

Impact of Self Study Module (SSM) on Mechanical Ventilation Knowledge Among Critical Care Nurses in Ayub Teaching Hospital Abbottabad

Farman Ali, Roheeda Amanullah Khan*, Umar Zaib

Institute of Nursing Sciences, Khyber Medical University Peshawar, Khyber Pkhtunkwa, Pakistan

Email address:

roheedakhan2@gmail.com (R. A. Khan), farman.bakar@gmail.com (F. Ali), rose.biana@gmail.com (U. Zaib)

*Corresponding author

To cite this article:

Farman Ali, Roheeda Amanullah Khan, Umar Zaib. Impact of Self Study Module (SSM) on Mechanical Ventilation Knowledge Among Critical Care Nurses in Ayub Teaching Hospital Abbottabad. *American Journal of Nursing and Health Sciences*. Vol. 2, No. 1, 2021, pp. 1-5. doi: 10.11648/j.ajnh.20210201.11

Received: August 10, 2020; **Accepted:** August 31, 2020; **Published:** January 28, 2021

Abstract: Respiratory problems and ailments are becoming the major concerns around the world in terms of its relevance, morbidity and mortality. Managing such problems is challenging task however improvements could be brought with the immediate interventions. Many of the patients require special attention in this regard to be managed with adequate mechanical ventilation. Statistics shows that approximately 80% of the admitted patients with acute respiratory illnesses required mechanical ventilation in critical and intensive care units. Therefore health care professionals specifically nurses who spend more time on floor with patients must have to be skilled and well equipped to fulfill the needs of patients receiving oxygen therapy on ventilator machines. Quasi experimental (pre and post study design) study was used to carry out the study in Ayub Teaching Hospital Abbottabad. A universal sample (30) critical care nurses were selected from Intensive Care Units. Data was collected by a self-administered questionnaire that was validated and found reliable after the pilot study. Questionnaires consist of two parts the first one demographic information and second part is knowledge of mechanical ventilation. SPSS version 20 was used for the analysis of information. Descriptive statistical analysis method (frequency, mean and standard deviation) inferential statistics the Fisher exact test value was used. Findings were portrayed in the form of graphs, figures and tables. The results showed that 56.66% of the nurses had poor knowledge on the framed parameters in the initial phase of the study which was reduced to 10% in the later on stage of the study. Further the analysis reported that the mean score knowledge was (52.03±12.24) in the pre phase assessment of knowledge through multiple choice questions while the results were significantly found better with the mean score knowledge of (70.133±13.35) in the post intervention phase with a p value (0.011). The findings of the study showed that nurses were having inadequate knowledge regarding mechanical ventilation that may affect the care of critical ill patients. Therefore nurses may be updated with the latest guidelines, session, manuals and study modules that may improve the level of knowledge among nurse towards the provision of best possible care.

Keywords: Nurses, Knowledge, Mechanical Ventilation, Study Module, Critical Care Units

1. Introduction

Mechanical ventilation is a process that delivers oxygen in and out of the lungs with the exact flow of oxygen to the patient through ventilatory support. [1] Various methods of oxygen administration is suggested in ARF however supplemental oxygen is followed as basis and key therapeutic intervention. Sometimes when it does not work aptly in serious conditions patients are exposed with the invasive and non-invasive mechanical ventilation choices. [2, 3] Multiple treatment

modalities are available to treat the patients for their respiratory problems however there are certain conditions where patients need more specialized and developed technologies and equipment to be managed sophisticatedly by the nurses and doctors. [4] However; mechanical ventilation through ventilator machine is considered as the one of most significant method in the resuscitation and broad treatment of respiratory failure in Intensive Care Settings. [4, 5]

The causes for mechanical ventilation include ARF, acute lung injury, head injuries, critical illness and support to

respiratory system after surgery. [6, 7] Critical ill patients with lung pathologies need special attention to be adjusted with the ventilator setting because wrong setting may lead to certain adverse effects and complications that could be life threatening. [8, 9] Patient management in intensive care units is an essential part of nursing care. Therefore, nurses need to be well equipped with the knowledge, skills and understanding of proper mechanical ventilation process, ventilator parameters, settings and other relevant care for the provision of best possible care. [10, 11] Studies shows that nurses are considered as the integral part of any health care system around the globe however they have been found inadequate in their knowledge and skills towards the cure and treatment of critically ill patients with severe or chronic respiratory failures through the mechanical ventilatory support. [12, 13]

Each patient differs according to the lung or cardiac pathology therefore proper setting of the ventilator machine and care becomes a priority for the nurses to manage the patients effectively otherwise it may leads to certain consequences counting ventilator induced lung injury (ILI), ventilator associated pneumonia (VAP), necrosis in trachea and Pneumothorax. All these complications may turn into the morbidity, mortality, prolong hospital stay and increasing costs among patients as well as it may overburden the health care settings. [14, 15]

2. Methodology

Quasi experimental study (pre and posttest) design was used on all nurses working in critical care units in Ayub Teaching Hospital Abbottabad. Universal sample of (30) critical care nurses were used in CCU.

Questionnaires were developed to assess the nurse's knowledge on mechanical ventilation. The questionnaire had a reliability of (Cronbach's Alpha Score) = 0.72. The value of

Cronbach's Alpha is acceptable of reliability scale. [16] A pilot study was carried out on a five nurses that was 10% of the actual sample size. While it had a content validity index of 0.97 after the scoring of expert estimated. Questionnaires consist of two parts: the first part related to demographic data and second part is related to knowledge regarding mechanical ventilation.

Twenty five items were constructed on the base of multiple choice questions. The nurse's knowledge assess through rating scale. The rating scale for the data collected through questionnaire was categorized as (Excellent Knowledge: "Greater than 80%", Good Knowledge: "65 – 80%", Average Knowledge: "50 – 65%" and Poor Knowledge: "Less than 50%") [17].

Data was collected in three phase: Pretest Phase: data collection where the questionnaires were distributed and collect the required data on same day. Intervention Phase: Self-study module was handed over to all study participants for their self-study. Posttest Phase: same questionnaire to the same participants for Post-test to assess their knowledge regarding mechanical ventilation after three week of giving them with the self-study module.

Statistical Analysis

The facts and data were examined by Software SPSS Version-20 for its pertinent arrangement, appearance and comparison of the mean score knowledge. Findings were portrayed in the form of graphs, figures and tables. Mean and standard deviation was calculated for age which was a continuous variable. Percentages and Frequencies were calculated for categorical variables including (Gender, Qualification, Designation and Working Unit) to compose it in summarizing, apparent and expedient shapes for its understating. Statistical Test (T-test) was used to deduce conclusions regarding the knowledge on mechanical ventilation in the form of pretest posttest mean scores of the research participants. Fisher exact test was used for comparison of pre and posttest knowledge score.

3. Results

Table 1. Distribution of General Information of the Critical Care Nurses.

Demographic variable		Frequency	Percentage
Gender	Male	8	26.33%
	Female	22	73.33%
Total		30	100
Qualification	Diploma	20	66.66%
	Bachelor's Degree	8	26.66%
	Master's Degree	2	6.6%
Total		30	100
Total years of experience	1 to 3 years	15	33.33%
	4 to 6 years	10	26.66%
	7 to 10 years	4	13.3%
	10 years and above	1	26.66%
Total		30	100
Workshop on Mechanical Ventilation	Yes	6	20%
	No	24	80%
Total		30	100
Working area	Medical ICU	13	43.3%
	Surgical ICU	8	26.6%
	Neuro ICU	9	30%
Total		30	100

“Table 1” shows the majority were female (73.33%) and only 26.33% was male participants and the majorities were diploma holder and 33.33% have 1 to three year experience

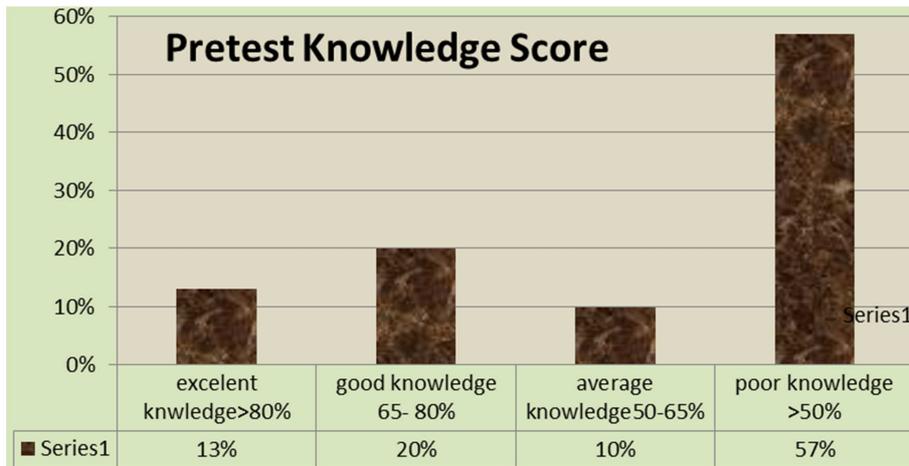


Figure 1. Pre-Test Knowledge Assessment/ Without Handing Over SSM.

Figure 1 explains the statistics gained in the pre intervention phase when data was collected through the questionnaire. It was reported that majority (57%) of the study participants scored poor level of knowledge and they

corrected less than 50% of the questions on the 25 items scale. 10% of the participants scored the average knowledge and they corrected 50 to 65% of the questions. 20% of them corrected questions from 65 to 80% of the question.

Table 2. Comparison of pre and post test score.

Knowledge Categories	Pre-Test-Phase		Post-Test-Phase	
	Frequency	Percentage	Frequency	Percentage
Excellent Knowledge (>80%)	04	13%	14	46.66%
Good Knowledge (65 – 80%)	06	20%	9	30.00%
Average Knowledge (50 – 65%)	03	10%	04	13.33%
Poor Knowledge (< 50%)	17	57%	03	10%

Table 2 shows the overall responses of the participants in both the pre and post phases of the intervention with their frequencies and percentage. The analysis reflects that the results were found significantly improved in the post intervention phase. The knowledge was improved from 13% to 46.66% in the excellent knowledge category. It was improved from 20% to 30% in the good knowledge category while it was reduced in the average knowledge category from

10% to 13.33% in the post phase. The reason might be the improvement of excellent and good knowledge categories and the responses would have moved from average knowledge to the excellent and good knowledge. Furthermore the poor knowledge significantly reduced from 57% to 10% of the poor category of knowledge in the post phase of the intervention of assigning SSM to the critical care nurses working in critical units.

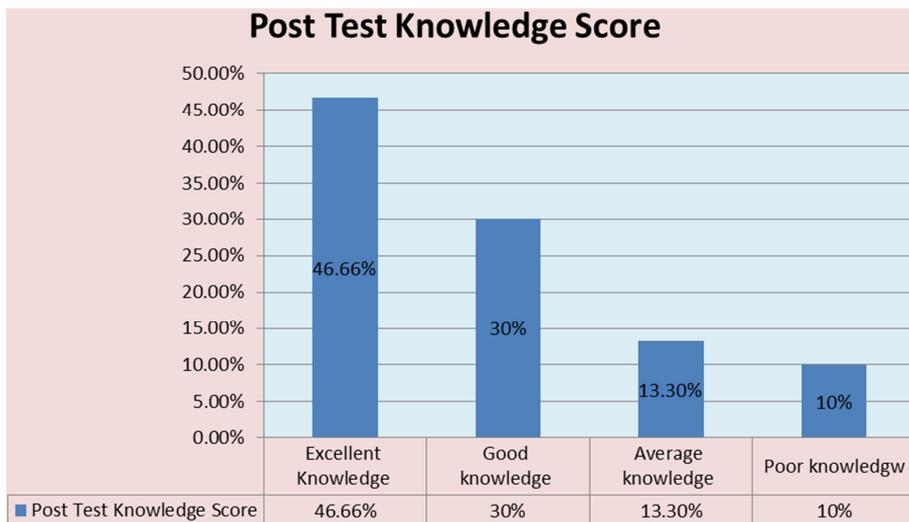


Figure 2. Post Knowledge Assessment/With Handing Over SSM Handing.

Figure 2 Posttest knowledge were assess after two weeks of time the same nurses were again approached to assess their level of knowledge for the post phase of the intervention. The data collected showed that the nurses were significantly improved with their knowledge after studying the module assigned to them. It was found that around 46.66% of the participants scored excellent level of knowledge and corrected more than 80% of the questions on self-administered

questionnaire. 30% of the participants scored good level of knowledge on corrected 65-80% of the questions on the MCQs based questionnaire. Similarly 13.33% of the nurses were found with average knowledge as they corrected 50-65% of the questions. Only 10% of the participants were reported in the post phase of the intervention who corrected questions less than 50% of the questions.

Table 3. Association between the demographic variables and total nurse's posttest knowledge score.

No	Variables name	Fisher exact test value	P value
1	Gender	1.23	0.821
2	Qualification	4.55	0.523
3	Total years of experience	5.32	0.387
4	Workshop on Mechanical Ventilation	1.00	0.101
6	Working unit	5.432	0.324

Table 4. Mean Comparison of the Pretest and Posttest Knowledge.

PRE AND POST TEST KNOWLEDGE						
Phase	N	Minimum	Maximum	Mean	Std. Deviation	P-Value
Pre-test	30	36.00	82.00	52.0333	12.24036	.011
Post-test	30	47.00	89.00	70.1333	13.35906	

Analysis of the scores in table 4 reflected that the minimum score was 36% and maximum was 82% in the pretest with an overall mean score of 52.0333% in pre phase of the intervention while it was reported 47% as minimum and 89% of maximum score with the overall mean of 70.1333% in the post phase of the assignment of self-study module. Statistical analysis after applying the t test on the data it was found that the results were significantly improved with a p-value of (0.011). Based on the outcome the research hypothesis is proven that self-study module has a positive effect on the nurses' knowledge regarding the mechanical ventilation working in critical care areas.

4. Discussion

The current study findings showed inadequate knowledge among nurses regarding mechanical ventilation in the pre assessment phase and it was found that a very small fraction (13.33%) of the study sample size scored excellent knowledge and majority (56.66%) of the study participants had poor level of knowledge and they scored an overall mean score of 52.0333±12.24036. In contrast; after the intervention in terms of giving them a self-study module it was found that they scored statistically significant high score and 46.66% of the nurses showed excellent knowledge. In comparison a very small proportion (10%) of the sample were noted with inadequate or poor level of knowledge among the critical care nurses. The overall post knowledge assessments mean score was found 70.1333±13.35906. The comparison was done through paired t-test which shown statistical significant difference with a P-value of 0.011. One of the studies conducted by Botha (2012) showed that nurses had poor level of information (48%) regarding mechanical ventilation in intensive care units.[2] Further ICU qualified nurses were compared with non ICU nurses and the difference was not

found significant. The findings showed that all the nurses must have to be well equipped with the knowledge of mechanical ventilation through structured educational programs, study modules or any other teaching and written materials among nurses. Another study conducted by Aiken et al (2008) shows that nurses' education needs to be plan and design according to the learning gaps that in response would progress and enhance the eminence of care among patients in critical care. [18]

Same result were found the study carried out by the Geravandi et al (2018) to look into the impact of educational instruction on the nursing quality care of patients on mechanical ventilation had shown the same nature of findings that updating nurses with the current knowledge helps to increase their competence in the provision of best possible care. [19]

Another study by Mohamed EA, Ramadan HM (2015) have shown that in service training in terms updating the nurses through education, guidelines, guidebook and teaching sessions help the nurses significantly to manage patients with mechanical ventilation. [20]

The current study findings that the 57% nurses have poor knowledge in pretest phase it reflect and justify the lack of continues nursing education in clinical side, nursing curriculum has not sufficient content about mechanical ventilation.

It is concluded that on bases of study finding the knowledge of nurses regarding mechanical ventilation are inadequate in public sector hospitals. The critical care nurses need to continue nursing education, training, and provide opportunities for learning in clinical atmosphere.

5. Conclusion

The findings of the study showed that nurses were having

inadequate knowledge regarding mechanical ventilation that may affect the care of critical ill patients. Therefore nurses may be updated with the latest guidelines, session, manuals and study modules that may improve the level of knowledge among nurse towards the provision of best possible care.

6. Recommendations

The finding of the study recommend that directed the great emphasis to providing workshops, Educational or training program, Seminars, continue nursing education and modern educational facilities in critical care units specific to mechanical ventilation and ventilator setting need to be designed to improve their knowledge, acumen and skills to improve patient care.

Time, limited number nurses of the CCU who met the criteria and the study conducted only in one tertiary care hospital and a census method of sampling is used so their findings cannot be generalized is the major limitation for this study.

This study cannot be generalized because this study is conducted only one teaching hospital.

Acknowledgements

I would like to express my gratitude to Principal Supervisor Mr Sardar Ali.

References

- [1] Kendall-Gallagher D, Blegen MA. Competence and certification of registered nurses and safety of patients in intensive care units. *American Journal of Critical Care*. 2009; 18 (2): 106-13.
- [2] Hamel MB, Phillips RS, Davis RB, Teno J, Connors Jr AF, Desbiens N, et al. Outcomes and cost-effectiveness of ventilator support and aggressive care for patients with acute respiratory failure due to pneumonia or acute respiratory distress syndrome. *The American journal of medicine*. 2000; 109 (8): 614-20..
- [3] Puri N, Puri V, Dellinger R. History of technology in the intensive care unit. *Critical care clinics*. 2009; 25 (1): 185-200.
- [4] Tehrani F, Rogers M, Lo T, Malinowski T, Afuwape S, Lum M, et al. Closed-loop control of the inspired fraction of oxygen in mechanical ventilation. *Journal of clinical monitoring and computing*. 2002; 17 (6): 367-76.
- [5] Van Deventer L. Intubation and mechanical ventilation: knowledge of medical officers at a South African secondary hospital. *South African Family Practice*. 2014; 56 (3): 182-5.
- [6] Clare M, Hopper K. Mechanical ventilation: ventilator settings, patient management, and nursing care. *Compendium on Continuing Education for the Practicing Veterinarian*. 2005; 27 (4): 256-69.
- [7] Dasta JF, McLaughlin TP, Mody SH, Piech CT. Daily cost of an intensive care unit day: the contribution of mechanical ventilation. *Critical care medicine*. 2005; 33 (6): 1266-71.
- [8] Esteban A, Anzueto A, Frutos F, Alía I, Brochard L, Stewart TE, et al. Characteristics and outcomes in adult patients receiving mechanical ventilation: a 28-day international study. *Jama*. 2002; 287 (3): 345-55.
- [9] Cox CE, Carson SS, Ely EW, Govert JA, Garrett JM, Brower RG, et al. Effectiveness of medical resident education in mechanical ventilation. *American journal of respiratory and critical care medicine*. 2003; 167 (1): 32-8.
- [10] Alphonso A, Quinones M, Mishra A. A Study to Evaluate the Competency of ICU Personnel in Mechanical Ventilation. *Respiratory clinical study" Focus, Journal for respiratory care and sleep medicine USA*, Jun. 2004; 22: 1571.
- [11] Parthasarathy S, Tobin MJ. Effect of ventilator mode on sleep quality in critically ill patients. *American journal of respiratory and critical care medicine*. 2002; 166 (11): 1423-9.
- [12] Jouviet P, Eddington A, Payen V, Bordessoule A, Emeriaud G, Gasco RL, et al. A pilot prospective study on closed loop controlled ventilation and oxygenation in ventilated children during the weaning phase. *Critical Care*. 2012; 16 (3): R85.
- [13] Iotti GA, Polito A, Belliato M, Pasero D, Beduneau G, Wysocki M, et al. Adaptive support ventilation versus conventional ventilation for total ventilatory support in acute respiratory failure. *Intensive care medicine*. 2010; 36 (8): 1371-9.
- [14] Coyer FM, Wheeler MK, Wetzig SM, Couchman BA. Nursing care of the mechanically ventilated patient: What does the evidence say?: Part two. *Intensive and critical care nursing*. 2007; 23 (2): 71-80.
- [15] Pirret AM. The level of knowledge of respiratory physiology articulated by intensive care nurses to provide rationale for their clinical decision-making. *Intensive and Critical Care Nursing*. 2007; 23 (3): 145-55.
- [16] Hair Jr JF, Black WC, Babin BJ, Anderson RE. *Multivariate data analysis. vectors*, 7th Editio. Pearson Prentice Hall; 2010.
- [17] ALI SAS, TAVERNER BC, GHANI M, KUSSOR Z, NAZ S. Knowledge of triage among nurses in emergency units. *Biomedica*. 2013; 29 (4): 240-3.
- [18] Aiken LH. Economics of nursing. *Policy, Politics, & Nursing Practice*. 2008; 9 (2): 73-9.
- [19] Geravandi S, Soltani F, Mohammadi MJ, Alizadeh R, Valipour A, Hoseini A, et al. The effect of education on the nursing care quality of patients who are under mechanical ventilation in ICU ward. *Data in brief*. 2018; 16: 822-7.
- [20] Mohamed EAS, Ramadan HM. Impact of in-Service Training Program for Nurses on Nursing Management for Children with Pneumonia Under Mechanical Ventilation at Ahmad Gasim Hospital, Khartoum, Sudan 2013. *American Journal of Clinical Neurology and Neurosurgery*. 2015; 1 (2): 60-7.