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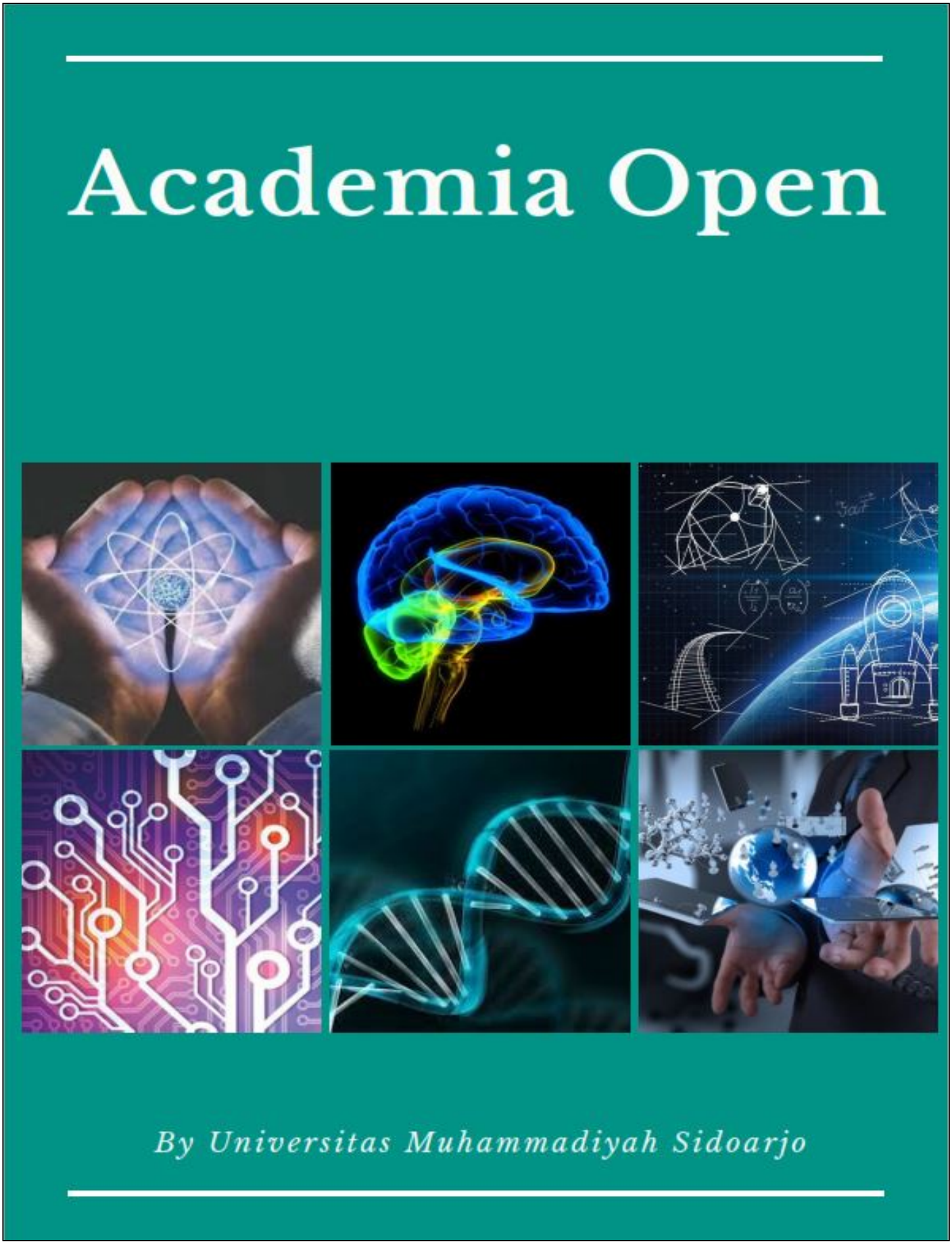

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Preventive Measures of Ventilator-Associated Pneumonia among Intensive Care Unit Nurses

Tindakan Pencegahan Pneumonia Terkait Ventilator di antara Perawat Unit Perawatan Intensif

Saja Kareem Jassim, saja.jassim@uobasrah.edu.iq, (1)

Assistant Lecturer, Fundamentals of Nursing Department, College of Nursing, University of Basrah, Basrah, Iraq, Iraq

(1) Corresponding author

Abstract

General Background: Ventilator-associated pneumonia (VAP) significantly prolongs intensive care unit (ICU) hospitalizations, elevating healthcare costs and increasing mortality risk. **Specific Background**: Despite existing knowledge of VAP's impact, there is limited research on the preventative practices of ICU nurses, a critical factor in mitigating this condition. **Knowledge Gap**: This study explores ICU nurses' preventive measures for VAP and their correlation with demographic characteristics, highlighting a gap in literature. **Results**: Conducted from November 1, 2023, to April 10, 2024, at Basrah hospitals, the study involved 93 purposively sampled ICU nurses. The findings revealed that 48.4% of participants exhibited moderate preventive behavior, while 39.8% displayed poor preventive behavior. Notably, a significant relationship was found between the preventative behavior scores and the education level, as well as years of service in the ICU. **Novelty**: The study provides valuable insights into the current VAP prevention practices among ICU nurses, highlighting demographic factors that influence these behaviors. **Implications**: The study highlights the need for educational interventions to improve ICU nurses' preventative practices, potentially reducing VAP incidence and improving patient outcomes in intensive care settings.

Higlights:

1. Moderate Preventive Behavior: 48.4% of ICU nurses showed moderate VAP prevention practices.
2. Demographic Relationships: Education level and service years influence preventive behavior scores.
3. Training Necessity: Targeted education needed to improve VAP prevention among ICU nurses.

Keywords: Ventilator-associated pneumonia, ICU nurses, preventive practices, demographic characteristics, patient outcomes.

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Introduction

Intensive care unit (ICU) patients are susceptible to various health issues, such as nosocomial infections, even when their condition is urgent. The patients do not have these infections when they are admitted to the hospital; instead, they develop while receiving medical care [2]. After urinary tract infections, nosocomial pneumonia is the second most frequent nosocomial infection among critically ill ICU patients [3]. As long as the patient was not incubating at the time of intubation, pneumonia that develops in a mechanically ventilated patient more than 48 hours after endotracheal intubation is known as ventilator-associated pneumonia (VAP) [4]. The utilization of artificial airways and the application of mechanical ventilation to the patient is typically life-saving in the ICU, the patient is experiencing a critical illness. This typically increases the risk of respiratory infection, particularly VAP, with an invasive endotracheal tube because the tube can be inserted directly into the lower respiratory tract without the need for a cannula [5]. The incidence of VAP among ICUs is between 10% and 25% of all patients in ICUs, and the associated death rate is between 22% and 71% [6]. The prevalence of VAP in developing countries has been documented to be between 9% and 27% [7].

Nosocomial infections were notably elevated at the University Teaching Hospital in Kigali, where surveillance indicated a 50.0% incidence of hospital-acquired infections in the ICU [8]. Ventilator-associated pneumonia can be prevented through several coordinated education and training initiatives, VAP has reemerged as a primary concern in intensive care units globally [9]. Numerous locations indicate elevated VAP rates, exceeding 40%, despite contemporary preventative strategies, utilizing bronchoscopy diagnosis [10]. Even though VAP is a severe issue on a global scale, its high prevalence in poor nations may be due to a lack of understanding and awareness of the issue. Several approaches have been developed to address the global VAP issue; these approaches include numerous evidence-based approaches that have been shown in the literature to reduce VAP and improve patient outcomes [11].

VAP can lead to extremely negative outcomes, such as an increase in overall healthcare costs because of the prolonged hospital stay and delayed extubation time. The hospital increases the probability of 5 rates of morbidity and death in addition to antibiotic resistance [12]. As a result, a series of interventions have been carried out. The Institute of Health Improvements (IHI) has acknowledged the VAP preventive bundle and has recommended it. Elevating the head end of the bed by 30 degrees between 0 and 45 is one of these interventions. Other measures include daily chlorhexidine, dental hygiene with sedation interruption, and prevention for deep vein thrombosis and peptic ulcer disease (PUD), 6 [13, 14].

In today's nursing and medical systems, the care of patients who are critically sick has become more important. The improvement of the efficiency of mechanical breathing in avoiding injury and maximizing patient outcomes is greatly aided by critical care nurses. Because of their expertise in managing patients on mechanical support ventilators and their understanding of the patient's clinical state, healthcare professionals can adjust ventilator settings to maximize benefits while reducing drawbacks [15, 16]. The knowledge that nurses possess on the purposes and restrictions of ventilator modes, reasons for discomfort, and dyssynchrony Their ability to provide excellent, patient-centered care is facilitated by the use of ventilators and adequate management [17, 18].

When it comes to patients and ventilators, nurses act as first-line managers. It's critical to recognize problems like dyspnea, respiratory distress, and increased labor of breathing and the actions needed to treat them. When providing care for patients on a ventilator, nurses need to be aware of the basic features of the device, such as the settings, alarms, and ventilator mode. To offer the best patient-centered care and avoid complications, it is critical to be proficient in the prompt diagnosis and management of common concerns of patients and ventilators [19].

Because they are by patients' bedsides around the clock, ICU nurses are in the best position to apply evidence-based practice. As a result, they are crucial in the prevention of ventilator-associated pneumonia (VAP), such study aims to identify ICU nurses' measures to avoid VAP, which can prolong patient stay in the hospital and make ICU patients more vulnerable to further complications.

Methods

The present study used a descriptive cross-sectional design to assess the preventative measures of Intensive Care Unit nurses regarding ventilator-associated pneumonia, conducted from November 1, 2023, to April 10, 2024. The research was performed at the intensive care units of Basrah hospitals situated in the city center. The entire study sample comprised 93 ICU nurses, who met the study criteria and were included in the research. The sampling was purposive (non-probability).

Inclusion criteria and Exclusion Criteria

Inclusion criteria include nurses employed in the ICU, both sexes (male and female), and Eligible to participate in the study. Exclusion Criteria include nurses from other departments within the hospital and Individuals who decline to participate in the study.

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Ethical considerations

The researcher attained informed consent from all participants, affirming their comprehension of the study's aims, and method. This is especially significant in a hospital setting, since staff may feel obligated to engage owing to their professional responsibilities.

Instrument of study

To achieve the study goals. The study instrument consists of two parts including:

Part I: Patient Sociodemographic Data

This section pertains to the acquisition of demographic data gathered via a personal interview questionnaire and comprises seven variables: hospital name, age, gender, educational level, years of service, years of service in intensive care units, and participation of nursing staff in intensive care training courses.

Part II: Assessing Preventive Measures of ICU Nurses Regarding VAP

This section comprises a questionnaire consisting of 17 items. Every item presents four alternatives: I seldom engage in that activity; I mostly do so occasionally; I consistently perform that action. The researchers employed four criteria to evaluate each item on the knowledge sheet. (4) for the accurate response (I consistently do that), (3) for the neutral response, (2) for the incorrect response (I infrequently do it), (1) (I do not). The overall level of the nursing staff's preventive conduct was categorized into three tiers based on the average score. The degree of inadequate, moderate, and effective preventative behavior [20].

Validity and Reliability

The association coefficient among the 17 items of the VAP preventative behavior measuring instrument was 0.72 ($p < 0.001$). The validity of the criterion was deemed established if the corresponding validity correlation coefficient was assessed to have been attained. The overall reliability of the final 17 items, as measured by Cronbach's alpha, was 0.80. The prevention of aspiration was 0.81, management of ventilators was 0.80, spontaneous awakening trials and spontaneous breathing trials were 0.74, subglottic suctioning trials were 0.71, management of suction systems was 0.87, and standard precautions were 0.75. The dental care score was 0.75 [20].

Statistical analysis

1- The collected data was examined using descriptive statistics, encompassing frequency distribution and percentages.

2- Inferential statistics, specifically bivariate analysis (Pearson's correlation), identifies connections between many factors and the execution of all preventive actions against them.

Result and Discussion

Demographic Variables	Rating and Intervals	Frequency n=93	Percent n=93
1- Hospital Name	Al-Fayhaa Hospital	15	16.1
	Al-Mawani Hospital	10	10.8
	Al-Naft Hospital	20	21.5
	Al-Sadar Teaching Hospital	24	25.8
	Al-Shifa Hospital	9	9.7
	Basrah General Hospital	15	16.1
2- Age	20-29	56	57
	30-39	25	26
	40-49	6	7
	50 and more	2	3
3- Sex	Male	45	48.4
	Female	48	51.56
4- Educational Level	Nursing School	21	22.6
	Diploma	40	43.0
	Bachelor's	31	33.3
	Postgraduate	1	1.1

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5- Total Number of years of service	1-10 years	59	63.4
	11-20 years	29	31.2
	>20 years	5	5.4
6- Service in Intensive Care (Year)	1-5 year	60	64.5
	6-11 year	22	23.7
	12-16 year	6	6.5
	17-21 year	4	4.3
	22-26 year	1	1.1
7- Have you participated in intensive care training courses?	No	47	50.5
	Yes	46	49.5

Table 1. ***Participants' Sociodemographics characteristics (n = 93)***

Table 1. According to the above table, among the 93 participants, with regard name of the hospital, the highest percentage of Al-Sadar Teaching Hospital 25.8%, more than half of the participants 57% were between (20-30) years old, more than half of them were female 51.56%, About educational level highest percentage of theme were diploma 43.0%, more than half of sample total years of service 1-10 years 63.4%, and the exact service in ICU were 64.5 % 1-5 years. Nearly half of the 50.5 % have not undergone training courses about ICU.

Levels of preventive behaviors	Frequency (F)	Percent (%)
Poor Preventive behavior	37	39.8
Moderate Preventive behavior	45	48.4
Good Preventive behavior	11	11.8
Total	93	100.0

Table 2. *Measuring preventative behavior of Intensive Care Unit Nurses Regarding Ventilator-Associated Pneumonia*

Table (2) shows that a total of 48.4% of the 93 participants have Moderate Preventive behavior regarding ventilator-associated pneumonia, while (39.8%) of the participants have Poor Preventive behavior regarding ventilator-associated pneumonia.

		Age	Gender	Level of Education	total number of years of service	number of years of service in intensive care	Have you participated in intensive care training courses?
scores of Preventatives Behavior	Pearson Correlation	-.091-	.144	.475**	-.167-	-.261-*	.645**
	Sig. (2-tailed)	.387	.169	.000	.109	.000	.000
	N	93	93	93	93	93	93
*. Correlation is significant at the 0.05 level (2-tailed).							
**. Correlation is significant at the 0.01 level (2-tailed).							

Table 3. ***Correlation between Scores of Preventative Behavior of Intensive Care Unit Nurses and Demographic Data.***

Table (3) shows a significant correlation between scores of Preventative Behavior and level of education at the 0.05 level, p-value .000, and another significance of these scores with the number of years of service in intensive care.

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No	Questions	F	%
1	Use sterile water filled with humidifiers to ventilate the respirator	59	63%
2	Changing the tubes of the artificial respirator for mechanical ventilation when we see that they are not clean and their mechanical function is reduced	56	60.2%
3	Do not use the oxygen tube, mask, and ammopack from one patient to another	54	58.1%
4	The suction time is 15 seconds	54	58.1%
5	Elevate the head of the patient's bed at an angle of 30-45 degrees except for patients who have contraindications to this procedure	52	55.9%
6	Observe aseptic technique, at the tracheostomy site when replacing the tracheostomy tube	41	44.1%
7	In patients using an open withdrawal system, use a single-use withdrawal catheter and sterile water with each withdrawal	43	46.2%
8	We should regularly check the proper position of the nasogastric tube	35	37.6%
9	The pressure of the endotracheal tube palm should be maintained within 20-30 ml.	45	48.4%
10	Before emptying the palm of the endotracheal tube, before that, move the tube or change the position of the patient to ensure that secretions are removed from the most expensive palm of the tube.	44	47.3%
11	Examine regularly and control the pressure of the palm of the endotracheal tube using manual examination	43	46.2%
12	Daily, subjectively or automatically, experience waking up with sedatives off, except for patients who have contraindications	43	46.2%
13	Oral care every 4-8 hours	41	44.1
14	In patients using a closed withdrawal system, a closed withdrawal catheter should be used for each new patient	41	44.1
15	Do not pour or push water from the respirator tubes into the device or onto the patient	38	40.9
16	Experiment with self or spontaneous breathing once daily	35	37.6
17	Oral care with hydrohexidine 0.12% or 12.5%	23	24.7

Figure 1. *Frequency and percentage of ICU nurses Regarding Prevention of VAP*

Table [4] shows the frequency and percentage of respondents to the questionnaire, more than 60.2% for the second question, while a lower percentage for the last question 17 were 24.7%.

Discussion:

The study presents many demographic data, including age, gender, educational level, and years of experience of the nursing personnel. This background information was crucial for comprehending the participants and the potential influence of these characteristics on their VAP preventive practices.

The age distribution of the sample indicated that more than half of nurses were in the 20–30-year age, Typically, it is the younger nurses who exhibit greater receptiveness to adopting innovative techniques and technologies aimed at mitigating Ventilator-Associated Pneumonia (VAP). Also, the sex distribution of the study indicated that approximately half of the nurses were female. Female nurses influence team dynamics and communication within the ICU, potentially hindering attempts to prevent VAP. This result agrees with the study [20, 21], which identified a notable cohort of young nurses delivering care to critically ill patients.

The substantial correlation between age and sex with adherence to preventative measures highlighted in prior studies emphasizes the necessity for targeted training programs that address these demographics, such as specialized educational initiatives for younger female nurses to enhance their knowledge and competencies in VAP prevention. Agree with the study [22].

Furthermore, a robust significant association existed between the scores of preventative behaviors and educational attainment. Higher education levels among ICU nurses correlate with improved preventative strategies against VAP. Emphasize the correlation between years of service in critical care and the scores of preventative actions. This link suggests that nurses with greater experience may exhibit superior adherence to preventive interventions, potentially leading to improved patient outcomes in the ICU. This outcome aligns with the research conducted by

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[22].

The study indicated that approximately fifty percent of the participants exhibited modest preventative activity for ventilator-associated pneumonia. Consequently, the sufficiency of the existing training and practice among ICU nurses warrants careful consideration. It is essential to emphasize that modest behavior is sufficient, as the avoidance of ventilator-associated pneumonia is a crucial aspect of patient safety and results. This discovery highlights the necessity for enhanced training and the establishment of regulations to elevate prevention practice standards, this contradicts the study by [23].

Conclusion

ICU Nurses exhibit moderate preventative behavior for ventilator-associated pneumonia. A relationship existed between Preventative Behavior scores and education level, as well as a notable relationship between these scores and years of service in the intensive care unit.

References

1. . A. A. Othman and M. S. Abdelazim, "Ventilator-Associated Pneumonia in Adult Intensive Care Unit Prevalence and Complications," The Egyptian Journal of Critical Care Medicine, vol. 5, no. 2, pp. 61–63, Aug. 2017. doi: 10.1016/j.ejccm.2017.06.001.
2. . A. Sikora and F. Zahra, "Candida Auris: Continuing Education Activity," StatPearls, 2021. [Online]. Available: https://www.ncbi.nlm.nih.gov/books/NBK563297. [Accessed: Dec. 17, 2021].
3. . M. J. Richards, J. R. Edwards, D. H. Culver, and R. P. Gaynes, "Nosocomial Infections in Medical Intensive Care Units in the United States," Critical Care Medicine, vol. 27, no. 5, pp. 887–892, May 1999. doi: 10.1542/peds.103.4.e39.
4. . R. N. Kinuthia, "Risk Factors and Treatment Patterns of Ventilator-Associated Pneumonia in Intensive Care Patients at Kenyatta National Hospital," Doctoral dissertation, University of Nairobi, Nairobi, Kenya, 2022. doi: 10.123456789/25140.
5. . P. Ramirez, G. L. Bassi, and A. Torres, "Measures to Prevent Nosocomial Infections During Mechanical Ventilation," Current Opinion in Critical Care, vol. 18, no. 1, pp. 86–92, Feb. 2012. doi: 10.1097/MCC.0b013e32834ef3ff.
6. . T. Bajpai, G. Shrivastava, G. S. Bhatambare, A. B. Deshmukh, and V. Chitnis, "Microbiological Profile of Lower Respiratory Tract Infections in Neurological Intensive Care Unit of a Tertiary Care Center from Central India," Journal of Basic and Clinical Pharmacy, vol. 4, no. 3, pp. 51–54, Jun. 2013. doi: 10.4103/0976-0105.118789.
7. . A. A. Kalanuria, W. Zai, and M. Mirski, "Ventilator-Associated Pneumonia in the ICU," Critical Care, vol. 18, pp. 1–8, Apr. 2014. doi: 10.1186/cc13775.
8. . S. Lukas, U. Hogan, V. Muhirwa, C. Davis, J. Nyiligira, O. Ogbuagu, and R. Wong, "Establishment of a Hospital-Acquired Infection Surveillance System in a Teaching Hospital in Rwanda," International Journal of Infection Control, vol. 12, no. 3, Sep. 2016. doi: 10.3396/ijic.v12i3.16200.
9. . J. Fumagalli, M. Panigada, M. Klompas, and L. Berra, "Ventilator-Associated Pneumonia Among SARS-CoV-2 Acute Respiratory Distress Syndrome Patients," Current Opinion in Critical Care, vol. 28, no. 1, pp. 74–82, Feb. 2022. doi: 10.1097/MCC.0000000000000908.
10. . C. O. Pickens, C. A. Gao, M. J. Cuttica, S. B. Smith, L. L. Pesce, R. A. Grant, M. Kang, L. Morales-Nebreda, A. A. Bavishi, J. M. Arnold, A. Pawlowski, "Bacterial Superinfection Pneumonia in Patients Mechanically Ventilated for COVID-19 Pneumonia," American Journal of Respiratory and Critical Care Medicine, vol. 204, no. 8, pp. 921–932, Oct. 2021. doi: 10.1164/rccm.202106-1354OC.
11. . A. F. Tolentino-DelosReyes, S. D. Ruppert, and S. Y. Shiao, "Evidence-Based Practice: Use of the Ventilator Bundle to Prevent Ventilator-Associated Pneumonia," American Journal of Critical Care, vol. 16, no. 1, pp. 20–27, Jan. 2007. doi: 10.4037/ajcc2007.16.1.20.
12. . T. P. Hellyer, V. Ewan, P. Wilson, and A. J. Simpson, "The Intensive Care Society Recommended a Bundle of Interventions for the Prevention of Ventilator-Associated Pneumonia," Journal of the Intensive Care Society, vol. 17, no. 3, pp. 238–243, Aug. 2016. doi: 10.1177/1751143716644.
13. . S. Burja, T. Belec, N. Bizjak, J. Mori, A. Markota, and A. Sinkovič, "Efficacy of a Bundle Approach in Preventing the Incidence of Ventilator-Associated Pneumonia," Bosnian Journal of Basic Medical Sciences, vol. 18, no. 1, pp. 105–110, Feb. 2018. doi: 10.17305/bjbms.2017.2278.
14. . Z. S. Dawood, K. M. Jassim, A. M. Tiryag, and A. S. Khudhair, "Nurses' Knowledge and Attitudes Toward Deep Vein Thrombosis: A Cross-Sectional Study," Bahrain Medical Bulletin, vol. 45, no. 4, pp. 45-50, Dec. 2023.
15. . D. U. Dumbre, "A Study to Assess the Knowledge and Compliance of Critical Care Nurses Regarding Ventilator Care Bundle in the Prevention of Ventilator-Associated Pneumonia," Medico-Legal Update, vol. 19, no. 1, pp. 35–40, Jan. 2019. doi: 10.5958/0974-1283.2019.00035.5.
16. . H. A. Hadi Atiyah and M. M. Abdul-Wahhab, "Nurses' Knowledge Toward Essential Care for Adult Patients Undergoing Mechanical Ventilation at Critical Care Unit in Baghdad City," Higher Education, vol. 4, no. 8, pp. 100–105, 2016. doi: 10.9790/1959-0505067276.

ISSN 2714-7444 (online), https://acopen.umsida.ac.id, published by Universitas Muhammadiyah Sidoarjo

17. . P. Raiju, G. R. Gireesh, B. T. Sachina, and A. Barnes, "Effectiveness of Structured Teaching Program on Knowledge Regarding Modes of Mechanical Ventilator Among Staff Nurses at a Selected Hospital, Bangalore," Asian Journal of Nursing Education and Research, vol. 5, no. 1, pp. 98–104, 2015. doi: 10.5958/2349-2996.2015.00021.X.
18. . E. Ruririmbwa, "Assessing Measures for Preventing Ventilator-Associated Pneumonia Among Nurses Working in Intensive Care Units: A Case of Two Selected Referral Hospitals in Kigali," Doctoral dissertation, University of Rwanda, Kigali, Rwanda, 2022. [Online]. Available: http://hdl.handle.net/123456789/399.
19. . K. A. Hassen, M. A. Nemera, A. W. Aniley, A. B. Olani, and S. G. Bedane, "Knowledge Regarding Mechanical Ventilation and Practice of Ventilatory Care Among Nurses Working in Intensive Care Units in Selected Governmental Hospitals in Addis Ababa, Ethiopia: A Descriptive Cross-Sectional Study," Critical Care Research and Practice, vol. 2023, pp. 1–6, 2023. doi: 10.1155/2023/4977612.
20. . S. Kwak and S. Han, "Development of a Tool for Measuring Ventilator-Associated Pneumonia Prevention Behaviors of Intensive Care Unit Nurses," International Journal of Environmental Research and Public Health, vol. 19, no. 14, pp. 1–12, Jul. 2022. doi: 10.3390/ijerph19148822.
21. . A. M. Tiryag, S. B. Dawood, and S. K. Jassim, "Nurses' Knowledge and Attitudes About Enteral Feeding Complications by Nasogastric Tube in Intensive Care Units," Rawal Medical Journal, vol. 48, no. 3, pp. 689–693, Jul. 2023.
22. . H. L. Lin, C. C. Lai, and L. Y. Yang, "Critical Care Nurses' Knowledge of Measures to Prevent Ventilator-Associated Pneumonia," American Journal of Infection Control, vol. 42, no. 8, pp. 923–925, Aug. 2014. doi: 10.1016/j.ajic.2014.05.012.
23. . G. Ab Getahun, Y. Belsti, M. Getnet, D. A. Bitew, Y. Y. Gela, D. G. Belay, B. Terefe, Y. Akalu, and M. Diress, "Knowledge of Intensive Care Nurses Towards Prevention of Ventilator-Associated Pneumonia in North West Ethiopia Referral Hospitals," Annals of Medicine and Surgery, vol. 78, pp. 103895, Jun. 2022, doi: 10.1016/j.amsu.2022.103895.

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