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EFFECT OF NURSE PERSPECTIVE INTERVENTION ON PREVENTION OF VENTILATOR-ASSOCIATED PNEUMONIA (VAP) IN THE CRITICAL CARE UNIT: A PILOT STUDY

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ABSTRACT

Background: Ventilator-associated pneumonia (VAP) is an infection of the lung parenchyma in patients exposed to invasive mechanical ventilation for more than 48 hours.

Methodology: An experimental research approach was adopted, and the research design employed was a true experiment. The data were collected from 20 intensive care unit (ICU) nurses who were randomly assigned to either active or passive educational interventions at Safdarjung Hospital, New Delhi. Pre- and post-interventional assessments were done.

Results: The observed mean difference in the knowledge score of nurses was found to be statistically significant as evidenced by the 't' value of 4.89, which was more than the 't' critical value of 2.1 at df 18, at a 0.05 level of significance ($P<0.05$) between the active and passive educational intervention groups. But the observed difference in compliance score was not found statistically significant, as evidenced by the 't' value of 0.81, which was less than the 'critical value of 2.10 at df 18, at a 0.05 level of significance ($P>0.05$) between active and passive groups. Barriers were identified, including the Unavailability of written guidelines or protocols for VAP prevention (100%), no continuous education on VAP prevention (90%), Practice in ICUs not based on research findings (100%), and a lack of required skills and knowledge (70%).

Conclusion: Active and passive educational interventions enhance nurses' knowledge and compliance with VAP prevention guidelines. This study recommends a regular training program for ICU nurses regarding VAP prevention guidelines, and administrative support is needed to overcome the barriers.

KEYWORDS: Ventilator-associated pneumonia, Critical care unit, Guidelines, Active intervention, Passive intervention, Knowledge, Compliance, Barrier

INTRODUCTION

Ventilator-associated pneumonia (VAP) is a lung parenchymal infection in patients on invasive mechanical ventilation (1,2). Despite clinical guidelines, it is the most prevalent and critical complication of mechanical ventilation, which is treated as a general hospital-acquired infection (HAI) in critically ill patients and has a high morbidity and mortality rate (1–3). It occurs in those who have been intubated and require mechanical ventilation for more than 48 hrs. The reported rates vary between "4.4 to 15.7 cases per 1000 ventilator days"(3). VAP affects "10 to 25% of ICU patients, and those who are intubated have a mortality rate associated with it that is 6–21 times greater (between 24 and 76%)"(3). VAP is the second most common hospital-acquired infection and the primary cause of mortality in critically ill patients (1,4). The majority of HAIs are preventable. Evidence-based guidelines facilitate the delivery of quality nursing care in ICUs. It has been proven that implementing evidence-based guidelines effectively can reduce the incidence of ventilator-associated pneumonia. However, nurses' "knowledge and compliance with evidence-based guidelines on VAP prevention" is low to average in middle-lower income countries [In 2024] (5). The consistency in using these guidelines depends on several factors, such as the nurse's knowledge, barriers, and surveillance. The gap between knowledge and practice existed mainly due to the lack of nurses' training and the organization's inability to transform evidence-based research into practice. Despite years of research, VAP remains one of the most common infections in intensive care units and is associated with higher mortality rates. High-level, prospective research is advised in the future to determine the possible advantages of specific bundle components combined with evidence-based methods in lowering the incidence of VAP (6,7).

METHODOLOGY

An experimental research approach was employed, utilizing a true experimental research design. The data were collected from 20 intensive care unit (ICU) nurses who were randomly assigned to either active or passive educational interventions at Safdarjung Hospital, New Delhi, during the period from 1st September 2025 to 30th October 2025. The data collection tools include a demographic proforma, a structured knowledge questionnaire, a self-report compliance checklist, and a

barrier assessment checklist. The pre-interventional assessment was done on the first day. Training on VAP prevention guidelines was provided to the active intervention group, and a poster outlining these guidelines was placed near each ICU bed. For the passive intervention group, only a poster regarding VAP prevention guidelines was displayed near every ICU bed. The Post-interventional assessment was done twice to assess knowledge and compliance. Barriers to VAP prevention compliance were assessed using a barrier assessment checklist. ANOVA, t-test, and Chi-Square were used for data analysis.

RESULTS

The sample consisted of 20 nurses, 10 in the Active and 10 in the Passive educational intervention. The obtained data describe the sample characteristics of age, gender, education, experience, and previous training.

Demographic profile

Table 1 revealed that the age distribution shows that the majority of samples, i.e., > 40 Years, were in the active intervention group, whereas 50% of samples were 20-30 years in the passive intervention group. All the samples were female (100%) in the active intervention group, whereas the fewest samples were male in the passive intervention group, i.e., 10%. Most samples were studied in BSc nursing. 70% of the samples had more than 3 years of experience in the Active and Passive educational intervention groups. And the Least of samples were previously trained, which was 20% in the active intervention group and 10% in the passive intervention group.

Effect on Knowledge score

The data presented in Table 2 show that the observed mean difference in knowledge score was found statistically significant between active and passive intervention groups, as evidenced by the 't' value of 4.89, which was more than the t critical value (two-tailed) of 2.1 at df 18, at a 0.05 level of significance ($P<0.05$). This means that the differences between these two groups were not obtained by chance. This suggests a significant difference in effectiveness between the active and passive educational intervention groups after the educational intervention.

This suggests that active educational interventions were more effective in enhancing nurses' knowledge of VAP prevention guidelines than passive educational interventions.

Effect on Compliance Scores

The data presented in Table 3 show that the observed difference in compliance score was not found to be statistically significant between active and passive intervention groups, as evidenced by the 't' value of 0.81, which was less than the critical value (two-tailed) of 2.10 at df 18, at a 0.05 level of significance ($P>0.05$). Thus, it was established that the difference in mean compliance score between these two groups was not statistically significant. This indicates that active and passive educational interventions were equally effective in enhancing the compliance of nurses regarding VAP prevention guidelines

Relationships between knowledge and compliance of nurses in the active and passive interventions

The data presented in Table 4 indicate that there was a very weak correlation between knowledge and compliance of nurses regarding VAP prevention guidelines, with an 'r' value of 0.12 and $p>0.05$. This suggests that there will be no correlation between knowledge and compliance of nurses regarding VAP prevention guidelines in the active intervention.

The data presented in Table 5 indicate that there was a very weak correlation between knowledge and compliance of nurses regarding VAP prevention guidelines, with an 'r' value of 0.14 and $p>0.05$. This suggests that there will be no correlation between knowledge and compliance of nurses regarding VAP prevention guidelines in the passive intervention group.

Barriers to compliance with VAP prevention guidelines

In both groups, the majority of nurses agreed with the following barriers: the lack of written protocols for VAP prevention, the lack of ongoing education on VAP prevention, the lack of necessary skills (70%), and the majority of nurses disagreed with the statement that sixty percent of VAP prevention techniques are not the nurse's responsibility.

Correlation between barriers and compliance of nurses

The data presented in Table 6 indicate a very weak negative correlation between barriers and nurses' compliance with VAP prevention guidelines, with an 'r' value of -0.42 and $p>0.05$ in the active intervention.

The data presented in Table 7 indicate that there was a very weak correlation between barriers and compliance of nurses regarding VAP prevention guidelines, with an 'r' value of 0.22 and $p>0.05$ in the passive intervention.

This suggests that there will be no correlation between barriers and nurses' compliance with VAP prevention guidelines in either group.

Association between knowledge of nurses and selected Demographic variables.

The knowledge score was not dependent on the selected variables, and it was dependent on its own and not influenced by them (age, gender, education, experience, and previous training). Therefore, there was no association between the knowledge score and these variables in either group.

Association between compliance scores of nurses and selected demographic variables

The compliance score was not dependent on the selected variables, and it was dependent on its own and not influenced by them (age, gender, education, experience, and previous training). Hence, there was no association between compliance score and selected variables in either group.

Association between barriers and selected Demographic variables

The barrier was not dependent on the selected variables, and it was dependent on its own and not influenced by the selected variables (age, gender, education, experience, and previous training). Hence, there was no association between barriers and selected variables in either group**.**

DISCUSSION

The present study revealed that active and passive educational interventions on VAP prevention guidelines enhanced the knowledge of nurses. These same results were obtained in the study conducted in Malaysia, after nurse-led education on VAP prevention(8). These results are consistent with other studies conducted in different countries(6,9–14). There was no difference in the compliance of nurses between the active and passive intervention groups in the current study. This result contradicts another study conducted in Iran, which found that the performance of nurses improves after the active intervention rather than the passive intervention on VAP prevention guidelines(15). After the intervention, both the active and passive intervention groups showed a notable increase in compliance. These results are consistent with other studies conducted in Lebanon, India, and Saudi Arabia(10,12–14). The current study found that barriers to compliance with VAP prevention are the unavailability of written guidelines or protocols for VAP prevention, the lack of continuous education on VAP prevention, and the shortage of staff. Some of the other studies also revealed the same findings (16–18).

CONCLUSION

Active educational interventions enhance nurses' knowledge of VAP prevention more than passive interventions. However, there was no difference in the compliance of nurses in both groups. This study emphasizes the importance of regular training and monitoring of nurses to enhance compliance with VAP prevention guidelines. The key barriers to compliance with VAP prevention are the unavailability of written guidelines or protocols for VAP prevention, the lack of continuous education on VAP prevention, the shortage of staff, and Practice in ICUs not based on research findings.

Conflicts of interest:
Nil

ANNEXURE

Table 1: Frequency and percentage distribution of sample characteristics of nurses in Active and Passive educational intervention groups. N=20

S.NO	Sample characteristics	Frequency of Active educational intervention n – 10	Percentage %	Frequency of Passive educational intervention n – 10	Percentage %
1.	**Age in years**				
	20-30	3	30	5	50
	31-40	3	30	4	40
	> 40	4	40	1	10
2.	**Gender**				
	Male	10	100	1	10
	Female	0	0	9	90
3.	**Education**				
	Diploma	3	30	4	40
	B.sc N	7	70	6	60
	M.sc N	0	0	0	0
	Ph.D in Nursing	0	0	0	0
4.	**Experience**				
	< 1 yr	0	0	0	0
	1-3 yrs	3	30	3	30
	More than 3yrs	7	70	7	70
5.	**Any previous training**				
	Yes	2	20	1	10
	No	8	80	9	90

Table 2: Computed "t" value and p-value of post-test knowledge score between active and passive educational intervention groups N-20

	Active intervention	Passive intervention
Mean	19.7	16.8
Variance	2.23	1.29
Observations	10	10
Pooled Variance	1.76	
Hypothesized Mean Difference	0	

df	18	
t Stat	4.89	
P(T<=t) one-tail	5.93948E-05	
t Critical one-tail	1.73	
P(T<=t) two-tail	0.00011879	
t Critical two-tail	2.1	

Table 3: Computed "t" value and p-value of compliance score after the active and passive educational intervention N-20

t-test	Active intervention	Passive intervention
Mean	9.6	9.2
Variance	1.16	1.29
Observations	10	10
Pooled Variance	1.22	
Hypothesized Mean Difference	0	
df	18	
t Stat	0.81	
P(T<=t) one-tail	0.21	
t Critical one-tail	1.73	
P(T<=t) two-tail	0.43	
t Critical two-tail	2.10	

Table 4: Correlation between mean post-test knowledge and compliance of nurses in the active intervention group n-10

Variables	Mean	Standard Deviation	'r' value	P value
Knowledge score	19.7	1.49		
Compliance score	9.6	1.01	0.12	0.63

Table 5: Correlation between mean post-test knowledge and compliance of nurses in the passive intervention group n-10

Variables	Mean	Standard Deviation	'r' value	P value
Knowledge score	16.8	1.13		
Compliance score	9.2	1.13	0.14	0.65

Table 6: Correlation between barriers and compliance of nurses in the active intervention group n-10

Variables	Mean	Standard Deviation	'r' value	P value
Barrier score	2.53	0.26		
Compliance score	9.6	1.01	-0.42	0.11

Table 7: Correlation between Barriers and compliance of nurses in the passive intervention group n-10

Variables	Mean	Standard Deviation	'r' value	P value
Barrier score	2.37	0.38		
Compliance score	9.2	1.13	0.22	0.13

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