

# Effect of Structured Teaching Programme on Knowledge Regarding Prevention of Ventilator Associated Pneumonia among Critical Care Nurses

Chithra R. A<sup>1</sup>, Janula Raju<sup>2</sup>

<sup>1</sup>Research Scholar, JJT University, Jhunjhunu, Rajasthan, India

<sup>2</sup>Department of Nursing, College of Applied Medical Science, Mohayil, King Khalid University, KSA

Corresponding Author: Chithra R.A

## ABSTRACT

**Background of the study:** Ventilator-associated pneumonia (VAP) is one of the most common encountered hospital-acquired infections seen in the critical care setting. Pneumonia is the second most common nosocomial infection in critically ill patients, affecting 27% of all critically ill patients. It prolongs the length of stay in intensive care unit and increase the risk of death in critically ill patients. Therefore, prevention of VAP is desirable to improve patient outcomes and to improve healthcare efficiency.

**Objective:** To determine the existing knowledge and to evaluate the effectiveness of structured teaching programme on knowledge regarding prevention of ventilator associated pneumonia among critical care nurses.

**Materials and methods:** one group pretest and posttest design was adopted in the present study to accomplish the objectives. Convenient sampling technique was used to select samples. The sample consists of 300 critical care nurses. The pretest assessment of knowledge of the patients was carried out using the self-administered questionnaire followed by STP session regarding respiratory therapy. The tool consists of two sections. Section A consists of demographic data, Section B comprised of forty items to assess the knowledge. The data obtained was analyzed and interpreted in terms of the objectives.

**Results:** The findings of the study revealed that there was a marked increase in the overall knowledge score of post-test than pre-test score which represents the effectiveness of structured teaching programme. The calculated t test value was found to be 5.934 which are highly significant at 0.01. Thus the structured teaching programme was effective in improving the knowledge of critical care nurses regarding prevention of ventilator associated pneumonia.

**Conclusion:** On the basis of findings the investigator concluded that the STP has improved the knowledge of critical care nurses regarding prevention of ventilator associated pneumonia.

**Keywords:** Effectiveness, structured teaching programme, Knowledge, prevention ventilator associated pneumonia, critical care nurses.

## INTRODUCTION

Mechanical ventilation is a life-saving intervention, for patients with respiratory failure and critical illness. Patients on mechanical ventilation are prone to develop complications such as nosocomial infection and Ventilator Associated Pneumonia (VAP) Pneumonia is defined as inflammation of the lung

parenchyma caused by infection. VAP is defined as pneumonia occurring >48 - 72 hours after endotracheal intubation. VAP may develop 48 hours after a patient has been admitted to a hospital. VAP is further defined as early-onset VAP (occurring <5 days after intubation) and late-onset VAP (occurring ≥5 days after intubation).<sup>[1]</sup> VAP usually develops when microorganisms

reach the lung and overcome the pulmonary host defense. Pulmonary infection results if the bacterial inoculum is sufficiently large, if the microorganism is particularly virulent, or if the host defenses break down. [2] VAP that occurs within 48 to 72 hours after tracheal intubations is usually termed early onset pneumonia it often results from aspiration which complicates the intubations process. [3]

VAP can be accurately diagnosed by any one of several standard criteria. Histopathology examination of lung tissue obtained by open lung biopsy, rapid cavitation of pulmonary infiltrate in the absence of cancer or Tuberculosis, positive pleural fluid culture, same species with same antibiogram isolated from blood and respiratory secretion without another identifiable source of bacteremia and histopathology examination of lung tissue at autopsy. [4] Aspiration of gastric secretion may also contribute though to a lesser degree. Tracheal intubations interrupt the body's anatomic and physiologic defenses against aspiration, making mechanical ventilation, a major risk factor for VAP. [5]

Infection control department also plays a key role in the education of the staff on infection control procedures, surveillance of the infections and helping to monitor compliance with the interventions. [6] Nurses' knowledge regarding ventilator associated pneumonia is having high impact on reduction of VAP among intubated patients. [7] Nurses need to have an awareness of the problem as well as evidence-based preventive strategies so as to adhere to such practices and integrate them into their nursing care. [8] Nurses' knowledge would facilitate optimal delivery of patient care. [9]

Intensive care nurses are in the best position to put the evidence based guidelines into practice as they are at the patient's bedside 24 hours a day and therefore they play an important role in the prevention of VAP. Nevertheless nurses need to have an awareness of the problem as well as knowledge on ventilator care bundle

so as to adhere to such practices. Skilled and knowledgeable nurses are extremely important and needed to make appropriate decisions in-patient care and minimize risks to patients. Knowledge on evidence-based practices should bring confidence to intensive care nurses to make appropriate decisions and prevent poor outcomes in the recovery of mechanically ventilated patients. [10]

However, several recent surveys reported that there is a substantial lack of knowledge among intensive care nurses concerning evidence-based strategies for preventing VAP Education plays a key role in the management of patients with VAP. [11] Use of Structured Teaching Programme on prevention of VAP can reduce the rate of morbidity significantly. Nurses are resourceful persons in the ICU, who take care of the patients round the clock. If nurses are familiar with knowledge of prevention of VAP, they can apply evidence based practice and thus reduce the morbidity and mortality rate associated with VAP. [12]

The aim of this study was to determine the existing knowledge and to evaluate the effect of structured teaching programme on knowledge regarding prevention of ventilator associated pneumonia among critical care nurses.

## **MATERIALS AND METHODS**

One group pretest and posttest design was adopted in the present study to accomplish the objectives. This design was adopted to find the effectiveness of structure teaching programme after implementing the structured teaching programme on VAP. Non-probability convenience sampling technique was used to select the samples. The investigator selected the samples from different hospitals. The sample size for the study was three hundred critical care nurses, who were available at the time of data collection. The study was conducted in selected hospitals at Aseer Region, Saudi Arabia. The population of this study includes all the critical care nurses who are actively willing to participate in this study.

The tool for data collection was self-structured questionnaire which is used to assess the knowledge of critical care nurses regarding prevention of ventilator associated pneumonia, based on extensive review of literature and expert's opinion. The investigator has given one mark for every correct response and zero mark for wrong answer. The maximum score was forty and minimum score was zero.

The obtained data were analyzed on the basis of objectives of the study using descriptive and inferential statistics. Frequency and percentage distribution was used to describe about demographic variables. Inferential statistics were used to determine the difference between pre-test and posttest knowledge.

Knowledge on critical care nurses regarding prevention of ventilator associated pneumonia was interpreted by summarizing into three categories such as inadequate, moderate and adequate knowledge. Paired t' test was used to determine the effectiveness of structured teaching programme on knowledge regarding ventilator associated pneumonia among critical care nurses. Chi-square test was used to determine the relationship between posttest knowledge and demographic data.

### Ethical consideration

Prior permission was obtained from the higher authorities. Informed consent was obtained from the study samples. The subjects were informed that the confidentiality of the data will be maintained. The subjects were also informed that their participation was purely on voluntary basis and they can withdraw from the study at any time.

### RESULT

**“Success isn't about the end result; it's about what you learn along the way”**

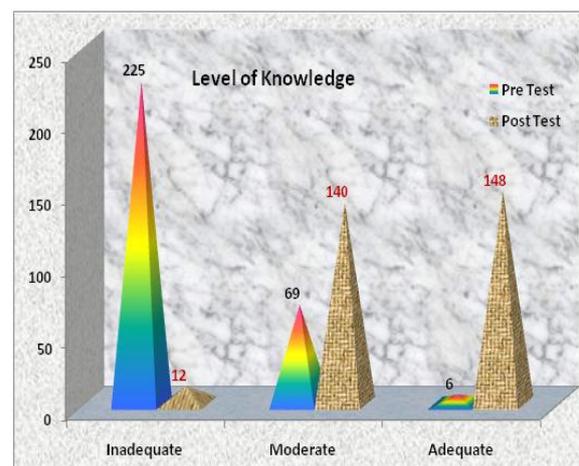
The data obtained before and after structured teaching programme was organized, tabulated, analyzed and interpreted by using descriptive and inferential statistics.

### Socio Demographic Variables

With regard to age, maximum number of subjects 152(50.7%) were in the age group of 26-35 years. Considering their educational status, 171(57%) were educated on General Nursing Midwifery, whereas 79(26.3%) were Graduate in nursing and 8(13.3%) were educated up to post-graduate level in nursing.

**Table 1: Shows the Frequency and percentage distribution of Demographic variables**

Sl no	Demographic variables	Frequency	Percentage
1	Age		
	26-35 years	152	50.7
	36-45 years	96	32
	46 years and above	52	17.3
2	Education		
	General nursing midwifery	171	57
	Graduate in Nursing	79	26.3
	Post graduate in nursing	50	16.7
3	Work experience in years		
	less than 5 years	86	28.7
	5-10 years	117	39
	10-15 years	65	21.6
	15 years and above	32	10.7
4	Area of working experience		
	Medical ward	119	39.7
	Surgical ward	93	31
	Other wards	88	29.3
5	Working organization		
	Teaching hospital	73	24.3
	Non-teaching hospital	227	75.7
6	Sources of information		
	Workshops and conferences	86	28.7
	Colleagues	107	35.7
	Journals and books	69	23
	Mass media	38	12.6



**Figure: 1** showing the comparison of overall knowledge score of Critical care nurses regarding Ventilator associated pneumonia during pre and posttest.

### Assessment of level of knowledge among Critical Care Nurses:

The level of knowledge regarding prevention of ventilator associated

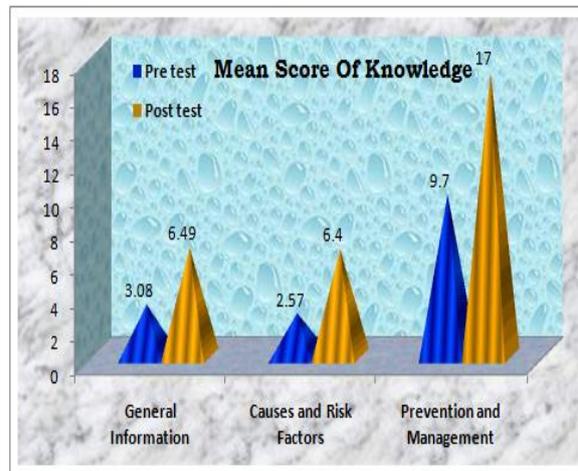
pneumonia among critical care nurses was divided into 3 categories such as < 50% - Inadequate, 51-75% - Moderate and > 75 % - Adequate. Figure1 revealed the frequency of knowledge score of Critical care nurses regarding Ventilator associated pneumonia during pre and posttest. It describes 225

nurses had inadequate Knowledge during pretest, but only 12 had inadequate knowledge during posttest. 6 nurses had adequate knowledge during pretest but after the STP 148 staff nurses had adequate knowledge.

**Table 2: Frequency and percentage distribution of Critical care nurses according to knowledge score in pretest and post test**

Knowledge score range	Pretest (n=300)		Posttest(n=300)	
	Frequency	Percentage	Frequency	Percentage
Inadequate knowledge(0-20)	225	75%	12	4%
Moderate knowledge(21-30)	69	23%	140	46%
Adequate knowledge(31-40)	6	2%	148	50%

The Table 2 depicts that in the pretest, out of 300 subjects majority of them 225(75%) had Inadequate knowledge, 69(23%) of them had moderate knowledge and 6 (2%) of them had adequate knowledge. In posttest out of 300 subjects, 148(50%) of them had adequate knowledge level, 140(46%) of them had moderate knowledge and 12(4%) of them had inadequate knowledge.



**Figure 2: Comparison of mean score knowledge of Critical Care Nurses during Pre and Post test**

**Table 3: Effect of structured teaching programme on VAP**

Knowledge	Pretest (n=300)		Posttest (n=300)		t value	P value
	Mean	SD	Mean	SD		
General Information	3.08	1.406	6.49	1.209	36.24*	<0.0001
Causes and Risk factors	2.57	1.274	6.4	1.390	39.05*	<0.0001
Prevention and Management	9.7	3.79	17	2.925	28.51*	<0.0001

\*P value is less than 0.0001; this difference is considered to be extremely statistically significant.

Table 3 shows Effect of structured teaching programme regarding Prevention of Ventilator Associated Pneumonia before and after STP. It shows the P value For General Information, Causes Risk factors and Management are less than 0.0001 this difference is considered to be extremely statistically significant. So it indicates the structured teaching programme which was conducted by the researcher was highly effective.

It clearly stated that there is significant increase in knowledge level of Critical Care Nurses on Prevention of

Ventilator Associated Pneumonia after the structured teaching programme.

Table 4 represents the association between selected demographic variables and the posttest knowledge level of Critical care nurses on prevention of ventilator-associated pneumonia. It showed that there was no significant association between the level of knowledge and variables such as age and working organization. But the statistically significant association was found between the level of knowledge with education, work experience in years, area of working experience and source of information at p<0.05 level of significance.

**Table 4: Association of post-test knowledge of critical care nurses with selected demographic variable:**

S.N	Knowledge variables	Post test		X <sup>2</sup> Value	P value
		≤Median	>Median		
1	Age			5.12	0.0771
	26-35 year	40	112		
	36-45 year	26	70		
	46 and above	22	30		
2	Educational status			6.80	0.0333*
	GNM	102	69		
	Under Graduate in nursing	39	40		
	Post graduate in nursing	20	30		
3	Work Experience			9.8246	0.02118*
	<5 years	40	46		
	5- 10 years	70	47		
	10-15 years	30	35		
	> 15 years	10	22		
4	Area of working experience			6.0038	0.0496*
	Medical	39	80		
	Surgical	33	60		
	Other	43	45		
5	Working Organization			2.411	0.1204
	Teaching hospital	43	30		
	Non-teaching Hospital	110	117		
6	Source of Information			14.176	0.0026*
	Workshop and conference	42	44		
	Colleagues	65	42		
	Journals and book	31	38		
	Mass media	10	28		

\*p<0.05 level, extremely statistically significant

## DISCUSSION

The present study intended to assess the effectiveness of structured teaching programme on knowledge regarding prevention of ventilator associated pneumonia among critical care nurses in selected hospitals, Saudi Arabia. The findings of the present study are discussed with reference to the objectives, hypothesis stated and with the findings of other similar studies.

Ventilator Associated Pneumonia represents a major health problem because of the excess mortality and morbidity rate in hospital and also this infection will aggravate the underlying disease process and worsening the condition of the patient. VAP is medical condition that results from infection which floods the alveoli - small, air-filled sacs in the lung responsible absorbing oxygen from atmosphere. [13] Pneumonia has accounted for approximately 15% of all hospital-associated infections and 24% - 27% of all infections acquired in the medical intensive care unit, and coronary care unit, respectively. It has been the second most common hospital associated infection after that of urinary tract. [14]

A survey was conducted to determine ICU nurses knowledge of EBP for the prevention of VAP. Questionnaires were distributed to nurses. Results of the study revealed that only 20% of nurses knew that ventilator circuits should be changed once in a week and only 60% nurses knew that subglottic drainage of secretions would reduce VAP. At the end of the study they concluded that, nurses have lack knowledge regarding recommendations for VAP prevention and continuing education would help to improve EBP. [15] The findings of the current study also revealed that the majority of the respondents were not having sufficient knowledge on prevention of VAP in pretest and they improved the knowledge on prevention of VAP after administering a structured teaching programme.

A descriptive study was conducted in Italy to evaluate nurse's knowledge regarding prevention of VAP. The sample included 106 nurses. Results of the study revealed that 22.6% nurses had satisfactory knowledge, 54.8% had poor knowledge, 80.9% said that they applied one or more strategy and 17.9% had applied none. They concluded that, VAP preventive strategies

are widely applied by nurses but not in a responsible manner. [16] So the present study is insisting the nurses to improve their knowledge regarding VAP to reduce the hospital acquired infection, it may leads to reduced morbidity and mortality rates.

In this study distribution of Critical Care Nurses according to the level of knowledge as described in table 5 showed that in the post test out of 300 subjects, 148(50%) of them had adequate knowledge level, 140(46%) of them had moderate knowledge and 12(4%) of them had inadequate knowledge. A study conducted at a private tertiary care teaching hospital in Karachi, Pakistan also stated that the Knowledge scores of participants increased significantly after the educational intervention in the first post-test; however, there was a decline in the score in post-test. [17] A pre intervention and post intervention observational study was conducted at Washington to determine whether educational initiative could decrease rates of VAP. They concluded that, educational interventions can be associated with decreased rate of VAP. [18]

Patients are 5-10 times more likely to acquire nosocomial infections than patients in the wards and approximately 86% of hospital associated pneumonia is linked with mechanical ventilation. [19] So the staff nurses working in Critical care units must know about the prevention of VAP. The study findings of Sailaja Busi (2016) also revealed that majority of their respondents were not having sufficient knowledge and practices on prevention of VAP. Knowledge and practices on VAP had significantly improved after administering the structured teaching programme. The STP was found effective in increasing the knowledge and practices on VAP among critical care nurses. [20] The present study was supported by a series of other studies, which confirmed that there is a lack of knowledge of the nurses regarding prevention of ventilator associated pneumonia. Nurses' preventive measures

will have a greater impact of VAP among patients admitted in ICU.

#### **Limitation**

- The setting of the study was limited Aseer Region only.
- The study did not use any control group.
- The study did not assess the attitude and practice of staff nurses regarding Prevention of VAP. Only a single domain that is knowledge is considered in the present study.
- The study was limited to the staff nurses working in critical care unit only. It can be done in other departments also.
- It was difficult to gather all the nurses together for STP.

#### **Recommendation**

- An experimental study can be undertaken with a control group for effective comparison of the result.
- A comparative study can be conducted between Nurses working in general and private hospital settings.
- A study can be carried out to evaluate the efficiency of various teaching Strategies like pamphlets, leaflets and computer-assisted instruction on VAP.
- A similar study can be conducted and evaluated using alternative teaching strategies like interactive learning sessions, self-instructional module, etc.
- Similar study can be conducted in different setting and different target population such as nursing students.
- A retrospective study can be conducted to find out the effectiveness of teaching and impact on the number of days for clients hospital stay can be conducted.
- The study can be conducted on attitude and practices of staff nurses regarding prevention of ventilator associated pneumonia.

#### **CONCLUSION**

The findings of the study concluded that there was a marked increase in the overall knowledge score of post-test than pre-test score, which represents the effect of structured teaching programme. Thus the

structured teaching programme was effective in improving critical care nurses knowledge regarding prevention of ventilator associated pneumonia. On the basis of findings, the researcher concluded that the structured teaching programme was very effective.

**Conflict of Interest:** There is no conflict of interest.

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