Arab American University
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Department of Health Science
Master Program in Critical Care Nursing

Intensive Care Nurses' Knowledge for Endotracheal Tube Suctioning in Private Hospitals in North West-Bank: Prospective Study

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Thesis Approval

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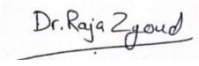
1. Dr . a Raj'a Zyoud	Main Supervisor	
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Declaration

I declare that, except where explicit reference is made to the contribution of others, this thesis is substantially my own work and has not been submitted for any other degree at the Arab American University or any other institution.

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Dedication

I dedicate this work to Almighty Allah, who has protected my life and provided me with the health and strength to complete it.

To my parents for their unending prayers and my family for their support.

To my pals for their support and encouragement.

To all the martyrs and injured in Palestine.

Thank you to everyone who has helped me finish this task.

Abdulnour Mohammad Hussein Marshoud

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This section could be filled with unending gratitude for my family, friends, and colleagues who helped make this thesis possible, but I'll keep it simple.

My heartfelt gratitude goes to my father and mother, who sacrificed my attention for two years to make this degree possible.

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Intensive Care Nurses' Knowledge for Endotracheal Tube Suctioning in Private Hospitals in North West-Bank, Prospective Study

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Abstract

Endotracheal intubation (ETT) with mechanical ventilation (MV) is the most common point of airway intervention practice used in clients referred to hospital Intensive care units for the sole target of preserving a clear and open airway. ETT prevents sufficient coughing and the loss of mucociliary function, which causes secretions to accumulate in the airway. The main objective was to assess ICU nurses' knowledge of ETS in private hospitals in the North West Bank.

A prospective, descriptive, quantitative study design, done in the ICU Department at Private Hospitals in the North-West Bank. The target population was all ICU nurses in private hospitals in the North West Bank, who met the inclusion criteria. A convincing sample was composed of 258 ICU nurses was participated in the study during the data collection period.

Demographic analysis revealed a predominantly male participant base (60.9%), primarily aged between 21-40 years (85.6%), with a Bachelor's degree as the most prevalent educational qualification (69.4%). Experience levels varied, with 39.5% having less than 5 years of ICU experience. Notably, 61.2% reported receiving specific ETS training. Findings regarding ETS knowledge and practices underscored a comprehensive understanding among participants. A resounding 86% emphasized the necessity of patient assessment before suctioning, while 77.5% advocated for smaller suction catheters. Moreover, 90.3% stressed the importance of aseptic techniques during suctioning. Analysis of knowledge levels yielded a mean score of 18.9 out of 24, with significant influences from demographic factors. Males exhibited a higher mean knowledge score (19.41 ± 3.32) than females (18.12 ± 3.54). Similarly, individuals with a Master's degree boasted the highest mean knowledge score (19.50 ± 4.33), while those with over 20 years of experience demonstrated the lowest (16.67 ± 3.14)

According to this study, the researcher concludes with several key insights regarding ICU nurses' knowledge of Endotracheal Suctioning (ETS). Some significant factors that influence ICU nurses' knowledge such as gender (male nursing), educational background, and years of experience play important roles. The experience years in nursing work and special experience in the ICU as a nurse are important points that influence the knowledge of nursing regarding ETS.

Keywords: Knowledge, Endotracheal Tube, Endotracheal tube suctioning.

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List of Definitions of Abbreviations

Abbreviations	Title
AARC	American Association of Respiratory Care
ARD	Acute Respiratory Distress
CCN	Critical care nurses
ETS	Endotracheal suctioning
ETT	Endotracheal Tube
HR	Heart rate
ICP	Intracranial pressure
ICU	Intensive care units
IRB	Institutional Review Board
MV	Mechanical ventilation
OSS	Open suction system
RR	Respiratory rate
SPO2	SPO2
US	United States
VAP	Ventilator Association Pneumonia

Chapter One: Introduction

1.1 Introduction and Background

Endotracheal Tube (ETT) with mechanical ventilation (MV) is the most common point of airway intervention practice used in clients referred to hospital ICU for the sole target of preserving an open airway. ETT prevent sufficient coughing and the loss of mucociliary function, which causes mucous to accumulate in the airway (Aboalizm & Abd Elhy, 2019).

Suctioning is indicated when the respiratory rate (RR) is above normal, there is inadequate airway opening, the level of SPO2 has decreased, there is a risk of infection, atelectasis, and alveolar collapse due to mucous accumulation, secretion in complicated clients, and there is a risk of aspiration (Mohamed & Ahmed, 2022).

Endotracheal suctioning (ETS) is a procedure in which a catheter is placed into an endotracheal tube (ETT) and mucus from the clients lungs are evacuated using negative pressure. This procedure prevents secretion buildup, which maintains airway patency, guarantees adequate oxygenation, and saves patients' lives (Hamed et al., 2023).

ETS's basic goals are to increase oxygenation, keep airway patent and gas exchange, promote alveolar ventilation, and prevent ventilator-associated pneumonia (VAP) (Majeed, 2017).

So, ETS is an important part of therapy for these individuals. Suctioning has been found as a potentially risk procedure related to a variety of consequences such as trauma, bronchoconstriction, hypoxemia, cardiac arrest, and death in the nursing intervention of these patients (Harjot, Kumar & Krishan, 2016).

A patient with a tracheostomy or ETT ***has a lower ability to increase intrathoracic pressure to cough up mucus. ETT is the most often utilized artificial airway for respiratory support. ETS, a vital way the keeping of airway opens and mucus aspirate in the complicated sick, is a standard aspect of care for MV clients in the ICU (Hamed et al., 2023).

ETS symptoms include decreased SPO2 and arterial blood gas (ABG) readings, visible airway mucus, acute respiratory distress (ARD), and probable aspiration of stomach or upper airway secretions. Airway suctioning is one of the most commonly used therapies for clients with respiratory problems, and nurses must be well-versed in its application (Rafiq et al., 2022).

It was also linked to repercussions and hazards such as hemorrhage, tracheal mucosa lesions, infections, atelectasis, cardiovascular problems, hypoxemia, and increased intracranial pressure (ICP) (Negro et al., 2014).

Closed and open system suctioning is an accessible approach for doing endotracheal suction. Open suctioning necessitates disconnecting the client from MV, whereas closed suctioning does not necessitate disconnection but instead suctions through a specific catheter (Aboalizm et al., 2019).

In updating, the closed suction system has been approved in advanced states such as the United States (US); it is utilized totally in 58% of ICUs, whereas the open system is used in 4% of other centers. OSS (open suction system) is the most commonly utilized approach in Egypt because its suction catheter is less expensive and more accessible. The improper suction method causes complications such as dysrhythmia, lung collapse or closure, decreased oxygen level in the blood, nosocomial infections, and increased ICP, all of which have an impact on the client prognosis, length of hospitalization, and costs (Pinto, D'silva & Sanil, 2022).

1.2 Problem Statement

The researchers felt there was a need to assess the knowledge of ICU nurses and understanding linked to ETS techniques and to offer protocols for effective and safe practice. It is believed that 30-40% of these individuals are not receiving care based on updated protocol and that 20% or more are receiving possibly hazardous care (Negro et al., 2014).

Because secretory micro-aspiration is a risk factor for VAP, it is critical to evaluate oral suctioning, oral care, and ETT management procedures (Pinto, D'silva & Sanil, 2022).

A screening of intensive care unit nurses' knowledge and competence in acute and high-dependence ward areas revealed that there was a lack of understanding of numerous subjects concerning ETS (Harjot, Kumar & Krishan, 2016). They discovered that ICU nurses are frequently unaware of the availability of standards and studies done about the subject; also, they discovered a significant disparity between recommendations and intensive care nurses' practice (Aboalizm et al., 2019).

There was no available study that was done previously in Palestine to assess ICU nurses' knowledge of ETS and recommendations (Rafiq et al., 2022).

According to a study by Abu Ejheisheh et al. (2025), that show most nurses showed moderate knowledge of tracheostomy care, with significant differences observed based on age, gender, years of experience, and educational level.

1.3 Study Significance

ETS inhibits the accumulation of excessive mucus in the lungs, maintaining airway open, ensuring adequate oxygenation, and preserving patients' lives. This technique permits airways to clear, conserving permeability and allowing for appropriate gas exchange.

The significance of this study was determined by the researcher's clinical experience, which revealed that ETT care is a difficult process with several attendant risks and complications. ETT difficulties increase morbidity, hospital costs, and death in trauma patients requiring intubation during intensive care unit stays, prompting healthcare providers and intensive care nurses to undertake significant efforts to reduce the frequency of this issue. They must be knowledgeable, practiced, and skilled in dealing with these issues. As a result of these factors, there is an obvious need for more effective nurse education about ETT care (Abu Ejheisheh et al., 2025).

To avoid this complication, nurses should be oriented to the risks and adhere to standards based on the American Association of Respiratory Care (AARC) advice, which improves client outcomes. These suggestions include administering 100% oxygen before, during, and after ETS, avoiding normal saline instillation before ETS, employing a close system with high positive end-expiratory pressure, and increasing FIO2.In adults, the catheter's diameter is half the length of the ETT. The maximum suction period ranges from 10 to 15 seconds. (Aboalizm et al., 2019).

Effective ETS is a critical component of airway management in intubated critically sick suction. As a result, it is critical to reduce complications by paying close attention to all suction processes. Clients must be properly assessed and prepared, and sterilization must be maintained to prevent infection and improve patient outcomes.

Improved results will reduce ICU length of stay and hospitalization, as well as the financial burden on client and hospital costs.

As a result, the researcher felt there was a need to evaluate ICU knowledge of existing procedures and ETS techniques and offer protocols for efficacy and safe practice, which would

also have a favorable impact on client results, lowering staff expenditures, and promoting safe patient care.

1.4 Study Objective

1.4.1 General Objective

The main objective was to assess ICU nurses' knowledge of ETS in privet hospitals in the North West Bank.

1.4.2 Secondary Objective

1. To examine intensive care unit nurses' competence in ETS in privet hospitals in the North West bank.
2. To explore the socio-demographic factors that influence ICU unit nurses' knowledge of ETS in privet hospitals in North West Bank.
3. To make recommendations and guidelines for improving educational interventions about ETS for ICU nurses and other healthcare providers.

1.5 Study Questions

1. What is the level of ICU nurses' knowledge of ETS in privet hospitals in North West Bank?
2. What are the socio-demographic factors that influence the knowledge of ICU nurses of ETS in privet hospitals in North West Bank?
3. What are the recommendations and guidelines that should be used for improving educational interventions about ETS?

1.6 Study Hypothesis

1. There is no statistically significant difference at $\alpha \leq 0.05$ between ICU nurses' knowledge of ETS in privet hospitals in North Westbank, and the competence of nurses in the application of ETS before, during, and after the procedure.
2. There are no significant differences at a level of ($\alpha \leq 0.05$), between the knowledge of ICU nurses of ETS in privet hospitals in the North West Bank attributed to gender.
3. There are no significant differences at a level of ($\alpha \leq 0.05$), between the knowledge of ICU nurses of ETS in privet hospitals in the North West Bank attributed to age.

4. There are no significant differences at a level of ($\alpha \leq 0.05$) between the knowledge of ICU nurses of ETS in privet hospitals in North West Bank attributed to the educational level of ICU nurses.
5. There are no significant differences at a level of ($\alpha \leq 0.05$), between the knowledge of ICU nurses of ETS in privet hospitals in the North West Bank attributed to years of experience.
6. There are no significant differences at a level of ($\alpha \leq 0.05$) between the knowledge of ICU nurses of ETS in privet hospitals in the North West Bank attributed to years of experience in ICU.
7. There are no significant differences at a level of ($\alpha \leq 0.05$) between the knowledge of ICU nurses of ETS in privet hospitals in the North West Bank attributed to receiving training courses about ETS.

1.7 Study Variables

1.7.1 Dependent Variables: Nursing knowledge regarding endotracheal tube suction.

1.7.2 Independent Variables: Age, Gender, Educational Level, Years of Experience, Years of Experience in ICU, Training courses about ETT suction.

1.8 Conceptual and Operational Definition

Conceptual Definition of Nursing knowledge regarding endotracheal tube suction: The ability of nurses to remember, comprehend, and apply scientific principles, techniques, and guidelines about the safe and efficient suctioning of endotracheal tubes in patients on mechanical ventilation is known as nursing knowledge (Abu Ejheisheh, et al., 2025).

Operational Definition of Nursing knowledge regarding endotracheal tube suction: A structured questionnaire created by the researcher will be used to assess nursing knowledge. It will include multiple-choice and/or true/false questions about ETT suction indications, procedures, infection control methods, and complications. Based on predetermined scoring criteria, knowledge levels will be classified as poor, moderate, or good after the total score has been determined.

Chapter Two: Literature Review

2.1 Introduction

This chapter provides a synthesis of recent research concerning knowledge regarding endotracheal tube suction. Concepts that are critical to the study of this phenomenon include demographic data, nursing knowledge, and endotracheal tube suction. Each concept is individually discussed.

To find studies related to nursing knowledge of endotracheal tube (ETT) suction, a targeted literature search was carried out using databases like PubMed, CINAHL, ScienceDirect, Scopus, ProQuest, and Google Scholar. Results were refined using Boolean operators and keywords and MeSH terms such as "nursing knowledge," "ETT suction," "ICU nurses," and "mechanical ventilation." Peer-reviewed, English-language publications with ICU nurses that addressed ETT suctioning knowledge or training and were published between 2015 and 2025 met the inclusion criteria. In order to support the development of the study framework and tool, pertinent studies were reviewed.

2.2 Review of the studies

A study conducted by Abu Ejheisheh et al. (2025) in Palestine that tracheostomy, a common critical care procedure, facilitates airway management for patients who need continuous mechanical ventilation. However, complications like infections and airway blockages can result from nurses' inadequate understanding of tracheostomy care. Therefore, improving patient outcomes in intensive care units (ICUs) requires an understanding of nurses' proficiency in tracheostomy care. To gauge the level of tracheostomy care knowledge among 237 ICU nurses in the southern West Bank of Palestine, a cross-sectional study was carried out. A structured questionnaire was used to collect the data, and descriptive and inferential tests were used for analysis. With notable variations according to age, gender, years of experience, and educational attainment, the majority of nurses demonstrated a moderate level of tracheostomy care knowledge. Nurses must take part in ongoing education and training programs centered on tracheostomy care if they are to dramatically improve patient outcomes and safety in intensive care units.

Raq et al (2022) conducted a descriptive cross-sectional study design. Endotracheal suctioning is a critical and commonly performed invasive technique that involves inserting a

synthetic tube into a client's airway. This research aimed to analyze the knowledge and practical application of the ICU nurses in Karachi's tertiary care hospitals about endotracheal suctioning for intubated clients. which included ICU nurses from two public sector tertiary care hospitals. The study found that nurses in the intensive care units of tertiary care facilities demonstrated excellent knowledge and proficiency with endotracheal suctioning. Notably, professional education was linked to endotracheal suctioning practice, and gender was statistically associated with knowledge. The results underlined how critical it is that nurses have access to the right tools, knowledge, and abilities created especially to improve their ability to perform ETS procedures.

Majeed (2017) did a cross-sectional design study. Mechanical ventilation is an important therapeutic technique for critically sick patients suffering from severe diseases and respiratory problems. The study sought to assess ICU nurses' knowledge and skills related to ETS for adult clients, as well as to investigate the potential association between demographic variables and nurses' understanding and application of these procedures. A selective sample of 50 nurses from several hospitals in Baghdad. The study found that, despite having a moderate degree of education, nurses performed admirably when doing endotracheal suctioning operations. It stressed the growing need for continuing education while serving, emphasizing the need for nurses to participate in continuing education courses. According to the study, educational activities, particularly theoretical training, had a considerable impact on nurses' performance. However, it emphasized the importance of practical education, as well as attention to pre-vocational and managerial aspects, to improve nursing proficiency in this crucial operation. Furthermore, the provision of appropriate equipment for completing endotracheal suctioning correctly was regarded vital for nurses' efficacy in this element of care.

According to Heidari and Shahbazi (2017), Airway suctioning is still a common intervention for patients suffering from respiratory illnesses, and nurses must be knowledgeable enough to perform this treatment. This research aimed to evaluate nurses' familiarity with the fundamental principles behind airway suctioning. A census-based sampling strategy was used for this cross-sectional study, which included 85 staff nurses at Vali-Asr Hospital. A questionnaire developed internally examined nurses' understanding of airway suctioning principles. A significant relationship (p0.05) appeared between knowledge levels and nurse gender, suggesting that female nurses were more aware of airway suctioning principles than their male counterparts.

Although airway suctioning is a skill used by nurses, respiratory therapists, and skilled technicians, the study found that nurses' awareness of this technique was only at an intermediate level. Given the significance of the approach and its impact on patients' hemodynamic status, the study suggests in-service educational courses to supplement nurses' expertise in this arena.

Endotracheal suctioning (ETS) entails placing a catheter into the endotracheal tube, a critical process aimed at minimizing secretion accumulation, hence preserving airway patency and guaranteeing adequate oxygenation to save patients' lives, according to Hamed et al (2023). Understanding and commitment to proper suctioning practices by nurses is critical in infection, while this research aimed to evaluate nurses' understanding of ETS. A descriptive study was carried out at Najran Hospital, which included all nurses who worked there during the data collection period. Sample were recruited in the study, and information was gathered through the use of a self-administered questionnaire. The vast majority (75%) of participants were aware of the rationale for endotracheal tube suctioning, whereas 62% were aware of associated problems and 57% were aware of critical actions to reduce infection risks. Furthermore, more than half (56%) demonstrated a thorough understanding of endotracheal tube suctioning. The study discovered a significant relationship between overall knowledge level and attendance in training courses (p-value 0.032). Regarding to the study's result, 57.9% of participants had a moderate level of understanding, while 33.3% had inadequate knowledge. It emphasizes the significance of providing detailed, up-to-date written rules for endotracheal tube suctioning within the research environment to ensure that nurses are knowledgeable in this area.

Endotracheal tube suction (ETS) was defined as an invasive method performed by ICU nurses to preserve airway clarity from lung secretions in a study conducted by Alessa et al (2022). Inadequate understanding and inadequate practice by evidence-based standards among ICU nurses during these procedures can result in a variety of problems. This review aimed to analyze ICU nurses' knowledge and practice levels regarding ETS and to investigate the factors impacting their competency in this area. Across several research, ICU nurses show an acceptable degree of knowledge but frequently practice levels that do not accord with current ETS guidelines. Nurses' proficiency in ETS procedures is influenced by their degree of professional education, expertise, ICU type, support systems, and educational background. More research with bigger sample sizes in a variety of situations, particularly poor countries, is advised. Recognized

as an important part of airway management, ETS needs a reduction in the gap between nurses' knowledge and their practical application to avoid ETS-related issues that could jeopardize nursing care quality and patients' quality of life. Previous research has found that ICU nurses who participate in educational programs enhance their knowledge and practice significantly. The implementation and continuous upgrading of ETS teaching programs for all nursing personnel within hospitals is advocated. Further research with larger sample sizes, undertaken in a variety of settings, particularly developing countries, would considerably improve understanding and practice in this critical area of nursing care.

Maras et al (2016) conducted cross-sectional and nonparticipant structured observational methods to assess ICU nurses' knowledge and practices related to open system ETS, as well as to assess potential correlations between nurses' demographic data and their understanding and performance. information was collected using a 45-item structured self-administration survey and a 31-item observational checklist in a cross-sectional and non-participant structured observational approach. The research contains 72 nurses from 3 adult ICUs at a teaching hospital. Nursing knowledge and practice had mean scores of 23.79 3.83 and 12.88 2.53, respectively. In terms of knowledge, 59.7% indicated a very high level, while 34.7% demonstrated a good level. In terms of practice, 79.2% demonstrated fair practice, and 18.1% showed good practice. The kind of department and nurses' knowledge level was shown to have statistically significant relationships ($p = 0.013$). However, no statistically significant relationship was found between nurses' knowledge and practice ratings ($r = 0.220$; $p = 0.063$). The research focuses on ICU nurses' proficiency in endotracheal tube suctioning, indicating good knowledge but only fair practice. This gap between theoretical understanding and practical implementation may have an impact on the quality and outcomes of patient treatment. In-service training and critical care courses, including evidence-based procedures post-bachelor degree achievement, regular updating and repetition of training, and the use of clinical guidelines are all part of the solution to this disparity. The study recommends implementing an evidence-based ventilator care bundle that focuses on effective suctioning to minimize VAP. It is critical to improve the skill set of ICU nurses through specialized training, including simulation approaches. Experienced clinicians and academic professionals specialized in nursing practice knowledge and skill training should be involved in this strategy. Improving nurses' practical abilities lowers errors, improves care quality, reduces hospital stays and costs, reduces unnecessary medical interventions and harmful

consequences, and lowers death rates. The study suggests investigating the efficacy of using evidence-based guidelines and care bundles in ETT suctioning techniques, as well as pushing for the mandatory application of evidence-based guidelines in all ICU departments. Nurses should be urged to these standards for the best possible patient outcomes.

Ventilator-associated pneumonia (VAP) is a substantial contributor to mortality and morbidity among patients with endotracheal intubation, according to a systematic study undertaken by Pinto, D'silva, and Sanil (2020), often due to inappropriate suctioning methods performed by healthcare personnel. A study was conducted to look into the flaws in present nursing procedures and to develop complete guidelines to improve safer practices. To discover relevant articles, the study used a two-phase technique that included a thorough electronic search in databases such as PubMed, Google Scholar, ProQuest, Ovid, and Helinet Summon using predetermined keywords from 2002 to 2016. Similarly, only 46% of nurses were aware of the recommended suction pressure for ETS, and only 62% were compliant with handwashing before ETS. Despite being aware of potential complications, nurses frequently fail to adhere to recommended practice guidelines. Meta-synthesis was used to synthesize qualitative data, while quantitative analysis was used to combine the available quantitative evidence on endotracheal suctioning (ETS) knowledge and practices. Meta-synthesis was performed on thirty research, with six studies giving data sufficient for quantitative analysis. According to the quantitative synthesis, only 36% of nurses assessed patients before ETS and were knowledgeable about the proper size of suction catheters. Similarly, just 46% knew what suction pressure was advised for ETS. Only 62% of nurses observed handwashing compliance before ETS. Despite being aware of the risks, nurses frequently fail to follow recommended practice recommendations. The review found gaps in standard practice adherence, particularly in the use of personal protective equipment, hyperoxygenation, and patient assessment and communication skills among nurses caring for intubated patients. It also pointed out a lack of attention on handwashing and patient education before suctioning, despite its importance in lowering patient anxiety. About particular procedures, the study highlighted the value of providing high inflation and hyperoxygenation via ventilatory setting, warned toward saline implantation throughout suctioning, and emphasized important procedures such as restricted suctioning time frame, cuff pressure monitoring, rotational suction removal, and recording of heart rate (HR) and SPO2 (SPO2) scales. These procedures are critical in avoiding tracheobronchial lesions and hypoxemia, as well as

recognizing hemodynamic instability early. The study emphasizes the need to conduct additional high-quality studies to verify nursing practices associated with ETS in India, to improve patient safety and outcomes in this vital field.

Shrestha and Shrestha (2018) used a descriptive, cross-sectional study design. Endotracheal suctioning is a standard treatment done by nurses in the ICU to guarantee airway opening and adequate oxygenation in intubated patients. This research aimed to analyze ETS knowledge and practice levels among nurses working in educational hospitals in Bharatpur. Research involving 95 nurses from different critical care departments in two educational institutions in Chitwan was done. A non-probability, intentional sampling strategy was used in the investigation. A semi-structured questionnaire that was self-administered and an organized observational checklist were used to assess knowledge and practice of ETS. Descriptive and inferential statistics were used in the analysis. With an average age of 21.77 1.91, the majority of responders (66.3%) were over the age of 20. Furthermore, 87.4% said they were Hindu, 82.1% achieved the Competence Certificated Degree in Nursing, 76.8% had more than six months of ICU job experience, and 11.6% attended in-service education. The results showed that 55.8% had an appropriate understanding of ETS, with a mean of 61.6%. The healthcare facility of employment ($p = 0.001$) and specific working wards ($p = 0.001$) were the variables that substantially influenced knowledge levels. Furthermore, 44.2% of participants demonstrated good experience in endotracheal suctioning and a mean percent of 47.5%. Religion ($p = 0.04$) and ethnicity ($p = 0.017$) were significant factors determining practicing levels. Furthermore, although statistically insignificant, a slight positive association ($r = 0.197$) was detected among knowledge and practice scores in ETS. This suggests that even nurses with basic knowledge may not consistently perform satisfactory endotracheal suctioning. According to the study, more than half of the respondents had good knowledge but inadequate practices in endotracheal suctioning. Hospitals and particular work areas had a considerable impact on knowledge levels, whereas religion and ethnicity had an impact on practice levels. Furthermore, the limited positive connection between knowledge and practice scores suggests that even nurses with sufficient knowledge may not consistently display proficient endotracheal suctioning procedures.

Endotracheal suction (ETS) is a frequent invasive treatment aiming at preserving airway patency in intubated individuals by eliminating pulmonary secretions, according to

Mwakanyanga, Masika, and Tarimo (2018). Failure to carry out this treatment appropriately can result in serious problems. Despite the availability of evidence-based ETS recommendations, nurses' clinical practices frequently depart from these recommendations. In this study, we evaluate ICU nurses' knowledge and practice of ETS at the chosen hospitals in Dar es Salaam, Tanzania. In 2014, 103 ICU nurses in Dar es Salaam participated in a research. The vast majority of ICU nurses (69.9%) were knowledgeable of the procedure's indications, and 77.7% were knowing of what to do if the ECG monitor suddenly changed. However, 80.6% of respondents had insufficient knowledge of updated ETS recommendations. Notably, nurses who underwent ICU training (57.3%) had considerably greater knowledge of ETS than those who did not (P0.005), while other characteristics had no effect. Despite possible consequences such as the effect of Hawthorne and the minimalize of psychometric tests for the evaluation tool, the study found that ICU nursing procedures did not correspond to current ETS advice. Significant gaps in knowledge and actual practices were discovered, as well as potential hurdles such as resistance to modification, inadequate training, and inadequate backing from higher-ups. Given the dangers that malpractice ETS skills bring to clients' safety and nursing care quality, we propose unique educational programs that follow updated ETS protocol. Medical protocol, support systems such as guidelines and SOPs, coaching, and the availability of learning resources such as papers, publications, computers, and internet access should all be included in these interventions. Furthermore, additional research employing analytical methodologies to find other impacting factors beyond the scope of this study, as well as assessing successful strategies that encourage compliance to evidence-based ETS recommendations, is necessary.

2.3 Teaching Intervention Regarding Knowledge of Endotracheal Suctioning

Endotracheal suctioning is a vital obligation for nurses in the treatment of airways for client who are critically ill inside ICUs, according to Aboalizm and Abd Elhy (2019). The efficacy and possible problems of this therapy are inextricably tied to the mode of execution, which needs careful and skilled administration by nurses. The major goal of this research was to assess the effect of a training program on nurses' knowledge and practices about ETS. To accomplish this goal, a type of quasi-experimental study with pre- and post-tests was used. Subjects: A convenience sample of 100 nurses from Menoufia University's intensive care units participated in the study. Two instruments were used to collect data: Tool I - A structured interview survey schedule with two sections: the first focused on nursing staff characteristics,

while the second included a knowledge questionnaire on endotracheal tube suctioning and associated difficulties. Tool II is a checklist for evaluating endotracheal suctioning methods. Before the intervention, a sizable proportion of the sample (94%) lacked expertise in endotracheal suctioning. However, the majority of participants improved their knowledge levels after both of the initial post-intervention assessments (83% and 94%, respectively). The pre-intervention mean score for nurses' practice was 29.25, which substantially rose to 60.08 and 61.59 in the consecutive post-intervention evaluations. Endotracheal Tube Suctioning instructional intervention dramatically improved nurses' comprehension and practical execution of this operation. The report recommends endotracheal suctioning education regularly. Additionally, it is advised that colored pamphlets explaining suctioning techniques be distributed inside the ICU to aid in the retention and utilization of this critical knowledge among nursing staff.

Harjot, Kumar, and Krishan (2016) used research to assess the effect of a training course on the understanding and utilization of ETT suctioning amongst staff nurses at GGS Medical Hospital in Faridkot. This study used a pre-experimental design, especially a one-group pretest post-test research paradigm. To study the efficacy of the educational intervention, 35 staff nurses were chosen using a suitable sample method. A structured questionnaire was utilized to assess knowledge, and a checklist for observation was employed to assess the practical uses of ETT suctioning. According to the study findings, the educational intervention resulted in significant increases in the knowledge and practice of ETS. At first, the average pretest knowledge level amongst nurses was 19.234.180, but it climbed dramatically to 27.264.046 after the educational intervention. In a similar vein, the initial performance achieved for the staff nurses was 6.91±1.772, which increased to 10.54±1.686 after the treatment. As a result, the study indicated that the instruction program resulted in a significant beneficial change in both staff nurses' knowledge and practical skills regarding ETT suctioning. As a result, the data revealed a widespread insufficiency in staff nurses' knowledge and behaviors related to ETS before the intervention. The instructional program, on the other hand, was effective in greatly improving overall knowledge and practical abilities. The observed gap between the pretest and posttest results in both knowledge and practice was statistically significant, confirming the educational intervention's strong influence on increasing staff nurses' understanding and application of the endotracheal tube's suctioning techniques.

Education programs, according to a quasi-experimental design undertaken by Haza'a et al (2015), serve as a crucial instrument for equipping nurses with the essential theoretical and technical information required to gain new abilities. This research aimed to analyze nurses' knowledge and behaviors regarding patients with ETT, as well as the effect of carrying out an education program on nurses' practices and patient problems. The research was carried out in the Trauma and General ICU using a quasi-experimental approach. Before and following the program's adoption, the study population comprised 60 nurses and 120 individuals with endotracheal tubes. A nurse survey sheet, a checklist for observation sheet of paper, and an individual assessment sheet were used to collect data. When comparing pre-implementation and post-implementation total scores for nurses' knowledge of endotracheal tube care, the data showed statistically significant differences (P0.000). Similarly, there were substantial (P0.000) variations in total ratings for nurses' endotracheal tube care practices before and following program implementation. Following the program's implementation, the development of patient problems, particularly oral irritation, dropped by 70%. The study found a significantly significant difference in nurses' knowledge and practice before and following program implementation. Improving nurses' knowledge and behaviors had a positive effect on preventing or minimizing problems related to post-endotracheal tube care.

2.4 Clinical Guidelines Regarding Knowledge of Endotracheal Suctioning

Ncube (2019) used a non-experimental, descriptive qualitative, and cross-sectional design in his investigation. For patients to receive optimal care, an evidence-based approach that integrates existing practices, knowledge, and documented clinical outcomes is required. This research aimed to evaluate ICU nurses' understanding of the most recent scientific protocol for the use of endotracheal suction in adult ICUs at a university-affiliated hospital in Johannesburg. The goal was to advise on improving clinical procedures and improving nurses' training in this area. The design of the study was non-experimental, descriptive, quantitative, and cross-sectional. The study included 80 nurses who worked in adult intensive care units. Jordan (2011) designed a standardized questionnaire for data collection. The survey was divided into two sections: the first collected demographic data, and the second contained 27 questions that asked nurses to answer dichotomous questions and evaluate their views on a 5-point Likert scale (agree/disagree). The data was analyzed using descriptive and comparative data, such as Pearson's correlation coefficient (r) and ANOVA tests, with a significance level of p 0.05. The research found that ICU

nurses' (both qualified and untrained) knowledge level was a typical basis, with an average total score of 63.8% (SD 6.6), falling short of the recognized sufficient standard of 70%. There were no statistically significant variations in knowledge ($p>0.05$) depending on the nurses' age or years of experience. Furthermore, no significant relationships ($p>0.05$) were found among certification (skilled and non-trained ICU nurses), years of experience, and knowledge in the multivariable linear regression analysis. The study found that nurses lacked current evidence-based standards for endotracheal tube suctioning and lacked desirable expertise. Concerns were expressed about several elements of endotracheal suctioning, highlighting the necessity of clinical guidelines and advocating concentrated, practical training programs for nurses.

Alkubati et al (2022) conducted a cross-sectional and uninvolved observational design. Endotracheal suctioning (ETS) is a common invasive procedure performed by critical care nurses (CCNs) to aspirate accumulated pulmonary secretions, ensure appropriate functioning of the airways for adequate ventilation and oxygenation, and avoid atelectasis in intubated patients. This research aimed to assess CCNs' practices in ICUs before, during, and following performing ETS operations to discover factors impacting their practice. The methods were used in the ICU in 4 clinics in Hodeida, Yemen. From May to August 2019, a 25-item observation checklist was used to collect data. The analysis found that more than half (55%) of CCNs adhered to ETS practice standards with inadequate adherence (50%) and the remainder demonstrated moderate adherence (50-75%), with none exhibiting acceptable adherence (>70%). Gender, age, education level, or years of ICU experience had no effect on CCNs' practice during ETS procedures. However, CCNs' adherence to suggested practices was considerably improved by skills ($p=0.010$) and obtaining particular data concerning ETS ($p=0.028$). This study shows that the majority of CCNs in Hodeida hospitals' ICUs do not properly adhere to updated criteria during ETS procedures, which might result in harmful impacts and patient difficulties. Those who acquire knowledge and take part in practice sessions have better ETS practices. As a result, clear guidelines, ongoing training, and monitoring are critical to improving CCN procedures. Nursing schools should incorporate based on evidence ETS procedures into their educational programs. Healthcare managers must emphasize providing CCNs with up-to-date instructions, ongoing training, and monitoring, as well as guaranteeing the availability of the appropriate devices and equipment for performing ETS. More research is needed to investigate the knowledge-practice gap, as well as the hurdles and facilitators in applying ETS standards.

ETS was identified as an essential treatment performed by intensive care nurses in research carried out by Yilmaz, Ozden, and Arslan (2021), to keep airway openness and adequate gas exchange in complicated sick clients relying on MV. Given the risk of issues, ICU nurses must have a completely updated understanding of how to carry out this surgery effectively. This research aimed to analyze the familiarity and experiences of ICU nurses with the closed suctioning system. This research used a prospective, cross-sectional, descriptive approach with 195 nurses from five Turkish hospitals working in tertiary ICUs. To collect data, researchers created a survey aligned with the current literature, which was then assessed using the Kruskal-Wallis and Mann-Whitney U tests. The nurses participating were 30.58 and 6.28 years old on average. Their mean closed system knowledge score was 27.35 12.05 (range = 0-80), with 80.5% of those surveyed scoring between 0 and 40. Approximately 71.8% indicated ease in doing ETS with the closed system catheter, and 85% indicated time savings with this approach. However, a significant 50.8% had difficulty suctioning thick and viscous secretions. Furthermore, 44.6% said there was no need to rinse the catheter's interior, and 45.1% were unsure whether the code-tip catheter caused more bleeding discharges than the straight-tip catheter. Finally, almost fifty percent of the nurses demonstrated commendable competence in evidence-based suctioning expertise. While the majority of nurses reported positive experiences with the closed system, almost fifty percent reported ineffectiveness in removing thick secretions. Regular in-service training courses may be an effective way for nurses to improve their existing knowledge and refine their experiences.

ETS was identified as one of the most commonly applied invasive procedures by ICU nurses in research used by Chen et al colleagues (2021). The correct execution of this operation is dependent on nurses having adequate knowledge and skills based on the best evidence at their disposal. Despite this, there is little understanding of ICU nurses' knowledge and practices based on evidence of ETS in Chinese hospitals. This research aimed to look at ICU nurses' understanding and compliance with the updated endotracheal suctioning protocol. The study's specific goal was to look into (1) the degree of knowledge and compliance with ETS protocols among ICU nurses, as well as (2) the factors that affected their attitude and adherence. A cross-sectional design was done with 310 staff nurses employed by the ICU in Changsha, China. Online questionnaires were used to obtain information about participants' characteristics, acquaintance with, and adherence to ETS guidelines. Statistical Analysis Software Package

Version 23.0 was used to perform univariate descriptive statistics, followed by the Mann-Whitney U test and the Kruskal-Wallis H test. The survey was completed and submitted by 281 nurses, yielding a 90.6% response rate. According to the findings, half to a third of the nurses were aware of 21 of the 26 updated procedures and claimed they followed the recommendations in their practices. However, more than half of those polled were unaware of the differences between open and closed sections, in addition to the benefits and drawbacks of hyperinflation. Approximately half of the nurses admitted that some of their clinical procedures did not fit with recommendations based on evidence, such as not utilizing N/S 0.9% regularly and employing suction pressures ranging from 80-120 mmHg during ETS. When compared to untrained nurses, nurses who had received ETS training showed significantly higher levels of awareness and adherence to guidelines. The study found that Chinese ICU nurses were unaware of critical updated techniques in ETS. It also revealed significant discrepancies between the proof and the procedures that were used. Future research should concentrate on identifying barriers to applying evidence-based endotracheal suctioning methods and creating personalized treatments to facilitate guideline adoption. To promote changes in endotracheal suctioning practices, the study advises thorough education on endotracheal suctioning recommendations, combined with creative tactics developed from implementation science.

Chapter Three: Methodology

3.1 Introduction

This chapter aims to get a holistic of the research methods used in this thesis. It covers the following sections: study design, study setting, study duration, study population, sampling, and sample size, inclusion and exclusion criteria, study instruments, validity of questionnaire, reliability of questionnaire, pilot study, data collection, ethical considerations, and data analysis.

3.2 Study design

A prospective, descriptive, quantitative study design was conducted to describe the ICU nurses' knowledge of ETS.

3.3 Study Setting

It was done in the ICU Department at Privet Hospital in North-West Bank. (Specialized Arab Hospital, Nablus Specialized Hospital, An-Najah National University Hospital, Women's Union Hospital, St-Lukis Hospital, AlEssra Hospital, Al-Razi Hospital, Ibn Sina Hospital) which contains an Intensive Care Unit.

3.4 Study Duration

The study was conducted during January -2024.

3.5 Study Population

The study population is a collection of subjects or departments who have certain traits and meet the inclusion requirements, and from whom data can be collected. (Polit& Beck 2014). In this study, the target population was all ICU nurses in private hospitals in the North West Bank, who met the inclusion criteria. The accessible populations are those intensive care unit nurses who were on duty work at targeted hospitals while collecting data through January -2024. It was estimated to be about (**286**). Through contacting intensive care nurses working in the ICU, were recruited 286 intensive care nurses to participate in filling out questionnaires in the quantitative part of the study.

3.6 Sample and Sampling

Convenience sampling was used, which a type of non-probability is a sampling method that is also used in quantitative approaches. This form of sampling was used for the study because it was

convenient for respondents; The researcher uses this strategy to choose the appropriate sample while keeping in mind the need to include certain criteria and elements inside the study.

The total number of participants was (286) intensive care unit nurses. A convincing sample was composed of (258) ICU nurses was participated in the study during the data collection period. Indeed (28) ICU nurses could not fill out the questionnaire. (18) ICU nurses were excluded due to missing data information and for personal reasons including sick leaves and off duty. Some of them refused to participate in the study (10). Data were collected by the researcher directly with ICU nurses. The interview begins by providing the nurses with complete instructions and explanations about the study its aims and the significance of giving the right answers. The interview was considered all ethical considerations in order not to be annoying.

3.7 Inclusion criteria

1. Age ≥ 20 and < 50 years old.
2. Both Male and Female
3. Nurses work in ICU
4. Experience Years more than 1 year

3.8 Exclusion criteria

1. Aid Nurse
2. Volunteer students

3.9 Sample size

The total sample size was 258 nurses. However, a convincing sample was composed of 258 ICU nurses was participated in the study during the data collection period. As mentioned above, the population count is 286 nurses, where the total number of participants in the study is 258 nurses.

3.10 Study Instruments

To achieve the aim of the study, the survey was implemented by using a readily developed questionnaire developed previously by a researcher Chen et al., 2021. This questionnaire was available free to get it. Researched email researcher to get approval to use questionnaire, but unfortunately no response. Because the developed questionnaire was available free on the net, so researcher used it without hesitation. (Appendix II.)

The data abstraction sheet: Part I (socio-demographic data) was constructed based on the literature review. This part is used to collect socio-demographic data including age, gender, level of education, years of experience, years of work in ICU, job title, number of patients per nurse on duty, and ETS training course.

Part II. was collected and used a developed questionnaire and tool by Chen et al., 2021

This part contains ICU nurses' awareness of the ETS guidelines with answers of (Yes, No), which is subdivided into sections (A) Preparation before ETS with 5 questions, section (B) The procedure of ETS with 19 questions, section (C) Evaluation after Endotracheal suctioning with 2 questions.

3.11 Study Validity and Reliability

The questionnaires were shown to a statistician to measure reliability (calculating Cronbach's Alpha coefficient). The data survey was validated for included intensivists who work in each mentioned hospital and 3 experts. Reliability and internal consistency of the used tool showed very good reliability with a Cronbach alpha of 0.744 in all 33 variables of the used tool, data were tested for normality and results showed that the data were normally distributed, parametric analysis was used in the analysis to test the research hypothesis and answer our research questions (alpha = 0.05).

For the tools used in this study after receiving permission via email from the first authors, the author used five experienced ICU nurse managers to assess the questionnaire. They offered feedback on the content's clarity and comprehension of the items. After reviewing, we changed the phrasing of 4 questions in the 2nd category and 6 in the 3rd domain to improve clarity. No items have been included or removed. To examine the reliability of the revised survey, 5 ICU nurses completed it twice with a 2-week delay. The correlation coefficient between the two tests was 0.89. Cronbach's alpha values for the knowledge and commitment measures were 0.835 and 0.812, respectively.

3.12 Pilot Study

Before implementing the research, the researcher accomplished a pilot study with ten ICU nurse participants and then not included in the sample size, who offered comments regarding the survey to confirm its validity and reliability; recognized points of vagueness; estimated the

actual time required to complete the survey and the predicted response rate; pointed out wording flaws; and obtained clear feedback about the survey. The participants considered that it was a clear questionnaire, without comments; therefore, the participants were involved in the actual study.

3.13 Data Collection

Data collection begins immediately after obtaining the approval to conduct the study from the Arab American University-Palestine IRB code number (R-2024/A/12/N), private hospital administrations as attached in Appendix III and Appendix IV. Participants were asked to fill out the self-reported questionnaire after signing the consent form as attached in Appendix I.

The researcher began data collecting by introducing himself to the individuals and creating confidence with them. Participants were then given detailed instructions and explanations about the research, its objectives, and the need to deliver actual responses. Creating a separate space for data collecting offered an acceptable setting. The information collection was done at an appropriate time and adhered to all ethical principles.

The researcher helped the ICU nurses by providing explanations and answering their questions if needed. Data collection took place in January 2024.

3.14 Ethical Considering

The researcher was committed to all research ethics and general ethical principles. Ethical approval was obtained from the Arab American University Ethical Committee Institutional Review Board (IRB) before data collection with code number

(R-2024/A/12/N), and then permission to conduct the study in private hospitals was taken from their administrative departments, Appendix III +IV. Upon approval, a prospective ICU nurse's follow-up occurs after the signature of the consent form to participate in the research, Appendix I. During the prospective follow-up, risks to ICU nurses were minimal and the nurse’s identification was kept anonymous. Personal identification was not used to protect the nurses' identity. Without the identity of names, ID numbers, or other health information, all data gathered was registered on a researcher-developed platform. All information was kept in a locked cabinet and all information was used just for research purposes. Nurses in the study were voluntary. Participants were given the right to withdraw from the study at any moment.

3.15 Analysis Plan

The Statistical Package for the Social Sciences (SPSS) version 23 was used to analyze the acquired data in this study. SPSS is a software package used for statistical analysis, data manipulation, and the generation of tables and graphs utilizing descriptive and inferential statistics. Cronbach's Alpha was used to measure internal consistency ("reliability"). Data is summarized using means and standard deviations. As a result, the survey results were instantly loaded into the database, and data cleaning was performed.

This allowed the existence of potentially statistically significant correlations between the relevant variables to be identified. Frequency tables were used to describe the frequency of certain characters. Some statistical tests were used as needed, such as percentages (%), means, and standard deviations (SD), the t-test to determine whether the means of 2 groups are statistically different, and the one-way analysis of variance (ANOVA) test to determine whether there are any significant differences between the means of more than 2 independent groups.

In addition, the researcher employed Person correlation® to examine the relationship between numerical data. Finally, a probability value (P-value) less than or equal to 0.05 was deemed statistically significant.

Chapter Four: Result

4.1 Introduction

The present study is a prospective study that included 258 participants. The study aimed to assess ICU nurses' knowledge of ETS in privet hospitals in the North West Bank of Palestine. All 286 participants filled out the used data collection tool, 18 were excluded due to missing data information and another 10 participants refused to be part of this study.

1. What is the level of nursing knowledge regarding ETS in a privet hospital in North West Bank?
2. What are the factors that influence the knowledge of ETS in a privet hospital in North West Bank?
3. What are the recommendations and guidelines for education intervention about ETS?

Table 4.1: Reliability Statistics (N=258)

Reliability Statistics

Cronbach's Alpha	N of Items
.744	33

4.2 Part I. Demographics

Table (2) below shows that the majority of respondents are male (60.9%), with females accounting for 39.1%. In terms of age distribution, a significant portion falls within the highest percentage of 21-30 (45.7%) and the lowest percentage of less than 20 (4.3%) brackets. Educational backgrounds vary, with the highest percentage holding a Bachelor's degree (69.4%), followed by Diploma (22.1%), Masters (7.8%), and the lowest percentage of PhD (0.8%). Experience levels range from less than 5 years (39.5%) which was the highest percentage to more than 20 years (2.3%) which was the lowest percentage. The majority of participants have less than 5 years of experience working in ICUs (61.6%), while the minority have been 16-20 years (2.7%). General ICU is the most common type (47.7%), the less common type is cardiothoracic (0.8%), and the highest predominant job title is Registered Nurse (69.4%), while the lowest is head nurse (8.5 %). Workload distribution reveals that the highest significant number of nurses handle two patients (45.7%), while the lowest number handle one patient (8.9%). Specific

Emergency Trauma Services (ETS) training is reported the highest percentage of 61.2% of respondents, while the lowest percentage by (38.8%).

Table 4.2: Distribution of the study population according to Socio-demographic data

		Count	%
Gender	Male	157	60.9%
	Female	101	39.1%
Age	less than 20	11	4.3%
	21-30	118	45.7%
	31-40	103	39.9%
	41-50	26	10.1%
Level of Education	Diploma	57	22.1%
	Bachelor's Degree	179	**69.4%**
	Masters Degree	20	7.8%
	PhD	2	**0.8%**
Experience Years	less than 5 years	102	**39.5%**
	6-10	60	23.3%
	11-15	69	26.7%
	16-20	21	**8.1%**
	more than 20 years	6	2.3%
Years of work in ICU	less than 5 years	159	**61.6%**
	6-10	37	14.3%
	11-15	51	19.8%
	16-20	7	2.7%
	more than 20 years	4	**1.6%**
Type of ICU	General	123	**47.7%**
	Cardiothoracic	2	**0.8%**
	Medical	49	19.0%
	Surgical	56	21.7%
	CCU	28	10.9%

Job Title	Practical Nurse	57	22.1%
	Registered Nurse	179	**69.4%**
	Head Nurse	22	**8.5%**
Number of Patients per Nurse on Duty	one patient	23	**8.9%**
	Two patients	118	**45.7%**
	Three patients	68	26.4%
	Four patients	27	10.5%
	more than 5 patients	22	8.5%
Received specific ETS training	No	100	38.8%
	Yes	158	61.2%

4.3 Part II. Intensive Care Nurse's Awareness of the Endo Tracheal Tube Suctioning

A. Preparation before ETS

The following table 3 shows that the majority of respondents (89.1%) express confidence in possessing the necessary procedural skill and gentleness during ETS, acknowledging the associated hazards. While the minority of them believe that when it comes to the size of suction catheters, 77.5% agree that they should be as small as possible while still effectively removing secretions.

Another consideration is the internal diameter of the artificial airway, with 82.6% supporting the idea that the suction catheter should occlude no more than half to prevent increased negative pressures and potential declines in PaO2.

B. The Procedure of Endo Tracheal Suctioning

In the second part of the questionnaire related to the procedure of ETS, the participants' response in Table (4) was as shown in Table 4 below, A substantial majority, 87.2%, supports the use of a closed suction system for adults with high FIO2 or PEEP, or at risk for acute lung injury. There is a balanced opinion (69.0%) regarding the superiority of closed or open suction systems across various parameters such as SPO2, cardiovascular instability, secretion removal, environmental contamination, and cost. The aseptic technique is considered the highest percentage essential by 90.3% of respondents, emphasizing handwashing and glove use due to the invasive nature of endotracheal suctioning. Notably, 64.3% discourage the routine use of

normal saline instillation before suctioning. The majority (76.4%) acknowledge that ensuring patients are adequately hydrated facilitates the removal of respiratory secretions. There's a consensus (73.6%) on the method of inserting the suction catheter into the carina before suctioning. The lowest percentage of respondents 60.5 % agreed that Tidal volumes should be no more than 900 cc during hyperinflation because patients may feel dyspneic. Recommendations regarding suction pressure, duration, frequency, and pre-oxygenation also demonstrate varied perspectives.

C. Evaluation after Endo Tracheal Suctioning

The responses in Table 5 highlight healthcare professionals' perspectives on the evaluation after endotracheal suctioning. 88.4% of them emphasize the importance of monitoring various parameters such as breath sounds, SPO2, RR and pattern, hemodynamic parameters, sputum characteristics, cough characteristics, ICP, and ventilator parameters before, during, and after the procedure, if indicated and available. Additionally, 86.0% acknowledge the potential risks associated with endotracheal suctioning, including tracheal trauma, hypoxemia, hypertension, cardiac arrhythmias, and raised ICP, which, if not managed appropriately, can lead to increased mortality and morbidity rates.

Based on the previous responses in the three parts of the ETS process, table 6 below shows the level of knowledge as several 24, with a mean of 18.9 from 24 with a standard deviation of ± 3.45, figure 1 below also shows a graph of the level of knowledge.

Table 4.3: Distribution of the level of knowledge of respondents about ETS (N= 258)

Statistics

Level of Knowledge

N	Valid	258
	Missing	0
Mean		18.9031
Median		19.0000
Std. Deviation		3.45768
Range		12.00
Minimum		12.00
Maximum		24.00

Table (7) below presents the mean and standard deviation of the level of knowledge across various demographic factors. When considering gender, males exhibit a slightly higher

mean knowledge score (19.41 ± 3.32) compared to females (18.12 ± 3.54). In terms of age groups, participants aged 31-40 demonstrate the highest mean knowledge score (19.74 ± 3.53), while those aged 41-50 have the lowest (17.46 ± 3.64). Educational attainment reveals that individuals with a Master's degree exhibit the highest mean knowledge score (19.50 ± 4.33). Regarding experience, those with 6-10 years of experience display the highest mean knowledge score (19.27 ± 3.88). Notably, Head Nurses have a lower mean knowledge score (17.68 ± 4.35) compared to Practical and Registered Nurses. The number of patients per nurse on duty also influences knowledge scores, with those responsible for more than 5 patients having a lower mean (16.18 ± 3.83). Overall, participants who received specific ETS training have a higher mean knowledge score (19.27 ± 3.55) compared to those without such training (18.33 ± 3.24).

Table 8 below shows the correlations of demographics with the level of knowledge, Notably, there is a negative correlation between gender and knowledge level ($r = -.182$, $p = .003$), indicating that females tend to have slightly lower knowledge scores than males. Age exhibits a negligible positive correlation with knowledge ($r = .029$, $p = .641$), suggesting that age has minimal impact on the level of knowledge. The highest level of education shows a positive correlation ($r = .156$, $p = .012$), indicating that individuals with higher education tend to have higher knowledge scores. Experience years and years of work in the ICU show weak correlations ($r = -.049$, $p = .435$; $r = .049$, $p = .430$, respectively). Notably, the type of ICU has a moderate positive correlation with knowledge ($r = .233$, $p = .000$), implying that those in certain types of ICUs tend to have higher knowledge scores. Job title and the number of patients per nurse on duty demonstrate weak correlations ($r = -.022$, $p = .728$; $r = -.115$, $p = .065$, respectively). Individuals who received specific ETS training show a positive correlation with knowledge ($r = .132$, $p = .034$).

Table 4.4: Distribution of the study population according to level of knowledge correlations with demographics regarding ETS (N= 258)

Correlations

		Level of Knowledge
Gender	Pearson Correlation	-.182
	Sig. (2-tailed)	.003
Age	Pearson Correlation	.029
	Sig. (2-tailed)	.641
Level of Education	Pearson Correlation	.156
	Sig. (2-tailed)	.012
Experience Years	Pearson Correlation	-.049
	Sig. (2-tailed)	.435
Years of work in ICU	Pearson Correlation	.049
	Sig. (2-tailed)	.430
Type of ICU	Pearson Correlation	.233
	Sig. (2-tailed)	.000
Job Title	Pearson Correlation	-.022
	Sig. (2-tailed)	.728
Number of Patients per Nurse on Duty	Pearson Correlation	-.115
	Sig. (2-tailed)	.065
Received specific ETS training	Pearson Correlation	.132
	Sig. (2-tailed)	.034
Level of Knowledge	Pearson Correlation	1

Multivariate linear regression

In answering our research questions and testing our hypothesis we will be using a multivariant linear regression model, coding for categorical data with 3 or more categories was

done using dummy variables (0,1), the tables below clarify the model summary, with an adjusted R square of 14%, meaning that the mentioned variables were responsible about 14% of the level of knowledge, suggesting a weak model but this model had a significant effect on the level of knowledge as shown below in the ANOVA.

Table 4.5: Answering research questions according to level of knowledge of Endotracheal tube suctioning using Multivariant linear regression (N= 258)

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.412[a]	.170	.139	3.20747

a. Predictors: (Constant), Received specific ETS training, Years of work in ICU, Highest Level of Education, Number of Patients per Nurse on Duty, Type of ICU, Gender, Job Title, Age, Experience Years

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	521.185	9	57.909	5.629	.000[b]
	Residual	2551.393	248	10.288		
	Total	3072.578	257			

a. Dependent Variable: Level of Knowledge

b. Predictors: (Constant), Received specific ETS training, Years of work in ICU, Highest Level of Education, Number of Patients per Nurse on Duty, Type of ICU, Gender, Job Title, Age, Experience Years

The regression coefficients Table 10 below unveils valuable insights into the factors influencing the dependent variable. The constant term (18.616, SE = 1.392) represents the estimated mean level of the dependent variable when all other predictors are zero. Gender exhibits a significant negative association, with a coefficient of -1.178 (SE = 0.485, p = 0.016), suggesting that, on average, males score higher than females after accounting for other variables.

The highest Level of Education demonstrates a positive relationship, with a coefficient of 1.633 (SE = 0.451, $p < 0.001$), indicating that higher education is associated with higher scores. Experience Years (-0.969, SE = 0.319, p = 0.003) and Years of work in ICU (0.829, SE = 0.341, p = 0.016) show significant impacts, suggesting that as experience years increase the level of knowledge increases as for experience in the ICU increase the level of knowledge increase, Received specific ETS training. While the Type of ICU, Job Title, and Number of Patients per Nurse on Duty, show coefficients in the expected direction, their p-values suggest no significance.

4.4 Hypothesis

1- There is no statistically significant difference at ($\alpha \leq 0.05$) in knowledge of ICU unit nurses' ETS in private hospitals in North West Bank, and their competence in the application of ETS before, during, and after the procedure.

The analysis results showed that for level of knowledge p value was less than 0.05 so we have enough evidence to reject the above null hypothesis, meaning that there was a significant difference in the level of knowledge and nurses' competencies in the application of ETS before, during, and after.

2- There are no statistically significant differences at ($\alpha \leq 0.05$) in knowledge of ICU nurses ETS in private hospitals in North West Bank concerning socio-demographic factors.

Table 8 shows clearly that there is enough evidence to reject this null hypothesis, we notice significant gender differences, Highest Level of Education, Experience Years, and Years of work in ICU, and P value less than alpha.

3- There is no statistically significance difference at ($\alpha \leq 0.05$) in the knowledge of ICU nurses of ETS in private hospitals in North West Bank by age.

We conclude from Table 8 above that we don't have enough evidence to support this claim, the p-value was found to be higher than alpha, so we don't reject the null hypothesis.

4- There is no statistically significance difference at ($\alpha \leq 0.05$) in knowledge of intensive care unit nurses of ETS in private hospitals in North West Bank by gender.

With a p value of 0.016 gender had a significant effect on the level of knowledge, meaning that males had a significantly higher level of knowledge than females in privet hospitals in the West Bank.

5- There is no statistically significance difference at ($\alpha \leq 0.05$) in knowledge of ICU nurses of ETS in private hospitals in North West Bank by educational level.

Table 8 shows that educational level with a p-value of 0.0001 had a significant effect on the level of knowledge, meaning that individuals with higher educational qualifications had a significantly higher level of knowledge about ETS in private hospitals in the West Bank.

6- There is no statistically significance difference at ($\alpha \leq 0.05$) in knowledge of ICU nurses of ETS in private hospitals in North West Bank by experience years.

With a p value of 0.003 as shown in Table 8 above experience years had a significant effect on the level of knowledge, meaning that individuals with higher years of experience had a significantly higher level of knowledge about ETS in private hospitals in the West Bank.

7- There is no statistically significance difference at ($\alpha \leq 0.05$) in knowledge of ICU nurses of ETS in private hospitals in North West Bank by training courses about ETS.

With a p value of 0.017 receiving training about ETS had a significant effect on the level of knowledge, meaning that individuals who had received a training course about ETS had a significantly higher level of knowledge about ETS in privet hospitals in the West Bank.

Chapter Five: Discussion

5.1 Introduction

Within this chapter, the study findings are discussed in terms of the study aim and objectives along with the study variables, future recommendations, and the conclusion of the research study. To the best of our knowledge, this is the first study to be conducted among ICU nurses in privet hospitals in the North of West Bank using a tool for Awareness of the ETS guidelines.

5.2 Demographics

According to study results that show the percentage of male participants (60.9%) is more than female participants (39.1%), this result is constant with Majeed H, 2017 Which shows the percentage of males is 70%, it may related to a large number of male nurses more than females other than the ICU needs male nurses more than females that related to the nature of nursing work and follow-up of the patients.

On the other hand, the average age of participants was between 21 - and 30 years old (45.7%), similar to the study conducted by Hamed et al., 2022 which shows the average age of the same age interval is 43.2%.

The participant level of education, most of them is a bachelor's degree (69.4%), and experience of fewer than 5 years (39.5%), but the ICU experience of participants (61.6) is less than 5 years, this result is similar to the study by Raïq F et al., 2022 (35%,58.8% respectively), other studies by Afenigus et al., 2022.

Regarding the type of ICU, the major participants' response is working in General ICU (47.7%), and most of them handled two patients during a shift (45.7%), and were titled as Registered Nurses (69.4%). This finding is shown in another study conducted by Alkubati et al., 2022, which is similar to our result (39.9%, 38.2%, and 51.2% respectively).

Most of the participants reported that they received ETS training with a response average (61.2%), disagreeing with the study by Alkubati et al., 2022; but agreeing with Maras et al., 2016.

In this current study, the demographic data indicate that the gender proportion helps in assessing any gender base differences in knowledge, and about the age it insight into the age composition of nurses and potential differences that need to be adaption in some technology.

Most bachelor's degrees receive more clinical training during their studies and it explains the majority of them in our participants.

5.3 Knowledge about pre-procedure

The study examines the knowledge of nursing during the preparation of the patients for endotracheal Suction, our study shows the participants perform a patient assessment before suction (59%), and this result is similar to the study conducted by Alessa et al., 2021 And show (69.1%), which indicated the awareness among participants and well preparation before the procedure.

Other results show the participant uses small suction catheters (77.5%) to perform the procedure, which is consistent with Mwakanyanga et al., 2018 (69.9%) and Negro et al., 2014, which minimizes the tracheal injury and decreases the complications.

On the other hand, we have (82.6%) of the participants agree with limited occlusion of the airway, which is similar to Ahmed & Mohamed, 2022 that show (76.3%) which may indicate the knowledge of risk-related excessive negative pressure that leads to deoxygenation.

The good preparation before performing endotracheal suction shows the good knowledge of participants and to maintain the procedure safe and prevent complications and injury by preventing any risk that may lead to it.

5.4 Nursing Knowledge during Endotracheal Suction

The use of a close suction system leads to reduce the risk of infection and maintains a close ventilation system, so most of the participants (90.3%) know the importance of using close suction, this result is constant with Shrestha, 2022 (84.6%) and Alkubatiet al., 2022 (86%).

As shown in the literature, the endotracheal suction procedure must performed with a sterile technique, and a higher proportion of participants agree with it (90.3%), to the use of aseptic techniques to maintain patient safety and prevent nosocomial infection, this result is similar with study conducted by Shahbazi& Heidari, 2018 (88.2%).

During the procedure, (64.3%) disagreed with to use of routine saline, this result is shown by Chen et al., 2021 (50.1%) and it appears the knowledge of nursing towards evidence-based practice and safety of preventing risk of infection.

The most important step of endotracheal suction is performing the procedure, it needs more focus on the issue related to it, and the importance of this step is to prevent the risk of infection and healthcare-associated infection.

5.5 Nursing knowledge regarding evaluation after endotracheal suction

After performing the ETS, the nurses need to monitor parameters, that agree with (88.4%) of the participants, similar to the study conducted by Hamed et al., 2023 (77.2%) and by Mwakanyanga et al., 2018 (85.1%), the importance of monitoring parameters is to evaluate if detect complications and ensure patent airway and outcome of performing the procedure.

On the other hand, the evaluation after ETS is important to recognize the risk of complication, most of the participants agree with it (86%), and it is similar to Haza'a et al., 2015 and Yilmaz et al., 2021 (77.5%, 74.4% respectively).

5.6 Conclusion

According to this study, the researcher concludes several key insights regarding ICU nurses' knowledge of Endotracheal Suctioning (ETS). Some significant factors that influence ICU nurses' knowledge such as gender (male nursing), educational background, and years of experience play important roles. The experience years in nursing work and special experience in the ICU as a nurse are important points that influence the knowledge of nursing regarding ETS.

On the other hand, the continuous education program and endotracheal suction training can lead to keeping the procedure safe and develop the staff to perform the procedure while minimizing the risk of complication, which leads to decreased length of stay and caste of treatment, decreased patient and family stress that increase the quality of care in critical care sitting.

The study indicates the ongoing need for more education and training to bridge knowledge gaps and increase the skills and knowledge for optimal patient care in an intensive care setting.

5.7 Recommendation

1. Develop and implement target training programs focusing on Endotracheal Suction, and this training is accessible to nursing staff with specific design modules.
2. Ongoing nursing staff development, and focused evidence base of Endotracheal Suction, that reinforces and enhancement nursing knowledge.

3. Promote higher education level, encourage the advanced degree program and subspecialist in nursing educational program
4. Research and evidence-based practice, develop and encourage ICU nurses to actively engage in research about nursing topics and procedures, that may influence and increase nursing knowledge and build the clinical guideline and practice.

5.8 Study Limitation

1. It used self-reported information from questionnaires, which could be skewed by social desirability or recollection bias.
2. Only a few hospitals were included in the study, which might have limited how broadly the results can be applied to other healthcare environments.
3. Because the cross-sectional design only records data at one particular moment in time, it is challenging to evaluate how training has affected knowledge over time.
4. Observational assessments, which might have offered more impartial measurements of real clinical practice, were not included in the study.

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Appendices

Appendix 1: Consent Form

أنا ..... (اسم المشارك / اختياري)

أوافق بموجبه على المشاركة في البحث السريري (الدراسة السريرية / دراسة الاستبيان / تجربة الأدوية) المحددة أدناه:

معرفة ممرضات العناية المركزة بشفط الأنبوب الرغامي في مستشفى خاص في شمال الضفة الغربية، دراسة استطلاعية

لتحقيق درجة: الماجستير، في برنامج: العناية المكثفة للتمريض في الجامعة العربية الامريكية.

تم شرح وتفسير طبيعة الدراسة وهدفها عن طريق الباحث: **عبد النور مرشود**

لقد تم إخباري عن طبيعة البحث من حيث المنهجية والآثار السلبية المحتملة والمضاعفات (حسب ورقة معلومات المشارك).

بعد معرفة وفهم جميع المزايا والعيوب المحتملة لهذا البحث، أوافق طواعية بمحض إرادتي على المشاركة في البحث السريري المحدد أعلاه.

أفهم أنه يمكنني الانسحاب من هذا البحث في أي وقت دون إبداء أي سبب على الإطلاق.

التاريخ: ..... إمضاء المشارك: .....

في حضور:

اسم: .....

التسمية / اللقب:..... إمضاء:.....

(شاهد على توقيع المشارك)

أؤكد أنني أوضحت للمشارك طبيعة وهدف البحث المذكور أعلاه.

تاريخ: ..... إمضاء: **عبد النور مرشود**

(الباحث)

Appendix 2: Instrument

Intensive care nurses' knowledge for endotracheal tube suctioning in a privet hospital in North West-Bank, Prospective study

Section One: Demographic Data

Hospital Type: ( ) Governmental ( ) Privet

Gender ( ) Male ( ) Female

Age: ……

Level of Education ( ) Diploma ( ) Bachelor's Degree ( ) Masters Degree ( ) PhD

Experience Years: ……..

Years of work in ICU: ……..

Type of ICU ( ) General ( ) Cardiothoracic ( ) Medical ( ) Surgical ( ) CCU

Job Title ( ) Practical Nurse ( ) Registered Nurse ( ) Head Nurse

Number of Patients per Nurse on Duty ( ) 1 ( ) 2 ( ) 3 ( ) 4 ( ) >5

Received specific ETS training ( ) Yes ( ) No

Section Two: Intensive care nurses' awareness of the ETS guidelines

	Question	Yes	No
	Preparation before Endotracheal suctioning		
1	Suctioning should only be done when a thorough assessment of the patient establishes the need for such a procedure and not be dictated by routine		
2	If patients can cough up their own secretions, they should be encouraged to do so		
3	Suction catheters should be as small as possible, yet large enough to facilitate secretion removal		
4	The size of the suction catheter should occlude no more than half of the internal diameter of the artificial airway to avoid greater negative pressures in the airway and to potentially minimize falls in PaO2		
5	I possess required procedural skill and gentleness when suctioning because of the potential associated hazards		
	The procedure of Endotracheal suctioning		
6	The use of a closed suction system is suggested for adults with high FIO2 or PEEP, or at risk for acute lung injury		
7	The closed or open suction system is not superior to the other in terms of oxygen saturation, cardiovascular instability, secretion removal, environmental contamination, and cost		

8	Aseptic technique should be considered an essential component of the suctioning procedure for hospitalized patients with artificial airways, including handwashing and use of gloves because endotracheal suctioning is an invasive procedure that may lead to contamination of the lower airways		
9	Routine use of normal saline instillation before endotracheal suction should not be performed		
10	Ensuring patients are adequately hydrated is the way health care providers can facilitate the removal of respiratory secretions		
11	The suction catheter should be inserted into the carina and then retracted 1–2 cm before suctioning is performed, or the length of the suction catheter is estimated by measuring an identical endotracheal tube		
12	Deep suctioning is necessary for patients with large amounts of secretions in the lower airways		
13	Using the lowest possible suction pressure during endotracheal suctioning, usually 80–120 mmHg		
14	The suctioning procedure should last no longer than 15 s		
15	There should not be more than two consecutive suction procedures		
16	Perform suctioning at least every 8 hours to reduce the risk of partial occlusion of the endotracheal tube and the accumulation of secretions		
17	Using volumes of hyperinflation that is indexed to the size of the patient may assist in minimizing potential difficulties		
18	Tidal volumes should no more than 900 cc during hyperinflation because patients may feel dyspneic		
19	If hyperinflation is used in the patients before suctioning, caution should be employed because it may be associated with increases in mean arterial blood pressure		
20	Pre-oxygenation by the delivery of 100 % oxygen for at least 30 s prior to and after the suctioning procedure is recommended to prevent a decrease in oxygen saturation, especially when the patient has a clinically important reduction in oxygen saturation with suctioning		
21	Combining hyperoxygenation and hyperinflation prior to suctioning can minimize suctioning-induced hypoxemia		
22	A ventilator should be used rather than a manual resuscitation bag to provide hyperventilation/ hyperoxygenation prior to suctioning to reduce hemodynamic alterations		
23	Suctioning through an adaptor is preferred to preserve oxygenation in mechanically ventilated patients		
24	A washout time of up to two minutes can be required when hyperoxygenation is being delivered via some ventilators to allow time for the increased oxygen percentage to come through the ventilator tubing and reach the patient		
Evaluation after Endotracheal suctioning			
25	The following should be monitored prior to, during, and after the procedure, if indicated and available: breath sounds, oxygen saturation, respiratory rate and pattern, hemodynamic parameters, sputum characteristics, cough characteristics, intracranial pressure, and ventilator parameters		

26	Endotracheal suctioning, unless managed appropriately, can lead to various adverse events (tracheal trauma, hypoxemia, hypertension, cardiac arrhythmias, and raised intracranial pressure) and increase mortality and morbidity rates		

Appendix 3: IRB Approval

Arab American University
Institutional Review Board - Ramallah

الجامعة العربية الأمريكية
مجلس اخلاقيات البحث العلمي – رام الله

IRB Approval Letter

Study Title: "Intensive Care Nurses' Knowledge For Endotracheal Tube Suctioning in A Privet Hospitals in North West-Bank: A Prospective Study"

Submitted by: Abdulnour Mohammad Hussein Marshoud

Date received: 15th December 2023

Date reviewed: 5th January 2024

Date approved: 5th January 2024

Your Study titled **"Intensive Care Nurses' Knowledge For Endotracheal Tube Suctioning in A Privet Hospitals in North West-Bank: A Prospective Study"** with code number **"R-2024/A/12/N"** was reviewed by the Arab American University IRB committee and was approved on the 5th January 2024.

Sajed Ghawadra, PhD
IRB-R Chairman
Arab American University of Palestine

الجامعة العربية الأمريكية - فلسطين
مجلس اخلاقيات البحث العلمي - رام الله
IRB-R
ARAB AMERICAN UNIVERSITY-PALESTINE
INSTITUTIONAL REVIEW BOARD - RAMALLAH

General Conditions:
1. Valid for 6 months from the date of approval.
2. It is important to inform the IRB-R with any modification of the approved study protocol.
3. The Bord appreciates a copy of the research when accomplished.

رام الله – فلسطين
Tel: 02-294-1999 **E-Email:** IRB-R@aaup.edu **Website:** www.aaup.edu

Appendix 4: تسهيل المهمة

Arab American University
Faculty of Graduate Studies

الجامعة العربية الأمريكية
كلية الدراسات العليا

2024/1/11

الى من يهمه الامر

تسهيل مهمة بحثية

تحية طيبة وبعد،

أهديكم كلية الدراسات العليا في الجامعة العربية الأمريكية أطيب التحيات، وبالإشارة الى الموضوع أعلاه، تشهد كلية الدراسات العليا في الجامعة أن الطالب **عبد النور محمد حسين مرشود** والذي يحمل الرقم الجامعي 202113369هو طالب ماجستير في برنامج تمريض العناية المكثفة ويعمل على رسالة الماجستير الخاصة به بعنوان:

"Intensive care nurses' knowledge for endotracheal tube suctioning in a privet hospital in North West-Bank, Prospective study"

تحت إشراف الدكتورة رجاء زيود ،حيث سيكون الهدف من الدراسة: تقييم المستوى المعرفي لممرضي العناية المكثفة في المستشفيات الخاصة في شمال الضفة الغربية فيما يتعلق بممارسات شفط الأنبوب الرغامي في أماكن الرعاية الحرجة وسيتم متابعة التمريض خلال فترة جمع البيانات ووضع التوصيات، مع العلم بأن فترة جمع البيانات من وقت الحصول على الموافقة لغاية الوصول للعينة المطلوبة بواقع 200 ممرض في المجموع، نأمل من حضرتكم الإيعاز لمن يلزم لمساعدته للحصول على المعلومات اللازمة للدراسة ، علماً أن المعلومات ستستخدم لغاية البحث فقط وسيتم التعامل معها بغاية السرية، وقد أعطي هذه الرسالة بناءً على طلبه.

كما نود التنويه بأن الطالب عبد النور محمد حسين مرشود سوف يقوم بمتابعة التمريض وذلك بعد الحصول على موافقة رسمية من حضرتكم وأيضا **نتعهد بعدم ذكر أسماء الممرضين المشاركين بالبحث وتطبيق اخلاقيات البحث العلمي في حال تم نشر البحث**

وتفضلوا بقبول فائق الاحترام

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معرفة ممرضي العناية المركزة بشفط أنبوب التنفس في المستشفيات الخاصة في شمال الضفة الغربية، دراسة استباقية

عبد النور محمد حسين مرشود

د. رجاء زيود

د. عماد أبو خضر

د. سمر جلاد

ملخص

التنبيب الرغامي (ETT) مع التهوية الميكانيكية (MV) هو النقطة الأكثر شيوعًا لممارسة التدخل في مجرى الهواء المستخدمة في العملاء المحالين إلى وحدات الرعاية الحرجة في المستشفى لهدف وحيد هو الحفاظ على مجرى هوائي واضح ومفتوح. يمنع ETT السعال الكافي وفقدان الوظيفة الهدبية المخاطية، مما يتسبب في تراكم الإفرازات في مجرى الهواء .كان الهدف الرئيسي هو تقييم معرفة ممرضات العناية المركزة بخدمات الاختبارات التربوية في المستشفيات الخاصة في شمال الضفة الغربية.

تصميم دراسة استباقية وصفية وكمية، تم إجراؤها في قسم العناية المركزة في المستشفيات الخاصة في شمال الضفة الغربية. كان السكان المستهدفون هم جميع ممرضات– ممرضين وحدة العناية المركزة في المستشفيات الخاصة في شمال الضفة الغربية، والذين استوفوا معايير الاشتمال. وتكونت عينة الدراسة من (258) ممرضاً وممرضة من وحدة العناية المركزة، وقد شاركوا في الدراسة خلال فترة جمع البيانات.

كشف التحليل الديموغرافي أن قاعدة المشاركين غالبيتها من الذكور (60.9%)، وتتراوح أعمارهم في المقام الأول بين 21–40 سنة (85.6%)، مع كون درجة البكالوريوس هي المؤهل التعليمي الأكثر انتشارًا (69.4%). تباينت مستويات الخبرة، حيث أن 39.5% لديهم أقل من 5 سنوات من الخبرة في وحدة العناية المركزة. ومن الجدير بالذكر أن 61.2% أفادوا أنهم تلقوا تدريبًا محددًا على خدمات الاختبارات التربوية. وأكدت النتائج المتعلقة بمعارف وممارسات "خدمات الاختبارات التربوية" على الفهم الشامل بين المشاركين. وأكد 86% على ضرورة تقييم المريض قبل الشفط، في حين أيد 77.5% استخدام قسطرة شفط أصغر. علاوة على ذلك، أكد 90.3% على أهمية التقنيات المعقمة أثناء الشفط. وأسفر تحليل مستويات المعرفة عن متوسط درجات 18.9 من 24، مع وجود تأثيرات كبيرة من العوامل الديموغرافية. أظهر الذكور متوسط

درجات معرفة أعلى (19.41 ± 3.32) من الإناث (18.12 ± 3.54). وبالمثل، فإن الأفراد الحاصلين على درجة الماجستير يتباهون بأعلى متوسط درجات المعرفة (19.50 ± 4.33)، في حين أظهر أولئك الذين لديهم أكثر من 20 عامًا من الخبرة أدنى درجة.(3.14 ± 16.67)

وفقا لهذه الدراسة، اختتم الباحث بالعديد من الأفكار الرئيسية فيما يتعلق بمعرفة ممرضات وحدة العناية المركزة بشفط القصبة الهوائية .(ETS) تلعب بعض العوامل المهمة التي تؤثر على معرفة ممرضات وحدة العناية المركزة مثل الجنس (التمريض الذكور)، والخلفية التعليمية، وسنوات الخبرة أدوارًا مهمة. تعد سنوات الخبرة في العمل التمريضي والخبرة الخاصة في وحدة العناية المركزة كممرضة من النقاط المهمة التي تؤثر على معرفة التمريض فيما يتعلق بـ "خدمات الاختبارات التربوية."

الكلمات المفتاحية: المعرفة، الأنبوب الرغامي، شفط الأنبوب الرغامي.