

■ Basic Research

Effect of Educational Program About COVID-19 on Intern-Nurses' Performance and Work Engagement

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Abstract

Background: Corona virus disease (COVID-19) is the latest global pandemic which impose an occupational risk to health care personnel, that can lead to deficit in performance and work engagement which as a key tool for patients' safety. **Aim:** The study aimed to assess the effect of educational program about COVID-19 on intern-nurses' performance and work engagement. **Design:** A quasi-experimental research design with pre- post test was used to conduct this study. **Setting:** The study was carried out in the different departments where intern-nurses were trained on their clinical training areas at Benha University Hospital, Qaluobia Governate, Egypt. **Sample:** Simple random sample of the intern-nurses. **Tools of data collection:** four tools were used as the following: (1) Intern-nurses' COVID-19 knowledge questionnaire, (2) Intern-nurses' observational checklist, (3) Intern-nurses' attitude questionnaire, and (4) Intern-nurses' work engagement questionnaire. **Result:** About 34.4% of intern-nurses' had adequate knowledge in pre-program while after implementation of the program it was increased to 94.4% & in follow-up as 92.2%. Regarding to compliance of performance 40% of them had satisfactory level of performance in pre-program while in the immediate post and follow-up it was increased to 90% & 87.8% respectively. Regarding to the attitude 37.8% of inter-nurses had positive attitude in pre-program which changed to 86.7% & 82.2% at both post and follow-up phases. Concerning work engagement 18.9% of them had high work engagement in pre-program while increased to 85.6% & 80% at both immediate post and follow up the program respectively. **Conclusion:** The implementation of the educational program leads to improve in the intern-nurses' knowledge, performance and attitude about COVID-19 and also had a positive effect on their work engagement, moreover there were statistically significant positive correlation between study subject' COVID-19 knowledge, performance and attitude scores with their work engagement scores. **Recommendation:** Working continuously to expand the intern-nurses' performance set to provide safe patients' care and motivate them to be more engaged. **Keywords;** COVID-19, Educational program, Intern-Nurses, Performance, Work Engagement.

Introduction

Corona virus disease COVID-19 is the latest emerging infectious disease confronting the world. It was first discovered in December 2019, in Wuhan city, Hubei Province, China. Today, COVID-19 imposes an important occupational risk to health care workers (HCWs). Until now, globally several thousand of (HCWs) especially nurses have been infected who will be treating and assisting COVID-19 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 COVID-19 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. World health Organization (WHO) emphasizes health professionals' rights and obligations, including defined standards for maintaining occupational safety and health (**Pfaar, Klimek, & Jutel, 2021**).

The current COVID-19 pandemic is putting health care workers at risk for infection, and they are on the front lines of the outbreak response. The COVID-19 pandemic's quick spread has become a top source of worry for the healthcare profession especially nurses in all over the world (**Joshi, Madhura, & Jamadar, 2020**). Nurses are the first line of contact with patients in health-care settings; as a result, nurses are assumed to be at a high risk of infection. COVID-19 knowledge, attitudes, and performance are important in determining a nurse's willingness to adopt change initiatives. It would also be beneficial to gain a better understanding of the condition in order to design preventive methods and health promotion programs (**Abd Elaziz, Abd Elhafez, & Sayed 2021**).

A poor knowledge and negative attitude about COVID-19 pandemics among health care workers can result in delayed identification and treatment leading to rapid spread of COVID-19 infections and decrease their work engagement. Over 100 health care workers have lost their lives to COVID-19, a tragedy to the world and a barrier to fight against the disease (**MedScape, 2020**). Intern- nurses is a student focused learning experiences related

to the student academic studies. These experiences are essential to knowledge application, performance development and professional socialization, move from dependent supervised practice to independent collaborative practice, and provide students with experience in real-life situations **(Soliman, et al., 2011; Ghazy, and El Shahat, 2021)**.

The transition from nursing student to competent practitioner is critical, so nursing workforce engagement plays a critical role in today's health care organizations as well as to intern- nurses, lack of engagement affects organizational outcomes of the entire health care delivery system. Engagement is a predictor of proactive actions, loyalty, performance, and financial gains for intern nurses. Additionally, higher engagement has a number of advantages for nursing staff and the organizations they work for **(Dempsey, and Reilly, 2016; and Hisel, 2019)**.

COVID-19 pandemic might not be good, considering the current environment of fear and uncertainty. The reason for this is that those health care workers work under stress cannot devote themselves to their work and workplace because they feel unwell both physiologically and mentally, it is thought that this situation creates stress in staff and intern-nurses and negatively affects their performance in different areas as care planner, care provider, care educator, communicator, manager and as a researcher and critical lessons might be missed that enable us to have evolved and learned at a normal pace, such as coaching, communication and managing self-leadership **(Erer, 2020 ; Wolor, et al., 2020)**.

Work engagement is an attempt by nursing staff of an organization to bind themselves to their role at work and a positive, affective-motivational state of work-related well-being, with the characteristics of vigor, dedication, sharing of work, leadership and management relations and communication, job satisfaction and absorption. High levels of energy and mental strength are characteristics of vigor. The absorption is defined as being completely focused and joyfully engaged in one's job, whereas the dedication is described as being firmly involved in one's work and experiencing a sense of significance and pride,

sharing of work as a team to complete the work task and are jointly responsible for the job workload. Good leadership and management help staff to achieve their goals by focusing on task needs and maintenance needs. Also health care organizations with an effective and active communication that a driver of staff engagement, more leadership support and effective relations have four times higher staff engagement levels (**Bakker, et al., 2015; Abu Dalal, & Ramoo, 2021; Peng, and Chen, 2022**).

Work engagement of staff plays a very vital role in the entire organization and comprehend their motivation, where, and how they fit in. This prompts a better dynamic. Associations with a connected with the workforce outflank their opposition. The idea of staff engagement is an estimation of how happily individuals are with their particular employments, working conditions, and how productive their exhibition levels are. Overseeing high spirits among workers can be of momentous advantage to any association, as effectively drew in progressively gainful and remain faithful to the organization (**Kaushik, and Guleria, 2020; Lumbanraja, and Absah, 2020**).

Health care organizations need to understand how they can foster work engagement across multiple generations to maximize individual performance, productivity and clinical competency, while improving organizational and patient care outcomes (**Lepisto, et al., 2018; Haque, 2021**). Engagement is a very great predictor of important intern nurses, nurses, health care team, and organizational outcomes. Because of their strong dedication to and engaged nurses demonstrate superior role task performance and financial results by concentrating on their work tasks. Moreover, because of their openness to new experiences, engaged nurses have more creative ideas and are more likely to innovate and be entrepreneurial (**Attia, & Shokir, 2020**).

Engagement can be severely impacted by a variety of workplace factors, including administrative difficulties, conflict, organizational politics, a lack of resources and protective measures, role conflict, role ambiguity and work overload. There are many

things we can concentrate on to encourage engagement in addition to these, especially improving employee resources and supporting welfare. **(Abrol, and Madan, 2020)**. The COVID-19 pandemic affects job engagement by impacting mental well-being; pinpoint the structure of psychological resilience displayed by these staff for enhancing wellbeing for efficient work engagement. The study's insightful findings can be used to establish an empirical model, develop, and carry out mental health interventions for workers who want to contribute positively to their organizations through effective job engagement. **(Abbas and Zhiqiang, 2020)**.

Significance of study

COVID-19 has been confirmed by (WHO) as an international public health emergency problem, which is a new and hazardous virus that has never been seen before. The COVID-19 pandemic has already spread to 221 countries and territories worldwide. A growing number of cases have been reported in Egypt to reach about one hundred and four thousand cases, and about 6,000 deaths by the 1st week of October 2020, Egypt registered a high number of corona virus cases and deaths daily; where 102,375 cases, 5.882 deaths until September 2020 **(WHO, 2020)**. The (HCWs) including nurses and intern-nurses are at the frontline of the battle against this disease. This is unbelievably high number can lead to a high burden of workload, understaffing, elevated risk of infection, insufficient personal protective equipment, stigmatization of disease, lack of particular medications, and an unsupportive work environment may all contribute to the emotional strain on nursing staff **(Mohamed & Abou Shaheen, 2022)**.

A Nurses and intern-nurses are usually the first to respond when a patient requires care twenty-four hours a day, seven days a week, whether in community health centers, hospitals, or remote nursing stations. The health care organizations must deal with the issue of behaviors that endanger the performance of the healthcare team in order to ensure quality and promote a culture of protection. **(Guglielmi et al., 2016; Yamada, Duffy, & Berry 2018; and Alghamdi, 2021)**. In addition to when the researchers contact with

intern-nurses at clinical training areas during round for technical and administrative supervision of intern-nurses found that intern-nurses have experienced different levels of fear from infection, stress, anxiety and worry of being infected and transmitting infection to family members and have negative effects on their performance and work engagement. So this study was conducted to assess the effect of educational program about corona virus disease COVID-19 on intern-nurses' performance and work engagement.

Aim of the study

The study aims to assess the effect of educational program about corona virus disease COVID-19 on intern-nurses' performance and work engagement through:

1. Assessing intern-nurses' knowledge about corona virus disease COVID-19 throughout program phases.
2. Assessing intern-nurses' performance toward patients with COVID-19 in their clinical training areas throughout program phases.
3. Assessing intern-nurses' attitude about COVID-19 throughout program phases.
4. Assessing intern-nurses' work engagement in their clinical training area throughout program phases.
5. Designing and implementing the educational program about COVID-19 for intern-nurses.

Research hypotheses: -

There will be an improvement in intern-nurses' knowledge, performance and attitude about COVID-19 post program implementation, also will have a positive effect on their work engagement in the clinical training areas than before.

Subjects and Method:

Research Design:

A quasi-experimental research design with pre- post test was used to conduct this study.

Setting:

The current study was carried out in different clinical training areas of intern-nurses at Benha University Hospital, Qaluobia Governate, Egypt, as following: The firstly the obligatory clinical training areas; such as Medical surgical nursing, Intensive Care Units (I.C.U.), Pediatric nursing, Maternal and newborn health nursing, and Nursing administration. The secondly the selected clinical training areas, such as (Dialysis and Emergency).

Sample:

Simple random sample of the intern-nurses who were trained in the above mentioned study settings and available during the time of data collection. A sample of 90 intern-nurses out of 240 intern-nurses. The sample was calculated by using the following equation (**Ellen, 2020**):

$$n=N/1+(Ne^2)$$

n: The required sample size

N: Total number of intern-nurses

e: Error tolerance

I: A constant value

Tools of data collection:

The following four tools were used to collect the data for current study:

1- The Intern-nurses' COVID-19 Knowledge Questionnaire

A questionnaire developed by the researchers after reviewing relevant literature (**Hampton, Smeltzer, & Ross, 2020; WHO, 2020 and Zhang et al., 2020**) to assess intern-nurses' knowledge regarding COVID-19 and, It included two parts:

Part one: Intern-nurses' personnel characteristics include clinical training area, intern nurses' age, gender, marital status, previous education qualification, grade score and attending courses.

Part two: Knowledge test: it consisted of (40 questions) in order to assess intern-nurses' knowledge about COVID-19, nursing care and different methods of protection,

which distributed under main nine dimensions as follows:- 1- Concept of COVID-19 (2 questions), 2- Causes and risk factors (3 questions), 3- Pathophysiology of COVID-19 (2 questions), 4- Signs & symptoms of COVID-19 (4 questions), 5- Complications of COVID-19 (6 questions), 6- Preventive precaution related to COVID-19 (7 questions), 7- Management of COVID-19 (7 questions), 8- Isolation precautions related to COVID-19 (6 questions), 9- Health education strategies in management of patients with COVID-19 (3 questions).

The scoring system:

The questions were scored as "Zero" for incorrect answer and "One" for correct answer. The total score was "40", and intern nurse's knowledge level was adequate if the percent was $\geq 60\%$ and inadequate if $< 60\%$ and cut point was done at $60\% = 24$ scores (Jessica, and Crossman, 2017).

The total score:

- Adequate knowledge $\geq 60\%$ that equals (≥ 24 -40 marks).
- Inadequate knowledge $< 60\%$ that equals (0-23 marks).

2- Intern-nurses' Observational Checklist

An observational checklist developed by the researchers after review of related literature (Kamel, et al., 2010; Soliman, et al., 2011; Keshk, Qalawa, & Ibrahim, 2018; Hampton, Smeltzer, & Ross 2020) to assess intern-nurses' performance regarding basic nurses' procedure about care of COVID-19 patients, through observing of intern-nurses' compliance with safety protective measures throughout program phases. It consisted of (50 items) which concerned with intern-nurses' performance that related to their role as care giver to patient with COVID-19 these items categorizing under seven main categories as follows: 1-Role as nursing care planner (5 items), 2- Role as nursing care provider (20 items), 3- Role as nursing care evaluator (4 item), 4- Role as health care educator nurse (5 items), 5- Role as communicator nurse (5 items),6- Role as a manager nurse (8 items), and 7-Role as a researcher nurse (3 items)

Scoring system:

Intern-nurses' performance scored against (3) point of Likert Scale: " Completely done " as (2), " Incompletely done " as (1) and "Not done" as (0). Mean score and standard deviation was determined and then converted into percentage and the cut point was done at 60 % = 60 scores (**Jessica, and Crossman, 2017**).

The total score:

- Satisfactory performance level when total percentage was $\geq 60\%$ that equals between \geq (60-100 scores).
- Un satisfactory performance level when total percentage was $< 60\%$ that equals (0-59 scores).

3- Intern-nurses' COVID-19 Attitude Questionnaire

The questionnaire was developed by the researchers after reviewing relevant literature (**Sexton et al., 2006; Choi, 2019; Al- Dossary, et al., 2020; Reuben, et al., 2020**) to assess intern-nurses' attitude about COVID-19 throughout program phases. That consisted of (30 items) that classified under six main dimensions as follows: 1- team work climate (6 items), 2- safety climate (7 items), 3- job satisfaction (5 items), 4- stress recognition (4 items), 5- management perception (4 items) and 6- working condition (4 items).

Scoring system:

Intern-nurses' attitude were scored against three point of Likert Scale: "Agree " (3), "Neutral" (2) and "Disagree" (1). Mean scores and standard deviation were calculated and then transformed into percentages and the cut point was done at 75% = 68 scores (**Al-Dossary, et al., 2020**).

The total score:

- Positive Attitude when total percentage was $\geq 75\%$ that equals ($\geq 68-90$ scores)
- Negative Attitude when percentage was $< 75\%$ that equals (1-67 scores).

4- Intern-nurses' Work Engagement Questionnaire:

A structured questionnaire was developed by researchers after reviewing of relevant literatures (**Abd El-Aziz, Hassan, & Kamel, 2017; De Simone, Planta, & Cicotto, 2018; El-borey, Eid, & Elshahate, 2018; El-Moafi, Mostafa, and Saad, 2020; Lee, et al., 2021**) to assess level of intern-nurses' work engagement in the different clinical training areas throughout program phases. It consisted of 53 items that grouped under "7" main dimensions as following: 1- vigour (9 items), 2- dedication (5 items), 3- absorption (16 items), 4- sharing work (11 items), 5- leadership and management (6 items), 6- relations and communication (3 items) and 7- job satisfaction (3 items).

Scoring system:

Intern-nurses' answers scored against three points of Likert Scale: "Agree" equal (3), "Neutral" equal (2) and "Disagree" equal (1). The mean scores and standard deviation were calculated and then transformed into percentages and the cut point was done at 60% = 96 scores (**Abd El-Aziz, et al., 2017**)

- High work engagement level when the total percentage was $\geq 75\%$ that represent (≥ 120 -159) scores
- Moderate work engagement level when ranged from 60% - $< 75\%$ that represent (96-119) scores.
- Low work engagement level when percentage was $< 60\%$ represent (1-95) scores.

The COVID-19 educational program:

The COVID-19 educational program covers the following items:

- Theoretical part included:
 - Introduction, general and specific objectives of educational program, definition of infection and COVID-19, causes, mode of COVID-19 transmission, incubation period, clinical manifestation, diagnostic method and treatment of covid-19 infection.
 - Applying safety and 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 among patients.

- Mechanical ventilation definition, modes, indications, management, complications, and alarms.
- Discharge teaching, health education strategies and WHO recommendations.

- Practical part included:

- Care of acute respiratory distress syndrome COVID-19 patients
- Suctioning procedure
- Central venous pressure (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.

The validity and reliability of study Tools:

The validity

The four study tools and the educational program were reviewed by Jury group five experts in the field of nursing administration, community health nursing, and medical-surgical nursing from Benha Faculty of Nursing, to ensure its feasibility, applicability and visibility. Finally, modifications were done in the light of the experts' valuable comments such as modifying some phrases to give the most suitable meaning for the statement that were not understandable.

The Reliability

The reliability of study tools was done by Cronbach's Alpha Coefficient test which demonstrated moderate to high reliability for each study tool. Internal consistency as the

following: the first tool = (0.894), the second tool = (0.886), the third tool = (0.879) and final fourth tool = (0.923).

The pilot study

The pilot study was conducted on 10% of the total number of study subject (9) intern-nurses in order to assess the tools visibility, objectivity, feasibility and practicability and to determine the time needed for filling each tool that approximately ranged from 45-60. It was done in the end of December 2020. There were no changes made, thus intern-nurses who participated in the pilot trial were involved in the main study sample.

Field work

- The official letter was taken from the Dean of the Benha Faculty of Nursing, and submitted to the Benha University Hospital Directors for obtaining their approval to carry out the current study after explaining the aim of the present study.
- The current study was taking about fourteen months; the study started in the beginning of the September 2020 to end of the October 2021.

Preparation phase

Researchers were review recent literature and other theoretical knowledge of the different aspects that related to topic of the current study to develop and create COVID-19 educational program and tools of data collection. The researchers through assessment, implementation, and evaluation phases, a COVID-19 educational program was first created to give intern nurses the chance to advance their knowledge and skills about the treatment of patients with COVID-19 and safety protective measures.

- Assessment Phase:

- The researchers were meet with an intern-nurse and described the purpose and nature of the study, and process for completing the questionnaires. Additionally, the intern nurses were divided into 5 groups, each of which contained 18 intern nurses, according to their clinical training areas.

- In order to gain intern nurses, support and ensure the continuity of patient care, the researchers gave questionnaires to the intern nurses who had agreed to participate before beginning the educational programmed in January 2021. They asked them to complete them during their training shifts (morning and afternoon), which had been predetermined with their clinical instructors and the head nurse of each clinical training area based on the type of work and their workload. Following that, the researchers observed the intern nurses' behavior while they performed their duties as caregivers for patients who had COVID-19 while adhering to the safety protocols and preventive measures for COVID-19 prevention.

The Implementation Phase:

- The researchers obtained telephone number from each intern-nurse and assessed the availability of internet access to communicate with the researchers via Telegram group and Zoom meeting and to carried out the theoretical part of the educational program.
 - Educational sessions (practical part) were scheduled with the intern-nurses according to their circumstances which carried in the above mentioned settings and Faculty clinical labs.
 - The time required for implementing the educational program was 30 hours distributed as 20 hours for practical part and 10 hours for theoretical part. The educational program had 15 days; 15 sessions, 2 hours per session for 2 days per week.
 - Each researcher used the available materials, relevant contents, and instructional strategies to conduct out the educational program with one group individually each day. Lectures, group discussions, brainstorming, group activities, role acting, and practice sessions were among the various teaching techniques used. Power point presentations, educational videos, and handouts created by the researchers were used as instructional media and teaching aids. All intern nurses received these materials on the first day.
 - In order to meet the needs of the intern nurses and ensure that the COVID-19 educational program's objectives and contents were satisfied, feedback was given at the beginning of
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each session regarding the previous one and at the end of each session regarding the current sessions.

The evaluation phase:

- A pre-test was carried out before sessions. The goal and nature of the study was clarified to intern-nurse before answering the pretest, which filled by them in the presence of each researcher. The immediate post-test was conducted immediately after program implementation and done in the follow up after three months later.
- The evaluation phase focus on assessing the effect of the educational program on intern-nurses' knowledge and attitude regarding COVID-19 on their performance and work engagement through using study tools. To determine the level of improvement, and to evaluate the retained acquired knowledge and performance through comparison of the results of preprogram, immediate post and follow-up program, the data were collected immediately post and follow-up program after three months of program implementation.

Ethical Considerations:

Ethical approval was obtained from the scientific research committee at Benha faculty of nursing. each intern-nurse was notified about the nature, aim of the study, and then consent was obtained from each participant before starting the data collection of the current study. The researchers assured maintaining anonymity and confidentiality of the study subject' data. The intern nurses who were informed that they are allowed to choose to participate or not in the study and they have right to withdraw from the study at any time.

Statistical Design:

Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was utilized for this purpose. The obtained data were organized, analyzed and represented in tables and graphs as required. The data were presented by using descriptive statistics in the form of (percentages, frequency, mean score, mean percent, standard deviation and P- value). The test of significance (Chi-square

“ χ^2 ” and paired t test) were utilized to compare percentages and test the homogeneity of the outcome among study variables and to test the study hypothesis. The Pearson correlation coefficients were utilized. The statistically significant difference was considered when P-value $P \leq 0.05$, and a highly statistically significant difference was considered when P-value $P \leq 0.001$.

Results

Table (1): This table showed personnel characteristics of the intern-nurses. This table showed that 47.8% of the intern-nurses their age were 23 years old with mean score 31.71 ± 7.36 . Also 70% & 76.7% of them were female and married respectively. About 64.4% had secondary school. In addition to 56.7% had excellent score. Finally, 83.3% not attending training courses in their clinical training areas.

Figure (1): This figure clarifies that the intern-nurses' total knowledge level regarding COVID-19 throughout program phases. This figure showed that, 34.4 % of intern-nurses had adequate knowledge in pre-program while it increased to 94.4% in the immediate post program and 92.2% in the follow-up program.

Figure (2): This figure indicates that the intern- nurses' total performance level regarding COVID-19 throughout program phases. This figure showed that 60% of intern-nurses had unsatisfactory performance level in the pre-program phase while after program implementation 90% of them had satisfactory performance level and this percent slightly declined to 87.8% in the follow-up phase.

Table (2): This table illustrated mean scores and mean percent of the intern-nurses' performance regarding COVID-19 throughout program phases, showed that there was a statistically significant general improvement in performance of inter-nurses' after program implementation in immediately post program and follow-up phase after three months. The least mean scores 15.13 ± 4.16 of intern-nurses were related to role as nursing care provider before implementation and it was developed and increased to 36.14 ± 5.58 & 35.62 ± 3.34 in the immediate post and follow-up program respectively.

Figure (3): This figure reveals the intern-nurses' total attitude level about COVID-19 throughout program phases. This figure showed that 37.8% of inter-nurses had positive attitude in the pre-program which changed and increased to 86.7% & 82.2% after program implementation at immediate post and follow-up phase respectively.

Table (3): This table indicated the mean scores and percent of the intern-nurses' attitude dimensions about COVID-19 throughout program phases. It revealed that there was a statistically significant general improvement in the attitude of intern-nurses after implementation of educational program both immediately post and follow-up program. The least mean scores 7.36 ± 5.09 of intern-nurses were related to safety climate before implementation of the program and it was increased to 18.36 ± 5.41 in the immediate post program and 17.63 ± 5.32 in the follow-up program.

Figure (5): This figure illustrated the intern-nurses' work engagement total level throughout program phases. This figure revealed that about 18.9% of intern-nurses had high work engagement in the pre-program while increase to 85.6% & 80% at both immediately post and follow-up program.

Table (5): This table displayed mean scores and mean percent of the intern-nurses' work engagement throughout program phases. It revealed that there was a statistically significant general increasing in intern-nurses' work engagement following implementation of educational program both immediately post and follow-up program. Least mean score 15.68 ± 3.49 was related to the absorption before implementation and it was improved to 41.48 ± 4.39 in the post program and it declined to 38.89 ± 4.79 in the follow-up program but still more than pre-program.

Table (6): This table described correlation matrix among intern-nurses' knowledge, performance, attitude and work engagement throughout program phases. This table displayed that there were a statistically significant positive correlation among intern-nurses' knowledge, performance and attitude regarding COVID-19 total scores with their work engagement total scores.

Table (1): Frequency distribution of the studied intern- nurses' regarding their personnel characteristics. (N=90)

Items	Total (N=90)	
	N	%
Clinical training area		
Medical surgical nursing	15	16.7%
I.C.U	15	16.7%
Pediatric nursing	15	16.7%
Maternal and newborn health nursing	15	16.7%
Nursing administration	15	16.7%
Dialysis and Emergency department	15	16.7%
Age		
≤ 22 Years	29	32.2%
23 Years	43	47.8%
≥ 24 Years	18	20%
Mean and ±S.D	31.71±7.36	
Gender		
Male	28	31.1%
Female	62	68.9 %
Marital status		
Un Married	22	24.4%
Married	68	75.6%
Previous Education qualification		
Secondary school	58	64.4%
Secondary nursing school	7	7.8%
Technical nursing education	25	27.8%
Grade Score		
Excellent	51	56.7%
Very good	27	30%
Good	12	13.3%
Attending Training courses		
Yes	15	16.7%
No	75	83.3%

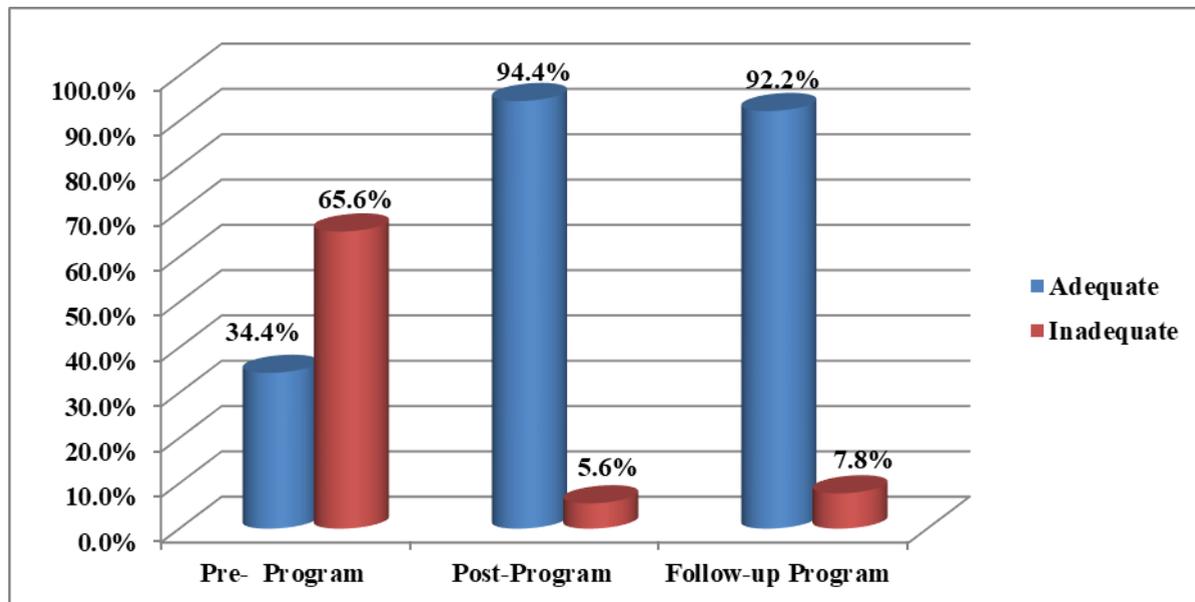


Figure (1): Intern-nurses' total knowledge level regarding COVID-19 throughout program phases.

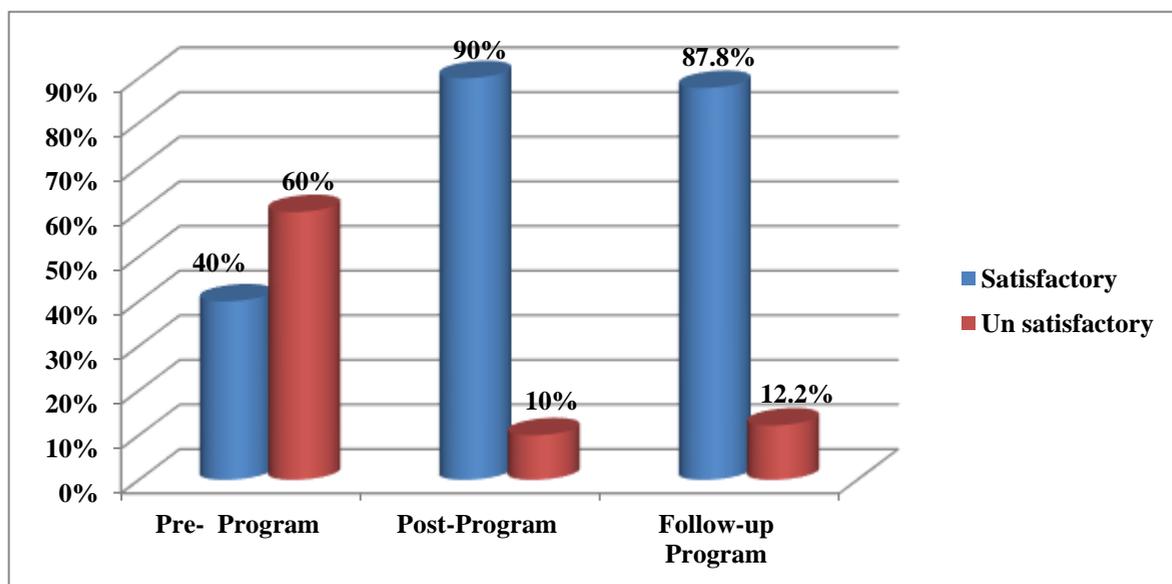


Figure (2): The Intern-nurses' total performance level regarding COVID-19 throughout program phases.

Table (2): Mean scores and percent of the intern-nurses' performance regarding COVID-19 throughout program phases (N=90).

Performance Dimension	Mini - Maximum Score	Pre-Program			Post-Program			Paired t test between pre-post program	P value	Follow-up			Paired t test between pre-follow up program	P value
		Mean	S.D.	Mean %	Mean	S.D.	Mean %			Mean	S.D.	Mean %		
Role as nursing care planner	5-10	4.22	±3.28	42.2%	9.03	±6.38	90.3%	25.1	0.001	8.68	±2.83	86.8%	5.62	0.001
Role as nursing care provider	20-40	15.13	±4.16	37.83%	36.14	±5.58	90.35%	35.1	0.001	35.62	±4.34	89.05%	8.27	0.001
Role as nursing care evaluator	4-8	3.26	±2.19	40.75%	7.21	±2.68	90.13%	18.62	0.001	6.89	±3.67	86.13%	6.78	0.001
Role as health care educator nurse	5-10	4.38	±2.26	43.8%	9.04	±1.99	90.4%	15.4	0.001	8.79	±2.78	87.9%	5.62	0.001
Role as communicator nurse	5-10	4.13	±3.212	41.3%	9.02	±2.14	90.2%	11.68	0.001	8.78	±3.14	87.8%	7.21	0.001
Role as a manager nurse	8-16	6.85	±3.92	42.81%	14.41	±3.27	90.06%	25.12	0.001	13.82	±4.42	86.38%	8.28	0.001
Role as a researcher nurse	3-6	2.36	±1.38	39.33%	5.41	±2.97	90.17%	8.62	0.001	5.21	±2.89	86.83%	5.67	0.001
Total	50-100	40.33	±6.28	40.33%	90.26	±6.27	90.26%	41.2	0.001	87.79	±7.51	87.79%	10.31	0.001

(Statistical significant $P \leq 0.05$ and highly statistical significant $P \leq 0.001$)

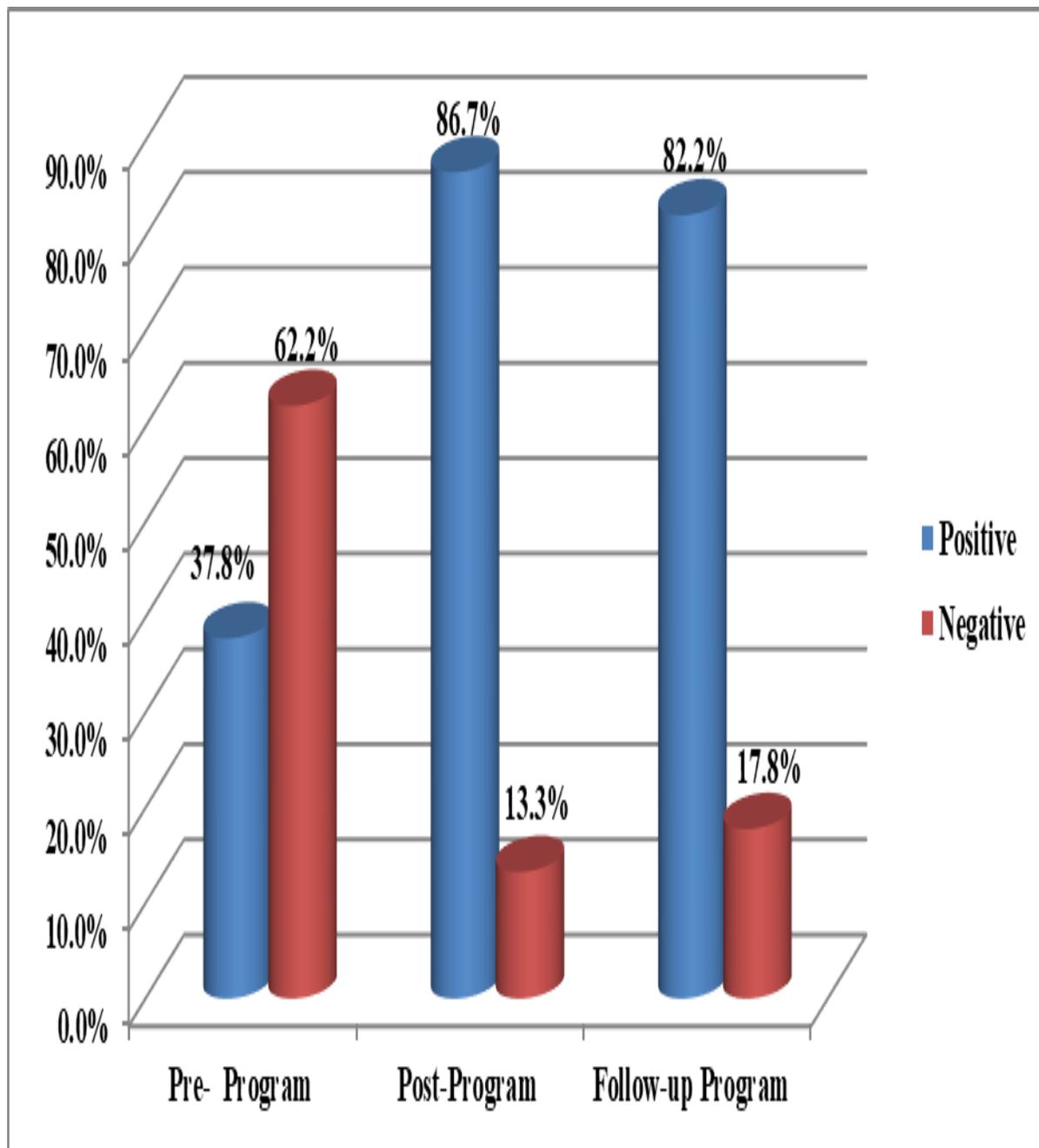


Figure (3): Intern-nurses' total attitude level about COVID-19 throughout program phases.

Table (3): Mean scores and percent of the intern-nurses' attitude dimensions about COVID-19 throughout program phases (N=90).

The Attitude Dimension	Min i- Max i- mu m Score	Pre-Program			Post-Program			Paired t test between pre- post program	P value	Follow-up			Paired t test between pre- follow up program	P value
		Mean	S.D.	Mean %	Mean	S.D.	Mean %			Mean	S.D.	Mean %		
1. Team work climate	6-18	6.74	±4.31	37.44 %	15.47	±4.81	85.94 %	7.01	0.001	14.78	±4.77	82.11 %	6.34	0.001
2. Safety climate	7-21	7.36	±5.09	35.05 %	18.36	±5.41	87.43 %	15.4	0.001	17.63	±5.32	83.95 %	6.11	0.001
3. Job satisfaction	5-15	5.89	±3.46	39.27 %	12.98	±3.54	86.53 %	11.52	0.001	12.25	±2.43	81.67 %	9.23	0.001
4. Stress recognition	4-12	4.63	±2.07	38.58 %	10.43	±2.34	86.92 %	13.71	0.001	9.73	±3.66	81.08 %	9.64	0.001
5. Management Perception	4-12	4.76	±2.25	39.67 %	10.42	±1.78	86.83 %	14.23	0.001	9.87	±2.69	82.25 %	11.32	0.001
6. Working condition	4-12	4.65	±1.77	38.75 %	10.27	±1.89	85.58 %	10.61	0.001	9.76	±2.95	81.33 %	8.74	0.001
Total	30-90	34.03	±5.77	37.81 %	77.93	±6.32	86.59 %	35.41	0.001	74.02	±6.89	82.24 %	31.7	0.001

(Statistical significant $P \leq 0.05$ and highly statistical significant $P \leq 0.001$)

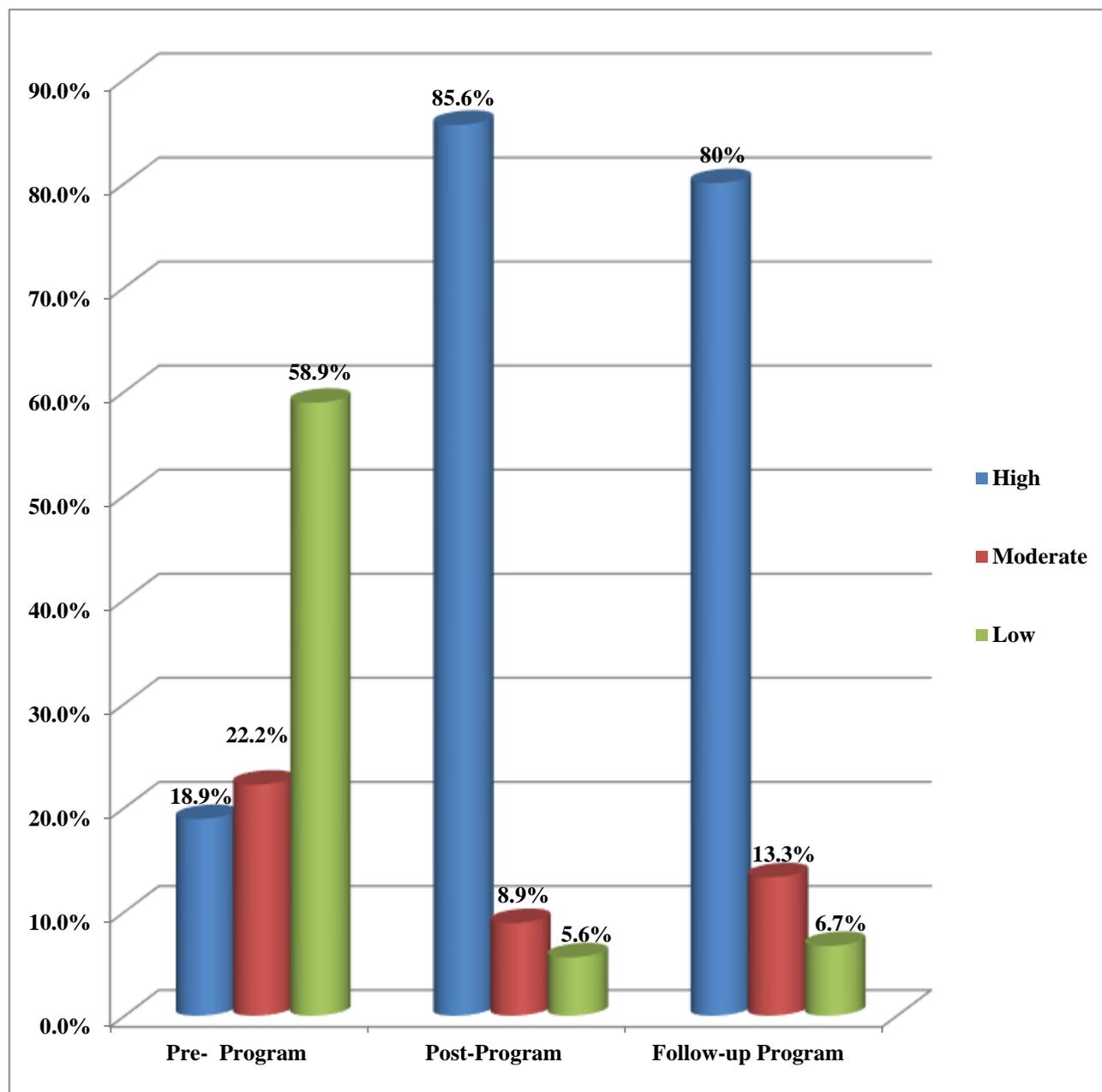


Figure (4): Intern- nurses' total work engagement level throughout program phases.

Table (4): Mean scores and percent of the intern-nurses' work engagement throughout program phases (N=90).

The Work Engagement Dimension	Min- Maximum Score	Pre-Program			Post-Program			Paired t test between pre-post program	P value	Follow-up			Paired t test between pre-follow up program	P value
		Mean	S.D.	Mean %	Mean	S.D.	Mean %			Mean	S.D.	Mean %		
Vigour	9-27	9.38	±1.13	34.74 %	23.15	±1.82	85.74 %	18.34	0.001	21.61	±1.56	80.04 %	14.91	0.001
Dedication	5-15	5.59	±1.09	37.27 %	12.79	±2.67	85.27 %	16.32	0.001	12.02	±3.04	80.13 %	13.42	0.001
Absorption	16-48	15.68	±3.49	32.67 %	41.48	±4.39	86.42 %	27.41	0.001	38.89	±4.79	81.02 %	19.43	0.001
Sharing of work	11-33	11.49	±2.87	34.82 %	27.86	±3.96	84.42 %	23.12	0.001	26.41	±4.36	80.03 %	18.67	0.001
Leadership and Management	6-18	6.38	±2.02	35.44 %	15.41	±3.69	85.61 %	22.04	0.001	14.42	±2.79	80.11 %	13.78	0.001
Relations and communication	3-9	3.27	±2.05	36.33 %	7.69	±2.98	85.44 %	14.22	0.001	7.23	±3.04	80.33 %	12.64	0.001
Job satisfaction	3-9	3.28	±1.08	36.44 %	7.68	±2.87	85.33 %	17.5	0.001	7.22	±1.99	80.22 %	13.12	0.001
Total	53-159	55.07	±4.26	34.64 %	136.06	±5.93	85.57 %	35.12	0.001	127.8	±5.39	80.38 %	23.61	0.001

(Statistical significant $P \leq 0.05$ and highly statistical significant $P \leq 0.001$)

Table (6): Correlation matrix among intern-nurses' knowledge, performance, attitude and work engagement throughout program phases (N= 90).

Variable	Program phases	Intern-nurses' knowledge		Intern-nurses performance		Intern-nurses' attitude		Intern-nurses' work engagement	
		R	P value	r	P value	r	P value	r	P value
Intern-nurses' knowledge	Pre- program	1	----	0.128	0.326	0.183	0.739	0.134	0.845
Intern-nurses' performance		0.128	0.326	1	----	0.354	0.643	0.139	0.846
Intern-nurses' attitude		0.183	0.739	0.354	0.643	1	----	0.248	0.835
Intern-nurses' work engagement		0.134	0.845	0.139	0.846	0.624	0.001	1	----
Intern-nurses' knowledge	Post- program	1	----	0.735	0.001	0.8324	0.001	0.736	0.001
Intern-nurses' performance		0.735	0.001	1	----	0.756	0.001	0.647	0.001
Intern-nurses' attitude		0.8324	0.001	0.756	0.001	1	----	0.718	0.001
Intern-nurses' work engagement		0.736	0.001	0.647	0.001	0.718	0.001	1	----
Intern-nurses' knowledge	Follow-up	1	----	0.635	0.004	0.581	0.002	0.726	0.003
Intern-nurses' performance		0.635	0.004	1	----	0.562	0.001	0.763	0.001
Intern-nurses' attitude		0.581	0.002	0.562	0.001	1	----	0.746	0.001
Intern-nurses' work engagement		0.726	0.003	0.763	0.001	0.746	0.001	1	----

(Statistical significant $P \leq 0.05$ and highly statistical significant $P \leq 0.001$)

Discussion:

Organizations frequently had rapidly changed the way they organize as a result of the quick spread of COVID-19 throughout the world and the subsequent events taken to keep (HCWs) secure. The health care organizations have quickly adjusted, preparing to wind down or helping their (HCWs) to be active and construct workspaces at home to enable remote working. They have also modified the work environment to allow for social distancing. (Zhang, et al., 2020). This study aimed to assess the effect of educational program about COVID-19 on intern- nurses' performance and work engagement.

The present study showed that there was a general improvement in intern-nurses' knowledge level after program implementation in immediate post and follow-up program. In pre-program phase about one third of intern-nurses had inadequate total knowledge level while in immediate post program it was enhanced and become adequate and slightly declined in the follow up program but still more than pre-program phase.

From the researchers' opinion of views this result might be due to the inadequacy of intern-nurse's knowledge level about COVID-19 as the majority of them hadn't attended previous training courses about COVID-19 so increasing knowledge acquired by intern-nurses could explained that education was a passive experience and the educational program developed a dynamic environment. Additionally, the simple, clear and concise way of presentation and lectures and the availability of the relevant media that gave more illustration for understanding the content of the educational program. Also during sessions, the intern-nurses showed an interest and positive interaction for the contents of the educational program because the COVID-19 was a new pandemic disease and they were afraid and worried from its infectious risks. Also improvement in their knowledge level beside the retention of knowledge immediate post program implementation is higher than three months, not all knowledge reserved in the long term memory as a biological fact and need to be periodically refreshed and updated.

These findings supported by **EL-Shafee, Eid, & Mahfouz, (2021)**, who reported that the majority of the studied nursing personnel had satisfactory knowledge level post and follow-up program and minority had unsatisfactory knowledge level in the pre-program. Also the finding of present study agreed with **AL-Guindy, El-Shahate, & Allah, (2021)**, who concluded in their study on intern-nurses and found that, there were general development in the intern-nurses' total knowledge level after program intervention. In the pre-program phase more than one quarter of the intern-nurses' knowledge level were inadequate; while in the post was improved to become adequate and increased to majority of them.

In addition to **Joshi, Madhura, & Jamadar (2020)**, who revealed that in their cross-sectional study with 407 study participants the overall responses to the survey was satisfactory because, overall correct responses of knowledge and awareness were recorded as three quarters of their studied sample. Also **Modi, et al., (2020)**, who conducted their on healthcare students and professionals in Mumbai metropolitan region, and showed that the overall correct responses on knowledge was more than three fifth of study sample.

The foregoing findings of the present study indicated that there was a statistical significant general improvement in the performance of inter-nurses after implementation of educational program in immediately post program and follow-up phase after three months of the program; more than half of intern-nurses had unsatisfactory total level of performance in the pre-program phase while after program implementation majority of them had satisfactory total level of performance in the immediate post and follow-up program phase.

From the researchers' point of views this finding might be due to the educational program was effective which enhance inter-nurses' performance related to activation of infection control policies, visible guidelines and posters, written handbook and continuous demonstration about COVID-19. Additionally, the intern-nurses were fears from infection

transmitted and sever compliance were noticed of all infection control safety measures from all health care workers and public during the world disaster. Also availability of resources and personal protective measures such as face mask, alcohol dispensers, alcohol hand pocket, continuous hand washing, environment cleaning and sterilization, equipment preparation, enough distance between each person and another, all these measures to avoid transmission of COVID-19 infection.

These findings were supported by **EL-Shafee, Eid, & Mahfouz, (2021)**, who study that there were highly significant improvements in performance level of studied nursing personnel toward infection control polices, and most of them had a highly positive performance in post and follow-up phase. Also these finding agreed with **Garderen and Leeuwen, (2022)**, who conducted their study on student's internship during the COVID-19 Pandemic in Vaa University of applied Sciences, Zwolle, Netherlands and found that, there was general enhancement and improvement in total level of intern-nurses' skills after program intervention. In addition to **Abd ElAziz, Abd Elhafez, & Sayed, (2021)**, who concluded that nurses caring for COVID-19 patients who attend nursing educational program should positive improvement more knowledge and practices than they did before.

The result of the current study indicated that there was a statistically significant general improvement in intern-nurses' attitude after implementation of the educational program in immediate post and follow-up program, more than half of inter-nurses had negative attitude about COVID-19 in pre-program while after implementation of the program the majority of them had positive attitude and the least mean scores were related to safety climate. From researcher's point of views this might be due to the effectiveness of the educational program on intern-nurses' knowledge and performance that made a reflect on their attitude about COVID-19 that improved and became positive and also the availability of the resources and intern-nurses' commitment with safety protective measures and precautions.

These results in the same line with **Khasawneh et al., (2020)**, who studied “Medical Students and COVID-19: Knowledge, Attitudes, and Precautionary Measures” and reported that the participants were found to have a positive attitude toward the dealing with COVID-19 disease. Additionally, this finding were similar to **EL-Shafee, Eid, & Mahfouz, (2021)**, who reported that there were highly significant changing in the attitude of the studied nursing personnel in relation to infection control policies activations in (I.C.U.s); the highest percentage of them had highly positive attitude at post and follow-up phases. Moreover, these finding agreed with **Garcia, et al., (2020)**, who conducted study on nursing students in Emergency and (I.C.U.s)” In Spain and found that, increasing in the mean scores of nursing students' attitude dimensions about COVID-19.

The present study revealed that there were a statistical significant general enhancement and improvement in intern-nurses' work engagement following implementation of educational program in immediately post and follow-up phase after three months of the program. Most of them had low total level of work engagement in pre-program while most of them had high work engagement total level at immediately post program and follow-up and least mean score was related to the absorption.

From researchers' point of views this might be due to improvement of intern-nurses' performance and also the change of intern-nurses' attitude about COVID-19 from negative to positive attitude due to success of the educational program that reflected consequently on improving intern-nurses' sense of meaning of work through receiving effective support from the leadership and management, building positive relationships and effective communication with others, and working by team spirit, all of this lead to safety climate that enhance positive emotions for motivating them to become more satisfied and engaged in their work.

These findings supported by **Barak, Eid, & El-Shahat, (2021)**, who conducted their study on newly graduated nurses and revealed that there was highly statistical significant

difference improvement in newly graduated nurses' work engagement immediate post and follow-up program phases compared with pre-program phases. The highest mean score and standard deviation was related to vigor dimension. Also **Abu Dalal, & Ramoo, (2021)** who showed in their study on health care professionals' work engagement in the Gaza Strip, Palestine, and found that, there were general improvement in their work engagement after intervention of their program. However, at pre-program less than half of them low level of work engagement.

This result was agreed with **Abbas and Zhiqiang, (2020)**, who found that improving the work engagement and argued that maintaining engagement requires considering job design into account. Unintentional changes to jobs may have occurred as a result of recent workplace developments, such as switching to remote work arrangements. This is crucial since research demonstrates that task significance and variation have a significant effect on engagement.

The finding of the current study founded that there was statistically significant positive correlation among intern-nurses' knowledge, performance and attitude about COVID-19 total scores with their work engagement total scores. From researchers' point of views this might be due to the knowledge and skills are necessary for practices as improvement in performance for patients with COVID-19, and logically when the improvement occurred in knowledge, attitude and performance level of intern-nurses' about COVID-19, their work engagement subsequently enhanced.

These finding agreed with **AL-Guindy, El-Shahate, & Allah, (2021)**, who found that there was statistically significant positive correlation between intern-nurses' knowledge and practice at Emergency Units during COVID-19 Pandemic" in Egypt. Also this foregoing findings supported by **EL-Shafee, Eid, & Mahfouz, (2021)**, who demonstrated that at the preprogram and follow-up phases of the study, there was a

positive statistically significant correlation among total knowledge scores, total performance scores, and attitude toward infection control activation policies.

Additionally, **Barak, Eid, & El-Shahat, (2021)**, who conducted in their study on newly graduated nurses and reported that there was positive statistically significant correlation between total knowledge, skills and work engagement. Also **Abbas, and Zhiqiang, (2020)**, who conducted their study on employees and showed that during the COVID-19 pandemic, employees without any medical complications also experienced mental health issues, that had a negative effect on their level of work engagement. Moreover, **Kodden, (2020)**, who revealed that engaged employees perform better, that much is clear. As this study has shown, dedication (the number 6 performance predictor) and vigor (number 7) are especially crucial for sustainable performance.

Conclusion:

In the light of the current study findings, it was concluded that there was high statistically significant improvement in the intern-nurses' levels of knowledge, performance and attitude about COVID-19 and also had a positive effect on their work engagement at immediately post and follow up program. Furthermore, there were highly statistically significant improvement and difference between mean scores assigned by intern-nurses throughout the three phases of the program; pre, immediate post and follow-up program. Additionally, the most improved items were related to role as nursing care provider and safety climate in relation to performance and attitude respectively. Also the most improved items were related to the absorption of work engagement. Moreover, there was a statistically significant positive correlation between intern-nurses' knowledge, performance and attitude total scores about COVID-19 with their work engagement total scores.

Recommendations:

The following recommendations were made based on the findings of this study:

- Conducting continuously in-service training program for intern-nurses are needed to keep their knowledge and performance up to date on the management of COVID-19 patients.
- Intern-nurses should be equipped with adequate needed personal protective equipment and materials that used in managing COVID-19 patients.
- Working continuously to expand the intern-nurses' performance set to provide safe patients' care and motivate them to be more engaged.
- Conducting continuous assessment of intern nurses' knowledge and performance to determine subject and areas that need to be covered in training courses.
- to improve their performance and enhance their work engagement.
- Clinical instructors should be help, support and communicate effectively with intern-nurses to be more motivated and engaged at their work.
- Respecting intern-nurses' role, performance and promoting the value and their work position in the hospital that improve their work engagement.
- Maintain healthy intern-nurses' relations and effective communication among health care team of an organization is necessary to reduce the gap and enhance work engagement.
- Cooperation and collaboration between hospital and faculty of nursing should be promoted for decreasing intern-nurses' level of stress, anxiety and uncertainty of the outbreak.
- Further study to investigate the factors and challenges affecting knowledge, attitude, performance and work engagement of intern-nurses.

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الملخص العربي

تأثير البرنامج التعليمي عن كوفيد-١٩ على أداء مرضى الامتياز واندماجهم في العمل

مقدمة: مرض فيروس كورونا كوفيد-١٩ هو أحدث جائحة عالمي يفرض مخاطر مهنية على العاملين في مجال الرعاية الصحية، والتي يمكن أن تؤدي إلى عجز في الأداء والاندماج في العمل كأداة رئيسية لسلامة المرضى.

الهدف من الدراسة: هدفت الدراسة إلى تقييم تأثير البرنامج التعليمي عن كوفيد-١٩ على أداء مرضى الامتياز واندماجهم في العمل.

تصميم البحث: تم استخدام تصميم شبه تجريبي باختبار قبلي وبعدي لتنفيذ هذه الدراسة.

مكان البحث: اجريت الدراسة في الأقسام المختلفة التي يتم تدريب مرضى الامتياز فيها بمستشفى جامعة بنها، محافظة القليوبية، مصر.

العينة: عينة عشوائية بسيطة من مرضى الامتياز.

أدوات الدراسة: تم استخدام أربع أدوات على النحو التالي: (1) استبيان المعرفة لمرضى الامتياز عن كوفيد-19، (2) قائمة الملاحظة لمرضى الامتياز، (3) استبيان سلوك مرضى الامتياز، و (4) استبيان الاندماج في العمل لمرضى الامتياز.

النتائج: كشفت الدراسة أن حوالي 34.4% من مرضى الامتياز لديهم معرفة كافية في ما قبل البرنامج بينما بعد البرنامج مباشرة وكذلك بعد المتابعة تمت زيادتها إلى 94.4% و 92.2% على التوالي. فيما يتعلق بالامتثال للأداء، كان 40% منهم يتمتعون بمستوى مرضٍ من الأداء في مرحلة ما قبل البرنامج، بينما تم تحسينه بعد البرنامج مباشرة وكذلك بعد المتابعة إلى 90% و 87.8% على التوالي. فيما يتعلق بسلوك مرضى الامتياز، كان لدي 37.8% من مرضى الامتياز سلوك إيجابي في ما قبل البرنامج والتي تغيرت إلى 86.7% و 82.2% بعد البرنامج مباشرة ووبعد المتابعة على التوالي. فيما يتعلق بالاندماج في العمل، كان 18.9% منهم لديهم اندماج في العمل عالي في مرحلة ما قبل البرنامج بينما زادت إلى 85.6% و 80% في كل من بعد البرنامج مباشرة وبعد المتابعة للبرنامج.

الخلاصة: نستخلص من هذه الدراسة أن تنفيذ البرنامج التعليمي أدى إلى تحسين معرفة وأداء وسلوك مرضى الامتياز عن كوفيد-19 وكان له أيضًا تأثير إيجابي على اندماجهم في العمل، علاوة على وجود علاقة إيجابية ذات دلالة إحصائية بين المستويات الكلية للمعرفة والأداء والسلوك لمرضى الامتياز مع المستويات الكلية للاندماج في العمل.

توصيات البحث: العمل باستمرار لتوسيع مجموعة أداء مرضى الامتياز لتوفير رعاية آمنة للمرضى وتحفيزهم على الاندماج في العمل بشكل أكبر.