



Effect of educational intervention on Nurses performance about precautionary measures and coping skills with stressors facing children with COVID-19

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Abstract

Background: COVID-19 outbreak is proving to be an unprecedented disaster, especially in the most afflicted countries including China, Italy, Iran, Egypt and USA in all aspects, especially health, social and economic is too early to forecast any realistic scenario. The aim of the present study was to evaluate the effect of educational intervention on nurses' performance about precautionary measures and coping skills with stressors facing children with COVID-19.

Subjects and Method: A convenience sampling of 60 nurses who provide direct care to children. The study was conducted at pediatric outpatient and inpatient isolation unit of Elsanata Hospital which is affiliated to Ministry of Health and Population. Three tools were used in the present study. Structured interview schedule, observational check list about precautionary measures for children with COVID-19 and Nurses' implementation of coping skills with stressors facing children with COVID-19.

Results: represented an improvement of educational intervention to nurses about precautionary measures for children with COVID-19 after the program implementation.

Conclusion: That nurse's knowledge and practice about precautionary measures of COVID-19 and coping skills with stressors of children with COVID-19 improved after the implementation of educational intervention.

Recommendation: ongoing in-service education programs to nurses at hospitals about COVID-19 are necessary to improve their knowledge and practice.

Keywords: COVID-19, coping skills, precautionary measures, nurses, stressors

Introduction

COVID-19 is a large family of viruses that cause illnesses ranging from the common cold to more severe conditions such as Middle East Respiratory Syndrome (MERS) and severe acute respiratory syndrome. In December 2019, a series of cases of pneumonia of unknown origin with clinical presentations similar to viral pneumonia occurred in Wuhan, Hubei, China^[1].

Deep sequencing analysis from lower respiratory tract, samples indicated a novel coronavirus that was later named severe acute respiratory syndrome corona virus (SARS-CoV-2). Thus far, more than 49,000 confirmed cases, including health-care workers, have been identified in Wuhan, and many cases have been confirmed in other provinces in China, and in Italy, Iran, South Korea, Spain, and other countries worldwide^[2].

COVID-19 viral pneumonia is an acute infectious respiratory disease caused by a novel corona virus. By the beginning of February 2020, nearly 30,000 cases had been confirmed nationwide. While the actual number is larger. The virus can be transmitted by an infected person or an asymptomatic carrier and is a highly contagious disease. Respiratory droplets are the main route of transmission, but can also be transmitted by contact and digestive tract^[3].

Epidemiology and virologic studies suggest that

transmission mainly occurs from both symptomatic and asymptomatic children to others by close contact through respiratory droplets or by direct contact with infected children, or by contact with contaminated objects and surfaces or by aerosols, i.e. in enclosed spaces indoors, crowded and inadequately ventilated spaces, where infected children spend long periods of time with others, which may include schools, fitness classes and nightclubs^[4].

The incubation period for COVID-19, which is the time between exposure to the virus becoming infected and symptom onset, is on average from 5-7 days, but can be up to 14 days. During this period, also known as the pre symptomatic period, some infected persons can be contagious, from 1-3 days before symptom onset. It is important to recognize that pre symptomatic transmission still requires the virus to be spread via infectious droplets or by direct or indirect contact with bodily fluids from an infected person.

An asymptomatic case is a person infected with COVID-19 who does not develop symptoms. Among symptomatic patients, the duration of infectious virus shedding has been estimated at 8 days from the onset of any symptoms. The proportion of persons who become infected with COVID-19 and remain asymptomatic remains to be better understood, recent meta-analysis reported an overall estimate of 31%,

from seven studies with predefined screened populations, prediction interval ranging between 26-37%^[6].

COVID-19 is associated with mental and neurological manifestations, including anxiety, depression, sleep problems, headache, dizziness, impaired sense of smell or taste, myalgias, delirium, encephalopathy, agitation, stroke, hypoxic ischaemic brain injury, seizures, coma, meningo-encephalitis and Guillain-Barré syndrome^[7].

Anxiety and depression appear to be common amongst children hospitalized for COVID-19, with one hospitalized cohort from Wuhan, China, revealing over 34% of children experiencing symptoms of anxiety and 28% experiencing symptoms of depression. Preliminary findings from retrospective cohort studies of over 60 000 COVID-19 cases in the United States of America indicate an 18.1% incidence of psychiatric diagnoses including anxiety disorders and insomnia in the first 2 weeks to 3 months after COVID-19 diagnosis^[8].

Clinical manifestations of COVID-19 are generally milder in children compared with adults. Relatively few cases of infants confirmed with COVID-19 have been reported; infants also experience mild illness. However, an acute presentation with a hyper inflammatory syndrome leading to multi organ failure and shock has been reported, described as multisystem inflammatory syndrome temporally associated with COVID-19 in children and adolescents. Underlying conditions with severe illness in children appear to be similar to adults. Among 655 children with laboratory-confirmed COVID-19 and complete information about underlying conditions, 23% had an underlying condition, with obesity, chronic lung disease (including asthma), cardiovascular disease and immune suppression most commonly reported^[9].

Understanding of the mid and long term complications of COVID-19 is emerging. This new condition which has been described as post-COVID syndrome or long COVID still lacks a consensus worldwide on terminology and clinical definition. The post-intensive care syndrome has been well described in other critically ill children's and it seems is also being observed in COVID-19 children. However, non-hospitalized children or those with mild and moderate COVID-19, on the long-term consequences of COVID-19 for patients in Wuhan, warned that dysfunctions and complications could persist in some discharged patients for at least 6 months^[10].

Children who affected with COVID-19 feel with stress, If child feel with stress mother cannot cope with the stress by herself, mother needs to contact medical professionals or psychological consultants. Mother should make a plan in advance in order to know where to seek mental health and psychological support when necessary^[11].

Facing the stress, children often demonstrate different behaviors than adults. For example, children can become more stubborn, anxious, timid, angry, upset, or even wetting the bed. Nurse should employ supportive measures to cope with the stress responses of children. For example, Nurse should listen carefully to the worries of the children and dedicate more love and attention to the children^[12].

Nurse should listen to children carefully and speak to them softly in order to put children's minds at ease. During an emergency, children need more love and attention from nurses. Give more time and care than usual. If possible, let

the children relax and play. Avoid separating the children from their parents and families. If it is necessary to separate the children from their families, such as in a hospital setting, please make sure that children can communicate with their families regularly in order to reduce their anxiety^[13].

Consider that children under the age of 18 years form a large proportion of the population (24% in the US and 32% globally). Ensuring protection for a group that constitutes a quarter of the total population seems essential as we progress towards pandemic control. Protection is urgently needed when the disease risk is high^[14].

Yet for children, there is a relatively low risk of disease. Although they account for 1 in 9 SARS-CoV-2 infections, children constitute only 2% of all hospitalizations. Most infections in children are mild and they recover fully. Serious illness is rare, but well-described; this includes the inflammatory and potentially deadly condition^[15].

While children are known to spread the virus to others, recent evidence from Iceland and South Korea suggests that children may be less efficient transmitters of SARS-CoV-2 than previously thought. To place this in perspective, it is important to remember that the risk of children spreading the virus is not zero, and a surge of cases in the community will be reflected in children as well. Although keeping schools open for in-person classes is critical for children's education and development, having a large cohort of unvaccinated and susceptible children, despite their lower risk of infection and transmission, can become significant if cases in the community begin to rise^[16].

Evoking the ethical principle of distributive justice that the benefits *and* burdens should be distributed among society's members in a just manner, makes the case that children should be included in COVID-19 vaccine trials so that they may benefit from immunization.

Significance of the study

Precautions and the actions of caregivers are important to prevent transmission of COVID-19. COVID-19 is having a psychological impact on the lives of affected children and their mothers with coronavirus as it causes them stress, anxiety, fear and stigma in both positive and negative external situations. Coping skills help you deal with stressful situations in the Tolerating, minimizing and dealing with life.

Struggling to overcome unhealthy behavior problems on their own, a behavioral health program can be helpful. In a behavioral health program, you meet with mental health professionals to discuss the mental health issues you face. Working with a therapist can be helpful in developing psychological coping skills. Together they will create a personalized treatment plan to help the child and their parents develop healthy coping skills. A therapist can help the child identify major childhood challenges, process the child's thoughts and feelings, and find ways to respond to negative events with positive action.

Aim of the study

The study was conducted to evaluate the effect of educational intervention on nurses' performance about precautionary measures and coping skills with stressors facing children with COVID-19.

Subjects and Method

A quasi experimental research design was used in the present study.

Setting

The study was conducted at pediatric outpatient and inpatient isolation unit of El Santa Hospital which is affiliated to Ministry of Health and Population.

Pediatric inpatient isolation unit: Including three floors, each floor consists of seven rooms. Each room contains three beds and others two beds and basins for washing hands, each floor contains two bath rooms.

Pediatric outpatient unit: including sorting room and a nurse responsible for sorting the cases by taking history, in case of suspected cases with corona, the child goes in a special path and rests in the sorting room until confirmation of the disease by investigation at children's isolation unit.

Subjects

Convenience sampling of 60 nurses who provide direct care to children at the previously mentioned settings was included in the study.

The sample size was based on the following parameters: confidence level of error is 5% type I error 0.05 and power of test 95%.

Forty children selected by simple random sample who have the following criteria

- Both sexes
- Age ranged from 6-15 years
- No other medical disease
- Not ventilated or on Continuous positive airway pressure

Tools of Data Collection

Three tools were used in this study.

Tool I: Structured interview schedule: It was developed by the researcher after reviewing recent literature to collect data^[14]. It consisted of four parts:

Part (1): Socio-demographic characteristics of the studied nurses as Age, sex, level of education, and years of experience.

Part (2): Socio-demographic characteristics of the studied children as Age, sex, number of family members, and residence.

Part (3): Health problems of the children accompanied with COVID-19:

- **Gastrointestinal problems:** Diarrhea, abdominal pain, vomiting, nausea,
- **Respiratory problems:** Sore throat, dry cough, sneezing and dyspnea,
- **Other problems:** As headache, fever or shivering, itching of the eyes, loss of sense of taste and smell.

Part (4): Nurses' Knowledge about COVID-19: As definition, mode of transmission, incubation period, signs and symptoms, complication, prevention through maintain

health, reinforcement of nutrition immunity and precautionary measures.

Scoring system for nurse's knowledge was scored as the following

- Correct and complete answer was scored (2).
- Correct and incomplete answer was scored (1).
- -Don't know was scored (0).

Total scoring system for nurses' knowledge was categorized as the following:

High level of knowledge was considered from 80% to 100%.

Moderate level of knowledge was considered from 60 to less than 80%

Low level of knowledge was considered less than 60%

Tool II: Observational check list about precautionary measures for children with COVID-19^[15].

It was adapted and modified by the researcher to assess nurses' practice about precaution measures for children with COVID-19. It was used three times before, immediately and after one month of implementation of educational intervention.

Precautionary measures: Used by the nurses at the Proper technique of hand washing, cough etiquette, physical distancing, wearing masks and gloves, Test of Polymerase Chain Reaction (PCR), isolation room, in detection room, in patients' room and during discharge from the hospital such as:

1. Proper technique of hand washing

Several steps can be taken to prevent the spread of infectious diseases, and according to the Center for Disease Control and Prevention, hand washing is the single most effective way to prevent the spread of disease, children were taught proper techniques and principles of hand washing⁽¹⁷⁾ See Appendix I tool II

2. Cough etiquette⁽¹⁸⁾: See Appendix I Tool II

3. Physical distancing at least one meter

4. Wearing the child safety face mask and gloves all the times

5. Test of Polymerase Chain Reaction (PCR)

Will be done when a child is admitted to the outpatient clinic and repeated after 5 days. Swap will be done when rapid test appears positive. Swap will be done every week. Two swaps will be done to the child, if negative when a child is admitted, so the child will be discharged from the hospital.

6. Isolation room

In isolation room the nurse monitors vital signs (heart rate, respiratory rate, blood pressure and temperature), measure weight, calculate fluid balance (intake and output), administer drug for children according to their age and protocol Ministry of Health and Population. The child wears mask when nurse goes to assess vital signs or give drug. Nurse wears all protective means when going to isolation room of child

7. In detection room: Nurse wears mask, gown and gloves and glasses in case of respiratory secretions.

8. In patients' room: Nurse wears mask N95, gown,

overhead, glasses and face shield

When children suffering from breathing problems: administer immediate breathing session every 6 hours through oxygen inhalation and nebulizer by put 500 cc normal saline with ampoule atrovent

Management of children was focus on prevention of transmission to others and monitoring for health problems with prompt hospitalization. Disinfection of frequently touched surfaces is also important. Rooms should be well ventilated.

9. Discharge from the hospital

After 14 days of disappear the symptoms and two swaps negative, the child can discharge from the isolated room and disinfected the room should be using the precautionary measures.

Scoring system for nurses' practice was as following: -

- Done was scored (1).
- Not done was scored (0).

Total scoring system for nurses' practice was calculated as

- Less than 80% was considered unsatisfactory.
- From 80% to 100% was considered satisfactory.

Tool III: Nurses' implementation of Coping skills with stressors facing children with COVID-19^[17-20]: was include the following:

1. **Deep breathing exercise:** helps decrease sensations of fear or distress and increases a sense of calm. Teach how to properly practice deep relaxing breathing by breath in through the nose for a count of 3 or 4 and out through the mouth for a count of 3 or 4, relaxing diaphragm breathing. See Appendix I, Tool III

Scoring system of coping skills with stressors facing children with COVID-19 was be as following:

- Done was scored (1)
- Not done was scored (0)

Total score was calculated as follows:

- Less than 80% was considered unsatisfactory.
- From 80% or more was considered satisfactory

Method

1. Administrative process

Official permission was obtained from the responsible authorities.

2. Ethical and legal considerations

- a) Nature of the study was not cause harm or pain.
 - b) Privacy and confidentiality was maintained.
 - c) Ethical committee approval from faculty of nursing was obtained
 - d) Children and nurses' consent was taken to participate in the study.
 - e) Meeting with nurses who participated to explain the aim of the study.
3. Study tools was developed based on a review of related literature.
 4. Tools (I, II, III) was presented to a jury of five experts in the area of specialty to check content validity and clarity of the tools.

5. A suitable statistical test was used for testing questionnaire reliability.

6. A pilot study was carried out on 10% of the nurses and children who were fulfill the inclusion of the study to test the tool for its clarity, applicability and feasibility and the necessary modification was done. Pilot study was excluded from the present study.

7. The present study was conducted at four phases of educational intervention include with COVID-19 during assessment, planning, implementation and evaluation

1. **Assessment phase: Assessment of nurses' information about COVID-19 and their practice of precautionary measure and coping skills with stressors facing children** with COVID-19 using. It was carried out by the researcher by using (tool I, II, III) three times before, immediately and one month after implementation of educational intervention.

2. **Planning phase:** Educational intervention was planned according to children educational needs assessment and based on literature review which includes the following:

- **Setting objectives**

- Preparation of the content which will cover the reason behind the implementation of the sessions.
- The educational intervention was translated into Arabic.
- Different methods and materials of educational intervention was used including lectures, group discussion, demonstration and video-based learning

3. **Implementation phase:** Educational intervention was implemented by the researcher for nurses and children using interactive lectures, video presentations, and booklet. They were divided into 10 subgroups, each subgroup contain from 3-5 person, that available to work place area attend sixth sessions and scheduled in the morning. The time for each session will be about 30 – 45 minutes.

The content of the sessions will be as the follows:

First Session: Focus on introduction about COVID-19, definition, mode of transmission, incubation period, signs and symptom, and complication

Second session: Focus on prevention through maintains health, nutritional status, and reinforcement nutrition for immunity.

Third session: Focus on Precautions measures e.g proper technique of hand washing, cough etiquette and physical distancing.

Fourth session: Focus on, wearing masks and gloves, **Test** of Polymerase Chain Reaction (PCR) and precautionary measures in isolation room,

Fifth session: Focus on detection room, in patients' room and discharge from hospital measures.

Sixth session: Focus on coping skills with stressors facing children with COVID-19. the time for each session was ranged from 50-60 minutes. It was carried out on three

successive days for 1-2 group /day

10. Data were collected over a period of 6 months starting from December 2020 till July 2021. The study work took two years.

4. Evaluation phase

Each nurse was evaluated by the researcher before, immediately and one month after implementation of educational intervention about precautionary measures and coping skills with stressors facing children with COVID-19 using (Tool I, II, III).

Statistical analysis

The collected data were organized, tabulated, and statistically analyzed using SPSS software (Statistical Package for the Social Sciences, version 26, SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean, and standard deviation were calculated. For qualitative data, a comparison between two groups and more was done using Chi-square test (χ^2). For comparison between means of two related groups (before & after change) of non-parametric data, Z value of Wilcoxon Signed Ranks Test was used. For comparison between more than two means of parametric data, F value of ANOVA test was calculated. Correlation between variables was evaluated using Pearson's correlation coefficient (r). Significance was adopted at $p < 0.05$ for the interpretation of the results of tests of significance [19].

Results

Table (1): Shows percentage distribution of studied nurses according to socio-demographic characteristics. It was observed that more than half of studied nurses (55.0%) of them their age was from 25 - < 35 years while 30.0% of them their age was from 35 - < 40 years with the mean age of 30.567 ± 6.49 years. It was observed that the majority (90.0%) of them were females, While 10% were male. Regarding to their marital status of studied nurses it was noticed that (86.6%) were married. According to nurses education level it was noticed that 16.7% had nursing school education, 63.3% were bachelor of nursing science, two third. According to their residence two thirds of them (66.7%) were from rural and 33.3% were from urban. As regard to years of experience, it was noticed that less than half of nurses (48.3%) had of experience from 10 to 15 years and 41.7% of them had from 5 to less than 10 years.

Table (2): Illustrates total score of nurses' knowledge about COVID-19. It was noticed that more than half of nurses (56.6%) had low level of knowledge before the educational intervention, while all of them (100.0%) had high level of knowledge immediate and one month after the educational intervention respectively, as illustrated in figure (6). As regard to the mean of total knowledge score were 9.116 ± 3.32 , 6.000 ± 0.00 , and 5.550 ± 0.768 before, immediate and one month after the educational intervention respectively with a highly statistically significant difference ($\chi^2 = 77.260$) and ($P = 0.0001$) between before and immediate and between before and one month after educational intervention

Table (3): Illustrates total score of nurses practice regarding

COVID-19. It was observed that the majority (98.3%) of nurses had unsatisfactory practice before the educational intervention while, all of them (100.0%) had satisfactory practice immediately and one month after the educational intervention, there was a highly statistically significant difference before, immediate and one month after where ($\chi^2 = 116.06$) and ($P = 0.0001$), as illustrated in figure (1).

Table (4): Illustrates correlation between nurses' total knowledge, practice measures for children with COVID-19 and nurses' implementation of coping skills with stressors for children with COVID-19 before and after the health education. It was observed that there was a statistically significant difference between total knowledge and practice scores one month after the educational intervention where ($r = 0.029$) and ($P = 0.002$), as illustrated in figure (3). As regard to correlation between total knowledge score and total nurses' implementation of coping skills with stressors facing children with COVID-19, there was statistically significant difference between before and one month after the educational intervention where ($r = -0.345$ and 0.059) and ($P = 0.007$ and 0.004) respectively, As illustrated in figure (3).

Table (5): Illustrates correlation between scores of total nurses' knowledge and their socio demographic characteristics before, immediate, and one months after the educational intervention. It was observed that there was positive correlation with a statistically significant difference where ($r = -0.103$) and ($P = 0.035$) between educational level and nurses' knowledge before educational intervention. And also, positive correlation with a statistically significant difference where ($r = 0.308$ and 0.777) and ($P = 0.018$ and 0.037) years of experience and nurses' knowledge before and one month after respectively.

Table (6): Illustrates correlation between scores of total nurses' practice and their socio demographic characteristics before, immediate, and one months after the educational intervention. It was observed that there was positive correlation with a statistically significant difference where ($r = 0.295$, 0.119) and ($P = 0.022$, 0.036) between residence and nurses' practice before and immediate after educational intervention. And also, positive correlation with a statistically significant difference where ($r = 0.253$, 0.175) and ($P = 0.015$ and 0.018) years of experience and nurses' practice before and one month after respectively.

Table (7): Illustrates correlation between scores of total nurses' implementation of coping skills with stressors facing children with COVID-19 and their socio demographic characteristics before, immediate, and one months after the educational intervention. It was observed that there was negative correlation with a statistically significant difference where ($r = -0.255$) and ($P = 0.049$) and positive correlation with a statistically significant difference where ($r = 0.725$) and ($P = 0.046$) between residence and years of experience and nurses' implementation of coping skills with stressors facing children with COVID-19 before the educational intervention respectively.

Table 1: Percentage distribution of studied nurses according to socio-demographic characteristics

Socio-demographic characteristics of nurses	(n=60)	
	No.	%
Age in years		
< 25	5	8.3
25 - < 35	33	55.0
35 - < 40	18	30.0
≥ 40	4	6.7
Range	20 – 53	
Mean ± SD	30.567 ± 6.49	
Sex:		
Male	6	10.0
Female	54	90.0
Marital Status		
Single	4	6.7
Married	52	86.6
Widowed	4	6.7
Educational level		
Diplom Nursing School (3years)	10	16.7
Technical Institute of Nursing	6	10.0
Bachelor of Nursing Science	38	63.3
Master degree	6	10.0
Residence		
Rural	40	66.7
Urban	20	33.3
Years of experience		
< 5	6	10.0
5 - < 10	25	41.7
10 – 15	29	48.3
Range	2 – 15	
Mean ± SD	9.850 ± 3.511	

Table 2: Percentage distribution of total score of nurses' knowledge about COVID-19

Total score of nurses' knowledge regarding COVID-19	Before (n=60)		Immediate after (n=60)		One month after (n=60)		I	II	III
	No	%	No	%	No	%	χ ² P	χ ² P	χ ² P
Levels of total knowledge:									
Low level of knowledge < 60% (0 - 9)	34	56.6	0	0.0	0	0.0	77.260 0.0001**	77.260 0.0001**	-- --
Moderate level of knowledge 60% - <80% (10 - 12)	13	21.7	0	0.0	0	0.0			
High level of knowledge 80% - 100% (13 - 16)	13	21.7	60	100.0	60	100.0			
Total knowledge scores							F value P		
Range (0 - 28)			3 - 15		16 - 16		229.214		
Mean ± SD			9.116 ± 3.32		16.000 ± 0.00		15.550 ± 0.768 0.0001**		

* Statistically significant difference at ($p < 0.05$)** Highly statistically significant difference at ($p < 0.001$)P₁ Between before and immediate afterP₂ Between before and one month afterP₃ Between immediate and one month after**Table 3:** Total score of nurses practice regarding COVID-19

Total practice scores regarding COVID-19	Before (n=60)		Immediate after (n=60)		One month after (n=60)		I	II	III
	No	%	No	%	No	%	χ ² P	χ ² P	χ ² P
Unsatisfactory	59	98.3	0	0.0	0	0.0	116.06	116.06	--
Satisfactory	1	1.7	60	100.0	60	100.0	0.0001**	0.0001**	--
							F value P		
Range (0 - 99)	58 - 80		95 - 99		85 - 98		1515.66		
Mean ± SD	69.116 ± 4.67		97.750 ± 1.20		94.766 ± 2.47		0.0001**		

** Highly statistically significant difference at ($p < 0.001$)- P₁ Between before and immediate after- P₂ Between before and one month after- P₃ Between immediate and one month after

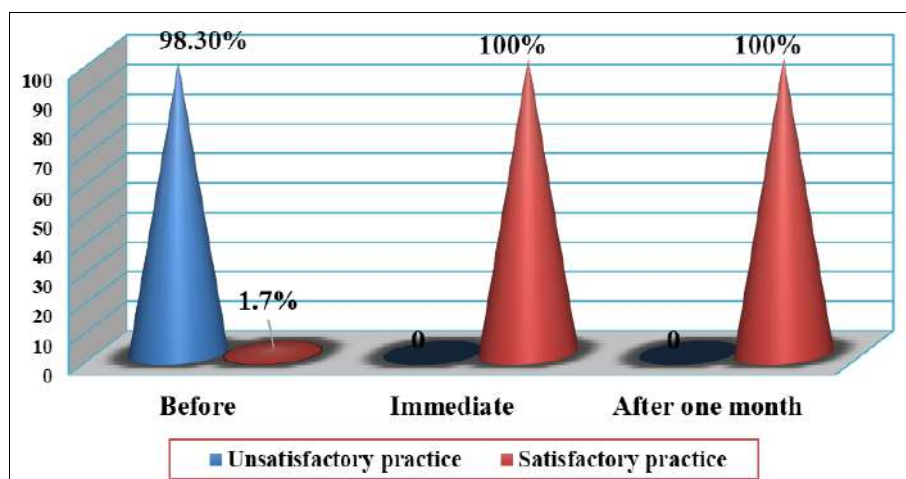


Fig 1: Total practice scores of nurses about COVID-19.

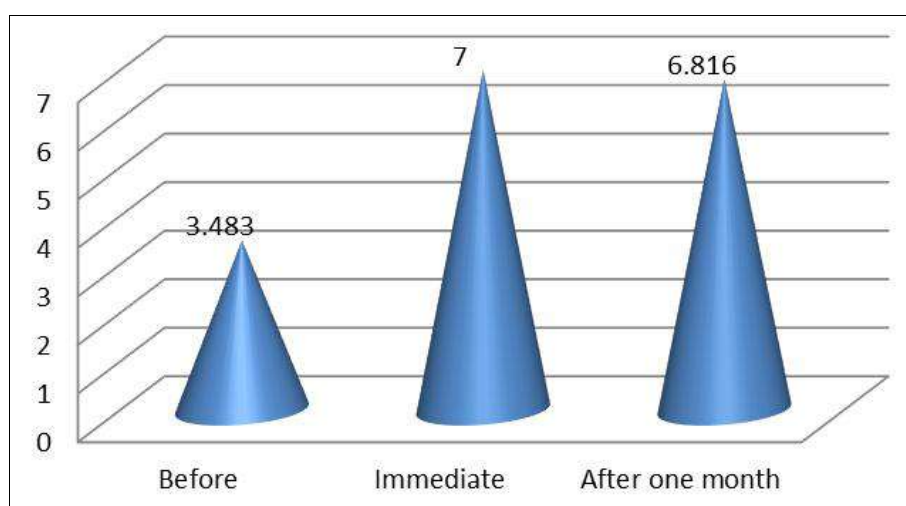


Fig 2: Mean of total scores of coping skills about stressors facing children with COVID-19

Table 4: Correlation between nurses' knowledge, precautionary measures and nurses' implementation of coping skills with stressors facing children with COVID-19 before and after the health education.

The studied nurses (n=60)	Total knowledge level(n=60)					
	Before		Immediate after		One month after	
	r	P	R	P	R	P
Total practice scores	-0.085	0.519	--	--	0.029	0.002*
Nurses' implementation of coping skills with stressors for children with COVID 19	-0.345	0.007*	--	--	0.059	0.004*

* Statistically significant difference at ($p < 0.001$)

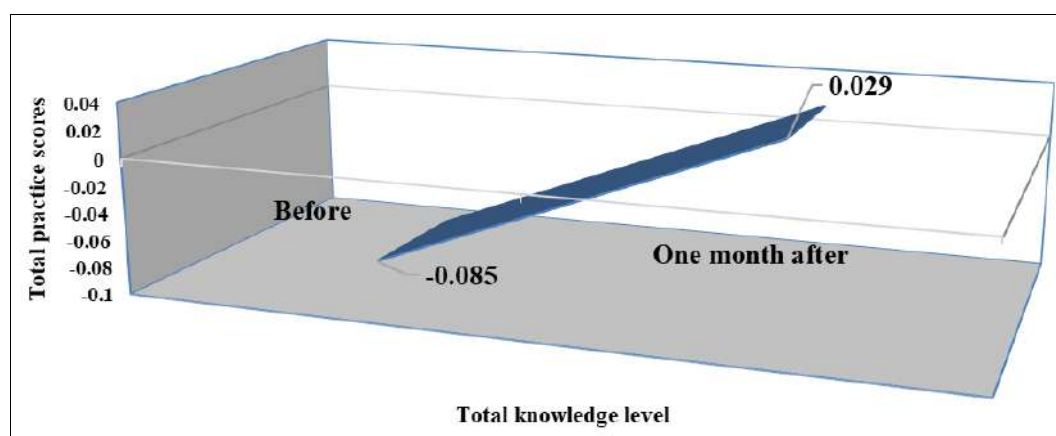


Fig 3: Correlation between nurses' total knowledge and precautionary measures for children with COVID-19 before and after the health education

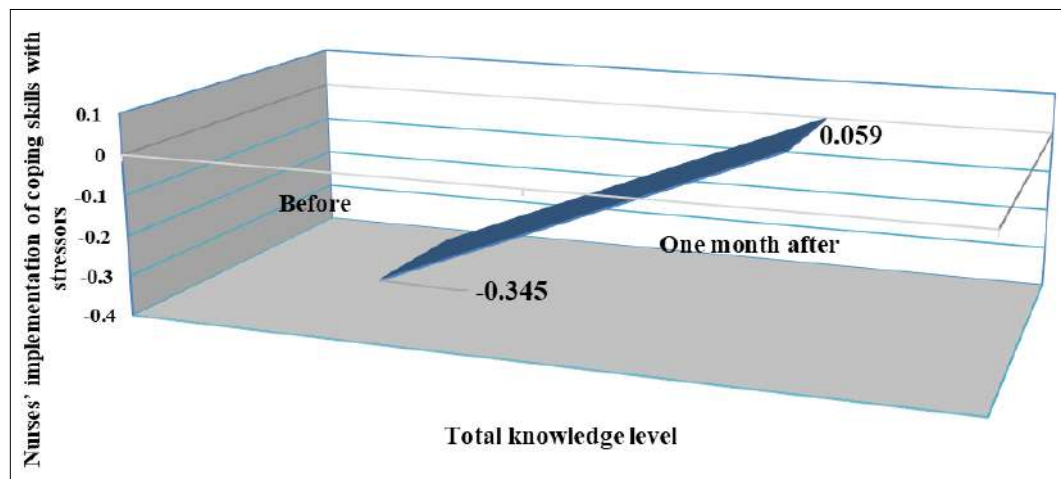


Fig 4: Correlation between nurses' total knowledge and implementation of coping skills with stressors facing children with COVID-19 before and after the health education.

Part VII: Correlation between scores of total nurses' knowledge, practice, implementation of coping skills with stressors facing children with COVID-19 and their socio demographic characteristics.

Table 5: Correlation between scores of total nurses' knowledge and their socio demographic characteristics

Socio-demographic data	Total knowledge scores (n =60)					
	Before		Immediate after		One month after	
	r	P	R	P	r	P
Age in years	0.195	0.136	--	--	0.099	0.449
Sex	-0.005	0.969	--	--	-0.124	0.346
Marital status	0.111	0.400	--	--	-0.180	0.170
Educational level	-0.103	0.035*	--	--	0.000	1.000
Residence	0.071	0.587	--	--	-0.039	0.481
Years of experience	0.305	0.018*	--	--	0.777	0.037*

Statistically significant difference at ($p < 0.05$)*

Table 6: Correlation between scores of total nurses' practice and their socio demographic characteristics

Socio-demographic data	Total practice scores (n =60)					
	Before		Immediate after		One month after	
	R	P	R	P	r	P
Age in years	-0.080	0.544	0.071	0.592	0.041	0.756
Sex	-0.123	0.347	0.163	0.213	0.149	0.255
Marital status	-0.099	0.454	-0.077	0.561	0.019	0.888
Educational level	0.061	0.645	0.145	0.270	0.036	0.783
Residence	0.295	0.022*	0.119	0.036*	0.168	0.200
Years of experience	0.253	0.015*	0.214	0.101	0.175	0.018*

Table 7: Correlation between scores of total nurses' implementation of coping skills with stressors facing children with COVID-19 and their socio demographic characteristics.

Socio-demographic data	Total scores of nurses' implementation of coping skills with stressors facing children with COVID-19 (n =60)					
	Before		Immediate after		One month after	
	R	P	r	P	r	P
Age in years	-0.085	0.519	--	--	-0.119	0.366
Sex	-0.084	0.525	--	--	-0.014	0.913
Marital status	0.000	1.000	--	--	0.118	0.369
Educational level	0.073	0.581	--	--	0.116	0.379
Residence	-0.255	0.049*	--	--	0.152	0.245
Years of experience	0.725	0.046*	--	--	0.472	0.095

*Statistically significant difference at ($p < 0.05$)

Discussion

COVID-19 can be defined as mild to severe respiratory illness that is caused by a corona virus that can be transmitted by contact with respiratory droplets or with

objects or surfaces contaminated by the causative virus, and is characterized by fever, cough, and shortness of breath and may progress to pneumonia and respiratory failure^[20].

Nurse has a vital role in the provision of comprehensive

health services to children with COVID-19, nurses are identified as a source of support for children and their mothers and have crucial role in managing stress and anxiety, check children frequently about how they feeling and listen without interrupting, hearing to their child concerns, validating their feelings and keeping communication open are an important way to support them during this time. The nurse has great role such as administering medications, assisting with elimination, mobility, nutritional status and hydration assessing children's health communication, managing care, emotional counseling and children hygienic care, making evidence-based decisions, collecting specimens and interpreting results^[21-24].

The current study revealed that two thirds of the studied children were females, this may be a result of females children prefer more peer communication and relationship, this result of the current study was disagree with Ward (2019)^[25] who mentioned that females were more cautious, taking the risk of infection more seriously than males, in addition to Gershon, *et al.* (2019)^[26, 28] who mentioned that the most of the study sample were male^[25, 26].

Concerning to age of the studied children, the current study clarified that age of more than half of studied children were from nine to twelve years, Liu Y (2019), *et al.* was in the same line with the present study and reported that affected age of children was very high in school age children^[27].

Professional nurses must use a combination of theoretical and practical knowledge in their work to provide skillful and effective care. Nurses may acquire their knowledge from many sources. These sources should be evaluated and updated^[28].

As regard to nurse's knowledge about ways of transmission of COVID-19, the current study illustrated that less than two thirds of them gave correct and incomplete answer before educational intervention, while all of them gave correct and complete answer immediate and one month after the educational intervention as a result of combination of theoretical part and hands on notes. Wiedemann, P. and Schütz, H (2020)^[31] support the result of the present study and mentioned that nurses knowledge about ways of transmission improved after educational intervention^[29].

Concerning of nurses knowledge about COVID-19 the present study showed that all of nurses were high level of knowledge after educational intervention while more than half of them were low level of knowledge before the intervention this may be a tributed to a good communication with the nurses during educational intervention and effect of teaching method and materials which were used in the program. This result was in harmony with Balkhy H *et al.*, (2020)^[32] who mentioned that increase nurses knowledge about novel COVID-19 after teaching lecture as a result of effective educational program^[30].

In addition our study in consistent with Shabaan *et al.*, (2021)^[33] who cleared that three-quarters of the study sample had a sufficient level of knowledge prior to the education program, while the entire study sample had a suitable level of knowledge after the training program, with a very significant difference^[31].

These findings corroborate those of Elgzar *et al.* (2020)^[34] who found significant differences between control and

intervention groups in their awareness and all health belief model variables related to COVID-19 after the intervention^[32].

El shenawie *et al.* (2020)^[35] illustrated the total score of Nurses Knowledge regarding care for patients with COVID-19 improved post implementing educational program with positive statistical significance difference. On the contrary Nemati *et al.* (2020)^[36] found that total level of Iranian nurses' knowledge and anxiety toward COVID-19 during the current outbreak in Iran. Nurses had almost adequate knowledge related COVID-19 at pre assessment^[33, 34].

Regarding nurse's knowledge about Preventive measure for COVID-19, the present study shows that majority of regarding to assess nurse's knowledge about COVID-19 had significant differences immediate, one month after than before educational program. this may suggest that inadequate pretest knowledge due to familiar nursing precaution not new preventive measure for COVID-19 isolation developed by WHO As European Centre for Disease Prevention and Control (ECDC)(2020)^[35].

On the other hand, there was an improvement in nurse's practice immediately and one month after implementation of nursing intervention than before. This improvement may be attributed to a combination of the theoretical part and the practical training element of the intervention which was effective in improving nurse's practice.

Regular training and education of all nurses and providing them with up to date posters and videos for pre and post procedures for example hand hygiene and cough etiquette that provide nurses with the essential knowledge and skills and improve their level of practice.

Healthcare facilities should ensure the availability of materials for adhering to respiratory hygiene or cough etiquette in waiting areas for patients and visitors. Provide tissues and no-touch receptacles for used tissue disposal. Provide conveniently located dispensers of alcohol-based hand rub, where sinks are available, ensure that supplies for hand washing (i.e., soap, disposable towels) are consistently available^[36].

The present study observed that less than two thirds of nurses done the steps of proper technique of hand washing before the educational intervention compared by all of them and the majority of them done it immediately and one month after the educational intervention respectively. This was may be due to that effective demonstration and re-demonstration of hand washing make nurses and children less risk for infection effective. The result was supported by Sax H (2020)^[38]. Who mentioned that nurse's performance of hand washing technique improved after implementation of teaching program^[38].

The finding of present study Clarifies that less than three quarters of nurses don't perform the steps of cough etiquette before the educational intervention as a result of lack of periodic evaluation of nursing practice by nursing supervisor and head nurse for detecting strength and weakness point to work on it and refusal of some nurses to change their practice while the majority of them done it immediately and one month after the educational intervention respectively this may due to effective researcher communication, education, the nurses was cooperative and has the ability to learn hoping for a speedy recovery for children and control of COVID-19

transmission. Berry *et al.* (2014) ^[39]. Was the same line with the current study and mentioned that directly teaching respiratory hygiene behaviors to nurses in the United States affect positively on children ^[39].

The present study illustrates that the majority of done nurse's precautionary measures for children (cough etiquette, hand washing, physical distancing and safety safe mask as a result of their honesty, effective education and awareness of proper methods, this result was disagree with Srivastav *et al.* (2018) ^[40] who mention that behavior of nurses was lazy, dishonest and only 9.2% respond to understanding ^[40].

The result of present study found that more than three quarters of nurses done all steps of nurses precautionary measures for children with COVID-19 related to hygienic practices this may be attributed to demobrsynstration an re demonstration. This finding in the same line of Bieri F, *et al.* 2019 ^[41] who stated that using of effective targeted videos and cartoon based entertainment in educational intervention of hygienic practice fill this need. This is important now during the peak of transmission and, monst importantly, to reinforce and habituate good hygiene practices long-term to prevent rebound infections ^[41].

It was observed that the majority of nurses done steps of cough etiquette immediately and one month after educational intervention. This was agree with Aledort *et al.* (2017) ^[42] who says that effective educational campaign for proper steps of cough etiquite had effective role in prevention of transmissions of COVID-19 ^[42].

The present study illustrated percentage distribution of health problems associated with children with COVID-19. It was observed that all of children had digestive problems associated for children with COVID-19, the majority of them had abdominal pain and vomiting respectively. Also, all of them had respiratory problems associated with children with COVID-19, all of them had dry cough and shortness of breath for both. As regards to other problems, all of them had fever and loss of the sense of smell and taste for both, the most of them had headache, shivering, and itching in the eye as a result of side effect of virus this was in the same line Jiang *et al.* 2020 ^[43] who mentioned that the current situation of pediatric cases, most of the clinical manifestations are relatively mild, with G.I.T problems, respiratory problems, fever, pneumonia, and have a good prognosis. ^[43].

Pediatric nurses have a great responsibility to ensure that families and children are fully informed about their home isolation precautions. Nurses instruct child and their parent regarding precautionary measures related to COVID-19.

As for providing health education for child and his family members, the present study revealed that nurses had unsatisfactory level practice before the implementation of nursing intervention and a satisfactory practice afterward. From the researcher point of view, this can be explained by nurse's perception that instructing the children's about the disease is the responsibility of doctors, lack of communication skill between nurses and child's parent, the lack of time, the lack of nurses ' self-confidence and the lack of their knowledge related to child condition.

It was observed that the majority of nurses had good knowledge and practice regarding precautionary measures in isolation room as a result of effective education program

and good communication and co-operation of studied nurses this was consistent with Becker *et al.* (2020) ^[44] who mentioned that improvement of nurses knowledge about precautionary measures in isolation room is due to nurses desires to learn more, gain knowledge to protect themselves ^[44].

It was noticed that the majority of nurses not done all steps of Polymerase Chain Reaction test before the educational intervention, while the majority and of them done it immediately and one month after the educational intervention respectively. The Sakthivel *et al.* (2012) ^[45] say that Multiplex PCR is a highly sensitive, highly specific test for the detection of viral nucleic acids in respiratory secretions. If PCR reveals the presence of RNA derived from respiratory syncytial virus, human Meta pneumo virus, para influenza virus, or influenza virus, then an acute infection caused by the corresponding pathogen is probably present, and further treatment can be given accordingly. On the other hand, the nucleic acids of adeno, boca, rhino or corona viruses can be found in relatively trivial infections as well as in asymptomatic persons, probably reflecting either a prior infection or a current subclinical one. For children in particular, upper respiratory infections ^[45].

Regarding the total score for nurses' practices level. It was observed that the majority of nurses had unsatisfactory practice before the educational intervention while, all of them had satisfactory practice immediately and one month after the educational intervention for both, with a highly statistically significant difference before, immediate and one month after the educational intervention.

This may be explained that that teaching programs for nursing staff play an important role in assist in staff nurses in developing and enhancing their skills needed to provide high standards of care to their patients. This finding was supported by Pfaar *et al.*, (2021) ^[46] who showed statistically significant differences between nurses' practices categories indicating adequate practice after the educational program compared with practice before the educational program ^[46].

Also, this was in the same line with Koo *et al.*, (2016) ^[47] who revealed that improvement in nurses' practice after the attendance of continuing nursing education sessions. Research findings indicated that nursing education programs improve knowledge, practice and attitudes ^[47].

Our study agree with the findings of Elshenawie *et al.* (2020) ^[35] who cleared that the mean total score of nurses practice regarding care for patients with COVID-19 significantly improved post implementing educational program compare with before. But not in the line with findings of the study titled "Factors determining the knowledge and prevention practice of healthcare workers towards COVID-19 in Amhara region, Ethiopia" carried out by Asemahagn (2020) ^[48] who reported that participants had good practices towards COVID-19 ^[33, 48].

The current study present percentage distribution of levels and mean of total coping skills scores with stressors facing children with COVID-19. It was observed that less than two thirds of nurse had unsatisfactory coping skills before the educational intervention while, all of them had satisfactory coping skills immediately and one month after the educational intervention for both, with a highly statistically significant difference before, immediate and one month

after where ($X^2 = 57.778$) and ($P = 0.0001$) for both this was in agreement with Elisa *et al.* (2019) ^[49] who mentioned that effective educational intervention result in positive satisfactory coping skills ^[49].

The result Clarifies changes of mean of total coping skills scores with stressors facing children with COVID-19. It was noticed that the changes of total coping skills scores immediate and one month after than before the educational program were 3.516 ± 2.746 and 3.333 ± 2.796 respectively, with a highly statistically significant difference where Z value = (6.122 and 5.881) respectively and ($P = 0.0001$) for both, this was consistent with Smith (2016) ^[50] say that effective training on coping skills improve recover ^[50].

The present study indicated that there was a statistically significant difference between total knowledge and practice of nurse's precautionary measures as illustrated in table. This result was in the same direction with Van and Plig (2014) ^[51] who mentioned that more knowledge result in effective practice of precautionary measures ^[51].

The present result was in an agreement with Pfaar *et al.*, (2021) ^[46] who demonstrated that there was a highly statistical significant difference in knowledge and practice after giving the educational program. Also, this study was in the line with Ozekcin *et al.*, (2015) ^[52] who expressed that the nursing care educational programs established to be effective in improving the knowledge and practice among staff nurses ^[46, 52].

Moreover Elasrag and colleges (2021) ^[53] cleared that there was highly positive correlation between nurses' knowledge and practice The current research finding was in agreement with Saqlain *et al.* (2020) ^[54], instudy about "Knowledge, attitude, practice and perceived barriers among health-care professionals regarding COVID-19" found a positive correlation between knowledge, attitude, and practice ^[53, 54]. Moreover, Zhang *et al.* (2020) ^[55] who investigated Knowledge, attitude, and practice regarding COVID-19 among health-care workers in Henan, mentioned that knowledge affects the practice of preventive measures ^[55].

Our study agree with the findings of Elshenawie *et al.* (2020) ^[35] who showed the correlation between knowledge, attitude & practice of studied nurses regarding safety measures guidelines in caring patients with COVID-19 post-implementation phase after two months passed. There was a positive correlation between studied nurses' knowledge toward the safety measures guidelines and their practice ^[33].

Also, agreement with the study done by Wahed and colleges (2020) ^[56] who stated that there was positive correlation between knowledge and attitude scores when studied knowledge, attitudes, and perception of healthcare workers regarding COVID-19 ^[56].

The present study indicated that there was positive correlation with a statistically significant difference between educational level and nurses' knowledge, The higher level of education, the higher rate of knowledge and response more to educational level this was in harmony with Rukavina A. (2018) ^[57] who say that level of education affect positively on gaining knowledge ^[57].

The current study illustrated that there was a significant improvement in the nursing staff knowledge and their practice after implementation of nursing intervention in relation to precautionary measures of COVID-19, there was significant improvement in their knowledge and practice

level at both immediate after and one month after implementation of nursing intervention compared with pre intervention phase. This improvement may be due to development of nursing intervention based on pre assessment need of nurses, the simplification of information and the use of attractive educational aids which increases their interest, concentration, attention and desire to acquire a lot of knowledge.

Conclusion

Based on the findings of the present study, it can be concluded that nurses showed an improvement in their knowledge and practices about nurse's performance about precautionary measures and coping skills with stressors facing children with COVID-19 after the implementation of program. Children who received care from nurses got fewer acute adverse reactions. There were statistical significant difference between total knowledge and practice of the studied nurses before and after the implementation of an educational program (P value < 0.000).

Recommendations

Based on the results of the present study, the following recommendations could be suggested:-

For nurses

- Ongoing in-service education programs must be designed and implemented to staff of nurses and regular follow up to improve their knowledge.
- Making rewards for the best nurse that introduce the best care and practice of affected children.
- Distribution of an updated summary of the precautions to be taken with nurses

For hospital administration

- Posters in communal areas and staff wash rooms indicating the best daily practices and the adoption of responsible behavior (frequent hand-washing, use of disposable tissues).
- Educational outreach for both nurses is critical.

For nursing education

- Precautionary measures for COVID-19 and coping skills should be included in the curriculum of graduates and post graduate students

For governorate

- Educational videos and advice on social media about precautionary measures.
- Activate and approved telemedicine and roper help to protect medical team from infection

For future nursing research

Replication of the study using larger probability sample from different geographical areas on various age as a result of groups to attain more generalization

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