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RESEARCH ARTICLE
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AN EXPLORATORY STUDY TO ASSESS THE KNOWLEDGE OF STAFF NURSES REGARDING MECHANICAL VENTILATION IN CRITICAL CARE AREAS OF CHRISTIAN MEDICAL COLLEGE AND HOSPITAL, LUDHIANA, PUNJAB. (2020)

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ABSTRACT
Mechanical Ventilation is commonly used in the patients admitted in Critical Care Areas and it is the need of an hour that, nurses should be knowledgeable and skillful with Mechanical Ventilation. **Objectives:** To assess the level of knowledge of staff nurses regarding Mechanical Ventilation in Critical Care Areas of Christian Medical College and Hospital, Ludhiana Punjab. To ascertain relationship between the knowledge of staff nurses regarding Mechanical Ventilation with selected variables like age, gender, professional qualification , training institute, professional experience, area of work and source of information. To identify the deficit areas of knowledge of staff nurses regarding Mechanical Ventilation and prepare and provide guidelines to the staff nurses on Mechanical Ventilation. A knowledge Questionnaire on Mechanical Ventilation (KQMV) were developed and used. By using non-probability purposive sampling technique, data was collected from 110 staff nurses who worked in CCA of Christian Medical College & Hospital, Ludhiana, Punjab. The data was analyzed by using descriptive statistics and inferential statistics. The results showed that Maximum number i.e, 52 (47.3%) of staff nurses had average level of knowledge regarding Mechanical Ventilation in critical care areas. The staff nurses had highest mean knowledge percentage in the area of Conceptualization (Rank I) and the lowest in the area of Nurses Responsibility r/t M.V (Rank 9). Age, Professional Experience, Training Institute and Area of work had significant impact on knowledge of staff nurses regarding Mechanical Ventilation. The investigator provided "Guidelines regarding Mechanical Ventilation" to improve the knowledge of staff nurses regarding Mechanical Ventilation.

Key words: Knowledge, Staff nurses, Mechanical Ventilation (MV), Critical Care Area (CCA)

Introduction

A Mechanical Ventilation is a method used to support respiratory function artificially by means of ventilator machine. It may be required for a variety of reasons: to control the patient's respirations during surgery or treatment, to oxygenate the blood when the patient's ventilatory efforts are inadequate, and to rest the respiratory muscles. **(Elliot JZ,2018)[1]**

Nurses must be knowledgeable about the function and limitations of ventilator modes, causes of respiratory distress and dyssynchrony with the ventilator, and appropriate management in order to

provide high-quality patient–centered care. Prompt recognition of problems and action by the nurse may resolve acute respiratory distress, dyspnea, and increased work of breathing and prevent adverse events. Hence, this article presents an overview of Mechanical ventilation modes and the assessment and management of dyspnea and patient –ventilator dyssynchrony and recommends the education for the staff and strategies related to management of patients' responses to Mechanical ventilator support**.(Grossbach I, 2011)[2]**

Critical Care Nurses plays vital role to ensure safety and promote overall comfort to the patient during Mechanical Ventilation and Weaning from Mechanical Ventilation. Although, Mechanical Ventilation is life-saving intervention, some patients need ventilator support for a short time, but others may require weeks or months. Before Ventilator can be removed, the patient must first undergo ventilator weaning. Ventilator weaning is a gradual withdrawal of ventilator support that encourages a return to independent, spontaneous respirations. This process can occur in a single day or over several weeks to months. Ventilator weaning is the most challenging aspects of ICU care management; on average 40% of the patient's time on ventilator is spent undergoing ventilator weaning. Efforts to reduce the amount of time a patient spends on the ventilator, specifically during ventilator weaning is found to be critical, but can reduce the physical and financial burden of mechanical ventilation. Hence, It is imperative that Critical Care nurses serves as leaders and they should adopt the latest Evidenced Based Practices to provide high quality care during MV and weaning from MV. **(Hetland B, Heusinkvelt, Jennifer, Krabbenhoft, Lisa, Grofts, Erin, et.al, 2018)[3]**

The nurse plays an important role in care of patients on mechanical ventilator like client's response to ventilator, intervenes to maintain oxygenation and ventilation and ensures that the client's complex needs are met etc. So, in order to provide a quality care in cost effective manner to the patient on mechanical ventilator and to reduce the cases of common complications, it is needed that the nurse must have scientific in-depth knowledge and perform evidence based skill to the mechanically ventilated patients**. (Sharma S, Sarin J, Bala GK, 2016)[4]**

Review of Literature, Clinical experience and the Investigator's observation while working with the staff nurses during clinical posting in Critical Care Areas and other areas given evidence that, Nurses have inadequate knowledge regarding Mechanical Ventilation, its types, modes, indication, contraindication, troubleshooting problems and weaning criteria. So, the Investigator proposed to take up this topic for research study, to identify the deficit areas and provide guidelines so that, there will be increase in knowledge of staff nurses.

Review of Literature

Among those numerous machines used in ICU, the Mechanical Ventilator is the most commonly used and probably the most intimidating one because of its visible presence and the frequency of alarms. In fact, the invention of positive pressure ventilation is the evolution of critical care. Yet, this critical care modality is only a support not a cure for any ventilator issues. However knowledge of the control panel, settings, modes, and troubleshooting is a necessary skill for nurses.**(Simon Elizabeth, 2017)[5].**There are many studies conducted which concluded that nurses had inadequate knowledge regarding mechanical ventilator and needs training related to the technical aspects of mechanical ventilation **(Preet K,2018)[6]** Many studies have revealed that nurses has inadequate knowledge regarding weaning criteria and professional experience as whole. Hence, need of protocol, in service education, effective supervision and reinforcement for improvement of knowledge on weaning criteria among nurses. As well as nurses must be knowledgeable about the functions and limitations of ventilator modes, causes of respiratory distress and dysynchrony with the ventilator, and appropriate management in order to provide high-quality patient-centred care. (**Pradhan CI, Shrestha R, 2017)[7]** It is recommended that patients who are mechanically ventilated should have a documented weaning plan, and spontaneous breathing should be established as soon as possible. A daily assessment of readiness for weaning should be undertaken, and transition from controlled ventilation to assisted ventilation, such as pressure support ventilation (PSV) should

occur as soon as possible. **(Huby G, Kydonaki K, Tocher J, 2014)[8]**Studies have perceived that nurses must have greater autonomy, influence and cooperative interactions regarding decisions on Mechanical Ventilation. Hence, greater awareness and acknowledgement of nurses role is important to promote inter professional coordination and improve patient care,. **(Haugdahl HS, Storli S, Rose L, Romild U, Egerod I, 2013)[9]** The study was conducted with the aim to evaluate knowledge of Nurses regarding complications related to Mechanical Ventilation. The results showed that 19.9% of nurses had good knowledge, 51.14% had average knowledge and 23.8% had below average knowledge while, none had excellent level of knowledge. It is concluded that nurses need to be trained about Mechanical Ventilation related complications, so that they could effectively participate in propagating a safe and holistic care to the patient**. (Sampaio YO, Frota NM, Batisa RD, Lopes RM, Da Dilva JD, Pereria JD, et.al.2018)[10]**.It was found that the practice regarding the prevention of ventilator –associated pneumonia was unsatisfactory among intensive care nurses of hospitals.So, in-service education and training programs should be conducted for the nurses so as to improve their knowledge and practice and to decrease infections among patients**. (Kapoor J, 2017)[11]**.The findings of the study recommended the need for developing and implementing a protocol for VAP prevention in ICUs. Moreover, there is also a need for training programs for nurses on infection control and VAP bundle preventive measures to lessen the prevalence of ventilator associated pneumonia**. (Ali NS, 2013)[12].**The studies have recommended to upgrade nurses knowledge by encouraging nurses to attend seminars and workshop about endotracheal tube and the care of patient with endotracheal tube as, nurses have unsatisfactory knowledge regarding the aspect of Anatomy and Physiology of respiratory system, Endotracheal tube and measuring Endotracheal tube cuff pressure. **(Ali Hassan AM, Abd El-Aziz MM, Hassan MS, El-Hosany WA, 2017)[13]**
. Nurses with ICU training significantly demonstrated higher knowledge of ETS than Non-trained nurses .The majority of nurses do not have desirable knowledge and skills of ETS and are currently not following current ETS recommendations and needs ICU training, provision of guidelines and adequate support to nurses employed in ICUs.(**Mwakanyanga ET, 2017)[14].**Study have concluded that, though the nurses had an acceptable knowledge and skill there are inadequacies in the practice of various phases of ET suctioning, so there is need for training of ET suctioning specifically focusing on those phases**.** The elements of ET suctioning which were not followed by majority of the nurses includes auscultation of chest(2%) , post suctioning assessment (2%), weaning apron(6%), maintaining suction pressure(10%), reassuring the patients before(30%) and after suctioning(185), hand washing(42%) and after suctioning (28%), time for suction applied(36%), Hyper-oxygenating prior suctioning (35%) and maintaining sterility (46%). **(Varghese ST, 2016)[15].** The study have concluded that, there is practice variances were noted among the professional nurses, especially in the private healthcare sector. The lack of evidence-based clinical decision-making related to cuff pressure management in mechanically ventilated patients was evident. Best practice recommendations need to be used effectively when performing ETT cuff pressure management, to reduce practice variance, standardize safe patient care, and minimize complications**. (Jordan P, Rooyen D, Venter D, 2012)[16].** A study was conducted to assess the knowledge and practice staff nurses regarding ABGs among ICU Nurses which revealed that, 11.7% (7) nurses had good knowledge, 65%(39) had average knowledge and 23.3%(14) nurses had below average knowledge. While 45% (27) had average level of practice and 55% (33) nurses had below average level of practice. Thus, the study concluded that there is a need to enhance the knowledge of nurses by providing inservice education and training program related to the ABG**. (Akashpreet K., Charan GS, 2018)[17].** The descriptive study was conducted to assess the nurses knowledge regarding Oxygen therapy and toxicity. The result showed that,6%(3) had satisfactory Knowledge, 18%(9) had average knowledge and 76%(38) nurses had unsatisfactory knowledge related to oxygen therapy and toxicity. Based on the results it was recommended that the hospital authority should establish relevant training courses, workshops, standardized protocol and clearly written and readable medical prescription for oxygen therapy**. (Mayhob MM, 2018)[18]**

- ***Research Problem :***

An Exploratory Study to Assess the Knowledge of Staff Nurses Regarding Mechanical Ventilation in Critical Care Areas of Christian Medical College and Hospital, Ludhiana, Punjab.

- ***Aim of the study***

Aim of the study is to gain insight into the knowledge of staff nurses regarding Mechanical Ventilation with a view to prepare & provide the guidelines to increase their knowledge.

- ***Objectives of study***

1. To assess the level of knowledge of staff nurses regarding Mechanical Ventilation in Critical Care Areas of Christian Medical College and Hospital, Ludhiana Punjab.
2. To ascertain relationship between the knowledge of staff nurses regarding Mechanical Ventilation with selected variables like age, gender, professional qualification , training institute, professional experience, area of work and source of information.
3. To identify the deficit areas of knowledge of staff nurses regarding Mechanical Ventilation and prepare & provide guidelines to the staff nurses on Mechanical Ventilation.

- ***Assumption***

The investigator assumed that, the staff nurses do have some knowledge related to Mechanical Ventilation and knowledge may be influenced by age, gender, professional qualification, professional experience, area of work, training institute and source of information.

- ***Delimitation***

The study will be limited to the Staff Nurses working in Critical Care Areas (CCA) of Christian Medical College and Hospital, Ludhiana, Punjab.

- ***Methodology***

- Quantitative Research Approach and Non Experimental Exploratory Design has been used to carry out the present study and after obtaining the formal permission from the authorities of Christian Medical College & Hospital, Ludhiana, Punjab. The investigator selected samples by adopting purposive sampling techniques, the sample for the study was (110) registered staff nurses who were present on duty in the Adult Critical Care Areas. The investigator gave self-introduction**,** explained the purpose of the study and the subjects willingness to participate in the study was ascertained. The subjects were assured anonymity and confidentiality of the information provided to them and written informed consent has been obtained then administered structured knowledge questionnaire. The data analysis includes descriptive and inferential statistics such as mean, percentage, standard deviation. ANNOVA, ‘t’ test and Z- test was used to determine the association between knowledge of staff nurses and demographic variables.

RESULTS & DSCUSSION

The findings of the present study revealed that Maximum number of staff nurses were in the age group of 26-30 years of age, were females with G.N.M training having more than 6 years of professional experience. Most of the staff nurses gained information related to Mechanical ventilation during clinical practice and maximum number of staff nurses worked in critical care units of surgery and were trained from other than C.O.N, C.M.C &H, Ludhiana, Punjab.

Table.1. Frequency and Percentage Distribution of Staff Nurses according to Level of Knowledge regarding Mechanical Ventilation in Critical Care Areas

N=110

Level of Knowledge	Score	Staff Nurses N	%
Excellent	> 43	6	5.5
Good	36 – 43	32	29
Average	27 – 35	52	47.3
Below average	< 27	20	18.2

Maximum score- 54
Minimun Score-0

In the present study majority i.e 52(47.3%) staff nurses had average level of knowledge and 32 (29%) staff nurses had good level of knowledge, while 20(18.2%) staff nurses had below average level of knowledge and only 6(5.5%) staff nurses had excellent level of knowledge regarding Mechanical Ventilation.(Table I , Fig.1) which are supported by the findings of **Botha. L (2012)**[19] who assessed the Knowledge of Staff nurses regarding Mechanical Ventilation and found that, 79% of staff nurses had poor level of knowledge and 21 % had average level of knowledge while none had good or excellent knowledge related to Mechanical Ventilation

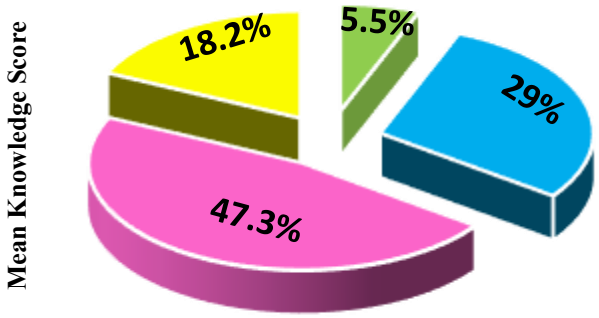

Fig.1. Percentage Distribution of Staff Nurses according to Level of Knowledge regarding Mechanical Ventilation

To ascertain relationship between the knowledge of staff nurses regarding Mechanical Ventilation with selected variables like age, gender, professional qualification, training institute, professional experience, area of work and source of information.

- According to Age, highest mean knowledge score 36.31 regarding Mechanical ventilation was found among the staff nurses with age group 36 and above and lowest was 31.18 among staff nurses with age group 26-30 years. Analysis was done with analysis of variance. It was statistically significant at $p<0.05$ level which shows, age had a significant impact on knowledge score of staff nurses regarding Mechanical Ventilation. The present finding of the study are consistent with the findings of the study done by **Pradhan CI, Shrestha R (2017)**[7] at Teaching Hospital, Chitwan, Nepal.

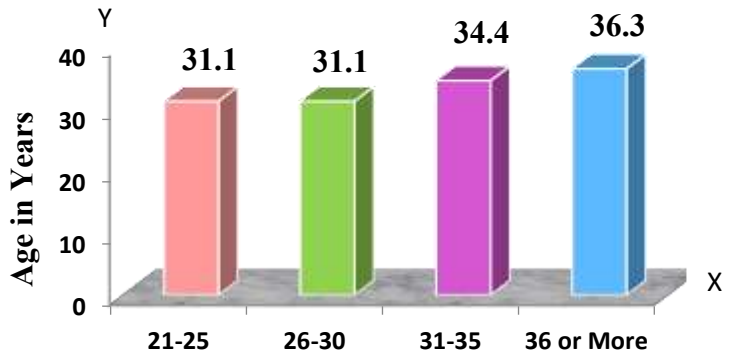

Fig.2: Mean knowledge score of staff nurses regarding Mechanical Ventilation according to Age

- According to Gender, highest mean knowledge score 33.44 regarding Mechanical Ventilation was found among Females. Analysis was done with Z test. It was statistically non-significant at $p < 0.05$ level which shows that gender had no influence on knowledge score of staff nurses regarding Mechanical Ventilation. The finding is similar with the study findings of **Khudur KM, Layth A.K.Al-Tameemi (2017)[20]**
- With professional qualification B.Sc (N) had highest mean knowledge score 34.2, and lowest was among GNM which was 32.4. Analysis was done with analysis of variance, which was found statistically non-significant at $p< 0.05$ level which shows, professional qualification had no significant impact on knowledge score of staff nurses regarding Mechanical Ventilation. The finding is similar with findings of **Awad Mahmoud H.S, Mohamed AA, Hassan MS, Tabey S (2016)[21]**
- According to Professional Experience, the highest mean knowledge score 34.5 regarding Mechanical Ventilation was found among the staff nurses having more than 6 years of experience and the lowest 28.8 was among the staff nurses with 6months-2years of experience. Analysis was done with analysis of variance. It was found statistically significant at the level $p< 0.05$. Which shows that, the Professional Experience had significant impact on knowledge score of staff Nurses regarding Mechanical Ventilation. The finding of the present study is consistent with the study done by **Latha GP, David S, Xavier R, Chako B, Sebastian T (2019)[22]**
- According to the Training Institute, the highest mean knowledge score 33.9 regarding MV was among staff nurses who were trained from C.O.N,C.M.C & Hospital and the lowest 32.2 was among staff nurses who were trained from, other than C.O.N, C.M.C & Hospital. Analysis was done with Z test and found statistically significant at $p< 0.05$ level which shows that training institute had significant impact on knowledge score of staff nurses regarding Mechanical Ventilation. The finding is supported by **Shehab MS, Sadoon MM, Nasser HM, Fathy AM (2018)[23]**
- According to the Source of Information, the highest mean knowledge score 34.3 regarding Mechanical Ventilation was among staff nurses who gained information through internet, and the lowest was 31 among staff nurses who have gained knowledge through the Workshop/Conference. Analysis of Variance was done and was found statistically non-significant at the level of $p<0.05$.Thus it shows that, the Source of Information had no effect on knowledge score of Staff Nurses regarding Mechanical Ventilation. The finding of the present study is compatible with a study done by **Fathimath Suhara KA, Jancy G, Jancy TK, Chako J (2013)[24]**
- According to the Area of Work, the highest mean knowledge score 34.9 regarding MV was among the staff nurses working in surgical units of Critical Care Areas and 30.6 was lowest among the staff nurses working in Triage/ Trauma. Analysis was done with Analysis of Variance. It was statistically significant at $p<0.05$ level. Which shows that, Area of work had significant impact on knowledge score of Staff Nurses regarding Mechanical Ventilation. The findings are consistent with the study findings of **Pradhan CI, Shrestha R (2017)[7]**

Findings related to the deficit areas of knowledge of staff nurses regarding Mechanical Ventilation

- It was found that, the staff nurses had highest mean percentage of knowledge score in the area of Conceptualization and the lowest in the area of Nursing Responsibilities r/t care of patient on MV. So, there is a need for the enhancement of knowledge of staff nurses regarding Mechanical Ventilation by providing guidelines regarding Mechanical Ventilation. The finding is supported by similar study done by **Fathimath Suhara KA, Jancy G, Jancy TK, Chako J (2013)[24]**

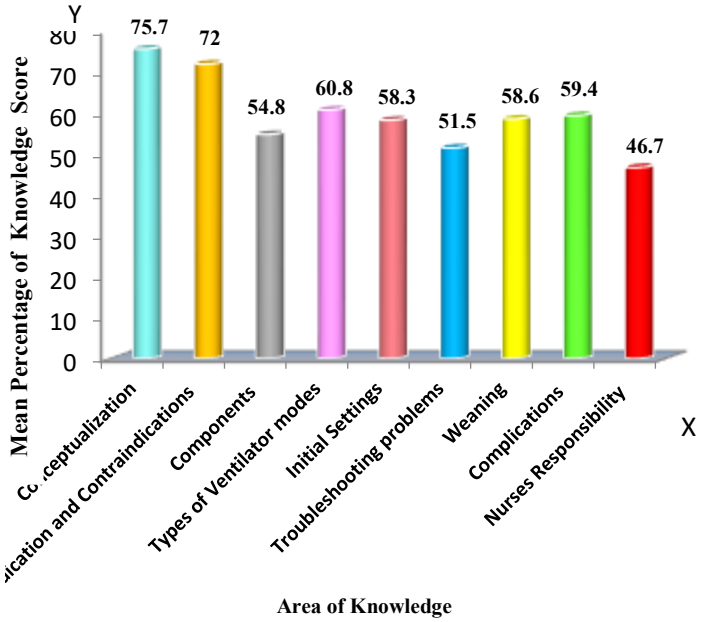

Fig.3 Mean Percentage of Knowledge Score of Staff Nurses regarding Mechanical Ventilation and different Area of Knowledge

Summary:

This chapter deals with discussion to compare the findings of the present study with other study findings, regarding knowledge of Mechanical Ventilation among staff nurses working in Critical Care Areas. This revealed that age, professional experience, training institute and area of work had significant impact on knowledge. While gender, professional qualification and source of information had no impact on knowledge of staff nurses regarding Mechanical Ventilation.

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