

# A Study to Evaluate the Effectiveness of Ventilator Bundle on Prevention of Ventilator Associated Pneumonia Among Patients with Mechanical Ventilator at Selected Hospitals, Perambalur

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**Introduction:** Pneumonia is a form of acute respiratory infection that affects the lungs. The lungs are made up of small sacs called alveoli, which fill with air when a healthy person breathes. It is an important public health problem in India.

**Objectives:** The main objective of the study was assessing the ventilator bundle on prevention of ventilator associated pneumonia among patients with mechanical ventilator.

**Methods and results:** Quasi experimental post test only control design was adopted for this study, 60 patients with patients with mechanical ventilator were recruited by Non Probability Purposive sampling technique into two groups. Experimental group (N=30) received ventilator bundle for 7 days and control group (N=30) were given Hospital routine intervention. The pre-test and post-test ventilator associated pneumonia status was measured with modified clinical pulmonary infection score. Statistical findings revealed that post test mean score  $0.933 \pm 1.3888$  in experimental group was lesser than the control group mean score  $3.266 \pm 1.8427$ . The obtained “t” value was 5.45, significant at  $p < 0.05$  level.

**Conclusion:** The study concluded that the use of ventilator bundle is effective in prevention of ventilator associated pneumonia among patients with mechanical ventilator.

**Keywords:** Pneumonia, Prevention, Ventilator Associated Pneumonia, Mechanical Ventilator, Evaluate, Effectiveness.

## 1. Introduction

“Critical Care Nursing is not what you think it is...”

Human body needs a constant supply of oxygen to support the body’s metabolism. Respiration is one of the processes needed for survival and also provides the necessary energy for carrying on all essential life processes. It is the process by which an organism exchanges gases with its environment. The respiratory tract is the path of air from the nose to the lungs. It is divided into two sections, Upper Respiratory Tract and the Lower Respiratory Tract.

The respiratory system allows for the inhalation of gases such as oxygen in the air which can then be transported by the blood around the body to supply tissues and cells, and the exhalation of waste gases such as carbon dioxide into the air. The goals of the respiration are to provide oxygen to tissues and to remove carbon dioxide.

Need for the study

Sanjeev Kharel (2021) Ventilator-associated pneumonia (VAP) is one of the most frequent ICU-acquired infections and a leading cause of death among patients in Intensive Care Unit (ICU). The South East Asian Region is a part of the world with limited health resources where infectious diseases are still underestimated. We aimed to review the literature in this part of the world to describe incidence, mortality and microbiological evidence of VAP and explore preventive and control strategies.

Atul Ashok Kalanuria (2018), VAP is always associated with increase in morbidity and mortality, hospital length of stay and costs. VAP can develop at any time during ventilation, but occurs more often in the first few days after intubation. The concept of ventilator bundle is based on the fact that delivering evidence-based interventions reliably and consistently will improve patient care. A bundle is a collection of several evidence-based practices which should be implemented together on a daily basis. The use of ‘bundles’ has grown in popularity throughout health care due to the quality improvement movement.

Statement of the problem

A study to evaluate the effectiveness of ventilator bundle on prevention of ventilator associated pneumonia among patients with mechanical ventilator at selected hospitals, Perambalur.

Objectives

1. To assess the ventilator associated pneumonia among patients on mechanical ventilator in experimental group and control group
2. To evaluate the effectiveness of ventilator bundle on prevention of ventilator associated pneumonia among patients on mechanical ventilator in experimental group.
3. To associate the post test score on prevention of ventilator associated pneumonia among patients on mechanical ventilator with their selected demographic variables in experimental group.

Hypotheses

H1: There will be significant difference in on prevention of ventilator associated pneumonia among patients with mechanical ventilator in experimental group.

H2: There will be significant association between on prevention of ventilator associated pneumonia among patients with mechanical ventilator with their selected demographic variables in experimental group and control group.

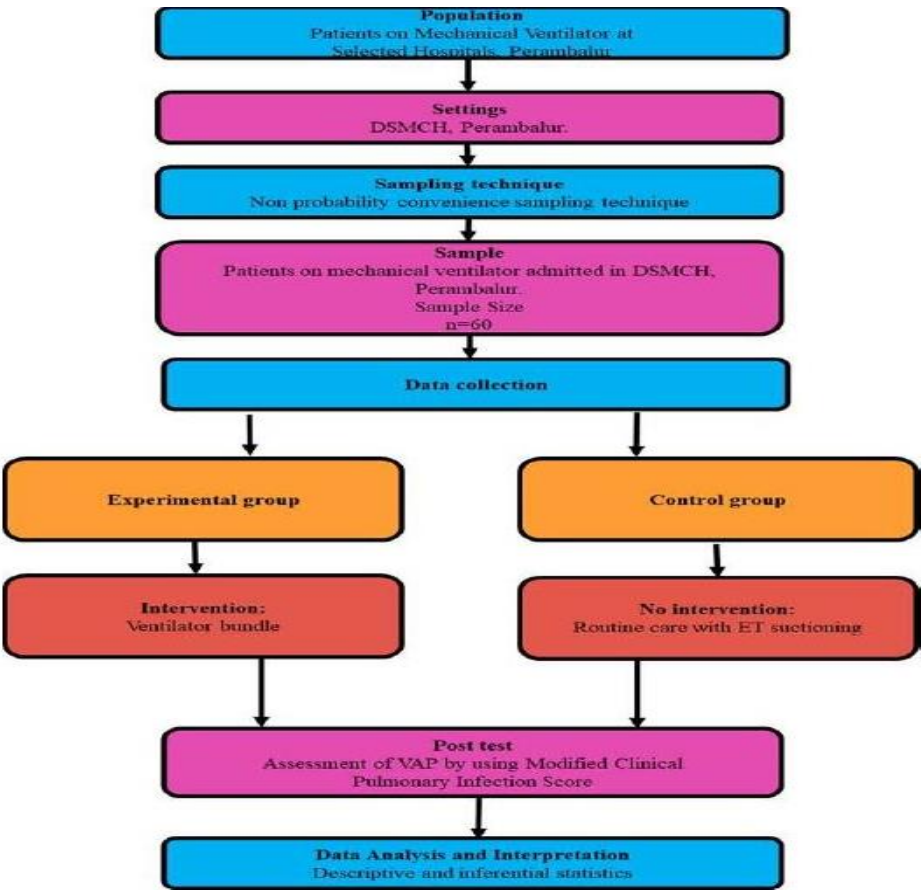


Figure: 1 Steps of Research Process

2. Methods and materials

The present study was conducted at Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur, 60 patients with ventilator associated pneumonia were selected for the study. 60 of them were categorized 30 in control group and 30 in experimental group by using Non Probability Purposive sampling technique. Formal permission was obtained from the dissertation committee of Roever nursing college and authorities of Dhanalakshmi Srinivasan Medical College and hospital, Perambalur. The data collection procedure was carried out for a period of 31 days. The samples were selected based on the inclusive and exclusive criteria. The researcher visited the department daily and met all the patients with Pneumonia and selected the needed number of subjects based on the set criteria for this study. On the day one all the sample were selected by using Non Probability Purposive sampling technique into

experimental and control group assessment using modified clinical pulmonary infection score (CPIS) or PUGIN score.

### 3. Results of the study

Based on the distribution of the subject according to their demographic variable in experimental and control group. In experimental group according to age 4(13.33%) belongs to the age group 20 – 30, 10(33.33%) belongs to the age group 31 – 40 and 8(26.67%) belongs to the age group 41 – 50 and also 51 – 60 years. In control group 4(13.33%) belongs to the age group 20 – 30 years, 8(26.67%) belongs to the age group 31 – 40 years, 6(20%) belongs to the age group 41 – 50 years and also 12 (40%) belongs to the age group 51 – 60 years.

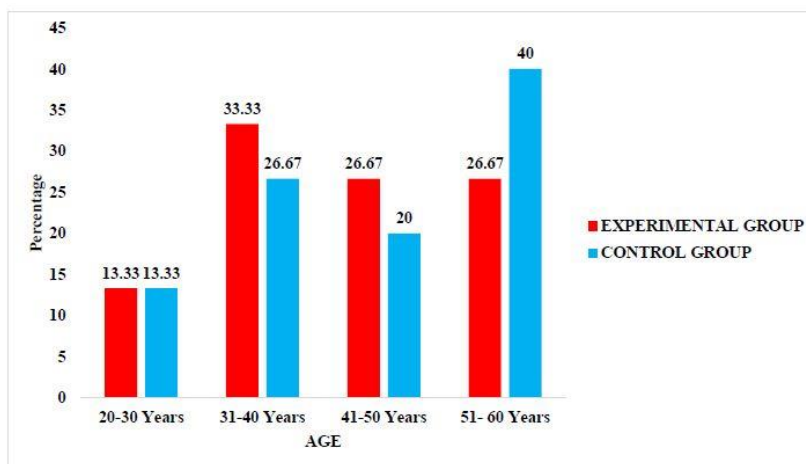


Figure: 2 Distribution of samples based on the age

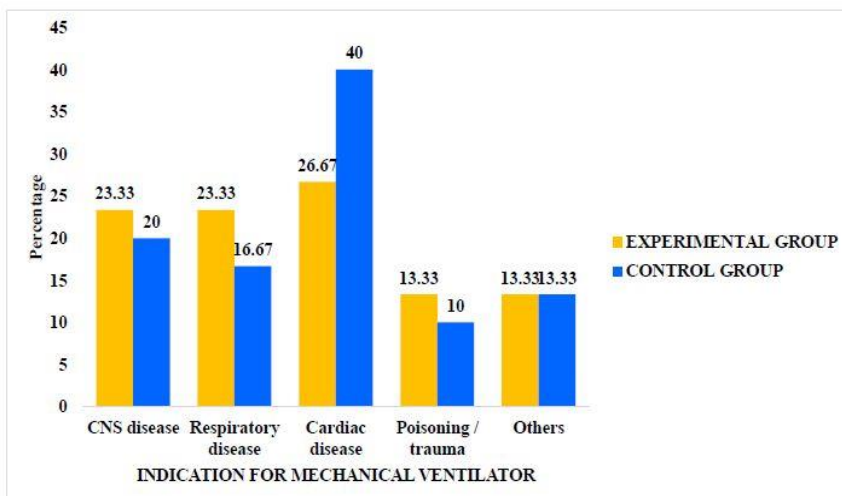


Figure: 3 Distribution of samples based on the age

Table 1: Frequency and percentage distribution of patients according to post test score on prevention of ventilator associated pneumonia in experimental group and control group

N=60 Control Group= 30, Experimental Group=30

S.No	Level of infection	Experimental group		Control group	
		(n)	(%)	(n)	(%)
1	No infection	18	60	3	10
2	Mild infection	10	33.33	6	20
3	Severe infection	2	6.67	21	70

Table 2: Comparison of mean score and standard deviation on prevention of ventilator associated pneumonia among patients on mechanical ventilator of experimental and control group in post test

N=60 Control Group= 30, Experimental Group=30

Group	Maximum score	Mean	SD	Mean Difference	‘t’value
Experimental	5	0.930	1.388	2.336	5.45*
Control	5	3.266	1.842		

The findings Association with selected demographic variables propose that there was a significant association found between post test level of Prevention of ventilator associated pneumonia among patients on mechanical ventilator among gender, marital status, previous hospitalized and history of smoking, whereas there was no significant association found between post test level of Prevention of ventilator associated pneumonia among patients on mechanical ventilator age, education, family income, indication of mechanical ventilator and frequency of changing position.

4. Discussion and Implications

The experimental group depicts the according to post test score on prevention of ventilator associated pneumonia in experimental group. The majority of subjects 18 (60%) had No infection, 10 (33.33%) had Mild infection and 2 (6.67%) had Severe infection. The control group represents the according to post test score on prevention of ventilator associated pneumonia in control group. The majority of subjects 21 (70%) had severe infection, 6 (20%) had mild infection and 3 (10%) had no infection.

The post test Mean score of Prevention of Ventilator Associated Pneumonia among Patients on Mechanical Ventilator in both group. In control group the mean score was  $3.266 \pm 1.8427$  and an experimental group the mean score was  $0.933 \pm 1.3888$ . The mean difference was 2.336. Hypothesis was accepted. H1: There will be significant effect of ventilator bundle on prevention of ventilator associated pneumonia among patients with mechanical ventilator in experimental group at significant level of  $p<0.05$ . Hypothesis H1 was accepted.

Implications for nursing service:

- The nurse should understand the importance of ventilator bundle for the prevention of ventilator associated pneumonia among patients on mechanical ventilator.

- The nurse should teach the other nurses about the benefits & importance of ventilator bundle in preventing the ventilator associated pneumonia among patients on mechanical ventilator.

Implications for nursing education:

- The nurse educator should provide the concept about the ventilator bundle on prevention of ventilator associated pneumonia.
- Nursing curriculum needs to be updated to identify the aspects of nursing care that are lacking to provide supportive education on ventilator bundle for the prevention of ventilator associated pneumonia.

Implications for nursing administration:

- Nurse administrator should arrange training programmes on ventilator bundle and closed system suctioning of endotracheal tube for the prevention of ventilator associated pneumonia.
- Nurse administrator should initiate education program for nurses regarding ventilator bundle for preventing the ventilator associated pneumonia.

## **5. Recommendations:**

- A similar study can be conducted with large group.
- A similar study can be conducted in various settings to identify the factors influencing ventilator associated pneumonia.
- A comparative study can be done to determine the effectiveness of closed suctioning system versus open suctioning system on preventing the ventilator associated pneumonia.

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