

Effectiveness of Learning Package Regarding Care of a Patient on Mechanical Ventilator to the Staff Nurses of a Selected Hospital in Gwalior

Sunil Namdev

Ph.D. Scholar, University LNCT University Bhopal, Madhya Pradesh, India

Abstract: *This study evaluates the effectiveness of a structured learning package designed to enhance the knowledge and skills of staff nurses in caring for patients on mechanical ventilators within the intensive care setting. With the backdrop of mechanical ventilation being a critical, non-curative intervention aimed at supporting patients until they remain independent breathing capabilities, the necessity for proficient nursing care becomes paramount. Ventilator-associated pneumonia, a significant risk associated with prolonged mechanical ventilation, underscores the need for stringent adherence to aseptic techniques during endotracheal suctioning. Through a blend of theoretical education and practical demonstrations, the research assesses improvements in the nurse's knowledge and skillsets, as evidenced by higher post-test scores compared to pre-test evaluations. Emphasizing the importance of specialized training for nurses, this study highlights the role of comprehensive educational programs in mitigating complications, facilitating patient recovery, and enhancing the overall quality of care in critical care environments.*

Keywords: mechanical ventilation, nursing education, ventilator-associated pneumonia, aseptic technique, endotracheal suctioning

1. Introduction

“When you can't breathe, nothing else matters”

The patient in the intensive care unit often requires mechanical assistance to maintain airway patency. Inserting a tube into the trachea by passing upper airway and laryngeal structures creates an artificial airway.

Endotracheal intubation is more common in intensive care unit patients. It can be performed quickly and safely at the bedside. A tracheostomy is a surgical procedure that is performed when there is need for an artificial airway for a longer period of time.

Mechanical ventilation is the process by which room air or oxygen - enriched air is moved into and out of the lungs mechanically.

2. Background of the problem

Mechanical ventilation is not curative. It is a means of supporting patients until they recover the ability to breathe independently.

In patients receiving prolonged ventilation, sputum cultures often grow gram negative bacteria such as pseudomonas, serratia and klebsiella.

These are abundant in the hospital. Organisms can spread in number of ways including contaminated respiratory equipment, inadequate hand washing, adverse environmental factors such as poor room ventilation and decreased patient ability to cough and clear secretions.

Endotracheal tube bypasses normal airway defence. Poor nutritional state, immobility and the underlying disease process (e. g., immuno suppression, organ failure) make the patient more prone to infection. The prevalence of

ventilator - associated pneumonia is very high compared to other types of pneumonia. In addition, patients who develop ventilator associated pneumonia have significantly longer hospital days and higher mortality rates. Infection can be minimised using strict aseptic technique while suctioning.

Today nursing has changed from traditional intuitive nursing to modern cyber space nursing. Technological advances demand more qualified and specially trained nurses, particularly in critical areas, emergency areas and in medical surgical units in the tertiary care hospitals.

Nurses are expected to perform multiple tasks that are performed by clinicians, nurse practitioners, nurse educators, nurse consultants, nurse specialists, nurse administrators and nurse researchers.

Quality of teaching has most important influence on the quality of nursing outcomes.

3. Need for the Study

Mechanical ventilation is widely used therapeutically for critically ill patients. Endotracheal suctioning is the necessary procedure carried out in the intensive care units. Ventilator - associated pneumonia is the major complication. Hence, it is essential for the nurses to have adequate knowledge of and expertise in performing this procedure safely and effectively to minimise these hazards.

The scientific knowledge on which nurses base their clinical practice is often lacking. Nurses' lack of adherence to aseptic technique may be a factor in transmitting infection or cross infection. When an infection can be prevented by ordinary and reasonable care, nurses must use such care. Adequate knowledge is required to follow the aseptic technique.

The nursing staff in collaboration with other members of the healthcare team are responsible for providing comprehensive care to the mechanically ventilated patients. Therefore, they need to have a good working knowledge of concepts related to mechanical ventilation, working principle, components of general nursing interventions, communication needs of a patient, potential complications of mechanical ventilation, strategies for prevention of complications, and guidelines for weaning.

Nurses are the frontline health personnel who provide the care aspect of cure to patients who need mechanical ventilation. Thus, a nurse has to undergo a specified training in taking care of patients on mechanical ventilator, thereby ensuring quality care which in turn will promote efficient utilisation of hospital resources. This knowledge could aid the nurse to facilitate early recovery of the patients, hasten discharge and enhance cost effectiveness through reduction of inpatient stay in hospital.

A study was conducted to assess the effectiveness of standard endotracheal suctioning technique on patients with mechanical ventilator to the nursing personnel of a selected hospital in Pune. An evaluative research approach was used with the size 50. The overall mean post - test knowledge score (27) was significantly higher than the overall pre - test score (17). The paired 't' test value was 25.52 ($t_{49} = 3.4, P < 0.01$)⁷.

A study was conducted on the assessment of knowledge and practice of 30 nursing personnel regarding immediate post - operative care of cardiac clients on ventilator in cardiothoracic intensive care units (CTICU). The study revealed that 60% of nurses had below average knowledge and practice and 40% had above average knowledge and practice. The findings of the study showed that they did not have special training in the care of patients on mechanical ventilator. The mean post - test knowledge score ($x_2 = 35.5$) was significantly higher than the mean pre - test knowledge score ($x_1 = 24.5$) with $t_{(29)} = 6.61$ at 0.05 level of significance.

4. Objectives

The objectives of a study include testing the research hypotheses, but may also encompass some broader aims like developing recommendations for changes to nursing study results.

Statement of the problem

Effectiveness of learning package regarding care of a patient on mechanical ventilator to the staff nurses of a selected hospital in Gwalior.

Objectives

- 1) To assess the knowledge of staff nurses regarding the care of a patient on mechanical ventilator as measured by structured knowledge questionnaire
- 2) To assess the skill of staff nurses in performing endotracheal suctioning procedure as measured by observation checklist.

- 3) To determine the effectiveness of learning package in terms of gain in knowledge score and skill score of the staff nurses.

Operational definitions

Effectiveness

In this study, it refers to the extent to which the learning package has achieved the intended result in the staff nurses in terms of gain in knowledge and skill score as measured by knowledge questionnaire and observation checklist.

Learning package

In this study, learning package refers to a systematically written educational material containing instructional module for the staff nurses regarding the care of a patient on mechanical ventilator and demonstration of endotracheal suctioning.

The package consists of 3 sections with a total of 10 modules.

Section 1: Review of anatomy and physiology of the respiratory system.

Section 2: Mechanical ventilators.

Module 1: Definition and indications for mechanical ventilators

Module 2: Types of mechanical ventilators.

Module 3: Modes of mechanical ventilators.

Module 4: Basic ventilator settings and working principles.

Section 3: Nursing care of a patient on mechanical ventilator.

Module 1: Recording of ventilator parameters and vital signs.

Module 2: Endotracheal tube suctioning.

Module 3: Arterial blood gas analysis.

Module 4: Nutritional needs, psychosocial needs and communication needs.

Module 5: Complications and prevention.

Module 6: Weaning from ventilator

Staff nurses

In this study, it refers to the nursing personnel who have successfully completed diploma in nursing or B. Sc. nursing with at least two months of clinical experience and are working in a Intensive Care Units of selected hospital in Gwalior.

Knowledge

In this study it refers to the correct responses obtained from the staff nurses regarding the care of a patient on mechanical ventilator expressed in terms of gain in knowledge score as measured by structured knowledge questionnaire.

Skill

In this study, it refers to the explanation and step - wise actual performance of endotracheal suctioning as per the

written and validated guidelines for endotracheal suctioning as measured by an observation checklist.

Assumptions

- 1) The staff nurses will have some knowledge regarding the management of patients on mechanical ventilator.
- 2) Learning package is considered as an accepted teaching strategy to improve the knowledge and skill of staff nurses.

Hypotheses

All hypotheses will be tested at 0.05 level of significance.

H₁: The mean post - test knowledge score of staff nurses regarding the care of a patient on mechanical ventilator will be significantly higher than the mean pre - test knowledge score.

H₂: The mean post - test skill score of staff nurses in performing endotracheal suctioning procedure will be significantly higher than the mean pre - test skill score.

H₃: There will be significant relationship between knowledge score and skill score of staff nurses in endotracheal suctioning.

H₄: There will be significant association between knowledge, skill and selected variables such as professional qualification, (degree/diploma) working experience in intensive care unit and exposure to training programme in caring for clients on mechanical ventilator.

5. Conceptual Framework

Conceptual framework is a theoretical approach to the study of problems that are scientifically based and emphasises the selection and clarification of its concepts.

Conceptual framework acts as a building block of the research study.

The overall purpose of the framework is to make scientific findings meaningful and generalised. It provides a certain frame of reference for clinical practice, research and education.

The present study aims at evaluating the effectiveness of learning package regarding care of a patient on mechanical ventilator to the staff nurses to enhance their knowledge and also to improve their skill in performing endotracheal suctioning.

The conceptual framework is based on the Inductive Model of Teaching developed by Hilda Taba. She identified a set of cognitive tasks and then developed a set of teaching moves called teaching strategies.

It is one of the information processing models. It primarily aims for development of inductive mental processes and academic reasoning. Its central focus is on the mental ability and emphasis on concept formation. The purpose of

concept formation is to induce learners/students to expand the conceptual system with which they process information.

She identifies three postulates about thinking. They are:

- 1) Thinking can be taught (using any of the teaching methods). In the present study learning package regarding the care of a patient on mechanical ventilator is administered to the subjects to generate/stimulate thinking.
- 2) Thinking is an active transaction between the individual and data. In this study active transaction of thinking is between the investigator and subjects. Active transaction is also promoted by learning the contents of the learning package.
- 3) The process of thought evolves in a sequential order. In this study process of thought follows sequential order as follows: review of literature, content validation by experts, developing the learning package, pre - test, administration of learning package followed by demonstration of endotracheal suctioning procedure and post - test.

Thinking helps the learner to go beyond the data given; there is a deliberate attempt to increase productive or creative thinking. It helps the learner to ingest and process large quantity of information.

In the present study the learning package regarding the care of a patient on ventilator is given to the staff nurses by the researcher to improve the knowledge regarding care of a patient on mechanical ventilator. The learning package is presumed to develop the following attributes in the learner involved in the study, which are also the 5 concepts of Hilda Taba's Inductive Model of Teaching.

In the present study the learner attributes expected to develop are:

- 1) **Basic concept formation** – staff nurses are expected to learn anatomy and physiology of respiratory system in order to understand the concept related to mechanical ventilation and care of patient on ventilator.
- 2) **Specific concept formation** – staff nurses are expected to understand the concepts related to mechanical ventilator which include definition, indication, types and modes of ventilator.
- 3) **Attention to logic** - logic is a formal scientific method of examining or thinking about ideas. The staff nurses must understand the principles of functioning of a ventilator.
- 4) **Sensitivity to changes in behaviour** – sensitivity is understanding what other people need and being helpful and kind to them. So the nurses are expected to be sensitive to the communication, nutritional and psychosocial needs of a mechanically ventilated patient.
- 5) **Awareness of knowledge and application** – the nurses are expected to practice whatever they learn in theory, i. e., maintaining aseptic technique while performing endotracheal suctioning and following all the steps of procedure. They should also be knowledgeable regarding the associate care aspects of

patient on mechanical ventilator such as ABG analysis, prevention of complication and weaning from mechanical ventilator.

At each of these stages the learner would be required to expand her capacity to handle information.

The central focus of the researcher in this study is to promote knowledge and specific skill of staff nurses regarding care of a patient on mechanical ventilator based on the above said concepts.

This would enhance their ability for effective application of learnt matter in nursing practice. Assessment of knowledge is done by a structured knowledge questionnaire, and improvement in skill is observed by an observation checklist (pre - test). The learning package will be administered to the staff nurses followed by demonstration of endotracheal suctioning procedure immediately after pre - test.

Post - test will be conducted after seven days to assess the effectiveness of learning package and demonstration of endotracheal suctioning. If the objectives of the learning package are achieved, the learner would gain knowledge and skill to provide comprehensive care to the patient on ventilator and also improve the skill of performing endotracheal suctioning. In summary, the whole conceptual design is developed on the basis of Hilda Taba's Inductive Teaching Model which is designed to instruct students in concept formation and simultaneously to teach concepts

Delimitations

- 1) The study is delimited to those who are willing to participate in the study.
- 2) The study is delimited to the staff nurses working in the intensive care units at the time of data collection.

Scope of study

- 1) The findings of the study will reveal the existing knowledge and skill of staff nurses regarding care of a patient on mechanical ventilator.
- 2) Learning package can be used to educate the staff nurses as well as nursing students.
- 3) The staff nurses can use it as a handbook while caring for patients.
- 4) The study will also help in preventing nosocomial infection and bring about awareness on the prevention of complications associated with mechanical ventilators.
- 5) The study will also bring about awareness for further studies in other areas of nursing management of patient on ventilator.
- 6) Improved knowledge regarding care of a patient on mechanical ventilator will help staff nurses diagnose nursing problems and provide better quality care.

6. Summary

The chapter dealt with the conclusions drawn based on the findings of the study. The respondents were satisfied and happy with the information they received. The study was a new learning experience for the investigator. The results of the present study showed that there is a great need for the staff nurses to update their knowledge regarding care of a patient on a mechanical ventilator. The study revealed that the learning package could be used as an effective teaching strategy.

References

- [1] Anderson HL. What interventions facilitate weaning from the ventilator.2004. Available from: URL: <http://www.int.org/vent/>
- [2] Lewis SM, Medial surgical nursing.6th ed. Philadelphia: Mosby Publications; 2004.
- [3] Susan L. Quality assurance. American Journal of Respiratory and critical care medicine 2003; 168 (5); 56 - 9.
- [4] Harries, Bernstein. Clean versus sterile tracheostomy care and level of pulmonary infection. Journal of advanced nursing 2004; 80 (6); 155 - 8
- [5] Crighton H. Legal aspects of nosocomial infection. Am J Nurs 1980; 789 - 92.
- [6] Vicki A. Lindgsen. Nursing knowledge and assessment skills in the management of patients with head injury. Am j of Nurs 2005 May; 105 (5): 52 - 4.
- [7] Mary P. Effectiveness of standard endotracheal suctioning technique. Nursing Journal of India, 2005 May; 28 (6): 5 - 7.
- [8] Sumithra P. Study to assess the knowledge and practice of nursing personnel regarding immediate post operations care of cardiac surgery client on ventilator in cardio thoracic intensive care units at selected hospitals of Hyderabad. Thesis submitted to N. T. R. university of health sciences Vijayawada, 1998.
- [9] Bernard. Insurance education and its importance. Am J Nurs 2001; 87 (5): 56 - 7
- [10] Tharnamme. N Pneumonia in mechanically ventilated patients Journal of medical Association 1995; 56 (2): 102 - 4.
- [11] Polit DF, Hungler BP. Nursing research principles and methods.18th ed. Philadelphia: J. B. Lippincott Company; 2004.
- [12] Basavanthappa BT. Nursing research. New Delhi: Jaypee Brothers; 1998.
- [13] Abdellah FG, Levine E. Better patient care through nursing research. 3rd ed. Macmillan Publishing Company; 1986.
- [14] Sanatombi Devi E. Manipal manual of nursing education.1st ed. New Delhi: CBS Publishers and Distributors; 2006.
- [15] Joyce B, Weil M. Methods of teaching.2nd ed. New Delhi: Prentice - Hall of India; 1985.