Effectiveness of Nursing Care Bundle in Terms of Knowledge and Practices Regarding Care of Patients on Mechanical Ventilator among Nursing Personnel

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Abstract

Background- Covid-19 Pandemic has proved the Nurse's crucial role in health care delivery system and providing nursing care to critically ill patients. It is a challenge for nurses as they need to be astute, competent, compassionate and critical thinker when they have to take care of patients on mechanical ventilator. Aim– To assess knowledge and practices regarding care of patients on mechanical ventilator among nursing personnel before and after administration of Nursing Care Bundle (NCB) in experimental and comparison group. Material and method. A Quasi Experimental non Equivalent comparison group pretest post test design used in thus study. 65 nursing personnels (30 experimental and 35 comparison groups) were selected from hospitals of North India using convenience sampling technique. NCB was administered in experimental group. Structured knowledge questionairre, Structured Observation Checklist for practices was used to collect data before and after intervention. Results- The mean post test knowledge and practices scores of nursing personnel in experimental and comparison groups were (21.6 ± 3.84, 30.83 ± 4.51) and (17.54 ± 2.76, 19.54 ± 4.17) respectively. There was significant difference between mean pre test and post test knowledge and practices scores (p=0.00).There was statistically no significant correlation between post test knowledge and practices score [r=0.16 (0.39)] among nursing personnel in experimental group at the level of significance 0.05.There was significant association of selected variable in area of gender (0.02) in experimental and education (0.02) in comparison group with pre test knowledge scores , also there was a significant association of selected variable in area of gender in experimental (0.03) and present area of working (0.03) in comparison group with pre test practices score. Conclusion- Nursing Care Bundle was effective in improving knowledge and practices of nursing personnel.

Keywords- *Effectiveness, Nursing Care Bundle, Knowledge, Practices, Nursing Personnels*

Introduction

Mechanical ventilation is found to be an essential method for resuscitation and comprehensive treatment of critically ill patients in the intensive care units. Approximately 20% of acute care and 58% of emergency admissions and about 80% of patients in intensive care units are reported to require mechanical ventilation.[1] Mechanical Ventilator are the one of the most frequently used modalities to help patient recover from respiratory failure and other critical illness such as acute respiratory failure with hypoxemia, acute respiratory distress syndrome, heart

failure with pulmonary edema, pneumonia, sepsis, and complications of surgery and trauma etc.[2] 65% of patients are found to be ventilated due to hypercarbic ventilatory failure such as coma exacerbations of chronic obstructive pulmonary disease and neuromuscular diseases admission. Studies depict that ventilator associated complications can cause prolonged stay and increase the risk of death among critically ill patients. [3] The patient in intensive care unit often requires mechanical assistance to maintain airway patency. The ICNARC report also revealed mortality rate of 35.1% among patients treated in ICU for viral pneumonia and required mechanical ventilation from year 2017 to 2019.[4] The ICNARC revealed 3883 patients with confirmed COVID-19 were admitted to (ICUs) in England, Wales, or Northern Ireland. Among 66.3% of the 1053 patients who required mechanical ventilation died. [3] The ICNARC report also revealed mortality rate of 35.1% among patients treated in ICU for viral pneumonia and required mechanical ventilation from year 2017 to 2019. In Wuhan, China, it depicts that 37 (71%) required mechanical ventilation whereas 32 (61.5%) died within 28 days of ICU admission.[5] Morality was higher among those who required mechanical ventilation than among those who did not (94% v/s 35%).The Journal of the American Medical Association (JAMA) stated that the mortality rate for all patients placed on mechanical ventilation was 88.1%. Analyzed by age group, mortality rates for patients aged 18 to 65 were 76.4 percent. [6]COVID-19 pandemic, the nurses are one of the frontiers for care of patients admitted in hospitals.Nurses armed with clinical supplies are usually the front line of care and, in some cases, may be the only provider in the area, especially in developing countries. Across the globe,New York has reported 80 % of patients admitted in hospital require mechanical ventilation in critical care settings whereas 86% in china and 66% patients in UK.[7] Knowledge about dealing with patient on mechanical ventilator utilized in intensive and long-term care settings to assist patients requiring additional respiratory support is of great importance for the patient's safety and their early recovery. Novice nursing personnel need orientation and special training programs to update knowledge and prctices concerning care of critically ill patients on mechanical ventilator to provide efficient care.[8]Hence, Ministry of health and family welfare initiated various health care professional regarding care of patients and operating ventilator along with behavior and documentation for establishing and maintaining invasive care with certain disorders and various other components of care such as response to ventilator, intervenes to maintain oxygenation and ventilation ensuring that complex needs are met. WHO has declared the year 2020 as the "International Year of Nurses and Midwives

Methods

The present study is a quasi- experimental non equivalent control group pretest/posttest design. The population of the study included nursing personnels who work in MMIMS&R, M.M super specialty Hospital, Mullana, Ambala, Haryana and M.M Hospital Solan H.P. The sample included 68 nursing personnel selected using the convenience sampling method. Confidentiality was maintained along with informed consent. Nursing personnel available at time of study and willing to participate in the study were included whereas not able to attend intervention and post test or were in night shifts during data collection were excluded.

Data Collection

For data collection, the researcher initially

developed a structured knowledge questionairre and structured observation checklist for practices after an extensive review of the relevant literature to achieve good content validity. Structured knowledge questionairre first part included questions about selected variables of nursing personnel, including age, gender, education, **previous work experience, present area of working,** and total work experience. The second part contained 30 questions to investigate nursing personnel knowledge regarding care of patients on mechanical ventilator including 4 subgroups of **Concept of mechanical ventilator (7), Assessment (12), Oral care** (3), **Endotracheal tube care (8).** The questions were rated using Likert scale (0= not attempted, 1= correctly done) and the maximum score was 30. Scores**>26 were very good, 22 -26 were good, 15 -21 were average and 0 -14 were below average. Structured observation checklist for practices included checklist for practices of assessment, oral care and endotracheal tube care** which comprises of 29 items. Each item has a marking of 0 (not attempted), 1 (Incorrectly) and 2 (correctly done) which is given based on performance of nursing personnel regarding care of patients on mechanical ventilator. Scores **> 44 were good, 29-44 were fair and 0-28 was poor. Content validity of tool was established by nine experts,** three professors(from Medical surgical Nursing, obstetrics and Nursing Education). One Associate professor, one assistant professor (from medical surgical nursing), two Doctor'sand two nursing superintendents to check the accuracy and relevance of the tool. Furthermore, reliability was checked by adopting techniques such as Kuder Richardson -20 and Inter Rater Reliability. The reliability for structured knowledge questionnaire and structured observation checklist for practices were found to be 0.86, 0.76 respectively. Thus tools were found to be reliable for study. The questionnaire was given to research participants as pretest before intervention and data were collected and analyzed. Intervention held for one day and after 15 days, posttest to analyse knowledge and practices of nursing personnel regarding care of patients on mechanical ventilator.

Data Analysis

To analyze data, descriptive tests, including frequency, percentage, mean, and standard deviation (SD) and analytical tests, including the Kolmogorov–Smirnov test was conducted to indicate that the data were sampled from a population with a normal distribution. The correlation between knowledge and practices mean score was examined by the Pearson correlation coefficient, paired t-test, , and ANOVA using the SPSS software.

Results

A total of 65 nursing personnel were included in the study, more than half of nursing personnel (53.3%) were in age group of 24-26 years in experimental group whereas in comparison group age of nursing personnel is equally distributed from age group of 21-23(34.3%), 24-26 (31.4%), and 27-29 years (34.3). Nursing personnel (100%) in comparison group were females whereas in experimental group (90%) were female. Maximum number of nursing personnel in experimental group (60%) and comparison group i.e. (91.4%) had completed General Nursing and Midwife. Most of the nursing personnel in experimental group (66.7%) had no previous work experience while (65.7%) nursing personnel in comparison group had work experience in ward settings. Majority of (76.7%) were presently working in ICU in experimental group whereas nursing personnel (62.9%) in comparison group were presently working in wards. Majority

of nursing personnel (83.3%) in experimental and comparison group (88.6%) had 0-2 years of work experience. The chi square computed values to check the homogeneity for the selected variables of the nursing personnel in experimental and comparison group showed that there was a significant difference in both the groups in terms of all selected variables except total work experience that was found to be homogenous. Research findings showed that mean and SD of total knowledge and practices score prior to administration of nursing care bundle regarding care of patients on mechanical ventilator in experimental group was 14.23 ± 3.15, 20 ± 5.52 and for comparison group 15.85 ± 3.01, 14.77 ±5.56 while after the administration of NCB mean and SD score of knowledge and practices among nursing personnel in experimental group was 21.6 ± 3.84, 30.83± 4.51and comparison group 17.54 ± 2.76, 1.9.45 ± 4.17 (as depicted in table 1 and 2). Findings revealed that knowledge and practices of nursing personnel regarding care of patients on mechanical ventilator, mean score and SD increased at all dimensions after the administration of nursing care bundle comparing mean and SD before the administration of NCB.

Table 1: Mean, mean difference, standard deviation, standard error of mean, df, "t" value and "p" value of knowledge scores before and after administration of nursing care bundle regarding care of patients on mechanical ventilator in Experimental and comparison groups. N=65

Group	Mean ±SD	MD	SEMD	"t " value	df	"p" value
pre test Experimental group (n=30) Comparison group (n=35)	14.23± 3.15 15.85 ±3.01	1.62	0.75	2.11	63	0.04*
post test Experimental group (n=30) Comparison group (n=35)	21 .6 ± 3.84 17.54 ± 2.76	4.06	0.82	4.92	63	0.00*

*significant ($p \leq 0.05$) NS Not Significant

($p > 0.05$)

t (63) = 1.9983

Table 2: Mean, mean difference, standard deviation, standard error of mean, df, "t" value and "p" value of practices scores before and after administration of nursing care bundle regarding care of patients on mechanical ventilator in Experimental and comparison groups. N=65

Group	Mean ±SD	MD	SEMD	"t " value	df	"p" value
pre test Experimental group (n=30) Comparison group (n=35)	20± 5..5 14.77 ±5.56	1.38	3.78	2.11	63	0.00*
post test Experimental group (n=30) Comparison group (n=35)	30.83 ± 4.51 19.45 ± 4.17	11.77	1.07	10.91	63	0.00*

*significant (p≤0.05) NS Not Significant (p>0.05)

t (63)= 1.9983

Karl Pearson correlation coefficient showed that there was statistically no significant correlation between post test knowledge and practices score [r=0.16 (0.39)] among nursing personnel in experimental group at the level of significance 0.05 (as depicted in table 3). Post hoc test was applies and pair wise comparison was done.

TABLE 3 Correlation between the mean pre test and post test knowledge and practices scores of nursing personnel regarding care of patientson mechanical ventilator in experimental and comparison group N=65

Groups			Practices	
			Pre test	Post test
Experimental group (n=30)	Knowledge	Pre test Post test	0.19 (0.31NS)	0.16 (0.39 NS)
Comparison group (n=35)		Pre test Post test	0.33 (0.52 NS)	0.14(0.93NS)

*significant (p≤0.05) NS Not Significant (p>0.05)

Post hoc test using Bonferroni correction revealed that there was a significant difference in practices score of nursing personnel in comparison group in ICU and CCU (p= 0.02) along with wards and CCU (p= 0.02). Despite in the area of Wards and ICU which was found non significant (p= 0.83) (as depicted in table 4)

Table 4 Post- hoc test value showing mean difference of pre practice score regarding care of patients on mechanical ventilator among nursing personnel with their selected variable (Present area of working) in comparison group

Variable	Category	Mean difference	Standard error	"p" value
Present area of working	**ICU Vs CCU** **Ward Vs CCU** **Ward Vs ICU**	6.42 6.42 1.30	2.38 2.38 2.24	0.02s 0.02s 0.83NS

*Significant ($p \leq 0.05$) NS Not Significant ($p > 0.05$)

Discussion

According to the results, majority of the nursing personnel were female in age group of 24-26 years qualified as GNM **resp**. In the experimental group majority had no previous work experience and were found to be working in ICU's with work experience of 0-2 years whereas in comparison group majority had experience working in ward settings for 0-2 years**.** These findings were consistent with study conducted by Manisha Macchar, Kirtida Lakum and Suresh V [9]where majority of nursing personnel were females under age group of 23 – 27 years with qualification of diploma nursing along with 1- 3 years of experience. Also consistent with study conducted by "Ravikant Sharma, Shiv Kumar Mugdal (2018)[10] where it showed that majority of nursing personnel were female in age group of 21-25 years. Study conducted by LynnBotha , to determine and describe level of competence with regard to mechanical ventilation, states that age and experience had minimal influence on levels of competency amongst the nurses[11]Also, Suhara et al (2010) found that there was no significant association between knowledge scores of staff nurses in relation to their demographic variables.[12] The mean knowledge score in experimental and comparison group was significantly higher after administration of nursing care bundle respectively. These findings were supported with study conducted by Jasoda Sanasam, Veena D Sakhardande et.al [13](2017). Study observed that mean post -test score was significantly higher than mean pre test knowledge score The study concluded that teaching program was effective in increasing knowledge and practices of nursing personnel. Findings were also consistent with study conducted by Maria Sagario, Acebedo et al.[14] which showed that more experienced nurses develop natural and spontaneous response in care of critical patients and that the application of everyday knowledge and practice. Another study conducted by Ravikant Sharma and Shiv Kumar Mugdal (2018) [7] states that pre knowledge and skill scores was lower than the post test knowledge and skill score respectively. There was significant difference between the pre-test and post-test practice scores ($t = 8.70$, $p = 0.00$) before and after the administration of NCB in experimental group. Findings were consistent with study conducted by Ms. A Indira [14] which stated statistically significant difference in the post test practices score among experimental group. It was found that there was statistically no significant co-relation among nursing

personnel in experimental comparison groupin terms of knowledge and practices before and after administration of nursing care bundle.These finding werepartially supported by Ravikant Sharma and Shiv Kumar Mugdal et al. (2014)[7] and Gomes, (2010) who stated a weak correlation between working years in ICU and knowledge, but this correlation may be clinically insignificant.[15]There was significant association of selected variable in area of gender (0.02) in experimental and education (0.02) in comparison group with pre test knowledge scores, also there was a significant association of selected variable in area of gender in experimental (0.03) and present area of working (0.03) in comparison group with pre test practices score. Findings were inconsistent with the study conducted by Ravikant Mishra,[7] which showed no significant association between nursing personnel knowledge and practice with selected variables such as age, gender and professional education. Another study by "Said," (2012)[16] found, no association between knowledge and years of working experience (p-value 0.34), ICU training (p-value 0.64) and level of education (p-value 0.55) concluded that level of knowledge is not affected by the work experience of nursing personnels. Findings were inconsistent in light of study by Shaimaa Hesham Mahmoud Awad to assess nurses' performance regarding management of patients on mechanical ventilator stated there was no statistically significant relationship between nurses' knowledge and practices regarding the management of patients on the mechanical ventilator and their demographic characteristics.[17]

Conclusion

The Nursing Care Bundle was effective in improving the knowledge and practices of nursing personnel regarding care of patients on mechanical ventilator as there was a significant increase in knowledge and practices regarding after the administration of nursing care bundle. There was statistically no significant co-relation found between knowledge and practices scores, but a significant association of selected variable in area of gender (0.02) in experimental and education (0.02) in comparison group with pre test knowledge scores, also there was a significant association of selected variable in area of gender in experimental (0.03) and present area of working (0.03) in comparison group with pre test practices score.

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