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Original Article

Effectiveness of Structured Training Module on Ventilator Graphic Interpretation Among ICU Nurses Working at NIMS Hospital

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Abstract:

One of the most popular life-support techniques for critically ill patients in intensive care units (ICUs) is mechanical ventilation. Ventilator visuals, such as pressure-time, flow-time, and volume-time waveforms, offer important details on lung compliance, airway resistance, patient-ventilator interaction, and problems related to the ventilator. ICU nurses must accurately interpret these visuals since they are vital to the ongoing care and monitoring of patients on mechanical ventilation. Inadequate understanding and proficiency with ventilator graphic interpretation might impede the detection of problems and negatively impact patient outcomes. In order to improve ICU nurses' understanding and proficiency with ventilator graphic interpretation, systematic educational interventions are necessary.

Methodology: For this study, a pre-experimental one-group pre-test post-test research design using a quantitative research methodology was used. Eighty ICU nurses from NIMS Hospital in Jaipur participated in the study. A non-probability convenience sampling method was used to choose the participants.

Result: The study findings revealed that before administration of the Structured Training Module, 42 (52.5%) ICU nurses had inadequate knowledge regarding ventilator graphic interpretation, whereas only 12 (15%) demonstrated adequate knowledge. With regard to competency, 46 (57.5%) ICU nurses had inadequate competency and only 10 (12.5%) demonstrated adequate competency during the pre-test assessment.

Conclusion: The study concluded that the Structured Training Module was effective in significantly improving the knowledge and competency of ICU nurses regarding ventilator graphic interpretation.

Keywords: ICU nurses, mechanical ventilation, ventilator graphic interpretation, structured training modules, knowledge, competency, and critical care nursing.

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INTRODUCTION

One of the most crucial life-support techniques in contemporary critical care is mechanical ventilation. In patients who are unable to sustain sufficient ventilation and oxygenation on their own, it is a therapeutic approach that either supports or replaces spontaneous breathing.[1] In addition to being essential for the care of critically ill patients, mechanical ventilation has greatly decreased the morbidity and mortality linked to respiratory failure.[2] The development of critical care services and medical technology has made mechanical ventilation a crucial part of patient treatment in intensive care units (ICUs) all over the world.[3]

Respiratory failure is linked to a high risk of morbidity and mortality and is still one of the main

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reasons people are sent to intensive care units. Ventilator assistance is often needed for conditions such acute respiratory distress syndrome (ARDS), chronic obstructive pulmonary disease (COPD), severe pneumonia, sepsis, pulmonary edema, trauma, neurological diseases, poisoning, and surgical problems.[4] In these circumstances, mechanical ventilation offers sufficient oxygenation, makes it easier to expel carbon dioxide, lessens the effort of breathing, and gives the underlying illness process time to be treated.[5]

Due to advancements in intensive care medicine and the increasing prevalence of severe illnesses, the use of mechanical ventilation has significantly expanded during the past few decades.[6] Evolved into sophisticated systems capable of continuous respiratory function monitoring and precise ventilator support. These advanced ventilators provide helpful information about respiratory mechanics, airway pressure, airflow, lung volume, and patient-ventilator interaction through graphical displays called ventilator graphics. A crucial part of modern ventilator monitoring is ventilator graphics.[7]They offer visual depictions of pressure, flow, and volume changes that take place during the respiratory cycle in real time. Pressure-time waveforms, flow-time waveforms, volume-time waveforms, pressure-volume loops, and flow-volume loops are examples of these graphical displays. Healthcare practitioners can assess the efficacy of ventilator assistance and comprehend respiratory mechanics with the use of ventilator visuals.[8]

Because it allows for the early detection of respiratory irregularities and issues with patient-ventilator interaction, the interpretation of ventilator graphics has grown in significance in critical care practice.[9] Healthcare practitioners can identify airway blockage, secretion build up, bronchospasm, air leaks, auto-positive end-expiratory pressure (Auto-PEEP), dynamic hyperinflation, changes in lung compliance, and patient–ventilator asynchrony by accurately interpreting waveforms. Early identification of these anomalies enables timely correction and may avert major mechanical ventilation-related problems.[10]

OBJECTIVES:

1. To assess the baseline knowledge and competency of ICU nurses in interpreting ventilator graphics before the implementation of the structured training module.
2. To implement a structured training module on ventilator graphic interpretation among ICU nurses.
3. To compare the pre-test and post-test knowledge and competency scores of ICU nurses regarding ventilator graphic interpretation in order to determine the effectiveness of the structured training module.
4. To find out the relationship of pre-test knowledge and competency score regarding ventilator graphic interpretation with selected demographic variables of ICU nurses.

HYPOTHESIS:

H_1 : Hypotheses are tentative statements formulated by the investigator to predict the expected relationship between the variables under study.

H_2 : In the present study, hypotheses are formulated to determine the effectiveness of a structured training module on ventilator graphic interpretation among ICU nurses.

H_3 : There will be no statistically significant association between the pre-test knowledge and competency scores of ICU nurses regarding ventilator graphic interpretation and selected demographic variables such as age, educational qualification, years of ICU experience, area of ICU, and previous exposure to ventilator-related training.

METHODOLOGY:

RESEARCH APPROACH:

A quantitative research approach

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RESEARCH DESIGN:

A pre-experimental one-group pre-test post-test research design was adopted for the present study.

SETTING:

The present study was conducted in selected Intensive Care Units (ICUs) of NIMS Hospital, Jaipur, Rajasthan.

POPULATION:

The target population for the present study consisted of all ICU nurses working in tertiary care hospitals.

SAMPLE SIZE:

The sample size for the present study was 80 ICU nurses.

SAMPLE TECHNIQUE:

A non-probability convenience sampling technique was adopted for the present study.

Inclusion Criteria:

The study included ICU nurses who:

- We're working in selected Intensive Care Units of NIMS Hospital, Jaipur.
- Were directly involved in the care of mechanically ventilated patients.
- We're willing to participate in the study.
- Were available during the period of data collection.

Exclusion Criteria:

The study excluded ICU nurses who:

- Were on leave during the data collection period.
- Had previously undergone specialized training in ventilator graphic interpretation within the last six months.
- We're not directly involved in the management of mechanically ventilated patients.

INDEPENDENT VARIABLE:

RESULT:

Table 01 Distribution of ICU Nurses According to Demographic Variables (N = 80)

Demographic Variables	Frequency (f)	Percentage (%)
Age (Years)		
21–30 years	34	42.5
31–40 years	28	35.0
Above 40 years	18	22.5
Gender		
Female	52	65.0
Male	28	35.0
Educational Qualification		
GNM	30	37.5
B.Sc. Nursing	34	42.5
M.Sc. Nursing	16	20.0

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Demographic Variables	Frequency (f)	Percentage (%)
ICU Experience		
< 2 years	26	32.5
2–5 years	32	40.0
> 5 years	22	27.5
Previous Ventilator Training		
Yes	26	32.5
No	54	67.5

Table 2 presents the distribution of ICU nurses according to pre-test knowledge scores regarding ventilator graphic interpretation.

Knowledge Level	Percentage
Inadequate	52.5
Moderate	32.5
Adequate	15.0

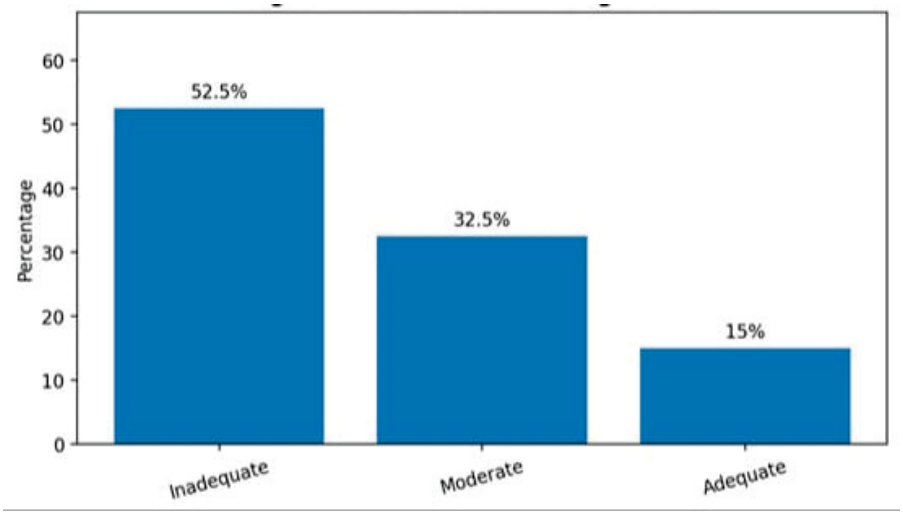

Figure 01: Pre-test knowledge score

Table 3: Distribution of Post-Test Knowledge Scores (N = 80)

Knowledge Level	Frequency (f)	Percentage (%)
Inadequate	12	15.0
Moderate	28	35.0
Adequate	40	50.0
Total	**80**	**100**

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CONCLUSION:

The goal of the current study was to assess how well ICU nurses at NIMS Hospital in Jaipur responded to a structured training program on ventilator graphic interpretation. ICU nurses' knowledge and proficiency were evaluated both before and after the structured training module was administered.

The findings revealed that the majority of ICU nurses had inadequate knowledge and competency regarding ventilator graphic interpretation before administration of the educational intervention. Following administration of the structured training module, a significant improvement was observed in both knowledge and competency scores.

CONFLICT OF INTEREST: The authors declare no conflict of interest.

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