

## Knowledge and Skill Regarding Care of a Patient on Mechanical Ventilator among the Staff Nurses Working in Selected Hospital

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### Abstract

**Background:** The patient in the intensive care unit often requires mechanical assistance to maintain airway patency. Current generations' ventilators incorporate computerized systems to deliver and monitor ventilator parameters. So nurses need to gain in-depth knowledge and advance skills to provide the quality nursing care of a patient on mechanical ventilator. The aim of this research was to study effect of learning package on nurse's knowledge and skills regarding care of a patient on mechanical ventilator among staff nurses. **Material and Methods:** One group pretest-posttest pre-experimental research design was used to assess the effectiveness of learning package on knowledge and skill regarding care of patient on mechanical ventilator among 60 staff nurses who were selected by non-probability convenience sampling technique. Structured knowledge questionnaire and structured observation checklist were used to assess the knowledge and skill of staff nurses respectively. Both descriptive and inferential statistics were used to analysis of data. **Findings:** Majority 34 (56.66%) of staff nurses were male and 55% and 90% were between the age group 21-25years and having diploma in nursing respectively. The mean pre-test knowledge score and skill score was  $21.6 \pm 3.9$  and  $25.0 \pm 3.3$  respectively whereas; posttest knowledge and skill score were  $30.4 \pm 3.5$  and  $31.6 \pm 3$  respectively. The level of knowledge and skill regarding care of patient on mechanical ventilator was significantly higher after receiving the learning package and knowledge and skill was significantly correlated. **Conclusion:** The study concluded that learning package lead to significant improvement in nurse's knowledge and skills about care of patient on mechanical ventilator as computed 't' test was significant at 0.05 level of significance.

**Keywords:** Learning Package; Knowledge; Skill, and Staff Nurses.

### Introduction

Intensive care units provide life saving care for the patients who are critically ill but are associated with significant complications e.g. complications associated with mechanical ventilator [1].

Mechanical ventilation is an essential, life-saving therapy for patients with critical illness in intensive

care unit [2]. Patients who are dependent on mechanical ventilation experience discomfort and anxiety, and have an increased risk of complications associated with this therapy. Therefore, optimal patient outcomes are achieved through skilled delivery of care by a multidisciplinary team [3].

In India a study suggest that during 19 days period of hospital the 1150 patients who were admitted in ICU during study duration, 34.5% (n= 397) needed mechanical ventilation and 3.91% (n=45) required prolonged mechanical ventilation [4].

In Rajasthan an observational, 4-day point prevalence study was performed between 2010 and 2011 in 4209 patients from 124 ICUs. Data were analyzed for 4038 adult patients from 120 ICUs.

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Nearly, 37% received mechanical ventilation (MV) and vasopressors or inotropes, respectively [5].

The nurse plays an important role in care of patients on mechanical ventilator like the client's response to ventilator, intervenes to maintain oxygenation and ventilation and ensures that the client's complex needs are met ect. So, in order to provide a quality care in cost effective manner to the patient on mechanical ventilator and to reduce the cases of common complications, it is needed that the nurse must have scientific in-depth knowledge and perform evidence based skill to the mechanically ventilated patients [5].

As mechanical ventilation is essential to maintain ventilation and oxygenation but patients on mechanical ventilation are prone to develop complications such as alveolar hypoventilation, alveolar hyperventilation, fluid and electrolyte imbalance, pneumothorax and Ventilator Associated Pneumonia (VAP) etc. Studies have shown that ventilator associated complications prolong the length of stay in intensive care unit and increase the risk of death in critically ill patients [6].

In the ICU, there is a high complexity of care, which together with rapid changes in the health care system and technology means that CE is essential for nurses to keep their knowledge and skills up to date, and to ensure they do not work beyond the limits of their competency [7].

The staff development strategies through implementing patient safety educational program can minimize the medical errors and improve patient outcome in hospital [8].

## Methodology

A pre-experimental research was conducted to determine the effectiveness of learning package on care of patient on mechanical ventilator among 60 staff nurses working in teaching hospital who were selected with convenient sampling technique. To collect data, the structured knowledge questionnaire and structured observation checklist were developed. Structured knowledge questionnaire consisted of two parts. Part-I included information on age, gender, education, and professional experience, etc; and, in Part-II, there were 38 questions under three main categories and structured observation checklist consisted 43 items.

A learning package was developed regarding care of patient on mechanical ventilator for staff nurses.

Content validity was obtained by giving it to seven experts from the field of medical and nursing. Reliability of the structured knowledge questionnaire was established by test-retest method and by using coefficient correlation, which was found 0.96 and for structured observation checklist it was 0.92. Hence, the tools were found reliable.

Data were collected after obtaining formal permission from administrative officer and nursing superintendent. A written consent was obtained from the study participants after explanation about the purpose and usefulness of the study and assurance about the confidentiality of their responses. Data collection was done during one month. The data were analyzed by descriptive and inferential statistics using Microsoft excel sheet and EP-Info.

Little more than half 55% and 56.66% of study participants were 21-25 years of age and male respectively. Majority of them 90% had qualification of Diploma nursing and 73.3% were working from 2 months to 1 year and 70% had not expose to any training programme on mechanical ventilator (Table 1).

The data presented in Table 2 shows that the mean pre-test knowledge score is 21.6 with S.D  $\pm 3.9$  and median of 21. The mean post-test knowledge score is 30.4 with standard deviation  $\pm 3.5$  and median of 30. The statistical significance of the difference was computed and the 't' (59) = 18.14, is found highly significant at 0.05 level.

The data in Table 3 shows that mean post-test knowledge scores in all the areas were greater than the area-wise pre-test knowledge scores. The calculated 't' value in all areas was greater than the table value ( $t_{(59)} = 2.00, p < 0.05$ ).

The data presented in Table 4 shows that the mean pre-test practice score is 25.0 with S.D  $\pm 3.3$  and median of 25. The mean post-test practice score is 31.6 with standard deviation  $\pm 3.1$  and median of 32. The statistical significance of the difference was computed and the 't' (59) = 10.13, is found highly significant at 0.05 level.

Data in Table 5 shows that area-wise mean post-test skill scores in all the areas were greater than the area-wise mean pre-test skill scores. Calculated 't' value in all areas was greater than the table value.

The data showed in Table 6 reveals that there was significant positive correlation ( $r = 0.66$ ) between the knowledge and skill of staff nurses at 0.05 level of significance.

Association of levels of knowledge and skill with the selected variables of nursing personnel

**Table 1:** Frequency and percentage distribution according to age, gender, professional qualification, years of experience and attended any CNE of the staff nurses

Sr. No.	Variable	Frequency (f)	Percentage (%)
1	<i>Age (in years)</i>		
	21-25	33	55
	25-29	18	30
	>29	09	15
2	<i>Gender</i>		
	Female	26	43.33
	Male	34	56.66
3	<i>Professional qualification</i>		
	Diploma nursing	54	90.00
	Graduate nursing	06	10.00
4	<i>Total working experience in intensive care unit</i>		
	2 months - 1 year	44	73.3
	1 year - 2 year	06	10.00
	2 year - 3 year	08	13.3
	More than 3 year	02	3.4
5	<i>Have you had exposure to any training programme in caring for clients on mechanical ventilator?</i>		
	Yes	18	30.00
	No	42	70.00

**Table 2:** Range, Mean, Median, Standard Deviation, Mean Difference and 't' Value of Pre and Post-test Knowledge Score of Staff Nurses  
N = 60

Test	Range	Mean	Median	Standard deviation	Mean difference	't' value
Pre - test	15-30	21.6	21	3.9		
Post - test	22 - 36	30.4	30	3.5	8.8	18.14

**Table 3:** Significance of Difference between Area-Wise Mean Pre-Test and Post-Test Knowledge Score of Staff Nurses  
N = 60

S.No.	Area	Mean		Mean difference	't' value
		Pre - test	Post - test		
1	Review of anatomy & physiology of respiratory system	1.37	2.60	1.23	6.11*
2	Concept related to mechanical ventilator	4.37	5.90	1.53	5.50*
3	Working principle of ventilator	1.47	2.60	1.13	6.62*
4	Recording of ventilator parameters & vital signs	0.97	1.63	0.67	6.02*
5	Endotracheal tube suctioning	4.13	4.87	0.73	3.06*
6	Arterial blood gas analysis	1.83	3.43	1.60	8.73*
7	Nutritional needs, psychosocial needs & communication needs	2.70	3.30	0.60	2.98*
8	Prevention of complications	4.03	5.70	1.67	7.35*
9	Weaning from mechanical ventilation	0.47	0.83	0.37	3.26*

\* Significant

**Table 4:** Range, Mean, Median, Standard Deviation, Mean Difference and 't' Value of Pre and Post-test Knowledge Score of Staff Nurses  
N = 60

Test	Range	Mean	Median	Standard deviation	Mean difference	't' value
Pre - test	20 - 30	25.0	25	3.3		
Post - test	24 - 37	31.6	32	3.1	6.6	10.13*

\* Significant

**Table 5:** Significance of Difference between Area-Wise Mean Pre-Test and Post-Test Skill Score of Staff Nurses  
N = 60

Area	Pre – test	Post – test	Mean difference	't' value
Preparatory phase	3.40	4.43	1.03	4.26*
Performance phase	20.33	25.50	5.17	8.94*
Evaluator phase	1.30	1.70	0.40	2.04*

\* Significant

**Table 6:** Correlation between Post-Test Knowledge Score and Skill Score of Staff Nurses  
N = 60

Variable	Co - efficient of correlation
Post – test knowledge level Post – test skill level	0.66*

\* Significant

The result depicts the chi-square values for association of knowledge and skill of nursing personnel with selected variables i.e. age, years of experience in ICU, gender, professional education and any in-service education attended were not found statistically significant at 0.05 level.

### Discussion

The major findings of the study have been discussed with findings of other related studies for the possible explanation. Maximum number of staff nurses (90%) had been qualified up to GNM level and having had 2 months -1 year years of working experience. Similar findings were observed regarding the qualification and working experience in a study [9] in which it was seen that 93% and 73% of nursing staff included in the study were GNM qualification and had less than one year of experience respectively.

The present study adopted a pre experimental research approach on sixty staff nurses working in intensive care units. The findings of the present study showed that the mean post-intervention knowledge scores and practice scores in all areas of knowledge and skill was significantly higher than the mean pre-intervention knowledge scores and skill score as evident from 't' test ( $< 0.05$ ). These findings were partially consistent with the findings of an evaluatory study conducted by Sharma S [10] to assess the effectiveness of planned teaching programme (PTP) on knowledge and practice of endotracheal suctioning among staff nurses. The findings were also consistent with the findings of the study conducted by Mudgal SK and Gaur R [11] to determine the knowledge of nurses before and after training regarding tracheostomy care which had shown a significant increase in the post-implementation knowledge score.

With regards to the relationship between knowledge and skill of staff nurses regarding care of patient on mechanical ventilator consistent with the findings of study conducted by Shirazi HZ et al. [12] to evaluate the training Nursing and educational needs in nurses working with ICUs which showed mild relationship between knowledge and performance of endotracheal suctioning.

Study results showed that there was no significant association between staff nurses' knowledge and skill with their selected personal variables such as age, gender, professional qualification and exposure to training programmes in caring for clients on mechanical ventilator. These findings are supported by another study which showed that there was no significant association between staff nurses' post-test knowledge and skill score with their selected variables like professional qualification, clinical experience and training programme [13].

### Conclusion

The analysis of findings concluded that learning package is an effective method to increase the knowledge & skills of staff nurses about care of patient on mechanical ventilator as the computed 't' test was significant at 0.05 level of significance. Knowledge and skill of staff nurses regarding care of patient on mechanical ventilator were positive correlated.

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