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Effectiveness of a Structured Teaching and Demonstration Programme on Knowledge and Expressed Practices of Staff Nurses Regarding Ventilator Use in Intensive Care Units: A Quasi-Experimental Study

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Abstract: ***Background: Mechanical ventilation is a life-saving intervention commonly used in intensive care units. Nurses play a vital role in ensuring the safe and effective management of mechanically ventilated patients. Inadequate knowledge and inappropriate practices regarding use of ventilator may result in serious patient complications. Aim: To assess the Effectiveness of Structured Teaching and demonstration Programme on Knowledge and Expressed Practices regarding use of ventilator among Staff Nurses working in different ICU's of IGMC and Hospital Shimla, H.P. Methods: A quantitative research approach with a quasi-experimental research design was adopted. The study was conducted among 60 staff nurses working in different ICUs of IGMC and Hospital Shimla, selected through a simple random sampling technique. Data were collected using a structured knowledge questionnaire and a five-point Likert scale for expressed practices. Following the pre-test assessment, a structured teaching and demonstration programme was administered, and the post-test was conducted after 11 days of pre-test. Results: In the pre-test, 46.7% of participants had average knowledge, whereas 45% demonstrated excellent knowledge in the post-test. Similarly, expressed practices improved from predominantly average levels (61.7%) in the pre-test to higher proportions of good (36.7%) and excellent (23.3%) practices in the post-test. The mean knowledge score increased from 18.67 ± 5.05 (53.30%) to 24.95 ± 5.88 (71.30%), with a mean difference of 6.28. The paired 't' test value (t = 13.911) was statistically significant at p < 0.001. Likewise, the mean expressed practices score increased from 61.12 ± 12.06 (61.10%) to 68.80 ± 14.77 (68.80%), with a mean difference of 7.68, and the paired 't' test value (t = 9.159) was statistically significant at p < 0.001.The findings suggest that the structured teaching and demonstration programme regarding use of ventilator given to the group was effective in significantly improving their knowledge and expressed practices score among staff nurses.***

Keywords: Staff nurses, knowledge, expressed practices, structured teaching and demonstration programme, ICU and ventilator

1. Introduction

A mechanical ventilator is a life-support device used when a patient is unable to maintain adequate spontaneous breathing. It assists or completely controls ventilation by delivering oxygen-rich air to the lungs and facilitating carbon dioxide removal and ensuring adequate gas exchange and tissue oxygenation. [1] In the beginning of the 20th century infectious diseases were the leading cause of death worldwide. But in 21st century according to **WHO (2021),** seven of the ten leading causes of death globally were **non-communicable diseases,** accounting for **38% of all deaths worldwide** and **68% of deaths among the top ten causes.** [2] The results of an audit of **Critical Care Society** of Southern Africa in 2021 highlighted that **75 % of the intensive care nurses lacked basic understanding** and competence related to the fundamental ventilator mechanics; but were still independently dealing with the intubated patients. [3] Improper management or lack of expertise can lead to complications such as barotrauma, ventilator-associated pneumonia (VAP), asynchrony between the patient and ventilator, and hemodynamic instability. These complications underscore the importance of proper training and knowledge among ICU nurses, who are often the first responders to ventilator alarms and patient distress. [4] According to the **Indian Nursing Council (2023-2024),** India has **approximately 28.96 lakh registered nurses** [5]. However, when measured against population metrics, the availability of nurses is **only 2.06 per 1,000 people**, falling significantly short of the **World Health Organization's (WHO) minimum recommended threshold of 3 nurses per 1,000 population**. [6] This shortage is more pronounced in critical care settings, where the demand for skilled nurses is high. In Himachal Pradesh, institutions like the Indira Gandhi Medical College (IGMC) and Hospital in Shimla are pivotal in providing advanced medical care, including ventilator support in ICUs.

According to the **Indian Journal** of **Critical Care Medicine (2023),** India has only **2.3 ICU beds per 100,000 people**, far below global standards, placing considerable strain on critical care services. National initiatives like the National Health Mission (NHM) and Ayushman Bharat are working to improve healthcare access, affordability, and quality through a more integrated, need-based approach. [7] The care of critically ill patients requires adequate staffing, appropriate infrastructure, and a continuous supply of resources within healthcare institutions. Intensive Care Units (ICUs) are designed to provide the necessary care for critically ill patients. Patients requiring mechanical ventilation need expert nursing care to manage the complexities associated with ventilator usage. [8]

2. Objectives

1) To assess the knowledge and expressed practices regarding use of ventilator among staff nurses working in different ICU's of IGMC and Hospital Shimla, HP.
2) To evaluate the effectiveness of structured teaching and demonstration programme on knowledge and expressed practices regarding use of ventilator among staff nurses working in different ICU's of IGMC and Hospital Shimla, HP.

3. Methodology

Quantitative research approach, a quasi-experimental one group pre-test post-test research design was adopted to accomplish the main objectives of the study. The study was conducted at IGMC and Hospital, Shimla - HP. Sample size was 60 Staff nurses, selected by using Simple Random sampling technique (Probability sampling technique).

Analysis and Interpretation of Data

Among the 60 staff nurses, the majority (51.7%) were aged 25–35 years, 70.0% were married, and 98.3% were Hindu. Half of the participants (50.0%) held a Diploma/GNM qualification, while 46.7% had a B.Sc. Nursing degree. Most nurses (35.0%) had 1–3 years of ICU experience. Participants were distributed across various critical care units, with the highest proportion working in the Pediatric ICU (33.3%). More than half (53.3%) were regular employees, and the majority (83.3%) had not attended any in-service education programme related to ventilator use.

Findings related to knowledge and expressed practices

The pre-test knowledge scores of staff nurses show that most participants 46.7% (14–20) had average knowledge, followed by 36.7% (21–27) with good knowledge, 13.3% (0–13) with poor knowledge, and only 3.3% (28–35) with excellent knowledge, indicating moderate knowledge and need for improvement. In contrast, post-test knowledge scores show a marked improvement, with 45% (28–35) achieving excellent knowledge, followed by 28.3% (14–20) average and 23.3% (21–27) good knowledge, and none with poor knowledge, reflecting the effectiveness of the structured teaching and demonstration programme.

Table 1: Distribution of Participants According to Knowledge Levels Before and After the Intervention, N=60

Knowledge Level	Pre Test f (%)	Post Test f (%)
Excellent (28-35)	2 (3.3)	27(45)
Good (21-27)	22 (36.7)	14 (23.3)
Average (14-20)	28 (46.7)	17 (28.3)
Poor (0-13)	8 (13.3)	0 (0)

The pre-test expressed practices scores reveal that the majority 61.7% (40–59) had average practices, followed by 23.3% (60–79) good and 15% (80–100) excellent practices, with no participants showing poor practices, indicating moderate practices levels initially. Post-test results show improvement, with 38.3% (40–59) average, 36.7% (60–79) good, and 23.3% (80–100) excellent practices, and none with poor practices, demonstrating enhanced expressed practices after the intervention.

Table 2: Distribution of Participants According to Expressed Practices Levels Before and After the Intervention, N=60

Score Level	Pre Test f (%)	Post Test f (%)
Excellent (80-100)	9 (15)	14 (23.3)
Good (60-79)	14 (23.3)	22 (36.7)
Average (40-59)	37 (61.7)	23 (38.3)

Findings related to effectiveness of structured teaching and demonstration programme

The pre-test results show that the mean knowledge score of staff nurses was 18.67±5.051 (53.30%), and the mean expressed practices score was 61.12±12.065 (61.10%), indicating moderate levels of knowledge and expressed practices before the intervention. The post-test results reveal that the mean knowledge score increased to 24.95±5.876 (71.30%), with a mean difference of 6.280, and the calculated paired 't' test value (13.911) was higher than the table value (2.00) with $p < 0.001$, indicating a highly statistically significant improvement. Similarly, the mean expressed practices score increased to 68.8±14.766 (68.80%), with a mean difference of 7.680, and the paired 't' test value (9.159) exceeded the table value (2.00) with $p < 0.001$, also indicating a highly statistically significant improvement. These findings demonstrate that the structured teaching and demonstration programme was effective in significantly improving both the knowledge and expressed practices of staff nurses.

4. Discussion

The **first objective** assessed knowledge and expressed practices regarding ventilator use among staff nurses in IGMC and Hospital, Shimla –HP. In the pretest, most nurses had average knowledge (46.7%), followed by good (36.7%), poor (13.3%), and only 3.3% excellent. For expressed practices, the pretest showed majority average (61.7%), followed by good (23.3%) and excellent (15%), with no poor expressed practices.

These findings are consistent with a similar study conducted by **Ali Shimaa Attia and Ahmed Rasha Alsayed (2023)** at intensive care units of three public hospitals in Egypt with 60 nurses. Data were collected using a structured questionnaire and a practical skill checklist. The findings revealed that in the pre-test phase, only 31.7% (knowledge) and 35% (practices) of nurses had adequate levels. [9] A study conducted by **K.A. Hassen, M.A. Nemera, A.W. Aniley, A.B. Olani, and S.G. Bedane (2023)** a descriptive cross-sectional study among ICU nurses in selected governmental hospitals of Ethiopia and found that 51.4% had poor knowledge regarding mechanical ventilation, while 58.9% demonstrated poor ventilatory care practices. [10] The variation in findings may be attributed to differences in institutional policies, training opportunities, and clinical exposure.

The **second objective** evaluated the effectiveness of the structured teaching programme. The mean knowledge score increased from 18.67±5.051 (53.30%) to 24.95±5.876 (71.30%), with a mean difference of 6.280 and a highly significant t-value (13.911, $p < 0.001$). Similarly, expressed practices improved from 61.12±12.065 (61.10%) to

68.8±14.766 (68.80%), with a mean difference of 7.680 and a significant t-value (9.159, $p < 0.001$), indicating the programme's effectiveness.

A similar study by **Sharma Bandhu, Thomas Sherly, and Rebica (2021)** at Holy Family Hospital Delhi, reported that the mean post-test knowledge score (27.5) was higher than the pre-test score (18.6), with a significant t value of 8.217 ($p < 0.05$). Similarly, the mean post-test practice score (44.5) was higher than the pre-test score (33.83), with a significant 't' value of 7.01 ($p < 0.05$), indicating the effectiveness of the nursing care protocol. [11] **Benedict Raphael Oamen et al. (2021)** conducted a quasi-experimental study among ICU nurses in South Africa to assess knowledge regarding ventilator liberation and the effect of an educational intervention. The findings showed that Intervention group-1 showed a slight but statistically insignificant improvement in knowledge scores ($p = 0.371$; Cohen's $d < 0.20$). Intervention group-2 showed a significant decrease in scores ($p = 0.033$; Cohen's $d = 0.49$). The control group showed no significant change in knowledge scores ($p = 0.884$). [12] These results highlight the potential influence of healthcare institutions on nurses' knowledge and practice levels.

The findings indicate that structured educational interventions can effectively enhance nurses' competency regarding ventilator management in critical care settings.

5. Limitation of the Study

The study was conducted in a single institution with a sample of 60 staff nurses, which may limit the generalizability of the findings. Additionally, the short duration of follow-up did not allow assessment of long-term retention of knowledge and practices.

6. Conclusion

The structured teaching and demonstration programme was effective in significantly improving the knowledge and expressed practices of staff nurses regarding ventilator use. Regular in-service educational programmes may enhance nursing competency and contribute to improved quality of care for mechanically ventilated patients.

References

[1] Sharma R, Mundalkumar S. Knowledge and skill regarding care of a patient on mechanical ventilator among the staff nurses working in selected hospital. Int J Pract Nurs. 2018;6(3):117-121.(cited 2025 Jan 7) Available from: https://www.researchgate.net/publication/342916850_IPJNMechanicalVentilator

[2] The top 10 causes of death [Internet]. Who.int. [cited 2025 Mar 22]. Available from: https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death.

[3] Rafiq N, Mughal FB, Valliani K. Assessing Nurses' Knowledge regarding Ventilator Mechanics. Pakistan Journal of Public Health. (cited 2025 Jan 9)11(3):172–7. Available from :https://pjph.org/index.php/pjph/article/view/805

[4] Hetland B, Heusinkvelt J, Krabbenhoft L, Grotts E. Mechanical ventilation weaning: An evidence-based review. Nurs Crit Care.): 5–16. (cited 2025 Jan 9) Available from: https://experts.nebraska.edu/en/publications/mechanical-ventilation-weaning-an-evidence-based-review

[5] Indian nursing council [Internet]. Indiannursingcouncil.org. [cited 2025 Apr 20]. Available from: https://indiannursingcouncil.org/annualreports

[6] Bajeli-Datt K. Almost half of India's nurses are trained in five southern states: Centre. The New Indian Express [Internet]. 2023 Aug 13 [cited 2025 Mar 22]; Available from: https://www.newindianexpress.com/thesundaystandard/2023/Aug/13/almost-half-of-indias-nurses-are-trained-in-five-southern-states-centre-2604676.html

[7] Government of India. Pradhan Mantri Jan Arogya Yojana (AB-PMJAY): Hospital empanelment and bed capacity report [Internet]. 2024 Oct [cited 2025 Mar 31]. Available from: [URL] : https://www.mordorintelligence.com/industry-reports/india-icu-beds-market

[8] Morton, P.G., Fontaine, D.K., Hudak, C.M. and Gallo, B.M. (2005) Critical Care Nursing, a Holistic Approach. 8th Edition, Lippincott William Wilkins, Philadelphia.- Scientific Research Publishing. (cited 2025 Jan 9 [Internet]. www.scirp.org. Available from: https://www.scirp.org/reference/referencespapers?referenceid=1957794

[9] Shimaa ShiAttia Ali SA, Rasha Alsayed Ahmed RA. Effectiveness of in-service training module on intensive care nurses' performance regarding mechanical ventilator patients' skillful handling. Helwan University; 2023 [cited 2026 Apr 29]. Available from: http://chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://pdfs.semanticscholar.org/bc2b/23fa202c1b37db9475650888a42a79b42123.pdf

[10] Hassen KA, Nemera MA, Aniley AW, Olani AB, Bedane SG. Knowledge and practices regarding mechanical ventilation among nurses working in intensive care units in selected governmental hospitals in Addis Ababa, Ethiopia. Int J Nurs Stud. 2021; 58:21–28.

[11] Sharma B, Thomas. Nursing care protocol regarding care of child on mechanical ventilator [Internet]. Holy Family Hospital, Delhi. 2021. (cited 2025 Jan 9) Available from: https://www.researchgate.net/publication/353121620_Nursing_care_protocol_regarding_care_of child on Mechanical ventilator

[12] Oamen BR, Jordan P, ten Ham-Baloyi W, Hlungwane EZ. Liberation from ventilation: An intervention study in public adult intensive care units in the Eastern Cape Province of South Africa. Africa J Nurs Midwifery. 2021;23(1):1–18.