An-Najah National University

Faculty of Graduate Studies

PREVALENCE AND RISK FACTORS OF DELIRIUM IN CRITICALLY ILL PATIENTS AT HOSPITALS IN THE NORTH OF WEST BANK

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Dedication

الحمد لله رب العالمين.. الحمد لله ملئ السماوات والأرض وفي السراء والضراء حمدا طيبا مباركا..

لن تسعفني كل كلمات الكون كي أزجيها من نبض القلب إلى شغاف روحك في الأبدية لأهدي إليك ثمرة علمي الذي كنت له الملهم الأول في الحضور وبعد الغياب.. أمي الحبيبة لترقدي بسلام فقد أديت الرسالة وكنت العون لنا ولوالدي الحنون في مسيرة علمنا وأدبنا ونجاحنا.. لروحك أهدي عملي هذا..

إلى من دعموني وكانوا لي خير السند في مسيرتي الدراسية أخي الغالي وأخواتي وزوجي وأخص بالذكر ابن شقيتي أحمد.

إلى من قدموا لي المعرفة بكافة أصنافها من المدرسين والإخصائيين والإداريين وزملاء العمل في قسم العناية المكثفة بالمستشفى الإنجلي بنابلس.

إلى زملاء وزميلات الدراسة وكل من وضع بصمة جميلة أقدرها عاليا وأسجلها وسام شرف على صدري.

ولكل طالب علم أمضى ذؤابة حياته باحثا مجدا ومجتهدا يسعى لكسب المعرفة والاستزادة منها اضع بحثي هذا بين يديكم..

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نهى حلمي محمود سليمان

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I need to thank all for help me to end this thesis.

Declaration

I, the undersigned, declare that I submitted the thesis entitled:

PREVALENCE AND RISK FACTORS OF DELIRIUM IN CRITICALLY ILL PATIENTS AT HOSPITALS IN THE NORTH OF WEST BANK

I declare that the work provided in this thesis, unless otherwise referenced, is the researcher's own work, and has not been submitted elsewhere for any other degree or qualification.

Student's Name: _____

Signature: _____

Date: _____

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PREVALENCE AND RISK FACTORS OF DELIRIUM IN CRITICALLY ILL PATIENTS AT HOSPITALS IN THE NORTH OF WEST BANK

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ABSTRACT

Background: Delirium is a very common issue in acute hospital settings, notably those admitted to the intensive care unit (ICU). This study was conducted to estimate the prevalence of delirium among patients admitted to the ICU in hospitals in the north of West Bank. The study also assessed the characteristics of the patients who were more likely to develop delirium.

Methods: This study was conducted in a descriptive analytical design. Patients admitted to the ICU of Rafidia, Al-Watani, Al-Itthad, Al-Arabi, Nablus-Surgical, An-Najah and Sant-Luke's hospitals were assessed for delirium using the confusion assessment method.

Results: A total of 100 ICU patients were included in this study. The prevalence of delirium among the ICU patients was 55%. Of the patients, 20% had hypoactive, 20% had hyperactive, and 14% had mixed type. Age and income were significantly associated with delirium. Additionally, pain, receiving high flow nasal cannula, general anesthesia, and antiepileptic drugs were significantly associated with experiencing delirium in the ICU. There was a significant association between the Richmond Agitation Sedation Scale score and delirium among the patients in this study.

Conclusion: Delirium was highly prevalent among critically ill patients admitted to the ICUs in northern Palestinian hospitals. Providers of intensive care services should consider screening patients who are elderly, have low income, fever, use high flow nasal cannula, be in a prone position, use feeding tube/nasogastric tube/ percutaneous endoscopic gastrostomy, general anesthesia, and receive antiepileptic drugs for delirium. More studies are still needed to determine the best ways to address delirium among critically ill patients who are admitted to the ICUs.

Keywords: Delirium, intensive care, critical care, CAM-ICU, monitoring.

Chapter One

Introduction and Theoretical Background

1.1 Introduction

According to the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (DSM-5), delirium is defined as fluctuating changes in focus, memory, and cognition that develop over hours to days (1). Delirium is a major concern in the intensive care unit (ICU) because patients admitted to the ICU have a higher number of risk factors compared to non-ICU patients (2). Delirium has acute onset and fluctuating pattern. It can also be described as inattention, diminished memory, and cognitive disorder (3). In hospitalized patients, delirium is considered as a negative prognostic factor which often leads to longer hospital stays and higher mortality rates (4).

Delirium is a very common issue in acute hospital settings (5). According to some studies, the prevalence of delirium was about 20% (5-10). In ICU settings, studies have shown that delirium was highly prevalent (ranging from 11% to as high as 87%) (11, 12). According to some estimates, delirium affects as high as 80% of patients in the emergency department (ED) and about 70% of those seeking end-of-life care (13). These high prevalence rates were attributed to the presence of many risk factors among the patients admitted to the ICU, ED, and those admitted to long-term care facilities.

It is noteworthy mentioning that delirium could be largely invisible and often goes unrecognized in different clinical settings including the ICU. Previous studies have estimated that 33% to 72% of delirium often remain unrecognized or undetected (12, 14). Additionally, patients in the ICU might also acquire delirium. This ICU-acquired delirium and unrecognized or undetected delirium can further worsen prognosis, increase mortality rates, duration of hospital stay, and institutionalization among the patients admitted to the ICU (11, 14). According to some studies, patients with delirium in the ICU have less than 6 months survival compared to patients without delirium (8). This could be especially true when patients with delirium do not receive adequate care. Therefore, there has been many calls to precent delirium and improve care of patients with delirium (14).

Symptoms of delirium include acute onset, waxing and fading, inattention, shifts in cognition, and altered level of consciousness (4). In the ICU and ED, physicians would attempt to rule out life-threatening causes like hypoxia, hypoglycemia, stroke, or acute myocardial infarction as soon as possible. Once these life-threatening conditions have been ruled out, a detailed medical history and physical examination should be done to rule out any other possible causes (15).

According to some estimates, the number of people over 60 years old in developing countries will rise significantly in the near future. This will pose new challenges in diagnosing patients with delirium superimposed on dementia (DSD). A recent systematic review with meta-analysis identified older age, dementia, hypertension, pre-ICU emergency surgery or trauma, Acute Physiology and Chronic Health Evaluation II (APACHE-II) scores, mechanical ventilation, metabolic acidosis, delirium the day before, and coma as risk factors for developing delirium (16). The systematic review also showed that delirium affected the outcomes of the patients like mortality, cognitive impairment, longer durations of mechanical ventilation, and long stay in ICU (16).

The pathophysiology of delirium is not fully understood, and a number of different pathogenic mechanisms can cause the condition to occur. Current research indicated that drug toxicity, inflammation and acute stress responses may all significantly contribute to neurotransmission disruption and, eventually may lead to delirium (7). The production, release, and inactivation of neurotransmitters that typically regulate cognitive function, actions, and mood, delirium was theorized as a neurobehavioral manifestation of imbalances (8). The underlying medical triggers are almost always activated and are also accompanied by abnormal enthusiasm and perceptual disturbances (5). Studies have shown that delirium is often misdiagnosed, detected late or ignored throughout the healthcare setting in more than 50% of the patients (11).

Several approaches for the diagnosis of delirium in ICU patients have been developed and validated. Among these approaches, the Intensive Care Unit Confusion Assessment method and the Intensive Care Delirium Screening Checklist (ICDSC) are the most commonly used tools for this purpose (17). Of the two methods, the confusion assessment method is the most widely used delirium diagnosis tool (11). The confusion assessment method has a sensitivity of 93% and specificity of 85%, as well as good inter-rater reliability as shown by data from multiple studies (2). Additionally, the

confusion assessment method was validated among both mechanically ventilated and non-mechanically ventilated patients (18). Early identification is important in the treatment of delirium. The confusion assessment method should be used to screen patients for delirium on a regular basis, according to ICU guidelines (19).

Delirium can come in three forms: hyperactive, hypoactive, and a mixed type delirium. Patients with hyperactive delirium experience increased arousal, restlessness, agitation, and irritability. Patients with hypoactive delirium become withdrawn, lethargic, and quiet. Patients with mixed delirium exhibit a blend of hyperactive and hypoactive delirium (20).

Nurses play a critical role in detecting delirium in patients. Nurses can be the first to detect a difference in a patient's baseline awareness since they provide round-the-clock bedside treatment. Nurses must be aware of the effects of delirium on patient care and outcomes. When compared to patients who do not have delirium, patients with delirium are more likely to have a bad outcome (21).

Nurses can play a key role in delirium screening because they are not only in the regular and close contact with patients, but they also have a better chance of identifying even mild delirium changes in patients by comprehensive examination and evaluation (22). Nurses are key caregivers, and they are in the best position to diagnose, avoid, and manage delirium as part of routine patient care. Therefore, nurses play a critical role in recognizing and diagnosing postoperative delirium (23).

1.2 Definitions

1.2.1 Theorical definition of delirium

Delirium is a condition that is defined by the DSM-5 as an acute onset of a fluctuating disturbance in one or more of the following cognitive functions: attention, environmental memory, cognition, and/or perception. Patients with sleep/wake cycle disruptions, mental lability, hallucinations, or delusions are more likely to experience delirium (24).

1.2.2 Operational definition of delirium

Delirium can be assessed using the confusion assessment method. The confusion assessment method was originally developed in 1988-1990, to improve the identification and recognition of delirium. The confusion assessment method was intended to provide a new standardized method to enable non-psychiatrically trained clinicians to identify delirium quickly and accurately in both clinical and research settings (25). The confusion assessment method is an excellent diagnostic tool for delirium in critically ill ICU patients (17). The test follows a detailed protocol; and with adequate training, it can be administered by any member of the ICU staff (26). The confusion assessment method diagnostic algorithm is based on four cardinal delirium features: 1) acute onset and fluctuating course, 2) inattention, 3) disorganized thought, and 4) altered consciousness level. A confusion assessment method diagnosis of delirium includes traits 1, 2, and either 3 or 4 to be present (27).

1.3 The concept of delirium

By the late 19th century, with signs of impaired focus, vision, restlessness, incoherent expression, and delusions, the concept of delirium had been known as a temporary condition of intellectual cognitive function (28).

For almost 2000 years, the word "delirium" has been used. "Delirium" is originally derived from the Latin meaning "to go wrong" or to be off the path." It was first used to characterize mental illnesses by Aulus Cornelius Celsus, who was a great medical writer who lived between 25 BC and 50 BC (10).

The development of delirium has been researched and identified by Lipowski as a psychiatric illness and commented on the terminological chaos that has characterized its history from ancient times until today In Hippocratic writings, especially in the books of Epidemics, there are many descriptions of what we would recognize as delirium. The term phrenitis was used by these writers to refer to the transient mental disorder associated with physical illness, characterized by restlessness, insomnia and mood disorders, and perception (28).

The coexistence of symptoms from multiple domains requires both the DSM-IV-TR and ICD-10 diagnostic criteria for delirium (29).

In DSM-IV, delirium was substituted by disturbed attention, reflecting the conceptualization of delirium as an attentional disorder. Consciousness clouding is however, retained in the ICD-10 diagnostic criteria for delirium research (28).

There has been no systematic analysis of thinking in delirium, as Lipowski has noted, but some writers have concentrated on delirium as a disturbance of the train of thought due to impaired consciousness (28).

1.4 Clinical subtypes of delirium

Hypoactive delirium is associated with worse results than hyperactive or mixed delirium, the authors logically hypothesized. Their reasoning is that the hypoactive subtype is sometimes underrecognized, with the consequence that the cause of delirium is delayed (30).

Patients with hypoactive delirium appear lethargic and drowsy, respond slowly to questions, do not initiate movement, and are likely to be misdiagnosed as depressed, whereas patients with hyperactive-hyperalert are restless and agitated, with sympathetic nervous system overactivity. In consideration of the fact that many patients encounter aspects of both in short time periods, a third "mixed" category was introduced (30).

For cases of hypoactive delirium, misdiagnosis and delayed identification of delirium may be more important, where symptoms can easily be confused with those of depression (20).

Until incorporating a new 'mixed' category to account for patients who encounter aspects of both within short time periods, Lipowski proposed 'hyperactive' and 'hypoactive' trends, marked by increased and decreased motor activity, respectively .Before adding a third 'mixed' category to account for patients who experience elements of both within short time frames, Lipowski proposed 'hyperactive' and 'hypoactive' patterns, characterized by increased and decreased motor activity, respectively (31).

It was the first to describe 'hyperactive' and 'hypoactive' delirium subtypes, and later added a third 'mixed' category in recognition that in short time frames, many patients experience elements of both. Later researchers added another subtype,' no or no' subtype, to the three subtypes above (32).

1.5 Clinical feature of delirium

Delirium is a dangerous illness that is frequently related to extreme acute and long-term complications. Delirium may be regarded as "acute brain failure" according to Inouye et al. (2014), representing the ability of the brain to withstand external influences (25). Supportive delirium characteristics include sleep-wake cycle and awareness disturbances (hallucinations or illusions), delusions, and behavioral disturbances (33).

Studies were concerned in investigating the delirium in adult patients in ICU, like the one which was conducted by Rieck, Pagali, and Miller (2020), who found that it may be associated with several consequences, for example, poor functional and cognitive outcomes, longer length of stay (LOS), or death (34). They also found an interesting and significant management strategies, which are the non-pharmacological methods of delirium management, which are associated with 40% reduction in delirium incidence, and the use of antipsychotics is still not highly supported. A major surveillance project named 'Delirium Day' was undertaken by the Italian Delirium Research Group on September 30, 2015, which was the first national point prevalence study to measure delirium in older adults who were admitted to acute and recovery hospital wards across Italy and used the 4AT for identification of delirium (35).

1.6 Risk factor of delirium

The different factors that contribute to delirium can be divided into two categories: vulnerability or predisposing factors and precipitating or etiological factors. The manifestation of delirium is determined by the interaction of risk and precipitating factors. Patients with a high risk of developing delirium may only need mild precipitating factors, while patients with a lower risk of developing delirium may need more or serious precipitating factors (9).

The duration of stay in the ICU prior to admission was found to be a factor in the development of delirium. The risk of delirium rose by 26% per day based on the duration of stay before it was included as a risk factor. Internal medicine patients have a greater chance of experiencing delirium than surgical patients (36).

To give patients the best chance of recovery, early detection of delirium, accompanied by rapid diagnosis and treatment of all existing precipitating factors, is critical. To this end, it's critical to understand which of the most common precipitating factors are (36).

Two recent systematic reviews and meta-analyses identified risk factors (e.g., advanced age, dementia, hypertension, pre-ICU emergency surgery or trauma, mechanical ventilation, metabolic acidosis, delirium the day before, and coma) as well as outcomes (e.g., coma) (i.e., increased mortality, cognitive impairment; longer durations of mechanical ventilation and longer lengths of stay in the ICU) (16).

Delirium is almost often multifactorial, resulting from a combination of predisposing and precipitating causes. Some predisposing factors, such as age, gender, addiction, pre-existing cognitive disability, and pre-existing cardiac and pulmonary disease, are unchangeable. Environmental and acute illness causes such as no visible daylight, no clock, no visits, sedation, increased length of stay, fever, discomfort, tubes and catheters are all modifiable (6).

1.7 The confusion assessment method

The confusion assessment method for the ICU patients is a well-developed tool for the assessment and diagnosis of delirium, and needs a practiced health care personnel to perform it on the patient. It assesses four patient's characteristics, which are acute changes or fluctuation in consciousness state, inattention, changes in the level of consciousness, and thinking disorder. The positive diagnosis is upon the finding of the first and second characteristics, with either the third or fourth one (37).

The confusion assessment method was developed and modified in to different versions regarding the specific situation and need, including 4AT tool, 3-minute diagnostic CAM (3D CAM) and Brief CAM (b-CAM), among others. Nurses, as the first line in the assessment and diagnosis of patients' neurological system, should have the adequate level of knowledge and practical experience in the application of neurological assessment tools, including the confusion assessment method (34), and one of the recent studies in Malaysia concluded a significant correlation between educational interventions and the increased level of knowledge about the application of confusion assessment method in the assessment of proper neurological conditions among ICU patients. The study also investigated for the main barriers that nurses may have that hinder their implementation of delirium assessment, and the first reason was that physicians do not use their assessment in their decision making, followed by the difficulty to interpret the assessment data in intubated patients, and then the complexity

of delirium assessment tools. Other reasons included decreased confidence in the implementation of delirium assessment tools and the inability of nurses to document the delirium adequately (38).

One of the most recent studies that used confusion assessment method among the assessment tools for delirium was conducted in France on a sample of 140 COVID-19 patients using a cohort analysis of the patients in ICU between the period of March 3 and May 5, 2020. Main results showed that delirium was diagnosed in 79.5% of ICU patients using confusion assessment method, with 18.6% of them had delirium at the admission time, and the rest of patients had delirium at least once during their staying in the ICU. Results also showed that delirium is associated with significantly longer LOS, which ranged between 6 and 21 days in non-delirium patients compared with 11 to 25 days foe delirium patients (p-value = 0.017). The study also concluded that the COVID-19 itself may be a factor that increased the incidence of ICU delirium, and thus, a recommendation for similar studies is to compare the incidence of delirium using confusion assessment method between COVID-19 patients and other patients (39).

Studies were also concerned in the assessment of the most factors associated with delirium using confusion assessment method in different settings and medical conditions. For example, one study recruited 332 patients (48 of them were unable to be assessed due to prolonged coma and language barriers), 74 (26.1%) of them are delirious. The significant difference between delirious and non-delirious patients was found to be higher in patients with trauma and medical cases, compared to surgical cases (p-value < 0.001). Also, higher patient's age, gender, the use of sedation and vasopressors and the mechanical ventilation are associated with higher delirium risk, and higher delirium incidence is associated with longer ICU days and mortality. Another study used the case-control approach, and investigated the most common risk factors associated with delirium in ICU patients, with the control of patients characteristics between delirious and non-delirious patients, and found hat that the incidence of delirium is significantly related to mechanical ventilation (90.8% of delirious vs 74% of non-delirious patients, p-value <0.001), the use of sedatives (87.7% vs 64.7%, p-value < 0.001), length of ICU stay (6-15 days vs 4-10 days, p-value < 0.001) and physical restrain use (95.1% vs 73%, p-value < 0.001). The researchers also found that length of ICU stay of 7 days or more is associated with 3.6 times risk of

developing delirium, where physical restrain is associated with 3.7 times risk of delirium, and sedative is associated with 2.2 risk of developing delirium (19).

1.8 Reviews of the confusion assessment method in the literature

Although some studies stated that the confusion assessment method may not be suitable for using in some settings and under specific circumferences (40), it is still widely used. In this part, a review of the use of the confusion assessment method is done, with the focus on the comparison with other delirium assessment tools and how the confusion assessment method may have more advantages over them, which will result in stating the validity of its use.

A prospective study was conducted to investigate the sensitivity and specificity of the confusion assessment method and another tool compared to traditional neurological assessment tool held in critical care unit of stroke and neurological diseases in a single center in Germany. The sensitivity is the proportion of cases that are positively diagnosed with both the new tool (the confusion assessment method in this case) and the traditional tool (Richmond Agitation and Sedation Scale, RASS), while specificity is the proportion of cases that were diagnosed as absence of the disease by both tools, so in some cases, diagnosis of delirium could be found in the new tool but not in the old tool (called false positive), or in the old tool but not in the new tool (called false negative). The sample was 123 neurological patients in the targeted setting over one month. According to RASS tool, 18.7% of the patients were diagnosed with delirium, and the confusion assessment method had a sensitivity of 66.9% and a specificity of 93.3%, with no significant difference with the other new tool. In conclusion, new tools (the confusion assessment method and the other tool) are not significantly different in their diagnosis, but need to be more specific, by developing other tools, as the study found that sensitivity and specificity of the confusion assessment method is associated with the presence of neurological deficits (41). Another study that was conducted to investigated the same purpose. This study is more powerful because it was conducted using a systematic review approach, and included 29 articles about the confusion assessment method. The main result indicated that the pooled sensitivity is 84% and specificity is 95%, when compared to the other tool, so the review concluded that the confusion assessment method has more accuracy in diagnosing the absence of the delirium (p-value = 0.04). Moreover, the review found that the accuracy of the tools is significantly

affected by ICU type, patient's No gender, the presence of hypoactive delirium and the use of mechanical ventilator (42).

Another retrospective study was conducted to investigate the association between consciousness fluctuation and the confusion assessment method assessment in stroke patients when compared to other patients (sepsis in this study). The study also used RASS tool as a traditional tool to compare results. The study found that the confusion assessment method has a higher rate of "unable to assess" findings when compared to RASS (less specificity), and so post-stroke delirium may be undetected using the confusion assessment method, especially in cases of consciousness fluctuation (43). In other settings, some studies found that the confusion assessment method has a very high sensitivity of 100%, a specificity of 98%, a positive predictive value of 92% and a negative predictive value of 100%, and that it has a diagnosis rate of delirium three folds higher than the traditional neurological assessment methods in Emergency Departments (ED), and these results were found in Netherlands on a sample of 70 years old and older patients (490 patients using the traditional method, delirium found in 3%, and 478 patients using the confusion assessment method, delirium found in 10%), and thus, indicating a high validity of using the confusion assessment method in ED (44).

An Arabic version of the confusion assessment method was developed, and was validated by Saudi researchers, who translated the original the confusion assessment method English version, and evaluated the back translation by a bilingual expert interpreter, with the supervision of Vanderbilt ICU Delirium and Cognitive Impairment Study Group (45). The Arabic the confusion assessment method was also tested in terms of validity in Saudi Arabia by investigating sensitivity and specificity on 108 ICU patients with RASS score of -2 or more, and compared to the delirium assessment of the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5). The sample has a mean age of 62.6 years old, with 51.9% of them are male. The diagnosis by Arabic the confusion assessment method tool was conducted by an ICU nurse and an intensivist. Results showed that 63% of the patients were diagnosed with delirium using DSM-5 criteria, and the Arabic the confusion assessment method had a sensitivity of 74% and a specificity of 98% for the ICU nurse, compared with a sensitivity of 56% and a specificity of 92% for the intensivist, with a significant difference in duration of assessment (2 minutes for the ICU nurse compared with 4.5 minutes for the intensivist).

Results also showed that the sensitivity of the Arabic confusion assessment method is significantly correlated with mechanically-ventilated patients, women and patients older than 65 years old, while specificity was significantly correlated with patients younger than 65 years old, non-mechanically ventilated patients and men. In conclusion, the inter-reliability (kappa) for the Arabic confusion assessment method version is 0.66, indicating an acceptable reliability and validity to assess delirium in ICU patients who speak Arabic (46).

1.9 Problem Statement

Delirium is a frequent and distressing symptom in critically ill patients. In ICU, delirium affects 45% to 87% of the patients. One of the causes may be a lack of ICU personnel sensitization and preparation, which can cause delays in diagnosis and management (6).

In Asia, delirium screening was used by 80% of physicians, with the confusion assessment method scale being the most commonly used scale for assessment. Just 2% of clinicians in Asia agree that more than 60% of ICU patients have delirium (9).

When compared to patients who do not experience delirium while in the hospital, patients with delirium have a higher risk of poor outcomes. Delirium is linked to a higher risk of death, prolonged hospital stays, and cognitive impairment. Delirium patients are much more likely to be admitted to long-term care facilities. Since delirium has a negative effect on hospitalized patients' prognoses and makes providing nursing care in any environment more difficult (21).

Delirium, with identifiable risk factors, is a common complication of critical illness in adults. In order to examine the impact of delirium on long-term results and potential preventive and treatment interventions, more multi-institutional, longitudinal studies are needed (14).

In the acute hospital setting, delirium is a very common issue, with a point prevalence of approximately 20% (11). In order to diagnose and manage underlying causes and provide supporting treatment, the occurrence of delirium requires timely intervention (47).

Up to my search and knowledge. The importance of early diagnosis, prevention, and care for the underlying causes is critical in minimizing the length and severity of delirium, as well as the patient's negative outcomes (23).

Because delirium has a poor impact on hospitalized patients' prognoses and complicates nursing care in any context, prevention should be prioritized. Nurses must be aware of the signs and symptoms of delirium and be able to identify patients who are most at risk. Nurses will be able to take steps to maintain orientation, mobility, and cognition, as well as sleep, appropriate diet, hydration, and pain management, if the condition is detected early (21).

Up to my search and knowledge, prevalence of delirium in ICU not present. This study is a base line of study in Palestine give us how the problem that present about delirium. So, the awareness of nurses about delirium is increase, so assessment and prevention of delirium decrease prevalence rate of delirium, if good assessment and prevention done, mortality rate, ventilation days, hospital stay and negative consequence will be decrease.

1.10 Research questions

- What is the Prevalence of delirium in ICU in Palestine hospitals?
- Is there a significant difference in certain between critical ill patients who has delirium and patient who not has delirium?
- Is there a significant relationship between certain demography and presence of delirium among critical ill patients?
- What is the most common type of delirium?
- What are the risk factors of delirium?

1.11 Research hypothesis

- There is positive relationship between certain demography and delirium such as length of stay in ICU. Such as: age, gender and education.

- There is a significant different between certain demographic variables and presence of delirium among critical ill patients. Such as: hypertension, hearing impairment and depression.

1.12 Objectives of the study

- To estimate delirium prevalence at ICU.
- To assess the characteristics of patient who is with delirium and who is without delirium.
- To assess a significant relationship between certain demographic and present of delirium among critical ill patent.
- To assess a significant different between certain demographic and present of delirium among critical ill patent.

1.13 Significance of the Study

The importance of the topics comes after research and experience that incidence of delirium is very high between 11-87% and prevalence rates is high as 50% of hospitalize older patients. Delirium still does not receive enough clinical attention making that the most hospital complication and increased mortality, length of stay and ventilation days. The nurses must work on the assessment and prevention of delirium to decrease prevalence rate of delirium, if good assessment and prevention done, mortality rate, ventilation days, hospital stay and negative consequence will be decrease. This study is a base line of study give us how the problem that present about delirium.

Chapter Two

Methods

2.1 Study design

This study was conducted in a descriptive analytical design. The study was conducted in a prospective study. The study was a 1-day point prevalence in the all medical and surgical ICUs of Palestinian hospitals in the north of the West Bank of Palestine. The data were collected in the period between November 2021 and January 2022.

2.2 Study population

The target population was all patients in the ICUs in Palestinian hospitals in the north of the West Bank of Palestine who met the inclusion criteria and admitted to be treated in ICUs. The diagnosis of delirium in ICU was made using the confusion assessment method.

2.3 Study sites and settings

The study was conducted in the ICUs of all Palestinian hospitals in the north of the West Bank of Palestine. The study included governmental and private hospitals (Rafidia, Al-Watani, Al-Itthad, Al-Arabi, Nablus-Surgical, An-Najah, Sant-Luke's, Tulkarm, Al-Zaka, Al-Razi, Qalqilya and Jenin).

2.4 Sample size

The study included 100 adult patients who were admitted to the ICUs. The data collected in this study included demographic and clinical variables of the patients. These independent variables were collected and analyzed to determine their relationships with delirium.

2.5 Inclusion and exclusion criteria

2.5.1 Inclusion criteria

- Patients who were admitted to ICU.
- Patients above 18 years.

2.5.2 Exclusion criteria

- Children.

2.6 Sample technique

A consecutive sampling technique was used to include the patients in this study. The study was a 1-day point prevalence in the all medical-surgical ICUs in Palestinian hospitals in the north of the West Bank of Palestine.

2.7 Study tool

Using the confusion assessment method, ICU patients were screened to identify the patients who were at risk for or developed delirium during their hospital stays. The confusion assessment method was originally developed in 1988-1990 to improve the identification and recognition of delirium. The confusion assessment method was intended to provide a new standardized method to enable non-psychiatrically trained clinicians to identify delirium quickly and accurately in both clinical and research settings (25). The confusion assessment method is an excellent diagnostic tool for delirium in critically ill ICU patients (17). The test follows a detailed protocol; and with adequate training, it can be administered by any member of the ICU staff (26). The confusion assessment method diagnostic algorithm is based on four cardinal delirium features: 1) acute onset and fluctuating course, 2) inattention, 3) disorganized thought, and 4) altered consciousness level. The confusion assessment method diagnosis of delirium includes traits 1, 2, and either 3 or 4 to be present (27).

The confusion assessment method was translated into over 25 languages, including Swedish, Korean, Greek, Chinese, Italian, Thai, Arabic, and Japanese. The Arabic version of the confusion assessment method has been verified as a reliable and simple instrument for detecting delirium in ICUs. In detecting delirium in the ICU, Arabic confusion assessment method has a sensitivity and specificity above 80% (minimal number of false-negatives and false-positives; range 5-6) and a very good interrater reliability (= 0.82) (45).

2.8 Study variables

2.8.1 Dependent variable

- Delirium

2.8.2 Independent variable

- Medication
- Pain assessment
- Gender
- Age
- Hypertension
- Depression
- Hearing impairment
- Dementia
- Trauma
- Mechanical ventilation
- Pulmonary disease
- Pre-ICU emergency surgery

2.8.3 Negative consequence for delirium

- Morality rate
- Length of stay
- Ventilation days

2.9 Statistical analysis

The data were saved into a computer and were analyzed using the SPSS program. Microsoft Office Programs (such as Excel and Word) and other software were also used for data analysis and interpretation.

Q1:) What is the Prevalence of delirium in ICU in Palestine hospitals.

Q2:) Is there a significant difference in certain demographic variables between critical Ill patients who have delirium and patient who not has delirium.

Q3:) Is there a significant relationship between certain demographic variables and presence of delirium among critical ill patent.

Q4:) What is the most common of delirium.

Q5:) What are the risk factor of delirium.

Question number one statistical analysis will be done by percentage and number.

Question number two statistical analysis will be done by t-test or ANOVA.

Question number three statistical analysis will be done by person r.

Question number four statistical analysis will be done by number and percentage.

Question number five statistical analysis will be done by using chi- squared and regression analyses.

2.10 Ethical considerations

This study was conducted in adherence to Helsinki Declaration guidelines. Approval from the institutional review board (IRB) was obtained from An-Najah National University IRB committee. The Palestinian Ministry of Health facilitation letter was also obtained to allow data collection from the clinical field in all ICUs in Palestinian hospitals in the north of the West Bank of Palestine. Prior to participation a written consent was obtained from the participants or their families for the patients who were unable to take decision. The project was explained to potential participants before they consented to participate in the study. Anonymity and confidentiality were secured.

Chapter Three

Results

3.1 Introduction

This thesis was implemented to estimate the delirium prevalence among ICU patients. Additionally, to assess the characteristics of patient who developed delirium during ICU stay and to assess if there was a significant relationship between certain demographic variables and occurrence of delirium among critical ill patient?

3.2 Prevalence and type of delirium among ICU patient

Table 3.1 shows that the prevalence of delirium among ICU patients was 55%. Hypoactive and hyperactive types were more prevalent (20% and 20%) the mixed type (14%). The type of delirium in 1 patient was not determined due to missing information.

Table 3.1

Prevalence and type of delirium among ICU patients

		Frequency	Percent
Does The Patient Have Delirium	Yes	55	55
	No	45	45
Delirium Type	Hyperactive	20	20
	Hypoactive	20	20
	Mix	14	14
	Missing information	1	1

3.3 Demographic characteristics and delirium among participants

Statistical analysis showed that there was no statistically significant relationship between hospital type or gender with the occurrence of delirium (p values= 0.39 and 0.47 respectively). Among ICU patients, despite the presence of small differences in percentages from one hospital to another, as well as for sex, as males had a higher percentage (57.4% vs. 43.6% respectively). Nablus hospital had the highest prevalence (16.4%) while Itihad hospital had the lowest prevalence (1.8%) of delirium among ICU patients. However, these differences were not statistically significance. On the other hand, age and income showed that there was statistically significant relationship between hospital and gender with the occurrence of delirium (p values= 0.050 and 0.019, respectively) among ICU patients.

Delirium was more likely to develop among older ICU patients as the mean of age of patient who develop delirium was higher compared with those who did not develop delirium (58.5 vs. 53.7 years respectively). While, delirium was more likely to develop among low income of ICU patients as the mean of income of patient who develop delirium was lower compared with those who did not develop (2976.6 vs. 3738.1 shekels respectively) as shown in Table 3.2.

Table 3.2

The relation of demographic characteristics with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	df	*P* value
Gender	Male	31	57.40%	29	65.90%	60	61.20%	0.738	1	0.39
	Female	23	42.60%	15	34.10%	38	38.80%			
	Missing information	1								
Hospital	Itihad	1	1.80%	3	6.70%	4	4.00%	11.592	12	0.479
	Darweesh Nazzal	2	3.60%	1	2.20%	3	3.00%			
	Zakah	3	5.50%	2	4.40%	5	5.00%			
	Nablus Spatiality	9	16.40%	7	15.50%	16	16.00%			
	Rafeedia	7	12.70%	3	6.70%	10	10.00%			
	Jenin	4	7.30%	1	2.20%	5	5.00%			
	Enjeli	5	9.10%	0	0.00%	5	5.00%			
	Razi	4	7.30%	4	8.90%	8	8.00%			
	Thabi Thabit	3	5.50%	4	8.90%	7	7.00%			
	Watany	5	9.10%	5	11.10%	10	10.00%			
	Arabi	4	7.30%	8	17.80%	12	12.00%			
	An-Najah National University	8	14.50%	7	15.60%	15	15.00%			
Smoking	Yes	36	65.50%	28	63.60%	64	64.60%	0.035	1	0.851
	No	19	34.50%	16	36.40%	35	35.40%			
	Delirium	N	Mean		Std. D			t	df	P value
Age	Yes	54	58.5		13.52			1.984	95	0.05
	No	43	52.76		14.86					
Income	Yes	27	2976.6		992.6			-2.428	46	0.019
	No	21	3738.1		1179.1					

3.4 Past medical history and delirium among participant

There was no statistically significant relationship between the medical history of ICU patients and occurrence of delirium. Although there were some differences as patient with pain, hypertension and diabetes had higher prevalence of delirium (81.8, 56.4%, and 54.5% respectively) compared with patients without pain, hypertension and diabetes (81.8%,43.6%, and 45.5%), but these differences were not statistically significant (p values > 0.05) as shown in Table 3.3.

Table 3.3

The relation of past medical history with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	df	*P*value
Hypertension	Yes	31	56.4%	27	60.0%	58	58.0%	.134	1	.714
	No	24	43.6%	18	40.0%	42	42.0%			
Diabetes	Yes	30	54.5%	26	57.8%	56	56.0%	.105	1	.746
	No	25	45.5%	19	42.2%	44	44.0%			
Renal dysfunction	Yes	13	23.6%	13	28.9%	26	26.0%	.355	1	.551
	No	42	76.4%	32	71.1%	74	74.0%			
Thyroid disease	Yes	8	14.5%	10	22.2%	18	18.0%	.988	1	.320
	No	47	85.5%	35	77.8%	82	82.0%			
Pulmonary Disease	Yes	22	40.0%	21	46.7%	43	43.0%	.449	1	.503
	No	33	60.0%	24	53.3%	57	57.0%			
Cardiac Disease	Yes	22	40.0%	24	54.5%	46	46.5%	2.079	1	.149
	No	33	60.0%	20	45.5%	53	53.5%			
Pre ICU-Emergency Surgery	Yes	19	35.2%	13	28.9%	32	32.3%	.445	1	.505
	No	35	64.8%	32	71.1%	67	67.7%			
Depression	Yes	15	27.3%	7	15.9%	22	22.2%	1.826	1	.177
	No	40	72.7%	37	84.1%	77	77.8%			
Dementia	Yes	12	21.8%	14	31.1%	26	26.0%	1.111	1	.292
	No	43	78.2%	31	68.9%	74	74.0%			
Trauma	Yes	21	38.2%	11	24.4%	32	32.0%	2.146	1	.143
	No	34	61.8%	34	75.6%	68	68.0%			
Fever	Yes	27	49.1%	12	26.7%	39	39.0%	5.231	1	.022
	No	28	50.9%	33	73.3%	61	61.0%			
Pain	Yes	45	81.8%	32	71.1%	77	77.0%	1.602	1	.206
	No	10	18.2%	13	28.9%	23	23.0%			

3.5 Hearing and vision impairment with delirium

Patients who suffer from a hearing or vision impairment were less likely to develop delirium, as just 23.6% of those who had visual impairment and 21.8% of those who had low hearing developed delirium during their stay in the ICU compared with those without impairment (76.4% and 78.2 % respectively). However, neither vision impairment nor hearing impairment had a statistically significant relationship with the occurrence of delirium among critical care patients (*P* values > 0.05) as shown in Table 3.4.

Table 3.4

The relation of hearing and vision impairment with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	**df**	***P* value**
Hearing impairment	Yes	12	21.8%	14	31.1%	26	26.0%	1.111	1	.292
	No	43	78.2%	31	68.9%	74	74.0%			
Vision Deficit	Yes	13	23.6%	11	24.4%	24	24.0%	.009	1	.925
	No	42	76.4%	34	75.6%	76	76.0%			

3.6 Ventilation support and delirium

With regard to the relationship of the type of oxygen support for ICU patients with the occurrence of delirium, the results showed that delirium was highly prevalent among the patients who received high flow nasal cannula compared to the patients who did not receive (21.6% vs. 78.4% respectively) (P= 0.025) as shown in Table 3.5.

As for the other types of supportive oxygen, there was no statistically significant difference in the prevalence of delirium between the patients who received mechanical ventilation or nasal cannula and those who did not receive (p value > 0.05).

Table 3.5

The relation of ventilation support with delirium among ICU patient participants

		Delirium								
		Yes		**No**		**Total**		χ^2	**df**	***P*value**
Mechanical ventilation	Yes	13	23.6%	9	20.5%	22	22.2%	.143	1	.705
	No	42	76.4%	35	79.5%	77	77.8%			
High Flow Nasal Cannula	Yes	11	21.6%	2	5.0%	13	14.3%	5.026	1	**.025**
	No	40	78.4%	38	95.0%	78	85.7%			
Nasal Cannula	Yes	35	66.0%	30	69.8%	65	67.7%	.151	1	.698
	No	18	34.0%	13	30.2%	31	32.3%			

3.7 Nursing care interventions and delirium

The patients who were placed in prone position had a statistically significant (p= 0.036) higher prevalence of delirium than those who were not placed in prone position (18.5% vs. 4.5% respectively) as shown in Table 3.6. Furthermore, the patients whom were restrained, the prevalence of delirium was lower but not statistically significant than those whom were not in supine position or restrain (22.2% vs. 37.8% respectively). Patients fed by NG or PEG tubes had a statistically significant higher prevalence of delirium while urinary catheter and arterial line had no statistically significant relation with development of delirium.

Table 3.6

The relation of nursing care interventions with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	df	*P* value
Prone	Yes	10	18.5%	2	4.5%	12	12.2%	4.405	1	.036
Position	No	44	81.5%	42	95.5%	86	87.8%			
Supine	Yes	45	81.8%	35	77.8%	80	80.0%	.253	1	.615
Position	No	10	18.2%	10	22.2%	20	20.0%			
Restrain Use	Yes	12	22.2%	17	37.8%	29	29.3%	2.868	1	.090
	No	42	77.8%	28	62.2%	70	70.7%			
Feeding Tube	Yes	18	32.7%	6	13.6%	24	24.2%	4.851	1	.028
NGT or PEG	No	37	67.3%	38	86.4%	75	75.8%			
Urinary	Yes	45	81.8%	37	84.1%	82	82.8%	.089	1	.766
Catheter	No	10	18.2%	7	15.9%	17	17.2%			
Arterial	Yes	33	60.0%	24	54.5%	57	57.6%	.298	1	.585
Catheter	No	22	40.0%	20	45.5%	42	42.4%			

3.8 Visitation by family or friends with delirium

The proportion delirium among patients whom were visited by family or friends was lower than the patients whom were not visited (61.5% vs. 69.8% respectively), and this difference was not statistically significant (p values > 0.05) as shown in Table 3.7.

Table 3.7

The relationship of visitation by family or friends with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	df	*P* value
Visit by family or friends	Yes	32	61.5%	30	69.8%	62	65.3%	2.232	2	.328
	No	20	38.5%	13	30.2%	33	34.7%			

General anesthesia and anti-epileptic medications had a statistically significant relationship with the development of delirium among patients in ICU (p values= 0.046 and 0.007 respectively). On the other hand, other medications had no statistically significant relationship with delirium. The percentage of patients who were exposed to general anesthesia or took anti-epileptic medication had a higher rate of delirium compared to their peers (24.1% & 43.6% vs. 8.9% &18.2% respectively) as shown in Table 3.8.

Table 3.8

The relationship of medications with delirium among ICU patient participants

		Delirium								
		Yes		No		Total		χ^2	df	*P* value
General Anesthesia	Yes	13	24.1%	4	8.9%	17	17.2%	3.979	1	.046
	No	41	75.9%	41	91.1%	82	82.8%			
Sedative Infusion	Yes	11	20.0%	5	11.1%	16	16.0%	1.455	1	.228
	No	44	80.0%	40	88.9%	84	84.0%			
Oral Anxiolytics	Yes	9	16.4%	8	17.8%	17	17.0%	.035	1	.851
	No	46	83.6%	37	82.2%	83	83.0%			
Diuretics	Yes	33	60.0%	27	60.0%	60	60.0%	.000	1	1.000
	No	22	40.0%	18	40.0%	40	40.0%			
Antihypertension	Yes	33	60.0%	27	60.0%	60	60.0%	.000	1	1.000
	No	22	40.0%	18	40.0%	40	40.0%			
Antidiabetics	Yes	27	49.1%	24	54.5%	51	51.5%	.291	1	.589
	No	28	50.9%	20	45.5%	48	48.5%			
Antibiotics	Yes	43	78.2%	31	70.5%	74	74.7%	.773	1	.379
	No	12	21.8%	13	29.5%	25	25.3%			
Antibiotics	Yes	43	78.2%	32	72.7%	75	75.8%	.396	1	.529
	No	12	21.8%	12	27.3%	24	24.2%			
Antidepressant	Yes	17	30.9%	11	25.0%	28	28.3%	.421	1	.517
	No	38	69.1%	33	75.0%	71	71.7%			
Antiepileptic	Yes	24	43.6%	8	18.2%	32	32.3%	7.240	1	.007
	No	31	56.4%	36	81.8%	67	67.7%			
Vasopressor	Yes	20	36.4%	13	28.9%	33	33.0%	.625	1	.429
	No	35	63.6%	32	71.1%	67	67.0%			
Use of NSAIDS	Yes	30	54.5%	22	48.9%	52	52.0%	.317	1	.573
	No	25	45.5%	23	51.1%	48	48.0%			
Opiates use	Yes	12	21.8%	8	17.8%	20	20.0%	.253	1	.615
	No	43	78.2%	37	82.2%	80	80.0%			
Benzodiazepines	Yes	10	20.0%	9	20.9%	19	20.4%	.012	1	.912
	No	40	80.0%	34	79.1%	74	79.6%			

There was a statistically significant relationship between the Richmond Agitation Sedation Scale score and delirium among ICU patients in this study as shown in Table 3.9.

Table 3.9

The relationship of Richmond Agitation Sedation Scale score with delirium among ICU patient participants

	Delirium	N	Mean	Std. D	Mean Rank	Mann-Whitney U	Z	Sig.
Richmond Agitation Sedation Scale	Yes	55	.4364	1.50	57.89	831.000	-2.999	.003
	No	45	-.1333	.504	41.47			

Logistic regression was used to analyze the relationship between demographic variables and the probability of delirium among ICU patient participants. Age and gender of patient in ICU had a statistically significant relationship with the occurrence of delirium. It was found that the odds of developing delirium decreased by 90% (95% CI [.014, .57]) for female compared with male and the odds of developing delirium increased by 5.7% (95% CI [.99, 1.11]) for elder patient whom were admitted to ICU as shown in Table 3.10.

On the other hand, the other demographic variables (hospital, education, and income) and visitation by family or friends had not a statistically significant relationship with the occurrence of delirium among patient whom were admitted to ICU.

Table 3.10

Binary logistic regression to analyze the relationship between demographic variables and the probability of delirium among ICU patient participants

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Hospital	-.237	.131	3.289	1	.070	.789	.611	1.019
Gender	-2.413	.950	6.451	1	.011	.090	.014	.576
Age	.055	.029	3.674	1	.055	1.057	.999	1.118
Education	.726	.489	2.210	1	.137	2.067	.794	5.386
Income	.000	.000	1.753	1	.185	1.000	.999	1.000
Visitation by family or friends	-.184	.859	.046	1	.830	.832	.155	4.474
Constant	1.109	2.061	.290	1	.590	3.032		

Logistic regression was used to analyze the relationship between past medical history and the probability of delirium among ICU patient participants. Fever of patient in ICU had a statistically significant relationship with the occurrence of delirium. It was found that the odds of developing delirium were 4.6 (95% CI [.069, 0.68]). ICU patient with fever are 4.6 times more likely to develop delirium as shown in Table D.1 in Appendix D.

On the other hand, the other past medical history had not a statistically significant relationship with the occurrence of delirium among patient whom were admitted to ICU.

Logistic regression was used to analyze the relationship between ventilation mode and the probability of delirium among ICU patient participants. Although ICU patient using high flow nasal cannula and mechanical ventilation patients were 4.0 and 1.4 times more likely to develop delirium but the ventilation mode had not a statistically significant relationship with the occurrence of delirium among patient whom were admitted to ICU as shown in Table D.2 in Appendix D.

It was found that the odds of developing delirium was 4.6 (95% CI [.069, 0.68]). Logistic regression was used to analyze the relationship between nursing intervention and the probability of delirium among ICU patient participants. Prone position, restrain the patient, and NGT feeding of patient in ICU had a statistically significant relationship with the occurrence of delirium. It was found that the odds of developing delirium were 6.5 (95% CI [.025, .94]) and 4.5 (95% CI [.062, 0.77]). ICU patient in prone position and fed by NGT were 6.5 times and 4.5 times more likely to develop delirium. On the other hand, restraining ICU patient had the odds of developing delirium by 0.245 (95% CI [1. 26, 13.2]) and had a statistically significant relationship with the occurrence of delirium. Restrained ICU patient was 0.245 times less likely to develop delirium as shown in Table D.3 in Appendix D.

On the other hand, the other nursing interventions had not a statistically significant relationship with the occurrence of delirium among patient whom were admitted to ICU.

Logistic regression was used to analyze the relationship between medications and the probability of delirium among ICU patient participants. General anesthesia, antiepileptic, and Richmond Agitation Sedation Scale score of patients in ICU had a statistically significant relationship with the occurrence of delirium. It was found that General anesthesia, antiepileptic and Richmond Agitation Sedation Scale score of patients in ICU had the odds of developing delirium by 9.0 (95% CI [.026, .88]), 5.3 (95% CI [.048, 0.53]) and 2.2 (95% CI [1. 20, 3.04]). General anesthesia, antiepileptic and Richmond Agitation Sedation Scale scores of ICU patient had 9.0 times, 5.3 times and 2.2 times more likely to develop delirium as shown in Table D.4 in Appendix D.

On the other hand, the other medications had not a statistically significant relationship with the occurrence of delirium among patient whom were admitted to ICU.

Chapter Four

Discussions and Conclusions

4.1 Introduction to the discussion chapter

This chapter discusses the data generated in this thesis. In the first part, readers are reminded of the objectives of this thesis and the main findings are summarized. In the second part, the main findings are discussed/ interpreted in relation to those previously reported in the literature. In the third part, the main strengths of this thesis are discussed. In the fourth part, the main limitations of this study are appraised. A conclusion is drawn from the data generated in this thesis. Finally, recommendations are provided based on the findings of this thesis.

4.2 Summary of the main findings

Delirium is a common observation among critically ill patients who are admitted to the ICU in different healthcare systems around the world (48). Previous studies that were conducted among critically ill patients in different healthcare systems have shown that delirium has negatively affected the health and outcomes of patients admitted to the ICU (49-51). This descriptive-analytic study estimated the prevalence of delirium among critically ill patients who were admitted to the ICU in the hospitals of the northern West Bank. The study also investigated the relationships between certain demographic variables of the patients and delirium. The study showed that delirium was prevalent in more than half (55%) of the critically ill patients who were admitted to the ICU in the hospitals of the northern West Bank. To the best of our knowledge, this is the first descriptive-analytic study to assess the prevalence of delirium among critically ill patients admitted to the ICU in the hospitals of the northern West Bank. The findings of this descriptive-analytic study are informative to providers of care for critically ill patients admitted to the ICU, decision-makers in health care authorities, and managers of healthcare.

4.3 Interpretation of the main findings

In this study, the prevalence of delirium among critically ill patients in the ICU was 55%. Although previous studies conducted in different ICUs elsewhere reported variable prevalence rates of delirium. The findings of this study were consistent with

those previously reported among patients admitted to the ICU elsewhere (52-56). Balas et al reported that about 45% of older patients admitted to the ICUs exhibited delirium sometime before and/or during their hospital stays (56). In another study, Bryczkowski et al reported that the incidence rate of delirium was 61% among older trauma patients who were admitted to the surgical ICU (54). On the other hand, Pandharipande et al reported that as high as 73% of mechanically ventilated patients in the surgical and trauma ICUs (55). In a recent systematic review with meta-analysis that included 48 different studies (27,342 patients), Krewulak et al showed reported a pooled prevalence rate of delirium of 31% (95% CI of 24% to 41%) (52). It is noteworthy mentioning that discrepancies in the reported prevalence rates between studies could be explained by differences in the tools used to assess delirium, settings investigated, demographic and clinical characteristics of the patients included, and severity of their health conditions (52-56).

The findings of this study indicated that 20% of the patients had hyperactive, 20% had hypoactive, and 14% had mixed subtypes of delirium. In the systematic review with meta-analysis of Krewulak et al, 31 studies reported subtypes of delirium among adults admitted to the ICU (52). Hypoactive delirium was the most prevalent type with a pooled prevalence rate of 17% (95% CI of 13% to 22%). On the other hand, the pooled prevalence rate of mixed delirium was 10% (95% CI of 6% to 16%) and the pooled prevalence rate of the hyperactive delirium was 4% (95% CI of 3% to 6%). The pooled prevalence rate of hypoactive delirium was 35% (95% CI of 23% to 55%) among mechanically ventilated patients and 29% (95% CI of 18% to 46%) among severely ill patients. In the study of Pandharipande et al, the majority of the patients admitted to the surgical ICU (64%) had hypoactive delirium (55). On the other hand, 9% of the patients had mixed delirium and about 1% had hyperactive delirium. The findings of this study showed a variable prevalence of the three subtypes of delirium among the patients included. This variability could be explained by heterogeneity between different studies, differences in the tools used to assess delirium, stratification of patients into delirium subtypes, the severity of the health conditions of the patients, medical procedures performed on the patients, and the medications administered to the patients (52, 55, 57). It is noteworthy mentioning that the subtype of delirium could be associated with the duration of delirium experienced by the patients, length of stay in the hospital and ICU, the intensity of the therapy, and hospital mortality rate (57). Therefore, determining the

type of delirium experienced by the patients could be informative to providers of ICU to patients admitted to the ICU who might need to design appropriate and/or individualized care plans for the patients.

Despite the existence of small differences, statistically significant associations were not established between the prevalence of delirium, gender, type of hospital, and smoking status in this study. Previous studies have reported that variabilities in prevalence rates of delirium could be reported among different hospital settings. These variabilities could be attributed to differences in care plans, interventions/procedures performed on the patients, medications administered to the patients in different hospital settings, and other organizational factors like the type of the hospital, assessment methods, and frequency of patient screening (58, 59). In a systematic review of 14 studies by Hsieh et al, smoking was an independent predictor of delirium in 1 study, had a tendency of association in 1 study, and showed a dose-dependent response in 1 study (60). The systematic review reported that the quality of assessment of smoking was widely variable among the different studies. The systematic review failed to draw a solid conclusion that smoking was a strong risk factor for delirium among patients admitted to the ICUs (60). Taken together, these findings might be considered a call for more investigations on the potential link between cigarette smoking and delirium.

Consistently with those reported in the literature, age and income were significantly associated with delirium. Many previous studies have reported that age was a predictor of developing delirium among patients admitted to the ICUs in different settings (52-56). Although the pathophysiological basis of delirium is largely speculative and based on animal studies, it is widely accepted that abnormalities in neurotransmitters can explain the different clinical presentations of delirium (61, 62). Not surprisingly, elderly patients admitted to the ICUs are at higher risk for developing delirium. The higher prevalence of delirium among elderly patients could be explained largely by the age-associated changes in neurotransmission and signaling pathways in the brain. Additionally, elderly patients are more likely to experience increased secretion of cytokines and other inflammatory mediators due to clinical and physical stressful conditions, notably in critically ill conditions (61). Similarly, previous studies also showed that experiencing delirium was associated with socioeconomic factors like the economic status of the patient and living in a disadvantaged neighborhood (63-65).

Taken tighter, these findings might be considered as a call to improve the care of elderly disadvantaged patients by intensifying screening and treating/addressing delirium among those admitted to the ICUs.

In this study, pain and receiving high flow nasal cannula were significantly associated with the prevalence of delirium among the patients. Additionally, using a prone position and feeding tube/nasogastric tube/ percutaneous endoscopic gastrostomy was significantly associated with delirium. Probably, those patients were more critically ill or had severer health conditions that needed extra interventions that other patients did not need. Experiencing severe pain and needing oxygen support is one of the most devastating stressful conditions. Pain is known to have effects on neurotransmission and signaling pathways in the brain (61, 62). Additionally, pain is known to induce the release of cytokines and other mediators that underlie the pathophysiology of delirium. The findings of this study were consistent with those in which experiencing pain and using invasive procedures increased the risk of delirium among hospitalized patients (66, 67). The findings of this study might indicate that providers of ICU to patients should consider alleviating pain and reducing the incidence of delirium among patients admitted to the ICU (66). On the other hand, the prevalence of delirium was not associated with hypertension, diabetes, renal disease, thyroid disease, pulmonary disease, cardiac disease, surgery before admission to the ICU, depression, dementia, trauma, hearing difficulties, vision deficits, receiving mechanical ventilation, nasal cannula, supine position, restrain, urinary catheter, and arterial catheter. Probably, patients who were admitted to the ICU had serious conditions that overwhelmed the other chronic comorbidities.

The findings of this study showed that patients who received general anesthesia and antiepileptic drugs experienced delirium more than the patients who did not receive general anesthesia and antiepileptic drugs. The findings of this study were consistent with those reported in previous studies (68, 69). General anesthesia is often used for more invasive interventions. Probably, general anesthesia would have an effect on neurotransmission and signaling pathways in the brain (61, 62). Therefore, delirium in post-general anesthesia care units is common. Additionally, it has been argued that general anesthesia might increase delirium among the patients who receive more invasive interventions that require general anesthesia (69). Epilepsy is one of the most

prevalent neurological diseases of the brain. In epilepsy, many neurotransmission and signaling pathways are impaired. Therefore, a higher prevalence of delirium among patients with epilepsy who are admitted to the ICU would be expected. On the other hand, family visits and taking medications like anxiolytics, diuretics, antihypertensives, antidiabetics, antibiotics, antidepressants, vasopressors, NSAIDs, opiates, and benzodiazepines were not associated with delirium. Taken together, the findings of this study might indicate the need to screen and address delirium among patients who are scheduled to receive general anesthesia and those with epilepsy.

There was a significant association between the Richmond Agitation Sedation Scale score and delirium among the patients in this study. These findings were consistent with those reported in previous studies (70, 71). Khan et al reported that the Riker Sedation-Agitation Scale and the Richmond Agitation-Sedation Scale resulted in similar rates of delirium assessments among patients admitted to the ICU compared to the confusion assessment method (70). Additionally, Han et al reported that the Richmond Agitation-Sedation Scale was sensitive and specific in diagnosing delirium among elderly patients admitted to the emergency departments (71). The findings reported in this study might substantiate those previously reported on the agreement between the Richmond Agitation-Sedation Scale and the confusion assessment method and their applications in assessing delirium among patients admitted to the ICU.

4.4 The main strengths of the study

This study had several strength points that can be considered while interpreting the reported findings. First, this is the first study that assessed the prevalence of delirium among critically ill patients who were admitted to the ICUs of northern hospitals in the West Bank. Additionally, this is the first study that investigated the association between delirium and certain demographic and clinical factors of the patients. Assessing and identifying predictors of delirium can inform providers of intensive care services to patients admitted to the ICU. Second, this study was conducted in a descriptive-analytical design. Descriptive analytical studies are powerful in portraying phenomena and the factors that could be associated with them. Third, the patients were from different ICUs in the northern part of the West Bank. Data collected from multicenter studies are more reliable than those collected from a single center. This should have improved the external validity of the study and might allow the generalization of the

results. Third, the patients included in this study were diversified in terms of demographic and clinical characteristics. Patients were from both genders, belonged to different socioeconomic classes, were subjected to different interventions, and received different medications. This should have also improved the representation of different groups of patients who are admitted to the ICUs in Palestine. Fourth, a valid and reliable tool was used to assess delirium in this study. Using valid and reliable tools in assessing a certain phenomenon is essential for the generation of meaningful data. Finally, powerful statistical tools were used to establish relationships between delirium and different demographic and clinical variables of the patients.

4.5 Limitations of the study

This study has a number of limitations. First, the sample size used in this study was somehow small. Future studies might consider increasing the sample size to obtain more generalizable findings. Second, the patients in this study were collected from the ICUs of the northern West Bank. Collecting data from different regions of the West Bank (center and south) should have improved the representation of different hospitals across the West Bank. Third, delirium was assessed using the confusion assessment method. Using more than one tool to assess a certain phenomenon should have allowed re-validation of these tools and comparing their results.

4.6 Conclusion

In conclusion, delirium was highly prevalent among critically ill patients admitted to the ICUs in northern Palestinian hospitals. Delirium was significantly associated with older age, lower income, fever, using high flow nasal cannula, being in a prone position, using feeding tube/nasogastric tube/ percutaneous endoscopic gastrostomy, general anesthesia, and receiving antiepileptic drugs. The Richmond Agitation Sedation Scale score was significantly associated with delirium scores. Providers of intensive care services should consider screening patients who are elderly, have low income, fever, use high flow nasal cannula, be in a prone position, use feeding tube/nasogastric tube/ percutaneous endoscopic gastrostomy, general anesthesia, and receive antiepileptic drugs for delirium. More studies are still needed to determine the best ways to address delirium among critically ill patients who are admitted to the ICUs.

4.7 Recommendations

Based on the findings of this study, the following recommendations can be made:

- Attention should be paid to the incidence and prevalence of delirium among critically ill patients admitted to the ICUs
- Planners and providers of intensive care to critically ill patients who are admitted to the ICU should consider screening for delirium among the patients, notably, those who are elderly, have low income, fever, use high flow nasal cannula, be in a prone position, use feeding tube/nasogastric tube/ percutaneous endoscopic gastrostomy, general anesthesia, and receive antiepileptic drugs for delirium
- Researchers should consider conducting more studies to determine the best methods to reduce delirium among critically ill patients admitted to the ICUs

List of Abbreviations

Abbreviation	Meaning
3D CAM	3-minute diagnostic confusion assessment method
APACHE-II	Acute Physiology and Chronic Health Evaluation II
b-CAM	Brief confusion assessment method
CAM-ICU	confusion assessment method
DSD	delirium superimposed on dementia
DSM-5	Diagnostic and Statistical Manual of Mental Disorders, 5th edition
ED	Emergency department
ICDSC	Intensive Care Delirium Screening Checklist
ICU	intensive care unit
IRB	institutional review board
LOS	length of stay

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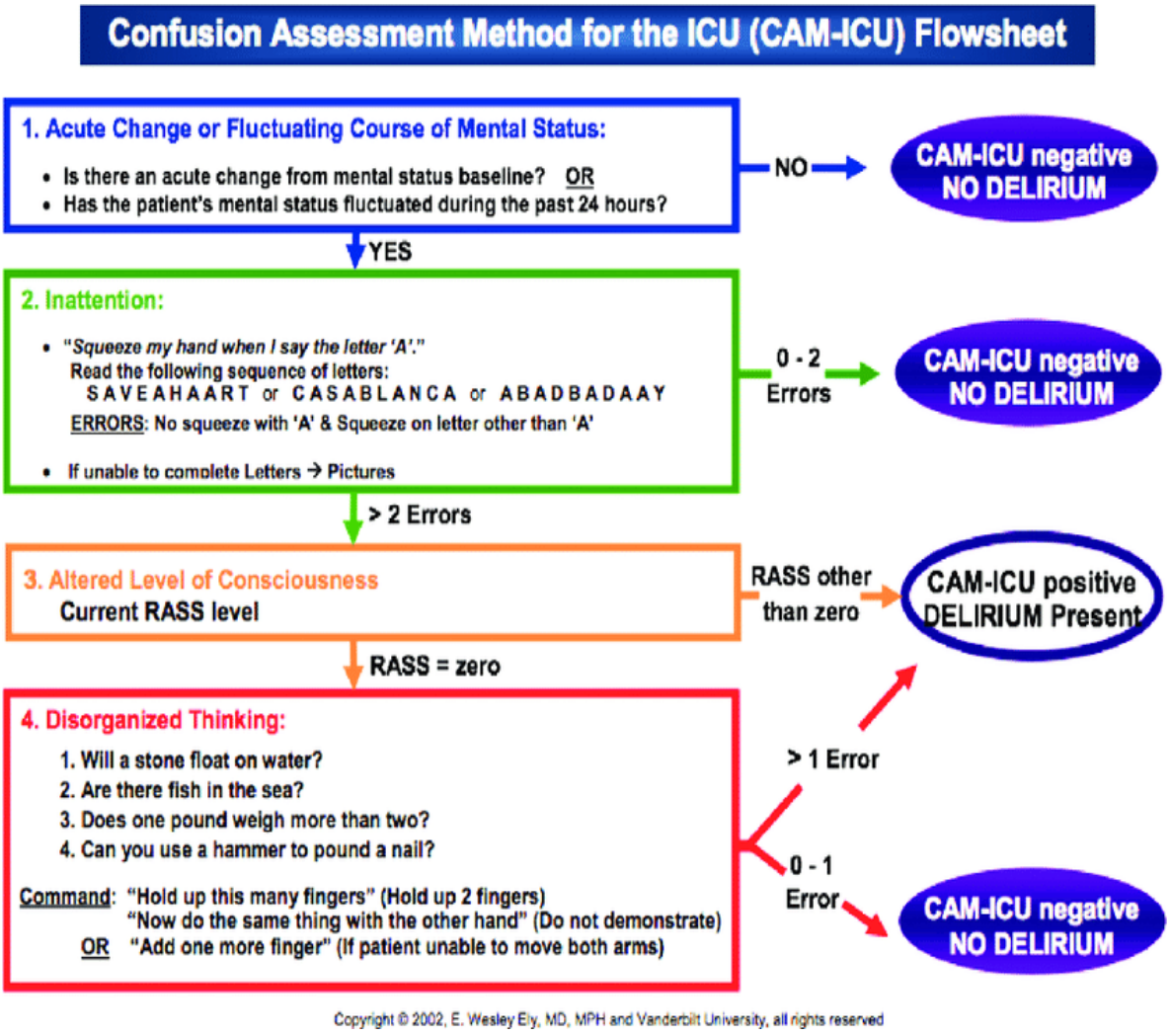
Appendices

Appendix A

Confusion assessment method (CAM-ICU)



Appendix B

Demographic variables collection sheet

Gender	□ **Male**	□ **Female**
Age		
Education	□ Tawjihi or less	□ Diploma
	□ University	
Fever	□ Yes	□ No
Total income		
Hypertention	□ Yes	□ No
Diabetes	□ Yes	□ No
Renal dysfunction	□ Yes	□ No
Throid disase	□ Yes	□ No
Hearing deficit	□ Yes	□ No
Vision desicit	□ Yes	□ No
Medication such as benzodiazepines	□ Yes	□ No
Depression	□ Yes	□ No
Use of NSAIDS	□ Yes	□ No
Opiates use	□ Yes	□ No
Dementia	□ Yes	□ No
Trauma	□ Yes	□ No

Mechanical ventilation	□ Yes	□ No
Ventilation type		
High flow nasal canula	□ Yes	□ No
Nasal canula	□ Yes	□ No
Vasopressors	□ Yes	□ No
Position prone	□ Yes	□ No
Position supine	□ Yes	□ No
Restraine use	□ Yes	□ No
Sedative infusion	□ Yes	□ No
Oral anxiolytics	□ Yes	□ No
Vistation from family or friend	□ Yes	□ No
Smoking	□ Yes	□ No
Pain	□ Yes	□ No
Antibitacis use	□ Yes	□ No
Pulmonary disease	□ Yes	□ No
Pre ICU emergency surgery	□ Yes	□ No
Feding tube and NGT or PEG	□ Yes	□ No
Cardiar disease	□ Yes	□ No
General anesthesia	□ Yes	□ No

Urinary catheter	□ Yes	□ No
Aterial catheter	□ Yes	□ No
Number of Drug on admission		
Duiretics	□ Yes	□ No
Antihypertension	□ Yes	□ No
Antidiabetics	□ Yes	□ No
Antibiotics	□ Yes	□ No
Antidepression	□ Yes	□ No
Antiepletics	□ Yes	□ No

Appendix C

Richmond Agitation Sedation Scale (RASS)

Richmond Agitation Sedation Scale (RASS)

Target RASS	RASS Description
+ 4	Combative, violent, danger to staff
+ 3	Pulls or removes tube(s) or catheters; aggressive
+ 2	Frequent nonpurposeful movement, fights ventilator
+ 1	Anxious, apprehensive , but not aggressive
0	Alert and calm
- 1	awakens to voice (eye opening/contact) >10 sec
- 2	light sedation, briefly awakens to voice (eye opening/contact) <10 sec
- 3	moderate sedation, movement or eye opening. No eye contact
- 4	deep sedation, no response to voice, but movement or eye opening to physical stimulation
- 5	Unarousable, no response to voice or physical stimulation

Appendix D

Tables of Study

Table D.1

Binary logistic regression to analyze the relationship between past medical history and the probability of delirium among ICU patient participants

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Fever	1.527	.587	6.767	1	.009	4.602	1.457	14.536
Hypertension	.274	.650	.178	1	.673	1.316	.368	4.707
Diabetes	-.079	.594	.018	1	.895	.924	.289	2.960
Renal Dysfunction	-.580	.696	.696	1	.404	.560	.143	2.188
Thyroid Disuse	-1.095	.637	2.955	1	.086	.335	.096	1.166
Depression	1.065	.679	2.463	1	.117	2.901	.767	10.973
Dementia	-1.214	.720	2.844	1	.092	.297	.073	1.217
Trauma	.655	.618	1.122	1	.289	1.926	.573	6.472
Smoking	.226	.510	.196	1	.658	1.254	.461	3.405
Pain	.401	.592	.459	1	.498	1.493	.468	4.764
Pulmonary Disease	.489	.649	.567	1	.451	1.630	.457	5.817
Pre ICU-Emergency Surgery	.045	.582	.006	1	.938	1.046	.334	3.277
Cardiac Disease	-.600	.662	.822	1	.365	.549	.150	2.008
Hearing Impairment	-.368	.678	.295	1	.587	.692	.183	2.613
Vision Deficit	.265	.660	.161	1	.689	1.303	.357	4.752
Constant	-.609	.728	.700	1	.403	.544		

Table D.2

Binary logistic regression to analyze the relationship between ventilation variables and the probability of delirium among ICU patient participants

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Mechanical Ventilation	.219	.559	.153	1	.696	1.244	.416	3.724
High Flow Nasal Cannula	1.392	.828	2.829	1	.093	4.025	.795	20.388
Nasal Cannula	-.226	.462	.238	1	.625	.798	.323	1.973
Constant	.182	.380	.230	1	.632	1.200		

Table D.3

Binary logistic regression to analyze the relationship between nursing interventions variables and the probability of delirium among ICU patient participants.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	Upper
Prone Position	1.874	.927	4.090	1	.043	6.517	1.060	40.084
Supine Position	.678	.648	1.097	1	.295	1.970	.554	7.011
Restrain Use	-1.407	.599	5.524	1	.019	.245	.076	.792
Feeding Tube NGT or PEG	1.519	.641	5.610	1	.018	4.566	1.299	16.047
Urinary Catheter	-.601	.710	.717	1	.397	.548	.136	2.204
Arterial Catheter	.232	.565	.169	1	.681	1.261	.417	3.816
Constant	-.061	.651	.009	1	.926	.941		

Table D.4

Binary logistic regression to analyze the relationship between medications and the probability of delirium among ICU patient participants.

	B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B)	
							Lower	
Benzodiazepines	-.779	.973	.641	1	.423	.459	.068	3.088
Use of NSAIDS	.558	.574	.945	1	.331	1.748	.567	5.387
Opiates Use	.113	1.078	.011	1	.917	1.119	.135	9.253
Sedative Infusion	.918	1.018	.812	1	.368	2.503	.340	18.426
Oral Anxiolytics	-1.363	1.006	1.835	1	.175	.256	.036	1.838
Antibiotics	.227	.821	.077	1	.782	1.255	.251	6.269
General Anesthesia	2.198	.978	5.048	1	.025	9.005	1.324	61.255
Diuretics	.026	.722	.001	1	.971	1.026	.249	4.223
Antihypertension	-.381	.719	.280	1	.597	.683	.167	2.796
Antidiabetics	-.149	.628	.056	1	.813	.862	.252	2.951
Antibiotics	.605	.826	.538	1	.463	1.832	.363	9.244
Antidepression	-.171	.660	.067	1	.795	.843	.231	3.071
Antiepileptics	1.678	.650	6.659	1	.010	5.353	1.497	19.140
Richmond Agitation Sedation Scale	.800	.280	8.141	1	.004	2.225	1.284	3.853
Constant	-1.027	.653	2.475	1	.116	.358		

جـامعـــة النجاح الوطنية

كليـــة الدراســـات العليـــا

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قدمت هذه الرسالة إستكمالاً لمتطلبات الحصول على درجه الماجستير في تمريض العناية المكثفة، من كلية الدراسات العليا، في جامعة النجاح الوطنية، نابلس– فلسطين.

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الملخص

خلفية الدراسة: يعد الهذيان مشكلة شائعة جدًا بين المرضى، لا سيما أولئك الذين يتم إدخالهم إلى وحدة العناية المركزة. أجريت هذه الدراسة لتقدير مدى انتشار الهذيان بين المرضى الذين تم إدخالهم إلى وحدة العناية المركزة في مستشفيات شمال الضفة الغربية. قيمت الدراسة أيضًا خصائص المرضى الذين كانوا أكثر عرضة للإصابة بالهذيان.

منهجية الدراسة: أجريت هذه الدراسة كدراسة وصفية تحليلية. تم تقييم المرضى الذين تم إدخالهم إلى وحدة العناية المركزة في مستشفيات رفيديا والوطني والاتحاد والعربي ونابلس الجراحي والنجاح والانجيلي ومستشفى طولكرم الحكومي (ثابت ثابت) ومستشفى الزكاة ومستشفى جنين الحكومي ومستشفى الرازي ومستشفى قلقيلية الحكومي (درويش نزال) باستخدام أداة تقييم الهذيان.

نتائج الدراسة: شملت الدراسة ما مجموعه 100 مريض من وحدة العناية المركزة. بلغت نسبة انتشار الهذيان بين مرضى وحدة العناية المركزة 55٪. من بين المرضى، كان 20٪ يعانون من نقص النشاط، و20٪ يعانون من فرط النشاط، و14٪ لديهم نوع مختلط. ارتبط العمر والدخل بشكل كبير بالهذيان. بالإضافة إلى ذلك، ارتبط الألم وتلقي أداة تنفس أنفية عالية التدفق والتخدير العام والأدوية المضادة للصرع بشكل كبير بالإصابة بالهذيان في وحدة العناية المركزة. كان هناك ارتباط كبير بين مقياس ريتشموند للتهدئة والهذيان بين المرضى في هذه الدراسة.

الخلاصة: كان الهذيان منتشرًا بشكل كبير بين المرضى ذوي الحالات الحرجة الذين تم إدخالهم إلى وحدة العناية المركزة في مستشفيات شمال فلسطين. يجب على مقدمي خدمات العناية المركزة النظر في فحص المرضى المسنين، وذوي الدخل المنخفض، والحمى، ومن إستخدم أداة تنفس أنفية عالية التدفق، ومن إستخدم أنبوب التغذية/الأنبوب الأنفي المعدي، والتخدير العام، ومن إستخدم الأدوية المضادة للصرع من أجل هذيان. لا تزال هناك حاجة إلى مزيد من الدراسات لتحديد أفضل الطرق لمعالجة الهذيان بين المرضى ذوي الحالات الحرجة الذين يتم إدخالهم إلى وحدة العناية المركزة.

كلمات مفتاحية: الهذيان، العناية المركزة، المراقبة.