

## Effect of educational Guidelines Intervention regarding COVID -19 on nurses knowledge and precautionary practices in gastrointestinal endoscopes

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### Abstract

**Background:** COVID-19 pandemic affected the global population, and infection is a high risk among nurses in the gastrointestinal endoscopy unit. Endoscopy is a diagnostic procedure that involves inserting a flexible fiber-optic tube into the esophagus, stomach, or upper small intestine, depending on the degree of suspected lesions. **This study aimed to** evaluate the effect of educational guidelines intervention regarding COVID -19 on nurses' knowledge and precautionary practices in gastrointestinal (GIT) endoscopes. **Design:** A quasi-experimental design was used. **Setting:** The study was carried out at the gastrointestinal endoscopy unit affiliated with General Portsaid Hospitals (Al-Mabarrah Hospital, Al-Amiri Hospital, Al-Zohour Hospital, Port Fouad Hospital, and Al-Tadamon Hospital). **Sample:** The study included a convenient sample of all endoscopy nursing personnel (30 nurses). **Three tools for data collection:** (1) Demographic structured interview sheet, (2) Nurses' Covid-19 Knowledge Questionnaire, and (3) Nurses' Covid-19 Precautionary Practices Checklists. **Results:** More than one-third of the studied nurses received training courses regarding COVID-19 before. Almost three-quarters of the studied nurses reported that their main source of information about knowledge regarding COVID-19 was doctors. There was an improvement with a highly statistically significant difference between nurse's knowledge regarding COVID -19 pre/post one month of educational intervention ( $P < 0.001$ ), with improved their precautionary practices score after one month. A statistically significant positive relation was found between the total mean score of studied nurses' COVID-19 knowledge and precautionary practice one month after the educational intervention. **Conclusion:** The study concluded that educational guidelines intervention for nurses in the GIT endoscopy unit greatly helps in improving COVID-19 levels of knowledge and precautionary practices with significant differences immediately and two months following an educational guidelines intervention. **Recommendation:** Continues designing and implementation in-service training program for nurses in the GIT endoscopy unit to improve their knowledge and precautionary practices

**Keywords:** COVID-19, Gastrointestinal endoscopes, Precautionary practices, and Nurses' knowledge.

### Introduction:

Endoscopy is a diagnostic procedure that involves inserting a flexible fiber-optic tube into the esophagus, stomach, or upper small intestine, depending on the degree of suspected lesions. To assist avoid infection transmission; flexible endoscopes must be processed correctly. Because flexible endoscopes enter bodily cavities, they may become contaminated with a high quantity of bacteria. Organic material that gathers in the channels and components of the endoscope (e.g., blood, feces, and respiratory secretions) might be difficult to remove (**Bashaw, 2016**).

The coronavirus illness (COVID-19) first appeared in China, in Wuhan, in late 2019, and

has since spread to more than 200 nations, prompting the World Health Organization (WHO) to designate it a worldwide pandemic. COVID-19 positive cases have been reported in approximately 5.6 million people worldwide, with at least 350,000 deaths. Governments and authorities in the field of health are issuing general warnings. COVID-19 is connected with an increased risk of the more serious and perhaps deadly disease in the elderly (**Azlan, Hamzah, Sern, Ayub, & Mohamad, 2020**).

Coronavirus disease of 2019 (COVID-19) is a relatively new and well-known acute viral respiratory infection caused by a member of the coronavirus family that was recently found. Its outbreak began in December 2019 in Wuhan, China. COVID-19 was declared a pandemic by

the World Health Organization (WHO) on March 11, 2020. According to the World Meter (May 2021), COVID19 has been confirmed in 154,098,279 cases worldwide, with 3,224,709 deaths and 131,412,537 recovered cases (WHO, 2020).

According to the World Health Organization (WHO), health professionals account for roughly 14% of COVID-19 cases globally, and up to 35% in some areas. On February 14, 2020, Egypt's Ministry of Health and Population declared the first COVID-19 infection. In October 2020, there were 750 documented cases and 56 deaths among healthcare professionals (WHO, 2020).

COVID-19 pandemic was and continues to be one of the most devastating global healthcare burdens on patients, families, communities, and healthcare providers (HCWs), state that the strain is not only physical, but also psychological, social, and financial. All HCWs are at risk of being exposed to various highly infectious pathogens while caring for patients, the patient's environment, and during various health care activities, primarily in basic bedside nursing care of infected patients, as well as the possibility of unintentionally transmitting the infection to their families, including COVID-19 infection. HCWs are often made up of recent graduates and seasoned employees with a variety of skills (Temsah et al., 2020).

Fever is the most prevalent symptom of COVID-19 infection. Other typical symptoms include coughing, malaise, weariness, and shortness of breath. Concerns about that virus have grown worldwide as a result of its improved transmission capabilities, which may have contributed to increasing rates of morbidity and mortality. The elderly and patients with concomitant conditions are more likely to contract the infection and are also more vulnerable to catastrophic consequences, which could be linked to ARDS and the cytokine storm (Abdelhafiz, et al., 2020).

The Coronavirus is primarily passed from one person to another through close contact within six feet of infected people through respiratory; sneezes or coughs or transmitted via touching an object or a surface that the virus settles on it (Huynh, Nguyen, Vo, & Pham,

2020). There are no established or demonstrated COVID19 therapies or vaccinations available at this time. The major method for limiting the spread of that virus in the community and healthcare settings is to follow infection control standards procedures (Li., et al., 2020)

During the COVID-19 outbreak, HCWs, including nurses' interns, are at a high risk of developing mental health problems (Zhong, et al., 2020). The COVID-19 pandemic is affected by the global population, and infection is a high risk among nurses in the gastrointestinal endoscopy unit. Infection prevention and effective care require up-to-date knowledge, attitudes, competent practices, and psychological preparation. As a result, mentoring is a fantastic way to develop these qualities (WHO,2020).

Knowledge, attitude, and practice are the bedrock of public partnership and the backbone of any health policy that enlightens and protects people from ignorance and darkness in all parts of their lives. Information is considered as the major activity that prepares a person for long and fruitful life, and collecting knowledge is seen as the gasoline that propels human existence onward. Threats must be avoided, and the nurses must stay strong and balanced in the face of adversity. The implementation of efficient measures is aided by a suitable level of understanding. The most important step in keeping the virus from spreading locally is to provide and practice protective measures (Abdelhafiz et al., 2020).

To avoid the transmission of the coronavirus infection, nurses' knowledge and practices should be directed toward strict preventive measures. Understanding nurses' knowledge, attitudes, and practice with COVID-19 are crucial at this time (WHO, 2020).

The goal of COVID-19 nursing care should be to keep the infection from spreading. Nurses have a vital role as educators and advisors in teaching service users and caregivers, offering health education in the community, and assisting other multidisciplinary team members in their development. To prevent infection transmission, they should use the proper hand washing

technique, maintain a safe social distance, use disinfectant materials such as alcohol, avoid shaking hands, use a tissue when coughing or sneezing on the mouth and nose, and wear a mask when coughing or sneezing (WHO,2020).

They should also be educated not to touch eyes, nose, or mouth. Encourage the use of separate equipment, including stethoscopes, thermometers, saturation probes, and blood pressure cuffs, with cleaning and disinfection between shifts. Stethoscopes are disinfected with alcohol-based solutions (Ministry of Health and Population Egypt, 2020). If endoscopy professionals fail to follow standard infection control guidelines, they may make it easier for infection to spread from one patient to another (Macedo de Oliveira,White &Leschinsky, 2005).

Nursing care for patients undergoing upper endoscopy includes informing the patient about the surgery, obtaining written consent, and any necessary pre-and post-procedure preparation (Abd El-All, Abd El-Lateef, & Sayed, 2014). In any medical setting, infection control procedures are essential for infection prevention. Previous research on endoscopy units found that training can increase nurses' understanding and practice of infection control and endoscopic reprocessing techniques significantly (Abd-Elhamid, El-khashab, Taha & Saleh, 2016).

### Significance of the study:

More than 22,000 healthcare providers (HCPs) have already been infected worldwide (WHO,2019). Ongoing training for nursing is critical to maintaining high-quality, effective, and efficient nursing care. Training has a significant impact, especially during the COVID-19 epidemic, when clinical expertise is passed down from more experienced to expand their knowledge (Bao et al., (2020).

There is an increased flow rate of patients with COVID-19 in Egypt 2020 (Ministry of Health and Population in Egypt “MOHP”, 2020). To protect them should keep them away from infection and improve their knowledge and practice about preventive measures towards COVID-19. Especially, nurses because they are at higher risk of serious illness with COVID-19. In Egypt, an underestimation

of the total number of cases is anticipated, as clarified by the Egyptian minister of health ((Hassany, Abdel-Razek, Asem, AbdAllah, & Zaid, 2020 and Bhardwaj, 2020).

Accordingly, availability and correct applying of preventive measures are essential to protect the patient during their coping with the COVID-19 pandemic. However, what is most important is their adherence to applying these preventive measures, which largely depends on nurses' knowledge and practice about COVID-19 (Armitage & Nellums, 2020).

### Aim of the study:

The study aimed to evaluate the effect of educational guidelines intervention regarding COVID -19 on nurses' knowledge and precautionary practices in gastrointestinal (GIT) endoscopes through:

1. Assessing nurses' knowledge regarding COVID-19 during GIT endoscopies.
2. Assessing nurses' practice regarding COVID-19 during GIT endoscopies.
3. Design educational intervention regarding COVID -19 in the light of the actual need of the study sample.
4. Implement and evaluate the effect of the educational guidelines intervention regarding COVID -19 on nurses' knowledge and precautionary practices in gastrointestinal (GIT) endoscopes.

### Research Hypotheses:

H1: Nurses' knowledge regarding COVID -19 would be improved after implementing the educational guidelines intervention.

H2: Nurses' practice regarding COVID -19 would be improved after implementing the educational guidelines intervention.

### Subject and Methods:

#### Research design:

A quasi-experimental design was used in the current study to achieve the study's objectives In terms of baseline characteristics; it identified a pre-group that is as comparable to the post-group as possible. There were

differences in results between before and after groups (Campbell and Stanley, 2015).

#### Setting:

The study was carried out at the gastrointestinal endoscopy unit related to General Portsaid Hospitals (Al-Mabarrah Hospital, Al-Amiri Hospital, Al-Zohour Hospital, Port Fouad Hospital, and Al-Tadamon Hospital) Saturday to Wednesday, from 9 a.m. to 1 p.m. It is located on the ground floor of the outpatient building. They consist of two rooms for sonar, examination and nursing staff. Also, there was a waiting area for patients and a lecture room which involved an adequate number of seats, and data show where the researchers interviewed the recruited patients to conduct this study. This unit provides diagnostic and therapeutic services for patients. This setting was selected because of the high prevalence of patients in the selected settings and also, it serves a biggest region of population.

#### Subjects:

The study included a convenient sample of all endoscopy nursing personnel (30 nurses) who are involved in endoscopies.

#### Tools of data collection:-

Three tools were used for data collection:

##### Tool (1): Demographic structured interview sheet:

It included questions about demographic data of nurses such as age, educational level, and years of experience in the endoscopy unit, training courses regarding COVID-19 in the GIT endoscopy unit (Hossen and Mohammed, 2014).

##### Tool (II): Nurses' Covid-19 Knowledge Questionnaire:

This tool was developed by the researchers after reviewing the related literature. It consisted of 16 questions (multiple choice questions) for assessing the endoscopy nurse's knowledge regarding COVID-19; it included ended questions regarding the followings items: definition, mode of transmission, clinical pictures, complications/risks, high-risk persons, treatment, personal protective measures to prevent the spread of infection, and their source of knowledge (Huynh, Nguyen, Vo, & Pham, 2020; Al-Hanawi et al., 2020 & Zhou et al., 2020).

##### Scoring system for nurses' knowledge about COVID – 19:

For known and unknown answers, the total nurses' knowledge percentages were determined. Each complete correct response received two marks, while an incomplete correct answer received one mark, and wrong or unknown answers received zero mark. The scores of the items were added up for each area of knowledge, and the total answers were divided by the number of items, yielding a mean score for the knowledge. The results were then transformed into a percentage score. If a nurse's knowledge score was 60% or more, it was regarded as satisfactory; if it was less than 60%, it was considered unsatisfactory.

##### Tool (III): Nurses' Covid-19 Precautionary Practices Checklists:

This tool was developed by the researcher after reviewing the related literature (Alzoubi et al., 2020 & Chan Chan, So, Wong, Lee, & Tiwari, 2007), it included items related to Hand Washing Observational Checklist: Involved in routine hand-washing practice. It consists of 12 items.

- **Face Mask Wearing Observational Checklist: face mask practice consists of 4 items.**

Items related to social distancing guidelines, cloth face coverings indications, gloving indication, recommendation for visitors, cough and sneezing etiquette, stress management methods, recommended action when experiences signs and symptoms of COVID-19, and recommended action when contacts with a person having signs and symptoms of COVID-19.

##### Scoring system for nurses' Covid-19 precautionary practices:

The nurses' Covid-19 precautionary practices were scored as follows; done correctly were scored (1), and the items not done or incorrectly done were scored zero. For each area, the scores of the items were summed up, and the total was divided by the number of the items, giving the mean score for the part. These scores were converted to a percentage score. Nurses' performance was considered adequate if the percentage score was 60% or more and inadequate if was less than 60%.

**Validity of the tools:**

The content validity of the tools was checked by three experts' professors in the field of medical-surgical nursing to ensure that the questions were clear, relevant, applicable, and complete. The recommended changes were made, and the final form was changed as well.

**Reliability of the tools:**

Test-retest reliability was used. The internal consistency of the tools was calculated using Cronbach's alpha coefficients. Study tools revealed reliability at Cronbach's alpha 0.76 for the tool (I), 0.84 for the tool (II), and 0.85 for the tool (III).

**Ethical considerations:**

Permission for conduction of the study was gotten from the responsible authorities after an explanation of its purpose. The tools were tested for disorders and appropriate modification was done accordingly.

The researchers obtained the nurses' consent before conducting the study. Assured them about confidentiality, safety, and privacy of data obtained. Written consent was obtained from nurses to gain their cooperation. The aim of the study was explained and the expected outcomes from the implementation of the study were included in this letter to obtain permission for data collection. The objective of the study was explained to nurses. The researchers informed the nurses that, the study was voluntary; they were allowed to refuse to participate in the study. Nurses had the right to withdraw from the study at any time, without giving any reason. Nurses were assured that their information would be confidential and used for research purposes only.

**A pilot study:**

The pilot study was conducted on 10% (3 nurses) of the entire sample to confirm that the measures were clear, that they were applicable, and that the time required to complete the survey was reasonable. The essential alterations were carried out based on the findings of the pilot research. Nurses who participated in the pilot study were not included in the research study.

**Data collection procedure:**

The researchers used scientific books, papers, periodicals, and the internet to analyze current local and international related literature to gain a better understanding of the problem, create the study measures, and complete them. The actual fieldwork took place at the chosen setting from the beginning of July until the end of December 2020. In the previously described scenarios, the researchers presented themselves to the medical and nursing staff. The researchers explained the study's nature and goal and requested cooperation.

**The researchers performed the study in the following phases:**

- 1- **Assessment Phase:** The researchers met with each nurse individually, introduced themselves, and obtained their consent to be recruited in the study after explaining the purpose of the study and collecting their demographic data. They also assessed nurses' knowledge about COVID-19 infection using tools II and III before the educational intervention.
- 2- **Planning phase:** The researchers prepared educational material about voluntary participation and confidentiality was assured by the researchers for each nurse by clarifying that all information will be used for scientific research only. All the study nurses were subjected to routine care of the study setting and then the content of the educational intervention was prepared in the light of the actual need assessment of the nurses. Nurses involved in the study were interviewed two times per week from 9:00 am to 1 pm.
- 3- **Implementation phase:** The researchers provided four educational sessions including a booklet and audio sessions. Each session is lasting from 45 minutes to 1 hour. These sessions were illustrated by using a booklet, PowerPoint, and educational videos. Each nurse received COVID-19 education individually. They were given information regarding COVID-19 definition, clinical picture, transmission modes, signs and symptoms, treatment, and prevention. While taking precautions throughout the application of the educational intervention, such as wearing a face mask and sterile

gloves, maintaining a safe personal distance, and periodic alcohol disinfection.

**4- Evaluation phase:** Reassessing the effect of the educational intervention regarding COVID -19 on nurses' knowledge and precautionary practices in gastrointestinal (GIT) endoscopes was followed and carried out after one month by using pre and post the same tools (tool II and tool III).

#### Statistical analysis:

Statistical Plan Data were analyzed by Statistical Program for Social Science (SPSS) version 20.0. Quantitative data were declared as mean± standard deviation (SD). Qualitative data were stated as frequency and percentage. The following tests were done: Chi-square (X<sup>2</sup>) test of significance was used to compare proportions between two qualitative parameters. The confidence interval was placed to 95% and the margin of error standard was placed to 5%. So, the p-value was considered significant as the following: P-value was considered significant when P-value <0.05, P-value <0.001 was highly significant and P-value 0.05 was insignificant.

#### Results:

**Table (1)** Showed that 63% of nurses aged less than 35 years. (87%) had a secondary school of nursing and 67% had years of experience in endoscopy unit more than 3 years.

**Figure (1):** Demonstrated that only 37% of the studied nurses received training courses regarding COVID-19 before.

**Figure (2):** Portrayed that 73% of the studied nurses reported that their main source of information about knowledge regarding COVID-19 was doctors.

**Table (2)** and **Table (3):** Demonstrated frequency and percentage distribution of the studied nurse's knowledge regarding COVID -19. It was observed that the highest percentage of the nurses had satisfactory knowledge regarding COVID -19 in all items post educational intervention than pre-implementation. There was an improvement with a highly statistically significant difference between nurse's knowledge regarding COVID -19 pre/post one month of educational intervention (P<0.001).

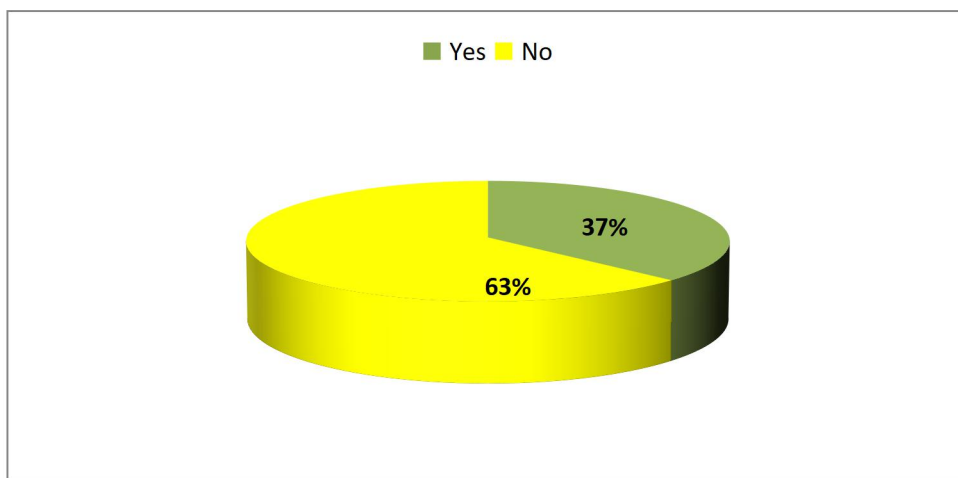
**Figure (3)** depicted the nurses' total practice scores before and one month after receiving COVID-19 education. It was discovered that the majority of the nurses investigated (91%) had inadequate COVID-19 practice before the educational intervention, which fell to 12 percent. On the other hand, just 9% of the nurses in the study had adequate practice before the educational intervention, but 88 percent of nurses improved their precautionary practices score after one month, with a statistically significant difference.

**Table (4):** Showed that a statistically significant positive relation was found between the total mean score of studied nurses' COVID-19 knowledge and precautionary practice one month after the educational intervention (  $r=0.258$ ,  $p=0.001$ ) and ( $r=0.383$ ,  $p=0.001$ ) respectively.

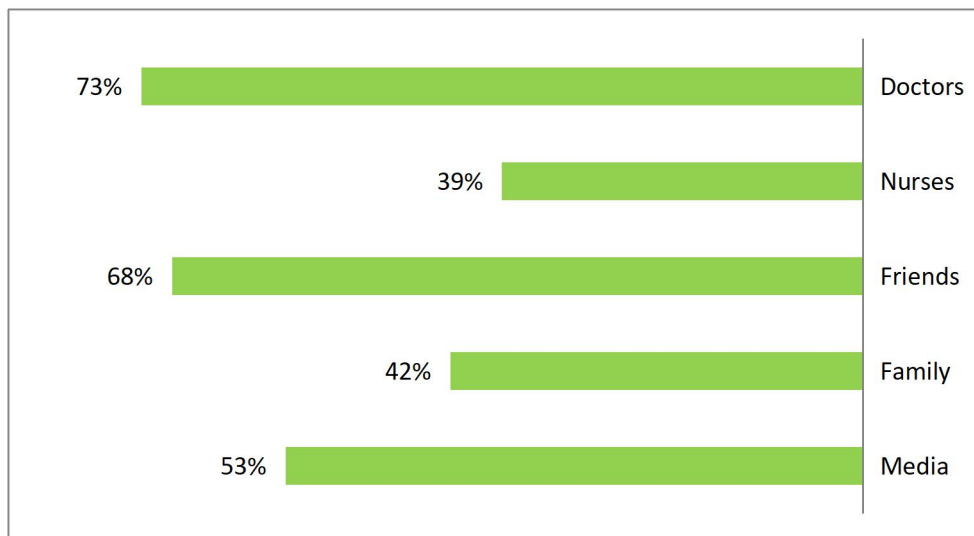
**Table (5):** Illustrated nurse's perceptions and evaluation about prepared educational intervention, the vast all (100%) said the educational intervention content answered all of their inquiries, and more than three-quarters (88%) said the educational intervention was helpful in prevention COVID-19, the majority (70%) of them reported that the educational intervention reduced their anxiety.

**Table (1):** Distribution of the studied nurses regarding their demographic characteristics (n=30)

Demographic characteristics	No	%
<b>Age:</b>		
- < 35	19	63
- > 35	11	37
Mean ± SD		36.8 ± 6.1
<b>Educational level</b>		
- Secondary school of nursing education	26	87
- Higher education	4	13
<b>Years of experience in the endoscopy unit</b>		
- 1-3 years	10	33
- < 3 years	20	67



**Figure (1):** Distribution of the studied nurses regarding their training courses regarding COVID-19 (n=30)



**Figure (2):** Distribution of the studied nurses according to their source of knowledge regarding COVID-19 (n=30)

**Table (2):** Distribution of the studied nurses' knowledge regarding COVID-19 pre and post educational intervention (n=30)

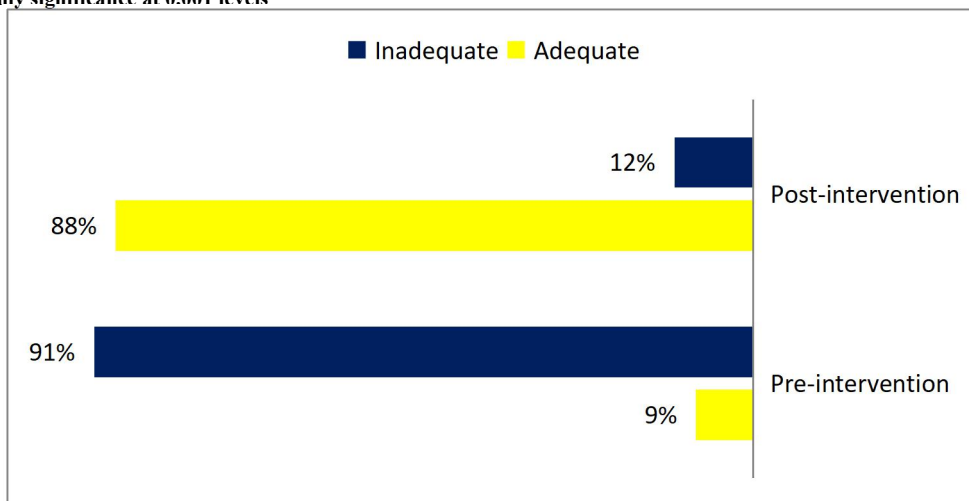
Nurses' knowledge	No = (30)		P-value
	Pre educational intervention (No/%)	Post educational intervention (No/%)	
Definition	12(40)	30 (100)	<0.001*
Mode of transmission	11 (35)	30 (100)	<0.001*
clinical pictures	12(40)	30 (100)	<0.001*
High risk persons	13(43)	30 (100)	<0.001*
Complications	13(43)	30 (100)	<0.001*
Treatment	9( 29)	30 (100)	<0.001*
Personal protective measures	15(50)	30 (100)	<0.001*

\*highly significance at 0.001 levels

**Table (3):** The total knowledge score level of the studied nurses regarding COVID-19 pre and post educational intervention (n=30)

Total knowledge	Pre educational intervention		Post educational intervention		T	P-value
	No	%	No	%		
Satisfactory	15	50	30	100	5.042	<0.001*
Unsatisfactory	15	50	0	0.0		

\*highly significance at 0.001 levels

**Figure (2):** The total practices score level of the studied nurses regarding COVID -19 pre and post-one-month educational intervention (n=30)**Table (4):** Correlation between the total mean score of COVID-19 knowledge and precautionary practices before and one month after implementation of the educational intervention

overall score	Pre COVID-19 precautionary practices	Post COVID-19 precautionary practices
COVID-19 Knowledgepre-intervention	r=0.258 P=0.001*	-
COVID-19 Knowledgepost one month of intervention	-	r= 0.383 P= 0.001*

\*. Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).



**Table (5):** Distribution nurse's evaluation of the educational intervention regarding covid-19 (n=30)

Nurse's evaluation of the educational intervention regarding covid-19	No	%
All of your inquiries were answered by the program • Yes • No	30 0	100 0.0
The program has been developed in a way that will assist you. • Yes • No	30 0	100 0.0
COVID 19 preventive program is beneficial. • Yes • No	26 4	88 12
The program is written in a simple language • Yes • No	30 0	100 0.0
The program assists you in reducing anxiety. • Yes • No	21 9	70 30

### Discussion:

The purpose of this study was to determine if implementing an educational intervention will improve nurses' knowledge and precautionary practices regarding COVID-19 at the GIT endoscopy unit. Nurses' knowledge and practice in endoscopic units improved significantly as a result of the study's findings. The findings lead to acceptance of the specified hypotheses, as well as evidence of the educational intervention's success.

The finding of the present study revealed that less than two-thirds of nurses aged less than 35 years. This result is supported by the study conducted by **Moqbel and his colleagues (2018)** who studied at Major Hospitals in Yemen "Effectiveness of Planned Health Education Program on Nurses' Knowledge and Practice for Preventing Infection in Gastrointestinal Endoscopy Units" and found that most nurses' age less than 30 years old. However, this result is in disagreement with **Abd-Elhamid, El-khashab, Taha, & Saleh, (2016)**, who studied "Impact of Training Education Program on Improving Nurses Performance Regarding Infection Control in Endoscopy Unit" and reported that found that more than two-thirds of nurses were in the age group of more than 40 years.

The finding of the present study indicated that the majority of nurses had a secondary school of nursing education. This finding goes in the same line with **El Ghatey, Mahrous,**

**&Gendy, (2013)** who conducted a study in Abha, Saudi Arabia entitled " Impact of Universal Infection Control Intervention Program for Nurses at Asser Hospital Medical-Surgical Nursing Department, Faculty of Nursing, King Khalid University" and observed that majority of nurses had completed their secondary nursing school education. Also, **Ali and Taha, (2014)** revealed in their study entitled "Effect of Infection Control Training Program on Nurse's Performance and Microbial Results on GIT Endoscopes " and found that about two-thirds were a secondary school of nursing education.

The finding of the present study highlighted that about two-thirds of nurses had years of experience in the endoscopy unit more than 3 years. This finding is consistent with **Ali and Taha, (2014)** who studied "Effect of Infection Control Training Program on Nurse's Performance and Microbial Results on GIT Endoscopes " and found that more than half of nurses had experienced more than 3 years. This finding is in contrast with **Soliman, (2018)** who studied in Mansoura "Effect of in-service Educational Program for Nurses about Infection Control Precautions on their Practice" and found that slightly more than half of the nurses had more than 10 years of experience.

The finding of the present study revealed that only more than one-third of the studied nurses received training courses regarding COVID-19 before. From the researchers' point

of view, it can be explained in light of the belief that training within the unit is not sufficient; it could also be due to a lack of nurses' interest in infection control training provided by the hospital.

This finding is similar to that of **Talaat et al., (2016)**, who investigated the "Evolution of infection control in Egypt" and concluded that the experience of developing and implementing a program in Egypt revealed many constraints that are common in developing countries, such as a lack of trained health care professionals.

The findings of this study agree with those of **Abolwafa, Ouda, Mohammed & Masoed, (2013)**, who investigated "Developing an educational program for Nurses' Related to Infection Control of Invasive Procedures" at EL-Minia University and General Hospitals and discovered that only about ten percent of the studied sample had previously attended infection control training courses. Also, according to **Hosoglu et al., (2017)**, who conducted a study in Turkey on "Health care workers' compliance with universal precautions," less than one-third of the participants had received disease prevention training.

The finding of the present study indicated that almost three-quarters of the studied nurses reported that their main source of information about knowledge regarding COVID-19 was doctors. This result is in the same line with the study done by **Albarrak et al., (2019)** about "Comparing the knowledge, attitude, and practices of different health care workers" and reported that the highest main source being seminars and workshops by doctors accounting for among almost half of nurses.

The finding of the present study indicated that there was an improvement with a highly statistically significant difference between nurse's knowledge regarding COVID -19 pre/post one month of educational intervention ( $P < 0.001$ ). This reflected that there was a lack of knowledge which may harm the endoscope reprocessing procedure and might lead to contamination in the endoscopies used in the endoscopic unit which may lead to health problems to the nurses and patients who undergoing GIT endoscopic procedure. But, after receiving educational intervention the positive effect of intervention helping in improving knowledge among nurses.

This is in agreement with **Abd-Elhamid, El-khashab, Taha, & Saleh, (2016)**, who stated that when comparing pre and post, pre and follow-up execution of the educational program, there was an improvement in overall nurses' knowledge. Also, the findings of this study are supported by **Soliman & Momtaz Abd Elaziz, (2012)** in Egypt who studied "Evaluation of an Isolation Program of Hepatitis C Virus" and observed an improvement in nurse knowledge post the introduction of an infection control program. The development of nurse knowledge and the implementation of the infection control program had a statistically significant difference ( $p < 0.01$ ).

This was in line with the study carried out in India by **Koshy and Patel, (2015)** who conducted a study about "Effectiveness of Planned Teaching Program on Knowledge Regarding the Infection Control Measures" and compared between the posttest and pretest knowledge scores of staff nurses regarding the infection control measures and they found to be highly significant ( $p < 0.05$ ).

The results are similar to the findings of **Khan, Shah, Ahmad, & Fatokun, (2014)** about "Knowledge and attitude of healthcare workers about Middle East Respiratory Syndrome in multispecialty hospitals of Qassim, Saudi Arabia study", it can thus be suggested that the positive influence of the educational intervention on the HCWs from the Ministry of Health in Vietnam.

Similarly, **Huynh, Nguyen, Vo, & Pham, (2020)** studied "Knowledge and attitude toward COVID-19 among healthcare workers at District Hospital, in Minh City" and observed that the majority of HCWs at the District Hospital had good knowledge and positive attitude toward COVID19 after program intervention.

The finding of the present study indicated that the majority of nurses improved their precautionary practices score after one month of educational intervention, with a statistically significant difference. This reflected the success of the educational intervention and its positive effect.

This finding is consistent with the findings of **El Ghaty, Mahrous, & Gendy (2013)**, who found highly statistically significant differences in nurse practice before and after program implementation. These findings were also consistent with those of **Abd-Elhamid El-**

**khashab, Taha, & Saleh, (2016)**, who found a significant statistical improvement in overall nurses' infection control practice in the endoscopy unit. In addition, **Gijare (2018)** investigated the "Effectiveness of education on infection control practices among health care professionals" and discovered a highly statistically significant difference in total infection control protocol practice among nurses during posttest showing that the overall effect of training was good.

The present study revealed that a statistically significant positive relation was found between the total mean score of studied nurses' COVID-19 knowledge and precautionary practice after the educational intervention. This link can be explained by the fact that more knowledge leads to increased practice. Also, when the nurses in the study had sufficient information, they were able to practice effectively.

These results are in the same line with **Gabr, Seif, & Allam, (2020)** who studied there was a significant positive correlation between knowledge and practice of the studied group toward COVID19. Another study conducted by **Erfani, Shahriarirad, Ranjbar, Mirahmadzadeh, & Moghadami, (2020)** in Iran on "Knowledge, Attitude, and Practice regarding the Novel Coronavirus (COVID19) epidemic" discovered a strong relationship between the participants' knowledge, attitude, and practice ( $P < 0.001$ ).

The findings of the present study illustrated that nurse's perceptions and evaluation about prepared educational intervention was positive, where the vast all said the educational intervention content answered all of their inquiries, and the educational intervention reduced their anxiety. The researchers' point of view, reflected the success of implementing the educational intervention regarding COVID-19 among nurses working in the GIT endoscopy unit.

These results were supported by **El-Maghawry & El-Hawy, (2019)** who revealed that In the GIT endoscopy unit, short-term in-service training can dramatically improve nurses' knowledge and practice of infection control protocols and endoscopic reprocessing techniques.

### **Conclusion:**

Based on the results and hypotheses of the present study, the study findings concluded that the results support the research hypothesis in which educational intervention for nurses in the GIT endoscopy unit greatly helps in improving COVID-19 levels of knowledge and precautionary practices with significant differences and one month after the educational intervention. There was a significant positive correlation ( $P=0.001$ ) between nurses' knowledge scores and their precautionary practices post-one-month of intervention.

### **Recommendations:**

**Based on the current study results, the following recommendations are proposed:**

- Designing and implementation–service training program for nurses in the GIT endoscopy unit to improve their knowledge and precautionary practices
- Illustrated videos regarding precautionary practices of COVID-19 should be available to be distributed to each nurse.
- Using the media, raise COVID-19 awareness among nurses. In all crowded settings.
- Emphasize the significance of following preventative measures.
- Replication of the current study with a larger sample of nurses in different settings is required for generalizing the results.

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