00	3.90±0.13	2.00	4.85±0.15	3.00	22.55	0.001**
Dispositional	1.74±0.32	1.88	2.84±0.27	2.88	4.82±0.38	3.82	24.67	0.001**
Total	1.82±0.38	2.82	2.84±0.27	2.88	3.74±0.32	3.88	24.67	0.001**

(**) Highly statistically significant difference $p \leq 0.001$

Table 6: Correlation matrix of knowledge, attitude, infection prevention practice, and total resilience scores

Total Scores KAPs concerning COVID-19	Spearman's rank correlation coefficient		
	Knowledge	Attitude	infection prevention Practice
Attitude	.617**		
infection prevention Practice	.670**	.646**	
Total Scores resilience	.618**	.641**	.660**

(**) Highly statistically significant $p \leq 0.001$

KAPs (knowledge, attitude, and practice).

Discussion

The pandemic has had a significant impact on the social, economic, and political aspects of nations, with a disproportionate global impact

on the health sector. Healthcare professionals were the pandemic's first responders through frequently interacting with infected people while providing care so, are exposed to physical and psychological harm due to a lack

of personal protective equipment (PPEs), limited human resources, inadequate training, and an increased workload (**Saleem et al., 2021**). This study aims to evaluate the effect of the COVID-19 training program on resilience among staff nurses.

This study illustrates that there was overall a highly statistically significant improvement in studied staff nurses' knowledge regarding COVID-19 in the Post and increased in the follow-up phase as compared to the pre-program phase. This result supports the first research hypothesis. The result of inadequate staff nurses' knowledge in pre-program owing to the novel, that a lot of misunderstanding and confusion, regarding the virus. mode of transmission, and the necessary precautions to prevent infection. In addition, nurses didn't participate in previous training programs about COVID-19.

However, the improvement in knowledge gained following the program is attributed to the availability of the program's handout, which provides information about COVID-19, and the lectures', and videos' clear, and concise presentation style. As regards, increasing knowledge in the follow-up which could be affected by the positive attitude and good practice of studied staff nurses.

These findings were supported by **AL-Guindy, El-Shahate & Allah (2021)** who mentioned that post-program intervention, there was an overall improvement in the level of knowledge possessed by nurse interns. On the same line, the result reported by (**EL-Metwaly et al., 2020**) concluded that there was a highly significant difference between the total COVID-19 knowledge score pre-program and post-program.

Additionally, this finding was like another study done by **Shu-Ching, Yeur-Hur & Shio-Luan (2020)** who showed how crucial applying the most recent COVID-19 knowledge to the safety of nursing staff and other medical professionals. A different study on healthcare workers' perceptions and knowledge of COVID-19 from the United Arab Emirates revealed a lack of understanding about the disease. According to **Bhagavathula et al. (2020)**, there was a suggestion for immediate educational training and a possible

connection to the study conducted at the beginning of the pandemic.

Staff nurses' attitudes toward COVID-19, the findings illustrated that there was a highly statistically significant improvement in staff nurses' positive attitudes in the post and follow-up program as compared to the pre-program. This result supports the second research hypothesis. All healthcare teams may experience these, particularly nurses who are seeking information about COVID-19, the mode of transmission, and ways to prevent the pandemic. Furthermore, the high degree of knowledge and excellent practice that participants have acquired after the program can be explained by this highly positive attitude.

These findings were supported by **El Shenawie et al., (2020)** who revealed that there was a highly statistically significant improvement in studied nurses' attitudes toward caring for patients with COVID-19 after program implementation. Moreover, this result agreed with a previous study that was conducted by **Wahed et al., (2020)** who found a positive attitude was observed among allied health professionals more than physicians who are working in hospitals in Fayoum, Egypt.

Without appropriate practice, knowledge and attitude do not yield the expected results for the control of COVID-19 infection. The results of the present study indicated that there was a highly statistically significant improvement in staff nurses' infection prevention practice in the post and follow-up phases as compared to the pre-program phase. This result supports the third research hypothesis. Generally, a wide range of concerns and fears of the infection being transmitted to staff nurses and their families, and after the program staff nurses identified the importance of safety measures in protection from COVID-19. In addition, the program enhances staff nurses' knowledge of infection prevention measures practice. Also, the availability of resources and personal protective measures such as face masks, alcohol dispensers, continuous hand washing, cleaning, and sterilization.

This finding was congruent with the results of **Choi et al., (2020)** who established the fundamental need for resources to be easily

accessible to guarantee quality nursing care. This is consistent with **El Pansiony et al.'s (2021)** finding that, for nurses' practices during the pre-program period, the nurses' practices were at an unsatisfactory level due to the obstacles to the implementation of infection control measures were overcrowding, a lack of supplies, noncompliance with the infection control program, and inadequate training. Furthermore, the health professional teams in Saudi Arabia used effective infection control procedures (**Rabbani and Al Saigul, 2020**).

Regarding the staff nurses' resilience through the program, phases were examined. Implementing the program increases nurses' resilience, as evidenced by the highly significant improvement in total resilience levels among the studied staff nurses and the positive, strong statistically significant correlation between total resilience and knowledge, attitude, and infection prevention practice. This result confirmed the fourth hypothesis.

This conclusion might be explained by the staff nurses' enhanced practice and knowledge from work exposure, training program attendance, and online resource availability and still being able to provide nursing care and adhere to infection control procedures as a result. Because staff nurses are reliable people who can express feelings and nursing managers offer valuable support to nurses during times of crisis.

The finding of the present is supported by the result of **Mintz-Binder (2021)** who reported that following the intervention, emergency nurses' resilience increased. This result is in line with that of **Sheroun et al. (2020)**, who noted that prior knowledge of COVID-19 is necessary to form prevention beliefs, and positive attitudes, and encourage positive behaviors and cognition. They also mentioned that people's attitudes toward the disease have an impact on how well-coping mechanisms work, reduce anxiety and increase resilience.

In the same vein, **Kobayashi et al. (2020) & Lin (2020)** noted that nurses' fears and anxieties are well-founded, particularly when discussing a threat to human life such as a virus. Consequently, mentors are crucial in offering

professional support and direction, promoting work and ideas, and helping nurses become more self-assured and independent in a health setting.

Conclusion:

Based on the results of the present study which concluded that implementation of the training program about COVID-19 was a highly significant improvement in the knowledge, attitude, and practices (infection prevention measures) of staff nurses and highly significant positive effects on nurses' resilience. Hence, the study aim was achieved, and the research hypothesis was supported.

Recommendations:

The following recommendations are suggested based on the results of the current study:

1. Conduct continuous and updating training programs for staff nurses and health care providers' knowledge, attitude, and practice about COVID-19 and resilience interventions
2. Evaluate staff nurses' KAP periodically to ensure application to the updating infection preventive measures in the health care setting to care for patients with COVID-19.
3. Facilitate the availability of necessary resources in the hospital to allow staff nurses to apply infection preventive measures and work in a safe work environment to increase resilience levels during COVID-19
4. Focus efforts by hospital administrators to support both individual and organizational resilience to enhance nurse care for patients with COVID-19.

Future study:

- 1- Assess the relationship between COVID-19 and resilience among health caregivers.
- 2- Investigate the effect of COVID-19 training programs for healthcare providers on patient health outcomes.

References:

- Alameddine M., Bou-Karroum K., Ghalayini W., and Abiad F. (2021).** Resilience of nurses at the epicenter of the COVID-19 pandemic in Lebanon. *International Journal of Nursing Sciences*, 8 (4): 432-438.
- Abd Elaziz, M., Abd El Hafez, N. & Sayed, S. (2021).** Effect of Nursing Educational Program on Nurses' Knowledge and Practices regarding Pandemic Covid-19 in Isolation Unit, Original Article, *Egyptian Journal of Health Care*, 12(4): 248-263.
- Adams J, and Walls R, (2020).** Supporting the healthcare workforce during the COVID-19 global epidemic. *JAMA* 323: 1439. [PubMed] [Google Scholar]
- Afshari, D., Nourollahi-Darabad, M., & Chinisaz, N. (2021).** Demographic predictors of resilience among nurses during the COVID-19 pandemic Work; 68:297-303. doi: 10.3233/ WOR-203376
- AL-Guindy, H., El-Shahate, M., & Allah, N., (2021).** Enhancing Nurse Interns Knowledge and Practice regarding Triage at Emergency Units during COVID-19 Pandemic” in Egypt, *Assiut Scientific Nursing Journal*, 9 (27): 30-40. Available at: <http://asnj.journals.ekb.eg>. <http://www.arabimpacktfactor.com> DOI: 10.21608/ASNI.2022.10440.01256.
- Bchetnia, M., Girard, C., Duchaine C., Laprise, C. (2020).** The outbreak of the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2): A review of the current global status. *J Infect Public Health*. doi: 32778421; PMID: PMC7402212.
- Bhagavathula, A. S., Aldhaleei, W. A., Rahmani, J., Mahabadi M.A., Bandari D.K., (2020).** Knowledge and perceptions of COVID-19 among health care workers: Cross-sectional study. *MIR Public Health Surveillance*, 6(2), e19160. <https://doi.org/10.2196/19160>.
- Braquehais MD, Vargas-Caceres S, Gomez-Duran E, Nieva G, Valero S, Casas M, et al. (2020).** The impact of the COVID-19 pandemic on the mental health of healthcare professionals. *QJM: Int J Med*;113(9):613e7. <https://doi.org/10.1093/qjmed/hcaa207>.
- Cai, W., Lian, B., Song, X., Hou, T., Deng, G., Li, H. (2019).** A cross-sectional study on mental health among health care workers during the outbreak of Corona Virus Disease. *Asian Journal of Psychiatric*.51:102111. doi: 10.1016/j.ajp.2020.102111. Epub 2020 Apr 24. PMID: 32361388; PMCID: PMC7194661.
- Chen X, Tian J, and Li G, Li G, (2020).** Initiation of a new infection control system for the COVID-19 outbreak. *Lancet Infect Dis* 20: 397–398. [PMC free article] [PubMed] [Google Scholar]
- Choi, K. R., Skrine Jeffers, K., & Cynthia Logsdon, M. (2020).** Nursing and the novel coronavirus: Risks and responsibilities in a global outbreak. *J Adv Nurs*.76(7):1486-1487. doi: 10.1111/jan.14369. Epub 2020 Apr 15. PMID: 32202336; PMCID: PMC7228354.
- Daniel, K., Chung, Y., Vida, I. (2020).** COVID-19 Scale: Development and Initial Validation, *International Journal of Mental Health and Addiction* (2020) 20:1537–1545 <https://doi.org/10.1007/s11469-020-00270>.
- Dahka, S., M., Maroufizadeh, S., Poralizadeh, M., Zahedsefat, T., Ganjari, M., G., Parsasal kisari, E., & Ghanbari, A., (2021).** mental Health and Resilience among Nurses in the COVID-19 Pandemic: A Web-Based Cross-Sectional Study. *Iranian Journal of Psychiatry*.doi: 10.18502/ijps.v17i1.8047.
- Daugherty, E.L., Perl, T.M., Rubinson. L., Bilderback, A., & Rand, C.S. (2020).** Survey study of the knowledge, attitudes, and expected behaviors of

- critical care clinicians regarding an influenza pandemic. *Infect Control Hosp Epidemiol.* 30: 1143–1149. <https://doi.org/10.1086/648085> PMID: 19877816
- El-pasiony, N.M., Mostafa, M. F., Gabr, W.F (2021).** Efficacy of COVID-19 Prevention Educational Program on Nurses' Knowledge and Practices at Haemodialysis Unit, *Egyptian Journal of Health Care*, 12(1).
- EL-Metwaly, A., Ibrahim, A., El-Gilany, A., & Elsayed, I. (2020).** Knowledge and Attitude of Nursing Students about COVID-19: An Intervention Study in Egypt. *Egypt. J. Health. Care.* 11 (2): 393- 407.
- El-shenawie, E. H. El Sayed, H & Dabou, E.A. (2020).** Impact of Educational Program Regarding Safety Measures Guidelines on Nurses' Knowledge, Attitude and Practice toward COVID-19 Patients. *Egyptian Journal of Health Care, EJHC* 11 .3.
- European Centre for Disease Prevention and Control (ECDC) (2020).** Infection prevention and control and preparedness for COVID-19 in healthcare settings - third update Stockholm: ECDC; 2020 [updated 13 May; cited 2020 24 June]. Available from: <https://www.ecdc.europa.eu/en/publications-data/infection-prevention-and-control-and-preparedness-covid-19-healthcare-settings>.
- Fawaz M, Anshasi H, and Samaha A (2020).** Nurses at the Front Line of COVID-19: Roles, Responsibilities, Risks, and Rights. *Am J Trop Med Hy*, (4):1341-1342. Doi: 10.4269/ajtmh.20-0650. PMID: 32783796; PMCID: PMC7543802
- Giao, H., et al. (2020).** Knowledge and attitude toward COVID-19 among healthcare workers at district 2 hospital, Ho chi minh city. *Asian Pac J Trop Med*:13.
- Huang, F., Lin, M., Sun, W., Zhang, L., Lu, H., & Chen, W. (2021).** Resilience of frontline nurses during the COVID pandemic in China: a qualitative study *Nursing Health Science.*;23(3):639-45. doi: 10.1111/nhs.12859
- Jose, S., Dhandapani, M., & Cyriac, M. (2020).** Burnout and Resilience among Frontline Nurses during COVID-19 Pandemic: A Cross-sectional Study in the Emergency Department of a Tertiary Care Center, North India. *Indian Journal Critical Care Med.*;24(11):1081-8. doi: 10.5005%2Fjcp-journals-10071-23667
- Joshi, K., Madhura, L., & Jamadar, D. (2020).** Knowledge and awareness among nursing students regarding COVID-19: A cross-sectional study. *International Journal of Community Medicine and Public Health.* 7 (6) : 1-5.
- Labrague LJ., and de Los Santos JAA (2021).** Fear of COVID-19, psychological distress, work satisfaction and turnover intention among frontline nurses. *J Nurs Manag*;29(3):395e403. <https://doi.org/10.1111/jonm.13168>.
- Limbu, D. K., Piryani, R. M., & Sunny, A. K. (2020).** Healthcare workers' knowledge, attitude and practices during the COVID-19 pandemic response in a tertiary care hospital of Nepal. *Plosone*, 15(11), e0242126.
- Lyu, H., Yao, M., Zhang, D., & Liu, X. (2020).** The relationship among organizational identity, psychological resilience and work engagement of the first-line nurses in the prevention and control of COVID-19 based on structural equation model. *Risk Manag Health Policy.*;2(13):2379-86.
- Mintz-Binder, R., Andersen, S., Sweatt, L., Song, H. (2021).** Exploring strategies to build resiliency in nurses during work hours. *J Nurs Adm.*;51(4):185-191. <https://doi.org/10.1097/NNA>.

- Ou, X., Chen, Y., Liang, Z., Wen, S., Li, S., Chen, Y. (2021).** Resilience of nurses in isolation wards during the COVID-19 pandemic: a cross-sectional study. *Psychol Health Med.*;26(1):98-106. doi: 10.1080/13548506.2020.1861312
- Park, M.M., & Park, J. (2016).** Development of resilience scale for nurses, *Journal of Korean Academy of fundamentals of nursing*,23(1),32-31.
- Pfaar, O., Klimek, L., & Jutel, M., (2021).** COVID-19 pandemic: Practical considerations on the organization of an allergy clinic—An EAACI/ARIA Position Paper. *Allergy*, 76(3), 648-676.
- Rabbani, U., & Al Saigul, A. M. (2020).** Knowledge, Attitude and Practices of Health Care Workers about Corona Virus Disease 2019 in Saudi Arabia. *Journal of epidemiology and global health.* doi: 10.2991/ jegh. k. 200819. 002.
- Ruiz-Fernandez MD, Ramos-Pichardo JD, Ibáñez-Masero O, Cabrera-Troya J, Carmona-Rega MI, Ortega-Galan AM. (2020).** Compassion fatigue, burnout, compassion satisfaction and perceived stress in healthcare professionals during the COVID-19 health crisis in Spain. *J Clin Nurs*;29(21e22):4321e30. <https://doi.org/10.1111/jocn.15469>.
- Saleem, J., Ishaq, M., Zakar, R., Suddahazai, I.K., & Fischer, F. (2021).** Experiences of frontline Pakistani emigrant physicians combating COVID-19 in the United Kingdom: a qualitative phenomenological analysis. *BMC Health Services Research.* 21(1):1–8. [PMCFree article] [PubMed] [Google Scholar] [Ref list].
- The National Institute for Occupational Safety and Health (NIOSH) (2020).** Use of Respirators and Surgical Masks for Protection Against Healthcare Hazards [updated 19 November 2018/1 April 2020]. Available from: <https://www.cdc.gov/niosh/topics/healthcarehazards/respiratory.html>.
- Wahed, W. Y. A., Hefzy, E. M., Ahmed, M. I., & Hamed, N. S. (2020).** Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. *Journal of Community Health*, 45(6), 1242- 1251. <https://doi.org/10.1007/s10900-020-008820>.
- World Health Organization (2020)** Coronavirus disease COVID-19 (pandemic? Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- World Health Organization (2019).** Coronavirus disease (COVID-19) pandemic. Available at: [https://www.who.int/emergencies/diseases/novel-coronavirus-](https://www.who.int/emergencies/diseases/novel-coronavirus-2019)
- Ye, F., Xu S, Rong, Z., Xu, R., Liu, X., & Deng, P. (2020).** Delivery of infection from asymptomatic carriers of COVID-19 in a familial cluster. *Int J Infect Dis.* 94: 133–138. <https://doi.org/10.1016/j.ijid.2020.03.042> PMID: 32247826.
- Yu, F., Raphael, D., Mackay, L., Smith, M., & King, A. (2019).** Personal and work-related factors associated with nurse resilience: A systematic review. *International Journal Nursing Studies.* 2019; 93:129-40.
- Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al (2020).** Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom*; 89(4) :242e50. <https://doi.org/10.1159/000507639>.
- Zhang X, Jiang X, Ni P, Li H, Li C, Zhou Q, (2021).** Association between resilience and burnout of front-line nurses at the peak of the COVID-19 pandemic: Positive and negative affect as mediators in Wuhan. *Int J Ment Health Nurs.*;30(4):939-54. doi: doi.org/10.1111/inm.12847.

Zhang, Y., & Ma, Z. F. (2020): Impact of the COVID-19 pandemic on mental health and quality of life among local residents in Liaoning Province, China: A cross-sectional study. *International journal of environmental research and public health*, 17(7), 2381.

Zhou, M., Zhang, M., Tang, F., Wang, Y., Nie, H., & Zhang, L. (2020). Knowledge, attitude, and practice regarding COVID-19 among healthcare workers in Henan, China. *J Hosp Infect.* 105: 183–187. [https:// doi.org/ 10.1016/j.jhin.2020.04.012](https://doi.org/10.1016/j.jhin.2020.04.012) PMID: 32278701.