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Original Research Article

Impact of a pediatric nursing emergency preparedness program for COVID on Nurses' knowledge, skills and confidence

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ABSTRACT

Background: Coronavirus disease-2019 (COVID-19) mainly affects adults and the proportion of children with COVID 19 illness has remained low although it is showing an increasing trend with each wave of the pandemic. This article reports the impact of a pediatric nursing emergency preparedness program on COVID-19 (PNEPPCO) on the knowledge and confidence of nurses in a tertiary hospital.
Methods: A selected number of common pediatric nursing skills that could be likely to be useful for care of children with COVID 19 illness were earmarked for the content of the training program. The training methodology consisted of a self-learning phase for 5 days, skill demonstration and practice for one day, and a preceptorship phase in the pediatric clinical area for 2 days. A total of 300 nurses were trained.
Results: The mean age of the participants was 32.1±6.5 years. A majority (68.1%) of them was female and had a bachelor's degree in nursing (68.1%). Most of them (85.1%) didn't have prior experience of working in pediatric areas. There was a significant improvement in the level of knowledge (12.57±2.96 vs. 16.36±4.26, p=0.001) and confidence (p=0.001) in performing pediatric skills among the participants after the training program.
Conclusions: The use of a multifaceted training methodology led to improvement in knowledge and skills in managing sick children among nurses. Building the nurses' capacity to face new challenges in the near future will boost their morale and ensure that the quality of patient care stays uncompromised even during crisis situations.

Keywords: COVID-19, Nurses, Skill training, Knowledge, Confidence, Preceptorship

INTRODUCTION

The healthcare workforce has shown immense fortitude and worked tirelessly to save lives during the ongoing COVID 19 pandemic. The first two waves of the pandemic mainly affected adults and the proportion of children with COVID 19 illness has remained low, although it is showing an increasing trend with each wave of the pandemic.[1-3] Current epidemiological data related to COVID-19 among children in India suggest that individuals less than 20 years constituted less that 12% of all confirmed cases and that the mortality has remained less than 2% in the same age group.[4] A report of COVID-19 testing on 1391 children from China during the early months of 2020 showed that a total of 171 (12.3%) had confirmed SARS-CoV-2 infection.[5] It is anticipated that in the third wave of the pandemic a considerable number of children are likely to be affected as children are not yet vaccinated against COVID-19. However, there is no evidence to date to support the same. According to the American Academy of Pediatrics, children represent around 13% of all COVID-19 cases; of which younger

children between the age group of 10 to 14 years are less likely to become infected as compared to people with the age of 20 and above.[6] Some children become severely ill with COVID-19 and need to be hospitalized, and treated in the intensive care unit, and require ventilatory support.[7] In a study on 402 children with severe COVID 19 disease in India, around half of them had underlying conditions such as obesity, diabetes, and asthma, are at higher risk of serious illness with COVID-19.[8] Also, children who have congenital heart disease, genetic conditions, or conditions affecting the nervous system or metabolism might be at higher risk of serious illness with COVID-19.[9] Nurses, as frontline workers are very important members of the health care team as well as being the majority of health care providers, will need to be well prepared to care for children with COVID-19 illness. Nurses are involved in triaging and initial assessment and stabilization of sick children, as well as providing ongoing care to hospitalised children. Nurses also play an important role in counseling the parents, who can be a great help in the management of sick children. In order to perform these essential tasks effectively, nurses must possess essential knowledge and skills required to manage sick children. Nurse preceptorship is a recommended model in patient care to promote the strong professional development among the novice nurses.[10] The preceptors provide a safe learning environment for the new nurses in applying their learned knowledge and skills in patient care. The preceptors guide nursing students and staff in developing problem-solving and decision-making skills as they are adapting to the clinical setting.[11] In view of handling the challenges of the subsequent waves of COVID-19, a need for preparing a COVID task force has been realized, who will participate in triaging, stabilization, and providing ongoing care to the sick children. Therefore, a pediatric nursing emergency preparedness program on COVID (PNEPPCO) was planned and conducted for 300 nurses currently working in the COVID-19 centre of the hospital. The impact of the training program was evaluated through pre and post-tests of the nurses' knowledge and self-reported confidence level in performing the pediatric procedures.

METHODS

Study setting

The trauma centre of the hospital was re-designated into a COVID-19 care centre during the first and second waves of COVID-19. All nurses currently working at this center participated in the training, which was 300 in total. Out of the total, 282 (94%) nurses completed the online needs assessment survey (pretest) which included demographic profile, a knowledge test and a self reported confidence rating scale. Two hundred and ninety of them (97%) completed the post assessment. The nurses were from inpatient care areas ranging from general wards to intensive care units (ICUs). Ethical permission was taken from the institutional ethics committee. The study was conducted from August 2021 to September 2021.

Intervention

The study was a quasi-experimental, one group-pre-test-post test design. A selected number of common pediatric nursing skills that could be likely to be useful for care of children with COVID-19 illness were earmarked for the content of the PNEPPCO training program (Table 2). The contents were validated by 4 to 5 experts from nursing and medical fields, and consisted of self reading handouts and videos of nursing procedures. The PNEPPCO training methodology consisted of a self learning phase for 5 days, a skill demonstration and practice session for one day, and a preceptorship phase in the pediatric clinical areas for 2 days. The 300 nurses were divided into 10 small groups of 30 for training at a time and a social media chat group comprising of these 30 participants was formed in the Telegram app. In the self learning phase, the training resource materials were shared with the nurses through the Telegram app. The participants were instructed to read the materials and clear their doubts if any. The self learning phase was followed by four hours of facilitator guided skills practice in small groups of 5 to 6 nurses per group per station. The participants were rotated through 5 skills stations, namely, assessment and stabilization of a sick child including proning, oxygenation, ventilation, medication and fluid therapy, and pediatric medical equipments. Each station was facilitated by a team of medical faculty, nursing faculty, and a clinical nurse expert. All facilitators had more that 10 years experience in the field of pediatrics and neonatal nursing. The participants spent approximately 40 to 45 minutes in each skills station. Following the skills training, the nurses were posted in pediatric units of the hospital for 2 days for clinical practice. Each nurse was assigned a preceptor to guide practice. Senior nurses currently working in pediatric areas for at least 5 years were approached to act preceptors to the trainee nurse. They were oriented to their role and expectation as a preceptor. The preceptors rated the assigned preceptee on competency of skills performed during the clinical posting on a 3 point rating scale at the end of the 2-day preceptor-ship program. The flow diagram of the study is given in (Figure 1).

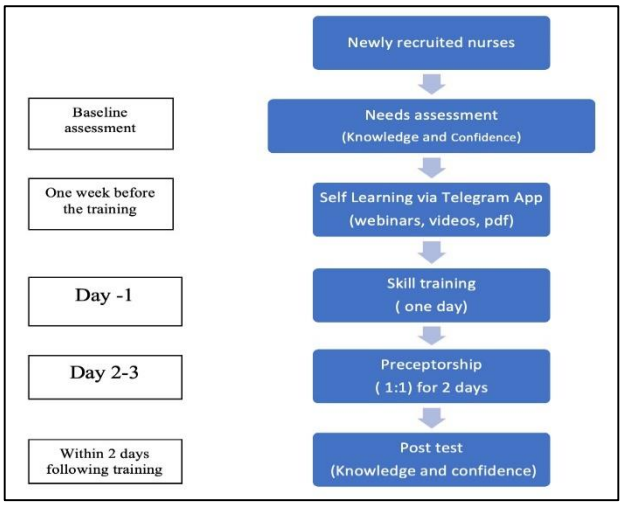

Figure 1: Flow diagram of the study.

Skill stations

The skill stations used in the training were namely- Skill station 1: Assessment and stabilization; In this station, skills such as triaging the children based on priority to initiate the care appropriately, aassessment of a sick child for any deviation from normal, monitoring of the vital signs of sick to identify abnormalities like respiratory distress, hypo/hyperthermia and shock, emergency equipment needed to stabilize child if condition of the child deteriorates, assisting in basic CPR, and proning to improve the oxygenation were taught. Skill station 2: Oxygenation; In this station, assessment a sick child for airway patency and performing basic measures to restore airway patency, and administering oxygen in children using low flow oxygen devices and low flow devices were taught to the participants, including use of heated, humidified, high flow nasal oxygen (HHHFNO). Skill station 3: Ventilation; The skills taught in this station include non-invasive ventilation (NIV), its indication and how to provide NIV, assisting in endotracheal intubation, monitoring of children on mechanical ventilation, and performing closed suction. Skill station 4: Medication and fluid therapy; The participants were taught the following skills in this station- identify appropriate vein, and select appropriate size cannula for inserting an intravenous cannula in children, perform care of intravascular catheters, fluid and drug dosage calculation in children, and how to administer drug using nebulizer. Skill station 5: Pediatric medical equipment; In this station, participants learn about equipment used in pediatrics- radiant warmer, and continuous positive airway pressure (CPAP) settings in children.

Tools used for data collection

The nurses completed a needs assessment survey 2 to 3 days prior to the training program. In the needs assessment, nurses rated their level of confidence in performing common pediatric nursing skills on a 5-point Likert scale ranging from "highly confident-5" to "not confident at all-1". A brief demographic performa was also filled by the nurses that included their educational background and professional experience. Prior knowledge assessment was done using a 25-item multiple choice questions (MCQs). The MCQs were developed from standardized resource materials on pediatric critical care. All the questionnaires were shared as a link on the Telegram app and the nurses were requested to click on the link and complete them. The impact of the training program was assessed in terms of knowledge and confidence of the participants within 2 days of completion of the training. Posttest assessments were also done by online mode. The participants also filled a feedback form on the quality of the training. Participants were awarded a participation certificate with credit hours on completion of post-test.

Analysis

Data was coded and entered in excel sheet and then imported to STATA software version 13.1, StataCorp, College Station, Texas 77845 USA. Descriptive statistics like frequency, percentage, mean, median, SD, inter-quartile deviation (IQR) was used to analyze data. Paired t test was used to compute the difference in knowledge and confidence scores between pretest and posttest values. Set level of significance for inferential statistics was taken as <0.05.

RESULTS

The mean age of the participants was 32.1±6.5 years. A majority (68.1%) of them was female and had bachelor's degree in nursing (68.1%). The median years of professional experience were 8 years. Most of them (85.1%) didn't have prior experience of working in pediatric areas and only a small proportion of the nurses (18%) had undergone online training related to COVID 19 during the last 6 months. A majority of them (89.4%) had worked in COVID 19 units and had a median work experience of 1 year. Most of them preferred resource materials in the form of videos (70%), followed by reading materials (25%) (Table 1).

Table 1: Demographic Profile of Nurses, who underwent Pediatric COVID Preparedness Program (n=282).

Particulars	F (%)
Age in years (mean)*	32.13±(6.27)
Sex	
Male	90 (31.9)
Female	192 (68.1)
Professional qualification	
GNM	80 (28.3)
B.Sc. Nursing	192 (68.1)
M.Sc. Nursing	10 (0.35)
Total professional experience (years)	8 (2.5-13)
Experience in pediatric area	
Yes	42 (14.8)
No	240 (85.1)
Attended any training on COVID 19 in the last 6 months	
Yes	43 (18)
No	239 (82)
Worked in a COVID unit before	
Yes	252 (89.4)
No	30 (10.6)
If yes, duration of work experience in COVID unit (years)	
Preference of learning materials	1 (0.4-1.3)
Videos	198 (70)
Reading materials	70 (25)
Webinars	14 (5)

*Mean±SD, **median (IQR)

The mean pretest knowledge score was 12.57±2.96, and the mean posttest score was 16.36±4.26. There was a significant (p=0.001) improvement in the level of knowledge of the participants after PNEPPCO training (Figure 2). The comparison of self-reported confidence

between pre and post intervention is given in (Table 2). There was increased level of confidence in performing pediatric nursing skills and the difference between the pretest and posttest level of confidence was statistically significant (p value=0.001) (Table 2). In the feedback (Table 3), the participants gave a mean rating of 4.5 out of 5 points on the quality of the resource material shared on the Telegram app, relevance of the skills taught, and quality of the hands-on training. The overall benefit gained from the course and confidence of performing pediatric skills after the course was also rated 4.6 and 4.4 out of 5 respectively. The likelihood of recommending the course to a colleague was also rated 4.8 out of 5. No association could be established between knowledge level and the qualification, and total professional experience of the participants (p>0.05).

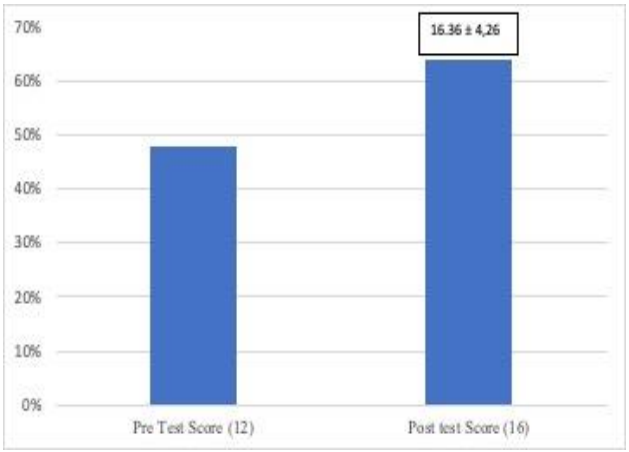

Figure 2: Comparison of mean knowledge scores pre and post intervention (p value=0.001).

Table 2: Self-reported level of confidence towards performing pediatric skills of Nurses attending PNEPPCO- pre and post intervention.

Pediatric nursing skills	Pretest (n=282)	Posttest (n=290)	P value
Triaging of children	3 (3,4)	5 (4,5)	0.001
Checking blood glucose in children	4 (4,5)	5 (5,5)	0.001
Monitoring of a sick child- vitals, CFT, Spo_2	4 (4,5)	5 (5,5)	0.001
Oral/ Oropharyngeal suctioning	4 (3,5)	5 (5,5)	0.001
Positioning a child for open airway	4 (3,4)	5 (4,5)	0.001
Endotracheal suctioning	4 (3,5)	5 (5,5)	0.001
Use of low flow oxygen delivery devices- nasal prong, face mask	4 (4,5)	5 (5,5)	0.001
Use of high flow oxygen delivery devices- NRM, HFNO	4 (3,4)	5 (4,5)	0.001
Taking care of a child on non- invasive mechanical ventilation	3 (3,4)	5 (4,5)	0.001
Taking care of a child on invasive mechanical ventilation	3 (3,4)	5 (4,5)	0.001
Assisting in ET intubation	4 (3,4)	5 (4,5)	0.001
OG/NG tube insertion and feeding	4 (3,4)	5 (4,5)	0.001
Drug dosage calculation, drop factor in paediatrics	4 (3,4)	5 (5,5)	0.001
Insertion of IV line	3 (3,4)	5 (4,5)	0.001
Nebulization	4 (4,5)	5 (5,5)	0.001
Fluid therapy	4 (3,4)	5 (5,5)	0.001
Blood and component therapy	4 (3,4)	5 (4,5)	0.001
Paediatric basic life support	3 (3,4)	5 (4,5)	0.001
Assisting in CPR	4 (3,4)	5 (4,5)	0.001
Proning of a paediatric COVID patient	4 (3,4)	5 (4,5)	0.001
Using radiant warmer	4 (3,4)	5 (5,5)	0.001
Using syringe pump	4 (4,5)	5 (5,5)	0.001
Handling CPAP/BiPAP/Ventilator	3 (3,4)	5 (4,5)	0.001

Median (Q1, Q3), Man Whitney U test, p <0.05

Table 3: Feedback from participants (n=290).

	Mean score (1 to 5)
Items	
Quality of resource materials shared in Telegram	4.5
Relevance of skills taught	4.5
Rating of hands-on training	4.5
Overall benefit from the course	4.6
Confidence of performing pediatric skills -	
Before the course	3.4
After the course	4.4
Likelihood of recommending the course to colleagues	4.8

DISCUSSION

Nursing care of children is markedly different from adults and needs specialized training and expertise. Most of the nurses who were currently working in the COVID-19 centre a did not have prior experience of caring for sick children apart from their pre-service training and there was a felt need for refreshing their knowledge and skills in pediatric care. Elhadi et al conducted a multicentre survey on the level of preparedness and awareness of health care workers (HCWs) on COVID 19 in low resource setting during the first wave of the pandemic and reported that 83.8% of participants had low confidence.

The level of awareness and preparedness was also low.[12] We had a similar finding in our study during the pre intervention phase. HCWs feel anxious, under prepared and face uncertainty when faced with high consequence infectious disease such as COVID-19, and also have expectations for training from the system.[13] Therefore it is of utmost importance that need based training be imparted to them on regular basis.[14] With additional patient load on the healthcare system due to the pandemic, the healthcare workforce has been stretched to its limit and HCWs have little time to spare for trainings. Thus, the need for time limited evidence-based training during the ongoing pandemic has been well recognized.[15,16] Our PNEPPCO training model was based on adult learning principles such as need based learning, self-paced learning, and respect and autonomy for the learner. The multidisciplinary team of trainers also ensured that the in-session doubts and queries of the participants were addressed holistically. The involvement of all stakeholders in the training also projects the deep level of investment in the training and may influence learning in a positive manner. The majority of our participants preferred videos as resource material for self-learning followed by reading materials, with only a few of them opting for webinars. Keeping this in mind, the resource materials were shared in the form of PDF handouts and skill related videos.

Studies have shown association between skill based training and level of confidence.[17,18] Similarly in our study there was improvement in confidence of performing pediatric skills after the training. The training program also received positive feedback from the participants. The major limitation of our study was the short duration of the training program. Informal feedback from our participants showed that they wanted more time for skill lab as well as clinical skills practice. Unfortunately, this was not possible for us due to the large number of participants to be trained in a short duration. We also could not assess the impact of our training on patient outcomes in the actual clinical setting.

CONCLUSION

The PNEPPCO training model with blended learning and multidisciplinary team involvement led to improvement in knowledge and confidence among nurses working in a COVID 19 centre. Nurses are the frontline COVID warriors and will be the first ones to respond in the subsequent waves of COVID-19 outbreak possibly affecting a larger proportion of children. Building the staff capacity to face new challenges in the near future will boost their morale and ensure that the quality of patient care stays uncompromised. Just in time training and capacity building of nurses has the potential to improve patient care during these challenging times.

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