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Effectiveness of Selected Bundle Interventions on Compliance of Ventilator - Associated Bundle Care among Nursing Professionals Working In Critical Care Unit

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Abstract: ***Background: Instigating quality health care to critically ill patient is associated with competence, compassion, and excellent care by healthcare professionals. It includes the development and widespread application of evidence-based interventions and the introduction of guidelines and protocol-based care to ensure the delivery of care at a minimum standard. A care bundle approach is a group of interventions that when delivered together lead to a better outcome than performing interventions individually, to prevent ventilator associated problems. Materials and methods: Quantitative evaluative approach with pre-experimental research, one group pre and post-test design with a convenient method of sampling, where seventy staff nurses was selected. A self-structured compliance checklist was used to collect the data. Results: With regard to oral care, positioning the patient in a semi-recumbent position, 47 (67.1%) subjects had followed during the morning and night shifts respectively and 70 (100%) subjects had followed the step during evening shift. The subjects 49 (70%) used the chlorhexidine solution for cleaning the mouth in all the three shifts during pre-test and 68 (97%) had scrubbed during post-test. With regard to head end elevation, of the bed at 45 degrees during the procedure, 32 (45.7%) subjects had followed the elevation in the pretest and 67 (95.7%) subjects had followed during the night shift in the posttest. Regarding eye care, performing pupillary examination during the pretest, 49 (70%), subjects had performed in evening and morning shifts and 70 (100%), had performed in all three shifts respectively during posttest. Regarding the use of an eye dropper or lubricant 46 (65.7%) subjects had used in the morning shift during pretest and in posttest. Conclusion: Health care professionals need to adopt the protocols and policies whichever existing in spite of their hurdles and workload. If it is implemented, the prevention of ventilator associated problems will be minimized and quality care will be improved.***

Keywords: Critically ill patients, Nursing professionals, Evidence-Based Interventions, Care bundle, , ventilator associated problems, Quality care

1.Introduction

Healthcare associated infections area type of infection caused by a prolonged hospital stay and it accounts for a major risk factor for serious health issues among patients who are mechanically ventilated. About 75% of the burden of these infections is present in developing countries. Hospital-acquired infections appeared before the origination of hospitals and became a major health problem during the current era. (**WHO 2019).** It also reported that the occurrence of epidemics of health care associated infections is a major public health problem, posing a significant impact on morbidity, mortality, quality of life and also economic burden at the society level. On an average at a given time 7% of patients in developed and 10% in developing countries acquire at least 80% on Hospital Acquired Infection (HAI). Mortality from HAI accounts for 10% of affected patients**.**

Center for Disease Control (2019) also emphasized that the components of an infection control program include standard and additional precautions, education and training of health care workers, identification of hazards and minimizing risk, aseptic techniques, use of single-use devices, reprocessing of instrument and equipment, Hospital waste management, surveillance, outbreak investigation and finally incident monitoring. Mechanical ventilation is an effective intervention method to save the life of critically ill patients and is widely used in intensive care units.

The international nosocomial infection control consortium (INICC) data suggests a VAP incidence as high as 13.6/1000 mechanical ventilation (MV) days. The occurrence of VAP in Asian countries is much higher and ranges from 3.5 to 46 infections/1000 MV days. (**Mathai 2021)**.

To combat such an incidence a bundled care was introduced. A bundle is a small set of evidence-based interventions for a defined patient segment population and care setting that, when implemented together, will result in better outcomes than when implemented individually. Multifaceted bundle care is a set of evidence-based practices performed collectively and improves the quality of care among patients with a mechanical ventilator. Multifaceted bundle care is used widely across healthcare settings and manages different health problems faced by the patients who are on ventilators. Nursing Professionals play a major role in utilizing the bundle care to combat the ventilator-associated problems.

2.Statement of the Problem

A study to assess the Effectiveness of Selected Bundle Interventions on Compliance of Ventilator Associated

Bundle care among Nursing Professionals working in Critical care unit at selected tertiary care hospital.

Objectives

1. To determine the level of compliance of selected bundle care intervention on ventilator-associated problems among staff nurses working in the critical care unit
2. To identify the associated factors with selected bundle interventions on ventilator associated problems among staff nurses working in the critical care units.

3.Methodology

Research Approach and Design:

The Quantitative evaluative approach with Pre-experimental research with one group pre and posttest design was adopted in this study.

Population and sampling:

A convenient method of sampling, whereby seventy registered staff nurses, working in medical ICU, were selected who met the inclusion and exclusion criteria.

Criteria for sample selection:

Inclusion Criteria:

The health care professionals

- Working in a Medical Intensive Care Unit
- Who has a Degree or Diploma in Nursing
- Who can read and write English.

Exclusion criteria

The health care professionals

- Having less than six months of experience
- Non nursing staffs
- Who were not willing to participate

Ethical considerations

The proposal was presented to the Institutional Ethical Committee (IHEC), and reviewed the proposal on its full board meeting. After getting ethical clearance, data collection was done. Informed consent was obtained from all the study participants and the researcher emphasized that participation in the study is entirely voluntary, the anonymity and the confidentiality of their responses were assured.

Development of Data Collection Instrument:

The tool was prepared by the investigator based on the objectives of the study, after the consultation with the experts in nursing, medical and by doing an extensive review of the literature.

Reliability:

The reliability of the instrument denotes the consistency of measures obtained of an attribute or concept in clinical practice. Based on the results obtained by a pilot study on all three shifts assessment, intra class correlation coefficient for consistency has been calculated and it was observed 0.85 for oral care, 0.90 for head-end elevation and 0.96 for eye care. This indicates good consistency exists in the practice of the staff nurses working in the critical care unit.

Data Collection Procedure

The informed and written consent was obtained from the study participants. The baseline data of demographic and professional variables were collected from the staff nurses. The simulated demonstration was demonstrated to all the nursing professionals as well at the bedside. The practice of health care professionals regarding certain interventional methods including ventilator associated pneumonia bundle which is existing in the hospital was assessed by using the observation checklist developed by the investigator.

Plan for Data Analysis:

The data were analysed by using both descriptive statistics (frequency, mean and standard deviation), and inferential statistics (Paired t test, Friedman test and chi square).

4.Findings and Discussion

Frequency and percentage distribution of Demographic & professional variable

The subjects included in this study reveals that the majority of the subjects 59 (89.3%) were females and 54 (77.1%) belonged to senior staff nurse. In total years of professional experience, most of the subjects 62 (88.6 %) were having work experience of more than five years.

In total years of experience in the critical care unit 47 (67.1) subjects had experienced less than three years and the majority 46 (65.7%) were allotted two patients per shift. Regarding the existence of standard protocol on VAP bundle in ICU, 62 (88.6%) subjects have accepted that they have the protocol and 51 (79%) accepted that VAP training can reduce the ventilator associated pneumonia.

Level of Compliance on Oral Care in pre and posttest among staff nurses working in the critical care unit

With regard to the hand washing and wearing gloves before the oral care, the subjects 35 (50%) had followed during morning and night shifts in pretest and after intervention 70 (100%) subjects had followed the step.

With regard to positioning the patient in a semi-recumbent position, subjects 47 (67.1%) had followed during the morning and night shifts respectively and 70 (100%) subjects had followed the step during evening shift. The

subjects 49 (70%) used the chlorhexidine solution for cleaning the mouth in all the three shifts during pre-test and 68 (97%) had scrubbed during post-test.

Level of Compliance on Head end elevation among staff nurses working in a critical care unit

With regard to assessing the degree of the patient bed, 17 (24.3%) subjects had assessed in the night shift and 7 (10%) assessed in the morning shifts during pretest and in posttest 67 (95.7%) subjects had assessed in all the three shifts respectively. The subjects 70 (100%) had provided semi recumbent position in all the three shifts respectively in pre and postest.

Regarding elevation of the bed at 45 degrees during the procedure32 (45.7%) subjects had followed the elevation in the pretest and 67 (95.7%) subjects had followed during the night shift in the posttest.

Level of Compliance on Eye care among staff nurses working in critical care unit

The subjects 19 (27.1%) had assessed the eyelids & eyelashes in all the three shifts during pretest and 70 (100%), assessed the eyelids & eyelashes in morning and night shifts during posttest. Regarding inspecting the eyes for drainage, irritation and lesions 42 (60%) subjects had inspected in the morning shift during pretest and 68 (97.1%) subjects had inspected during posttest.

With regard to performing pupillary examination during the pretest, 49 (70%), subjects had performed in evening and morning shifts and 70 (100%), had performed in all three shifts respectively during posttest. Regarding the use of an eye dropper or lubricant 46 (65.7%) subjects had used in the morning shift during pretest and in posttest.

Effectiveness of level of compliance on Oral Care Bundle in Pretest, Posttest 1 and Posttest II among Nursing Professionals
N=70

Shift/ Days	Morning		Evening		Night		Freidman test	P value
	Mean	SD	Mean	SD	Mean	SD		
Pre-test	0.37	0.156	0.33	0.116	0.36	0.173	9.268	0.010
Posttest I	0.91	0.079	0.91	0.089	0.95	0.081	24.07	**0.001*** **
Post-test II	0.93	0.071	0.91	0.083	0.96	0.058	0.000	**0.001*** **

***** Significant at P<0.001**

The above table 1, shows the comparison of the mean and standard deviation of compliance on oral care bundle among nursing professionals.

The table shows that the mean value of pretest in the morning shift was 0.37, 0.33 during evening shift, and mean 0.36 in the night shift, thus the difference in mean value of pretest, confirmed by the Freidman test of 9.268, which was not statistically significant.

In posttest I and posttest II, there was an improvement in mean and standard deviation in all the three shifts, thus the difference was confirmed by Freidman test of 24.07, which was highly statistically significant at P<0.001. This shows the effectiveness of the simulated demonstration and practice skills improves compliance with bundle care.

Effectiveness of level of compliance on Head End Elevation Bundle Care in pretest, posttest 1 and posttest II among Nursing Professionals
N=70

Shift/ Days	Morning		Evening		Night		Freidman test	P value
	Mean	SD	Mean	SD	Mean	SD		
Pre-test	0.48	0.129	0.49	0.143	0.51	0.121	8.000	0.018
Posttest I	0.85	0.137	0.84	0.142	0.92	0.105	30.015	**P<0.001*** **
Post-test II	0.96	0.078	0.96	0.083	0.96	0.081	1.000	0.61

The above table 2 shows the comparison of mean and standard deviation of compliance on head end elevation bundle among nursing professionals.

The pretest mean score in the morning shift was 0.48 with the standard deviation of 0.129 during morning shift, pretest mean score in the evening shift was 0.49 with the standard deviation of 0.143 and during night shift it was 0.51 with the standard deviation of 0.121, thus the difference in mean value of pretest, confirmed by Freidman test of 8.000, which was not statistically significant.

In posttest I, the mean score of morning was 0.85 with the standard deviation of 0.137, the mean of 0.84 with the standard deviation was 0.142 in the evening shift and 0.92 of mean score with 0.105 standard deviation in the night shift, thus the difference in mean value of Posttest I, confirmed by Freidman test of 30.015, which was highly statistically significant at P<0.001.

In posttest II, confirmed by Freidman test of 1.000, which was not statistically significant. It confirms the effectiveness of teaching and simulated demonstration Freidman test was calculated, which revealed statistical significant at the level P<0.001 in posttest I.

Effectiveness of level of compliance on Monitoring Eye Care Bundle in pretest, posttest 1 and posttest II among Nursing Professionals
N=70

Shift/ Days	Morning		Evening		Night		Freidman test	P value
	Mean	SD	Mean	SD	Mean	SD		
Pre-test	0.50	0.104	0.48	0.120	0.55	0.088	21.922	**P<0.001*** **
Posttest I	0.94	0.114	0.93	0.132	0.95	0.094	1.620	0.445
Post-test II	0.92	0.089	0.93	0.087	0.98	0.053	28.759	**P<0.001*** **

***** Significant at P<0.001**

The above table 3 depicts the effectiveness of level of compliance on monitoring eye care bundle in pretest, posttest 1 and posttest II among nursing professionals.

The pretest mean score in the morning shift was 0.50 with a standard deviation of 0.104 during morning shift, pretest mean score in the evening shift was 0.48 with the standard deviation of 0.120 and during night shift it was 0.55 with the standard deviation of 0.088, thus the difference in mean value of pretest, confirmed by Freidman test of 21.922 which was statistically significant at the level of P<0.001.

In posttest I, Freidman test of 1.620, confirmed that there was no statistically significant at the level of P<0.001.

In posttest II, the mean score of morning was 0.92 with the standard deviation of 0.089, and 0.93 and with the standard deviation 0.087 in the evening shift and mean score of 0.98 in the evening shift with 0.053 standard deviation, thus the difference in mean value of Posttest II, confirmed by Freidman test of 28.759, which was highly statistically significant at P<0.001.

Association of the pre-test level of knowledge on multifaceted bundle interventions with selected demographic and professional variables among Nursing Professionals

In the study, there was no statistically significant association between demographic and professional variables with knowledge and compliance on multifaceted bundle interventions among Nursing Professionals.

5.Conclusion

The above study findings revealed that there was effectiveness in practicing the bundle care of oral hygiene, elevation of the head end of the bed, and eye care. Following these bundles can minimize the intensive care-acquired infection, and reduce the hospital stay and costs for the critically ill patients. Majority of ICU nurses had average practice scores with poor association. On reviewing and comparing the findings, it was concluded that there was an urgent need to identify the strategies, tools, and techniques to improve practice to ensure the quality of care in order to prevent ventilator associated problems. Quality improvement studies are required to be taken up to improve the practices. In this study, it was found that there was a statistically significant in day wise and shift wise. Additionally, the hospital administration need to find out ways to make nurses more aware of the latest ventilator associated pneumonia prevention bundle guidelines, evidence based information's and must confirm the adherence of same in clinical practices.

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Conflicts of Interest

Nothing to declare.

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