Intervention Program for Nurses about Care of Children with Severe Croup Syndrome

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Abstract

Background: Severe croup syndrome characterized by barky cough, chest retraction, prominent inspiratory stridor, hypoxia, extreme respiratory distress and disturbed conscious level. Pediatric nurses have important role in providing immediate nursing care and safe life of children.. **Aim of study:** Was to evaluate intervention program for nurses about care of children with severe croup syndrome. **Design:** A quasi-experimental design was used to carry out this study. **Setting:** This study was conducted at Pediatric Department at Benha University hospital and Specialized Pediatric hospital at Benha City affiliated to Ministry of Health. **Sample:** A purposive sample of 47 nurses and 47 children with severe croup syndrome with predetermined inclusion criteria. **Tools of data collection:** Two tools were used, I: Structured Interviewing Questionnaire includes: Personal characteristics of the studied nurses and children, nurses' knowledge about severe croup syndrome and II: Observational checklists, to assess nurses' practice regarding care of children with severe croup syndrome. **Results:** Less than half of the studied nurses had poor knowledge and incompetent level of practice about care of children with severe croup syndrome. There was a highly statistical significant differences in all items of nurses' knowledge and practice regarding care of children with severe croup syndrome pre and post program implementation **Conclusion:** Educational program was effective in improving nurses' knowledge and practices regarding care of children with severe croup syndrome after program implementation as compared to preprogram. **Recommendation:** Improve the knowledge and practice of nurses by providing in service training program, designing and distributing an educational handout to nurses about care of children with severe croup syndrome.

Keywords: Children, Intervention program, Nursing care and severe croup syndrome.

Introduction

Croup is the most common respiratory infection that causes upper airway obstruction. Croup is also known as laryngo tracheo bronchitis because it leads to inflammation and edema of the larynx (voice box), trachea (windpipe), and bronchi **(Hanna et al., 2019).**

Croup syndrome classified as mild, moderate, severe croup and impending respiratory failure according to severity of symptoms of respiratory distress. Westley croup scoring system is the commonest used clinical score for croup **(Eghbali et al., 2016).** Westley croup scoring system ranging from 0 to 17 points depending on 5 factors: inspiratory stridor, chest retraction, air entry, level of consciousness and cyanosis. Severe croup syndrome corresponding to score 8- 11 **(Lee et al., 2019).**

Severe croup syndrome characterized by intensive barking cough, biphasic stridor, chest retractions, decrease or non-audible air entry, use of the abdominal muscles, anxiety

and agitation. Croup is an illness that occurs in infants and children less than 6 years of age, peaking at 1 to 2 years of age, more prevalent in boys than in females (1.5:1.0). The incidence of croup increases in autumn (from September to December) and early winter months **(Mazurek et al., 2019).** Croup affects about 3% of children per year, accounts for 7% of hospitalizations annually in the United States **(Sizar & Carr, 2019).**

Severe croup commonly occurs as a result of viral infection. Parainfluenza virus accounts for 75% of croup cases, other viruses include respiratory syncytical virus (RSV), influenza virus A and B. In fewer cases, croup may result from a bacterial infection such as Corynebacterium diphtheriae and Mycoplasma pneumonia **(Alsaeed et al., 2017).**

Severe croup presents with symptoms similar to upper respiratory infection from 2 to 3 days of low-grade fever (less than 39°C) and coryza. Then appear the barking cough and hoarseness, inspiratory stridor, tachycardia, tachypnea, upper airway obstruction and respiratory distress. Hypoxemia and hypercapnia may occur due to severe upper respiratory tract obstruction and airway inflammation. Severe croup may complicate to pneumonia, pulmonary edema, bacterial tracheitis, and rarely death **(Valero & Tolosa, 2019).**

Severe croup is primarily a clinical diagnosis which based on clinical finding (abrupt onset of a barking cough, hoarseness and inspiratory stridor), tachypnea, tachycardia, dyspnea, fever, chest retractions, nasal flaring and cyanosis. Radiographic imaging is not indicated routinely **(Smith et al., 2018).**

Treatment of severe croup include: provide comfortable environment, antipyretics to relieve fever, intravenous fluid intake to prevent dehydration, corticosteroids (Dexamethasone 0.6 mg/ kg, orally or intramuscularly & oral prednisolone), Nebulized racemic epinephrine 2.25% (0.5 ml in 2.5ml normal saline), supplemental oxygen, and endotracheal intubation **(Ortiz-Alvarez, 2017).**

Nurses have an important role in observation and accurate assessment of child's' respiratory status, vital signs, monitoring of oxygen levels, skin color, and conscious level are used to measure the child's condition and response to treatment, administer humidified oxygen if prescribed, administer IV fluids to prevent dehydration **(AlOtaibi & AlAteeq, 2018).**

Significance of the study:

Croup syndrome is a common pediatric illness that causes upper airway obstruction. Upper Respiratory Tract Infections (URTIs) are one of the common three diagnoses in the outpatient setting. The URTIs account for 10 million outpatient visits a year **(Thomas & Bomar, 2021).** In Egypt, Acute respiratory infections are responsible for 39% of outpatient visits at primary health care. The URTIs accounts for 65% from acute respiratory infections; acute croup accounts 6% from upper respiratory tract infections **(Kela, 2016).** Severe croup syndrome accounts for 15.3% at Assiut University children Hospital **(Rasmy et al., 2019).**

The number of croup in pediatric patients attributed to clinics and emergency department at Benha Children Specialist Hospital was 40 cases/ 200 cases per week infected with respiratory infection **(Benha Specialized Pediatric Hospital Statistical Department, 2019).** The number of croup cases attributed to the clinics and emergency department at Benha University Hospital was 35 cases/ 200 child per week infected with respiratory infection **(Benha University**

Hospital Statistical Department, 2019).

The researcher observed that children with severe croup syndrome were at risk for many complications. So that the present study is undertaken to evaluate intervention program for nurses about care of children with severe croup syndrome.

Aim of this study

The study aimed to evaluate intervention program for nurses about care of children with severe croup syndrome.

Research hypothesis

The nurses' knowledge and practice will be improved after implementing of intervention program for children with severe croup syndrome.

Subjects and Method

Research Design:

A quasi-experimental design was used to carry out this study.

Research Settings:

This study was conducted at Pediatric Department at Benha University hospital and Specialized Pediatric hospital at Benha city affiliated to Ministry of Health/ Egypt.

Research Subjects:

I- A purposive sample of 47 nurses, where 25 nurses from Benha University hospital and 22 nurses from Specialized Pediatric hospital at Benha city. Nurses were chosen based on the following inclusion criteria:

• More than three years of experience in pediatric nursing care.

• Age: more than 20 years old.

II- A purposive sample of children 47 case of severe croup syndrome from the previously mentioned settings over a 6 months period. The children chosen based on the following inclusion criteria:

• Age: 3 months to 6 years old.

• Both genders.

• Confirmed diagnosis with croup syndrome.

• Not suffered from mental or physical diseases.

Tools of Data Collection:

Data was collected through the following tools:

Tool I: A Structured Interviewing Questionnaire:

It was designed by the researcher in the light of current and relevant researches to assess nurses' knowledge about severe croup syndrome. It was written in an Arabic language and consisted of three parts

Part I: Personal characteristics of the studied nurses such as age, gender, marital status, years of experience and educational level.

Part II: Personal characteristics of the children with severe croup syndrome such as age, gender, date of admission, past history and vital signs.

Part III: Nurses' knowledge about severe croup syndrome was adapted from **Hockenberry & Wilson, 2015**. It consisted of close-ended questions related to definition, incidence, signs & symptoms, causes, diagnostic tests and nursing care for children with croup syndrome.

Scoring system for nurses' knowledge:

A scoring system was followed to assess nurses' knowledge related to severe croup syndrome. The Questionnaire was involved of 44 questions, the total scores of the questionnaire were 88 grades, the complete correct response was scored (2), the incomplete answer was scored (1) and incorrect or don't answer was scored (0). After check the answer, the total scores summited and converted into percentage. Scores ≥ 75% with a model key answer were considered Good knowledge, scores 50 < 75 % were considered Average knowledge and less than 50 % were considered Poor knowledge.

Tool II: Observational Checklists:

It was adapted from **Bindler (2017) & lynn (2015)** and modified by the researcher to suit the nature of study. It was used to assess nurses' practice about severe croup syndrome. Divided into 12 procedures including: Hand washing, measuring axillary body temperature, measuring apical pulse, measuring respiratory rate, measuring oxygen saturation by pulse oximetry, oxygen therapy, collecting a venous blood sample, collecting arterial blood gases (ABGs), administering oral medications, administering an intramuscular injection, administering medication by intravenous bolus or push and administering a nebulizer aerosol route pre& post intervention program.

Scoring system for nurses' practice:

The scoring system consisted of: one point for done and correct and zero for done incorrectly or not done. The total scores were ranged from 0- 183 marks. Competent practice: if scores ≥85% and Incompetent practice: if score <85 %.

Reliability:

Cronbach alpha coefficient test was used to assess the reliability of the developer tool through their internal consistency. It was 0.83 for knowledge structured interviewing questionnaire and 0.90 for the observational checklist.

Content validity:

It was ascertained by a jury of three experts (2 experts from Faculty of Nursing Benha University & 1 expert from Faculty of Nursing Helwan University) in the field of Pediatric Nursing. The experts reviewed the clarity and objectivity of the study tools for clarity, relevance, comprehensiveness, simplicity and applicability. The experts agreed on content and their opinion was elicited regarding the format, paraphrasing and accuracy of the tools and recommended minor language changes. The necessary modifications were done accordingly.

Ethical consideration:

A brief explanation of study was given to assure the nurse that information obtained used only the purpose of the study and maintained confidentiality, privacy and take oral consent for participation and all of them have the right to withdraw from the study at any time.

Oral consent was obtained from children's parent before data collection ensuring that the study is harmless and all data obtained was treated with complete privacy and confidentially for research purpose only.

Pilot Study:

Pilot study was carried out involving 10% of study subjects 5 nurses & 5 children from the previously mentioned setting to test applicability, clarity and efficiency of the tools and time needed. All participants in pilot study were included in study subjects, where no modification was carried out in the study tools are revealed from the pilot.

Field Work:

Assessment phase:

The data collection process was carried out from the beginning of November (2020) till the end of December (2020).The researcher was available at the study settings four days per week (morning and afternoon), two days at each hospital to collect data. The researcher interviewed nurses, introducing herself to them, informing them about the aim of the study and take an oral consent to share in the study, then the researcher assess nurses knowledge and practice about care of children with severe croup syndrome using the previously mentioned tools. The researcher also interviewed children's parents after introducing herself, informing them about the aim of the study and take oral consent to be

involved in the study.

Preprogram implementation

Explanation of the questionnaire was done. Then, each nurse was asked to fill out the questionnaire individually to collect baseline knowledge and assess nurses' educational needs. The average time required to complete the questionnaire sheet was 20-30minutes. The researcher observed each nurse separately during providing care of children with severe croup syndrome to assess performance by using observational checklists during their actual performance.

Program construction:

The intervention program was designed by the researcher in the light of actual need assessment of the studied nurses after reviewing the related literature. It was constructed, revised and modified to improve nurses' knowledge and practice about caring of children with severe croup syndrome. The content was prepared according to nurses' level of understanding in simple Arabic language.

Implementation phase:

The implementation phase of the intervention program was achieved through 12 sessions, each session started by summary of previous session and objective of new session. The studied nurses were gathered in small groups according to availability. The nurses divided into 10 groups, each group contains 4 to 5 nurses.

The researcher was available at the previous mentioned setting two days per week at each hospital. Saturday and Sunday at Benha Specialized Pediatric hospital & Monday and Wednesday at Benha University hospital from 9 am to 2 pm. The total number of sessions was 12 sessions (4 sessions for theory & 8 sessions for practice and the time of each session took about one or two hour.

Evaluation phase:

After completion of intervention program contents, evaluation of nurses were carried out immediately after program' implementation. The post tests were done to assess nurses' knowledge and practice using the same format of pre test. This helped to evaluate the effect of intervention program.

Statistical analysis:

The collected data were organized, coded, computerized, tabulated and analyzed by using the Statistical Package for Social Science "SPSS" Version 22. The quantitative data were described as numbers and percentage. Association between variables was tested using Chi-square test.

Level of significance was accepted at P value

- Non significant difference > 0.05
- Significant difference < 0.05
- High statistical significant difference < 0.001

Results:

Table (1): Represents distribution of the studied nurses regarding their characteristics. Regarding age, the mean age of the studied nurses was 29.95 ± 5.19 years. Regarding marital status, less than three quarter (72.3%) of them was married. Concerning educational level, less than half (46.8 %) of them had diploma of nursing. Regarding years of experience, more than half (57.4%) of them had 6- < 9 years of experience with mean 8.87± 3.24 years. Regarding attending previous training courses (100%) of them didn't attend pervious training courses regarding care of children with severe croup syndrome.

Table (2): Represents distribution of the studied children regarding their personal characteristics and medical data. This table also shows that more than half (53.2%) of

children were in the age group from one to less than 3 years with mean age 19.80 ± 11.60 months. This table also shows that more than three quarters (78.7%) of them didn't had past history of croup, while less than two thirds (63.8%) of them didn't make investigation. In addition, less than half (42.6%) of them received dexamethasone, nebulized adrenaline; most (93.6%) of children have no pervious hospitalization due to severe croup syndrome.

Table (3): Portrays that, all studied children (100%) had stridor, more than three quarters (78.7%) of them were conscious. Also, most (97.9%) of them had no cyanosis, majority of them (85.1%) had moderate chest retraction and majority of them (83%) had decreased air entry. Concerning pulse, less than two thirds (61.8%) had tachycardia, while more than two third (68.1%) had tachypnea and the majority (80.9%) of children had fever. Regarding length of stay, majority of them (89.4%) had hospitalized from 2 to less than 5 days.

Figure (1): Shows that, less than half (40.4%) of the studied nurses had poor knowledge, less than one third (29.8%) of them had average knowledge, while less than one third (29.8%) had good knowledge during the pre- intervention program. Meanwhile more than one tenth (10.6%) of the studied nurses had poor knowledge, more than one tenth (14.9%) of them had average knowledge, while less than three quarters (74.5%) had good knowledge post-intervention program.

Figure (2): Shows that, less than half (42.6%) of the studied nurses had incompetent practice at the pre- intervention program. While at the post-program the majority (89.4%) of them had competent practice.

Table (4): Illustrates that there was a statistical significant relation between nurses' total knowledge scores and their age in pre-intervention program where ($P< 0.05$), also there was a highly statistical significant relation between nurses' total knowledge scores and their level of education in pre-intervention program where ($P< 0.001$). There was a statistical significant relation between nurses' total knowledge scores and their years of experience in post-program where ($P< 0.05$).

Table (5): Demonstrates that there wasn't statistical significant relation between nurses' total practices scores and their personal data.

Table (6): Shows that there was a statistical significant differences with positive correlation between the studied nurses' total knowledge scores and their total practice scores ($P< 0.001$) in pre and post intervention program.

Table (1): Percentage distribution of the studied nurses regarding their characteristics (n =47).

Characteristics	No.	%
Age / years		
20 <25	7	14.9
25<30	18	**38.3**
30<35	13	27.7
35≤ 40	9	19.1
Mean ± SD	**29.95± 5.19 years**	
Marital status		
Single	9	19.1
Married	34	**72.3**
Divorced	2	4.3
Widow	2	4.3
Educational level		
Secondary nursing education	22	**46.8**
Technical institute of nursing	21	44.7
Faculty of nursing	4	8.5
Years of experience		
3<6	6	12.8
6<9	27	**57.4**
9<12	5	10.6
12≤15	9	19.1
Mean ± SD	**8.87± 3.24 years**	
Previous training courses regarding severe croup		
No	47	**100**

Table (2): Percentage distribution of the studied children regarding their personal characteristics and medical data (n =47).

Characteristics	No.	%
Age in years		
<1	8	17
1< 3	25	**53.2**
3≥ 6	14	29.8
Mean ± SD	**19.80±11.60 months**	
Date of admission		
November 2020	20	42.6
December 2020	27	**57.4**
Past history of croup syndrome		
Yes	10	21.3
No	37	**78.7**
Investigation done		
No	30	63.8
Chest x-ray	6	12.8
Arterial blood gases “ABGs”	11	23.4
Medication given to child		
Hydrocortisone+ nebulized adrenaline	11	23.4
Dexamethasone+ nebulized adrenaline	20	42.6
Hydrocortisone+ nebulized adrenaline+ oxygen	9	19.1
Nebulized adrenaline	7	14.9
Previous hospitalization related to severe croup.		
Yes	3	6.4
No	44	**93.6**

Table (3): Percentage distribution of the studied children regarding their present medical data (n=47).

Medical data	No.	%
Clinical picture		
Presence of stridor	47	**100**
Conscious level		
Conscious	37	**78.7**
Unconscious	10	21.3
Cyanosis		
No	46	**97.9**
When crying	1	2.1
Chest retraction		
Moderate	40	**85.1**
Severe	7	14.9
Air entry		
Decreased	39	**83**
Markedly decreased	8	17
Pulse		
Normal	18	38.2
Tachycardia	29	**61.8**
Respiratory rate		
Normal	15	31.9
Tachypnea	32	**68.1**
Temperature		
Normal	9	19.9
Fever	38	**80.9**
Length of hospital stay due to / day		
2 - < 5	42	**89.4**
5- < 8	5	10.6

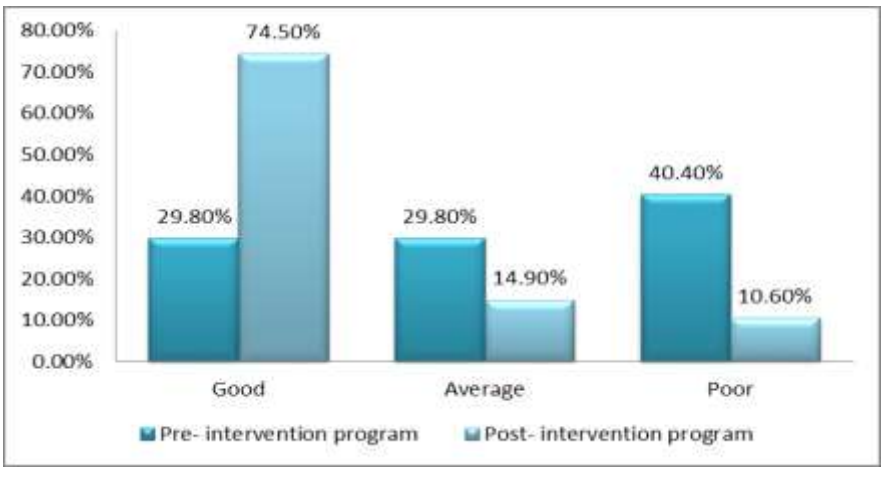

Figure (1): Distribution of studied nurses regarding their total knowledge pre and post program implementation

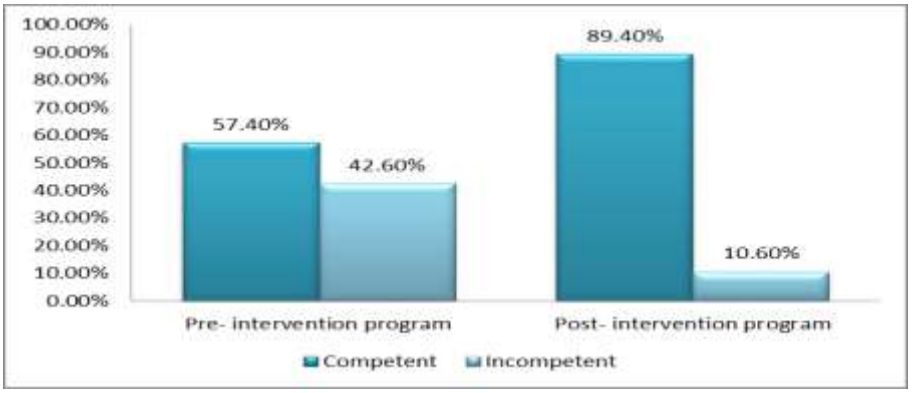

Figure (2): Distribution of studied nurses regarding their total practices level pre and post program implementation (n=47).

Table (4): Relation between the studied nurses' total knowledge and their personal characteristics pre and post intervention program

Personal data	Pre- intervention program						X^2	p-value	Post-intervention program						X^2	p-value
	Poor		Average		Good				Poor		Average		Good			
	No	%	No	%	No	%			No	%	No	%	No	%		
Gender																
Male	6	31.6	0	0.0	3	21.4	5.259	0.072	1	20.0	1	14.3	7	20.0	0.126	0.939
Female	13	68.4	14	100.0	11	78.6			4	80.0	6	85.7	28	80.0		
Age in years																
20 <25	4	21.1	1	7.1	2	14.3	9.081	0.169	1	20.0	0	0.0	6	17.1	13.44	.036*
25<30	8	42.1	6	42.9	4	28.6			4	80.0	2	28.6	12	34.3		
30<35	6	31.6	5	35.7	2	14.3			0	0.0	5	71.4	8	22.9		
35≥40	1	5.3	2	14.3	6	42.9			0	0.0	0	0.0	9	25.7		
Marital status																
Single	5	26.3	3	21.4	1	7.1	6.475	0.372	0	0.0	2	28.6	7	20.0	6.741	0.346
Married	12	63.2	10	71.4	12	85.7			5	100.0	3	42.9	26	74.3		
Divorced	2	10.5	0	0.0	0	0.0			0	0.0	1	14.3	1	2.9		
Widow	0	0.0	1	7.1	1	7.1			0	0.0	1	14.3	1	2.9		
Level of education																
Secondary nursing education	7	36.8	7	50.0	8	57.1	14.617	.006*	0	0.0	5	71.4	17	48.6	8.644	0.071
Technical institute of nursing	12	63.2	7	50.0	2	14.3			5	100.0	2	28.6	14	40.0		
Faculty of nursing	0	0.0	0	0.0	4	28.6			0	0.0	0	0.0	4	11.4		
Years of experience																
3<6	3	15.8	1	7.1	2	14.3	10.936	0.09	1	20.0	0	0.0	5	14.3	12.91	.044*
6<9	14	73.7	8	57.1	5	35.7			4	80.0	4	57.1	19	54.3		
9<12	1	5.3	3	21.4	1	7.1			0	0.0	3	42.9	2	5.7		
12≤15	1	5.3	2	14.3	6	42.9			0	0.0	0	0.0	9	25.7		

Table (5): Relation between the studied nurses' total practices and their personal characteristics pre and post intervention program

Items	Pre- intervention program				X^2	p-value	Post-intervention program				X^2	p-value
	Incompetent (n=20)		Competent (n=27)				Incompetent (n=5)		Competent (n=42)			
	No	%	No	%			No	%	No	%		
Gender												
Male	5	25.0	4	14.8	0.77	0.38	1	20.0	8	19.0	0.003	0.959
Female	15	75.0	23	85.2			4	80.0	34	81.0		
Age in years												
20 <25	5	25.0	2	7.4			0	0.0	7	16.7		
25<30	7	35.0	11	40.7	2.888	0.409	4	80.0	14	33.3	4.564	0.207
30<35	5	25.0	8	29.6			1	20.0	12	28.6		
35≥40	3	15.0	6	22.2			0	0.0	9	21.4		
Marital status												
Single	4	20.0	5	18.5			0	0.0	9	21.4		
Married	15	75.0	19	70.4	1.574	0.665	4	80.0	30	71.4	4.614	0.202
Divorced	0	0.0	2	7.4			0	0.0	2	4.8		
Widow	1	5.0	1	3.7			1	20.0	1	2.4		
Level of education												
Secondary nursing education	8	40.0	14	51.9				0.0	21	50.0		
Technical institute of nursing	12	60.0	9	33.3	5.136	0.077	1	20.0	17	40.5	2.897	0.235
Faculty of nursing	0	0.0	4	14.8			0	0.0	4	9.5		
Years of experience												
3<6	2	10.0	4	14.8			0	0.0	6	14.3		
6<9	14	70.0	13	48.1	2.517	0.472	4	80.0	23	54.8	2.742	0.433
9<12	1	5.0	4	14.8			1	20.0	4	9.5		
12≤15	3	15.0	6	22.2			0	0.0	9	21.4		

Table (6): Correlation between total knowledge and practices among studied nurses pre and post intervention program

Variable	Total knowledge scores			
	Pre- intervention program		Post- intervention program	
	r	P-value	r	P-value
Total practices scores	0.47	0.001**	0.50	0.000**

Discussion

As regard to the age, this study found that more than one third of studied nurses were between 25 < 30 years old (mean ± SD 29.95± 5.19 years). This results in an accordance with **AbduAllah et al., (2017)** in a study entitled "Effect of Educational Program for Nurses on Central Venous Catheter Maintenance Bundle for Critically Ill Pediatric Patients" at Benha Specialized Pediatric Hospital, who found that more than half (51.74%) of the studied nurses ranged between 25 to less than 30 years old (Mean ± SD 29.36±4.32 years).

Regarding marital status, the current study showed that less than three quarters of nurses were married. This finding was supported by the result of a study done by **AbdElhamed et al., (2017)** about "Nursing Personnel Perception toward Nursing Shortages Factors and its Effect on Their Work at Benha University Hospital" who found that the majority (87.3%) of studied nurses were married.

Concerning educational level, the finding of the current study showed that less than half of nurses had secondary nursing education. This finding also agreed with **Mostafa et al., (2019)** in a study entitled "Effect of Educational Program on Nurses' Knowledge and Practice about Oxygen Therapy" who found that educational level of less than half (42.0%) from studied nurses held 3 years secondary nursing education. From the researcher view this because the nursing education was mainly secondary education of nursing till 2007.

Distribution of the studied nurses according to years of experience, this study revealed that more than half of the studied nurses had 6- < 9 years of experience with mean and SD were 8.87± 3.24 years. this result in agreement with **Mostafa et al., (2019)** who found that less than half (42.0%) from studied nurses had 5- <10 years experience.

Regarding attending previous training courses, the present study showed that all the studied nurses hadn't attend pervious training courses regarding care of children with severe croup syndrome. This result in agreement with **Yazdannik et al., (2018)** in a study which entitled "Performance of ICU Nurses in Providing Respiratory Care" who concluded that less than half (39.64%) of studied nurses performed poorly in respiratory care due to lack of the training and educational program in relation to respiratory care.

Also, the present finding in accordance with **Elamia et al., (2020)** in a study which entitled "Head Nurses' Evaluation and Nurses' Self Evaluation for Performing Chest Nursing Care Procedure" who found that, the vast majority of the studied nurses (93.0%) had not training program.

As regards to age of children, The present study illustrated that, more than half of children were aged from 1 < 3 years with mean age 19.80 ± 11.60 months. This result in agreement with **Anyouzoa, (2018)** who mentioned in a study entitled "Impact of the Implementation of the Croup Clinical Standard Work Pathway in the Urgent Care and Emergency Department Settings in an Academic Pediatric Center " who found that, more than half (51.27%) of children in the age group from 6 months to less than 2 years.

Regarding date of admission, this study revealed that more than half of studied children were hospitalized in December. This results in agreement with **Bjornson & Johnson (2013)** in a review about "Croup In Children" who found

that, the peak incidence of croup occurs in late autumn (September to December).

Concerning past history of croup, this study showed that more than three quarter of them don't had past history of croup, less than one quarter had past history of croup. This findings were in agreement with findings of **Russell (2007)** in a study entitled "Risk Factors for Predicting Severe Croup and Bacterial Tracheitis" who revealed that, more than one third (41.9%) of children had past history of croup.

Regarding investigation, this study found that less than two thirds of children don't undergone investigation, also revealed that chest x-ray was done in more than one tenth of studied children. This findings were in agreement with findings of **Rasmy et al., (2019)**, in a study entitled "Clinical Audit on Management of Croup in Children at Assiut University Children Hospital" who revealed that, Chest x-ray was not done in the vast majority of the studied cases (88.2%) and was not recommended in all these cases.

Concerning management, the current study showed that more than one third of children received Hydrocortisone, neublized adrenaline. This finding congrunt with **Rasmy et al., (2019)** who found that management of severe cases dexamethazone and adrenaline were used in acute management of more than one quarter (26.9%). Hydrocortisone and nebulized adrenaline were used in more than one third (38.5%). While nebulized adrenaline only was used in more than tenth (11.5%).

Concerning clinical picture, this study revealed that all studied children had stridor. This finding was supported by **Russell, (2007)** who found that majority of studied children (80.8%) had combined obstructive stridor.

This study also showed that more than three quarter of children had good conscious level, while vast majority of them had no cyanosis, while majority of them had moderate chest retraction and majority of them had decreased air entry. This findings were similar with **Yang et al., (2017)** in a study about "Westly Score and Clinical Factors in Predicting the Outcomes of Croup in Pediatric Emergency Department" who found that cyanosis and altered conscious level were not clinically significant even in severe cases but chest retraction and decreased air entry were significant in predicting clinical outcomes.

Concerning vital signs, the current study found that less than two thirds of children had tachycardia, more than two thirds had tachypnea and the majority of children had fever. this result was in the same line with a study carried by **Lee et al., (2015)** "Clinical Characteristics of Children and Adolescents with Croup and Epiglottitis Who Visited 146 Emergency Departments in Korea" who found that fever the common complaints in children and adolescents with croup syndrome.

Regarding length of stay, this study found that majority of children had hospitalized from 2 to less than 5 days, more than one tenth of children hospitalized from 5 to less than 8 days. This result agreed with **Bagwell et al., (2020)** in a study "Management of Croup in the Emergency Department The Role of Multidose Nebulized Epinephrine" who found that most cases resolved by 1 week with improvement in symptoms expected at 48 to 72 hours.

On assessing total nurses' knowledge regarding care of children with severe croup syndrome, the current study showed that more than one third of the studied nurses had poor knowledge, less than one quarter had good knowledge in pre-program phase, while improved to less than three quarters of nurses had

good knowledge in post-program and there was highly statistical significant difference in all items of knowledge pre and post- program implementation. This result agreed with **NamLee et al., (2017)** who found that, mean score of knowledge 5.09±1.64 in pre-test which improved to 5.31± 1.29 in post-test and there were significant differences in the nursing students' baseline knowledge of patient care for children with croup syndrome.

Also, the present finding in accordance with **Elsayed et al., (2017)** in a study which entitled "Nurses' Performance regarding Management of Patients with Chest Infection in Neuro-Critical Care Unit" who found that, more than half (52.0%) of the studied nurses had unsatisfactory level about total knowledge regarding chest infection.

Concerning the total practices of the studied nurses, the present study showed that, less than half of the studied nurses had incompetent practice at the pre program implementation phase while at the post-program phase the majority of them had competent practice, there was a highly statistical significant differences in all items of nurses' practices pre and post program implementation. this finding were supported with **NamLee et al., (2017)** who found that there were significant differences in the mean scores of knowledge, confidence in performance, satisfaction with the learning method and ability in nursing practices.

The results of the present study illustrated that there was a statistical significance relation between the nurses' knowledge and their age after program implementation. This findings were consistent with **Soliman et al., (2019)** in a study which entitled "Nurses' Knowledge and Practices Regarding Peripheral Intravenous Cannulation and Blood Sampling in Pediatric Health Care Settings" who found that there was a a significant relation between between nurses' level of knowledge and their age.

The results of the present study showed that there was a highly statistical significance relation between the nurses' knowledge and their level of education in pre program implementation phase, this finding was supported with **Mohamed et al., (2020**) who found that there was a positive association between nurses' knowledge score with their educational level and practice level.

The results of the present study showed that there was a statistical significance relation between nurses' total knowledge and their years of experience in post program phase, this findings were supported with **Abd Elmageed et al., (2020**) who found that there was a statistically significant association between nurses' years of experience and their knowledge regarding medication administration.

On the contrary, the present results disagreed with the results of a study done by **Khalid & Hattab (2018)** who found that there was no statistical significant association between nurses' years of experience, level of education and their knowledge.

The results of the present study showed that there wasn't statistical significant relation between nurses' total practices scores and their personal data, this findings were consistent with **Mohammed et al., (2018)** in a study about "Nurses' Commitment to the Integrated Management of Childhood Illness Program in The Management of Children with Acute Respiratory Infection" who found that there was no statistical significant relations between the total score of nurses' practices and either their age or place of work.

In the same line, results of this study were consistent with **Mostafa et al., (2019)** who found

that there was no statistical significant relation between nurses' practice scores and their personal characteristics in pre and post- program.

The results of the present study showed that there was a statistical significant difference with positive correlation between the nurses' knowledge and practice. This findings was in the same line with **Abd Elmageed et al., (2020**) who found that there was a statistically significant relation between nurses' knowledge and their practice regarding medication administration where P=0.021.

Similarly, this findings were supported with **Mohamed et al., (2019)** in a study about "Effect of Educational Program on Improving Nurses' Performance Regarding Arterial Blood Gases Sampling for Critically Ill Children" who revealed that there was a statistical significant positive correlation between studied nurses' total knowledge scores and total practice scores at the post program phase (r=.588, p < 0.001**).

Conclusion:

There was a highly statistical significant improvement in the studied nurses' knowledge and practice score regarding to care of children with severe croup syndrome when compared with pre intervention program.

Recommendation

1) In-service training program for nurses to improve their knowledge and performance to enhance their competency level regarding care of children with severe croup syndrome.
2) Periodic evaluation for nurses' performance level to determine strategies to update their knowledge and improving their competency level of practice regarding care of children with severe croup syndrome.
3) Designing and distributing booklet for nurses about care of children with severe croup syndrome.
4) Further studies, the study should be replicated on large sample of nurses in different setting for the generalization of the obtained results.

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برنامج تدخلي للممرضات حول رعاية الأطفال المصابين بمتلازمة الخناق

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الخناق هو النوع الأكثر شيوعًا من عدوى الجهاز التنفسي الذي يسبب التهاب الحنجرة والقصبة الهوائية والشعب الهوائية. متلازمة الخناق الشديدة تتميز بوجود سعال نباحى، تراجع الصدر، صرير، نقص نسبة الأكسجين بالخلايا، ضيق التنفس الشديد، واضطراب في درجة الوعى. لذلك هدفت هذه الدراسة الي تقييم التدخل المبكر للممرضات حول رعاية الأطفال المصابين بمتلازمة الخناق. وقد أجريت الدراسة في قسم طب الأطفال بمستشفى جامعة بنها ومستشفى الأطفال التخصصي بمدينة بنها التابعة لوزارة الصحة. المواضيع: عينة هادفة من ٤٧ ممرضة و ٤٧ طفلا يعانون من متلازمة الخناق الشديدة. حيث كشفت النتائج بأن أقل من نصف الممرضات الخاضعين للدراسة لديهم مستوى ضعيف في المعلومات ومستوى غير كفء من الممارسة حول رعاية الأطفال المصابين بمتلازمة الخناق الشديدة.. كما اوصت الدراسة بضرورة توافر المزيد من التدريب في عيادة الأطفال لتزويد الممرضات بالمعلومات الدقيقة والممارسات المناسبة للأطفال الذين يعانون من الخناق الشديد.