Research Article

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A Study to Assess the Knowledge regarding Ventilator and it's Working Mechanism among DGNM II- and III-year Students in Sir Issac Newton School of Nursing at Pappakovil, Nagapattinam.

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ABSTRACT

Introduction: Mechanical ventilation is a vital therapeutic intervention used extensively in critical care settings for patients with respiratory failure or compromised airway function.

Aim: The main aim of the study to assess the knowledge of ventilators among DGNM II and III year students.

Methodology: This study used a quantitative, descriptive design to assess ventilator knowledge among 60 DGNM II- and III-year students at Sir Issac Newton School of Nursing. Participants were selected via simple random sampling based on age and willingness to participate. Data was collected through a self-administered questionnaire and analyzed using descriptive statistics to determine knowledge levels.

Results: The results revealed that 31.7% of the students possessed adequate knowledge, while a majority, 66.6%, demonstrated a moderate level of knowledge. Only 1.7% of the participants exhibited inadequate knowledge regarding ventilators and their functioning.

Conclusion: The study concluded that a significant number of students had adequate knowledge, the majority had a moderate level of knowledge, and only a few had inadequate knowledge regarding ventilators and their working mechanism.

Keywords: Knowledge, Ventilator Mechanism, Students.

INTRODUCTION

Mechanical ventilation is a vital therapeutic intervention used extensively in critical care settings for patients with respiratory failure or compromised airway function. This life-supporting technology serves to replace or assist natural breathing when a patient is incapable of adequate ventilation due to various medical conditions, including chronic obstructive pulmonary disease (COPD), acute respiratory distress syndrome (ARDS), and neurological impairments. The operational mechanisms of mechanical ventilators utilize various modes and settings tailored to individual patient

needs, highlighting the importance of comprehensive nursing education to ensure effective patient management. (Guilhermino et al. (2018), Rafiq et al., 2021)

The assessment of knowledge regarding ventilators and their working mechanisms among DGNM II- and III-year students is critical for enhancing nursing education and improving patient care within critical care environments. Current literature emphasizes that nursing students, although exposed to theoretical knowledge through their curriculum, often exhibit gaps in practical competencies and understanding of ventilator mechanics and associated patient care protocols.

Research conducted by Rani et al. indicates that a significant proportion of undergraduate nursing students continue to face challenges in recognizing clinical deterioration in patients on mechanical ventilation, largely due to inadequate exposure to advanced ventilator management during their clinical training (Rani et al., 2023). This inadequacy can be attributed to the complex nature of mechanical ventilation—understanding ventilator settings, modes, and patient-ventilator interactions is essential for nurses to provide coherent patient care and to respond appropriately to emergent situations (Grossbach et al., 2011). As highlighted in multiple studies, hands-on training considerably enhances knowledge retention and practical skills, suggesting the necessity for simulation-based educational modules alongside traditional classroom learning (Kim et al., 2021; Hawsawi et al., 2018).

Moreover, studies assessing the knowledge levels of nursing staff concerning ventilator-associated pneumonia (VAP) prevention reveal widespread gaps in understanding best practices among ICU nurses (Alreshidi et al., 2024; Cengiz & Kanan, 2019; Zeb, 2018). Such deficiencies could also mirror the findings among nursing students, who may lack familiarity with evidence-based guidelines for providing care to mechanically ventilated patients. Educational interventions targeted at improving knowledge and compliance with VAP prevention protocols have shown promising results in enhancing nurses' adherence to critical care standards (Saini et al., 2017; Hassen et al., 2023). Structured educational programs, including simulation exercises, have been shown to significantly improve both knowledge and practice levels in managing ventilator care (Jansson et al., 2014; Gatell et al., 2012).

Evaluating the curriculum's efficacy, it is prudent to bridge the gap between theoretical and practical applications of mechanical ventilation knowledge in nursing. A comprehensive training approach that incorporates theoretical instruction, practical workshops, and simulation training aligns with current educational strategies aimed at improving not just knowledge but also clinical competencies among nursing students (Ghafoor et al., 2022; Subramanian et al., 2013)

METHODOLOGY

This study employed a quantitative approach with a descriptive design to assess the knowledge of ventilators among DGNM II and III year students at Sir Issac Newton School of Nursing, Pappakovil, Nagapattinam. A total of 60 students were selected through simple random sampling based on inclusion criteria such as age above 19 years and willingness to participate. Data was collected using a self-administered questionnaire. Formal permissions and consent were obtained, and students were given 30 minutes to complete the tool. Data was analyzed using descriptive statistics, with frequency and percentage used to evaluate knowledge levels.

RESULTS

The demographic profile of the study participants showed that the majority of students (50%) were aged 19–20 years, followed by 26.7% aged 18–19 years and 23.3% aged 20–21 years. All participants were female. Regarding prior knowledge of ventilators, 41.7% reported having previous knowledge, while 58.3% did not. Sources of knowledge included classroom lectures (33.3%), clinical exposure (25%), books or internet (16.7%), and 25% reported no prior source. Additionally, 30% had exposure to training programs related to ventilator care, while 70% had not received any such training. (Table 1) The analysis of knowledge levels revealed that the majority of students (66.6%) had moderately adequate knowledge regarding ventilators and their working mechanism. About 31.7% of the participants demonstrated adequate knowledge, while only 1.7% were found to have inadequate knowledge. (Table 2)

Table 3 shows the chi-square analysis showed a statistically significant association between students' level of knowledge and various demographic variables. Age was significantly associated ($\chi^2 = 7.6$, $p = 0.022$). Likewise, previous knowledge ($\chi^2 = 19.267$, $p = 0.000$), source of knowledge ($\chi^2 = 38.40$, $p = 0.000$), and training exposure ($\chi^2 = 13.067$, $p = 0.000$) were all significantly related to students' knowledge levels regarding ventilators and their working mechanism, indicating that these factors influenced the learning outcomes.

Table 1: Demographic variables of students regarding ventilator and its working mechanism.

S.No	Demographic Variables	Frequency	Percentage
1.	**Age**		
	18–19 years	16	26.7%
	19–20 years	30	50.0%
	20–21 years	14	23.3%
2.	**Gender**		
	Female	60	100%
	Male	0	0%
3.	**Previous Knowledge Related to Ventilator**		
	Yes	25	41.7%
	No	35	58.3%
4.	**Source of Knowledge**		
	Classroom Lecture	20	33.3%
	Clinical Exposure	15	25.0%
	Books / Internet	10	16.7%
	No Source	15	25.0%
5.	**Exposure to Any Training Programme**		
	Yes	18	30.0%
	No	42	70.0%

Table 2: Level of Knowledge among Students.

Level of Knowledge	Frequency (n)	Percentage (%)
Inadequate knowledge	1	1.7%
Moderately adequate knowledge	40	66.6%
Adequate knowledge	19	31.7%

Table 3: Association of Level of Knowledge Regarding Ventilator and Its Working Mechanism with demographic Variables

S. No	Demographic Variables	Chi-Square (χ^2)	Degrees of Freedom (df)	P-Value	Significance
1	Age	7.6	2	0.022	*S (Significant)
2	Previous knowledge related to ventilator and its working mechanism	19.267	1	0.000	*S (Significant)
3	Sources of knowledge related to ventilator and its working mechanism	38.40	1	0.000	*S (Significant)
4	Training exposed on ventilator and its working mechanism	13.067	1	0.000	*S (Significant)

DISCUSSION

The presents the findings in alignment with the objectives of the study, which aimed to assess the knowledge regarding ventilators and their working mechanism among DGNM II- and III-year students at Sir Issac Newton School of Nursing, Pappakovil, Nagapattinam, and to evaluate the association of this knowledge with selected demographic variables.

The results revealed that 31.7% of the students possessed adequate knowledge, while a majority, 66.6%, demonstrated a moderate level of knowledge. Only 1.7% of the participants exhibited inadequate knowledge regarding ventilators and their functioning. These findings suggest that although most students have a fair understanding, there remains a need for enhanced educational interventions to improve comprehensive knowledge in this critical area of nursing practice. A study conducted by Wittenberg-Lyles et al. emphasizes that educational interventions can directly address deficits in nurse communication and knowledge, fostering improved patient outcomes in intricate cases such as mechanical ventilation Wittenberg-Lyles et al. (2012). However, this reference mainly focuses on nurse communication training and does not directly assess knowledge specific to mechanical ventilation. Therefore, it should be removed as a supporting reference for this claim.

Kim et al. demonstrated that simulation-based education significantly improved nurse participants' knowledge and self-efficacy concerning ventilator care, underscoring the effectiveness of practical training modules in enhancing understanding of mechanical ventilation practices (Kim et al., 2021).

This reference is relevant and supports the importance of simulation in education that enhances knowledge related to mechanical ventilation. Supplementing these findings, Tallo et al. noted that the formulation of specific questionnaires aimed at assessing knowledge of mechanical ventilation among medical students sheds light on the gaps present in student knowledge and the need for tailored educational interventions (Tallo et al., 2019). This reference is pertinent to the discussion and supports the notion that systematic evaluation can inform educational approaches in nursing.

Moreover, continuous education is pivotal for improving compliance with ventilator management protocols among nurses, with Aloush and Al-Rawajfah suggesting that an updated nursing curriculum is crucial for addressing gaps in knowledge and skills related to mechanical ventilation (Aloush & AL-Rawajfah, 2020). This perspective aligns with the necessity for ongoing education in reinforcing best practices in critical care nursing.

CONCLUSION

The study concluded that students had moderate depression. It is understood that the level of depression was moderate. The study also recommended that counselling should be given to the students. College should have counsellor to help out from the depression.53.3% of students moderate, 4.7% of students mild depression. 49(81.7%) had moderate level of depression ad 11(18.3%) had new level of depression.

CONFLICTS OF INTEREST:

No conflicts of Interest.

RECOMMENDATION:

- A similar study can be conducted by using quantity approach.
- A sample study can be replicated among students indifference setting.
- A comparative study can be performed in different department students.

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