Effect of Guideline Protocol Regarding COVID-19 Preventive Measures on Practice of Hospitalized School Age Children

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Abstract

Background: Coronavirus Disease 2019 (COVID-19) is spreading rapidly around the world with devastating consequences on patients, health care workers, health systems, and economies. To prevent the outbreak of such an epidemic, it depends mainly on public compliance including children regarding the guidelines of precautionary behaviors and practices. **Aim of the study:** to evaluate the effect of guideline protocol regarding COVID-19 preventive measures on practice of hospitalized school age children. **Subjects and Methods:** One group pre-posttest quasi-experimental **design** was conducted on **sample** of 72 hospitalized school-aged children in the medical wards at Zagazig University Pediatric Hospital, Zagazig, Egypt. Two **Tools** were used; first a Structured Interview Questionnaire to collect data about studied children characteristics and the second tool was checklist that included two parts; Part I: Reported Practice Checklist and Part II: Clinical Checklist to evaluate studied children practice regarding COVID-19 preventive measures. **Results:** the present study revealed that 12.5% of the studied children had satisfactory level of total practices regarding COVID-19 preventive measures before the guideline protocol compared to 95.8% post the protocol. **Conclusion**: the guideline protocol improved practice of hospitalized school age children regarding COVID-19 preventive measures. **Recommendations:** use of innovative methods of health education in teaching COVID-19 preventive measures for all children in all health care settings should be held

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1. Introduction

Coronavirus disease 2019 (COVID19) is an infectious disease caused by the novel severe acute respiratory syndrome-coronavirus 2 (SARS-CoV2). it is the most significant pandemic to have affected humanity in the last 100 years (Unnikrishnan & Misra, 2021). In late December 2019, a cluster of unexplained pneumonia cases has been informed in Wuhan, Hubei province, China. The rapid worldwide spread along with high morbidity and mortality led to the declaration of an International Public Health Emergency by January 2020 (Mitra, Misra, & Sharma, 2021).

Severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the cause of the deadest pandemic of the present century COVID-19, belongs to the Coronaviridae family in the Nidovirales order. Like other viruses, SARS-CoV-2 changes over time. Most mutations in the SARS-CoV-2 genome have no impact on viral function. Certain variants have received widespread attention because of their rapid emergence within populations and evidence for transmission or clinical implications; these are considered variants of concern (Kenneth McIntosh, 2022).Currently circulating variants of concern (VOCs) are Omicron and Delta variants (WHO, 2022c).

Covid-19 has been shown to attack humans of all ages ranging from adults to children (Hastuti, Rudhiati, & Suryaningsih, 2021). As of May 10, 2022, more than 2,7107825 confirmed cases and more than 1,877 deaths have been registered globally among children aged 5 to 14 years (WHO, 2022a). Children and adolescents under 20 years of age account for 33% of the 2020 population, 21% of the reported COVID-19 cases, 0.4% of the reported COVID-19 deaths (UNICEF, 2022)

A global pandemic requires a global effort to end it, none of us will be safe until everyone is safe (WHO, 2020). Egypt is one of the biggest countries in the Arab region, Africa, and the Middle East. With more than 100 million citizens, Egypt is among the most crowded countries in Africa (CAPMAS, 2022). This high number of citizens could be associated with a great risk of spread and mortality, especially among those with chronic diseases. Worldwide efforts have been exerted to prevent the spreading of the virus. These efforts include political efforts by the governments, together with personal attitude and behaviors, which depend on the awareness of the general public including children about the disease (Abdelhafiz et al., 2020). Here comes the importance of educating and training children, especially in hospitals, on COVID-19 and ways to prevent it.

The main mode of transmission of SARS-CoV-2 is via exposure to respiratory droplets carrying the infectious virus from close contact or droplet transmission from infected person. (Meyerowitz & Richterman, 2021). SARS-CoV-2 can also be transmitted longer distances through the airborne route, but the extent to which this mode of transmission has contributed to the pandemic is unclear (Chagla et al., 2021). The Centers for Disease Control and prevention stated that individuals can be infected with SARS-CoV-2 via contact with surfaces contaminated by the virus, but the risk is low and is not the main route of transmission of this virus (CDC, 2021).

The symptoms of COVID-19 are the same in children and adults, but the frequency of symptoms differs (Poletti et al., 2021). COVID-19 appears to be milder in children

than in adults, but severe cases have been reported in children (Mehta et al., 2020). Fever and cough are the most common reported. other findings were nausea/vomiting, diarrhea, dyspnea, nasal symptoms, rashes, fatigue, abdominal pain, Kawasaki-like signs, neurologic symptoms, conjunctivitis, and pharyngeal erythema (Irfan et al., 2021).

COVID 19 is evolving science and lot of research are in progress regarding characteristics of the virus and its treatment. Hence prevention plays a major role to fight the spread of infection. This can be achieved by education and training. The golden rules to fight against the spread of infection are frequent hand hygiene, respiratory and mask etiquette, social distancing. Although 80–90% COVID positive are mild and can be managed with home isolation still it's not possible due to poor housing condition in a densely populated country like Egypt. Mild and asymptomatic cases in the community remain undiagnosed and act as a super spreader affecting a wide majority of susceptible and vulnerable population. Hence, this study was undertaken with the objective to improve practice of hospitalized school age children regarding COVID-19 preventive measures.

2. Subjects and Methods:

Research design

A quasi- experimental design (Pre and Post) was utilized to evaluate the effect of guideline protocol regarding COVID-19 preventive measures on practice of hospitalized school age children. attending Zagazig University Pediatric Hospital, Egypt. The permissions were obtained when reviewing the tools used.

Study setting

The study was conducted at pediatric hospital at Zagazig University Hospitals, Egypt.

Subjects

A purposive sample composed of 72 school age children attending the previous setting and their parents who accepted to participate in the current study according to the following criteria:

Inclusion criteria:

Age: from 6 to 12 years, Sex: both sexes and did not suffer from coronavirus during data collection.

Exclusion criteria:

Any child with conditions that interfere with the cognitive or physical ability of the child (down syndrome, disturbed level of consciousness, ADHD, developmental delay, etc.).

The sample size was determined to be 72 by applying for the "Open Epi software package" program, at confidence interval 95% and power 80%.

Tools of Data Collection

Two tools were used for collecting data of the present study, they were:

Tool I: A Structured interview questionnaire

A Structured interview consisted of the two parts:

Part I: Characteristics of the studied hospitalized school age children: such as child's age, sex, educational status and

grade, crowding index, mother/ father education, residence and if the child knows anyone has been infected with COVID-19.

Part II: This part of the questionnaire included questions about source of information, preferred method for learning about COVID-19

Tool II: Checklists to evaluate children practice

It was composed of two main dimensions, reported practice checklist and clinical checklist

First: Reported-Practice Checklist

It was guided by (Aawdin Ali Hassan & Mustafa Abd El-Ghany, 2021), (Amer & Mohamed, 2020), (Shaikh & Likhite, 2020), and (Ngwewondo et al., 2020) and modified by the researcher to evaluate school age child practice regarding COVID19 preventive measures. It consisted of three parts as follows:

Part I: Reported-Practice Checklist Regarding Self-Protection against COVID-19. which included self-protection activities such as hand washing, wearing a mask, physical distancing, avoiding handshakes, avoiding touching eyes, nose or mouth with unclean hands, covering coughs & sneezes with disposable tissue or bent elbow, avoiding crowds and closed places, and maintaining good ventilation.

Part II: Reported-Practice Checklist Regarding How to Protect Others from COVID-19 which included activities that should be taken if the child is suspected COVID-19 case to protect others from infection such as contacting a health care provider right away, staying home, avoiding travel, staying away from other members of the household, washing hands, using separate personal tools, coughing or sneezing into a tissue and staying in separate room.

Part III: Reported-Practice Checklist Regarding Lifestyle and General Precautions which evaluated the school age children's lifestyle and general precautions that help raise their immunity against corona virus and other viruses such as eating healthy diet and practicing exercise.

Second: Clinical Checklist

It was guided by CDC (2021) and modified by the researcher to evaluate the child performance in general infection control precaution such as hand washing ad using a mask. It consists of two parts as follows:

Part IV: Clinical Checklist to Evaluate Children during Hand Washing:

It evaluated the school age children during hand washing with total score of 10 marks.

Part V: Clinical Checklist to Evaluate Children during Using Mask:

It evaluated the school age children during using mask with total score of 10 marks.

Scoring system

Reported practice received a score of 50. Each done response was given one score, no response was given zero. The total score was converted to 100% and then categorized as following: the total score of reported practices less than 60% (score less than 30) was considered as unsatisfactory while score of 60% (30 score) and more was considered as satisfactory level

Reliability

Testing reliability of the proposed tools was done by Cronbach's Alpha test, it was (0.84)

Validity

The tools' validity was done by a group of the panel who were three specialists from nursing faculty staff who revised the tools and ascertained its clarity, significance, and comprehensiveness.

Pilot study

A pilot study was carried out on 10% of hospitalized school age children (7 hospitalized school age children) to evaluate the content of the tools, their clarity, feasibility, arrangement, applicability of its items, as well as to estimate the time needed for filling the data. No modification was made and they weren't included in the studied group.

Data collection procedure

To carry out the study in the selected setting, an official permission was obtained from the director of Zagazig University Hospitals for data collection

Data collection took a period of 4 months from November 2021 to February 2022.

The researcher attended the study settings two days/week for data collection and implementation of the guideline protocol.

After identifying the subjects who fulfilled the criteria of the study, the researcher started with explaining the aim and process of the study briefly and obtained oral consent from parents of every hospitalized school age child who were willing to participate. The researcher also, determined the place of meeting and timetable.

Each hospitalized school age child was interviewed individually in the presence of his/her parent to collect the necessary data (personal and medical history), assess their practice regarding COVID19 preventive measures and healthy lifestyle behaviors using the previous tools (pretest) which took 10-20 minutes.

During the first session the researcher educate the school age child about COVID19, its origin, signs and symptoms, mode of transmission, high risk people etc.

Second session was after 20-30 minutes break and involved educating and training the child on COVID19 preventive measures as hand hygiene, cough etiquette and using a face mask

Assessment of the hospitalized school age Children' practice regarding preventive measures of COVID-19 were reassessed after one week of the intervention using the same tools (posttest).

Ethical consideration

This study was approved by the Ethics Committee of Zagazig University. All ethical issues were taken into consideration during all phases of the study, the aim and process of the study was explained to every hospitalized school age child and an oral consent was obtained from those who accepted to participate in the study. The researcher emphasized on the patient's right to withdraw from the study at any phase; also provided assurance of maintaining an anonymity and confidentiality of the patients' data that used for the research purpose only.

Statistical design

All data were collected, tabulated, and statistically analyzed using SPSS 20.0 for windows (SPSS Inc., Chicago, IL, USA 2011)). Quantitative data were expressed as the mean ± SD, median (range) and qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). Mc nemar test was used to compare between two dependent groups of categorical data. Wilcoxon signed ranks test was used to compare between two dependent groups of non-normally distributed variables. Percent of categorical variables were compared using Chi-square test or Fisher's exact test when appropriate. Cronbach alpha coefficient was calculated to assess the reliability of the scales through their internal consistency. P-value < 0.05 was considered statistically significant, p-value < 0.01 was considered highly statistically significant, and p-value ≥ 0.05 was considered statistically non-significant (NS).

3. Results:

Table (1) showed characteristics of the studied school age children. Regarding the age, it was found that 37.5% of the studied children aged from 10 to 12 years with a mean age 8.82 ± 1.95 years. Concerning gender, 52.8% was males. It is revealed from the same table that 87.5% of the studied school age children was students. Studied school age children from rural areas represented 73.6%. It was found also that 94.4% of the studied children lived with a crowding index of two or less. Regarding the length of stay, it was found that 43% of the studied children was hospitalized for two days or less with a mean length of stay 6.46± 8.44 days. As regards parents' education, it was found that 52.8% of studied children's fathers had university education compared to 37.5% of mothers.

Figure (1) illustrated that 60% of the study group did not know people who had COVID-19 before.

Table (2) showed diagnosis of the studied school age children. It was found that 47.2% of studied children had renal disease followed by children with blood disease who consisted of 33.3% of the studied children. The lowest percentage were to eczema, adenoiditis, and hypophosphatemia which was 1.4% for each.

Figure (2) represented common source of information regarding COVID-19 among the studied school age children. It was found that family and friends represented a common source of information for 83.3% of the studied children.

Figure (3) represented preferred method to learn about COVID-19. 43% of the children reported they would prefer to get information in a video form.

Children's practice score regarding COVID-19 preventive measures throughout study phases was illustrated in **Table (3).** This table showed that there were highly statistically significant improvements in all domains of children's practice regarding COVID-19 preventive measures. Including self-protection against COVID-19, how to protect others from COVID-19, lifestyle and general precautions, hand washing, and using mask after implementing the guideline protocol with highly statistically significant difference at (P<0.001) throughout study phases.

Tables (4) summarized the total scores of practices regarding COVID-19 preventive measures among the studied school age children. It was revealed that there was a highly statistically significant differences at (P<0.001) between two phases of the guideline protocol (pre and post) regarding COVID-19 preventive measures. As evidence, 12.5% of the studied children had satisfactory level of total practices regarding COVID-19 preventive measures before the guideline protocol compared to 95.8% post the protocol and that was illustrated in **Figure (4).**

Relation between total satisfactory Practice Level of the studied school age children and their characteristics throughout study phases was revealed in **Table (5).** It was found that there was statistically significant relation between total satisfactory practice level post intervention and the studied children age, educational status and father educational level at (P<0.05). Also, there was a highly statistically significant relation between satisfactory practice level pre intervention and the studied school age children crowding index. While no statistically significant relation was found between total practice score and the studied school age children gender, residence, length of stay, and diagnosis (P>0.05).

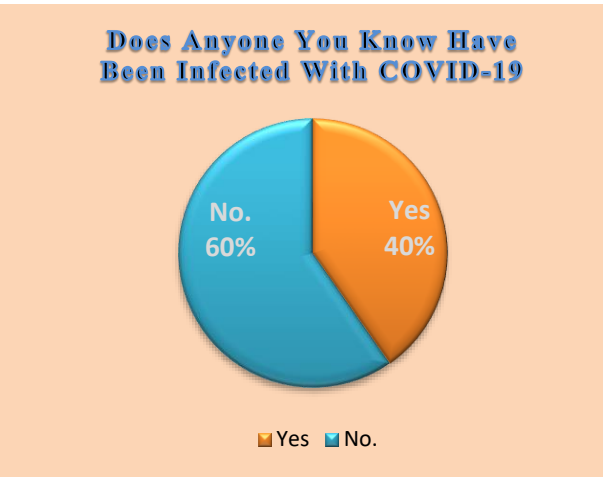

Figure 1:History of COVID 19 Infection

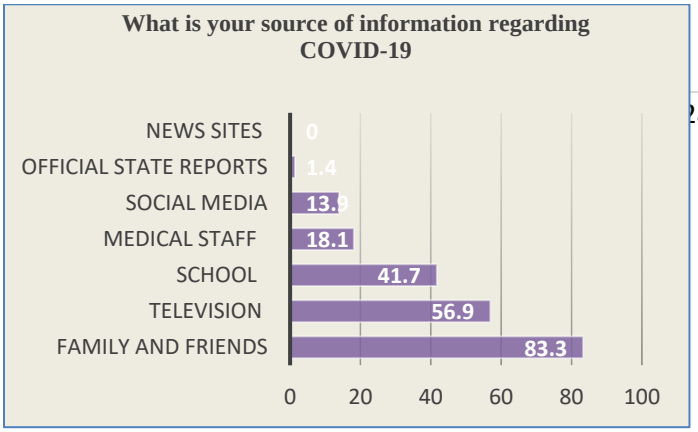

Figure 2: common source of information regarding COVID-19

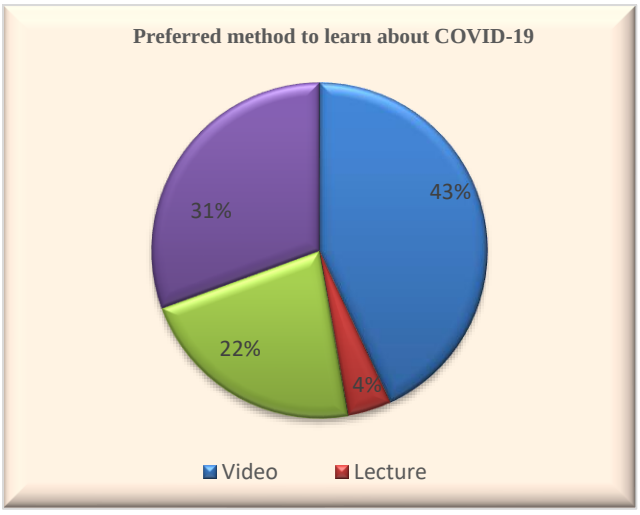

Figure 3: Preferred method to learn about COVID-19

Table 1: Characteristics of the studied children

Child characteristics	No. (72)	Percent (%)
Age in years		
6-	23	31.9
8-	22	30.6
10-12	27	37.5
Mean± SD	8.82± 1.95	
Gender		
Male	38	52.8
Female	34	47.2
Educational status		
Student	63	87.5
Not student	9	12.5
Educational grade (n=63)		
First grade primary school	9	14.3
Second grade primary school	7	11.1
Third grade primary school	15	23.8
Fourth grade primary school	9	14.3
Fifth grade primary school	8	12.7
Sixth grade primary school	15	23.8
Residence		
Rural	53	73.6
Urban	19	26.4
Crowding index		
≤2	68	94.4
>2	4	5.6
Length of stay(days)		
≤2	31	43
2-10	30	41.7
10+	11	15.3
Mean± SD Range	6.46± 8.44 (1-44)	
Father Educational level		
Illiterate- Read and write	4	5.6
Primary school	4	5.6
preparatory	10	13.9
Secondary	14	19.4
University	38	52.8
Postgraduate	2	2.8
Mother Educational level		
Illiterate- Read and write	8	11.1
Primary school	0	0.0
preparatory	9	12.5
Secondary	28	38.9
University	27	37.5
Postgraduate	0	0.0

SD: Standard deviation, No: Number

Table (2): Diagnosis of the studied school age children

Diagnosis	No. (72)	Percent (%)
Renal disease	34	47.2
Blood disease	24	33.3
Cardiac disease	4	5.6
Neurological disease	3	4.2
Others		
• Abdominal pain	2	2.8
• Adenoiditis	1	1.4
• Eczema	1	1.4
• Hypophosphatemia	1	1.4
• Pancreatitis	2	2.8

Table (3): Children's Practice Score Regarding COVID-19 Preventive Measures Throughout Study Phases (n= 72).

Domains of children's practice	Pre		Post		MC p
	no	%	no	%	
Self-protection against COVID-19	9	12.5	70	97.2	<0.001**
How to protect others from COVID-19	39	54.2	69	95.8	<0.001**
Lifestyle and general precautions	16	22.2	61	84.7	<0.001**
Hand washing	11	15.3	71	98.6	<0.001**
Using mask	6	8.3	71	98.6	<0.001**

MC: Mcnemar test, **: statistically highly significant (p<0.001)

Table (4): Total Score Of Children's Practice Regarding COVID-19 Preventive Measures Throughout Study Phases (n= 72).

Children's practice regarding COVID-19 preventive measures	Study phase				MC p
	Pre Intervention		Post Intervention		
	No.	%	No.	%	
Satisfactory level	9	12.5	69	95.8	<0.001**
Un-satisfactory level	63	87.5	3	4.2	
Mean± SD	23.44±7.03		46.90±2.38		

MC: Mcnemar test ,**: statistically highly significant (p<0.001)

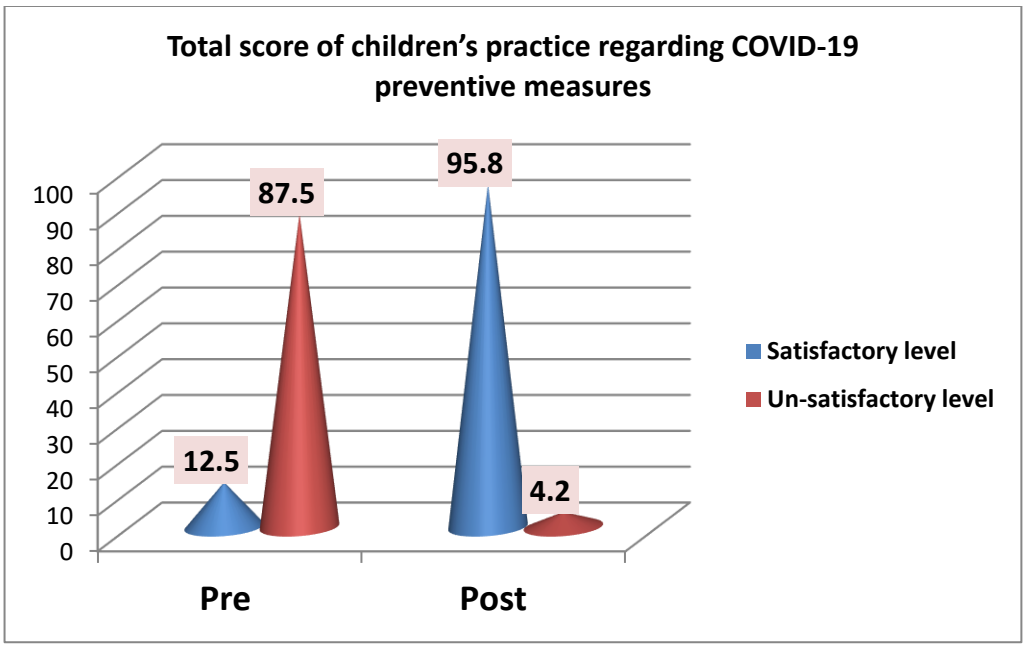

Figure 4: Total score of children's practice regarding COVID-19 preventive measures throughout study phases

Table (5): Relation Between Total Satisfactory Children's Practice Level and Their Characteristics Throughout Study Phases (n=72).

Items	Total Satisfactory children's practice level ≥60%				χ^2 ([1]p-value)	χ^2 ([2]p-value)
	Pre intervention (n=9)		Post intervention (n=69)			
	No	%	No	%		
Age (years)						
6-	5	55.6	20	29.0	2.669 (0.263)	6.669 (0.036*)
8-	2	22.2	22	31.9		
10-12	2	22.2	27	39.1		
Gender						
Male	4	44.4	37	53.6	FET (0.727)	FET (0.599)
Female	5	55.6	32	46.4		
Educational status						
Student	9	100.0	63	91.3	FET (0.590)	FET (0.001**)
Not student	0	0.0	6	8.7		
Educational grade						
First grade	4	44.4	9	14.3	8.815 (0.117)	------
Second grade	1	11.1	7	11.1		
Third grade	2	22.2	15	23.8		
Fourth grade	1	11.1	9	14.3		
Fifth grade	0	0.0	8	12.7		
Sixth grade	1	11.1	15	23.8		
Residence						
Rural	6	66.7	51	73.9	FET (0.690)	FET (1)
Urban	3	33.3	18	26.1		
Crowding index						

≤2	6	66.7	65	94.2	FET (0.001**)	FET (1)
>2	3	33.3	4	5.8		
Length of stay						
≤2 days	1	11.1	29	42.0	5.109 (0.078)	2.378 (0.305)
2-10days	5	55.6	30	43.5		
>10 days	3	33.3	10	14.5		
Father Educational level .						
Illiterate- Read and write	0	0.0	4	5.8	11.183 (0.048*)	53.217 (0.001**)
Primary school	2	22.2	3	4.3		
preparatory	1	11.1	10	14.5		
Secondary	4	44.4	14	20.3		
University	2	22.2	38	55.1		
Postgraduate	0	0.0	0	0.0		
Mother Educational level						
Illiterate- Read and write	2	22.2	7	10.1	3.803 (0.283)	3.710 (0.295)
preparatory	0	0.0	9	13.0		
Secondary	5	55.6	28	40.6		
University	2	22.2	25	36.2		

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Continue Table (5)

Items	Total Satisfactory children's practice level ≥60%				χ^2 (^{1}p-value)	χ^2 (^{2}p-value)
	Pre intervention (n=9)		Post intervention (n=69)			
	No	%	No	%		
Does anyone you know have been infected with COVID-19?						
Yes	2	22.2	28	40.6	FET (0.297)	FET (0.999)
No	7	77.8	41	59.4		
Diagnosis						
Renal diseases	3	33.3	31	44.9	3.454 (0.485)	3.499 (0.478)
Blood diseases	4	44.4	24	34.8		
Cardiac diseases	0	0.0	4	5.8		
Neurological diseases	0	0.0	3	4.3		
Other diseases	2	22.2	7	10.1		

χ^2: Chi square test FET: Fisher exact test non-significant($p>0.05$), *: statistically significant ($p<0.05$), **: statistically highly significant ($p<0.01$), p^1: for pre-intervention, p^2: for post-intervention.

4. Discussion

Coronavirus disease 2019 (COVID-19), the highly contagious infectious disease, has had a catastrophic effect on the world's demographics resulting in more than 6 million deaths worldwide, emerging as the most consequential global health crisis since the era of the influenza pandemic of 1918 (Cascella, Rajnik, Aleem, Dulebohn, & Di Napoli, 2022). With

more than 100 million citizens, Egypt is among the most populous countries in Africa (CAPMAS, 2022). This high number of citizens could be associated with a great risk of spread and mortality, especially among those with chronic diseases. High proportion of the fatal cases of pediatric COVID-19 are in children with underlying medical conditions, most commonly chronic lung disease, obesity, and neurological and developmental disorders. Here comes the importance of educating and training children, especially in hospitals, on COVID-19 and ways to prevent it.

Results of the present study revealed that families of the studied children in addition to TV were the most common sources of children's information on COVID-19. It was found that family represented a common source of information for more than three quarters of the studied children and then TV, which represented a common source of information for nearly three-fifth of the studied children. These results were consistent with YILDIZ (2021) who conducted a study of Determining the level of knowledge regarding COVID-19 and protection measures of children between aged 8-12 years in Turkey and found that children learned their knowledge on COVID-19 generally from television or families.

Similarly, in a study of Covid-19 through the eye of children and mothers that was conducted by Usta-Yüksek and Gökcan (2020), children were found to learn their knowledge on COVID-19 from the TV and their parents. These results disagreed with Elsakka and Khalil (2021) who reported in their study about Knowledge, perception and practice of children and adolescents towards COVID-19 pandemic in Egypt that social media was the most common source of information about COVID-19.

The family as the main source of information in the current study could be explained in the light of its results. As more than half of the fathers of the studied children had a university education, while more than three quarters of their mothers had a secondary or university education, which made them able to educate their children and make them aware of this pandemic. Also, the majority of the studied children's mothers were housewives, and therefore spent more time with their children. In addition to TVs which are more available in all Egyptian homes, especially the countryside, than social media.

In response to the current pandemic, child psychologists and health scientists have joined forces with, educators, artists, and writers to produce innovative communication materials which ranged from children's books, videos to infographics and comics. Those are a powerful way to teach kids about COVID-19 (Nafee, Elguoshy, & Samra, 2021).

This study illustrated that the highest percentage of the studied children, nearly two quarters, opted video as the preferred method to learn about COVID-19 followed by booklet, picture, and the least one was lecture.

These results were consistent with Shaikh and Likhite (2020) who conducted a study about Awareness, perception and safety practices about

COVID-19 in school children of 6-16 years using COVID-19 quiz in India and found that more than half of children would prefer to get information in pictures/video form, while less than the fifth opted lectures and information from parents/teachers. New information can be represented in the form of children friendly videos, cartoons, or pictures so that they are kept well aware of new advances regarding COVID-19.

The Covid-19 virus was a pandemic devastated within a short period to many parts of the world (Bong et al., 2020). Effective and efficient controlling of the pandemic requires strict adherence to precautionary measures. Including mask wearing, social distancing, hand hygiene, disinfection of frequently touched surfaces, improved ventilation, self-isolation, and quarantine (WHO, 2022b).

The current study found that a small percentage of the studied children had satisfactory practice regarding self-protection against COVID-19 pre-intervention. This result was lower than the findings from Saudi Arabia (Alahdal, Basingab, & Alotaibi, 2020), China (Zhong et al., 2020), and Addis Ababa (Defar et al., 2021). However, it is nearly the same results found by Bante et al. (2021) from Dirashe District, Southern Ethiopia. The variation is explained by the difference in the study participant, study period, and cut-off point used to dichotomize preventive measures practice to good or poor practice.

The unsatisfactory practice level regarding Self-protection against COVID-19 pre intervention in the current study was greatly improved after conducting the protocol, reaching more than ninety-seven percent. This could be explained in the light of the study results. As only one point four percent of the studied children had satisfactory awareness level regarding COVID-19 preventive measures pre intervention compared to ninety-four-point four percent post intervention.

In the current study, majority of the hospitalized children before and after the guideline protocol were convinced to use facemasks for protection when surrounded by infected people. This result was concurrent with Amer & Mohamed (2020) who found nearly the same results. Along with Wimalawansa (2020) who stated that facemasks are shielding tools designed for the filtration of viral and air-born particulates; however, it is not suggested to be used when not in close contact with sick people or crowded areas.

From the researchers' point of view, children's information before intervention could be explained within the framework of Morss (2020) who stated that school age children's thinking process has logical order; cause and effect, they can deduce general rules from observation. In this situation, a child in the hospital had two observations: (1) doctors and nurses wear a facemask (2) nurses and doctors wear masks in the hospital while they are in contact with ill people. The children arrived to one deduced general role: facemask can prevent infection.

Unfortunately, children's use of face mask was accompanied by several mistakes that were observed during

the evaluation of their wearing and taking off the mask pre intervention. Including: not cleaning the hands before putting on the mask, as well as after touching it at any time, not making sure that it consists of 3 layers and not making sure that it covers the nose, mouth, and chin, as well as not touching the face area of the mask only its borders. Most of these misbehaviors disappeared post intervention which could be attributed to the training they received regarding mask use during the study.

This results were in harmony with Ayran et al. (2022) who conducted a study of Hand hygiene and mask-wearing behaviors and the related factors during the COVID 19 pandemic: A cross-sectional study with secondary school students in Turkey and found nearly the same results.

Due to the COVID-19 pandemic, the World Health Organization and other major authorities recommend frequent hand washing and applying proper hand hygiene procedures as one of the cheapest, easiest, and most important ways to prevent the spread of a virus (Głąbska, Skolmowska, & Guzek, 2020). In the current study, it was found that the majority of the studied children didn't wash their hands after blowing the nose, coughing, or sneezing, after touching contaminated surfaces and after touching an animal.

This finding agreed with Amer & Mohamed (2020) who found that more than half were not aware of washing hands after contacting sick people and covering their mouth or nose when coughing or sneezing. This can be explained from different aspects; firstly, children in hospital area have a limited number of bathrooms in the whole ward so it was very difficult for them to practice hand washing. Secondly, the children themselves were tired and sick, because of the illness process and may feel it burdensome to do that. Finally, children in hospital as well as their mothers may think that the hospital is a sterile area, or their administration of antibiotics would protect them from any infection.

On the contrary, Głąbska et al. (2020) who conducted a study of Population-based study of the influence of the COVID-19 pandemic on hand hygiene behaviors—polish adolescents' COVID-19 experience (PLACE-19) study and found that most of the participants washed their hands when hands are visibly dirty, after coughing or sneezing, and after contact with animals.

Optimizing public health during this pandemic requires not only knowledge from the medical and biological sciences, but also of all human sciences related to lifestyle, social and behavioral studies, including dietary habits and lifestyle (Di Renzo et al., 2020).

Regarding lifestyle and general precautions, it was found that more than half of the studied children ate a variety of food, including fruits and vegetables and more than two thirds reduced salt in their food, but only one quarter of them reported drinking enough water and exercising routinely.

The total score of children's reported practice regarding lifestyle and general precautions was less than one-

quadrant pre intervention compared to more than four-fifth post intervention. The difference was highly statistically significant (P<0.001). This difference highlighted the remarkable impact of the guideline protocol.

This finding agreed with Mathad & Shetty (2022) who conducted a study of Impact of COVID 19 webinar on knowledge, attitude and practices among Indian population and found nearly the same results.

Comparing the results before and after the guideline protocol, it was found that there was a statistically significant difference in the children's practice throughout study phases. Significant positive statistical difference was found between children's total mean score of practice before and after the guideline. Most of the results regarding practices of children after the guideline protocol were in accordance with Amer & Mohamed (2020) as well as Nafee et al. (2021).

Generally, this study reflected that the guideline protocol had significant positive effects on hospitalized school age children and practice regarding covid19 preventive measures.

Concerning age of the studied children, it was disclosed that more than one third of the studied children ranged in age from 10-12 years with a mean of 8.82 ± 1.95 years. In relation to gender of the studied children, the results showed that more than half of the studied children were boys compared to less than half were girls. According to Finelli et al. (2021), data regarding the gender-based differences in COVID-19 suggests that male patients are at risk of developing severe illness and increased mortality due to COVID-19 compared to female patients. Nearly the same results were found by Nafee et al. (2021), Amer & Mohamed (2020) and Shaikh & Likhite (2020). Also, these results were consistent with Xue et al. (2021) who conducted a study of Knowledge, attitudes, and practices towards COVID-19 among primary school students in Hubei Province, China.

Rural children represented nearly three quadrants of the total studied children. There was statistically significant positive correlation between total general awareness level pre intervention and urban residence (P=0.011). The Rural children are more likely to be at risk than urban children due to poverty and low socioeconomic status. Rural children more likely to be attended to governmental hospital than urban children who may be attended to private hospitals.

In addition, rural children are at high risk more than urban children for hospitalization as their families delayed seeking medical care because of the less availability of health care providers and health care services in their rural areas. On the other hand, urban families overuse outpatient clinics in public hospitals (Galal & Al-Gamal, 2014).

This result was supported by Kirby & Yabroff (2020) in their study of Rural–Urban differences in access to primary care: beyond the usual source of care provider in the U.S. who found that rural residents have poorer health than urban residents and this disadvantage is growing. Despite having to travel longer to reach their usual source of care providers, residents of the most

rural counties were eighteen percentage points less likely than urban residents to have usual source of care providers with office hours on nights and weekends (27% vs 39%).

The present study revealed that more than three quadrants had insufficient income. That result was clarified by Gericke et al. (2018) in their study of Health System in Egypt. They stated that Egypt is the second most populous country in the Middle East and North Africa where poverty has nearly doubled over the last 15 years.

In relation to length of hospital stay, the present study illustrated that the highest percentage of studied children indicated two days or less with a mean length of stay 6.46± 8.44 days. This might reflect the improving processes related to diagnostic procedures, providing adequate staffing for specialized services in all hours of the day at Zagazig pediatric hospital leading to effective in optimizing patient length of stay. This result might also reflect adequate medical care as well as nursing care, especially in the Department of Nephrology and Hematology, from which more than three-quarters of the studied children were selected.

These results were in harmony with Baniasadi et al. (2019) who conducted a study of Factors affecting length of stay in Children Hospital in Southern Iran, found the median length of stay in the children's hospital was 3 days. One quadrant of patients stayed less than 2 days, Minimum and maximum of LOS were one and twenty-seven days respectively.

These results disagreed with Amer & Mohamed (2020) who found that more than half of the hospitalized school age children was admitted for more than two weeks.

5. Conclusion:

Based upon the findings of the present study, it could be concluded that the guideline protocol regarding COVID-19 preventive measures for hospitalized school age children had great effect on improving their practice regarding COVID-19 preventive measures.

6. Recommendations

In the light of the findings of the current study, the following recommendations are suggested:

- Use of innovative methods of health education in teaching COVID-19 preventive measures for all children in all health care settings should be held.

- Continuous formal educational training programs should be developed and implemented periodically for nurses and caregivers about updated infection control precautions.

- School children's curricula should include special activities about Covid-19 and how to limit its spread in the form of puzzles, comic stories and pictures.

- Hospitals and schools should provide adequate handwashing supplies, equipment, and facilities

- The use of face masks should be seen as a complementary measure, rather than a stand-alone measure to prevent transmission within schools.

Conflict of Interest: None

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