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A STUDY TO ASSESS THE EFFECTIVENESS OF A STRUCTURED TEACHING PROGRAM ON KNOWLEDGE REGARDING VAP BUNDLES AMONG 2ND YEAR G.N.M. STUDENTS.

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ABSTRACT

Ventilator-Associated Pneumonia (VAP) is a serious infection in mechanically ventilated patients, increasing morbidity and mortality. This study evaluated the effectiveness of a Structured Teaching Program (STP) on knowledge regarding VAP bundles among 40 2nd year G.N.M. students at RAMA University, Kanpur. A pre-experimental one-group pre-test post-test design was used. Data were collected using a structured questionnaire and analyzed using descriptive and inferential statistics. The mean knowledge score improved from 16.05 ± 7.77 (pre-test) to 25.80 ± 4.70 (post-test), showing a significant increase ($p<0.05$). Adequate knowledge rose from 12.5% to 92.5%. Significant associations were found with selected demographic variables. The study concluded that the STP was effective in improving knowledge regarding VAP bundles among nursing students.[1]

Keywords: Ventilator-Associated Pneumonia, VAP Bundles, Infection Control, Structured Teaching Program, Nursing Students& Knowledge Enhancement

2. INTRODUCTION

Ventilator-Associated Pneumonia (VAP) is a common healthcare-associated infection in mechanically ventilated patients, leading to increased morbidity, mortality, hospital stay, and healthcare costs. It typically develops after 48 hours of intubation and accounts for a significant proportion of nosocomial infections in ICUs[2].

The VAP prevention bundle includes evidence-based interventions such as head-of-bed elevation, oral hygiene with chlorhexidine, sedation assessment, subglottic suctioning, and early weaning from ventilation. These measures are effective in reducing VAP incidence and improving patient outcomes.

However, inconsistent adherence due to inadequate knowledge and training among nursing students limits their effectiveness. Structured Teaching Programs (STPs) can help improve knowledge and promote better infection control practices.[3]

Therefore, this study was conducted to assess the effectiveness of an STP on knowledge regarding VAP bundles among G.N.M. students.

3. NEED FOR THE STUDY

Ventilator-Associated Pneumonia (VAP) is a serious infection with high incidence and mortality, particularly in India. Although VAP prevention bundles are effective, their implementation depends on nurses' knowledge. Evidence shows that nursing students often have inadequate knowledge, leading to poor adherence to preventive practices. Therefore, this study aims to evaluate the effectiveness of a Structured Teaching Program in improving knowledge regarding VAP bundles to enhance infection control and patient care.[4]

4. STATEMENT OF THE PROBLEM

Statement: *"***Astudy to assess the effectiveness of a structured teaching program on knowledge regarding VAP bundles among 2nd year G.N.M. Students."**

Objectives:

1. To assess the pre-test knowledge level of 2nd year G.N.M. students regarding VAP bundles before administering the structured teaching program.
2. To assess the post-test knowledge level of 2nd year G.N.M. students after administering the structured teaching program.
3. To compare the pre-test and post-test knowledge scores to evaluate the effectiveness of the structured teaching program.
4. To determine the association between pre-test knowledge scores and selected socio-demographic variables of nursing students.

Hypothesis:

H_0: There is no significant difference between pre-test and post-test knowledge scores of 2nd year G.N.M. students regarding VAP bundles after the STP.

H_1: There is a significant difference between pre-test and post-test knowledge scores of 2nd year G.N.M. students regarding VAP bundles after the STP.

H_2: There is a significant association between pre-test knowledge scores and selected socio-demographic variables.

5. METHODS AND MATERIALS

Research Approach: A quantitative research approach was adopted, employing a pre-experimental, one-group pre-test and post-test design to evaluate the effectiveness of the STP on nursing students' knowledge of VAP bundles.[7]

Independent Variable: Structured Teaching Program (STP) on Ventilator-Associated Pneumonia (VAP) bundles.

Dependent Variable: Knowledge level of 2nd year G.N.M. students regarding VAP bundles, as measured by pre-test and post-test scores.

Extraneous (Demographic) Variables: Age, gender, prior training on VAP prevention, ICU/critical care experience, exposure to VAP bundles in clinical practice, and source of knowledge regarding VAP bundles.[8]

Study Setting: RAMA Faculty of Nursing, RAMA University, Kanpur, Uttar Pradesh.

Target Population: 2nd yearG.N.M. students currently enrolled at RAMA Faculty of Nursing, RAMA University, Kanpur, who have prior exposure to clinical training in ICUs.

Sample Size: 40 students of G.N.M. 2nd year, selected using purposive (non-probability) sampling.

Inclusion Criteria:

- 2nd year G.N.M. students enrolled at RAMA Faculty of Nursing, RAMA University, Kanpur.
- Students willing to participate in the study.
- Students who have attended clinical postings in ICUs and have had exposure to ventilated patients.

Exclusion Criteria:

- Students who have already received specialized training on VAP bundles from workshops, seminars, or previous structured educational programs.
- Students absent during the data collection period.
- Students who decline to participate despite eligibility.
- Students with prior work experience in ICUs beyond academic clinical postings.

6. DEVELOPMENT AND DESCRIPTION OF TOOLS USED IN THE STUDY

Section A – Socio-Demographic Questionnaire: A structured socio-demographic questionnaire comprising 7 closed-ended questions covering age, gender, prior training on VAP prevention, ICU/critical care experience, exposure to VAP bundles, awareness of VAP bundles, and source of knowledge on VAP bundles. This tool analyzed whether demographic factors influenced participants' baseline knowledge and the effectiveness of the STP.

Section B – Knowledge Questionnaire on VAP Bundles: A structured 30-item multiple-choice questionnaire (MCQ) to assess knowledge of 2nd year G.N.M. students regarding VAP bundles. Each correct answer = 1 mark; incorrect = 0 marks. Total score range: 0–30.[12]

Question categorization:

- General knowledge on VAP: 6 questions (items 1–6)
- Components of VAP bundles: 7 questions (items 7–13)
- Risk factors and prevention strategies: 5 questions (items 14–18)
- Diagnosis and treatment of VAP: 12 questions (items 19–30)

Table 1: Classification of Knowledge Level Based on Score

Sr.No.	Level of Knowledge	Score Range
1	Inadequate	0 – 10
2	Moderate	11 – 20
3	Adequate	21 – 30

Validity and Reliability: Content validity was established by subject matter experts (nursing educators, infection control specialists, and ICU nurses). The knowledge questionnaire was pilot-tested on a small sample outside the study, with Cronbach's alpha ≥0.7 confirming internal consistency.[13]

7. DATA COLLECTION AND PROCEDURE

Ethical clearance was obtained from the Institutional Ethics Committee of Rama University, Kanpur. Formal permission was obtained from the principal of the selected college at Rama University, Kanpur. Informed consent was obtained from all participants prior to data collection.[14]

8. RESULT AND FINDINGS

Section I: Demographic Profile of Participants

Table 2: Frequency and Percentage Distribution Based on Sociodemographic Variables (N=40)

Sociodemographic Data	Frequency	Percentage
1. Age in years		
a) 21 years	8	20.0%

b) 22 years	12	30.0%
c) 23 years	10	25.0%
d) 24 years and above	10	25.0%
2. Gender		
a) Female	26	65.0%
3. Prior training on VAP prevention?		
a) Yes	18	45.0%
b) No	22	55.0%
4. Worked in ICU/critical care unit during clinical postings?		
a) Yes	16	40.0%
b) No	24	60.0%
5. Provided care for ventilated patients?		
a) Yes	20	50.0%
b) No	20	50.0%
6. Observed implementation of VAP bundles in clinical practice?		
a) Yes, regularly	12	30.0%

b) Yes, occasionally	18	45.0%
c) No	10	25.0%
7. Primary source of knowledge about VAP bundles?		
a) Textbooks	8	20.0%
b) Clinical instructors	14	35.0%
c) Workshops/Seminars	10	25.0%
d) Nursing journals	8	20.0%
8. Frequency of infection control education in nursing program?		
a) Frequently	10	25.0%
b) Occasionally	16	40.0%
c) Rarely	8	20.0%
d) Never	6	15.0%

Note: Figures 3–10 in the original thesis depict percentage distribution charts for each demographic variable. Bar and pie charts confirmed the above distributions.

Section II: Pre-Test Knowledge Assessment on VAP Bundles (N=40)

Table 3: Maximum Score, Mean, SD, and Mean Percentage of Pre-Test Knowledge on VAP Bundles

Knowledge Level	No. of Items	Max. Score	Mean	SD	Mean %
General Knowledge on VAP	6	6	3.38	1.84	56.3
Components of VAP Bundles	7	7	3.63	2.02	51.8
Risk Factors & Prevention Strategies	5	4	2.28	1.28	56.9
Diagnosis and Treatment of VAP	12	12	6.78	3.38	56.5
Overall	**30**	**30**	**16.05**	**7.77**	**55.3**

Table 4: Distribution of Pre-Test Knowledge Level (N=40)

Knowledge Level	Frequency	Percentage (%)
Inadequate knowledge (0–10)	15	37.5
Moderate knowledge (11–20)	20	50.0
Adequate knowledge (21–30)	5	12.5
Total	**40**	**100.0**

The overall pre-test mean percentage was 55.3%, indicating a moderate level of understanding across different domains. Students scored relatively higher in diagnosis and treatment of VAP (56.5%) and risk factors & prevention strategies (56.9%), while knowledge about the components of VAP bundles was the lowest (51.8%). The majority (50.0%) demonstrated moderate knowledge, while only 12.5%

had adequate knowledge before the STP, emphasizing the need for the structured educational intervention.

Section III: Post-Test Knowledge Assessment on VAP Bundles (N=40)

Table 5: Maximum Score, Mean, SD, and Mean Percentage of Post-Test Knowledge on VAP Bundles

Knowledge Level	No. of Items	Max. Score	Mean	SD	Mean %
General Knowledge on VAP	6	6	5.15	1.29	85.8
Components of VAP Bundles	7	7	5.90	1.28	84.3
Risk Factors & Prevention Strategies	5	5	4.20	1.09	84.0
Diagnosis and Treatment of VAP	12	12	10.55	1.99	87.9
Overall	**30**	**30**	**25.80**	**4.70**	**86.0**

Table 6: Distribution of Post-Test Knowledge Level (N=40)

Knowledge Level	Frequency	Percentage (%)
Inadequate knowledge (0–10)	1	2.5
Moderate knowledge (11–	2	5.0

20)		
Adequate knowledge (21–30)	37	92.5
Total	**40**	**100.0**

The post-test overall mean percentage increased to 86.0%, with the highest improvement in diagnosis and treatment of VAP (87.9%), followed by general knowledge on VAP (85.8%), components of VAP bundles (84.3%), and risk factors & prevention strategies (84.0%). The percentage of students with adequate knowledge rose dramatically from 12.5% to 92.5%, confirming the high effectiveness of the STP.

Section IV: Comparison of Pre-Test and Post-Test Knowledge Scores (N=40)

Table 7: Comparison of Pre-Test and Post-Test Knowledge Scores

Knowledge Aspects	Items	Pre Max	Pre Mean	Pre SD	Pre %	Post Mean	Post SD	Post %	Mean Diff.
General Knowledge on VAP	6	6	3.4	1.8	56.3	5.2	1.3	85.8	29.6
Components of VAP Bundles	7	7	3.6	2.0	51.8	5.9	1.3	84.3	32.5
Risk Factors & Prevention	5	4	2.3	1.3	56.9	4.2	1.1	84.0	27.1
Diagnosis & Treatment of VAP	12	12	6.8	3.4	56.5	10.6	2.0	87.9	31.5

Overall	30	29	16.1	7.8	55.3	25.8	4.7	86.0	30.7

Section V: Effectiveness of the Structured Teaching Program (STP) (N=40)

Table 8: Paired t-Test – Effectiveness of the STP on Knowledge Regarding VAP Bundles

Knowledge Aspects	Pre-Test Mean (SD)	Post-Test Mean (SD)	t-value	Significance
General Knowledge on VAP	3.38 ± 1.84	5.11 ± 1.33	4.74	P<0.05; S
Components of VAP Bundles	3.63 ± 2.02	5.89 ± 1.31	5.37	P<0.05; S
Risk Factors & Prevention Strategies	2.28 ± 1.28	4.20 ± 2.04	7.43	P<0.05; S
Diagnosis and Treatment of VAP	6.78 ± 3.38	10.55 ± 2.04	5.46	P<0.05; S
Overall	**16.05 ± 7.77**	**25.80 ± 4.80**	**6.17**	**P<0.05; S**

S = Significant; NS = Not Significant; df = degrees of freedom

The paired t-test analysis showed a statistically significant improvement (P<0.05) across all knowledge aspects. The overall mean score increased from 16.05 ± 7.77 to 25.80 ± 4.80 (t = 6.17, P<0.05). The highest improvement was in risk factors and prevention strategies (t = 7.43) and components of VAP bundles (t = 5.37), confirming H_1 that there is a significant difference between pre-test and post-test knowledge scores.

Section VI: Association Between Pre-Test Knowledge Scores and Selected Demographic Variables (N=40)

Table 9: Chi-Square Analysis – Association Between Knowledge Scores and Demographic Variables

Sociodemographic Data	<Median	>Median	Total	df	Chi²	Table Val.	Inference
1. Age (21 yrs)	5	3	8	3	10.44	7.185	P<0.05; S
22 yrs	7	5	12				
23 yrs	5	5	10				
24 yrs & above	5	5	10				
2. Gender (Female)	7	7	14	1	10.22	3.841	P<0.05; S
3. Prior VAP Training (Yes)	8	10	18	1	1.47	3.841	P>0.05; NS
No	14	8	22				
4. ICU Experience (Yes)	9	7	16	1	3.02	3.841	P>0.05; NS
No	13	11	24				
5. Cared for ventilated patients (Yes)	8	12	20	1	3.64	3.841	P>0.05; NS

No	14	6	20				
6. Observed VAP bundles (Regularly)	8	4	12	2	6.57	5.991	P<0.05; S
Occasionally	8	10	18				
No	6	4	10				
7. Source of knowledge (Textbooks)	6	2	8	3	8.31	7.185	P<0.05; S
Clinical instructors	6	8	14				
Workshops/Seminars	6	4	10				
Nursing journals	4	4	8				
8. Infection control education frequency	6	4	10	3	0.25	7.185	P>0.05; NS
Occasionally	9	7	16				
Rarely	4	4	8				
Never	3	3	6				

S = Significant; NS = Not Significant

The chi-square analysis revealed significant associations between pre-test knowledge scores and age (χ^2 = 10.44, P<0.05), gender (χ^2 = 10.22, P<0.05), observation of VAP bundle implementation (χ^2 = 6.57, P<0.05), and primary sources of knowledge (χ^2 = 8.31, P<0.05). However, prior training on VAP (χ^2 = 1.47, P>0.05), ICU experience (χ^2 = 3.02,

P>0.05), and frequency of infection control education (χ^2 = 0.25, P>0.05) were not significantly associated, suggesting that occasional training alone is insufficient for substantial knowledge gain. H_2 was thus partially accepted.

9. RECOMMENDATIONS

Nursing Administration:

- Develop structured infection control training policies and allocate institutional resources for VAP bundle education programs.
- Implement standardized protocols for VAP prevention training and conduct regular workshops and refresher courses.[15]

Nursing Education:

- Integrate VAP prevention bundle training into the nursing curriculum as a mandatory component.
- Develop structured teaching materials, clinical guidelines, and simulation exercises to enhance practical VAP prevention skills.
- Encourage ongoing professional development programs for nurses on infection control best practices.[16]

Nursing Practice:

- Adopt standardized protocols for VAP prevention in ICUs to reduce errors and enhance infection control in ventilated patients.
- Integrate the STP into routine training for nursing students in hospitals and academic institutions.[17]

Nursing Research:

- Conduct further studies with larger sample sizes and multi-site designs to improve generalizability of findings.
- Investigate the long-term impact of structured training programs on VAP prevention practices.
- Encourage interdisciplinary research between nursing, infection control, and critical care experts.[23]

General Recommendations:

- Expand training programs to community health centers and rural healthcare facilities to ensure uniform knowledge dissemination.
- Establish periodic knowledge assessments and refresher courses to sustain knowledge retention and address gaps in VAP bundle implementation.

- Encourage collaboration between nursing schools, hospitals, and health organizations to promote continuous research and policy improvements in infection control training.

10. CONCLUSION

This study confirms that the Structured Teaching Program (STP) was highly effective in enhancing knowledge on VAP bundles and prevention strategies among 2nd year G.N.M. nursing students at RAMA University, Kanpur. The overall knowledge mean percentage improved significantly from 55.3% (pre-test) to 86.0% (post-test), with 92.5% of students achieving adequate knowledge post-intervention compared to 12.5% pre-intervention ($t = 6.17$, $P<0.05$).[25]

Significant improvements were seen across all knowledge domains, reinforcing the need for structured, evidence-based educational interventions in nursing curricula to enhance infection control practices and clinical competency. Age, gender, practical exposure to VAP bundle implementation, and primary sources of knowledge were significantly associated with higher post-test knowledge scores.

The integration of Structured Teaching Programs in nursing education and clinical practice can lead to improved infection control measures, patient safety, and adherence to VAP prevention protocols. Standardized training programs should be adopted in nursing curricula to ensure future nurses are well-prepared to implement evidence-based infection prevention strategies effectively. Regular training sessions, workshops, and integration of VAP bundle education into the nursing curriculum are recommended to ensure proper implementation of VAP prevention strategies for better patient safety and clinical outcomes.

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