

## Original Research Article

# A study to assess the effectiveness of clinical teaching on the level of knowledge regarding nursing care bundle to prevent ventilator associated pneumonia among ICU nursing officers at AIIMS Bhopal

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## ABSTRACT

**Background:** Healthcare is a professional area bound to the ethical foundation of “do no harm.”, But in the current scenario, a rush to promote the curative scenario has led to the total downplay of the preventive aspect of care. The aim of this study was to assess the knowledge regarding nursing care bundle for the prevention of VAP among nursing officers before and after clinical teaching and to evaluate the effectiveness of clinical teaching.

**Methods:** This pretest-post-test study was conducted on nursing officers working in the ICU of the All-India Institute of Medical Sciences, Bhopal, Madhya Pradesh. 100 nursing officers were enrolled in the study via convenience sampling technique. The self-structured tool was validated by 10 experts with a mean CVI value of 0.94. The reliability of the self-structured knowledge questionnaire was determined by the test-retest method and found to be 0.87. The collected data was analysed for frequency, mean, standard deviation, t-test, and association.

**Results:** Findings showed that the mean knowledge score was  $18.46 \pm 3.543$  before intervention. After the intervention of video-assisted clinical teaching, a post-test was conducted, and the mean post-test knowledge scores was  $25.07 \pm 2.801$  at the p value  $< 0.01$ . Knowledge of subjects about nursing care bundle for prevention of VAP was found to have a significant association with only educational qualification.

**Conclusions:** This study's findings concluded that educational interventions are necessary for the enhancement of knowledge and better compliance of nursing officers with guidelines regarding the bundle of care for the prevention of ventilator-associated pneumonia.

**Keywords:** Clinical teaching, Knowledge, Nursing care bundles, Nursing officers, Ventilator associated pneumonia

## INTRODUCTION

“Knowledge without practice is futile, whereas practice without knowledge is dangerous.” Ventilator-associated pneumonia is the most common nosocomial infection in intensive care units that develops in a person who is on a positive-pressure mechanical ventilator.<sup>1</sup>

Whenever the ET tube is inserted, most of the body's defences against pneumonia are diminished. The mucociliary defence mechanism of the patient is also compromised. Thus, ventilated patients are more at risk as their normal host defence mechanisms are impaired. Ventilator-associated pneumonia develops due to the invasion of microorganisms found in hospitals in the ventilated patient.<sup>2</sup>

Ventilator-associated pneumonia (VAP) is a common nosocomial infection that affects 10% to 70% of patients in intensive care units (ICUs).<sup>2</sup> VAP occurs in 22.8% of mechanically ventilated patients. The lack of knowledge among nurses about infection prevention and proper nursing care may be a barrier to preventing VAP.<sup>3</sup>

It has been proven by many studies that VAP increases hospital stays and financial costs for patients.<sup>4</sup> Furthermore, VAP is linked to longer ICU stays and delayed extubation, both of which increase morbidity and mortality.<sup>5,6</sup>

A descriptive study titled "Nurses' knowledge of evidence-based guidelines for preventing ventilator-associated pneumonia in intensive care units" quantified the result in percentages and found that the level of knowledge about preventive measures among nurses was 51.92%; they also recommended more educational programmes in the target field.<sup>7,8</sup>

Preventive measures for ventilator-associated pneumonia are well documented and evidence-based, and those nursing care bundles for prevention of VAP have always been incorporated in the nursing curriculum. Yet they remain poorly implemented in most intensive care units equipped with trained professionals. This has brought about the need for reworking the existing knowledge of VAP bundle practices as well as the inculcation of knowledge into areas of deficit.<sup>9</sup>

### ***Need and justification of the study***

Healthcare is a professional area bound to the ethical foundation of "do no harm." Prevention was always considered better than cure. But in the current scenario, a rush to promoting the curative scenario has led to the total downplay of the preventive aspect of care. These may be due to lack of knowledge or carelessness, but the patient's life is always at stake.

Critical care nurses play an important role in the prevention of ventilator-associated pneumonia by protecting patients from risk factors, notifying patients of early symptoms of VAP, and assisting in diagnosis. Nurses are health-care workers who keep patients safe from infection. As a result, a lack of knowledge about infection prevention and proper nursing care may be a barrier to preventing VAP. The occurrence of ventilator-acquired pneumonia indicates a lack of experienced nurses, as well as inadequate knowledge and understanding of the pathophysiology and prevention of VAP.

The objectives of this study were: (1) to assess the knowledge of nursing officers regarding nursing care bundles for the prevention of ventilator-associated pneumonia. (2) to evaluate the effectiveness of clinical teaching on the knowledge of nursing officers. (3) to find the association of the post-test knowledge score regarding

the nursing care bundle for the prevention of VAP with the selected demographic variables.

## **METHODS**

This quasi experimental, pretest-post test study was conducted on nursing officers of an intensive care unit. 100 nursing officers were enrolled in the study via convenience sampling technique. This study was conducted at All India Institute of Medical Science, Bhopal, Madhya Pradesh with the duration of 6 month from January 2023 to June 2023.

### ***Inclusion criteria***

Nursing officers who were willing to participate in the study. Nursing officers who were working in an intensive care unit and available at the time of data collection were included in the study.

### ***Exclusion criteria***

Nursing officers who were not directly involved in patient care were excluded.

### ***Data collection tools***

The data collection tools were developed to assess the knowledge regarding nursing care bundle for the prevention of ventilator-associated pneumonia. The tools were developed based on: (a) reviewing literature from books, journals, and web searches; and (b) consulting with experts.

### ***Description of tools***

It was a self-structured questionnaire, which was divided into two parts:

Part A: Socio-demographic data;

Part B: Tool to assess the knowledge regarding a bundle of nursing care practices for the prevention of VAP.

In the present study, each correct response marked by the participant was given 1 mark, and 0 marks were given for an incorrect response. The knowledge questionnaire had a maximum score of 30. Knowledge levels were categorised based on knowledge scores such as adequate (26–30), moderate (16–25), and inadequate (0–15).

### ***Content validity***

About 10 subject experts were requested to judge the items for clarity, relevance, appropriateness, and meaningfulness for the purpose of the study. A validity checklist was provided to assess the question as highly relevant, somewhat relevant, moderately relevant, or not relevant. They also provided opinions and suggestions on the content and the extent to which the tool covers the

topic. The suggested corrections and modifications were incorporated after careful review and discussion with guides and experts.

The formal permission was taken from the Institutional Ethical Committee. Written permission was obtained from the concerned authority, and informed consent was obtained from participants.

### **Try-out and pilot study**

Before the main study, a pilot study was conducted on 10 nursing officers. The subjects of the pilot study were not included in the main study. During the pilot study, there were no major issues found.

### **Reliability of the tool**

The reliability of the tool was calculated using the test-retest method, and the reliability was found 0.87, which is within the acceptable range.

### **Data collection procedure**

The study was conducted in four phases: 1) Assessment phase; 2) Planning phase; 3) Intervention/implementation phase; 4) Evaluation phase.

Data collection was done in two phases: during the assessment phase, which served as baseline data, and during the evaluation phase, which served as data to assess the effectiveness of the intervention.

*Phase 1 (Assessment phase):* This phase involved the preparation of a self-structured questionnaire for the purpose of data collection. The validity and reliability of the tool were assessed. After obtaining ethical approval and written consent from participants, the tool was administered as a pre-test to the study participants.

*Phase 2 (Planning phase):* Video-assisted clinical teaching sessions were planned based on an extensive review of the literature and other medical references. The targeted teaching video focused on the different components of a nurse's bundle of care for the prevention of ventilator-associated pneumonia and the need to prevent ventilator exposure. A blueprint was prepared for the video and tested for content-related validity by subject experts as well as critical care and emergency nursing experts. A 15-minute video was prepared along with the lesson plan for teaching.

*Phase 3 (Intervention phase):* The data collection was conducted over a period of 1 month, starting from the first week of April 2023. The researchers visited the study settings in shifts, and the video-assisted clinical teaching was administered in almost 13 sessions. First, written consent was obtained, and then video-assisted clinical teaching was given to participants. Each session consisted of 45 minutes, and the researchers utilised

different teaching methods like group discussion, clinical scenarios, and watching the video intervention. A post-test was administered after 5 days. The implementation of the education session covered the theoretical aspects concerned with the prevention of VAP.

*Phase 4 (Evaluation phase):* 5 days after the implementation of the clinical teaching program, the knowledge level of the nursing officers was assessed again by administering the same study tool used for the pre-test. The post-test was not conducted immediately to prevent recall bias. The pre-test and post-test data of all the study participants were analysed statistically.

### **Data analysis and interpretation**

The data analysis is conducted to reduce, organise, and give meaning to the data. The collected data was coded and entered into the statistical package of the social sciences (SPSS). For the current study data, analysis was done using descriptive and inferential statistics. The level of significance was set at  $p < 0.05$ . The statistical tests used were as follows: (a) Frequency and percentage distribution of personal variables data of nursing officers; (b) Mean and standard deviation for calculating knowledge scores; (c) T test to analyse the pre-test and post-test data to find the effectiveness of the clinical teaching intervention on the level of knowledge of nursing officers; (d) Chi-square was used to determine the association of post-test knowledge level with selected personal variables.

## **RESULTS**

This study shows that the maximum number (82%) of subjects were from the age group of 21-30 years, more than half (58%) of the subjects were males, and 42% were females. Professionally, nearly 85% of the respondents had a BSC Nursing degree, followed by 7% of participants who were MSc graduates, 4% of participants who were GNM + post-basic qualified, and only 4% who were GNM qualified. As far as total years of clinical experience are concerned, around half (54%) of participants had experience of less than or equal to 3 years, and 46% of participants had experience of more than 3 years in a clinical setting. Most of the respondents (85%) were found to have experience of less than or equal to 3 years in critical care units, and 15% of the study participants had experience of more than 3 years in critical care units (Table 1).

Study findings show that most of the nursing officers (84%) had moderate knowledge, 14% had inadequate knowledge, and only 2% of participants had adequate knowledge about the nursing care bundle for the prevention of ventilator-associated pneumonia before the intervention. The overall mean knowledge score is  $18.46 \pm 3.543$ , and the median was 19 before intervention (Table 2).

After the intervention of video-assisted clinical teaching, a post-test was conducted, and the mean post-test knowledge scores were 25.07±2.801. The p value of <0.01 signifies the effectiveness of clinical teaching on the level of knowledge of nursing officers. A t test was

used to assess the effectiveness of clinical teaching on the knowledge level of nursing officers, and the value of the t test was found to be -17.629 with a degree of freedom of 99 (Table 3).

**Table 1: Frequency and percentage distribution of demographic data (n=100).**

Demographic variables		Frequency (N)	Percentage (%)
Age (years)	21-30	82	82
	31 and above	18	18
Gender	Male	58	58
	Female	42	42
Professional qualification (degree)	BSc Nursing	85	85
	MSc Nursing	7	7
	GNM + post basic	4	4
	GNM	4	4
Total year of clinical experience	Less than or equal to 3 years	54	54
	More than 3 years	46	46
Past Experience in intensive care unit (ICU)	Less than or equal to 3 years	85	85
	More than 3 years	15	15

**Table 2: Frequency distribution of knowledge scores with mean, median and SD (n=100).**

Level of knowledge	Score range	N	%	Mean	Median	SD
Adequate knowledge (AK)	26-30	2	2	18.46	19	3.543
Moderate knowledge (MK)	16-25	84	84			
Inadequate knowledge (IK)	0-15	14	14			

**Table 3: Application of T test to assess the effectiveness of intervention on the sample population (n=100).**

Knowledge Gap	Mean score	SD	t-test	df	P Value
Pretest knowledge	18.46	3.543	-17.629	99	<0.01*
Post-test knowledge	25.07	2.801			

\* - Significant

The knowledge levels of the study participants were found to have a significant association with only professional qualification ( $\chi^2 = 16.108$ , p value = 0.013).

All the other personal variables (age, gender, total year of experience, and past experience in the critical care unit) did not have a significant association with the knowledge levels of the subjects (Table 4).

**Table 4: Association of post-test knowledge score with demographic variables (n=100).**

Demographic variables		Post-test score			Total	X2 Table value	P value
		AK	MK	IK			
Age (years)	21-30	38	43	1	82	1.419	0.492
	>31	11	7	0			
	Total	49	50	1			
Gender	M	31	27	0	58	2.267	0.322
	F	18	23	1			
	Total	49	50	1			
Qualification	BSc Nursing	41	44	0	85	16.108	0.013
	MSc Nursing	4	2	1			
	GNM + post basic	3	1	0			
	GNM	1	3	0			
	Total	49	50	1			
Total years of clinical exp.	< OR = 3 yrs	26	28	0	54	1.272	0.529
	> 3 yrs	23	22	1			
	Total	49	50	1			

Continued.

Demographic variables	Post-test score			Total	X2 Table value	P value
	AK	MK	IK			
Past exp. in ICU	< OR =3 yrs	40	44	1	0.965	0.617
	> 3 yrs	9	6	0		
	Total	49	50	1		

## DISCUSSION

Intensive care nurses play an important role in the prevention of ventilator-associated pneumonia by protecting patients from risk factors, notifying patients of early symptoms of VAP, and assisting in diagnosis.<sup>10</sup> Nurses are health-care workers who keep patients safe from infection. As a result, a lack of knowledge about infection prevention and proper nursing care may be a barrier to preventing VAP. The occurrence of ventilator-acquired pneumonia indicates a lack of experienced nurses, as well as inadequate knowledge and understanding of the pathophysiology and prevention of VAP.<sup>11</sup>

The present study findings revealed a significant increase in the mean post-test scores of the study group after video-assisted clinical teaching. Similar findings related to the present study were given by a quasi-experimental study conducted by Busi Sailaja in 2017, which revealed that the majority of the respondents did not have sufficient knowledge and practices on the prevention of VAP.<sup>3</sup> Following the implementation of a structured teaching programme, knowledge and practices on VAP had significantly improved. The teaching programme was found effective in increasing the knowledge and practices of VAP among critical care nurses. According to the study conducted by Korhan et al, increasing ICU nurses' knowledge of VAP and care bundle activities is an effective way to prevent VAP in the care environment.<sup>4</sup>

In the current study, the total mean score of knowledge level after intervention improved (pretest mean score: 18.46 and post-test mean: 25.07). This result comes in agreement with another study by Dipanjali et al, which showed lower scores for both study groups at the pre-test and showed improvement in the knowledge scores of the nurses after the educational sessions ( $p \leq 0.001$ ).<sup>5</sup> Moreover, in the study of Meherali et al that examines "the effectiveness of a teaching module on nurses' knowledge to practice evidence-based guidelines for the prevention of VAP", the post-test scores were higher than the pre-test scores, although there was a slight decrease in the follow-up-test scores conducted after four weeks of the intervention as compared to the post-test conducted immediately after the intervention (pre-test=7.8±2.9, post-test 1 = 10.8±2.0, and post-test 2 = 9.8±2.1).<sup>11</sup>

The t test performed on the pre-test and post-test scores in the current study shows a value of significance less than 0.001, indicating that the alternate hypothesis "there is

effectiveness of clinical teaching on the level of knowledge of nursing officers regarding nursing bundles of care for prevention of VAP" is correct. Another quasi-experimental study conducted by Mishra et al in the year 2020 concluded that the Structured Teaching Programme has improved the knowledge and practice of nurses regarding the care bundle on prevention of ventilator-associated pneumonia.<sup>12</sup>

In accordance with the association between socio-demographic characteristics and the total knowledge level of both nurses' groups about VAP, the present study presented an insignificant association between total knowledge level and selected demographic variables like age, gender, years of clinical experience, and area of working. But there was an association between post-test knowledge level and professional qualification ( $p=0.013$ ). One more study conducted by Ghimire et al presented that there is no statistically significant association between respondents' level of knowledge regarding the prevention of VAP and working experience ( $p=0.493$ ) and qualification ( $p=0.459$ ). Similar findings were reported by Mishra et al, who demonstrated a statistically insignificant relationship between participants' level of knowledge with age ( $p=0.17$ ), qualification ( $p=5.44$ ), and work experience ( $p=0.09$ ).<sup>12</sup>

This study has few limitations. Samples were limited to some specific area and the sample size was limited.

## CONCLUSION

Ventilator-associated pneumonia (VAP) is a hospital-acquired infection that affects intubated patients on a ventilator. Critical care nurses, being a significant component of patient healthcare service play a major role in the prevention of infections and other risk factors which may adversely affect the life of the patients. This study aimed to assess the knowledge of nursing officers and provide intervention for the recapitulation of the existing knowledge, recognition of deficit areas and filling those gaps thus increasing the awareness and adherence to the VAP bundle practices. The findings of the study revealed that there was a significant increase in the knowledge level of the study group after the teaching programme, which indicates that educational interventions are necessary to increase and maintain knowledge level, and better compliance of nursing officers to guidelines regarding bundle of care for prevention of ventilator associated pneumonia. Continuous nursing education programs in ICU should be organized and nurses should add to their daily routine



responsibilities, the regular reading, to update their knowledge. They should always be encouraged to attend scientific workshops and conferences to keep pace with the rapidly developing body of knowledge and practice necessary interventions for proper care bundles implementation.

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