

Effectiveness of Structured Teaching Programme on Knowledge and Practices of Pediatric Nurses Regarding Care of Children on Mechanical Ventilator

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Abstract: To assess the effectiveness of structured teaching programme on knowledge and practices of pediatric nurses regarding care of children on mechanical ventilator. Pre experimental research design i.e. one group pre-test and post- test design was adopted for this study. The subjects selected for the study were pediatric nurses working in pediatric intensive care unit, neonatal intensive care unit and pediatric ward. The study participants were selected by non probability convenient sampling technique. Knowledge of pediatric nurses was assessed by structured questionnaire and practices were assessed by three point scale check list. The study findings revealed that the mean and standard deviation and paired 't' value on knowledge on care of children on mechanical ventilator in pre test (15.38, 4.23) and post test mean and standard deviation (23.80, 2.61) and 't' value=17.76. The mean and standard deviation and paired 't' value on practices on care of children on mechanical ventilator in pre test (40.88, 7.33), in post test (55.30, 2.74) and 't' value =16.56, there was significant association between age and experience of the nurses with knowledge and practices.

Keywords: mechanical ventilator, pediatric nurses, care of children, effectiveness, structured teaching programme, knowledge, practices

1. Introduction

Mechanical ventilator support is routinely needed for critically ill in intensive care units and is also a common therapy in sub-acute and long-term care settings. The primary goals of mechanical ventilator support are to normalize arterial blood gas levels and acid-base imbalance by providing adequate ventilation and oxygenation. Mechanical ventilation can decrease the patient's work of breathing by unloading respiratory muscles in a synchronous manner. Mechanical ventilation can also maintain long-term respiratory support of patients with chronic ventilatory problems.¹

Mechanical ventilation can be lifesaving, but >50% of complications in conditions that require intensive care are related to ventilator support, particularly if it is prolonged. Mechanical ventilation with positive pressure is a technique that has been employed in the pediatric intensive care units (PICUs) with increasing frequency. The percentage of mechanical ventilation varies from 30 to 64% in PICUs. Since its introduction into the modern PICUs, mechanical ventilation has undergone continuous evolution. There has been an explosion of new ventilator modes, many of which have been incorporated into routine clinical practice without evidence of their efficacy or their superiority over other modes of ventilation. Currently, pressure modes are generally used for children throughout the world.²

Respiratory failure is the leading reason for the admission of children to intensive care units, and the ventilator is the main therapeutic tool used during the treatment of these patients. A competently used ventilator and adequate knowledge of

the anatomy, histology and physiology of the respiratory system in particular age groups of children (especially among neonates and infants) are crucial for successful treatment. Both non-invasive and invasive ventilation modes can be used for respiratory treatment in children. Invasive ventilation modes can be divided into two groups: conventional ones such as pressure-controlled or volume-controlled ventilation, or non-conventional modes such as oscillatory ventilation. Mechanical ventilation can involve a high risk of serious complications, such as pressure injury (barotrauma), volume injury (volutrauma) and bio trauma. Adhering to the principles of lung-protective ventilation can reduce the risk of side effects of mechanical ventilation.³

Supportive care of the child on mechanical ventilation include, equipment function, fluid and electrolytes, nutrition, skin care, mobilization of secretions, sedation and pain management, psychological needs of the child and family and strategies for weaning from ventilation.⁴

A descriptive study to assess the practices of the nurses regarding care of children on ventilator in pediatric intensive care unit in selected hospital, Mumbai city. The finding of the study revealed that the nurses need to develop their skills at regular intervals. In order to develop their skill, they need to constantly practice in a systematic way.⁵

The nurse requires knowledge about the indications, modes and settings of ventilator and different aspects of nursing care of children on mechanical ventilator, to prevent the different complications such as pneumothorax, airway injury, alveoli damage, and ventilator associated pneumonia, acute lung injury and respiratory distress syndrome.⁴

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2. Statement of the Problem

A Study to assess the effectiveness of structured teaching programme on knowledge and practices of pediatric nurses regarding care of children on mechanical ventilator in NRI General hospital, Chinakakani, Guntur (Dt), A. P.

3. Objectives of the Study

- 1) To assess the level of existing knowledge of pediatric nurses regarding care of children on mechanical ventilator.
- 2) To assess the practices of pediatric nurses regarding care of children on mechanical ventilator.
- 3) To evaluate the effectiveness of structured teaching programme on knowledge and practices of pediatric nurses regarding care of children on mechanical ventilator.
- 4) To find out the association between post-test knowledge of pediatric nurses regarding care of children on mechanical ventilator with selected variables.
- 5) To find out the association between post-test practices of pediatric nurses regarding care of children on mechanical ventilator with selected variables.

4. Research Methodology

- **Research Approach:** A Quantitative research approach was adopted for this study.
- **Research Design:** pre experimental, i.e. one group pre-test and post test design was used in the present study.
- **Research setting:** The study conducted in pediatric units of NRI General Hospital, Chinakakani, Guntur (Dt), Andhra Pradesh.
- **Study population:** Target population were Pediatric nurses working in pediatric units. Accessible population were the pediatric nurses working in NRI General Hospital, Chinakakani Guntur District, Andhra Pradesh.
- **Sampling:** The sample size of 50 nurses working in pediatric units. Non probability convenient sampling technique was adopted to select the sample.
- **Content validity of data:** Structured questionnaire was validated by a panel of experts consisting of nursing personnel and pediatricians.
- **Reliability of data:** Reliability of the tool was elicited by test- retest method to check the stability of an instrument by using Spearman's brown prophecy was computed in this study which revealed knowledge $r = 0.84$ and practices $r = 0.88$ indicating the tool is highly reliable for the study.
- **Description of tool:** The tool consists of three sections,

Section 'A': Socio demographic characteristics of the participants in relation to their age, gender, religion, marital status, income, professional qualification, experience, working area and exposure to training programme on mechanical ventilator.

Section 'B': Items on knowledge questionnaire consists of 32 items on knowledge with regard to care of children on mechanical ventilator. In the present study categorization of knowledge was done based on the scores in to three groups.

$\leq 50\%$ - Inadequate knowledge, 51-75 - Moderate adequate knowledge, $>75\%$ Adequate knowledge

Section 'C': Check list consists of 30 practice items regarding care of children on mechanical ventilator. In the present study categorization of practices based on score into three groups. $\leq 50\%$ - Inadequate practices, 51-75% - Moderate adequate practices, $>75\%$ - Adequate practices

5. Results and Analysis

This part deals with the overall analysis of samples related to knowledge and practices of the pediatric nurses in terms of frequencies, percentage, Mean, standard deviation, t values and chi-square.

Table 1: It deals with the analysis of Demographic characteristics related to care of children on mechanical ventilator among pediatric nurses.

S. No	Sample characteristics	Frequency (f)	Percentage (%)
1.	Age in years		
	21-25 years	19	38%
	26-30 years	26	52%
	31-35 years	05	10%
	35 years and above	00	0%
2.	Gender		
	Male	0	0%
	Female	50	100%
3.	Religion		
	Hindu	12	24%
	Christian	36	72%
4.	Marital Status		
	Married	32	64%
	Unmarried	18	36%
5.	Income		
	Less than Rs 8,000 per month	12	24%
	Rs 8,001-Rs 10,000 per month	18	36%
	Rs 10,001-Rs 12,000 per month	12	24%
	Rs 12,001-Rs 14,000 per month	04	08%
6.	Professional Qualification		
	GNM	24	48%
	B.Sc nursing	24	48%
	Post Basic B.Sc nursing	02	04%
	7.	Experience	
Less than 1 year		06	12%
1-3 years		22	44%
4-6 years		11	22%
More than 6 years		11	22%
8.	Working Area		
	Pediatric Intensive care	20	40%
	Neonatal Intensive care	17	34%
9.	Exposure to training programme regarding mechanical ventilator		
	Yes	00	0%
	No	50	100%

Table-1 shows majority of participants were, 26 (52%) in the age group of 26-30 years; regarding Gender, all 50 (100%) nurses were female and none of them were male; regarding religion, 36(72%) were Christians; regarding

Marital status, 32 (64%) of the participants were married; 18(36%) participants had an income between Rs 8,001-Rs 10,000 per month; professional qualification of participants, 24 (48%) had the qualification of B.Sc nursing and GNM; 22 (44%) had between 1-3 years of experience, regarding working area of participants, 20(40%) participants were working pediatric intensive care unit; Regarding exposure to training programme on mechanical ventilator, all the participants had 50(100%) no exposure to training programme on mechanical ventilator.

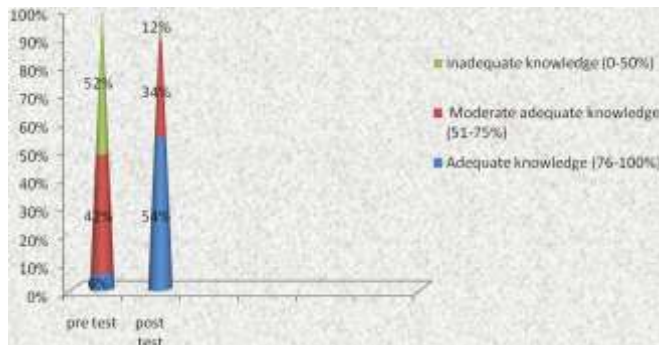


Figure 1: Level of knowledge on care of children on mechanical ventilator in pre test and post test scores.

The data presented in above fig:1, showed that in pre-test 3(6%) had adequate knowledge, 21(42%) had moderate adequate knowledge and 26(52%) had inadequate knowledge and in post-test 27 (54%) had adequate knowledge, 17(34%) had moderate adequate knowledge, and 6(12%) had inadequate knowledge, regarding care of the children on mechanical ventilator among pediatric nurses.

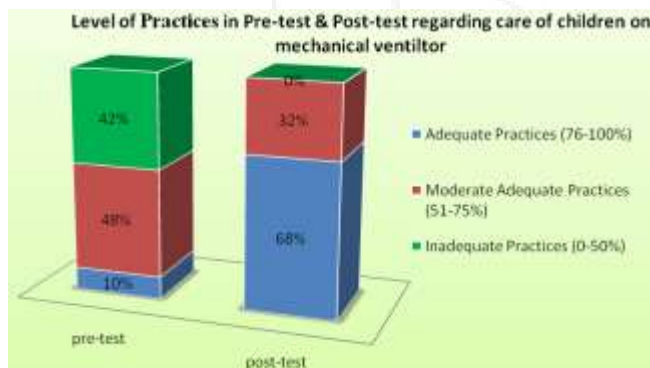


Figure 2: Level of practices on care of children on mechanical ventilator in pre test and post test scores.

The data presented in figure.2: showed that in pre-test 5 (10%) had adequate practices, 24(48%) had moderate adequate practices and 21(42%) had inadequate practices, and in post-test 34 (68%) had adequate practices, 16(32%) had moderate adequate practices, none of the participants had inadequate practices, regarding care of the children on mechanical ventilator among pediatric nurses.

There was significant difference between pre-test and post-test knowledge scores on care of children on mechanical ventilator among pediatric nurses indicating that structured teaching programme on care of children on mechanical ventilator was very effective in imparting knowledge among pediatric nurses. Hence the researcher had rejected the null hypothesis H_{01} .

Table 2: Mean, Standard Deviation and Paired 't' Value on Knowledge on Care of Children on Mechanical Ventilator Among Pediatric nurses. N=50

Knowledge	Mean	Standard deviation	Paired 't' value
Pre-test	15.38	4.23	Cal. Value 17.76 Table Value 7.46
Post-test	23.80	2.61	d.f =49 (P<0.05)

Table-2 describes that, obtained paired t value of knowledge on care of children on mechanical ventilator among pediatric nurses; in post-test mean and SD (23.80±2.61) was higher than pre-test mean and SD (15.38±4.23), the obtained 't' value was 17.76 which is greater than the table value (7.46) at (P<0.05). The findings indicate that, there was a significant difference between the pre-test and post test scores of knowledge on care of children on mechanical ventilator.

Table 3: Mean, Standard Deviation and Paired 't' Value on Practices of Care of Children on Mechanical Ventilator Among Pediatric Nurses. N=50

Practices	Mean	Standard deviation	Paired 't' value
Pre test	40.88	7.33	Cal. Value 16.56
Post test	55.30	2.74	Tab Value 13.51 d.f = (P<0.05)

Table-3 describes that, obtained paired 't' value of practices items on care of children on mechanical ventilator among pediatric nurses; in post-test mean and SD (55.30 ± 2.74) was higher than the pre-test mean and SD (40.88 ± 7.33). The obtained t' value was 16.56, which greater than the table value (13.51) at (P<0.05). The findings indicate that, there was significant difference between pre- test and post-test score of practices on care of children on mechanical ventilator among pediatric nurses. Hence the researcher had rejected the null hypothesis H_{01} .

The computed chi-square values for post-test knowledge scores and age of the pediatric nurses ($\chi^2=11.06$) and their experience ($\chi^2=12.88$) were found to be statistically significant at p<0.05 level, which indicates that, there was a significant association between knowledge scores regarding care of the children on mechanical ventilator among pediatric nurses and their age and experience. Hence the investigator rejected the null hypothesis H_{02} .

The computed chi-square values in post-test practices scores and age of the pediatric nurses ($\chi^2=10.76$), and their experience ($\chi^2=13.12$) were found to be statistically significant at p<0.05 level, which indicates that, there was a significant association between practices scores regarding care of the children on mechanical ventilator among pediatric nurses and their age and experience. Hence the investigator rejected the H_{03} .

6. Discussion

The study showed that 26 (52%) of participants were in the age group of 26-30 years, all nurses were female, 36(72%) were Christians, 32 (64%) of the participants were married, 18(36%) participants had an income between Rs 8,001-Rs 10,000 per month, 24 (48%) had the qualification of GNM

and B.Sc nursing, 22 (44%) had between 1-3 years of experience, 20(40%) participants were working in pediatric intensive care unit, they had no exposure to training programme on mechanical ventilator.

In pre-test, out of 50 pediatric nurses 26(52%) had inadequate knowledge and 21(42%) had inadequate practices, in post-test the pediatric nurses had 27(54%) had adequate knowledge, 34(68%) had adequate practices they improved the knowledge and practices regarding care of children on mechanical ventilator. The study was supported by a study to assess the effectiveness of structured teaching programme regarding care of infants on mechanical ventilator among 72 undergraduate student nurses in Krishna institute of nursing sciences, karad. The major findings of the study revealed that in pretest majority of student nurses (42 i.e. 58.3%) had average knowledge, (15 i.e. 20.8%) had poor knowledge and (3 i.e. 4.2%) had good knowledge where as in post-test (37 i.e. 51.4%) had average knowledge and (3 i.e. 4.2%) had poor knowledge. The study indicated that there was significant improvement in knowledge score regarding care of infants on mechanical ventilator. The study concluded that the structured teaching programme regarding care of infants on mechanical ventilators was an effective method for providing adequate knowledge and help the student nurses to enhance their knowledge for improving nursing care.⁶

Another supportive study was to assess the effectiveness of structured teaching programme on knowledge and practices regarding oral care of patient with mechanical ventilator among 30 nurses in the Deeraj Hospital, Vadodara. In the study showed that the majority of the nurses of age group between 23-27 years, 15(50%) had 1-2 years of experience, after administration of structured teaching programme in the post- test, the majority of nurses had moderate knowledge and practices regarding oral care on mechanical ventilated patients.⁷

The obtained paired 't' value was 17.76 which was greater than the table value (7.46) at ($P < 0.05$). The findings indicate that, there was a significant difference between the pre-test and post test scores of knowledge on care of children on mechanical ventilator. The obtained t' value was 16.56, which greater than the table value (13.51) at ($P < 0.05$). The findings indicate that, there was significant difference between pre- test and post-test score of practices on care of children on mechanical ventilator among pediatric nurses. Hence the researcher had rejected the null hypothesis H_{01} . It indicated that effectiveness of structured teaching programme on care of children on mechanical ventilator among pediatric nurses. This was supported by a study on Impact of structured teaching programme for prevention of ventilator associated Pneumonia on knowledge and practices of Intensive care nurses at Central Quwesna Hospital, Egypt. In the study they included 30 staff nurses, results revealed that, there was an association found between practice level and age, years of experience of nurses at $p < 0.05$ level.⁸

The computed chi-square values for post-test knowledge and practices scores and age of the pediatric nurses ($\chi^2=11.06$), ($\chi^2=10.76$) and their experience ($\chi^2=12.88$), ($\chi^2=13.12$) were found to be statistically significant at

$p < 0.05$ level. Which indicate that, there was a significant association between knowledge and practices scores with age and experiences among pediatric nurses regarding care of the children on mechanical ventilator. Hence the investigator rejected the null hypothesis H_{02} . This study was supported by another study on Impact of structured teaching programme for prevention of ventilator associate Pneumonia on knowledge and practices of Intensive care nurses at Central Quwesna Hospital, Egypt. In the study they included 30 staff nurses. This study revealed that, there was an association found between knowledge level and age, years of experience of nurses at $p < 0.05$ level.⁸

7. Conclusion

The study concluded that in pre-test the pediatric nurses had inadequate knowledge and practices regarding care of children on mechanical ventilator, they lack knowledge on certain knowledge items such as modes, alarms, monitoring, weaning, ET suctioning and feeding. Many nurses lack practices on assessment, suctioning etc after implementation of structured teaching programme, it showed significant improvement in the knowledge and practices regarding care of children on mechanical ventilator. Nurses require constant training and update on mechanical ventilator. Continuous education programmes, skill training and providing manual to nurses helps to provide quality of care to critically ill child.

8. Recommendations for Further Studies

- 1) A descriptive study can be conducted to assess the knowledge and practices of nurses regarding prevention of complication in mechanical ventilated children of different hospitals.
- 2) A quasi experimental study on impact of using nursing guidelines protocol on minimizing complications of ventilator among nurses.

9. Acknowledgement

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