

KNOWLEDGE AND PRACTICE REGARDING CARE OF THE PATIENTS WITH MECHANICAL VENTILATOR AMONG NURSES WORKING IN SELECTED HOSPITAL OF PROVINCE - 3

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ABSTRACT

Background: Mechanical ventilation is an essential, lifesaving therapy for patients with critical illness in intensive care unit. Mechanical ventilators can be defined as a technique through which gas is moved towards and from the lung through an external device connected directly to the patients. Mechanical ventilators are a machine that helps people breathe when they are not able to breathe enough on their own. The patient in the intensive care unit often requires mechanical assistance to maintain airway patency. **Methods:** A descriptive cross sectional study design was used in the study. Non-probability purposive sampling technique was adopted while selecting the setting and samples. Total 51 nurses were selected to answer the research questionnaires. **Results:** Total 51 participants were involved in the study among which majority of the participants 30(58.8%) had adequate and 21(41.2%) had inadequate knowledge regarding care of patients with mechanical ventilator. Likewise, 49(96.1%) of participants had adequate practice and only 2(3.9%) participants had inadequate practice regarding care of the patients with mechanical ventilator. Correlation between knowledge and practice revealed that positive and weak. **Conclusion:** The majority of participants had adequate knowledge on care of patients with mechanical ventilator. Although the overall knowledge of participants was good there is still some participants have poor knowledge and practice. Positive and weak correlation between knowledge and practice. Comparatively knowledge is poor than the practice. Accordingly, to increase the knowledge of participants working in the critical units, proper training and in-service education program must be needed.

KEYWORDS: Knowledge, Practice, Mechanical Ventilator, Nurses.

INTRODUCTION

Mechanical ventilation is an essential, lifesaving therapy for patients with critical illness in intensive care unit.^[1] Mechanical ventilators can be defined as a technique through which gas is moved towards and from the lung through an external device connected directly to the patients. Mechanical ventilator is a machine that helps people breathe when they are not able to breathe enough on their own. The patient in the intensive care unit often requires mechanical assistance to maintain airway patency.^[2] Current generations' ventilators incorporate computerized systems to deliver and monitor ventilator parameters. Therefore, nurses need to gain in-depth knowledge and advance

Globally, 90 % of the ICU patients need mechanical ventilation support.^[3] About 64, 69,674 patients need hospitalization in the six states of USA reported that

180326 people i.e.2.8% received invasive mechanical ventilation.^[4] As mechanical ventilation is essential to maintain ventilation and oxygenation but patients on mechanical ventilation are prone to develop complications such as alveolar hypoventilation, alveolar hyperventilation, and electrolyte imbalance, Pneumothorax and Ventilator Associated Pneumonia (VAP) etc. Studies have shown that ventilator associated complications prolong the length of stay in intensive care unit and increase the risk of death in critically ill patients.^[5] Increasing need of mechanical ventilators cost of 15-27 billion dollars every year in the developed countries.^[6]

It is highly important that the intensive care unit team should have a good knowledge and practice of the Mechanical ventilators in preventing the MV-associated complications or in diagnosing the developing

complications before it is too late. For this reason, the nurses working in ICUs should have a good knowledge about the MV indications, the mechanical ventilation modes and settings, the reason of alarm and the interventions for their solution.^[7] The fact is that when the nurses are known of the problems in M.V. and their appropriate actions may eliminate the acute respiratory distress, shortness of breath and the increasing respiratory load and prevent the complication.^[8]

RESEARCH METHODOLOGY

Methodology implies more than simply the method we intent to use to data.it is often necessary to include a consideration of the concepts and theories which underline the methods, for instance, if we intend to highlights a specific feature of sociological theory or test an algorithm for some aspect of information retrieval, or test the validity of a particular system, we have to show that we understand concepts of the methodology.

Research Design

A descriptive cross-sectional study design was used in this study.

Research Setting

The research was conducted at Intensive Care Unit, Norvic International Hospital. It is existed in heart of Kathmandu in 1994.The hospital operates 150 beds and certified as of ISO 9001:2015 standards.

Study Population

All the nurses of Nepal working in critical care units are study population.

Inclusion criteria

All nurses working in selected critical care units of Norvic International Hospital.
Who are willing to participate in the study
Who are present at the time of data collection

Sample Size

Sample size was selected by complete enumeration sampling method.

Sampling Technique

Non-probability purposive sampling technique was used while selecting the setting and choosing sample size.

Instrument Validity

The contents validity of the instruments was ensured by extensive literature review and obtaining opinions from subject's experts and research guide and pair review as well.

Pretesting

The reliability of the instrument was established by pre-testing of the instrument among 10% of the samples with similar characteristics in different setting i.e. Chiyau

International Hospital Bashundhara Kathmandu. Necessary modification of instrument was done based on obtained feedback, comments and suggestions. Also made more understandable to selected nurses.

Instruments

Self-administered semi-structured questionnaire was developed by researcher herself by consulting the subject experts and supervisors. Questionnaire was categorized into three parts.

Part I: Questionnaire related demographic information of Participants.

Part II: Questionnaire related to knowledge regarding care of patients with mechanical ventilator among nurses.

Part III: Questionnaire related to Practice regarding care of patients with mechanical ventilator among nurses.

Data collection Procedure

Data was collected through online basis after getting the approval from concerned authority of Norvic International Hospital. Questionnaire in google form was forwarded to all the participants of intensive care unit (CCU,NICU,MICU, SICU, GICU) and response on questionnaires was received within 10 days (Date 2077/06/29 to 2077/07/07).

Data Analysis and Processing

The collected data was checked for accuracy, consistency and completeness. Coding was done. The data was entered in computer and analyzed by using statistical package of social science (SPSS) version 22 as well as data cleaning procedure.

FINDING OF THE STUDY

Introduction

This chapter deals with in depth analysis and interpretation of the findings on knowledge and practice regarding care of the patients with mechanical ventilator among nurses working in selected hospital. All the date was analyzed and interpreted based on objectives of the study. This chapter comprises the analysis presentation and interpretation of the finding analysis of socio-demographic, knowledge and practice.

Major Findings

Part I: Socio-demographic information of the participants.

Part II: Knowledge regarding care of patients with mechanical ventilator.

Part III: Practice regarding care of patients with mechanical ventilator.

Part IV: Correlation between knowledge and practice regarding care of patients with mechanical.

Table 1: Socio - Demographic information of participants.

n=51

Demographic data	Frequency (n)	Percentage (%)
Age		
17-20	4	8
21-25	34	68
26-30	12	24
Ethnicity		
Brahmin	21	42
Chhetri	12	23
Janajati	16	2
Newar	1	2
Rai	1	2
Education Status		
BSC Nursing	19	37
BN	18	35
PCL	14	28
Marital Status		
Married	25	49
Unmarried	26	51
Working Experience		
6-12 months	15	29
1-3 years	17	34
3-5 years	19	37
Working Department		
CCU	14	27
MICU	4	10
SICU	19	37
NICU	8	15
GICU	6	11
Training on MV		
Yes	32	62
No	19	38
Training on VAP		
Yes	19	37
No	32	63

Table 1 depicts the socio demographic characteristics of the participants. Where the majority of participants were aged between 21-25 years 34(68%). The majority of the respondents were unmarried 26(51%). Majority of the participants were Brahmin 21(42%) and Janajati were 16(31.3%). The majority of the participants level of education were BSC nursing 19(37%) and 18(35%) were

BN. The majority of the work experience among the participants were 2-5 years 32(62%). 32(62%) participants had received training on mechanical ventilator and remaining 38% had not received. Similarly, all must 63% participants had not received training and 37% participants had to received training on prevention of VAP.

Table 2 knowledge regarding meaning and mode of mechanical ventilation.

n=51

Variable	Frequency(n)	Percentage (%)
Meaning of mechanical Ventilator		
A device that helps breathing to a person who cannot breathe own.	45	88.2
A device that helps easy breathing in patients	6	11.3
Mode of M.V.		
PCV	51	100
SIMV	51	100
CPAP	51	100
PSV	24	67
Meaning of SIMV mode		

Synchronized intermittent mechanical ventilation	11	21.5
Synchronized intermittent mandatory ventilation	40	78.5
Meaning of PEEP		
Partial end expiratory pressure	1	2
Positive expiratory pressure	1	2
Positive end expiratory pressure	49	96

Table 2 shows that majority of participants answered M.V as a device which helps breathing to a person who cannot breathe own which is about 45(88.2%) and almost 100% participants PCV, SIMV, CPAP, PSV as mode of mechanical ventilator in multiple response question. As

well 40(78.5%) participants answered meaning of ventilator SIMV mode means Synchronized intermittent mandatory ventilation. Similarly, 49(96%) participants answered Ventilator parameter PEEP means positive end expiratory pressure.

Part II: Knowledge regarding care of patients with mechanical ventilator.

Table 3: Knowledge on indication and parameter of mechanical ventilation.

n =51

Variable	Frequency(n)	Percentage (%)
Indication of mechanical ventilation		
Acute respiratory distress syndrome.	51	100
Severe head injury	10	7.8
Respiratory failure	51	100
Ventilation-perfusion mismatch	15	19.6
Parameter of mechanical ventilation		
Tidal volume	45	88.2
Peep	49	96
Minute volume	9	17.8
Pressure support	49	94.1
Complication of mechanical ventilator		
Ventilation acquired pneumonia	50	98
Sepsis	37	72.5
Respiratory distress syndrome	38	76.5
Renal failure	23	45.1

Table no 3 shows that all the participants 51(100%) answered Acute respiratory distress syndrome and Respiratory failure as an indication of M.V. Majority of participants 49(96%) answered PEEP and Pressure

support as a parameter of mechanical ventilator. Most of the participants 50(98%) Ventilation acquired pneumonia is the complication of M.V in multiple response question.

Table 4: Knowledge on minute volume, mode and weaning criteria of mechanical ventilator.

n=51

Variable	Frequency (n)	Percentage (%)
Minute Volume equal to		
Tidal Volume *Respiratory rate	40	78.4
Tidal Volume/Respiratory rate	11	21.6
Weaning criteria for mechanical Ventilator		
Spontaneous respiration force at least 20cm H2O	51	100
Weaning mode of mechanical ventilator		
ASB	2	3.9
CPAP	45	88.2
SIMV	4	7.8
Mode of Ventilation allow the patients to breathe Spontaneous		
CPAP	4	7.8
SIMV	47	92.8

Table 4 depicts that participants has knowledge about minute volume 40(78.4%) participants answered the minute volume equal to Tidal volume*Respiratory rate.

As well 51(100%) participants answered weaning criteria for mechanical ventilator is Spontaneous respiration force at least 20 cm H2O. Almost more than half of the

participants 45(88.2%) said CPAP is the commonly weaning mode of mechanical ventilator. Most of

participants answered 47(92.8%) SIMV mode of ventilation allow the patients to breath spontaneous.

Table 5: Knowledge on Endotracheal Suctioning.

Variable	Frequency(n)	Percentage (%)
Time of endotracheal suctioning		
15sec	47	91.2
20sec	4	8.8
Selection of suction catheter		
Take the size of ET Tube and multiply by 2, then take size lower than multiplied number	4	8.8
Take the size of ET Tube, multiply by 3, and divided by 2.	47	91.2
Success full suctioning		
Auscultation of lung	3	5.9
Improvement in Spo2level	1	2
All of the above	47	92.1
Importance during suctioning		
Hypo inflation, hyperventilation, hyper oxygenation	34	66.7
Hypo inflation, hyperventilation, Hypo Oxygenation	17	33.3

Table no 5 shows that most of the participants answered 47(91.2%) 15 sec is the maximum time limit for endotracheal suctioning. Almost more than half of the participants 47(%) answered as Take the size of ET Tube and multiply by 3 and divided by 2 is the proper size and

length of suction catheter. Most of the participants 47(92.2%) knew all of the above is the key of conform successful suctioning. Majority of participant 34 (66.7%) knew Hypo inflation, hyperventilation, Hyper oxygenation is importance during suctioning of ET tube.

Table 6: Knowledge on cause of barotrauma and cuff pressure.

n=51

Variable	Frequency(n)	Percentage (%)
Causes of barotrauma		
High airway pressure	49	96.1
High tidal volumes	2	3.9
Normal value of cuff pressure		
10-20 mm of hg	9	17.6
20-30 mm of hg	39	76.5
5-10 mm of hg	3	5.9

Table no 6 shows that most of the participants 49(96.1) answered high airway pressure is the cause of barotrauma. As well as Maximum participants answered

39(76.5%) 20-30 mm hg cuff pressure should be prevent tracheal damage.

Table 7: Knowledge on purpose of position change and prevention of VAP

n=51

Variable	Frequency (n)	Percentage (%)
Purpose of position		
Facilitate lung expansion and prevent from aspiration	8	15.7
Facilitate secretion removal	5	9.8
Prevent from pressure sore	38	74.5
Prevention of VAP		
Oral care every 4 hours	45	88.2
Position changes every 2 hours	40	78.4
Head elevation at 30-45degree	45	88.2
Proper hand washing	5	9.8

*Multiple responses

Table no 7 shows that most of the participants 38 (74.5%) said that the purpose of position change every

2hourly among patients with mechanical ventilator is to prevent from pressure sore. Almost more than half of the

participants 45 (88.2%) preferred oral care every 4 hours and head elevation at 30-45 degree is followed to prevent ventilator acquired pneumonia.

Part III: Practice on care of patients with mechanical ventilator.

Table 8: Practice on endotracheal suctioning.

Variable	Frequency(n)	Percentage (%)
Hand washing before and after s suctioning		
Yes	51	100
Check the level of ET Tube		
Yes	51	100
Wear sterile glove during ET Tube suctioning		
Yes	50	98
No	1	2
Administer 100% oxygen before ET suctioning		
Yes	51	100
Maintain suction pressure between 120-150 mm of hg		
Yes	48	94
No	3	6
Apply suction pressure on insertion of suction catheter		
Yes	23	45.1
No	28	54.9
Assess airway and repeat suctioning as necessary		
Yes	50	98
No	1	2
Discard suction tube immediately after single use		
Yes	48	94.1
No	3	5.9
Perform appropriate recording and reporting after procedure		
Yes	50	98
No	1	2

The table no 8 practice of nurses shows that all participation 51(100%),51(100%) hand washing before and after suctioning, check the level of ET Tube before suctioning. like-wise in this study Most of the participants 50(98%),51 (100%), 48(94%) Wear sterile glove during ET Tube suctioning, administer 100% oxygen before ET suctioning and Maintain suction pressure between 120-150 mm of hg during suctioning

respectively. More than half of the participants 28(54.9%) did not applied suction pressure on insertion of suction catheter. Must of participants 50(98%), 48((94.1%) 50(98%) Assess airway and repeat suctioning as necessary, discard suction tube immediately after single use and Perform appropriate recording and reporting after procedure.

Table 9: Practice on oral care of patients with mechanical ventilation.

Variable	Frequency(n)	Percentage (%)
Wear clean gloves during oral care of intubated patients		
Yes	48	94.1
No	3	5.9
Apply water-soluble jelly to patients lip after oral care		
Yes	46	90.2
No	5	9.8
Use (chlorhexidine solution, sodium bicarbonate or Normal saline) for oral care of patients under mechanical Ventilator.		
Yes	50	98
No	1	2
Perform oral care of patients every 4-6 times a day patient under mechanical ventilator.		
Yes	43	84.3
No	8	15.7

Table no 9 shows that most of the participants 48(94.1%) answered in wear clean gloves during oral suctioning. majority of the participants 46(90.2%) apply water soluble jelly to lip after oral care of patients with mechanical ventilator. Most of the participants preferred 50(98%) Use (chlorhexidine solution, sodium

bicarbonate or normal saline) for oral care of patients under mechanical ventilator. Similarly, majority of the participants 43(84.3%) performed oral care of patients every 4-6 times a day patient under mechanical ventilator.

Table10: Practice on to eye care, position of patients and precaution for VAP.

n=51

Variable	Frequency(n)	Percentage (%)
Perform eye care of patients under mechanical ventilator		
Yes	50	98
No	1	2
change position of patients every 2 hourly under M.V		
Yes	51	100
Yes	51	100

Table 10 practice of nurses shows that most of the participants 50(98%) Perform eye care of patients under mechanical ventilator. All the participants have excellent practice 51(100%) change position of patients every 2

hourly under Mechanical ventilator. All the participants 51(100%) followed precaution for prevention of ventilator acquired pneumonia.

Table11: Level of Knowledge and Practice regarding care of the patients with mechanical ventilator.

n=51

Level	Frequency(n)	Percentage (%)
Knowledge Score		
Inadequate	21	41.2
Adequate	30	58.2
Practice Score		
Adequate	2	3.9
Inadequate	49	96.1

Table 11 shows that more than half of the participants have to adequate knowledge 30(58.8%) and 21(41.2%) have an inadequate knowledge regarding care of patients with mechanical ventilator among nurses. Similarly,

most of participants 49(96.1%) have adequate and 2(3.9%) have inadequate practice regarding care of mechanical ventilator among the nurses.

Part IV: Correlation between knowledge and practice regarding care of patients with mechanical.

Table: 12: Co-relation between Knowledge and Practice.

		Knowledge	Practice
Know Score	Knowledge and Practice	1	0.36
	P value		0.86
Practice Score	Pearson Correlation	0.36	1
	Sig.(2 tailed)		0.801

The table 12 shows that, the Pearson Co-relation between Knowledge and Practice is 0.036. However, this coefficient is statically insignificant at 95% of practice level (p=0.801).

DISCUSSION AND CONCLUSION

This chapter includes the discussion, conclusion limitation, recommendation and plan for dissemination provided to improve the existing situation for further study. The conclusion was drawn based on the facts and finding Relating to the research objectives.

DISCUSSION

The study was aimed to find out knowledge and practice about the care of mechanical ventilator among nurses. Therefore, the discussion has been by focusing the finding of analysis and interpretation of data.

Regarding socio demographic characteristics of nurses this study shows that majority of them 34 (66.6%) were age group between 21-25 years. About religion, majority, 40 (78.4%) belongs to Hindu. Similarly, regarding academic qualification more than 30 (58.8%) were B.Sc. nursing. Majority have work experience above 3 years

19(37.2%). The data shows that 32(62.7%) have training on mechanical ventilator and 19(37.2%) have not received any training. More than half of participants 32(62.7%) have and 19(37.2%) have training on prevention of VAP.

The finding of present study is supported by Ravikant S, Shiv M to assess the Knowledge and Skill Regarding Care of a Patient on Mechanical Ventilator among the Staff Nurses working in ICU. More than half 55% and 56.66% of study participants were 21-25 years of age and male respectively. Majority of them 90% had qualification of Diploma nursing and 73.3% were working from 2 months to 1 year and 70% had not expose to any training program on mechanical ventilator.

The knowledge of nurses shows that majority of participants answered M.V as a device which helps breathing to a person who cannot breathe own which is about 45(88.2%) and almost 100% participants PCV, SIMV, CPAP, PSV as mode of mechanical ventilator in multiple response question. As well 40(78.5%) participants answered meaning of ventilator SIMV mode means Synchronized intermittent mandatory ventilation. similarly, almost 49(96%) participants answered Ventilator parameter PEEP means positive end expiratory pressure. all the participants 51(100%) answered Acute respiratory distress syndrome and Respiratory failure as a indication of M.V. Majority of participants 49(96%) answered PEEP and Pressure support as a parameter of mechanical ventilator. Must of the participants 50(98%) Ventilation acquired pneumonia is the complication of M.V. 40(78.4%) participants answered the minute volume equal to Tidal volume*Respiratory rate. As well 51(100%) participants answered weaning criteria for mechanical ventilator is Spontaneous respiration force at least 20 cm H2O. Almost more than half of the participants 45(88.2%) said CPAP is the commonly weaning mode of mechanical ventilator Most of participants answered 47(92.8%) SIMV mode of ventilation allow the patients to breath spontaneous. Most of the participants answered 47(91.2%) 15 sec is the maximum time limit for endotracheal suctioning. Almost more than half of the participants 45 (88.2%) preferred oral care every 4 hours and head elevation at 30-45 degree is followed to prevent ventilator acquired pneumonia.

The finding of present study is supported by S Saritas, A kaya, to assess the Knowledge and Practices of Intensive Care Nurses on Mechanical Ventilation. When the knowledge of the ICU nurses on the technical data and terms of MV was examined 24% of the nurses answered correctly the question on the Pao2 and the respiration type, which are critical value in the MV initiation; 86% answered correctly the question on the modes used in the ventilation process, and 68% answered correctly the question on meaning and function of the term PEEP. While 60% of them did not answer correctly, the question on the causes of the MV's high-pressure alarm

and 71% did not answer correctly the question on the MV's low-pressure alarm.

Assess practice level regarding care of patient with mechanical ventilator among nurses:

The practice of nurses shows that all participation 51(100%) hand washing before and after suctioning. As well as 51(100%) participants check the level of ET Tube before suctioning. Most of the participants 50(98%) Wear sterile glove during ET Tube suctioning. All the participants 51(100%) Administer 100% oxygen before ET suctioning. Majority of participants 48(94%) Maintain suction pressure between 120-150 mm of hg during suctioning. Most of the participants preferred 50(98%) Use (chlorhexidine solution, sodium bicarbonate or normal saline) for oral care of patients under mechanical ventilator. Similarly, majority of the participants 43(84.3%) performed oral care of patients every 4-6 times a day patient under mechanical ventilator. that most of the participants 50(98%) Perform eye care of patients under mechanical ventilator. All the participants have excellent practice 51(100%) change position of patients every 2 hourly under Mechanical ventilator. All the participants 51(100%) followed precaution for prevention of ventilator acquired pneumonia.

The finding of present study is supported by Saritas S, A kaya, to assess the Knowledge and Practices of Intensive Care Nurses on Mechanical Ventilation. Assess the practice, almost all of them performed the ETT care (94%), 85% of them controlled the cuff pressure and 63% did this control by touching with hand. 57% of the nurses stated that they used the physiological saline solution before aspiration. It was determined that 69% used chlorhexidine in the oral care. In the study, it was determined that 47% of the participants got training on VAP.

In this study shows that majority of the respondents had 58.8% participants had adequate knowledge, 41.2% had inadequate knowledge on mechanical ventilator care. The finding of present study is supported by Pradhan C, Shrestha R (2017), was conducted on Chitwan medical college and teaching hospital among 57 nurses working in critical care unit. Results revealed that 45.6% knowledge have care of mechanical ventilation and weaning criteria and 54.4% have inadequate knowledge.

In this study, Co-relation between Knowledge and Practice between is 0.036 weak and positive correlation between knowledge and practice. The finding of present study supported by Latha Gracelin. P to assess Knowledge regarding Mechanical Ventilation and Practice of Ventilatory Care among Nurses in General Pulmonary and Medical Wards and 86 nurses were participated. The study shows weak positive correlation noted between knowledge and practice of staff nurses with $r = 0.084$ and $p = 0.440$.

CONCLUSION

A descriptive cross-sectional study was conducted to assess the level of knowledge and practice regarding care of mechanical ventilator among nurses of selected private hospital of Kathmandu valley. Total 51 no of sample was selected by using non-probability purposive sampling technique. Obtained data were tabulated and analyzed using descriptive and inferential statistics on the basis of objectives and questionnaire of the study.

The finding of the study revealed that majority of the participants had adequate knowledge, and some of them had inadequate. Likewise, most of the participants had adequate practice. Correlation between knowledge and practices is positive and weak. Thus, it is recommended that in-service education, training and workshops should be organized by concerned hospitals to enhance knowledge and practice on mechanical ventilator among nurses.

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