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Research Article

THE IMPACT OF COMPREHENSIVE INTERVENTIONAL PACKAGE TO IDENTIFY THE RISK OF VENTILATOR ASSOCIATED PNEUMONIA AMONG VENTILATED PATIENTS

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A R T I C L E I N F O

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A B S T R A C T

Ventilator Associated Pneumonia (VAP) is one of the common nosocomial infections in ICU. VAP is the second leading cause of morbidity and mortality in the intensive care unit after urinary tract infection. The incidence of VAP was 86% and mortality rates exceed 59%. Once the patient has developed VAP, additional requirement of treatment increases the length of stay by up to 22 days and raise the cost of care. 86% of nosocomial pneumonia was associated with intubation and mechanical ventilation. The aim of the study is to evaluate the impact of comprehensive interventional package in identifying the risk of ventilator associated pneumonia among ventilated patients in selected hospital Madurai, Tamilnadu. Quasi experimental pre-test post-test control group design was adopted. The sample comprised of 60 ventilated patients, among which 30 patients were assigned in the control group and 30 patients were in the experimental group. The samples were recognized based on the inclusion criteria and selected by convenience sampling technique. Risk assessment tool for VAP was used for data collection. Comprehensive interventional package was implemented on the experimental group only. In the experimental group, majority of the patients were having 27 (90%), 24 (80%) and 24 (80%) had mild risk in pre-test, post-test-1 and post-test-2 respectively. Whereas in the control group, majority of the patients had mild risk 27 (90%) in pre-test, whereas in post-test-1 and post-test-2 majority of patients had moderate risk 16 (53.33%) and 18 (60%) respectively. Regarding the impact of comprehensive interventional package, the mean score for post-test-2 was lower than the mean score for post-test-1. It was 2.3 in the post-test-1 and 2.13 in the post-test-2. The Paired't' test for the risk of Ventilator Associated Pneumonia was 5.38 ($p<0.001$), which was highly significant. The independent 't' test was 8.136 ($p<0.001$), which was highly significant. Thus, the study concluded that the implementation of comprehensive interventional package is a good method to prevent the risk of Ventilator Associated Pneumonia among the mechanically ventilated patients.

INTRODUCTION

The health care providers and patient face multiple challenges, where new treatment modalities and technology interfere with the continuing efforts to strive for quality care and expected outcomes. Ventilator Associated Pneumonia (VAP) is one of the common nosocomial infections in ICU. VAP is the second leading cause of morbidity and mortality in the intensive care unit after urinary tract infection. The incidence of VAP was 86% and mortality rates exceed 59%. Once the patient has developed VAP, additional requirement of treatment increases the length of stay by up to 22 days and raise the cost of care. 86% of nosocomial pneumonia was associated with intubation and mechanical ventilation.

The development of sophisticated technology, support and elaborate medical interventions, which help many patients to walk out of the hospital, which was unimaginable a few decades back. In order to gain maximum benefits out of advanced technologies, it is mandatory for the health care professionals to follow standard guidelines to prevent nosocomial infections.

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Problem Statement

A Study to evaluate the impact of comprehensive interventional package to identify the risk of ventilator associated pneumonia among ventilated patients in selected hospital, Madurai.

Objectives of the Study

1. To assess the risk of ventilator associated pneumonia before and after implementation of comprehensive interventional package among patients in control and experimental group.
2. To determine the impact of comprehensive interventional package on ventilator associated

pneumonia risk by comparing pre-test and post-test scores among control and experimental group.

3. To determine the impact of comprehensive interventional package on ventilator associated pneumonia risk by comparing post-test scores between the control and experimental group.
4. To find out the association between the risks of ventilator associated pneumonia among ventilated patients with their selected demographic and clinical variables in control and experimental group.

METHODOLOGY

Research Approach

Quantitative approach

Study Design

Quasi experimental pre-test post-test control group design was adopted

Sampling Technique

Convenience sampling technique was used to select the sample.

Sample Size

The sample comprised of 60 ventilated patients, among which 30 patients were assigned in the control group and 30 patients were in the experimental group.

Tool

The tool used for the study was risk assessment tool for VAP to identify the risk of ventilator associated pneumonia among ventilated patients.

The tool comprised of 2 sections:
Section A - It includes 2 parts

- Demographic variables
- Clinical variables

Section B- Risk assessment tool for VAP: It consists of 10 parameters related to risk of ventilator associated pneumonia, which includes the normal findings and the deviated findings.

Comprehensive interventional package (oral hygiene, endotracheal suctioning, semi-recumbent positioning, single use equipment, personnel protective measures, staff education and changing ventilator circuit) was implemented on the experimental group only. The data obtained was analyzed and interpreted using descriptive and inferential statistics.

RESULTS

The score of the modified clinical pulmonary score for risk of ventilator associated pneumonia were compared within the groups. The findings revealed that, In the experimental group, Out of the total 30 patients after the implementation of comprehensive interventional package, in the pre-test majority of the patient 27 (90%) had mild risk, 3 (10%) had no risk and none had moderate or high risk. Whereas in the post-test-1 most of the patients 24 (80%) had mild risk, 2 (6.66%) had no risk, 4 (13.33%) had moderate risk and none had high risk. Similarly in the post-test-2 majority of patients 24 (80%) had mild risk, 3 (10%) had moderate risk, 3 (10%) had no risk and none had high risk.

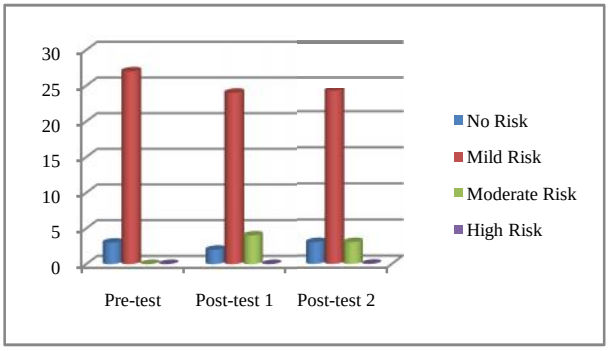

Figure 1 Distribution of ventilated patients based on their risk of ventilator associated pneumonia in the experimental

Whereas in the control group, Out of the total 30 patients, in the pre-test relatively a high proportion of the patients 27 (90%) had mild risk, 3 (10%) had no risk and none of them had moderate or high risk. Whereas in the post-test-1 majority of the patient 16 (53.33%) had moderate risk, 14 (46.66%) had mild risk and none of them had no risk or high risk. Whereas in post-test-2 most of the patient 18 (60%) had moderate risk, 6 (20%) had high risk, 6 (20%) had mild risk and none of them had no risk.

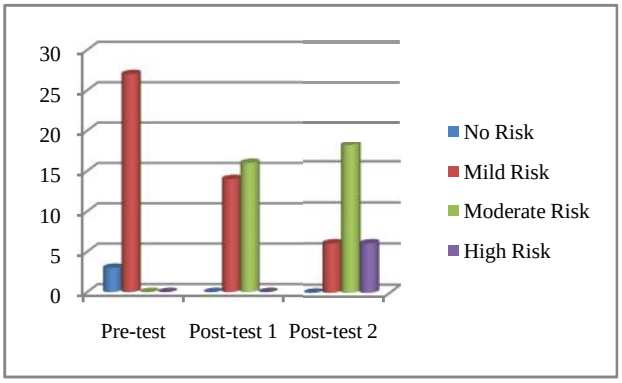

Figure 2 Distribution of ventilated patients based on their risk of ventilator associated pneumonia in the control group

In Experimental group, the risk of Ventilated Associated Pneumonia risk score in pre-test was 1.83, post-test-1 was 2.3 and the post-test-2 was 2.13. The paired 't' test for the risk of ventilated associated pneumonia was 3.58, 1.8 and 0.54, which shows there is no raise in the risk of Ventilated Associated Pneumonia in the pre-test, post-test-1 and post-test-2 among experimental group after the implementation of comprehensive interventional package.

Whereas in Control group, the risk of Ventilated Associated Pneumonia risk score in pre-test was 1.73, post-test-1 was 3.23 and the post-test-2 was 5.36. The paired 't' test for the risk of ventilated associated pneumonia was 7.14, 7.56 and 5.38, which shows there is raise in the risk of Ventilated Associated Pneumonia in the pre-test, post-test-1 and post-test-2 among control group without the implementation of comprehensive interventional package.

Table 1 Comparison of risk of VAP in pre-test and post-test 1 between control and experimental group

Group	n	Pre-test		Post-test 1		Paired t-test
		Mean±SD	Mean%	Mean±SD	Mean%	
Experimental	30	1.83±0.854	18.3	3.23±1.228	32.3	3.56 P=0.00*
Control	30	1.73±0.926	17.3	2.3±1.069	23	7.14 P=0.00*

Table 2 Comparison of risk of VAP in pre-test and post-test 2 between control and experimental group

Group	n	Pre-test		Post-test 2		Paired t-test
		Mean±SD	Mean%	Mean±SD	Mean%	
Experimental	30	1.83±0.854	18.3	2.13±1.095	21.3	1.8 P=0.00*
Control	30	1.73±0.926	17.3	5.36±2.448	53.6	7.56 P=0.00*

Table 3 Comparison of risk of VAP in post-test 1 and post-test 2 between control and experimental group

Group	n	Post-test 1		Post-test 2		Paired t-test
		Mean±SD	Mean%	Mean±SD	Mean%	
Experimental	30	3.23±1.228	32.3	2.13±1.095	21.3	0.54 P=0.00*
Control	30	2.3±1.069	23	5.36±2.448	53.6	5.38 P=0.00*

Regarding the impact of comprehensive interventional package, the mean score for post-test-2 was lower than the mean score for post-test-1. It was 2.3 in the post-test-1 and 2.13 in the post-test-2. The paired 't' test for the risk of Ventilator Associated Pneumonia was 5.38 ($p<0.001$), which was highly significant. The independent 't' test was 8.136 ($p<0.001$), which was highly significant. This was statistically proven that the impact of comprehensive interventional package on risk of Ventilator Associated Pneumonia was effective among mechanically ventilated patients. It can be interpreted that the risk of ventilator Associated Pneumonia has not increased in the experimental after the implementation of comprehensive interventional package.

Regarding association between the pre-test risk of Ventilated Associated Pneumonia with the selected socio-demographic and clinical variables, there is no significant association between the risk of Ventilator Associated Pneumonia with the selected socio-demographic and clinical variables.

DISCUSSION

The first objective of this study was to assess the risk of ventilator associated pneumonia before and after implementation of comprehensive interventional package among patients in control and experimental group.

In the experimental group, Out of the total 30 patients after the implementation of comprehensive interventional package, in the pre-test majority of the patient 27 (90%) had mild risk, 3 (10%) had no risk and none had moderate or high risk. Whereas in the post-test-1 most of the patients 24 (80%) had mild risk, 2 (6.66%) had no risk, 4 (13.33%) had moderate risk and none had high risk. Similarly in the post-test-2 majority of patients 24 (80%) had mild risk, 3 (10%) had moderate risk, 3 (10%) had no risk and none had high risk. Whereas in the control group, Out of the total 30 patients, in the pre-test relatively a high proportion of the patients 27 (90%) had mild risk, 3 (10%) had no risk and none of them had moderate or high risk. Whereas in the post-test-1 majority of the patient 16 (53.33%) had moderate risk, 14 (46.66%) had mild risk and none of them had no risk or high risk. Whereas in post-test-2 most of the patient 18 (60%) had moderate risk, 6 (20%) had high risk, 6 (20%) had mild risk and none of them had no risk.

The second objectives of the study was to determine the impact of comprehensive interventional package on ventilator associated pneumonia risk by comparing pre-test and post-test scores among control and experimental group.

In the experimental group, out of 30 patients after the implementation of comprehensive interventional package, the mean score for risk of Ventilator Associated Pneumonia in pre-test was (1.83±0.854), mean post-test-1 score was (2.3±1.069) and mean post-test-2 score was (2.13±1.095), with a mean difference of 0.47 (pre-test and post-test-1), 0.3 (pre-test and post-test-2) and 0.17 (post-test-1 and post-test-2). In the control group, out of 30 patients the mean pre-test score for risk of Ventilator Associated Pneumonia was (1.73±0.926), mean post-test-1 score was (3.23±1.228) and mean post-test-2 score was (5.36±2.448), with a mean difference of 1.5 (pre-test and post-test-1), 3.63 (pre-test and post-test-2) and 2.13 (post-test-1 and post-test-2).

This above findings implies that comprehensive interventional package is effective in reducing the risk of ventilator associated pneumonia among mechanically ventilated patients.

The third objective of the study was to determine the impact of comprehensive interventional package on ventilator associated pneumonia risk by comparing post-test score between the control and experimental group.

Out of 60 patients in experimental and control group, the mean post-test-1 score (2.3±1.069) of the experimental group was found to be lower than the post-test-1 score (3.23±1.228) of the control group, with the mean difference of 0.93, and the mean post-test-2 score (2.13±1.095) of the experimental group was found to be lower than the post-test-2 score (5.36±2.448) of the control group, with the mean difference of 3.23

Regarding the risk of Ventilator Associated Pneumonia, obtained from independent 't' test value in the control and experimental group after the implementation of comprehensive interventional package on risk of Ventilator Associated Pneumonia was 3.141 (post-test-1) and 8.136 (post-test-2) ($p<0.001$). Regarding risk of Ventilator Associated Pneumonia, obtained paired 't' value of experimental group was 3.58, 1.8 and 0.54 at $p<0.001$ level, which indicates that this difference shows no significance and paired 't' value of the control group was 7.14, 7.56 and 5.38, which is considered to be highly significant. It indicates that the risk of Ventilator Associated Pneumonia was prevented after the implementation of comprehensive interventional package in the experimental group.

The fourth objective of the study was to find out the association between the risks of ventilator associated pneumonia among ventilated patients with their selected demographic and clinical variables in control and experimental group.

There was no association between pre-test risk of Ventilator Associated Pneumonia with selected socio-demographic and clinical variables in both experimental and control group. Hence the Research Hypothesis H_3 is rejected.

Regarding post-test-1, there was no association between post-test-1 risk of Ventilator Associated Pneumonia with selected socio-demographic and clinical variables in both experimental and control group. Hence the Research Hypothesis H_3 is rejected.

Regarding post-test-2, there was no association between post-test-1 risk of Ventilator Associated Pneumonia with selected socio-demographic and clinical variables in both experimental and control group, except Gender and Occupation which

shows significant association in experimental group. Hence the Research Hypothesis H_3 is accepted.

CONCLUSION

The study results reveal that, there is significant difference in the risk of ventilator associated pneumonia in experimental and control group. The study concluded that the implementation of comprehensive interventional package was effective in preventing the risk of ventilator associated pneumonia among mechanically ventilated patients.

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