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A cross sectional study Assessing the Knowledge of ICU nurses on ABDCEF Bundle in governmental hospitals in the West Bank of the Palestinian Territories

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Thesis Approval

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This thesis was defended successfully on **February 4, 2024** and approved by:

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Declaration:

I declare that this thesis was composed by myself and that the work contained herein is my own, except where it states otherwise by references or acknowledgment, the work presented is entirely my own.

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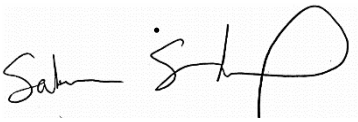
Signature: 

Date: March 24, 2024

Dedication:

This thesis is dedicated to the noble martyrs and prisoners of my dear motherland, Palestine.

I would especially want to express my appreciation to my devoted parents, Marwan and Suha Shalhout, whose support and insistence on perseverance have left a lasting impression on me. I have dedicated this as well to my husband, Dr. Khaled Judeh, whose unwavering support has ensured that I put in the necessary effort to complete the task at hand. To my two lovely boys, Abdelrahman and Jawad, who have inspired me to pursue my goals and never give up.

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Thank You All

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Abstract:

Objectives: This investigation aims to assess the level of knowledge of Intensive care nurses on the ABCDEF Bundle as well as its efficacy in preventing delirium. The ABCDEF bundle includes assessing and management of pain (A), both spontaneous awakening and breathing trials (B), choice of sedation (C), delirium monitoring and management (D), early mobility (E), and family engagement (F).

Design: The research was conducted as a cross-sectional study among all qualified nurses in intensive care units in major governmental hospitals in the Palestinian Territories to assess the level of knowledge of the ABCDEF bundle.

Methods: A quantitative descriptive cross-sectional design was used for this study. A structured questionnaire that breaks down the ABCDEF bundle elements and distributed to 134 ICU nursing staff in major governmental hospitals in the Palestinian territories (Ramallah, Nablus, and Hebron) to assess the level of knowledge of ICU staff members have on this bundle and its importance

Questionnaires were distributed, explained, and collected after signing the consent form by the participants. Descriptive and inferential statistics were applied using SPSS v25.

Results: There were 134 respondents from 4 governmental hospitals in the region of West Bank, 56.7% of respondents had implemented the PAD guidelines, whereas only 35.1% of respondents had the knowledge about the ABCDEF bundle with varying degrees across hospitals. The knowledge of the ABCDEF bundle was higher for ICUs using a 1:3/1:4 (respectively, 1:4) nurse/patient ratio during the day (respectively, at night), and respondents with a higher average length of stay.

Conclusions: Interventions should be developed by policymakers and hospital managers to increase critical care nurses' awareness of the ABCDEF bundle and how it may be utilized in the ICU to prevent and treat delirium. Future research on this bundle, as well as its implementation in Palestinian hospitals, should be conducted.

Keywords: Critical care nurses, ABCDEF bundle, knowledge, intensive care unit (ICU), Delirium, pain management

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Chapter 1: Introduction

1.1 Background

Delirium is described by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) criteria as an abrupt shift in attention and awareness that occurs over a brief period and is linked with other cognitive abnormalities such as memory loss, disorientation, or perceptual difficulties (Association 2013). Delirium can arise in the intensive care unit (ICU) for a variety of causes, including duration of stay, cognitive impairment, number of days the patient is ventilated, and so on (Liang et al., 2021). Physicians and nurses had previously noticed substantial variations in patients' mental health and activities during the day, which was one of the main reasons the PADIS guideline was established (Seo et al., 2022). ICU syndrome and ICU psychosis are two phrases that have been used interchangeably to represent a group of mental symptoms that are exclusive to the intensive care unit (ICU) (McGuire, Basten et al. 2000). Sleep deprivation, sensory overload or repetitiveness, delirium, and other features of the ICU are frequently considered as causes of the condition (McGuire, Basten et al. 2000).

The Society of Critical Care Medicine proposed the first version of the guideline as Pain, Agitation/ Sedation, Delirium (PAD) in 2013, and it was subsequently amended in 2018 adding on two important components, which developed the PADIS (Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption) guideline (*SCCM | ICU Liberation Bundle (A-F)*, n.d.). It provided an introduction to medical practitioners on the needs of critical care patients. As advances in treatment continue to help people survive devastating illnesses, healthcare providers are noticing an increase in the number of patients with delirium (Vasilevskis et al., 2010). Patients who acquire delirium in the ICU are more prone to have ICU problems, such as being mechanically ventilated for extended periods of time, and to suffer long-term functional and cognitive damage (Vasilevskis et al., 2010).

The ABCDEF bundle was developed by the Society of Critical Care Medicine's (SCCM) ICU Liberation to provide healthcare providers with a set bundle that is distinctive, clear, and applicable to all patients who are in the intensive care unit on how to treat delirium and shorten patient stays in ICU (*SCCM | ICU Liberation Bundle (A-F)*, n.d.). This bundle is mostly used to prevent and control delirium in the ICU. The acronym ABCDEF stands for: A: pain assessment, prevention, and management; B: both spontaneous waking and spontaneous breathing trials; C: analgesic and sedation selection; D: delirium evaluation, management, and prevention; E: early mobilization and exercise; F: family participation and empowerment (*SCCM | ICU Liberation Bundle (A-F)*, n.d.). Multiple studies involving over 20,000 patients have shown that the ICU Liberation Bundle reduces the chance of hospital death within seven days by 68 percent, delirium, and coma days by 25 percent to 50 percent, physical restraint use by more than 60 percent, and ICU re admissions by half (*SCCM | ICU Liberation Bundle (A-F)*, n.d.).

In conclusion, The ABCDEF bundle provides clinicians with evidence-based recommendations on how to address the organizational changes needed to improve ICU patient recovery and outcomes (Marra, Ely et al. 2017). Therefore, evaluating the level of knowledge among ICU nursing staff will provide a baseline of data that demonstrates where to start with the ABCDEF bundle implementation process in Palestinian governmental hospitals.

1.2 Problem Statement:

ICUs are dealing with an epidemic of patients suffering from delirium, which is related to higher mortality and long-term impairment. ICU Delirium is widespread in ICUs and is frequently caused or aggravated by sedation and ventilation choices and treatment (Dziegielewski et al., 2021)). Patients who experience delirium while being treated in the intensive care unit (ICU) tend to have unfavorable outcomes, such as higher mortality rates, increased reliance on mechanical ventilation, and an extended

length of stay (LOS) (Dziegielewski et al., 2021). Despite more than a decade of research demonstrating the dangers of delirium, the quality gap between existing and ideal treatment practices persists and the monitoring of delirium and sedation levels still remains inconsistent (Vasilevskis et al., 2010). ICU Delirium has been shown to occur in 40% of all ICU patients, of which 60-90 percent are mechanically ventilated (Stollings et al., 2021).

Studies have shown that patients' requirements to be evaluated every shift for the development of delirium, which is a problem that medical professionals still face in most ICUs today (Barr et al., 2013). The Confusion Assessment Method for the ICU (CAM-ICU) is the most accurate and reliable delirium monitoring tool for adult ICU patients, and it may be used to assess patients for delirium. Clinically, it is possible to regularly assess delirium in adult patients in the ICU (Barr et al., 2013). A study that was done in 2013 “Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit” had a recommendation for delirium prevention that includes early mobilization, pain management, daily sedation interruption or a light target level of sedation be routinely used in mechanically ventilated adult ICU patients (Barr et al., 2013).

ICU syndrome and delirium are two conditions for which the ABCDEF bundle was created to be utilized by healthcare practitioners (*SCCM | ICU Liberation Bundle (A-F)*, n.d.). Currently, many ICUs in Palestine are unaware of the effects or causes that might make an ICU patient susceptible to delirium, which in turn means that the ABCDEF bundle is not utilized or administered as a strategy of prevention of delirium, possibly due to the lack of knowledge on the issue itself. Compliance with the bundle is associated with higher survival rates, reduced delirium, fewer days on mechanical ventilation, and fewer ICU re-admissions (Mart, Brummel et al. 2019). The present issue is whether or not hospitals utilize the ABCDEF bundle or its components regularly, and whether or not the ICU nursing staff in Palestinian government facilities is knowledgeable about the components and their application.

1.3 Aim of the Study:

This investigation aims to determine the level of knowledge of ICU nurses on the ABCDEF Bundle in governmental hospitals in major cities (Ramallah, Nablus, Hebron) in the Palestinian Territories.

1.4 Objectives of study:

Main Objectives

The purpose of this research is to study the level of knowledge of ICU nurses on the ABCDEF bundle, in governmental hospitals in major cities in the Palestinian Territories.

Secondary Objectives

1. To determine if there is a relationship between the demographic data and level of knowledge on the ABCDEF bundle

1.5 Research Questions

1. What is the level of knowledge of the ABCDEF bundle and its components among ICU nursing staff?
2. Is there a relationship between demographic data and level of knowledge among ICU nursing staff

1.6 Research Hypothesis

1. There is no relationship between nurses' knowledge on the ABCDEF bundle and the demographic data
2. There is no relationship between the level of knowledge of nurses on the ABCDEF bundle and ICU patients developing delirium.

1.7 Significance of Study

When it comes to patients who have been in the intensive care unit for more than 48 hours, the patient's mental health, as well as their physical well-being, should be considered. This research is critical since delirium is still a major problem in ICUs across the world, and it is often under-diagnosed, delirium is associated with a significant increase in morbidity and mortality in critical patients. (Faria Rda and Moreno 2013).

The ABCDEF bundle provides health care professionals with a broader range of treatment options based on the needs of their patients. If thoroughly investigated, the level of knowledge the ICU staff has with the ABCDEF bundle's components will serve as a baseline for the bundle's future adoption as well as considerably improving how delirium in the ICU is managed and prevented. Furthermore, this study can demonstrate conclusively the knowledge gap that can possibly exist in the ICU while addressing ICU delirium.

The findings of this study will aid in the development of a standardized procedure inspired by the ABCDEF bundle that will be implemented in all West Bank government hospitals that do not currently do so.

1.8 Definitions of the Study Variables:

The primary study variable was the nursing staff's level of knowledge on the ABCDEF Bundle,

1.8.1 Conceptual Definition of Terms

1. *Knowledge.* to the knowledge of, or understanding of concepts, principles, theories, models, classifications, etc. We learn conceptual knowledge through reading, viewing, listening, experiencing, or thoughtful, reflective mental activity.

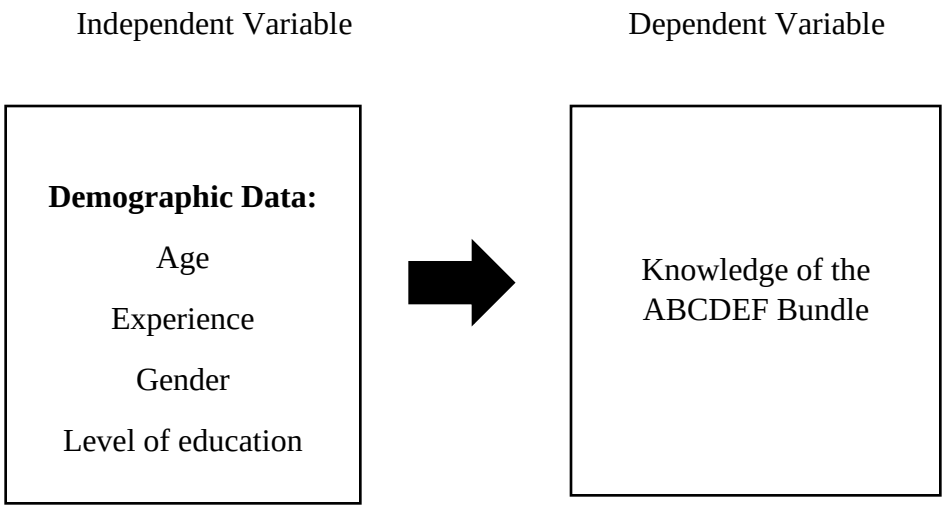
1.8.2 Operational Definitions of Terms

1. *Knowledge*: understanding of or information about a subject, such as facts, information, descriptions, or skills that is accumulated by education, experience, discovering, interpretation of data, or combination (Enterprise 2022)
2. *ABCDEF Bundle:*
    a) **A: A**ssess, Prevent, and Manage Pain: The assessment of pain is the initial step before delivering pain treatment.
    b) **B: B**oth Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT): Daily interruptions of sedatives or "sedation vacations" are termed Spontaneous Awakening Trials (SAT). Daily mechanical ventilator weaning evaluations are termed Spontaneous Breathing Trials (SBT)
    c) **C: C**hoice of analgesia and sedation: the decision to choose the appropriate type of sedation and analgesia that will keep the patient light to moderately sedated, which is assessed by RASS score.
    d) **D: D**elirium: Assess, Prevent, and Manage: Several approaches for diagnosing delirium in ICU patients have been developed and validated, notably the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) (Marra, Ely et al. 2017)

e) **E: E**arly mobility and exercise: Early mobility in the ICU is defined as activities of mobilization that are initiated after stabilization of physiologic disturbances (Parker, Sricharoenchai et al. 2013)

f) **F: F**amily engagement and empowerment: The intertwined relationship between medical professionals and the patient's intermediate family

1.8.3 Conceptual Frame Work



Summary:

In conclusion, ICU nurses were able to prevent patients from acquiring ICU delirium by using the ABCDEF bundles framework. The ABCDEF bundle gives health care practitioners a larger selection of treatment alternatives based on their patients' requirements. If extensively explored, the ICU staff's level of understanding with the ABCDEF bundle's components will serve as a benchmark for the bundle's future implementation while also significantly improving how delirium is handled and prevented in the ICU. Furthermore, this study can successfully indicate the information gap that may occur in the ICU while dealing with ICU delirium. The study's findings will help in the establishment of

a uniform approach based on the ABCDEF bundle that possibly can be adopted in all West Bank government hospitals.

Chapter 2: Literature Review

Introduction

This chapter provides an overview of similar studies that have been conducted internationally and have produced noteworthy findings pertaining to the ABCDEF bundle as well as how there could be a knowledge gap about the bundle.

Search Strategy

Although there are hundreds of databases available, these specific ones were the ones that received the most attention; PubMed, EBCSO, Google Scholar, as well as Medline. Due to the bundle being updated often over the years, all research from the year 2000 to the present were taken into consideration in this assessment. These were the most common keywords that were used: ICU nurses, knowledge, ABCDE bundle, ABCDEF bundle, critical care, intensive care, healthcare provider, implementation.

Due to advancements in critical care medicine, better quality intensive care, and long-term multiorgan support technologies, hospital mortality for critically ill patients has substantially decreased over the past 20 years in the industrialized world. ((Sosnowski, Mitchell et al. 2021)). Delirium does not have a single cause; rather, it develops as a result of a combination of risk factors and triggering incidents that take place while a patient is hospitalized. (Foreman, Wakefield et al. 2001)According to a 2022 study, delirium, which can afflict up to 83% of ICU patients receiving mechanical ventilation (MV), is the most common clinical indication of acute brain dysfunction in the ICU (Ali & Cascella, 2020).

The ABCDEF bundle, is significant when it comes to preventing delirium and allowing the patient to recover in the quickest way possible without any outside distractions. However, the problem is not with the bundle itself but with the implementation of the bundle. A cross- sectional study that was done in

2021, about the practices of the ABCDEF care, where 334 registered ICU nurses in China, where the results showed that nearly 50% of sampled nurses did not know that the ABCDEF existed, nevertheless 86.83% implemented pain assessments and 95.51% implemented sedation assessments, and 46.41% of the surveyed ICUs performed routine spontaneous awaking trials (Liang et al., 2021).

In addition, a study done in 2022, focusing on 45 cardiac intensive care nurses to assess their knowledge of intensive care unit (ICU) delirium. The findings indicated that most nurses lack awareness of the factors that lead to delirium, are unable to effectively communicate with patients experiencing it, and, most importantly, are unaware of the consequences of their actions (Krupa et al., 2022).

Furthermore, a global survey including 1,521 respondents from 47 countries was carried out to ascertain the ICU staff's level of understanding of the ABCDEF bundle and its individual components, found that the majority of intensive care units used each component separately, for example, pain 83% of ICUs utilized a pain scale, 66% conducted trials of spontaneous breathing and waking, 89% of ICUs used a sedation scale, 70% of ICUs adopted delirium monitoring, and only 42% of ICUs employed a validated delirium instrument. Similarly, the majority requested early mobilization, although only 69% had a mobility team and 79% had a clear mobility scale. As well as, only 36% evaluated ICU-acquired weakness. In 67% of ICUs, family members were actively involved; however, only 33% claimed that their unit was available 24 hours a day for family visits, and only 35% said that they had specialized personnel to help families (Morandi, Piva et al. 2017). It is evident that educating critical care unit staff members about ICU delirium is the first step in putting the ABCDEF bundle into practice, and that doing so will make the bundle's adoption easier.

The ABCDEF bundle (assess, prevent, and manage pain and delirium; both spontaneous awakening and breathing trials; choice of analgesia/sedation; early mobility; and family participation) improves intensive care unit outcomes, but implementation is limit (Balas et al., 2022). The ABCDEF bundle was

designed to make it easier to execute the 2018 Pain, Agitation/Sedation, Delirium, Immobility, and Sleep Disruption in Adult Patients in the ICU (PADIS) Guidelines. This bundle has been demonstrated in several trials to enhance mortality, decrease patient length of stay in the ICU, coma and delirium duration, cost (Stollings, Kotfis et al. 2021) To understand the significance of this bundle, a breakdown of the relevance of each component is evident.

Previous Literature

This section provides an overview and breakdown of the literature on the ABDCEF bundle's components in its individuality and the importance of why it should be adopted in all ICUs worldwide as a preventative and treatment measure for delirium. In addition to clarifying how recognizing that nurses lack the necessary level of expertise on the subject is the first step in implementing the ABCDEF bundle.

(A): Assess, Prevent, and Manage Pain

The ABCDEF bundle begins with its first component: assess, prevent, and manage pain; pain management it is vital when it comes to critically ill patients, these types of patients are extremely vulnerable, such as impaired communication, changed mental status, mechanical breathing, procedures and usage of intrusive devices, sleep disturbance, and immobility/mobility status, a systematic approach to pain evaluation and management is necessary (Devlin, Skrobik et al. 2018). Pain is defined by the International Association for the Study of Pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, it’s a personal experience that only a person can report (Terminology | International Association for the Study of (Pain), 2021).

In a cross-sectional study conducted in 2022 on the nurses’ knowledge, attitudes, and practice of Palestinian nurses in ICU settings in regard to pain treatment, with a median knowledge score of 7 and an interquartile range (IQR) of 4–8, the overall knowledge score was 15. Higher scores suggest a greater

understanding of pain management and control. There was a 78.5% knowledge gap in pain treatment. According to the study's findings, Palestinian nurses who work in intensive care units have a gap in knowledge, attitudes, and behaviors around pain (Sweity et al., 2022).

A cross-sectional study conducted in 2018 by Palestinian researchers on nurses' knowledge of pain management in high-acuity care units, involving 123 critical care nurses from seven West Bank hospitals, revealed that Palestinian nurses in these units have insufficient knowledge of the pain management (Salameh, 2018).

In Saudi Arabia in 2022, a study on nurses' understanding of pain assessment came to the conclusion that nurses had considerably inadequate knowledge and inadequate attitudes about the evaluation and management of pain. Results revealed that the majority of participants (70.1%) had inadequate knowledge and attitude (rated below 50%) (AL-Sayaghi et al., 2022).

In ICUs, pharmaceutical treatment of pain is frequently the first step taken for relief; typically, no efforts are done to stop pain before it even begins since caregivers lack knowledge of how to do so. An analysis of 60 critical care nurses' non-pharmacological pain management techniques used on patients at Egypt's Al Manial University Hospital in 2018 found that few nurses utilized non-pharmacological treatments such positioning the patient comfortably, talking to the patients' relatives, and utilizing comfort items. Nurses were unable to apply non-pharmacological pain management techniques because of a lack of knowledge, lack of time, workload, and unstable patients (Khalil, 2018). A pain education program on the Knowledge and Attitude About Pain Assessment and Management Among Critical Care Nurses was created by Saudi Arabian researchers in 2019, The knowledge and attitudes of nurses about pain evaluation and management were examined using a pretest-posttest intervention design. The training was shown to be successful in raising nurses' knowledge levels and changing their attitudes about pain evaluation and management, the mean score of nurses' knowledge

about pain assessment and management increased from 89 ± 45.95 before the intervention to 131.14 ± 28.1 after the intervention, and attitudes toward pain assessment and management increased from 71.82 ± 44.57 before the intervention to 142 ± 20 after the intervention. This study offered ideas and implications for practice on how modifying current education programs could improve efficient pain evaluation and treatment, which will reflect on the best possible care for critical care patients (Issa et al., 2019).

A systematic review completed in 2021 over 4 databases on nursing barriers of pain assessment and management in critical care patients concluded that the main reported barriers in this study included nurses' lack of knowledge regarding the use of pain assessment tools, patients' inability to communicate, physicians' prescription of analgesics being independent of pain scores evaluation, and absence of standardized guidelines and protocols for pain evaluation and control (Rababa, Al-Sabbah et al. 2021).

(B) Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT)

The second component is Spontaneous Awakening Trials (SAT) and Spontaneous Breathing Trials (SBT). The goal of the SAT (spontaneous awakening trial) is to identify whether a patient who is now receiving sedation needs to continue receiving it or may instead get treatment without it (Girard, Kress et al. 2008). The goal of a spontaneous breathing trial, or SBT, is to assess whether or not a patient can breathe on his or her own without using a mechanical ventilator (Girard, Kress et al. 2008). This is crucial since people who use mechanical ventilators are more likely to encounter complications. Once understood the importance of SAT and SBT, a Wake up and Breathe flow chart was created, which entails that first and foremost making sure a safety screening was done due to the circumstances of each patient being different. After passing the safety check, a patient should proceed to the SAT, which involves stopping the sedatives that have been administered, followed by observation of the patient. The trial continues until the patient wakes up successfully without any interruptions or the patient fails the

trial; if the patient fails the trial, it is crucial to restart the sedation at half the dose that had previously been administered. SBT as well follows the same steps, most importantly considering safety, then the observation of the patient and determination if pass or fail as well as lowering the mechanical ventilation set-up (Girard, Kress et al. 2008).

The study “Effectiveness of Implementing a Wake Up and Breathe Program on Sedation and Delirium in the ICU” was done over a 3 year period 2010-2013 implementing the Wake up and breathe flow chart of daily paired spontaneous awakening trials (daily sedation vacation plus spontaneous breathing trials) in a pre- and post-design study in the Wishard Memorial Hospital resulted in the finding that reflected positively on the goals of the study which were to enhance overall RASS scores; Prior to the protocol implementation, patients had a median RASS of –4 (mean, –3.74) on weekdays and –5 (mean, –4.4) on weekends (adjusted mean difference, –0.44 [$p < 0.0001$]). After implementation of the protocol, there was an increase in the mean RASS on weekdays of 0.88 ($p < 0.0001$) and on weekends of 1.20 ($p < 0.0001$). This was accomplished through the introduction of a "Wake Up and Breathe Program". Even though the program was unable to lower incidence of delirium that had developed in the ICU, there were hopeful developments for mechanically ventilated critically ill patients regarding the reduction of prevalent delirium (Khan et al., 2014).

Another study conducted in 2018 on the "Efficacy and Safety of a Paired Sedation and Ventilator Weaning Protocol for Mechanically Ventilated Patients in Intensive Care" came to the conclusion that intervention group patients spent more days breathing on their own during the 28-day study period than control group patients: (14.7 days vs 11.6 days; mean difference 3.1 days, 95% CI 0.7 to 5.6; p=0.02) and were discharged from intensive care (median time in intensive care 9.1 days vs 12.9 days; p=0.01) and the hospital earlier (median time in the hospital 14.9 days vs 19.2 days; p=0.04)

(Girard, Kress et al. 2008). According to the study's findings, all ICUs should adopt a plan and conduct daily waking and breathing trials.

(C) Choice of Analgesia and sedation

The third component of the ABCDEF bundle is the choice of analgesia and sedation, sedation and analgesia are needed in the critical care unit to minimize pain, anxiety, unintentional extubation, and increase patient-ventilator synchronization. The management of pain is prioritized first in the Society of Critical Care Medicine's Pain, Agitation, Delirium, Immobility, and Sleep Disruption (PADIS) clinical practice guidelines (2018 PADIS SCCM/ACCP Guidelines), then goal-directed delivery of psychoactive medications to prevent over sedation and encourage earlier extubation. However, excessive use of these drugs increases morbidity and death, requiring protocol (Temesgen et al., 2021). Sedation is given to approximately 60-90% of all ICU admission (Hutton, Burry et al. 2016).

Analgesia and sedation in the ICU will be administered as needed after it has been decided that they are required. Excessive heavy sedation raises hospital and personnel expenditures by lengthening ICU stays. Sedation breaks are as crucial as spontaneous breathing attempts (Temesgen et al., 2021). One of the recommendations of the 2018 PADIS, is to assist the medical team in agreeing on a target sedation level by using sedation scales, such as The Richmond Agitation-Sedation Scale (RASS); The RASS is a 10-point scale with four degrees of increasing agitation (RASS +1 to +4) to determine sedation levels from mild to severe (Marra, Ely et al. 2017), or the Riker Sedation-Agitation Scale which is a 7- point scale which is a subjective assessment of sedation status. (Raikhelkar and Papadakos 2008).

A SEDCOM research indicated that patients who were sedated using Dexmedetomidine, a selective -2 adrenoreceptor agonist, may benefit from sleep-wake cycle regulating in addition to anxiolysis and sedation. Sedation can affect patient outcomes depending on the type of medicine administered. Mechanically ventilated patients sedated with dexmedetomidine showed a 23% decreased

incidence of delirium compared to those sedated with midazolam in two double-blind, randomized controlled studies. (Riker, Shehabi et al. 2009).

The use of benzodiazepines or opioids in the ICU is associated with a longer duration of a first episode of delirium, according to a prospective cohort study on 304 patients over 60, which compared the use of these drugs and the duration of ICU delirium in an older population. Of the 304 patients, 239 (79%) developed delirium. Using the Confusion Assessment procedure for the ICU (CAM-ICU) and a validated chart review procedure, patients were evaluated daily for delirium. ICU delirium lasted an average of 3 days, ranging from 1 to 33 days. Receiving an opioid or benzodiazepine was linked to longer durations of delirium in a multivariable regression model (RR, 1.64, 95% CI, 1.27-2.10) (Pisani, Murphy et al. 2009).

The patient's success and length of stay in the intensive care unit depend greatly on the choice of analgesic and sedative medications.

(D) Delirium

The fourth component to the ABCDEF bundle is Delirium; assessment, prevention and management; when a patient is in the ICU they need to be routinely checked daily for delirium, due to the cause of delirium being unknown (Stollings, Kotfis et al. 2021). Several approaches for diagnosing delirium in ICU patients have been developed and validated, notably the Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) (Marra, Ely et al. 2017). The CAM-ICU is made up of four components. 1) sudden onset of mental status alterations or a changing course; 2) inattention; 3) disordered thinking; and 4) altered level of consciousness. If the patient exhibits both features 1 and 2, as well as either feature 3 or 4 he or she is classified CAM positive and delirious. The CAM-overall ICU's accuracy is very reliable, with averaged values for sensitivity and specificity of 80% and 95.9%, respectively (Marra, Ely et al. 2017).

Another highly recommended tool that is used for delirium detection is the Intensive Care Delirium Screening Checklist (ICDSC), the tool is used as a screening checklist of eight items based on DSM criteria and features of delirium: altered level of consciousness, inattention, disorientation, hallucination or delusion, psychomotor agitation or retardation, inappropriate mood or speech, sleep/wake cycle disturbance, and symptom fluctuation (Bergeron, Dubois et al. 2001). Even though both the CAM-ICU and the ICDSC are reliable screening instruments for delirium in critically ill patients, the CAM-ICU is more effective at excluding individuals without ICU delirium and identifying delirium in patients in the medical ICU and those receiving mechanical ventilation (Chen, Chung et al. 2021).

In 2021 a study was done focusing on the geographical regions of the West Bank and Jerusalem within Palestine, Awareness of Delirium among Intensive Care Unit (ICU) nurses. This cross-sectional study included a selection of ten Palestinian healthcare institutions, encompassing both government-operated and privately-owned facilities. The findings of this research elucidated that ICU nurses within these establishments exhibit a range of understanding concerning delirium that can be categorized from moderate to notably low. Furthermore, it was discerned that there exists a significant deficiency in the necessary clinical experience essential for effectively managing delirium cases. The study recommended the visible absence of standardized assessment guidelines and protocols specifically tailored for the management of patients afflicted with delirium in the clinical practice setting (Asmar et al., 2021).

In a 2020 cross-sectional study to determine the correlation between the CAM-ICU-7 and ICDSC scores was examined during 641 paired evaluations of 218 patients conducted by bedside nurses and research assistants. The CAM-ICU-7 and ICDSC measured the prevalence of delirium at 46.3% and 34.4%, respectively. The prevalence of delirium symptoms below the clinical threshold as determined

by the CAM-ICU-7 (score: 1-2) and ICDSC (score: 1-3) was 30.3% and 50.9%, respectively. Significant positive connection between the CAM-ICU-7 and ICDSC was seen (0.58, p0.001). There is a strong correlation between the severity assessments of delirium, the CAM-ICU-7 and the ICDSC (Krewulak et al., 2020).

A study done in 2021, focused mainly on post- operative patients focused on identifying the onset of postoperative delirium and evaluate evaluation techniques that accurately identify delirium with the least amount of testing. The retrospective study that used a database from a five-center randomized trial determined in the first five postoperative days, 95 out of 788 patients (12%; 95% CI, 10% to 15%) experienced at least 1 episode of delirium. The conclusion of the study was that postoperative delirium is frequent, and CAM-ICU tests performed twice a day for four days almost constantly identify delirium (Hamadnalla, Sessler et al. 2021).

(E) Early Mobility

The fifth component of the ABCDEF bundle is Early mobility; many studies have shown positive outcomes when it is related to delirium due to increased mobility, but unfortunately, it's not really implemented in ICUs to this day. Usually, critically ill ICU patients are not exposed to early mobilization, due to restrictions such as, on MV, restraints, the use of catheters, and medications (Needham et al., 2010).

Patients who are receiving invasive mechanical ventilation frequently have ICU-acquired weakness, early physical mobility may decrease weakness gained in the ICU, and improve survival (Hodgson, 2022).

In 2021, a quasi-experimental design study was conducted in Egypt to examine the impact of educational sessions on nurses' knowledge and practices regarding early mobility of critically ill patients. The study involved 45 nurses employed at University Hospital in Egypt, and the results

indicated statistically significant differences in the nurses' knowledge and practice regarding early mobility of critically ill patients pre and post the educational sessions. Following the introduction of educational sessions, the majority of the nurses in the study attained a sufficient level of early mobility knowledge and practices (Mohamed et al., 2021).

Recent 2022 Australian research examined the hypothesis of whether early mobility has an effect on patients' number of days alive while on mechanical ventilation; with a sample size including a total of 750 patients the study's findings indicated in the early-mobilization group, the median number of days patients were alive and out of the hospital was 143 (interquartile range: 21–161), while in the usual-care group, it was 145 (interquartile range: 51–164). The conclusion of the study showed that an increase in early active mobility among individuals receiving mechanical ventilation in the intensive care unit did not lead to a notably higher number of days that patients were alive and discharged from the hospital compared to the standard level of mobilization in the ICU (Hodgson, 2022).

In 2019, a meta-analysis was conducted to determine if ICU-acquired weakness might be decreased with early mobility and rehabilitation. The results indicated Fifteen randomized controlled trials involving a total of 1941 patients were included in this meta-analysis. Pooled estimates suggested that early mobilization significantly reduced the incidence of ICU-AW (RR = 0.49, 95% CI: 0.26, 0.91; P = .025), shortened the length of ICU (WMD = -1.82 days, 95% CI: -2.88, -0.76; P = .001). Concluding early mobilization reduced the duration of ICU and hospital stays, improved functional mobility, and prevented the incidence of ICU-AW. On the other hand, it had no impact on ventilator-free days or the ICU mortality rate (Zang et al., 2019).

(*F) Family Engagement and Empowerment*

The last component of the ABCDEF bundle is Family Engagement and empowerment; this is a new add to the bundle, after realizing how important it is to include family in the decision-making

process, as well as the family being informed of the treatment plan. Family engagement is also important to patient who have experienced traumatic events. When a patient is around their close relatives, there is a sense of comfort, and can help in lowering anxiety and stress, which are risk factors for delirium. It is also important for family to be aware of exactly what critical state their relative is in, and a plan can be created if at some point in time end of life treatment needs to be done (Marra, Ely et al. 2017).

A systematic review, which was published in 2022, focused on interventions that include the family in the prevention of delirium in the adult intensive care unit. It contained a total of 8 articles from August to October 2019 and was found in 11 databases using key phrases such as; critical care, delirium, and family. According to the study's findings, non-pharmacological techniques that lessen the incidence of delirium in the ICU and provide several advantages to both the patient and family/caregiver include extended time with family visits, the creation of family-mediated activities, and redirection (Pabón-Martínez et al., 2021).

A cross-sectional study was conducted in Palestine in 2020, focusing on the Essential Care Needs for Patients' Family Members at the Intensive Care Units (ICUs). The study involved 240 participants from four Palestinian hospitals. Its objective was to identify the needs of families with loved ones in the ICU. The findings indicated that the assurance domain was deemed the most crucial, while participants expressed some unmet needs in the support domain. Interestingly, parents placed higher importance on all needs compared to other relatives of the patients. Furthermore, participants with a higher level of education emphasized the significance of assurance dimensions for family members of ICU patients. These findings highlight the importance of addressing the unmet needs of family members in Palestinian hospitals, calling for attention from healthcare professionals and administration (Saleh Salameh et al., 2020).

In 2019 a Brazilian randomized clinical trial looked into whether allowing family members to visit the intensive care unit more often lowers the risk of delirium. A total of 36 Adult ICUs were included in the trial, these ICU's have restricted visiting hours to approximately only 4 hours a day. The trial itself increased the visiting hours to about 12 hours per day. The clinical trial concluded that compared to typical limited visiting hours, a flexible family visitation policy did not substantially lower the prevalence of delirium among ICU patients. However, also, exhibiting that it assisted in lowering family members' anxiety levels (Rosa, Falavigna et al. 2019).

Summary

In conclusion, the ABCDEF bundle is a significant bundle created especially for ICU patients experiencing delirium without a known cause. The research done suggests that the ABCDEF bundle, as a whole as well as its components, is related to a reduction in the incidence of delirium (Balas et al., 2014). While a few studies were conducted in the Middle East, most were conducted internationally and none specifically focused on Palestine.

According to the studies, every element of the ABCDEF bundle has a substantial impact on its own and, when given careful consideration, has improved the prognosis of critically sick patients. Pain research conducted worldwide revealed a severe lack of knowledge among critical care nurses regarding how to recognize a patient who is in pain and the appropriate scales to use to do so, even if the patient is being mechanically ventilated.

However, surprisingly, recent research revealed that many hospitals have developed "wake up and breathe" programs and protocols around the second element of the bundle after realizing how important it is for patients to take a break, be able to be fully assessed, and be watched to see if their condition has improved or not determine the appropriate level of sedation that is required.

Research on the third component of the bundle, which is the choice of sedations, revealed that this is still an area that receives little attention and that different countries have different protocols. Some people don't fully comprehend how sedatives work, and when delirium symptoms appear, doctors just increase the dosage of sedation, but through worldwide protocols sedation scales were created and a target ideal level for sedation was created.

The fourth component, delirium, has been extensively researched worldwide with encouraging results. However, it was found in every study that a large number of ICU nurses are unaware of the symptoms of delirium or how to screen for it. As a result, some hospitals established daily protocols for delirium assessments using instruments like the CAM-ICU scale.

Research involving the fifth component; early mobility, was evident. According to the research, it's critical to initiate early mobility in critical care patients—including those on mechanical ventilation—as soon as it's safe to do so. This increases the likelihood that patients won't acquire ICU-acquired weakness and, once they can, enables them to resume regular activities more quickly.

Family interaction, the final element in the bundle, was the most recently introduced. As family presence is a relatively recent addition, there isn't much data demonstrating how much of an impact it has on delirium. However, studies have shown that including family members in the patient's treatment plan reduces anxiety and increases the family's level of trust in the caregivers.

Thus, it is crucial before attempting to apply the bundle throughout Palestine's ICUs, it is important to stress the significance of assessing the critical care nurses' level of understanding of ICU delirium and the components of the ABCDEF bundle

Chapter 3: Research Methodologies:

3.1. Introduction

The primary goal of this study is to assess ICU nursing staff knowledge of the ABCDEF bundle and how well it may be used to reduce delirium incidents. The following section details the methodology for the present study, including the research design, setting, demographic and sample, study instruments, data collecting techniques, data analysis, and study ethics.

3.2. Study Design

The research utilized a cross-sectional, quantitative, descriptive correlational technique. This approach has a number of advantages, including the capacity for precise measurement, detailed data analysis, assessment of the relationship between variables, and support for hypothesis development (Polit and Beck 2021). Additionally, it may be completed quickly and affordably (Polit and Beck 2021)

3.3. Inclusion Criteria

This research's eligibility requirements are rather broad: any critical care nurses, regardless of gender or experience level, who work in the specific governmental hospitals selected for inclusion in the study are eligible to participate in the four hospitals included in the research, there are 190 critical care nurses in total.

3.4. Exclusion Criteria

Specifically for this study, any nurse that does not work in the ICU was excluded

3.5. Study Population, Sampling Method, and Sample Size

Study Population:

The study's target group consists of registered critical care nurses who work in the West Bank of the Palestinian territories' major government hospitals. Owing to the tight timeline for this study, the West Bank was separated into three parts: the north, center, and south. Hospitals with the most functioning critical care units—which include cardiac and adult medical surgery units were selected from each of these regions. Across the four hospitals in the research, there were a total of 190 intensive care nurses. (Ministry of Health annual report 2022)

Sampling Method

Two different types of sampling methods were utilized in this study. The first was the cluster sampling approach, which divides a population into groups based on the population. (Dovetail 2023). The West Bank was divided into three geographic zones using this sampling method: the north, center, and south. Once divided the 4 main governmental hospitals were chosen to be included in the study. Then convenience sampling method which is where units are selected for inclusion in the sample because they are the easiest for the researcher to access (*Convenience Sampling Method: How and When to Use It?* 2023), was used which focused on all critical care nurses working in the 4 governmental hospitals in the cardiac care units, and the intensive care units.

Sample Size:

The sample size was determined using the tool G*power (3.0.10). The population size was set to 190, the confidence level to 95%, and the confidence interval to 0.05. This study requires a sample size of 127 nurses in total.

General characteristics of the respondents

Of the 190 registered nurses that are distributed in intensive care units at 4 hospitals located in the region of West-bank/Palestine, 134 completed the questionnaire (i.e., the response rate was 70.5%). Table 1 summarizes nurses' response rate according to hospital.

Table 1: Nurses' response rate according to hospital.

Hospital		ICU Team	Response n (%)
1	Al Watani, Nablus	22	18 (81.8)
2	Palestine Medical Complex (PMC), Ramallah	90	65 (72.2)
3	Queen Alia, Hebron	55	36 (65.5)
4	Rafidia, Nablus	24	15 (62.5)
Total cohort		**190**	**134 (70.5)**

3.6. Study Setting

The location of this study was conducted In the West Bank, Palestine, with a population near 2.8 million Palestinians. In the West Bank alone there is approximately 53 hospitals combined between governmental and private hospitals. According to the Ministry of Health, there are approximately 291 beds for critical care patients ("Palestinian Health Annual Report 2022," 2023)). This study precisely focused on intensive care unit nurses, working in adult critical care units such as Medical/ Surgical ICU, and CCU in governmental hospitals.

The West bank of the Palestinian Territories was divided into three zones, with the North Zone including Rafidia Surgical Hospital and Al Watani Hospital, the Central Zone including the sole governmental hospital, Palestine Medical Complex, and the South Zone including Alia Hospital. The hospital selection process was restricted to governmental hospitals with highly functional intensive care units.

The Palestine Medical Complex (PMC), founded in 1963, is one of the main medical institutions in the Palestinian territory and is located in the Central Zone of the territory. It includes more than 312 beds and more than 800 employees. (“Palestinian Health Annual Report 2022,” 2023) Before adopting the name of PMC in 2010, the institution was formerly known as "Ramallah Governmental Hospital." These include the Ramallah Sons Building, the Sheikh Zayed Building for emergency and orthopedic departments, the Bahrani Building for pediatric specialties, the Kuwaiti Building for specialized and cardiopulmonary surgeries, as well as the Hemodialysis unit and Blood Bank. Presently, PMC has five adult ICUs, two of which are located in the old building and are used for adult medical and surgical cases, and cardiac care unit (CCU) for post-cardiac catheterization procedures is also located in the old building. In the newer building known as Al-Kuwaiti building, there is another unit CCU for post-open heart surgical patients + Neurosurgery ICU.

The Rafidia Governmental Surgical Hospital is in the city of Nablus, in the northernmost part of the territory. The hospital was founded in 1976 and focuses mostly on surgical specialties, including anything from general surgery to neurosurgery to plastic surgery and everything in between. (Rafidia Governmental Hospital Statistics 2016, n.d.), with roughly around 200 beds are available, as well as more than 200 working nurses. (“Palestinian Health Annual Report 2022,” 2023). 11 beds at the Rafidia Surgical Hospital's intensive care unit are reserved exclusively for critically ill post-surgical patients.

One of the largest public hospitals in the area, Al-Watani Hospital is recognized for handling all problems. Additionally, it is one of Palestine's and Nablus's oldest hospitals. Al-Watani Hospital was established in 1888 while still part of the Ottoman Empire. There are 62 inpatient beds available in Al-Watani overall (Palestinian Health Annual Report 2022, 2023). The hospital offers two critical care units: a cardiac care unit with a total of 13 beds and a medical/surgical ICU with about 20 beds.

According to information from the Ministry of Health published in 2018, there are about 240 certified nurses employed in the facility.

The final hospital to take part in the study in the southern zone is Al-Alia Governmental Hospital, which was established in 1957 and is situated in the center of Hebron. One of Hebron's only government hospitals, this facility provides almost all types of healthcare. The 274 beds of Alia Hospital are distributed throughout its departments, including internal medicine, surgery, CCU & ICU, and pediatrics. Over 300 nurses work at the facility, including about 50 ICU nurses ("Palestinian Health Annual Report 2022," 2023).

3.7. Study Instruments

A modified questionnaire from a prior global survey conducted in 2017 was utilized as the study instrument in this investigation. It was named "Worldwide Survey of the "Assessing Pain, Both Spontaneous Awakening and Breathing Trials, Choice of Drugs, Delirium Monitoring/ Management, Early Exercise/Mobility, and Family Empowerment" (ABCDEF) Bundle" (Morandi, Piva et al. 2017). Permission was requested and granted from the researchers of this particular study. (Appendix B). There is a total of 42 questions in the survey; There are 9 demographic data questions and 2 introduction questions. Then the survey follows the ABCDEF bundle structure: Assessment, Prevention and Management of Pain *(4 questions);* Spontaneous Awakening Trials (SAT) & Spontaneous Breathing Trials (SBT) *(3 questions);* Choice of Analgesia and sedation *(4 questions);* Delirium: Assessment, Prevention and Management *(11 questions);* Early Mobility and Exercise (*3 questions)*, Family Engagement and Empowerment (*6 questions).* (Appendix C). The original questionnaire was tested by supplemental survey, Supplemental Digital Content, who provided written feedback on Face validity, Content Validity, and Criterion Validity.

3.7. Data Collection Procedures:

Initially, the Institutional Review Board of Arab American University granted ethical permission for this study, which marked the start of the data-gathering procedure. Then, authorization from the Palestinian Ministry of Health was required to gather data from governmental hospitals before being allowed to visit the hospitals selected for this study. (Appendix A).

After approvals were gained, specific dates were set up for the researcher to first meet with the Head of the Nursing Department in each of the 4 hospitals to explain the study and get approval to be able to enter into the ICU/CCU, once done questionnaires were distributed to team members in the ICU/CCU over multiple shifts, until the sample size was met. Data collection process took place between 15 August to 30 October 2023.

3.8. Data Analysis

SPSS (Statistical Package for Social Sciences) software version 25 was used for data analysis. We examined results using descriptive statistics, where aggregated responses are reported as frequencies and percentages. Inferential statistics were used to explore possible relationships between the study variables. For instance, studying the relationships between demographic data and level of knowledge among respondents. Chi-square test was used to determine the association between categorical variables. Multiple logistic regression was performed to determine the significant predictors of the dependent variables (i.e., the implementation of PAD guidelines, and knowledge of the ABCDEF bundle). A P-value ≤ 0.05 was considered statistically significant.

3.9.Ethical Consideration

To conduct this study authorization was obtained from Arab American University's Institutional Review Board (IRB), under the authorization code **2023/A/73/N** (Appendix D). To allow the collection

of data in the hospitals, more authorizations from the Palestinian Ministry of Health were required, which was granted. (Appendix E) We obtained informed consent from year participant in the study as well. (Appendix F)

Participants in the study were asked to refrain from disclosing their names or any other personally identifiable information in order to ensure confidentiality. A classified file was used to protect the data. The research participants were informed that they could withdraw at any point during the process without incurring any consequences and that they could return incomplete or partial surveys. To the best of the researchers' abilities, all participant queries about the survey and or the study were answered

Chapter 4: Results

This chapter introduces the findings regarding the knowledge of the ABCDEF bundle and its components among respondents. It also explores possible relationships between the knowledge of ABCDEF bundle and demographic data among participants.

The general characteristics of the respondents are presented in Table 2. The mean age of participated nurses was 32.2 ± 6.0 years, ranging from 23 to 48 years old. The majority of respondents were males (58.2%), and with a bachelor 's degree (79.1%). Nearly half of the respondents (49.3%) had 5 to 10 years of ICU experience. Most respondents (64.2%) had an average length of ICU stay 5 days or less. Nearly two-thirds (65.7%) of ICU units had 10 beds or more. Only 26.9% of units had 70% or more mechanically ventilated patients. Most units use a 1:3 nurse/patient ratio during day (71.6%) and at night (56.7%).

Table 2: General characteristics of the respondents (n = 134)

Characteristic	Categories	n (%)
Age (years)	< 30	54 (40.3)
	30 - 39	57 (42.5)
	≥ 40	23 (17.2)
	Mean ± SD (min - max)	32.2 ± 6.0 (23 – 48)
Gender	Male	78 (58.2)
	Female	56 (41.8)
Education	Diploma	21 (15.7)
	Bachelor	106 (79.1)
	Master	7 (5.2)
ICU experience (y)	< 5	42(31.3)
	5 - 10	66 (49.3)
	11 - 20	24 (17.9)
	>20	2 (1.5)
ICU no. of beds	< 10	46 (34.3)
	≥ 10	88 (65.7)
ICU length of stay (d)	1 - 2	7 (5.2)

	3 - 5	79 (59.0)
	> 5	48 (35.8)
Ventilated patients (%)	< 50	40 (29.9)
	50 - 70	54 (40.3)
	> 70	36 (26.9)
	Not available	4 (3.0)
Nurse/patient ratio (d)	1:1	2 (1.5)
	1:2	33 (24.6)
	1:3	96 (71.6)
	1:4	3 (2.2)
Nurse/patient ratio (night)	1:1	4 (3.0)
	1:2	27 (20.1)
	1:3	76 (56.7)
	1:4	27 (20.1)

4.2 Assess, prevent, and manage pain

Table 3 demonstrates our findings regarding assess, prevent, and manage pain. About one-third (33.6%) of the respondents reported using protocol for pain treatment. Only (63.4%) of the respondents reported using a scale to evaluate pain. The pain scale reported to be most widely used were the Numerical Rating Scale (NRS) (52.9%) and the Visual Analogic Scale (VAS) (50.0%). Nearly one-quarter (23.1%) of the respondents reported using preemptive analgesia before nursing procedures. The preferred analgesics in the ICU were paracetamol (89.6%), fentanyl (66.4%), and morphine (62.7%) alone or in combination.

Table 3: Assess, prevent, and manage pain (n = 134)

Characteristic	Categories	n (%)
Do you use protocol for pain treatment?	No	89 (66.4)
	Yes	45 (33.6)
Do you use any scale to evaluate pain in your unit?	No	49 (36.6)
	Yes	85 (63.4)
Scale used to evaluate pain[a]	Critical-Care Pain Observation Tool	17 (20.0)
	Behavioral Pain Scale	4 (4.7)

	Numeric Rating Scale	45 (52.9)
	Visual Analogic Scale	43 (50.0)
	Faces Pain Scale	26 (30.6)
	Non-Verbal Pain Scale	6 (7.1)
Do you use preemptive analgesia before nursing procedure?	No	75 (56.0)
	Yes	31 (23.1)
	At nurse's discretion	28 (20.9)
Drugs used for pain treatment[a]	Fentanyl	89 (66.4)
	Morphine	84 (62.7)
	Remifentanil	5 (3.7)
	Paracetamol	120 (89.6)
	Nonsteroidal anti-inflammatory drugs	74 (55.2)
	Other	40 (29.9)
[a]Multiple responses were possible		

4.3 Spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT)

Table 4 summarizes nurses' practices regarding SATs and SBTs. Just over three-quarters (76.9%) of the respondents reported performing daily SATs, most often once daily (59.2%). Moreover, nearly two-thirds (65.7%) of respondents reported performing daily SBTs. Only 59.7% of respondents reported using a coordinated protocol synchronizing SAT and SBT (i.e., a "wake up and breathe" protocol), most often performed by nurses on M.D. order (62.5%).

Table 4: Spontaneous awakening trials (SAT) and spontaneous breathing trials (SBT) (n = 134)

Characteristic	Categories	n (%)
Do you perform daily SAT?	No	31 (23.1)
	Yes	103 (76.9)
How many times do you perform daily SAT?	As many times as possible	24 (23.3)
	Every nurse's shift	18 (17.5)
	Once a day	61 (59.2)
Do you perform daily SBT?	No	46 (34.3)
	Yes	88 (65.7)
Do you use have a "wake up and breathe" protocol?	No	54 (40.3)
	Yes	80 (59.7)

How perform SAT/SBT coordination?	M.D.	24 (30.0)
	Nurse on M.D. order	50 (62.5)
	Respiratory therapist	6 (7.5)

4.4 Choice of analgesia and sedation

Table 5 illustrates our findings regarding the choice of analgesia and sedation. Sedation scale was used in 74.6% of ICUs. About half of the respondents (50.7%) reported using the Richmond Agitation Sedation Scale (RASS) to evaluate the level of arousal, whereas about one-quarter (25.4%) use any specific scale. Only 28.4% of respondents reported using a sedation protocol. When treating an agitated patient, most respondents (41.0%) reported that they evaluate pain first and then delirium before considering using sedation. Moreover, the preferred drugs to continue the sedation strategy were Propofol (88.8%), Haloperidol (85.1%), and Benzodiazepines (56.7%) alone or in combination.

Table 5: Choice of analgesia and sedation (n = 134)

Characteristic	Categories	n (%)
Scale used to evaluate sedation[a]	Risker Sedation-Agitation Scale	17 (12.7)
	Richmond Agitation Sedation Scale	68 (50.7)
	Ramsay Scale	4 (3.0)
	None	34 (25.4)
	Other	11 (8.2)
Do you follow protocol for sedation in your unit?	No	96 (71.6)
	Yes	38 (28.4)
In a restless and agitated patient who screened positive at delirium assessment, how do you approach the sedation strategy after clinical evaluation?	Sedation → pain → delirium	38 (28.4)
	Pain → delirium → sedation	55 (41.0)
	Delirium → pain→ sedation	9 (6.7)
	Delirium → sedation → pain	2 (1.5)
	Pain → sedation → delirium	7 (5.2)
	None	17 (12.7)
	Other	6 (4.5)
In a restless and agitated patient who screened positive at delirium assessment, how would	Propofol	119 (88.8)
	Benzodiazepines	76 (56.7)
	Dexmedetomidine	45 (33.6)

you continue the sedation strategy?	Haloperidol	114 (85.1)
	Atypical antipsychotic	19 (14.2)
	Other	18 (13.4)
Multiple responses were possible		

4.5 Delirium monitoring and management

Table 6 summarizes our findings about delirium monitoring and management. The majority of respondents (64.9%) estimate that 30% or less of patients in their ICU units have delirium. Delirium monitoring was implemented in 65% of ICUs, but only 26.9% did not use a validated delirium assessment tool. Just over one-third of respondents (35.1%) not routinely monitor delirium, whereas 35.1% report that they assess patients for delirium once a day, and 29.9% report doing so more than once a day. More than half of the respondents (53.0%) preferred Confusion Assessment Method for the ICU (CAM-ICU) to monitor delirium, whereas 26.9% do not use any specific tool. Delirium assessment most often performed by nurses (40.3%), followed by residents (23.1%). When delirium is identified, only 26.1% of respondents would investigate potential causes. Respondents believe that delirium could affect ICU length of stay (86.6%), hospital length of stay (76.1%), and mortality (50.7%). Among measures used to prevent delirium, respondents most commonly prefer pain management (64.9%), followed by awakening and breathing trial coordination (53.0%). Among non-pharmacologic interventions to promote sleep, respondents most commonly prefer optimizing ambient light (65.7%), followed by noise reduction during the night (52.2%). Alternatively, 43.3% of respondents reported prescribing drugs to promote sleep, with Haloperidol (91.4%) being the preferred agent, followed by benzodiazepine (50.0%). When managing delirium, 71.6% of respondents reported that they do not use a protocol. The majority of respondents (65.7%) reported using haloperidol for the treatment of episodes of delirium, followed by prevention of delirium (29.9%).

Table 6: Delirium monitoring and management (n = 134)		
Characteristic	**Categories**	**n (%)**
Do you routinely monitor delirium in your unit?	Once a day	47 (35.1)
	More than once a day	40 (29.9)
	Never	47 (35.1)
Which tools do you routinely use to assess delirium?	Confusion Assessment Method for the ICU	71 (53.0)
	Intensive Care Delirium Screening Checklist	6 (4.5)
	None	36 (26.9)
	Other	21 (15.7)
Who performs delirium assessments in your unit?	M.D.	24 (17.9)
	Nurse	54 (40.3)
	Resident	31 (23.1)
	None	25 (18.7)
Do you generally investigate the potential causes of delirium in your patients?	No	99 (73.9)
	Yes	35 (26.1)
In your experience, how many patients have delirium in your ICU? (%)	0 - 10	7 (5.2)
	11 - 30	80 (59.7)
	31 - 60	42 (31.3)
	> 60	5 (3.7)
Do you think delirium could have an impact on[a]	Mortality	68 (50.7)
	ICU length of stay	116 (86.6)

	Hospital length of stay	96 (71.6)
	ICU costs	34 (25.4)
	Family burden	55 (41.0)
	Cognitive impairment following critical Illness	28 (20.9)
According to your opinion, which of the following measures can prevent delirium?[a]	Awakening and breathing trial coordination	71 (53.0)
	Early exercise rehabilitation	59 (44.0)
	Nonpharmacological intervention to regulate sleep/wake cycle	61 (45.5)
	Minimizing noise	31 (23.1)
	Sleeping medications/Antipsychotics	61 (45.5)
	Pain management	87 (64.9)
	Minimizing physical restraints and catheter use	37 (27.6)
	Ensure family member presence	26 (19.4)
	None	1 (0.7)
Do you use non-pharmacologic interventions to promote sleep in your unit?[a]	Light optimization	88 (65.7)
	Optimization of drugs timing administration	30 (22.4)
	Noise reduction during the night	70 (52.2)
	Other	21 (15.7)
Do you use drugs to promote sleep in your Unit?	No	77 (57.5)
	Yes	58 (43.3)
Drugs used to promote sleep[a]	Benzodiazepines	29 (50.0)

	Overnight Propofol infusion	18 (15.7)
	Haloperidol	53 (91.4)
	Melatonin	9 (15.5)
	Other	6 (10.3)
Do you use protocols for the management of delirium?	No	96 (71.6)
	Yes	38 (28.4)
How do you use haloperidol to manage delirium in your unit?	Treatment of episode of delirium	88 (65.7)
	Prevention of delirium	40 (29.9)
	To minimize the use of sedatives	19 (14.2)
	Other	16 (11.9)
[a]Multiple responses were possible		

4.6 Early mobilization and exercise

Table 7 demonstrates our findings about early mobilization and exercise. More than half of respondents (53.0%) reported that they routinely assess patients for ICU-acquired weakness (ICU-AW). Early mobilization was “prescribed” by most (70.2%). About one third of the respondents (33.6%) reported prescribing early mobilization, whereas 36.6% prescribed early mobilization only to non-ventilated patients. Of the respondents (58.2%) reported having a mobility team, consisting of physical therapist and ICU nurses (42.3%) or physical therapist (30.8%), or physical therapist, respiratory therapist, and ICU nurses (12.8%).

Table 7: Early mobilization and exercise (n = 134)		
Characteristic	**Categories**	**n (%)**
Do you evaluate ICU-acquired muscle weakness in your unit?	No	63 (47.0)
	Yes	71 (53.0)
Do you prescribe early mobilization to your patients?	No	40 (29.9)
	Yes	45 (33.6)
	Only in non-ventilated patients	49 (36.6)
Do you have a dedicated mobility team in your ICU?	No	56 (41.8)
	Yes	78 (58.2)
Who is part of the mobility team?[a]	Physical therapist	24 (30.8)
	Nurse	7 (9.0)
	Physical therapist + Nurse	33 (42.3)
	Physical therapist + Respiratory therapist + Nurse	10 (12.8)
	Physical therapist + Occupational therapist + Nurse	4 (5.1)
[a]Multiple responses were possible		

4.7 Family Engagement and Empowerment

Our findings regarding family engagement and empowerment are summarized in Table 8. The majority of the respondents (88.1%) reported that their unit is not open 24 hours per day for family visitation, and 63.6% reported that family member visits are allowed between 2 - 5 hr./d. More than half of respondents (53.7%) reported that they explain delirium to family members, with 17.9% reporting they used booklets

or training material to improve delirium knowledge among family members. Only 31.3% of the respondents involve family members in delirium management, but only 23.9% of the ICUs use dedicated staff to support families.

Table 8: Family Engagement and Empowerment (n = 134)		
Characteristic	**Categories**	**n (%)**
Is your unit open 24hr per day to family members visit?	No	118 (88.1)
	Yes	16 (11.9)
How many hours is your unit open to family members if not 24hr per day? (hr.)	1 - 2	41 (34.7)
	2 - 5	75 (63.6)
	> 5	2 (1.7)
Do you generally explain to family members what delirium is?	No	62 (46.3)
	Yes	72 (53.7)
Do you use booklets or training material to improve delirium knowledge among family members?	No	110 (82.1)
	Yes	24 (17.9)
Do you involve family members in the delirium management?	No	92 (68.7)
	Yes	42 (31.3)
Do you use dedicated staff for managing the relationship with family members?	No	102 (76.1)
	Yes	32 (23.9)

4.8 Implementation of the pain, agitation, delirium (PAD) guidelines

The analysis revealed that just over half (56.7%) of respondents reported implementing the PAD guidelines. Chi-square test was performed to determine if respondents' general characteristics were significantly associated with the implementation of PAD guidelines, see Table 9.

- The implementation of PAD guidelines was significantly **related to hospitals**, greater in Rafidia (73.3%), followed by PMC (72.3%), and Al Watani (66.7%).
- The implementation of PAD guidelines was significantly **related to age**, higher for younger respondents aged less than 30 years (64.8%).
- The implementation of PAD guidelines was significantly **related to ICU no. of beds,** higher for ICUs with lower no. of beds; less than 10 (64.8%).
- The implementation of PAD guidelines was significantly **related to the percent of ventilated patients**, higher for ICUs with higher percent of mechanically ventilated patients; more than 70% (75.0%).
- The implementation of PAD guidelines was significantly related to **the average ICU length of stay**, higher for the responder ICU with higher length of stay; of more than 5 days (85.4%).
- The implementation of PAD guidelines was significantly related to **the nurse/patient ratio** at night, higher for ICUs using a 1:4 nurse/patient ratio (81.5%).

Table 9: Implementation of PAD guidelines according to general characteristics

Independent characteristic	Categories	n (%) of yes	P-value
Hospital	PMC	47 (72.3)	< **0.01***

	Rafidia	11 (73.3)	
	Al Watani	12 (66.7)	
	Queen Alia	6 (16.7)	
Age	< 30	35 (64.8)	**0.050***
	30 - 39	33 (57.9)	
	≥ 40	8 (34.8)	
Gender	Male	43 (55.1)	0.661
	Female	33 (58.9)	
Education	Diploma	13 (61.9)	0.601
	Bachelor/master	63 (55.8)	
ICU experience (y)	< 5	29 (69.0)	0.126
	5 - 10	35 (53.0)	
	> 10	12 (46.2)	
ICU no. of beds	< 10	34 (73.9)	**0.004***
	≥ 10	42 (47.7)	
Ventilated patients (%)	≤ 70	49 (52.1)	**0.018***
	> 70	27 (75.0)	
ICU length of stay (d)	≤ 5	35 (40.7)	**< 0.01***
	> 5	41 (85.4)	
Nurse/patient ratio (d)	1:1/1:2	19 (54.3)	0.736
	1:3/1:4	57 (57.6)	
Nurse/patient ratio (night)	1:1/1:2	17 (54.8)	**0.012***

	1:3	37 (48.7)	
	1:4	22 (81.5)	
* The relationship is significant using Pearson Chi-square test; P-value ≤ 0.05			

Furthermore, multiple logistic regression was performed to determine the significant predictors of the implementation of PAD guidelines among the respondents. The estimated model is summarized in Table 10. The findings revealed that respondents age, ICU no. of beds, percent of ventilated patients, and ICU length of stay (d) had significant effects.

- The odds of implementation of PAD guidelines for respondents aged less than 30 y was 3.31 times higher than the odds for respondents aged 40y or older, fixing other variables constant.
- The odds of implementation of PAD guidelines for ICUs with less than 10 beds were 3.05 times higher the odds for ICUs with 10 or more beds.
- The odds of implementation of PAD guidelines for ICUs with higher percent of mechanically ventilated patients (i.e., greater than 70%) was 3.07 times higher than the odds for ICUs with lower percent of ventilated patients (i.e., 70% or lower), fixing other variables constant.
- The odds of implementation of PAD guidelines for respondents with an average length of ICU stay of more than 5 days was 7.10 times higher than the odds for respondents with an average length of ICU stay of 5 days or less, fixing other variables constant.

Table 10: Predictors the implementation of PAD guidelines among the respondents using multiple logistic regression model (n = 134)

Independent characteristic	**Categories**	**Coefficients (B)**	**P -value**	**Odds Ratio**
Age (y)	< 30[a]	1.197	0.**043***	3.31

	30 - 39[a]	1.186	0.069	3.27
Gender	Male	0.213	0.643	1.24
Education	Diploma[b]	0.315	0.617	1.37
ICU experience (y)	< 5[c]	0.375	0.639	1.46
	5 - 10[c]	0.189	0.775	1.21
ICU no. of beds	< 10[d]	1.116	**0.030**[*]	3.05
Ventilated patients (%)	> 70[e]	1.120	**0.039**[*]	3.07
ICU length of stay (d)	> 5[f]	1.961	**< 0.01**[*]	7.10
Nurse/patient ratio (d)	1:3/1:4[g]	0.231	0.711	1.26
Nurse/patient ratio (night)	1:3[h]	-0.242	0.702	0.79
	1:4[h]	0.707	0.405	2.03
[*] The relationship is significant using Wald test; P-value ≤ 0.05 Reference categories: [a] ≥ 40, [b]bachelor/master, [c] > 10, [d]≥ 10, [e]≤ 70, [f]≤ 5, [g]1:1/1:2, [h]1:1/1:2				

4.9 Knowledge of the ABCDEF bundle

The analysis showed that just over one-third (35.1%) of respondents reported knowing the ABCDEF bundle. Chi-square test was performed to determine if respondents' general characteristics were significantly associated with the knowledge of ABCDEF bundle, see Table 11.

- The knowledge of ABCDEF bundle was significantly **related to hospitals**, the greatest in Rafidia (53.3%), followed by PMC (49.2%).
- The knowledge of ABCDEF bundle was significantly **related to the average ICU length of stay**, higher for respondents with higher length of stay; more 5 days (52.1%).

- The knowledge of ABCDEF bundle was significantly **related to the nurse/patient ratio at night**, higher for ICUs using a 1:4 nurse/patient ratio (55.6%).
- The knowledge of ABCDEF bundle was not significantly related to the age, gender, education, ICU experience, ICU no. of beds, percent of ventilated patients, and nurse/patient ratio during day.

Table 11: Knowledge of the ABCDEF bundle according to general characteristics

Independent characteristic	Categories	n (%) of yes	P-value
Hospital	PMC	32 (49.2)	**< 0.01***
	Rafidia	8 (53.3)	
	Al Watani	2 (11.1)	
	Queen Alia	5 (13.9)	
Age (y)	< 30	20 (37.0)	0.333
	30 - 39	22 (38.6)	
	≥ 40	5 (21.7)	
Gender	Male	28 (35.9)	0.814
	Female	19 (33.9)	
Education	Diploma	9 (42.9)	0.416
	Bachelor/master	38 (33.6)	
ICU experience (y)	< 5	19 (45.2)	0.162
	5 - 10	22 (33.3)	
	> 10	6 (23.1)	
ICU no. of beds	< 10	15 (32.6)	0.665

	≥ 10	32 (36.4)	
Ventilated patients (%)	≤ 70	35 (37.2)	0.679
	> 70	12 (33.3)	
ICU length of stay (d)	≤ 5	22 (25.6)	**0.002***
	> 5	25 (52.1)	
Nurse/patient ratio (d)	1:1/1:2	8 (22.9)	0.078
	1:3/1:4	39 (39.4)	
Nurse/patient ratio (night)	1:1/1:2	12 (38.7)	**0.021***
	1:3	20 (26.3)	
	1:4	15 (55.6)	
* The relationship is significant using Pearson Chi square test; P-value ≤ 0.05			

Moreover, multiple logistic regression was performed to determine the significant predictors of the knowledge of ABCDEF bundle among the respondents. The estimated model was summarized in Table 12. The findings revealed that respondents ICU length of stay (d) and nurse-patient ratios during day and at night had significant effects.

- The odds of knowledge of ABCDEF bundle for respondents with an average length of stay of more 5 days was 3.12 times higher than the odds for respondents with an average length of ICU stay 5 days or less, fixing other variables constant.
- The odds of knowledge of ABCDEF bundle for ICUs using 1:3/1:4 nurse/patient ratios during day were 3.37 times higher the odds for ICUs using 1:1/1:2 ratios, fixing other variables constant.

- The odds of knowledge of ABCDEF bundle for ICUs using 1:4 nurse/patient ratio at night was 3.40 times higher the odds for ICUs using 1:1/1:2 ratios, fixing other variables constant.

Table 12: Predictors the knowledge of ABCDEF bundle among the respondents using multiple logistic regression model (n = 134)

Independent characteristic	Categories	Coefficients (B)	P -value	Odds Ratio
Age (y)	< 30[a]	0.142	0.797	1.15
	30 - 39[a]	0.684	0.284	1.98
Gender	Male	0.111	0.797	1.12
Education	Diploma[b]	0.224	0.699	1.25
ICU experience (y)	< 5[c]	1.376	0.061	3.96
	5 - 10[c]	0.778	0.217	2.18
ICU no. of beds	< 10[d]	-0.535	0.246	0.59
Ventilated patients (%)	> 70[e]	-0.242	0.628	0.79
ICU length of stay (d)	> 5[f]	1.136	**0.011**[*]	3.12
Nurse/patient ratio (d)	1:3/1:4[g]	1.216	**0.049**[*]	3.37
Nurse/patient ratio (night)	1:3[h]	-0.532	0.479	0.59
	1:4[h]	1.225	**0.045**[*]	3.40

[*] The relationship is significant using Wald test; P-value ≤ 0.05

Reference categories: [a] ≥ 40, [b]bachelor/master, [c] > 10, [d]≥ 10, [e]≤ 70, [f]≤ 5, [g]1:1/1:2, [h]1:1/1:2

4.10 Family involvement and the use of delirium prevention techniques

Generally, when family members are involved, there is a higher prevalence of interventions to prevent delirium, where family involvement were significantly related to early exercise rehabilitation, minimizing noise, ensuring family member presence (P-value < 0.05), see Table 13.

Table 13: Family involvement and the use of delirium prevention techniques

Delirium prevention techniques	**Family involvement**		**P-value**
	Yes (n = 42)	**No (n = 92)**	
	n (%)	**n (%)**	
Awakening and breathing trial coordination	21 (50.0)	50 (54.3)	0.640
Early exercise rehabilitation	24 (57.1)	35 (38.0)	**0.039***
Nonpharmacological intervention to regulate sleep/wake cycle	20 (47.6)	41 (44.6)	0.742
Minimizing noise	17 (40.5)	14 (15.2)	**0.001***
Sleeping medications/ Antipsychotics	24 (57.1)	37 (40.2)	0.068
Pain management	23 (54.8)	64 (69.6)	0.096
Minimizing physical restraints and catheter use	15 (35.7)	22 (23.9)	0.156
Ensure family member presence	17 (40.5)	9 (9.8)	**<0.01***

* The relationship is significant using Pearson Chi square test; P-value ≤ 0.05

4.11 Specific interventions for delirium prevention according to nurses-patients ratio

Finally, Table 14 demonstrates the relationship between some specific interventions for delirium prevention (family involvement, ensure family presence, and early exercise and mobilization) and nurses-patients ratio during day. Obviously, there was no significant association between these techniques and nurses-patients ratio.

Table 14: Specific interventions for delirium prevention according to nurses-patients ratio (d)

Prevention techniques	Nurses-patients ratio (day)		P-value
	1:1/1:2	1:3/1:4	
	n (%)	n (%)	
Family involvement (yes)	12 (34.3)	30 (30.3)	0.662
Ensure family presence (yes)	27 (77.1)	81 (81.8)	0.548
Early exercise and mobilization (yes)	19 (54.3)	56 (56.6)	0.815

4.12 Summary

The current study is the first study regarding the knowledge of ABCDEF bundle and its components among ICU nurses in Palestinian hospitals. To sum up, there were 134 respondents from 4 governmental hospitals in the region of West Bank, 56.7% of respondents had implemented the PAD guidelines, whereas only 35.1% of respondents knew the ABCDEF bundle with varying degrees across hospitals. The implementation of PAD was higher for younger respondents, ICUs with higher mechanically ventilated patients' percent, ICUs using a 1:4 nurse/patient ratio at night, ICUs with lower no. of beds, and respondents with a higher average length of stay.

The knowledge of the ABCDEF bundle was higher for ICUs using a 1:3/1:4 (respectively, 1:4) nurse/patient ratio during the day (respectively, at night), and respondents with a higher average length of stay. Most of the respondents (63.4%) used a scale to evaluate pain. Spontaneous awakening trials and spontaneous breathing trials were performed in 76.9% and 65.7% of the responder ICUs, respectively. Sedation scale was used in 74.6% of ICUs. Delirium monitoring was implemented in 65% of ICUs, but only 26.9% did not use a validated delirium assessment tool.

Likewise, early mobilization was “prescribed” by most (70.2%), but 41.8% had no mobility team. Only 57.0% of the respondents assessed ICU-acquired weakness. Family members were actively involved in 31.3% of ICUs; however, only 23.9% used dedicated staff to support families and only 11.9% reported that their unit was open 24hr/d for family visits.

Generally, when family members are involved, there is a higher prevalence of interventions to prevent delirium, where family involvement were significantly related to early exercise rehabilitation, minimizing noise, ensure family member presence.

Chapter 5: Discussion

This chapter's primary subjects were the study's analysis and the practical implementations of its significant findings. Furthermore, this chapter goes into great detail about the results, recommendations, and limitations.

Study Findings:

The primary goal of the study was to find out how much the ABCDEF bundle—and its complex significance in preventing delirium was understood and implemented by intensive care nurses in the West Bank, Palestine. The results from this study will primarily be compared to a worldwide study that was conducted using the same questionnaire tool that was used in this study.

The findings of the study will be broken down by the ABCDEF components. The first component is Assess, Prevent, and Manage Pain, the findings of the study showed that only 33.6% of critical care nurses used a protocol for paint treatment, when compared to the worldwide study done in 2017 showing that in total 62% of critical care nurses have a protocol for pain management, with highest average of respondents coming from North America (63%) (Morandi, Piva et al. 2017).

This study showed that on average Only (63.4%) of the respondents reported using a scale to evaluate pain. The Numerical Rating Scale (NRS) was determined to be the most extensively utilized pain scale (52.9%). Significantly, a study conducted in Jordan found that 89.7% of nurses employed instruments for assessing pain, with the numerical rating scale being the most often utilized tool (Hamdan, 2019). Another study showed that approximately 83% of respondents use a scale, and the most used is the Visual Analogic Scale at 54% (Morandi, Piva et al. 2017), this can be due to the different protocols that are implemented in different regions of the world.

Regarding the use of preemptive analgesia, only 23.1% of the respondents reported using preemptive analgesia before nursing procedures, and the preferred analgesics were paracetamol (89.6%),

fentanyl (66.4%), and morphine (62.7%). Although in the study of Morandi, et al., (2017) results showed only 56% % used preemptive analgesia before nursing procedures as well as the preferred analgesics were morphine (78%), fentanyl (79%), and paracetamol (69%) alone or in combination (Morandi, Piva et al. 2017). Ultimately, the West Bank has the same top 3 preferred analgesics as the rest of the regions that were included in the worldwide study, However, the findings indicate that preemptive pain management is still not a major part of therapy in the critical care units.

The second component of the ABCDEF bundle is Spontaneous Awakening Trials (SATs) and Spontaneous Breathing Trials (SBTs). According to study findings, 76% of respondents complete SATs every day, compared to just 65.7% who complete SBTs. Similar results are observed when compared to the global survey, which revealed that 59% of participants do daily SATs and 67% do daily SBTs (Morandi, Piva et al. 2017). Of the respondents of this study, 59.7% reported using the "wake up and breathe protocol," whereas 49% of the respondents worldwide reported using this approach (Morandi, Piva et al. 2017). The parallels seen in the outcomes of this component demonstrate that the intensive care units in the West Bank have evidently received training on the latest, most efficient protocols designed to enhance ICU treatment regimens.

The third component of the ABCDEF bundle is the Choice of Analgesia and Sedation, approximately 74% of respondents stated that they have used a sedation scale, and 50.7% of them reported the most commonly used scale is the Richmond Agitation Sedation Scale (RASS) to evaluate the level of arousal, whereas 28.4% of respondents reported using a sedation protocol. Compared to the study carried out in 2017, and showed 61% of participants stated that they most frequently used the Richmond Agitation Sedation Scale (RASS) to evaluate the level of arousal, as well as 65% reported using a sedation protocol (Morandi, Piva et al. 2017). By comparing the various research, it is possible

to conclude that ICU nurses now in the West Bank have a better understanding of sedation levels, but that sedation procedures/ protocols still need to be established.

Delirium, the fourth element of the ABCDEF bundle, is a condition for which 64% of respondents believe that 30% or less of ICU patients suffer from it. These findings are consistent with a global survey conducted in 2017. While 65% of ICUs were found to have implemented delirium monitoring, only 26.9% of respondents stated that there was no validated technique in place to test for delirium. Whereas 29.9% of respondents have checked for delirium at least once a day, 31% of respondents do not routinely monitor delirium. About 40% of participants in the global survey stated that they check for delirium at least once a day, with Asia having the greatest percentage (Morandi, Piva et al. 2017).

The (CAM-ICU) Confusion Assessment Method for the ICU was found to be the most chosen tool by 53% of respondents which is consistent with the study by Morandi et al., (2017) that showed 83% of respondents chose this tool. Regarding delirium monitoring, over 53% of respondents check for delirium, however, 74% would not investigate the causes or reasons for delirium incidence, in contrast, 74% of participants in the other study said they would look into the cause of delirium (Morandi, Piva et al. 2017). However, respondents did think that duration of stay in the intensive care unit (86.6%), length of stay in the hospital (76.1%), and mortality (50.7%) may all have an impact on delirium. According to 71.6% of respondents, they do not follow a process for managing delirium; a similar finding was observed in the global research, where 58% of respondents did not follow a protocol. Haloperidol is used by about the same percentage of responders (65%) in both trials to treat episodes of delirium. It is evident from the results that delirium still is understudied and that there is still a knowledge gap regarding treatment strategies and the most effective ways to prevent episodes from happening.

Early Mobility and Exercise make up the fifth component of the ABCDEF bundle. According to 53.0% of respondents, they regularly screen patients for ICU-acquired weakness (ICU-AW), and the majority (70.2%) said that mobilization was "prescribed." These findings were largely consistent with a 2017 study (Morandi, Piva et al. 2017). In contrast to the study of Morandi et al., (2017), where only one third of respondents (31%) reported having a mobility team consisting of a physical therapist (33%) or physical therapist and ICU nurses (17%), here in the West Bank 58.2% of respondents reported having a mobility team consisting of physical therapist and ICU nurses (42.3%) or physical therapist (30.8%).

Family involvement is the last element of the ABCDEF bundle. While the majority of respondents—88.1%—agreed that intensive care units are not often available to family visits for 24 hours a day, 63.6% of them stated that family visits are permitted for two to five hours each day. Comparably, 74% of respondents to the global survey said that family visits are permitted for two to five hours each day, while 65% of respondents claim that their unit is closed 24 hours a day for family visits. Over 50% of participants in both research projects said they explain delirium to family members (Morandi, Piva et al. 2017). Family engagement was substantially correlated with early exercise rehabilitation, minimizing noise, and ensuring family member participation. In general, measures to prevent delirium are more common when family members are involved.

According to the study's analyzed data, 35.1% of respondents were aware of the ABCDEF bundle as a whole. At Palestine Medical Complex (49.2%) and Rafidia Surgical Hospital (53.3%), there was a noticeable increase in the understanding of the bundle itself. The study found no significant correlation between the understanding of the ABCDEF bundle and the following factors: age, gender, education, ICU experience, number of ICU beds, percentage of ventilated patients, and nurse/patient ratio during working hours.

5.1 Conclusion

The current study's results indicate that there was a mean knowledge score deficiency among ICU nurses, which may have raised the risk of complications, hospitalization, death, and hospital expenses. The study's conclusions demonstrated that, on average, only 63.4 percent of respondents reported using a scale to assess pain, while only 33.6% of critical care nurses employed a strategy for treating pain.76% of respondents complete SATs daily, compared to just 65.7% who complete SBTs, according to study results. In addition, the most popular analgesics were morphine (62.7%), fentanyl (66.4%), and paracetamol (89.6%). Choice of Analgesia and Sedation is an additional third component of the ABCDEF bundle. A sedation scale was first used by about 74% of respondents.

5.2 Recommendations

In light of the main findings of the research, the study has suggested several recommendations that may help improve ICU nurses' knowledge, practice, understanding and competence toward ABCDEF bundle These recommendations specifically focus on three main domains; nurses' education and training, research and policymakers as follows:

First, education and Training:

- Nurses should undergo formal education and training on ABCDEF bundle; they can attend workshops, and seminars, or enroll in courses that are focused on ABCDEF bundle.
- Enhancing incorporate simulations and skills labs into the ICU nurse's training. These can help the ICU nurse practice ABCDEF bundle techniques in a controlled environment before performing them on actual patients.

Secondly, nursing research:

- Conduct more needs assessment to understand the specific challenges and gaps in knowledge and practices on delirium prevention in the hospital in Palestine through surveys, interviews and data collection from healthcare facilities, practitioners and patients.

Thirdly, policymakers:

- Decision-makers should develop appropriate guidelines and provide crucial data for developing clear guidelines and regulations.
- Legislating laws enhancing workforce development and quality improvement to ensure that healthcare providers have the capacity to meet these standards effectively.
- For decision- makers in The Ministry of Health to initiate the implementation of meticulously designed delirium management protocol. These protocols necessitate detailed documentation to ensure their consistent application on a daily basis.

5.3 Limitations

The study employed a questionnaire-based "self-reporting" approach, which may have limitations about the validity of the individual replies. Additionally, several participants from the same institution might mean that several of the replies are the same or similar. The study's small sample size of hospitals may not accurately represent all West Bank hospitals. Furthermore, given the political unrest and attacks on the West Bank during the period the data was collected, it's possible that some respondents were too overwhelmed by the volume of patients admitted to the intensive care units to fully read the questionnaire and give their best answers.

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Appendices:

Appendix A: Approval From Ministry of Health

State of Palestine
Ministry of Health
ation in Health and Scientific
Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي
والبحث العلمي

الرقـــم: [illegible]/٢٠٢٤
التـاريخ: ١١/٧/٢٠٢٤

عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،
ق. أ. الوكيل المساعد لشؤون المستشفيات والطوارئ المحترم،،،
تحيـة واحتـــرام،،،

الموضـــوع: تسهيل مهمة بحث

يرجى تسهيل مهمة الطالبة: **صابرينا مروان شلعوط – ماجستير تمريض العناية المكثفة**- الجامعة العربية الامريكية، بعنوان:

"Assessment of Knowledge of ABDCEF Bundle among all ICU nurses in major hospitals in the Palestinian Territories"

حيث ستقوم الطالبة بجمع معلومات عن طريق تعبئة استبانة الدراسة من قبل ممرضي وحدة العناية المركزة (بعد اخذ موافقتهم)، وذلك في:

-مجمع فلسطين الطبي

-مستشفى رفيديا - مستشفى الوطني - مستشفى عاليه

مع العلم ان مشرف الدراسة: د. عماد ابو خضر.
على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

دولة فلسطين وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

نسخة: عميد كلية المهن المساندة المحترم/ الجامعة العربية الامريكية

Appendix B Questionnaire Approval Request

Re: Survey used in study "Worldwide survey of ABCDEF bundle "

Alessandro Morandi <morandi.alessandro@gmail.com>
Tue 6/6/2023 7:23 PM
To: Sabrina Marwan Fadel Shalhout <s.shalhout@student.aaup.edu>
Cc: Simone Piva <simone.piva@unibs.it>

Dear Sabrina,

I'm glad to hear that you are working on this. Simone (cced) will send you the questionnaire. We kindly ask you to let us know if you are planning to to write a scientific article on your data and in this case Simone and I would be glad to help you and your group with the paper drafting and editing as coauthors.

Thanks

Il giorno lun 5 giu 2023 alle ore 21:08 Sabrina Marwan Fadel Shalhout <s.shalhout@student.aaup.edu> ha scritto:

> Good evening,
> My name is Sabrina Shalhout, from the Palestinian Territories, a master student in the intensive care nursing program at Arab American University
> I am messaging about your study
> "Worldwide survey of ABCDEF bundle "
>
> Will it be possible if you can send me the questionnaire that was used in this study, and allow access to me as a reference, I am planning on doing a similar study in my area and would greatly appreciate the help
>
> Thank you for your cooperation and time
> Sabrina Shalhout
>
> Get Outlook for iOS
>
> Get Outlook for iOS

Appendix C: Questionnaire

A cross sectional study: Assessing the knowledge of ICU nurses on the ABCDEF Bundle on preventing Delirium in Governmental hospitals in the Palestinian Territories

Dear participant,

Oversedation, immobility, and delirium have serious implications for critically ill patients who are on mechanical ventilation. The ABCDEF bundle has been proposed to reduce these conditions and improve patient outcomes. However, no survey has been carried out in the Palestinian territories in order to understand the ABCDEF application and knowledge. Our main focus is to explore the knowledge about the ABCDEF bundle. The survey follows the ABCDEF bundle structure: Assessment, Prevention and Management of Pain *(4 questions);* Spontaneous Awakening Trials (SAT) & Spontaneous Breathing Trials (SBT) *(3 questions);* Choice of Analgesia and sedation *(4 questions);* Delirium: Assessment, Prevention and Management *(11 questions)*; Early Mobility and Exercise (*3 questions)*, Family Engagement and Empowerment (*6 questions),* for a total of 31 questions. It should take no more than 15 minutes to complete the survey. Your participation is voluntary and your responses will remain anonymous. Completion of the survey implies consent to use the responses/data for this research study.

Thank You for Your Participation 😊

There are 42 questions in this survey

General Information

What is your age?

Please write your age here:_____

What is your Gender?

○Male ○ Female

Level of Education?

○Diploma (2 years) ○ Bachelor's Degree (4 years) ○ Master's Degree

How long have you been working in the ICU? *

○<5 yrs. ○5-10 yrs. ○11-20 yrs. ○>20 yrs.

What is the numbers of beds in your ICU? *

○<10 ○10-20 ○ >20

What is the average length of ICU stay (days)?

○1-2 days ○3-5 days ○ >5 days

What is the proportion of mechanically ventilated patients? *

○<50% ○51-70% ○>70% ○Not available

What is the nurse: patient ratio during the day? *

○1:1 ○1:2 ○1:3 ○1:4

What is the nurse: patient ratio at night? *

○1:1 ○1:2 ○1:3 ○1:4

Introduction

Have you implemented the Pain, Agitation, Delirium (PAD) guidelines in your unit? *

○Yes ○No

Do you know the Awakening and Breathing Coordination, Delirium monitoring/management, Early exercise/mobility, and Family (ABCDEF) bundle? *

○Yes ○No

Assess, Prevent and Manage Pain

Do you use any scale to evaluate pain in your unit? *

○Yes ○No

*******If yes, which of the following scales do you use? *******

Please choose **all** that apply:

☐The Critical Care Pain Observation Tool (CPOT) ☐BPS (Behavioral Pain Scale)

☐NRS (Numeric Rating Scale) ☐VAS (Visual Analogue Scale)

☐Faces Pain Scale ☐NVPS (Non-Verbal Pain Scale)

Do you use any kind analgesia before invasive nursing procedures (venipuncture, mobilization, etc...)? *

○Yes ○No ○At the nurse's discretion

Do you use protocols for pain treatment in your unit?

○Yes ○No

What drug do you use for pain treatment? * Please choose all **that apply:**

☐Fentanyl ☐Morphine ☐Remifentanil ☐Paracetamol

☐NSAIDs (Nonsteroidal anti-inflammatory drugs) ☐Other:

Spontaneous Awakening Trials (SAT) & Spontaneous Breathing Trials (SBT)

Do you perform daily SAT (Spontaneous Awakening Trials)? *

○Yes ○No

****If yes, how many times do you perform SAT (Spontaneous Awakening Trials) during the day?**

○Every nurse's shift ○Once a day ○As many times as possible ○ Other

Do you perform daily SBT (Spontaneous Breathing Trials)?

○Yes ○No

Do you have a "wake up and breathe" protocol? *

○Yes, we have our own protocol ○No

If yes, who perform SAT (Spontaneous Awakening Trials)/SBT (Spontaneous Breathing Trials) coordination? *

Only answer this question if the following conditions are met:

☐M.D. ☐Nurse on M.D. order ☐Respiratory therapist ☐Other:

Choice of Analgesia and Sedation

Which sedation scale do you use in your unit?

○SAS (The Riker Sedation-Agitation Scale) ○RASS (The Richmond Agitation-Sedation Scale)

○Ramsay scale ○None ○Other

Do you follow protocols for sedation in your unit?

○Yes ○No

In restless and agitated patient who screened positive at delirium assessment, how do you approach the sedation strategy after clinical evaluation? *

Please choose **only one** of the following:

○Sedation first --> pain management --> goal-directed delivery of psychoactive medications

○Pain management first --> goal-directed delivery of psychoactive medications --> sedation

○Goal-directed delivery of psychoactive medications --> pain management --> sedation

○Goal-directed delivery of psychoactive medications --> sedation --> pain management

○Pain management first --> sedation --> goal-directed delivery of psychoactive medications

○None of the above

Other

In a restless and agitated patient who screened positive at delirium assessment, how would you continue the sedation strategy (please rank the drugs in order of priority)?

Please number each box in order of preference from 1 to 6 (max 4 answers)

Propofol

Benzodiazepines

Dexmedetomidine

Haloperidol

Atypical antipsychotic

Others

Delirium: Assess, Prevent and Manage

Do you routinely monitor delirium in your unit? *

○Yes, once a day ○Yes, more than once a day ○No, never

Which tools do you routinely use to assess delirium? *

☐ The Confusion Assessment method for the ICU (CAM-ICU)

☐ Intensive Care Delirium Screening Checklist

☐None ☐Other:

Who performs delirium assessments in your unit? *

☐M.D. ☐Nurse ☐Resident ☐None

Do you generally investigate the potential causes of delirium in your patients? *

○Yes ○No

In your experience, how many patients have delirium in your ICU? *

○0-10% ○11-30% ○31-60% ○>60%

Do you think delirium could have an impact on: *

Please choose **all** that apply:

☐Mortality ☐ICU length of stay ☐Hospital length of stay

☐ICU costs ☐Family burden ☐Cognitive impairment following critical Illness

According to your opinion, which of the following measures can prevent delirium? *

Please choose **all** that apply:

☐Awakening and breathing trial coordination ☐Early exercise rehabilitation

☐Nonpharmacological intervention to regulate sleep/wake cycle ☐Minimizing noise

☐Sleeping medications/Antipsychotics ☐Pain management

☐Minimizing physical restraints and catheter use ☐Ensure family member presence

None of them

Do you use non-pharmacological interventions to promote sleep in your unit? *

Please choose **all** that apply:

☐Light optimization ☐Optimization of drugs timing administration

☐Noise reduction during the night ☐Other:

Do you use drugs to promote sleep in your Unit? *

○Yes ○No

If yes, please rank the drugs you use in order of frequency.

Please number each box in order of preference from 1 to 4

Benzodiazepines Overnight Propofol infusion

Haloperidol Melatonin

Others

Do you use protocols for the management of delirium? *

○Yes ○No

How do you use haloperidol to manage delirium in your unit? *

Please choose **all** that apply:

☐Treatment of episode of delirium ☐Prevention of delirium

☐To minimize the use of sedatives ☐Other:

Early Mobility and Exercise

Do you evaluate ICU-acquired muscle weakness in your Unit? *:

○Yes ○No

Do you prescribe early mobilization to your patients? *

○Yes ○No ○Only in non-ventilated patients

Do you have a dedicated mobility team in your ICU? *

○ Yes ○ No

If yes, who is part of the mobility team? *

Please choose **all** that apply:

☐ Physical therapist ☐ Occupational therapist ☐ Respiratory therapist

☐ Nurse ☐ Other:

Family Engagement and Empowerment

Is your unit open 24 hours per day to family members visit? *

○Yes ○No

If no, how many hours is your unit open to family members visit per day? *

○1-2 hours per day ○ 2-5 hours per day ○ >5 hours per day

Do you generally explain to family members what delirium is? *

○Yes ○No

Do you use booklets or training material to improve delirium knowledge among family members?

○**Yes** ○**No**

Do you involve family member in the delirium management? *

○Yes ○No

Do you use dedicated staff for managing the relationship with family members? *

○Yes ○No

Thanks for your participation and completing this survey

Appendix D: Institutional Review Board (IRB) Approval

Arab American University- Palestine
Deanship of Scientific Research
IRB committee
Tel: 04-241-8888, ext 1196
E-mail: irb.aaup@aaup.edu

الجامعة العربية الامريكية- فلسطين
عمادة البحث العلمي
لجنة أخلاقيات البحث العلمي
تلفون: 1196 ext 04-241-8888
البريد الالكتروني: irb.aaup@aaup.edu

IRB Approval Letter

Study Title: "The effectiveness of an educational program on the ABCDEF Bundle on nursing knowledge prevention of Delirium in Intensive Care Units in Palestine Medical Complex in Ramallah, Palestine"

Submitted by: Sabrina Marwan Shalhout

Date received: 09th April 2023

Date reviewed: 1st May 2023

Date approved: 1st May 2023

Your Study titled **"The effectiveness of an educational program on the ABCDEF Bundle on nursing knowledge prevention of Delirium in Intensive Care Units in Palestine Medical Complex in Ramallah, Palestine"** With archived number 2023/A/73/N was reviewed by the Arab American University IRB committee and was approved on 1st May 2023.

Reham Khalaf-Nazzal, MD, PhD
IRB committee chairman
Arab American University of Palestine

General Conditions:
1. Valid for 4 months from date of approval.
2. It is important to inform the committee with any modification of the approved study protocol.
3. The committee appreciates a copy of the research when accomplished.

Appendix E: Authorizations from the Palestinian Ministry of Health

State of Palestine
Ministry of Health
ation in Health and Scientific Research Unit

دولة فلسطين
وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

الرقـــم: ١٣٦٤/١٣٤٧/٢٠٢٢
التـاريخ: ١١/٧/٢٠٢٢

عطوفة الوكيل المساعد لمجمع فلسطين الطبي المحترم،،،
ق. أ. الوكيل المساعد لشؤون المستشفيات والطوارئ المحترم،،،
تحيـة واحتـرام،،،

<u>الموضـــوع: تسهيل مهمة بحث</u>

يرجى تسهيل مهمة الطالبة: **صابرينا مروان شلعوط – ماجستير تمريض العناية المكثفة**- الجامعة العربية الامريكية، بعنوان:

"Assessment of Knowledge of ABDCEF Bundle among all ICU nurses in major hospitals in the Palestinian Territories"

حيث ستقوم الطالبة بجمع معلومات عن طريق تعبئة استبانة الدراسة من قبل ممرضي وحدة العناية المركزة (بعد اخذ موافقتهم)، وذلك في:

-مجمع فلسطين الطبي

-مستشفى رفيديا - مستشفى الوطني - مستشفى عاليه

مع العلم ان مشرف الدراسة: د. عماد ابو خضر.
على ان يتم الالتزام بالمحافظة على اخلاقيات البحث العلمي وسرية المعلومات.
على ان يتم تزويد الوزارة بنسخة PDF من نتائج البحث، التعهد بعدم النشر لحين الحصول على موافقة وزارة الصحة.

مع الاحترام،،،

د. عبد الله القواسمي
رئيس وحدة التعليم الصحي والبحث العلمي

دولة فلسطين وزارة الصحة
وحدة التعليم الصحي والبحث العلمي

نسخة: عميد كلية المهن المساندة المحترم/ الجامعة العربية الامريكية

Appendix F: Informed Consent from Participants

Informed Consent

I, ... *(Name of Participant / optional)*
hereby
agree to take part in the clinical research questionnaire study specified below:

Title of Study: A cross sectional study Assessing the Knowledge of ICU nurses on ABDCEF Bundle in governmental hospitals in the Palestinian Territories

The nature and purpose of which has been explained to me by Sabrina Shalhout, and interpreted by him to the best of his/her ability in English.

I have been told about the nature of the research in terms of methodology, possible adverse effects and complications (as per Participant Information Sheet).
After knowing and understanding all the possible advantages and disadvantages of this research, I voluntarily consent of my own free will to participate in the clinical research specified above. I understand that I can withdraw from this research at any time without assigning any reason whatsoever.

Date: ……...……. ….. **Signature:** ……..……

(Participant)

IN THE PRESENCE OF:

Name: ……...……

Designation: Signature: ……..……

(*Witness for Signature of Participant)*

I confirm that I have explained to the patient the nature and purpose of the above-mentioned research.

Date: …… Signature: …….

دراسة مقطعيه لتقييم معرفة ممرضات وحدة العناية المركزة بحزمة ABCDEF في المستشفيات الحكومية في الضفة الغربية في الأراضي الفلسطينية

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الخلاصة

الأهداف: يهدف هذا التحقيق إلى تقييم مستوى معرفة ممرضات العناية المركزة بحزمة ABCDEF بالإضافة إلى فعاليتها في منع الهذيان. تتضمن حزمة ABCDEF تقييم وإدارة الألم(A) ، وتجارب الصحوة والتنفس التلقائية (B)، واختيار التخدير(C) ، ومراقبة الهذيان وإدارته(D) ، والحركة \التنقل المبكر(E) ، ومشاركة الأسرة(F) **التصميم:** تم إجراء البحث كدراسة شاملة مقطعية بين جميع الممرضات المؤهلات في وحدات العناية المركزة في المستشفيات الحكومية الكبرى في الأراضي الفلسطينية لتقييم مستوى المعرفة بحزمةABCDEF .

الطرق: تم استخدام تصميم مقطعي وصفي كمي لهذه الدراسة بحيث تم توزيع استبيان منظم يحلل عناصر الحزمة على 134 من موظفي تمريض العناية المركزة في المستشفيات الحكومية الرئيسية في الأراضي الفلسطينية (رام الله ونابلس والخليل) لتقييم مستوى معرفة تمريض العناية المركزة بهذه الحزمة وأهميتها. تم توزيع الاستبيانات وشرحها

وجمعها بعد التوقيع على استمارة الموافقة من قبل المشاركين وتم تطبيق إحصاءات وصفية واستدلالية باستخدام SPSS v25

النتائج: كان هناك 134 مستجيبًا من 4 مستشفيات حكومية في منطقة الضفة الغربية، 56.7٪ من المستجيبين نفذوا إرشادات PAD، في حين أن 35.1٪ فقط من المستجيبين كان لديهم معرفة بحزمة ABCDEF بدرجات متفاوتة عبر المستشفيات. وقد كانت المعرفة بحزمة ABCDEF أعلى لدى كل من ممرضين العناية المركزة الذين يستخدمون نسبة ممرض: مريض 1: 1/3: 4 (على التوالي)، حيث 3:1 نسبة التمريض /المرضى خلال النهار و1: 4 نسبة التمريض /المرضى في الليل، وكذلك كانت اعلى للمرضى الذين لديهم متوسط مدة إقامة أعلى.

الاستنتاجات: يجب تطوير التدخلات من قبل صانعي السياسات ومديري المستشفيات لزيادة وعي ممرضات العناية المركزة بحزمة ABCDEF وكيف يمكن استخدامها في وحدة العناية المركزة لمنع وعلاج الهذيان. وينبغي إجراء بحوث في المستقبل بشأن هذه الحزمة، فضلا عن تنفيذها في المستشفيات الفلسطينية.

الكلمات الرئيسية: ممرضات العناية المركزة، حزمةABCDEF ، المعرفة، وحدة العناية المركزة(ICU) ، الهذيان، إدارة الألم