DELIRIUM ASSESSMENT IN ADULT INTENSIVE CARE UNITS: DO NURSING PRACTICES HINDER OR HELP?

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DECLARATION

I, Kamanda Kandindi, declare this research report is my own work. It is being submitted for the degree of Master of Science (in Nursing) at the University of the Witwatersrand, Johannesburg. It has not previously been submitted for any degree or examination at this or any other university.

Signature …….

……day of …… 2018

Protocol Number: M170541

DEDICATION

This study is dedicated to my family for the support and love that you demonstrated throughout the time of my study.

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"I am the vine, ye are the branches: He that abideth in me, and I in him, the same bringeth forth much fruit: for without me ye can do nothing." John 15:5(Holy Bible)

Firstly glory to the Almighty God, for by His help I was able to reach this level.

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ABSTRACT

Background: Delirium is a well-recognised and severe problem in adult intensive care units. With a reported incidence as high as 80%, it has been associated with increased length of stay, higher costs of care, on-going cognitive impairment and increased mortality. International best practice guidelines recommend nurses perform frequent delirium assessments using validated screening tools for all intensive care patients. Lack of data exists in the South African context regarding nurses' current sedation and delirium practices and their perceptions towards delirium assessments.

Setting: The settings for the study were five adult intensive care units (ICUs) at one academic hospital in Johannesburg. These intensive care units were: trauma ICU, cardiothoracic ICU, coronary care, neurosurgical ICU and General ICU.

Purpose: The purpose of this study was to determine nursing practices regarding delirium assessments in the adult intensive care units of an academic hospital in Johannesburg, to make recommendations for clinical practice and education.

Design: A quantitative-descriptive and cross-sectional design was utilised in this study. The total sample (n = 105) of registered nurses from the adult intensive care units (n = 5) between the period of 1.08.2017 to 1.09.2017 was used. Non-probability convenience sampling was utilised and data were collected using a questionnaire developed by (Devlin *et al.*, 2008).

Results: Overall 100 (n = 100) nurses responded, which yielded a response rate of 95.2% for the study. Delirium assessment was less frequent than sedation assessment (20% vs. 51%; $p<0.001$). Only 21%, ranked delirium as the most important condition to evaluate, compared with the altered level of consciousness (41%), improper placement of invasive lines (18%) and presence of pain (16%). Preferred methods for assessing delirium included assessing the ability to follow commands (51%), checking for agitation-related situations (41%), the Confusion Assessment Method for the Intensive Care Unit (24%), the Intensive Care Delirium Checklist (15%) and psychiatric consultation (12%). The barrier to assessment included intubation (57%), sedation level (21%) and lack of confidence to use delirium assessment tools (22%).The majority of participants never received an education (56%) or attended a lecture (19%) on delirium.

Conclusion: These findings provide further evidence of a theory-practice gap that is likely to exist in South Africa where best practice guidelines in the management of delirium in the ICU settings are not implemented. Recommendations are made for clinical practice and education of intensive care nurses.

Key words: delirium assessment, CAM-ICU, intensive care unit, intensive care nurse

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CHAPTER ONE

OVERVIEW OF THE STUDY

1.0 INTRODUCTION

In this chapter, an overview of the study is provided. This includes the background to the study, the problem statement, the purpose of the study, research objectives, significance of the study, definitions of the key terms, an overview of the research methodology, layout of the study and finally, the summary.

1.1 BACKGROUND OF THE STUDY

Delirium is a serious condition that affects critically ill adult patients in the intensive care unit (ICU). It has been defined as an acute change in consciousness accompanied by an inattention of either a change in cognition or perceptual disturbances (Van Rompaey *et al.*, 2008; Thomason *et al*., 2005). According to Brummel *et al*. (2013) delirium is present in as many as 60 to 80% of mechanically ventilated patients and 20 to 50% of non-mechanically ventilated patients; and it presents a change in patient's baseline mental status that can fluctuate with severity (Gesin *et al*., 2012). The primary risk factor for delirium is pre-existing cognitive impairment, and other risk factors include advanced age, the presence of acute systematic illness or medical diseases with high morbidity and use of certain medications such as benzodiazepines (Ouimet *et al.*, 2007).

Delirium is also known as acute brain dysfunction or organic brain syndrome; it is a common condition that affects all ages in intensive care (Barr *et al.*, 2013). It is considered

a medical emergency among the critically ill (Gesin *et al.,* 2012), and a marker of brain dysfunction (Ely *et al.,* 2001). It has been linked with several negative outcomes for critically ill patients such as increased length of both, intensive care and hospital stay, increased number of days spent on mechanical ventilation, and increased risk of mortality (Devlin *et al.,* 2008). Patients who experience ICU delirium are at greater risk for cognitive impairment, decreased quality of life, short and long- term emotional and psychological distress; also greater health costs after discharge (Barr *et al.,* 2013; Girard *et al.,* 2010; Ouimet *et al.,* 2007; Pandharipande *et al.,* 2013; Skrobik, 2009).

Clinically, there are three sub-type forms of delirium, the hyperactive delirium where patients present with agitation, visual hallucinations; or have an out of character behaviour. Hypo-active delirium, patients present with hypo-activity or lethargy, which often will go unnoticed because the patients appear not to pose difficulties in their clinical management. The third, the mixed delirium, manifestation is a combination of hyperactivity and hypo-activity (Brummel *et al.,* 2013; Girard, Pandharipande & Ely, 2008; Pandharipande *et al.,* 2007). In all three forms, patients' symptoms will usually fluctuate between calm and disturbed periods over the course of the day. Whether patients display delirious manifestations or not they may experience dreams, delusions and hallucinations (Kiekkas *et al.,* 2010; Wade *et al.,* 2015).

Devlin *et al.* (2008), Mistarz *et al.* (2011) and Pantichote *et al.* (2015) have showed that under-recognition of delirium is common among nurses. In order to effectively manage delirium and to improve the situation, recognition and use of validated tools play an important role (Adams *et al.,* 2015; Devlin, Brummel & Al-Qadheeb, 2012; Pun & Devlin, 2013). The Intensive Care Delirium Screening Checklist (ICDSC) and Confusion

Assessment Method of the Intensive Care Unit (CAM-ICU) are the most commonly used and studied delirium screening instruments in intensive care (Brummel *et al.,* 2013). The use of these tools has many purposes including: to communicate effectively to the health team members the patient's cognitive status through a standardized score (Ely *et al.,* 2001); to modify patient management such as reducing administration of delirium-associated drugs (Shehabi *et al.,* 2012), to implement possible pharmacologic and non-pharmacologic treatment measures for delirium (Brummel *et al.,* 2013; Devlin *et al.,* 2007).

Due to the high incidence of delirium among critically ill patients, several international guidelines such as Society of Critical Care Medicine (SCCM) and National Institute of Health and Care Excellence (NICE) recommend use of a validated tool to assess delirium on a routine basis (Barr *et al.,* 2013; Devlin *et al.,* 2008; Gesin *et al.,* 2012; Ouimet *et al.,* 2007). Failure to use a validated tool by nurses and doctors may lead to 65% of cases going undetected (Girard *et al.,* 2008; Mistarz *et al.,* 2011; Spronk *et al.,* 2009). Much has been written in the last decade about under recognition and management of delirium in intensive care practices (Shehabi *et al.,* 2012). Several researchers are involved in the search for an optimal strategy to achieve best possible outcomes for patients suffering from delirium (Pandaharipande *et al.,* 2013; Shehabi *et al.,* 2012). No data exists in the South African context about nursing perceptions and practices with delirium screening tools. Therefore, this study intends to explore the practices of South African intensive care nurses in assessing patients with delirium in adult intensive care units.

1.2 PROBLEM STATEMENT

Studies suggest that there are many international practice guidelines promoting nurses to perform frequent delirium assessments using validated screening tools in intensive care units. However, lack of data exists in a South African context regarding nurse's current sedation and delirium practices and their perceptions towards delirium assessments. The research question addressed in this study was:

- What are the practices and perceptions of nurses in assessing patients with delirium in intensive care units?

1.3 PURPOSE OF THIS STUDY

The purpose of this study was to determine nursing practices regarding delirium assessments in the adult intensive care units of an academic hospital in Johannesburg, in order to make recommendations for clinical practice and education.

1.4 RESEARCH OBJECTIVES

The objectives of the study were:

- To explore current practices and frequencies in assessing delirium and sedation in ICU.
- To identify possible barriers to and enablers of delirium assessment.
- To determine ICU nurses' perceptions towards delirium assessments.

1.5 SIGNIFICANCE OF THIS STUDY

Delirium occurs in up to 80% of critically ill patients and is associated with both short-term and long-term complications. Although there has been a rising interest in assessing delirium in patients who are critically ill, this assessment has not been done in South Africa. Internationally the literature suggests nurses' practices may hinder recognition of and assessment of delirium in the ICU settings. To ensure the highest standard of nursing care, the nursing practice must be based on a strong body of scientific knowledge and empirical evidence. Knowing the practices, perceptions and opinions of nurses on delirium assessment will help to achieve easy and early detection of delirium in ICU patients, initiate treatment in time which will improve patient outcomes and prevent patients from further devastating consequences of delirium.

1.6 KEY VARIABLES

Definitions of the key variables that are used in the study are as follows.

- **Intensive care nurse**

A person registered as a professional nurse by the South African Nursing Council, who has undergone an advanced education and training program in intensive care nursing and has the direct responsibility for caring for patients in the ICUs.

- **Delirium/ ICU-delirium**

Delirium in intensive care has been defined by the American Psychiatric Association (APA) as "a disturbance of consciousness, attention, cognition and perception which develops over a short period (usually hours to days) and tends to fluctuate during the day" (APA, 2013; Devlin *et al.*, 2008). The same definition was applied in this study.

- **Practices**

Practices refer to the application or use of an idea, belief or method. The Oxford Dictionary and Thesaurus (2007) defines it as a way of doing something that was the usual or expected way in a particular organization or situation. In this study, practices refer to the nurses' direct participation, application and observation of delirium in ICU will be measured using the survey tool developed by Devlin *et al.* (2008).

- **Perceptions**

Perception is defined as an idea, belief, or an image that someone has as a result of how he/she sees or understands something (Oxford Dictionary and Thesaurus, 2007). A relevant example is nurse's perceptions of delirium assessments. In this study, nurses understanding and attitudes towards delirium assessments will be measured using the survey tool developed by Devlin *et al.* (2008).

1.7 OVERVIEW OF THE RESEARCH METHODOLOGY

Research methodology refers to overall plan that guides the researcher to have control over factors that could interfere with desired outcomes (Burns & Grove, 2009). A non-experimental, quantitative and cross-sectional design was utilised to achieve the objectives of the study. The study respondents were all intensive care trained and registered nurses affiliated to five adult intensive care units at a 1,200 bedded tertiary public sector hospital in Johannesburg, using a self-administered questionnaire by Devlin et al. (2008). The five ICUs included the General ICU, Trauma ICU, Cardiothoracic ICU, Neurosurgical ICU and Coronary Care ICU.

Ethical clearance and permission to conduct the study was obtained from the relevant University Research Committees, the Department of Health and the hospital. Participation in the study was voluntary and respondents were free to withdraw at any time.

After permission was obtained from the hospital and nurse unit managers, consent was obtained from the ICU nurses who agreed to participate in the study. Descriptive and inferential statistics were used to analyse the results of the study, with statistical software STATA version 13 used for analysis of the data. Reliability of the study was maintained by ensuring the researcher adhered to guidelines provided by the developers of the questionnaire. The researcher was the sole collector of the data. The sample size was achieved by a convenience sampling method. The data was verified by a biomedical statistician to ensure accuracy of the findings. Validity of the study was achieved by ensuring the data collection were verified by a small group of ICU clinical specialists to fit into the South African context.

1.8 LAYOUT OF THE STUDY

The layout of the study report will be as follows:

Chapter One: Overview of the study

Chapter Two: Literature review

Chapter Three: Research design and methods

Chapter Four: Data analysis and results

Chapter Five: Summary, main findings, conclusions and recommendations

1.9 SUMMARY

In this chapter, an overview of the study was provided to introduce the reader to the study. This included the background to the study, problem statement, the purpose, the objectives, and the significance of the study, key terms used in the study were explained. The layout of the study report was also provided.

In the following chapter, the literature review will be presented. It provides a detailed discussion of the current literature on delirium in ICU.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter discusses the literature review conducted for the study. Burns and Grove (2011) described a literature review as a well-organised written presentation of what has been published by a scholar on the topic of interest. A literature review lays the foundation for the study as it gives representation of what is known and not known about the topic under study.

The literature review focused on the epidemiology of delirium, risk factors for delirium, patient outcomes, and pathophysiology of delirium, the assessment and monitoring of delirium and non-pharmacological and pharmacological treatment interventions as well as nursing implications.

2.2 EPIDEMIOLOGY OF DELIRIUM

Delirium has had many different names and definitions in the past (Adamis *et al.,* 2007). Studies have shown that up to 25 terms were used in the past to describe delirium in the intensive care unit. Among the most commonly used are aggression and agitation, cognitive impairment, acute confusion and ICU psychosis (Arend *et al.,* 2009). Others include acute exogenous reaction type, acute brain failure, acute confusional state, ICU syndrome, acute brain syndrome, metabolic, encephalopathy, postoperative delirium, cardiac psychosis and toxic psychosis (Arend *et al.,* 2009; Boot, 2011; Devlin *et al.,* 2007).

2.2.1 Definition

Presently, a more precise definition of delirium is used based on the diagnostic criteria for delirium of the Diagnostic and Statistical Manual of Mental Disorders (DSM) fourth edition (DSM-IV, 2013) which are:

- "Disturbance of consciousness with reduced ability to focus, sustain or shift attention.
- A change in cognitive or the development of perceptual disturbance that is not better accounted for by pre-existing, established, or evolving dementia.
- The disturbance develops over a short period and tends to fluctuate during the day
- There is evidence from the history, physical examination, or laboratory findings that the disturbance is caused by the direct physiological consequences of a general medical condition".

This definition highlights the four characteristic features of delirium which include: "altered level of consciousness, inattention, disorganised thinking and acute onset with a fluctuating course" (APA, 2013; Boot, 2011; Devlin *et al.*, 2007). Arend *et al.* (2009) highlighted in their study that the diagnosis of delirium could be differentiated from anxiety, agitation and psychosis mostly by the inattention features.

2.2.2 Prevalence of Delirium

Critically ill patients are prone to the development of delirium during their stay in ICU, and this most commonly affects about 80% of critically ill patients of whom 60% were previously comatose or on mechanical ventilation. However, these figures may vary

depending on whether the study sample was drawn from medical, surgical, cardiac or neurological intensive care units.

A study by Sallut *et al.* (2010), they aimed to conduct a 1-day point prevalence of delirium in 104 intensive care units in 11 countries in America and Europe. The study findings reported that 32.3% of overall critically ill patients admitted to intensive care units developed delirium; all ICU disciplines were combined in this study (Sallut *et al.*, 2010). These findings are supported in other similar European and Asian studies (Adamis *et al.*, 2012; Kogaa *et al.*, 2014; Ouimet *et al.*, 2007; Roberts *et al.*, 2005; Sharma *et al.*, 2012; Vreeswijk *et al.*, 2008).

Findings from other studies have consistently demonstrated that these figures are higher amongst critically ill patients on mechanical ventilation, whereby up to 83.3% developed delirium (Bergeron *et al.*, 2001; Ely *et al.*, 2001; Ely *et al.*, 2004; Lat *et al.*, 2009).

Another study by Pandharipande *et al.* (2008), they found that prevalence of delirium was 70% in the combined surgical and trauma ICU patients with 73% of surgical and 67% of trauma patients develop delirium. Also, a literature review of medical patients reported that from 10% to 31% of medical inpatients develop delirium (Siddiqi *et al.*, 2006). All of these studies indicated that about half of the critically ill patients develop delirium during their stay in ICU with a high prevalence of up to 80% of those mechanically ventilated.

2.2.3 Types of Delirium

There are three subtypes of delirium in critically ill patients. Psychomotor activity, behaviour and attention are the determinants of this classification, which include: a) hyperactive delirium, b) hypoactive delirium and c) mixed delirium (Elliot, 2014).

Hyperactive delirium is seen in 5% to 22% of patients diagnosed with delirium (Elliot, 2014; Holly *et al.*, 2012; Olson, 2012). Hyperactive delirium exhibits overt manifestations such as agitation and restlessness. These patients are likely to become combative and uncooperative. They may experience visual and tactile hallucinations. Because of the acute onset of confusions, they are more likely to pull at tubes, catheters and intravenous lines (Allen & Alexander, 2012; Holly *et al.*, 2012; Olson, 2012). Hyperactive delirium can be more easily recognised, and therefore it is associated with better patient outcomes (Elliot, 2014).

Hypoactive delirium is more frequently undiagnosed. These patients do not act out as hyperactive patients, but instead appear to be calm or peaceful. Hypoactive delirium is seen in up to 86% of critically ill patients with delirium (Spiller *et al.* 2006). These patients may present with apathy and lethargy, a flat affect, decreased responsiveness and movement and withdrawal. Often they will sleep continuously during the day and do not ask for assistance. Therefore hypoactive delirium may be misdiagnosed as depression (Elliott, 2014; Spiller *et al.*, 2006).

Delirium is of the mixed type when patients fluctuate between hyperactive and hypoactive characteristics, exhibiting manifestations of either both concurrently or characteristics of

one type followed by characteristics of the other (Elliott, 2014; Peterson *et al.*, 2006). The patient may be calm at one point during the shift and followed by nervous a short time later. Additionally, some patients may have delirium features without manifesting the complete syndrome of delirium. In the study of Peterson *et al.* (2006), they reported that mixed delirium accounted for 54.9% of all delirium (n=475) in their study sample.

2.3 RISK FACTORS FOR DELIRIUM

Some risk factors have been identified in the literature reviewed for this study. These can be broadly categorised into two groups: namely a) predisposing risk factors and b) precipitating risk factors, which will be discussed in the following section.

2.3.1 Predisposing Risk Factors

Predisposing risk factors are those factors that are present in the admission of a patient in the ICU, so they are difficult to change. Studies conducted by Van Rompaey *et al.* (2008), Ouimet *et al.* (2007) and Pandheripande *et al.* (2008) have reported that age older than 65 (>65) years is a definite risk factor for the development of delirium. Dementia has been identified as crucial predisposing risk factor for delirium pre and post-admission in ICU (Allen & Alexander, 2012; McNicoll *et al.* 2003). Other predisposing factors reported in the literature include depression, the severity of the injury, chronic illness conditions such as hypertension, alcohol abuse and tobacco, visual and hearing impairment (Allen & Alexander, 2012; Ouimet *et al.*, 2007).

2.3.2 Precipitating Risk Factors

Precipitating risk factors are those that happen during the ICU stay, which may be caused by the nature of patient's acute illness and considered as potentially modifiable (Alexander, 2009; Olson *et al.*, 2012). The severity of critical illness, as measured by the Acute Physiology and Chronic Health Evaluation (APACHE II), was mentioned twice as a risk factor in the review by Van Rompaey *et al.* (2008). However, it was used as an adjusting covariate in the multivariate analysis (Ouimet *et al.*, 2007; Pandheripande *et al.*, 2008).

Psychoactive drugs seem to play an active role in delirium development in ICU patients such drugs include Lorazepam, Morphine and Dopamine (Dubois *et al.*, 2001; Pandheripande *et al.*, 2008). Abnormalities in laboratory blood values comprise a large group of precipitating factors in the literature, such as high levels of hepatic enzymes, hyperamylasemia, hyperbilirubinemia, hypocalcaemia, and hyponatremia (Eldemir *et al.*, 2001). In addition, hypotension, anaemia, azotemia, coma, epidural catheter use, fever, dehydration, seizure and head trauma have also been identified as risk factors (Eldemir *et al.*, 2001; Allen & Alexander, 2012; Dubois *et al.*, 2001; Ouimet *et al.*, 2007; Pandheripande *et al.*, 2008; Van Rompaey *et al.*, 2008).

2.4 PATIENT OUTCOMES

There are many short-term adverse consequences of delirium. For example, in a study by Ely *et al.* (2004), that aimed to investigate ICU delirium in 275 medical and coronary ICU patients. The results of this study found that the incidence of delirium during an ICU stay

was associated with a higher 6-month mortality rate (34% vs 15%, $p < .03$) and a 3 fold relative increase in 6-month mortality, when compared with, those in whom delirium never developed (hazard ratio =3.2, 95% confidence interval, 1.4–7.7, $p = .008$) (Ely *et al.*, 2004). Delirious patients were also seen with ten days longer hospital length of stay than patients without delirium (Ely *et al.*, 2004). Another study by Lat *et al.* (2009) that evaluated 134 surgical and trauma ICU patients. This study found that delirious patients needed the greater duration of mechanical ventilation (9.1 vs 4.9 days, $p<.01$) and had longer ICU (12.2 vs 7.4 days, $p < .01$) and hospital stays (20.6 vs 14.7 days, $p <.01$), respectively (Lat *et al.*, 2009).

Long-term consequences are less frequently explored in the literature. However, few are listed which include an increased transition to dementia after ICU discharge (Ely *et al.*, 2004; Holly *et al.*, 2012). For example, in a study by Girard *et al.* (2010) that investigated the relationship between duration of delirium and development of long-term cognitive impairment. The authors noted that an increase from 1 day of delirium to 5 days was independently associated with a decline in cognitive function at the 3-month follow-up (Girard *et al.*, 2010). Another study by Pisani *et al.* (2009) investigated the duration of delirium and 1-year mortality in 304 medical ICU patients. The authors found that for each additional day of delirium, the risk of 1-year mortality increased by 10% (hazard ratio = 1.10, $p = .01$) (Pisani *et al.*, 2009). Moreover, the ICU delirium was also an independent risk factor for increased ICU and hospital costs, with a median increase close to $10 000 and $15 000, respectively (Pisani *et al.*, 2009).

2.5 PATHOPHYSIOLOGY OF DELIRIUM

The pathophysiology of delirium in ICU is not fully understood at this time. It is thought to be multifactorial, and many theories have been put forward for the development of ICU delirium. It does not exclude the patient's previous psychological status, psychological trauma inflicted by illness, environmental stressors in ICU and organic factors affecting central nervous system (Holly *et al.,* 2012).

The clinical condition of delirium includes more than one etiologies and features. Further, it is believed to be related to the disturbance of brain function, due to abnormal cerebral metabolism and neurotransmitters which may come from many metabolic disorders. These include a deficiency in nutrition, endocrine imbalance, postoperative stress, the ingestion of a toxic product or alcohol consumption (Holly *et al.,* 2012).

The disturbance in the activities of neurotransmitters appears to be one of the major role players in delirium development (Cavallazi *et al.,* 2012). Acetylcholine, a neurotransmitter which is a product of choline interaction with acetyl coenzyme A (CoA) influence consciousness as well as attention by acting as a modulator in the sensory and cognitive input. Any disturbance in this pathway can affect acetylcholine activity by diminishing its excitatory effect, resulting in hypoactive delirium (Holly *et al.,* 2012). Glucose breakdown during the citric acid cycle produces Acetyl CoA which mean that malnutrition, hypoglycemia, deficiency in vitamin such as thiamine can result in Acetyl CoA deficiency as well.

Altered mechanism of synapses by anticholinergic drugs or toxins contribute to decreasing cholinergic activity, which leads to hypoactive delirium with all the symptoms such as withdrawal, sleepness, calm and less responsive (Elliot 2014). One study by Hsheh *et al.* (2008) supported the cholinergic deficiency effect in the development of hypoactive delirium. The hyperactive delirium, with contrast, can result from an excess of the monoamines dopamine and norepinephrine effects in the central nervous system (Chan *et al.*, 2006). It is also important to note that brain injury resulting from local hypoxia, hypoperfusion, cytokine-mediated inflammation, and microvascular thrombosis play a vital role in the development of delirium, explaining why patients who develop delirium can still have a long-term effect even after discharge (Holly *et al.*, 2012).

Besides the decrease in cholinergic activity, an increase in dopamine and noradrenaline activity and brain injury has been shown, along with increased serotonergic activity and a relative serotonin deficiency contribute to delirium development in ICU patients (Cavallazi *et al.*, 2012). Patients who have the serotonin syndrome, often emerging from the interaction of medications leading to increased serotonergic effects, present with hyperthermia, muscle rigidity, and multiple organ failures (Choudhury *et al.*, 2011).

Figure 2.1 displays the pathophysiology of delirium.

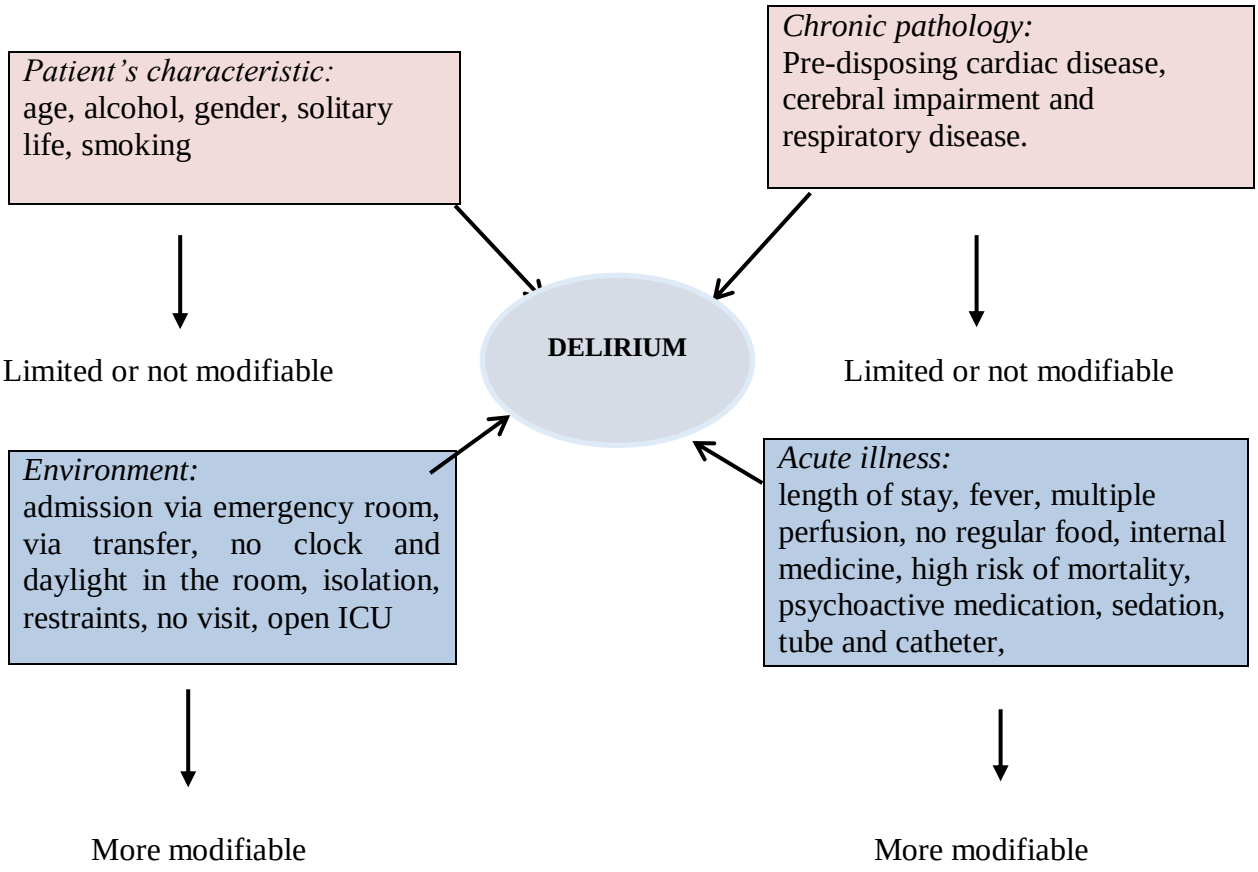

Figure 2.1 Pathophysiology of delirium

Source: Van Rompaey *et al.* (2008), cited in Holly *et al.* (2012:135).

2.6 ASSESSMENT AND DIAGNOSIS OF DELIRIUM

As previously stated, delirium is an independent predictor of death, length of stay, cost, and cognitive impairment outcome at discharge (Barr *et al.,* 2013). The American Society of Critical Care Medicine has developed global guidelines that recommend all critically ill patients be regularly monitored for delirium on a daily basis (Barr *et al.,* 2013). Although many scales have been developed over the years, assessment of intensive care delirium has been dominated by the Confusion Assessment Method for Intensive Care Unit (CAM-ICU) and the Intensive Care Delirium Screening Checklist (ICDSC) (Devlin *et al.,* 2007; Grover

et al., 2012). The tools were modified from the DSM-IV definition and had been shown to have greater validity (Devlin *et al.*, 2007).

2.6.1 The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU)

The Confusion Assessment Method for the Intensive Care Unit (CAM-ICU) was developed by Ely *et al.* (2001) in the United States of America, to be used in ICU patients (e.g., critically ill patients on or off the ventilator). It is an adaptation of the Confusion Assessment Method (CAM) created in 1990 by Dr Sharon Inouye (Inouye *et al.*, 1990). According to Ely et al. (2001) delirium is defined according to four diagnostic features:

- "Feature 1: An acute onset of changes or fluctuation in the course of mental status
- Feature 2: Inattention
- Feature 3: Disorganised thinking and
- Feature 4: Altered level of consciousness"

The patient is delirious or CAM-ICU positive when Feature 1 and Feature 2 and either Feature 3 or 4 are present. The CAM-ICU is one of the recommended ICU delirium screening tools.

The CAM-ICU has shown to be highly sensitive, specific, and reliable in the first study where delirium occurred in 87% of 38 intensive care patients (Ely *et al.*, 2001). Some of the advantages of CAM-ICU include:

- The CAM-ICU is the most valid and reliable instrument.
- CAM-ICU has high inter-rater reliability and easy to use

- CAM-ICU is not a time-consuming instrument, with an average assessment time between 2 to 5 min (Boot, 2012)
- CAM-ICU is recommended by the National Institute for Health and Clinical Excellence (NICE)
- Can be used by nurses and doctors at the patient's bedside.
- The CAM-ICU has higher sensitivity (100%) and specificity (89%) than the ICDSC (Van Eijk *et al.,* 2009)

The following disadvantages have also been reported in the literature:

- CAM-ICU is unable to detect hypoactive delirium (Devlin *et al.,* 2007)
- CAM-ICU can give false delirium assessment when patient's level of consciousness is shallow.
- CAM-ICU excluded the assessment of patients with psychiatric condition (e.g. dementia), neurological injury or structural abnormalities, whom might still be delirious (Devlin *et al.,* 2007)

2.6.2 The Intensive Care Delirium Screening Checklist (ICDSC)

The Intensive Care Delirium Screening Checklist (ICDSC) was developed by Bergeron *et al.* (2001), it includes eight-items based on DSM-IV criteria and other features of delirium. Included are: assessment of consciousness, attentiveness, orientation, the presence of hallucination or delusions, psychomotor agitation or retardation, inappropriate speech or mood, sleep/wake cycle disturbance, and overall symptom fluctuation (Bergeron *et al.,* 2001).

During the evaluation process, one (1) point is given towards each domain that is present, with the score of 4 or higher out of 8 denoting the presence of delirium (Devlin *et al.,* 2007)

In the literature, the ICDSC has been studied and demonstrate the following advantages:

- It is a user-friendly checklist (Bergeron *et al.,* 2001, Roberts *et al.,* 2005)
- It has high sensitivity of 99%
- Can be used by nurses and doctors
- Can detect hypoactive delirium (Devlin *et al.,* 2007)
- It includes a psychiatric condition in the assessment of delirium (Bergeron *et al.,* 2001, Devlin *et al.,* 2007)
- It utilises as many elements as possible from routinely collected ICU data (Plaschke *et al.,* 2008)

The Intensive Care Delirium Screening Checklist has the following disadvantages:

- The time to complete the ICDSC is not reported in the literature (Devlin *et al.* 2007)
- Poor specificity of 64%
- Less used in research settings than CAM-ICU
- The ICDSC summarises the result from different bedside assessments and tends to be more subjective than CAM-ICU (Plaschke *et al.,* 2008)

2.7 TREATMENT AND PREVENTION

The treatment of delirium is based on a multidisciplinary effort to identify patients who are at risk; prevention strategies should be in place and implemented to maintain patient safety (Faught, 2014). The treatment includes two significant strategies. Firstly, treatment of the acute cause of delirium and secondly, optimisation of cerebral conditions such as adequate oxygenation, nutrition, hydration and normal levels of metabolites, minimise drug effects, manage constipation, as well as pain, it is essential to assess and manage mental stress (Barr *et al.*, 2013). Throughout the literature, interventions to prevent or to treat delirium are divided into two categories: non-pharmacological and pharmacological intervention (Olson *et al.*, 2012).

2.7.1 Non-pharmacological Interventions

Non-pharmacological interventions are the first measure of delirium treatment, and the intensive care nurse can play an important role to implement it. Allen and Alexander (2012) and Alexander (2009) demonstrated that the non-pharmacological treatment of delirium reduced the rate of delirium in medical patients. Critical strategies arising from these studies are summarised below.

- It includes avoiding unnecessary movement, involving family members, having recognisable faces at the bedside, having means of orientation available (such as a clock and a calendar) and reducing noise.
- If this is insufficient, verbal and non-verbal de-escalation techniques may be required to offer reassurances and calm the person experiencing delirium.

- Only if this fails, or if de-escalation techniques are inappropriate, is pharmacological treatment indicated.

It has been noted that the method of "Tolerance, Anticipate, Don't Agitate" called "The T-A-DA method has been a useful management technique for people with delirium (Allen & Alexander, 2012). Other methods include removing all unnecessary attachments such as catheters, gastric tubes, allowing patients to be more mobile. Physical restraints are occasionally used as a last resort with patients in a severe delirium. Restraint use should be avoided as it can increase agitation and risk of injury, to avoid the use of restraints some patients may require constant supervision.

2.7.2 Pharmacological Interventions

Pharmacological treatment can be implemented if the non-pharmacological interventions do not provide an adequate expected outcome (Fong *et al.,* 2009), Treatment of agitation and confusion is based on the subtype of delirium. Any drug chosen to treat delirium should be started at the lowest possible dose (Faught, 2014).

The pharmacological interventions for delirium are dependant on its cause. Antipsychotics, particularly haloperidol, are the most commonly used drugs for delirium and the most studied (Olson *et al.,* 2012). However, evidence is weaker for the atypical antipsychotics, such as Risperidone, Olanzapine and Quetiapine. Benzodiazepines in themselves can cause delirium or worsen it and lack a reliable evidence base (Barr *et al.,* 2013; Olsen *et al.,* 2012), In the event that delirium is caused by alcohol withdrawal or Benzodiazepine withdrawal or in situations where antipsychotics are not advised (e.g. in Parkinson's

disease or neuroleptic malignant syndrome), then Benzodiazepines are recommended. Similarly, people with dementia with Lewy bodies may have significant side-effects to antipsychotics and should either be treated with a small dose or not at all (Fong *et al.,* 2009). The antidepressant Trazodone is occasionally used in the treatment of delirium, but it carries a risk of oversedation, and its use has not been well studied (Fong *et al.,* 2009)

The ABCDE bundled strategy is highly recommended as a way to lessen the impact of sedation, mechanical ventilation and delirium by using a standardised approach that incorporates interdisciplinary collaboration. This strategy consists of awakening, breathing coordination, delirium monitoring, and exercise/early mobility in the treatment and prevention of acute confusion. Studies have confirmed the effectiveness of this strategy in reducing the impact of delirium. For example, a recent randomised controlled trial found that early physical therapy reduces the duration of delirium in ICU patients.

2.8 NURSING IMPLICATIONS

Nurses play a crucial role in the identification of delirium in ICU (Devlin *et al.,* 2008). Flagg (2010) argued that nurses are in close contact with patients in ICU at all times, so they can recognise any discrete psychological changes in patients and are the ideal practitioner to identify delirium. The successful implementing the delirium screening in intensive care units not only depend on nurses but also on physicians, pharmacists and another allied health professionals (Devlin *et al.,* 2008).

2.8.1 Barriers and Perceptions to Delirium Monitoring

Despite many guidelines and recommendations to assess delirium in a daily basis in intensive care units, the implementation of daily screening of delirium in the intensive care unit remains a problem (Devlin *et al.*, 2008; Boot, 2012; Ouimet *et al.*, 2007; Scott *et al.*, 2013). A literature review by Devlin *et al.* (2008) Scott et al., (2013) and (Boot, 2012) identified several barriers to delirium assessment in the critically ill patient, which are summarised below.

- Delirium assessment never is shown to improve patient outcome
- Lack of knowledge regarding the presentation and sequelae of ICU delirium
- Lack of familiarity with available assessment instruments
- Available assessment instruments that are too complex
- Descriptors in available tools that are ambiguous and confusing
- Little reported use of assessment instrument outside of validating centres
- Assessment instruments designed for research personnel rather than bedside clinicians
- Lack of clear guidance regarding the patients who should receive priority screening
- Clinician time constraints
- Lack of clarity regarding the healthcare professional that should be most responsible for identifying delirium
- Inability to complete evaluation in the highly sedated patient
- Lack of experience in surgical populations

2.8.2 Previous Studies

The perception of delirium assessment in the ICU differs according to the settings. Both, nurses and doctors report that delirium is a severe, common and under-diagnosed syndrome in the ICU setting (Glynn & Corry, 2015; Devlin *et al.*, 2008).

In the USA, Ely *et al.* (2004) reported in their study that delirium was considered a significant or severe problem in the intensive care unit by 92% of healthcare professionals, but 78% acknowledged under-diagnosis. Only 40% reported routinely screening for delirium, and only 16% indicated using a specific tool for delirium assessment. A study by Devlin *et al.* (2008) revealed that delirium assessment was less common than sedation assessment (47% vs 98%, $p < .001$) and was more common among nurses who worked in medical intensive care units (55% vs 40%, $p = .03$) and at academic centres (53% vs 13%, $p < .001$) (Devlin *et al.,* 2008).

Elliott (2014) in the United Kingdom reported that 44% (n=33) of the respondents had not received education on ICU delirium and commonly associated barriers quoted in the literature appeared not to be an issue. Another study in Ireland found that almost all (95%) of the nurses recognised delirium as a serious problem, 93% considered it an under-diagnosed, only 17.9% reported support for delirium screening, and a marginal (4%) number ranked delirium essential to monitor in the ICU (Glynn & Corry, 2015). In the Netherlands, a survey conducted by Trogrlic *et al.* (2016) reported that the majority (83%) of respondents considered delirium a common and significant problem in the ICU, several important barriers to adhering to guidelines on delirium management were still present at the time of the study. In Turkey, a study by Ozsaban & Acaroglu (2015) revealed that more

than half (52.2%) of the nurses considered delirium to be a severe problem, while 73·8% reported that patients being under sedation hindered the assessment of delirium, 12% reported the excessive time taken in completing their observations was an obstacle.

It is important to note that the use of a multifaceted education program improves both nurses' knowledge about delirium and their perceptions about its recognition as was seen in the research done by Gesin *et al.* (2012). Therefore educating nurses using a different method of delirium assessment has been shown to improve practices and perceptions of delirium assessment, but also demonstrating the need for multifaceted education to achieve a thorough nursing assessment of delirium.

The recent study by Rowley-Conwy (2017) revealed that knowledge and practice of nurses on delirium were variable, but a correlation was found between education and years of experience with better scores. Several barriers to assessment delirium were reported, with the most common being lack of knowledge and difficulty in assessing intubated patients (Rowley-Conwy, 2017).

2.9 SUMMARY

This chapter discussed the literature review conducted for the study. The literature review focused on the epidemiology of delirium, risk factors and patient outcome, pathophysiology of delirium, assessment and monitoring, treatment interventions as well as nursing implications.

Chapter three discusses the research design and methodology used in the study.

CHAPTER THREE

RESEARCH DESIGN AND METHODS

3.1 INTRODUCTION

This chapter presents the research methodology and includes the research design, the research setting, sample and sampling, the inclusion and exclusion criteria, data collection, a description of the instrument used in data collection including validity and reliability of the instrument and the ethical procedures followed.

3.2 RESEARCH DESIGN

A quantitative-descriptive survey and cross-sectional design was used in the study to describe the current practices of intensive care nurses regarding delirium assessments in ICU patients. The study was conducted from the 1st of July 2017 to the 1st of September 2017.

3.2.1 Quantitative Design

Quantitative research is a research design that focuses on measurable aspect of human behaviour and found its roots in logical positivism (Brink, van der Walt, van Rensburg, 2012). It is classified as the structured approach because everything that forms the research process such as objectives, design, sample and measuring instrument is determined (De Vos *et al*., 2011).

3.2.2 Descriptive Design

According to Burns and Grove (2011) it is a research design used to identify phenomena of interest, identify variables and examine relationships that exist and to determine the frequency with which something occurs and to describe variables.

3.2.3 Cross-sectional Design

Cross-sectional is a research design where data are collected at one point in time or multiple times in a short time period (Brink, van der Walt, van Rensburg, 2012).

3.3 STUDY SETTING

The setting of the study was five adult intensive care units at a 1,200 bed capacity academic hospital in Johannesburg. These five intensive care units represent highly specialised public sector intensive care units, which accept critically ill patients from both medical and surgical disciplines, as well as trauma emergency admissions. The General ICU, Neurosurgical ICU, Trauma ICU, Cardiothoracic ICU and Coronary Care Unit are considered Level III ICUs, in terms of the South African Society of Anaesthesiology (SASA) classification system (SASA, 2013). These are academic ICUs that provide highly specialised care for patients with more than one organ failure. Intensive care treatment was provided by a multidisciplinary team of dedicated specialists of which intensive care nurses and medical doctors were considered the main team members. The number of official beds ranges from 7 to 12 intensive care beds per unit.

3.4 RESEARCH METHODS

The methods describe how the study was conducted and includes the sample, the setting, the instruments and the data collection process (Burns & Grove, 2011).

3.4.1 Population

The population for this study comprised of intensive care nurses practicing in adult intensive care units at one academic hospital in Johannesburg. The intensive care units included trauma ICU, cardiothoracic ICU, neurosurgical ICU, multidisciplinary ICU and coronary care unit.

A preliminary audit undertaken in October 2016 from the hospital allocation lists indicated that there were 105 (N = 105) intensive care registered nurses practicing in these units.

3.4.2 Sample and Sampling

Following discussion with a statistician and based on the nature of this study being a survey, it was decided to use the total sample (N=105) of intensive care nurses practicing in the intensive care units at the study selected institution. This was to ensure good representation of the population from which the sample was drawn. In this study, a non-probability convenience sample was used.

The inclusion criteria for prospective nurse participants were:

- Registered by the South African Nursing Council (SANC) with an additional qualification in intensive care nursing;
- Registered by the South African Nursing Council (SANC) as a professional nurse including permanent and agency nurses working in the selected public hospital;
- More than one year clinical experience in the selected intensive care unit.

The exclusion criterion excluded enrolled nurses and auxiliary nurses, as their sub-professional category of nursing staff practice under direct supervision of professional nurses, and were therefore not expected to have the skills and in-depth knowledge about delirium in critically ill patients.

3.4.3 Data Collection

3.4.3.1 Instrument

A questionnaire developed by Devlin, Fong, Howard, Skrobik, Yasuda and Marshall (2008) identified in the literature and previously published studies (Elliott, 2014; Forsgren & Erikksson, 2010; Scott, McIlweney & Mallice, 2013) was used to achieve the study objectives.

The survey questionnaire contained 19 questions divided into two sections (**Appendix A**). The first section comprises dichotomous and continuous questions to assess sedation and delirium assessment process, current opinions about delirium and delirium assessments and potential barriers to delirium assessment. This section contained nine questions, and the final section had ten questions that collect biographic and workplace data about the

respondents. Questions were all worded positively. Some statements are scored on a 5-point Likert scale ranging from 5 to 1, where 5 = strongly agree, 4 = moderately agree, 3 = strongly disagree, 2 = moderately disagree and 1 = neither agree nor disagree. The second section asked about demographic data from the respondents. One open ended question was included at the end of the first section allowing nurse respondents to write any issue relating to the study aim.

After verification by ICU clinical specialist experts, some questions were excluded whilst others were edited to fit the South African context.

- Item 13 was removed as the nurses involved in this study worked an average of 40 hours per week.
- Item 14 was removed as the nurses involved in this study worked day and night shift rotations according to established unit rosters.
- Items 15, 16 and 18 were removed as only one institution was involved in this study.

Some words were modified to fit the South African context. The term “to evaluate” or “evaluation” was replaced by the words “to assess” or “assessment” as these words are more familiar and better understood by nurse respondents in South Africa.

3.4.3.2 Validity and reliability of the instrument

Face and content validity was assessed by the developers in the sample of the original study, the inter-rater reliability of the instrument was reported to be 86% (Devlin *et al.*, 2008). Further, it was tested on a sample of 331 intensive care nurses in the United States

of America. Four subsequent studies (Elliot, 2014; Glynn & Corry, 2015; Ozsaban & Acaroglu, 2015; Trogrlic et al., 2016), utilising the questionnaire on independent samples of intensive care nurses were identified. These authors did not comment on validity and reliability of the scale items. However, the Cronbach alpha value for the scale items in the questionnaire was reported by the developer in the original study as 0.719, 0.730 and 0.742 (Devlin *et al.,* 2008). Thus the questionnaire was deemed suitable for use in the South African study.

3.4.3.3 Procedures

Permission was sought from the Chief Executive Officer (CEO) of the academic hospital where the study was conducted (**Appendix D**). Once permission was obtained from the institution, the permission from the nursing services manager and obtained; and thereafter the unit managers were also approached and permission was granted.

The researcher visited the units (n=5) and observed the respective nursing allocation lists for selection of potential participants. Those respondents who agreed to participate in the study were given an information letter outlining the study and its procedures (**Appendix B**). A consent form was also given to the participant (**Appendix C**). The study was anonymous, however, the participants were asked to provide information about their age group, qualification in nursing and duration of experience in the units.

Return of the completed questionnaire was placed into a self-addressed envelope and posted into a sealed box by the participant. This box was only opened once the data collection period was completed, which was from the 1st July 2017 to the 1st of September

2017. Finding a secure area to place the sealed box was negotiated by the researcher with the unit manager of the respective intensive care unit. The researcher visited the ICU on a weekly basis to remind participants to complete the questionnaire. Also a notice was posted on the ICU nurse's notice board to remind participants to complete the questionnaire.

3.5 DATA ANALYSIS

Data management ensured that data collection was within the planned time-period. Since the questionnaires were coded during data collection process, data were entered checked onto Microsoft Excel for data cleaning and coding purposes for accuracy. Data were then exported from Excel to statistical software STATISTICA version 13.1 for analysis purposes.

Demographic data were analysed using descriptive statistics to describe the characteristics of the sample group. Nominal scaled variables were displayed as numbers and percentages, interval scaled responses were reported as mean values and standard deviations. After statistical consultation, the Proportions test and factor analysis was used to make an overall relation between conditions considered essential to be assessed. Univariate and multi-variate logistic regressions were then computed to investigate factors of effective assessment of delirium in the intensive care unit. The Chi-square test was used to explore the association between the demographic data and nurse's practices to their role. For the open ended question, the researcher read all the responses and found common themes, which were used to come up with the frequencies and percentages.

3.6 PRE- TESTING

A pre-testing procedure was conducted prior to the commencement of the main study. The questionnaire was used on five (n=5) nurse respondents in another suitable ICU (private) in the same setting that was not included in the main study at the selected study site.

A pre-test was a small scale trial run of all the aspects for use in the main study. Its purpose was to help the researcher to fine-tune the study for the main inquiry and to determine whether the methodology, sampling and instruments and analyses were adequate and appropriate (De Vos *et al.,* 2011). As the survey questionnaire was developed in the USA, it was also important for the researcher to determine whether the wording and phrases on the questionnaire would be easily understood by nurse respondents in the South African study. The results from the pre-test were not be used in the main study.

3.7 ETHICAL CONSIDERATIONS

The following steps were taken to ensure that ethical considerations were observed.

- Approval for the study was sought from the Faculty of Health Sciences Postgraduate Committee and the Human Research Ethical Committee (Medical) of the University of the Witwatersrand and was granted (**Appendix D**)
- Written approval and clearance to proceed with the study was obtained from both the Faculty of Health Sciences Postgraduate Committee and the University Human Research Ethics Committee (**Appendix E**)
- Permission to conduct the research was obtained from the Director of Nursing Services and the Chief Executive Office of the hospital; thereafter permission was

obtained from the Medical Director of Intensive Care Units and respective Nurse Unit Managers (**Appendix F**).

- Permission was sought from the developer of the study instrument, and granted (**Appendix G**).
- The nurses were informed that their participation is voluntary and that they could refuse to participate at any point in the study without penalty (**Appendix B**). They were asked to sign a written informed consent form (**Appendix C**).
- The anonymity of the participants was ensured, as the names of participants were not written on any questionnaires.

3.8 VALIDITY AND RELIABILITY OF THE STUDY

In this study, reliability was maintained by ensuring consistency with the data collection instrument by using the same questionnaire administered by the researcher alone. The raw data were also verified on second entry of data capturing for statistical analysis and accuracy. Validity was maintained by using the survey questionnaire as it was used in the original study. A pre-testing procedure was carried out before the main study to ensure that the phrases of the questionnaire were clear and understood by participants in the South African context.

3.9 SUMMARY

This chapter described the research methodology. The research design was selected to appropriately meet the study objectives. An in-depth description was given of the instrument that was used for data collection. A small pre-testing procedure was conducted

at the main study site using the modified instrument. The instrument successfully met the study objectives. Ethical considerations and validity and reliability of the study has been described.

The following chapter presents data analysis and research findings.

CHAPTER FOUR

DATA ANALYSIS AND RESULTS

4.1 INTRODUCTION

This chapter describes the results of the study to investigate nurses' practices of delirium assessment in the intensive care units. This was achieved through a non-experimental, descriptive and cross-sectional survey. The population included all nurses working in the adult ICUs at a public sector tertiary hospital in Johannesburg. A sample size of 100 (n = 100) was obtained by means of convenience sampling. Data were collected by means of a data collection tool (Appendix A). Data were analysed by means of descriptive and inferential statistics. Statistical tests included the Proportions test and a factor analysis, Brandt test, univariate and multivariate logistic regressions and Chi-Square tests. Findings will be discussed on item, scale and construct level. This chapter discusses descriptive and inferential statistics employed to analyse, present and describe research findings.

4.2 APPROACH TO DATA ANALYSIS

Descriptive statistics were used to present the demographic data of nurse respondents. Included were: age, qualification, years of experience, types of ICU and current position. Measures of frequency distribution were used to summarise the questionnaire. Tables and graphs were used to present these results. Percentages in these findings were taken to the whole number.

For further exploration of the data, the overall summary of the demographic data (age, qualification and years of experience) were used as described previously and nurses' perceptions of 'conditions to be assessed in ICU' (item 1). The *Proportions test* and factor analysis were used to make an overall relation or significance between the five sub-items on the 'conditions to be assessed'. *Univariate and multi-variate logistic regressions* were then computed to investigate factors of effective assessment of delirium in the intensive care unit. The univariate logistic regression models were computed to investigate how each demographic factor (age, qualification and years of experience) contributed to the outcome, while the multi-variable regression models were used to assess the collection effect of the demographic (age, qualification and years of experience) factors on the outcome. The *Chi-square test* was used to explore the association between the demographic data and nurses' practices to their role. Statistical significance was set at level of $p<0.05$.

4.3 RESULTS

4.3.1 Socio-demographic Data

This section related to the nurse respondents' demographic data which comprised five (5) items. Items included age, qualification, and years of experience, type of ICU and clinical position, which were obtained by the researcher through a self-administered questionnaire.

A total of 100 (n = 100) nurse respondents made up the sample size. Results of this process are summarised in **table 4.1.** Items were grouped together to allow ease of discussion.

Table 4.1 Socio-demographic data of respondents for the total sample (n = 100)

Variables	Frequency	Percentage
"Age (*item 10*)		
20 to 29 years	10	10.0%
30 to 39 years	37	37.0%
40 to 49 years	23	23.0%
50 to 59 years	22	22.0%
60 and more years	8	8.0%
Qualification (*item 11*)		
Diploma	23	23.0%
Advanced diploma	39	39.0%
Bachelors	24	24.0%
Masters	12	12.0%
Doctorate	2	2.0%
Years of ICU experience (*item 12*)		
>6mnths <1 year	6	6.0%
1 to 5 years	**33**	**33.0%**
6 to 10 years	**33**	**33.0%**
>10 years to 15	14	14.0%
>15 to 20 years	13	13.0%
>21 years"	1	1.0%

Table 4.1 continued

Variables	Frequency	Percentage
"Type of ICU (*item 13*)		
General ICU	37	37.0%
Trauma	8	8.0%
Neurosurgery	25	25.0%
Cardiothoracic	30	30.0%
Coronary care	1	1.0%
Current position (*item 14*)		
Professional nurse	9	9.0%
ICU registered nurse	49	46.0%
Shift leader	25	25.0%
Charge nurse	6	5.7%
Nurses manager	1	1.0%
Nurse educator	3	3.0%
Nurse practitioner	2	2.0%
Clinical nurse specialist"	5	5.0%

Table 4.1 presented these results. The highest (37.0%; n = 37) responses were between the ages of 30 to 39 years, followed by 23.0% (n = 23) in the 40 to 49, and 22.0% (n = 22) in 50 to 59 categories, respectively. It can be extrapolated from these findings that the majority (60.0%; n = 60) respondents were between the ages of 30 to 49 years.

In terms of academic qualifications the largest (39.0%; n = 39) group of respondents held an advanced diploma. Only a marginal (2.0%; n = 2) number of respondents were educated to doctoral level. Of the remaining sample, 24.0% (n = 24) held a Bachelor's (Baccalaureate) degree and 12.0% (n = 12) were educated to master's level. It can be extrapolated from these findings that majority (62.0%; n = 62) respondents held diploma level qualifications. **Figure 4.1** displays these results.

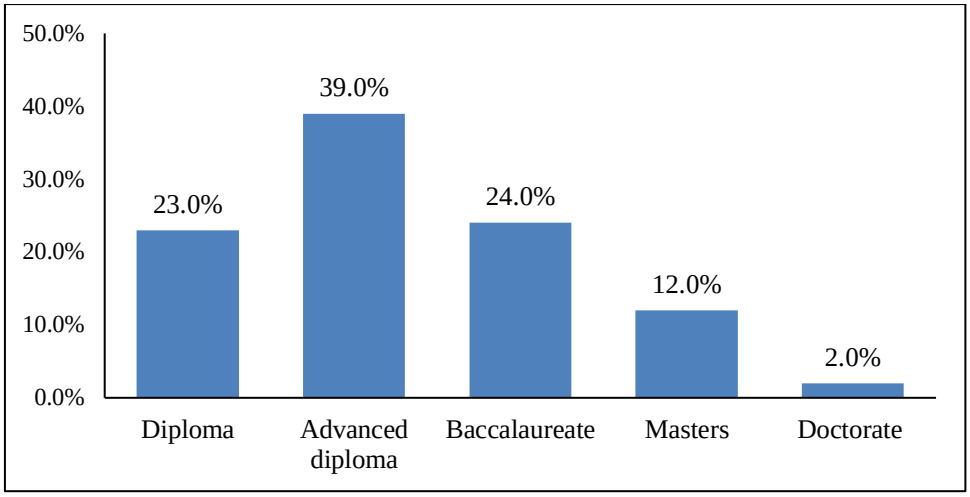

Figure 4.1 Distribution of the respondent's academic qualifications

In this study, an analysis of years of experience indicated an equal higher (33.0%; n = 33) response in the 1 to 5 year and 6 to 10 year groups. Of the remaining sample, 14.0% (n = 14) of the respondents had more than 10 to 15 years, and 13.0% had more than 15 to 20 years of experience, respectively. It can be extrapolated that majority (72.0%; n = 72) respondents had less than 10 years of ICU nursing experience. **Figure 4.2** displays these results.

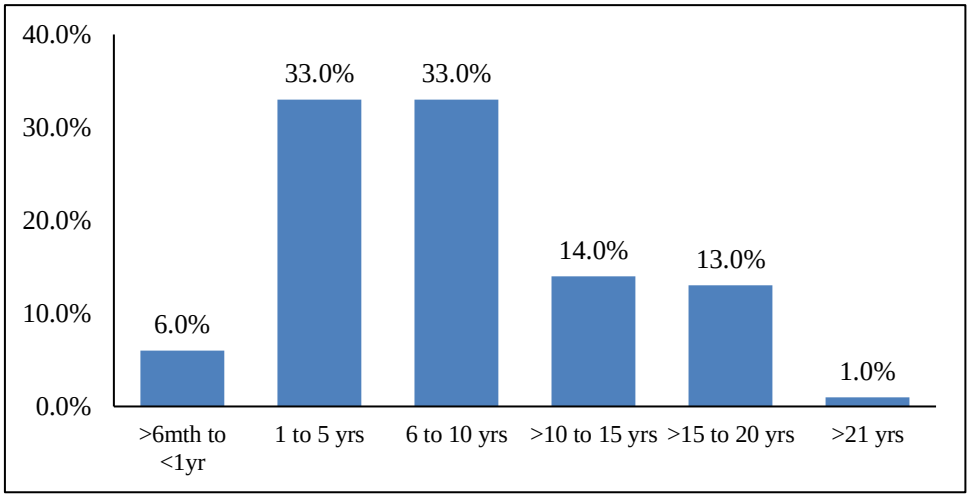

Figure 4.2 Distribution of respondent's years of ICU nursing experience

In terms of type of ICU, the largest (37.0%; n = 37) group of responses was indicated in the General ICU, followed closely by 30.0% (n = 30) and 25.0% (n = 25) as Cardiothoracic ICU and Neurosurgical ICU, respectively. It can be extrapolated from these findings that majority (92.0%; n = 92) of the nurses represented the General, cardiothoracic and neurosurgical units. **Table 4.1** displays these results.

In this study, an analysis in terms of current position indicated a higher (46.0%; n = 46) response in the ICU registered nurse group, followed by 25.0% (n = 25), 9.0% (n = 9) and 5.7% (n = 6) as shift leader, professional nurse and charge nurse, respectively. It can be extrapolated from these findings that majority (71.0%; n = 71) of the nurse respondents were involved in direct patient care. **Table 4.1** displays these results.

4.3.2 Current Clinical Practices, Use of Validated Screening Tools and Barriers and Enablers for Assessment

This section of the questionnaire related to current sedation and delirium assessment practices. It comprised of six items (items 1 to 5) to which responses were obtained from

the respondents through a self-administered questionnaire. Results of this process is summarised in **table 4.2.** Items were grouped together to allow ease of discussion.

Table 4.2 Current sedation and delirium assessment practices

Variables	Frequency	Percent
"ICU has a sedation protocol/guidelines (*item 2*)		
Yes	51	51.0%
No	37	37.0%
Not sure	12	12.0%
Missing	-	-
ICU sedation protocol specify a frequency by which delirium is assessed (*item 3*)		
Yes	20	20.0%
No	63	**63.0%**
Not sure	17	17.0%
Missing	-	-
Frequency with which level of sedation is assessed (*item 4.1*)		
Never/rarely	13	13.0%
Frequently/always	87	87.0%
Missing data"	-	-

Table 4.2 continued

Variables	Frequency	Percent
"Frequency with which level of delirium is assessed (*item 4.2*)		
Never/rarely	57	57.0%
Frequently/always	43	43.0%
Missing	-	-
Sedation assessment per 12 hour shift (*item 5.1*)		
Never	10	10.0%
One time only	27	27.0%
Two-three times	21	21.0%
More than 4 times	41	41.0%
Missing	1	1.0%
Delirium assessment per 12 hour shift (*item 5.2*)		
Never	43	43.0%
One time only	26	26.0%
Two-three times	16	16.0%
More than 4 times	13	13.0%
Missing"	2	2.0%

The majority (51.0%, n = 51) of the respondents reported that sedation protocol or guidelines were available in their units, whereas 37.0% (n = 37) reported absence of a

policy on sedation assessment in their units. Interestingly, 12.0% (n = 12) were unsure if a policy existed in their units.

Respondents were asked if this policy indicated the frequency by which delirium should be assessed. In response to this aspect, 20.0% (n = 20) of nurses stated that their units sedation policy specified the frequency of delirium assessment, while 63.0% (n = 63) reported that their policy does not state the frequency of delirium assessment; 17.0% (n = 17) remained unsure.

The number of nurses who always assessed for sedation was 43.0% (n = 43), while 44.0% (n = 44) checked frequently for sedation. Furthermore, 7.0% (n = 7) stated that they rarely assessed for sedation levels and 6.0% (n = 6) of respondents had never assessed for sedation. When comparing delirium assessment to the above data, 23.0% (n = 23) of nurses frequently assessed for delirium and 20.0% (n = 20) always performed delirium assessments. However, 39.0% (n = 39) reported that they rarely assessed for delirium, and 18.0% (n = 18) of respondents had never performed delirium assessments. **Figure 4.3** displays these results.

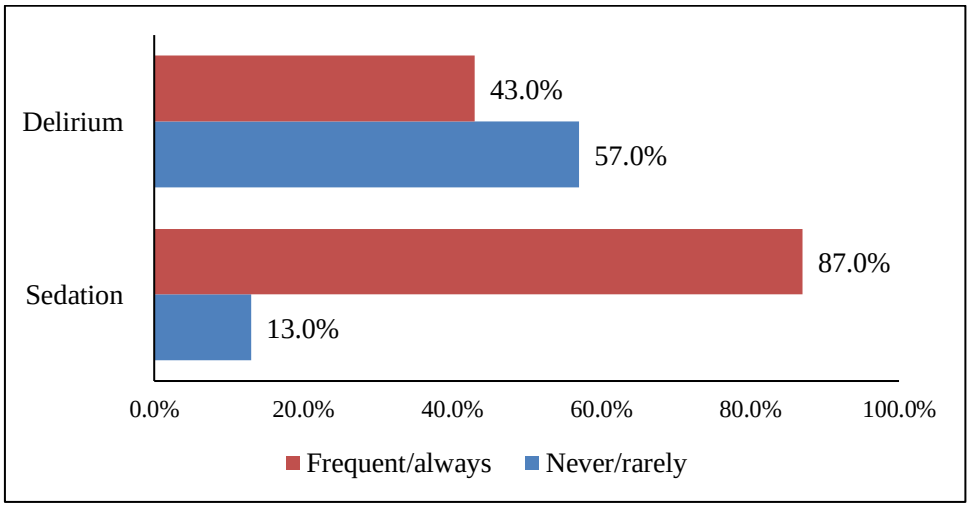

Figure 4.3 Frequency for level sedation and delirium assessment

The nurses who assessed for sedation once during their 12 hour shift were 27.0% (n = 27), while 21.0% (n = 21) evaluated two to three times. Furthermore, 41.0% (n = 41) stated that they assessed more than four times for sedation. When comparing delirium assessment to the above data, 26.0% (n = 26) assessed once per shift, 16.0% (n = 16) performed delirium assessment twice or three times. However, 13.0% (n = 13) reported that they assessed more than four times during their 12 hour shift.

4.3.2.1 Importance of delirium

Item one (1) asked respondents to rank order conditions deemed most important and least important to evaluate in intensive care units. The options provided to them were a choice out of five statements. **Table 4.3** presents these results.

Table 4.3 Conditions to be assessed by nurses in ICU

Variables	Frequency	Percentage
"Conditions deemed *most important* to evaluate in intensive care units (*item 1*)		
- Altered level of conscious	46	46.0%
- Improper placement of invasive devices	18	18.0%
- Presence of agitation	3	3.0%
- Delirium	21	**21.0%**
- Presence of pain	13	16.0%
Conditions deemed *least important* to evaluate in intensive care units (*item 1*)		

Table 4.3 continued

Variables	Frequency	Percentage
- Altered level of consciousness	16	16.0%
- Improper placement of invasive devices	31	31.0%
- Presence of agitation	26	26.0%
- Delirium	19	**19.0%**
- Presence of pain"	3	3.0%

A close majority (46.0%; n = 46) of the nurses stated that altered level of consciousness was the most important condition to be assessed. This was followed by presence of delirium (21.0%; n = 21), improper placement of invasive device (18.0%, n = 18), presence of pain (16.0%, n = 16), and agitation (4.0%, n = 4). When compared, the largest (31.0%; n = 31) group of nurses stated that improper placement of invasive devices was the least important condition to be assessed. This was followed by presence of agitation (26.0%; n = 26), delirium (19.0%; n = 19) and altered level of consciousness (16.0%; n = 16). **Figure 4.4** displays these results.

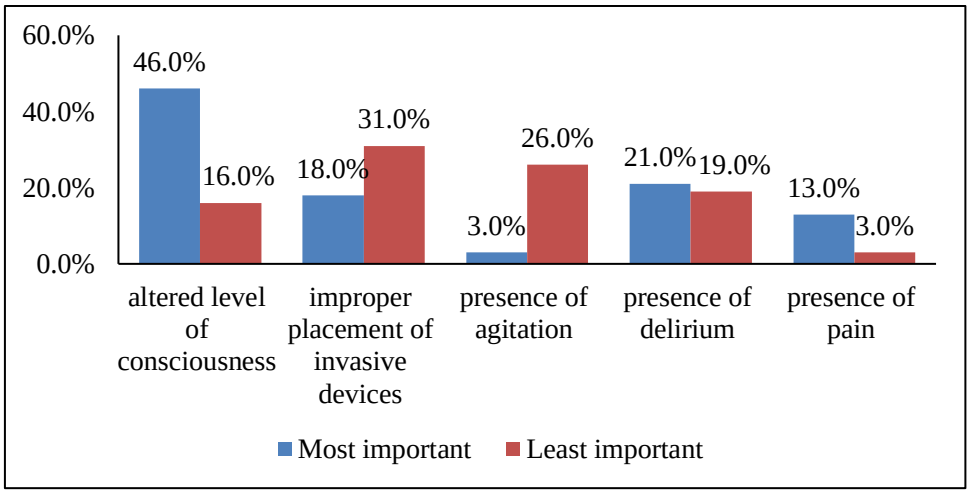

Figure 4.4 Conditions to be assessed by nurses in ICUs

4.3.2.2 Methods of screening for delirium

Item 6 required the respondents to indicate the primary means by which they assessed for delirium during their 12 hour shift and how frequently they used the tools. The options provided included for this question included was: "*ability to follow commands, agitated related events, CAM ICU, CIWAr-scales, ICDSC and psychiatric consult*."

Ability to follow commands was the most frequent method used by nurses to assess delirium (51.0%, n = 51) at least once per 12 hours shift or more which was followed by evaluation of agitated related events (41.0%, n = 41) respectively. Use of CAM-ICU and ICDSC were 24.0% (n = 24) and 15.0% (n = 15.0), respectively. 12.0% (n = 12) of nurses used psychiatric consultation to evaluate delirium and use of CIWA-AR scales 12.0% (n = 12) was reported. **Figure 4.5** displays these results.

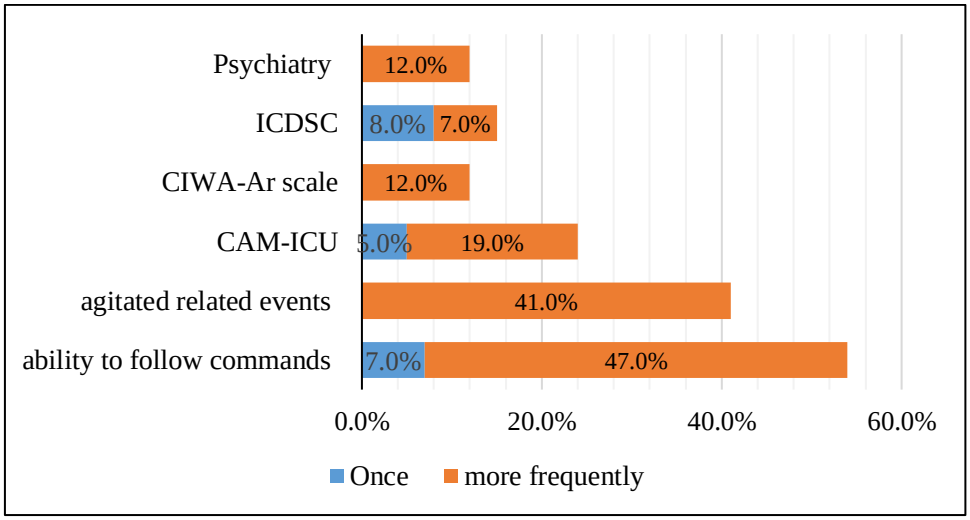

Figure 4.5 Frequency of use of validated screening tools

4.3.2.3 Barriers to delirium assessments

Item seven (7) asked the respondents to list the factors that might prevent them from assessing their patient for delirium. The options provided to them were out of a choice of ten statements and they were requested to rank the top 3 (Rank 1, Rank 2 and Rank 3, respectively) in order of importance. **Table 4.4** presents these results.

Table 4.4 Barriers to delirium assessments by rank order of importance

Statement	Rank 1	Rank 2	Rank 3
"Delirium assessment is too complex to use	5.0% (n = 5)	17.0% (n = 17)	7.0% (n = 7)
Difficult to interpret in intubated patient	**57.0% (n = 57)**	16.0% (n = 16)	9.0% (n = 9)
Do not feel confident in my ability to use delirium assessment tools	4.0% (n = 4)	5.0% (n = 5)	22.0% (n = 22)
Do not feel that using delirium assessment tool improves outcome	2.0% (n = 2)	3.0% (n = 3)	-
Inability to adequately document delirium assessments	7.0% (n = 7)	22.0% (n = 22)	3.0% (n = 3)
Inability to complete assessment in the sedated patients	5.0% (n = 7)	**27.0% (n = 27)**	10.0% (n = 10)
Not enough time to perform assessment (too time consuming)"	1.0% (n = 1)	3.0% (n = 3)	13.0% (n = 13)

Table 4.4 continued

Statement	Rank 1	Rank 2	Rank 3
"Nurses are not required to screen for delirium in my ICU	10.0% (n = 10)	1.0% (n = 1)	**17.0% (n = 17)**
Physicians already complete delirium assessments	7.0% (n = 7)	-	12.0% (n = 12)
Physicians do not use my assessment in their decision-making	2.0% (n = 2)	3.0% (n = 3)	9.0% (n = 9)
Other"	-	-	1.0% (n = 1)

In terms of rank order of important for barriers to assessments, the highest (57.0%; n = 57) response in the first rank category were related to "*difficulty to interpret in intubated patient"*, followed by 27.0% (n = 27) number of responses for "*inability to complete assessment in the sedated patients"* and 17.0% (n = 17) for *"nurses are not required to screen for delirium in ICU*" in the second and third rank categories, respectively. **Table 4.4** displays these results.

4.3.2.4 Training for sedation and delirium assessments

Item eight (8) asked of the respondents whether they had received education delirium and sedation assessment. Five options were provided for the respondents to consider in their responses.

More nurses received training for delirium assessment through live (presentation), out of hospital Continuous Education (CE) lectures (19.0%; n =19) than live (presentation), in-hospital lectures or in-service education (5.0%; n = 5). More than half (56.0%; n = 56) of the nurses reported that they had never received training for delirium assessment. Only 7.0 % of nurses reported that teaching at the bedside tool improves delirium outcome and few nurses were unable to perform a delirium assessment in sedated patients (7.0%; n = 7). **Figure 4.6** displays these results.

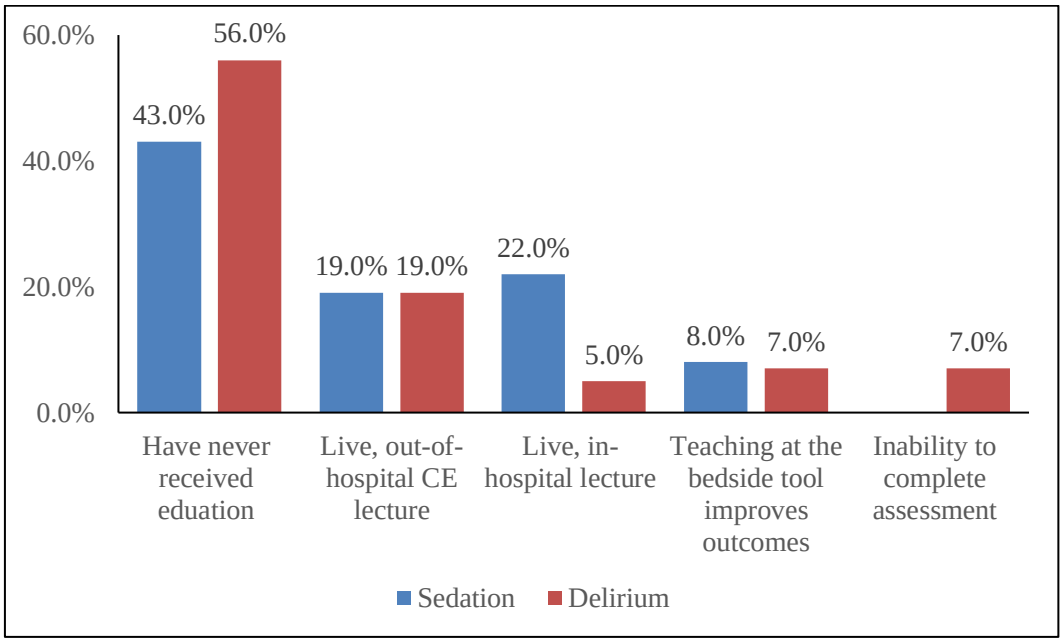

Figure 4.6 Sources of training received by the respondents

Table 4.5 Frequencies obtained for nurses' perceptions of delirium practices

Variable	Strongly agree		Moderately agree		Strongly disagree		Moderately disagree		Neither agree nor disagree	
	n	%	n	%	n	%	n	%	n	%
"Delirium is an undiagnosed problem	16	16.0%	14	13.0%	7	7.0%	21	21.0%	**42**	**42.0%**
Delirium is a common response to the ICU environment	3	3.0%	18	18.0%	6	6.0%	14	14.0%	**59**	**59.0%**
Delirium is a problem that requires active intervention on the part of caregivers	28	28.0%	12	12.0%	14	14.0%	19	19.0%	27	27.0%
Delirium is associated with higher patient mortality	12	12.0%	36	36.0%	25	25.0%	17	17.0%	10	10.0%
ICU patients with delirium are rarely agitated	14	14.0%	5	5.0%	18	18.0%	27	27.0%	**36**	**36.0%**
Initiation of antipsychotic therapy (e.g. halodol) should be the initial intervention for all patients with delirium	9	9.0%	23	23.0%	8	8.0%	25	25.0%	**35**	**35.0%**
Delirium is challenging to assess in ICU patients	10	10.0%	12	12.0%	24	24.0%	39	39.0%	15	14.0%
Patients with delirium usually have symptoms that are consistent over the entire nursing shift"	10	10.0%	37	37.0%	23	23.0%	22	22.0%	8	8.0%

4.3.3 Nurses' Perceptions of Delirium Assessment Practices

Item 9 required asked the respondents to indicate agreement with eight (8) statements related to delirium practices in ICU. The options provided to the respondents ranged from: strongly agree, moderately agree, strongly disagree, moderately disagree and neither agree nor disagree**. Table 4.6** displays these results.

Table 4.6 Summary of nurses' perceptions of delirium assessment practices by level of agreement and disagreement

Variable	Agree		Disagree	
	n	%	n	%
"Delirium is an undiagnosed problem	20	20.0%	80	80.0%
Delirium is a common response to the ICU environment	21	21.0%	79	79.0%
Delirium is a problem that requires active intervention on the part of caregivers	40	40.0%	60	60.0%
Delirium is associated with higher patient mortality	48	48.0%	52	52.0%
ICU patients with delirium are rarely agitated	19	19.0%	81	81.0%
Initiation of antipsychotic therapy (e.g. halodol) should be the initial intervention for all patients with delirium"	32	32.0%	68	68.0%

Table 4.6 continued

Variable	Agree		Disagree	
	n	%	n	%
"Delirium is challenging to assess in ICU patients	22	22.0%	78	78.0%
Patients with delirium usually have symptoms that are consistent over the entire nursing shift"	47	47.0%	53	53.0%

In the next section the relationships between demographic variables and nurses' perceptions of delirium assessment will be further explored. In order to determine the frequencies in assessing delirium and sedation in Intensive Care Units (ICU), frequency tables were computed to determine the proportions of nurses' responses on the order of importance of conditions that may occur in an ICU patient. The results are presented in **table 4.7.**

Table 4.7 Summary statistics of ICU nurses' responses on importance of conditions that may occur in an ICU patient

Rank of importance (1=most important, 5=least important)	Condition that may occur in patient									
	"Altered level of consciousness		Improper placement of invasive devices		Presence of agitation		Presence of delirium		Presence of pain"	
	n	%	n	%	n	%	n	%	n	%
1	46	46.0%	18	18.0%	3	3.0%	21	21.0%	13	13.0%
2	28	28.0%	15	15.0%	16	16.0%	9	9.0%	26	26.0%
3	4	4.0%	21	21.0%	29	29.0%	25	25.0%	29	29.0%
4	6	6.0%	15	15.0%	26	26.0%	26	26.0%	29	29.0%
5	16	16.0%	31	31.0%	26	26.0%	19	19.0%	3	3.0%

4.3.4 Relationships between Demographic Variables and Nurses' Assessments

4.3.4.1 Frequency of ICU nurses' responses on importance of conditions that may occur in an ICU patient.

To determine the frequencies in assessing delirium and sedation in Intensive Care Units (ICU), frequency tables were computed to determine the proportions of nurses' responses on the order of importance of conditions that may occur in an ICU patient and the results are presented in **table 4.7.**

A total of a 100 (n = 100) ICU nurses were respondents in the study**.** The summary statistics on nurses' responses on importance of conditions (*item 1*) that may occur in an ICU patient are presented in **table 4.7.**

Majority of the participants rated '*altered level of consciousness'* as the most important condition (46.0%; n = 46), while '*improper placement of invasive devices'* was rated as the least important by most ICU nurses (31.0%; n = 31%). The descending order of importance based on the sum of proportions of nurses' rankings was as follows: "*altered level of consciousness*" (46.0%; n = 46), "*presence of delirium*" (21.0%; n = 21), "*improper placement of invasive devices"* (18%; n = 18), "*presence of pain*" (13%; n = 13) and "**presence of agitation**" (3%; n = 3).

4.3.4.2 Relationship between demographic variables (age, qualification, experience and number of shifts) and nurse evaluations of delirium

To determine the relationship between demographic characteristics and nurses' evaluations of delirium, univariate and multivariate regression models were fitted. The following ordinal variables were considered as outcome variables "*altered level of consciousness", "improper placement of invasive devices", "presence of agitation", "presence of delirium"* and *"presence of pain"*. The outcome variables were categorised at an ordinal level of importance from category 1 -5, category 1 indicating *"most important*" and category 5 indicating "*least important*". The following demographic factors were considered as explanatory variables: age, highest qualification and years of experience. For the categorical explanatory variables, the category with the highest proportion was chosen as the base for comparison.

The following assumptions for fitting an ordinal logistic regression were checked: dependant variable measured as at the ordinal level, no or little multicollinearity (i.e. highly correlated independent variables; this applies for continuous variables) and proportionality of odds (i.e. each independent variable has a similar effect at each split of the ordinal outcome variable) (Bender & Grouven, 1997). There were no continuous explanatory variables hence, multicollinearity was not assessed. To test the assumption of proportional odds, the Brant test was used (Brant, 1990). The null hypothesis for the Brant test is that the odds are proportional, hence a p-value of >0.05 indicates that the assumption of proportionality of odds is met. The results of the Brant test are presented in **table 4.8.**

Table 4.8 Ordinal logistic regression diagnostics

Outcome variable	Variable	Brant test p-value
"Altered level of consciousness	Age	0.1133
	Years of experience	0.3355
	Highest qualification	0.8345
Improper placement of invasive devises	Age	0.1120
	Years of experience	0.9324
	Highest qualification	0.8458
Presence of agitation	Age	0.3050
	Years of experience	0.7250
	Highest qualification	0.6535
Presence of delirium	Age	0.8201
	Years of experience	0.0641
	Highest qualification	0.3274
Presence of pain	Age	06738
	Years of experience	0.4381
	Highest qualification"	0.3931

- **Relationship between demographic variables (age, qualification, experience and number of shifts) and ICU nurse ranking on altered level of consciousness**

The univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on altered level of conscious are displayed in **table 4.9.**

Table 4.9 Univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on altered level of consciousness

Outcome: Altered level of consciousness				
	Univariate analysis		**Multivariate analysis**	
	Coef (95% confidence interval)	**p-value**	**Coef (95% confidence interval)**	**p-value**
"Age				
20-29 years	-0.36 (-1.77-1.06)	0.619	-0.24 (-1.82-1.35)	0.767
30-39 years	Base			
40-49 years	-0.28 (-1.23-0.66)	0.555	-0.30 (-1.34-0.74)	0.571
50-59 years	-0.02 (-1.28-1.25)	0.613	-0.27 (-1.47-0.92)	0.652
60 + years	-0.32 (-0.76-0.20)	0.977	0.63 (-1.05-2.32)	0.461
Years of experience				
< 10 years	-0.32 (-0.76-0.20)	0.399	-0.16 (-1.17-0.84)	0.754
≥ 10 years	base			
Highest qualification				
diploma	0.04 (-0.95-1.04)	0.927	-0.10 (-1.25-1.06)	0.869
advanced diploma	Base			
baccalaureate	1.30 (0.34-2.26)	0.008*	1.35 (0.29-2.41)	0.013*
masters	0.26 (-0.92-1.44)	0.663	0.07 (-1.32-1.46)	0.926
doctorate"	-15.40 (-3302.56-3271.76)	0.993	-14.79 (-1743.33-1713.75)	0.987
*significant at the 5% level				

Table 4.9 shows the univariate and multivariate regression analysis results for assessing the relationship between demographic factors and ICU nurse ranking on the importance of altered level of consciousness. The results show that there was no significant association between nurses' age and their ranking on the importance of altered level of consciousness.

The results also show that the nurse's years of experience were not predictive of their ranking on the importance of altered level of consciousness.

However, the results show that nurses with a **baccalaureate as the highest qualification were more likely to** rank '*altered level of consciousness'* **as the least important condition** in comparison to nurses with an advanced diploma as the highest qualification both on a univariate analysis level and when adjusting for age of nurses and years of experience. Although advanced diploma nurses in this study are also registered nurses they do hold post basic additional qualifications in ICU nursing.

- **Relationship between demographic variables (age, qualification, experience and number of shifts) and ICU nurse ranking on improper placement of invasive devices**

Table 4.10 Univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on improper placement of invasive devices

Outcome: Improper placement of invasive devices				
	Univariate analysis		**Multivariate analysis**	
	Coef (95% confidence interval)	**p-value**	**Coef (95% confidence interval)**	**p-value**
"Age				
20-29 years	0.39 (-0.30-1.59)	0.518	0.13 (-1.25-1.51)	0.851
30-39 years	Base			
40-49 years	0.44 (-0.53-1.42)	0.369	0.76 (-0.31-1.83)	0.163
50-59 years	-0.35 (-1.30-0.61)	0.476	-1.03 (-2.17-0.11)	0.078
60 + years	0.10 (-1.16-1.36)	0.878	-0.04 (-1.97-1.90)	0.969
Years of experience				
< 10 years	0.06 (-0.67-0.78)	0.877	-0.23 (-1.24-0.78)	0.657
≥ 10 years	Base			
Highest qualification				
diploma	1.21 (0.25-2.18)	0.014*	1.75 (0.63-2.86)	0.002*
advanced diploma	Base			
baccalaureate	0.74 (-0.19-1.67)	0.119	1.34 (0.31-2.37)	0.011*
masters	0.51 (-0.72-1.74)	0.412	0.43 (-1.07-1.94)	0.571
doctorate"	-0.35 (-2.50-1.80)	0.750	-0.01 (-3.08-3.06)	0.993
*significant at the 5% level				

Table 4.10 shows the univariate and multivariate regression analysis results for assessing the relationship between demographic factors and ICU nurse ranking on the importance of improper placement of invasive devises. The results also show that the age of nurses and their years of experience were not predictive of their ranking on the importance of improper placement of invasive devices.

However, the results show that nurses with a diploma as the highest qualification **were more likely to** rank 'improper placement of invasive devises' as the **most important condition** as opposed to lower rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate analysis level and when adjusting for age of nurses and years of experience.

The univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on presence of agitation are displayed in **table 4.11.**

- **Relationship between demographic variables (age, qualification, experience and number of shifts) and ICU nurse ranking on presence of agitation**

Table 4.11 Univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on presence of agitation

Outcome: Presence of agitation				
	Univariate analysis		**Multivariate analysis**	
	Coef (95% confidence interval)	**p-value**	**Coef (95% confidence interval)**	**p-value**
"Age				
20-29 years	-0.17 (-1.50-1.16)	0.804	-0.11 (-1.49-1.27)	0.872
30-39 years	Base			
40-49 years	-0.24 (-1.15-0.67)	0.610	-0.39 (-0.01-2.32)	0.470
50-59 years	0.13 (-0.80-1.05)	0.788	1.16 (-0.01-2.32)	0.051
60 + years	-1.19 (-2.71-0.32)	0.122	-1.81 (-3.93-0.32)	0.096
Years of experience				
< 10 years	0.52 (-1.90 - -0.77)	0.163	0.78 (-.20-1.75)	0.118
≥ 10 years	Base			
Highest qualification				
diploma	-1.22 (-2.16 - -0.28)	0.011*	-1.53 (-2.61 - - 0.46)	0.005*
advanced diploma	Base			
baccalaureate	-1.27 (-2.21 - -0.34)	0.008*	-1.85 (-2.90 - -0.80)	0001*
masters	-0.92 (-2.10-0.27)	0.029	-0.59 (-2.90 - - 0.80)	0.384
doctorate"	14.78 (-200.99-2039.56)	0.385	15.50 (-1481.22-1518.22)	0.984
*significant at the 5% level				

Table 4.11 shows the univariate and multivariate regression analysis results for assessing the relationship between demographic factors and ICU nurse ranking on the importance of

the presence of agitation. The results also show that the age of nurses and their years of experience were not predictive of their ranking on the presence of agitation.

Nurses with a diploma as the highest qualification **were more likely to rank** 'presence of agitation' as the **most important condition** as opposed to lower rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate and multivariate analysis level.

Nurses with a baccalaureate as the highest qualification **were more likely to** rank 'presence of agitation' as the **most important condition** as opposed to lower rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate and multivariate analysis level.

- **Relationship between demographic variables (age, qualification, experience and number of shifts) and ICU nurse ranking on presence of delirium**

Table 4.12 Univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on presence of delirium

Outcome: Presence of delirium				
	Univariate analysis		**Multivariable analysis**	
	Coef (95% confidence interval)	**p-value**	**Coef (95% confidence interval)**	**p-value**
"Age				
20-29 years	0.23 (0.25-2.18)	0.711	0.35 (-0.94-1.64)	0.596
30-39 years	Base			
40-49 years	0.31 (-0.68-1.31)	0.537	0.19 (-0.98-1.37)	0.749
50-59 years	-0.36 (-1.27-0.56)	0.446	-0.27 (1.36-0.83)	0.633
60 + years	1.12 (-0.23-2.47)	0.104	1.20 (-0.68-3.07)	0.211
Years of experience				
< 10 years	-0.07 (0-0.77-0.63)	0.846	-0.19 (-1.13-0.75)	0.691
≥ 10 years	Base			
Highest qualification				
diploma	-0.28 (-1.18 - 0.63)	0.544	-0.41 (-1.42-0.60)	0.429
advanced diploma	Base			
baccalaureate	-0.70 (-1.60-0.20)	0.126	-0.60 (-1.54-0.35)	0.218
masters	0.13 (-1.14-1.41)	0.842	-0.22 (-1.65-1.21)	0.760
doctorate"	0.63 (-1.52-2.77)	0.566	-0.40 (-3.33-2.52)	0.788
*significant at the 5% level				

Table 4.12 shows the univariate and multivariate regression analysis results for assessing the relationship between demographic factors and ICU nurse ranking on presence of delirium. The results also show that the age of nurses, their years of experience and their

highest qualification were not predictive of their ranking on the importance of the presence of delirium.

- **Relationship between demographic variables (age, qualification, experience and number of shifts) and ICU nurse ranking on presence of pain**

Table 4.13 Univariate and multivariate ordinal logistic regression analysis for the association between demographic variables and ICU nurse ranking on presence of pain

Outcome: Presence of pain				
	Univariate analysis		**Multivariate analysis**	
	Coef (95% confidence interval)	**p-value**	**Coef (95% confidence interval)**	**p-value**
"Age				
20-29 years	0.38 (-1.56-0.81)	0.534	0.21 (-1.07-1.49)	0.745
30-39 years	Base			
40-49 years	0.47 (-0.45-1.39)	0.318	-0.02 (-1.14-1.11)	0.977
50-59 years	0.07 (-0.94-1.09)	0.885	-1.36 (-2.59 - -0.12)	0.031*
60 + years	0.57 (-0.74-1.89)	0.395	-0.07 (-1.87-1.74)	0.944
Years of experience				
< 10 years	-1.37 (-2.14 - -0.60)	0.000*	-1.87 (-2.92 - -0.83)	0.000*
≥ 10 years	Base			
Highest qualification				
diploma	0.38 (-0.56-1.33)	0.428	1.05 (-0.04-2.14)	0.059
advanced diploma	Base			
baccalaureate	1.09 (0.13-2.05)	0.026*	1.75 (-0.36-2.29)	0.002*
masters	0.93 (-0.18-2.05)	0.101	0.97 (-0.36-2.29)	0.153
doctorate"	-0.80 (-2.99-1.39)	0.473	0.31 (-2.68-3.29)	0.841
*significant at the 5% level				

Table 4.13 shows the univariate and multivariate regression analysis results for assessing the relationship between demographic factors and ICU nurse ranking on the importance of the presence of pain. The results also show that the age of nurses was not predictive of their ranking on the importance of the presence of pain.

Nurses with **less than 10 years of experience** in nursing **were more likely to rank** 'presence of pain' as **the most important condition** as opposed to lower rankings in comparison to nurses with more than 10 years of experience in nursing.

Nurses with a **baccalaureate as the highest qualification were more likely to** rank 'presence of agitation' as the **least important condition** as opposed to higher rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate and multivariate analysis level.

4.3.5 Open-ended Responses

One open-ended item on the instrument inquired whether the respondents wished to make additional comments or recommendations about delirium assessment in the ICU setting. Findings indicated that 27% (n = 27) of the respondents suggested that they wanted to "*learn more*" about delirium assessment. Further, results demonstrated that 7% (n = 7) of the respondents commented that they found the study "*interesting and would like to know more*".

4.4 DISCUSSION OF MAIN FINDINGS

The purpose of this study was to determine nursing practices regarding delirium assessments in the adult intensive care units of a public hospital in Johannesburg, in order to make recommendations for clinical practice and education.

In this study, a *demographic profile* of the respondents is presented in this part of the questionnaire. Five items supported the results and discussion of the findings in this part of the questionnaire.

Related to ages of respondents, the largest (37.0%; n = 37) group of nurses in this study were between the ages of 30 to 39 years, and 23 (23.0%; n = 23) were in the 40 to 49 age categories. This suggests that 60.0% (n = 60) of the nurses in this study were between the ages of 30 to 49 years. These findings are lower than 51.1% reported in a survey (Korkmaz *et al.,* 2015) with a sample of Turkish nurses.

Related to highest level of education, most (62.0%; n = 62) nurses had a diploma level qualification. This finding is higher than 24.5% (n = 37) reported in a survey (Glynn & Corry, 2015) with a sample of Irish nurses (n = 151). This finding is higher than 17.5% reported in a survey (Korkmaz *et al.,* 2015) with a sample of Turkish nurses (n = 97). In this study, one-quarter (n = 24; 24.0%) of the nurses had a bachelor's degree. This finding is lower than 75% (out of 331) reported in a survey (Devlin *et al.,* 2008) with a sample of North American nurses (n = 331). This finding is lower than 62.3% reported in a survey (Glynn & Corry, 2015) with a sample of Irish nurses. This finding is lower than 60.8% reported in a survey (Korkmaz *et al.,* 2015) with a sample of Turkish nurses (n = 97). In

this current study, a marginal (12.0%; n = 12) number of nurses had a master's degree. This finding is slightly higher than 10.0% reported in a survey (Devlin *et al.,* 2008) with North American nurses. This finding is slightly lower than 13.2% reported in a survey (Glynn & Corry, 2015) with a sample of Irish nurses.

Related to years of nursing experience, more than one third (39.0%; n = 39) of the nurses had less than 5 years of ICU nursing experience. This finding is similar to one survey by Gong *et al.* (2009) that indicated 38.2% as less than 5 years of ICU nursing experience in their sample of Chinese nurses. This finding is higher than 26.1% reported in a survey (Eastwood *et al.,* 2012) with a sample of Australian nurses (n = 110), but lower than 62.81% indicated in one study by Xing *et al.* (2017) with a sample of Chinese nurses (n = 991). This finding is lower than 73.2% in a survey (Korkmaz *et al.,* 2015) with a sample of Turkish nurses.

In addition, one third (33.0%; n = 33) of the nurses in this study had more than five years and less than ten years of ICU nursing experience. This finding is comparable with a United Kingdom survey by Rowley-Conwy (2017), whereby it was indicated as 32% in their sample of nurses (n = 31). This finding is higher than 23.01% reported in a survey (Xing *et al.,* 2017) with a sample of Chinese nurses. This finding is higher than 18.5% reported in a survey (Eastwood *et al.,* 2012) with a sample of Australian nurses. This finding is higher than 30.9% reported in the survey (Gong *et al.,* 2009) with a sample of Chinese nurses.

In this current study, more than one quarter (28.0%; n = 28) of the nurses had between 10 and 21 plus years of ICU nursing experience. This finding is higher than 23.0% reported in

a survey (Rowley-Conwy, 2017) with a sample of British nurses. This finding is lower than 55.3% reported in a survey (Eastwood *et al.,* 2012) with a sample of Australian nurses. This finding is lower than 30.9% reported in a survey (Gong *et al.,* 2009) with a sample of Chinese nurses.

Related to place of work of respondents, more than one third (37.0%; n = 37) of the nurses were in full time employment in the general mixed ICU. This finding is higher than 20% reported in a survey (Devlin *et al.,* 2008) with a sample of American nurses, but lower than 79.61% indicated in one study (Xing *et al.,* 2017) in their sample of Chinese nurses. In this current study, a close third (30.0%; n = 30) of the nurses were in full time employment in the cardiothoracic ICU. This finding is lower than 53.6% reported in a survey (Korkmaz *et al.,* 2015) with a sample of Turkish nurses.

Related to clinical positions of respondents, a close majority (49.0%; n = 49) of the nurses were ICU trained nurses with responsibility for direct patient care, and 25 (n = 25; 25.0%) were shift leaders. These findings are lower than 92.0% reported in a survey (Devlin *et al.,* 2008) with North American nurses. Similarly, in another survey (Glynn & Corry, 2015) indicated that 84.8% of their sample of Irish nurses were registered nurses.

In this study, this part of the questionnaire elicited respondents' perceptions about *current clinical practices, importance of delirium, methods of screening for delirium, barriers and training for use of validated screening tools*. Eight items supported the results and discussion of findings in this part of the questionnaire.

Related to current clinical practices, only a one-fifth (20.0%; n = 20) of the nurses reported that their unit protocol specified the frequency with which delirium should be assessed. These results are comparable with the study of Glynn and Corry (2015), whereby 19.0% of a sample of Irish nurses were in agreement that they had protocols that specified frequency of delirium assessment. However, these results are lower than 60.0% reported in a survey (Devlin *et al.*, 2008) with a sample of North American nurses. In addition, a majority (57.0%; n = 57) of the nurses in this study reported that they never or rarely assessed their patients for the presence of delirium. These results share some similarities with the study conducted by Devlin *et al.* (2008), whereby it was reported that 60.0% of their nurses were in agreement that they never or rarely assessed their patients for delirium. However, these findings are lower than 82.1% reported in a survey (Glynn & Corry, 2015) with a sample of Irish nurses. More recently, this particular aspect was also investigated by Rowley-Conwy (2017) with a sample of British nurses. Of their participants, only 23.0% of the nurses were in agreement that they never or rarely assessed their patients for delirium. In this current study, a majority (55.0%; n = 55) of the nurses reported that they conducted an assessment of the patient for the presence of delirium more than once (>1) per 12 hour shift. This finding is higher than 47.0% reported in a survey (Devlin *et al.*, 2008) with North American nurses. Similarly, this finding is higher than 42.0% reported in a survey (Xing *et al.*, 2017) with a sample of Chinese nurses.

When compared with sedation, a close majority (51.0%; n = 51) of the nurses reported that their unit had a sedation protocol. This finding is lower than 84.8% reported in a survey (Glynn & Corry, 2015) with a sample of Irish nurses. The finding is lower than 86.0% reported in a survey (Devlin *et al.*, 2008) with a sample of North American nurses. In addition, most (87.0%; n = 87) of the nurses in this study reported that the frequency with

which they assessed the patients sedation level as "*frequently/always*". These findings are higher than 68.0% reported in a survey (Rowley-Conwy, 2017) with a sample of British nurses. However, this current study's findings are lower than 98.0% reported in a survey (Devlin *et al.,* 2008) with North American nurses. In this current study, 89.0% of the nurses reported that they conducted an assessment of the patient for sedation more than once (>1) per 12 hour shift. This finding is lower than 98.0% reported in a survey (Devlin *et al.,* 2008) with North American nurses. However, this study's findings are higher than 23.0% reported in a survey (Rowley-Conwy, 2017) with a sample of British nurses.

Related to methods of screening for delirium, a close majority (51.0%; n = 51) of the nurses reported that the most frequently used methods to assess delirium was the *"ability to follow commands"*, followed closely by 41.0% (n = 41) of the nurses who reported *"agitated related events"* as most frequently used. These findings are slightly higher when compared with 44.4% and 37.1% respectively in a survey (Glynn & Corry, 2015) with a sample of Irish nurses. However, these findings are lower than 78.0% and 71.0%, respectively reported in a survey (Devlin *et al.,* 2008) with a sample of American nurses.

In this current study, a close one quarter (24.0%; n = 24) of the nurses reported the use of CAM-ICU, and compared with, only a marginal (n = 15; 15.0%) number for use of ICDSC as an assessment method. These findings are similar when compared with 15.81% and another 15.81% for use of CAM-ICU and ICDSC, respectively reported in a survey (Xing *et al.,* 2017) with a sample of Chinese nurses. This finding is lower than 78.0% for use of CAM-ICU and ICDSC reported in a survey (Devlin *et al.* 2008) with North American nurses. In addition, this current study's findings are than 39.0% for use of CAM-ICU assessment tool reported in a survey (Rowley-Conwy, 2017) with a sample of British

nurses, also this study found no nurse reported using the ICDSC as a delirium assessment method.

Related to the importance of delirium, a close majority (46.0%; n -= 46) of the nurses reported that "*altered level of consciousness*" was the most important condition routinely assessed, followed by 21.0% (n = 21) for "*presence of delirium*" and 18.0% (n = 18) for "*improper placement for invasive devices*". These findings are comparable with similar studies conducted in Ireland (Glynn & Corry, 2015) and North America (Devlin *et al.,* 2008).

Regarding barriers to delirium assessment, in this study the most common barriers to delirium assessment, in order or ranked priority, were "*difficult to interpret an intubated patient*" (57.0%; n = 57), "*inability to complete assessments in sedated patients*" (27.0%; n = 27) and a "*lack of confidence to use delirium assessment tools*" (22.0%; n = 22). These findings are higher when compared with 38.0%, 34.0% and 13.0% respectively, reported in a survey (Devlin *et al.,* 2008) with North American nurses. However, this current study's findings are comparable in part with one similar survey (Rowley-Conwy, 2017) that indicated the most commonly perceived barriers among their sample of British nurses were for intubated or non-verbal patients and a lack of knowledge of delirium (58.0% and 42.0%), respectively.

Regarding sources of training received by respondents, a majority (56.0%; n = 56) of the nurses in this study reported that they had never received training of any type regarding delirium assessment. This finding is higher than 39.0% reported in a survey (Rowley-Conwy, 2017) with a sample of British nurses. However, this finding is lower than 79.2%

reported in a survey (Gillen & Corry, 2015) with a sample of Irish nurses. In addition, many (43.0%; n = 43) of the nurses in this current study also reported that they had never received any type of training for sedation assessment. This finding is higher than 12.0% reported in a survey (Devlin *et al.,* 2008) with a sample of American nurses. In this current study when sources of training were compared between delirium and sedation assessment a small (19.0%; n = 19) but equal number of nurses reported live, out of hospital continuing education (CE) lecture were considered as the most likely training source. These findings are lower (46% and 30% respectively) than reported in a survey (Devlin *et al.,* 2008) with a sample of American nurses.

In addition, a small (22.0%; n = 22) number of nurses reported live, in hospital CE lecture were considered as the most likely training source for sedation, when compared with, only 5.0% (n = 5) reported for delirium assessment. These findings are lower (68% and 29% respectively) than reported in a survey (Devlin *et al.,* 2008) with a sample of American nurses. In this current study, only a marginal (<10%) number of nurses reported that teaching sedation and delirium assessment tools at the bedside improves outcomes, and only 7.0% (n = 7) reported an inability to complete delirium assessments. However, the latter finding in this current study may be an underestimation on the part of these nurses as noted in an earlier response that 22.0% (n = 22) of the nurses reported a "*lack of confidence to use delirium assessment tools*".

In this study, this part of the questionnaire elicited *nurses' perceptions of delirium assessment practices*. One item and eight statements supported the results and discussion of findings in this part of the questionnaire.

Related to respondents' perceptions of delirium assessment practices, only one-fifth (20.0%; n = 20) of the nurses in this study were in agreement that delirium is an underdiagnosed problem, and two-fifths (40.0%; n = 40) of the nurses were in agreement that delirium requires active caregiver intervention. This particular aspect was also investigated by Glynn and Corry (2015). Of these respondents in the study of Glynn and Corry (2015), 96% responded that delirium is an undiagnosed problem, and another 96% felt that delirium requires active intervention. These results are comparable with previously published studies (Devlin *et al.*, 2008; Rowley-Conwy, 2017). In addition, of the nurses (47.0%; n = 47) in this study who were in agreement with the statement, which stated that *"Patients with delirium usually have symptoms that are consistent over the entire shift*", a majority (53.0%; n = 53) of the nurses disagreed with this statement. This suggests nurses were divided into their responses to this statement.

In this study, the section relates to the univariate and multivariate analysis of *relationships between demographic variables* and *nurses' perceptions of delirium assessments*.

The results show that **nurses with a bachelor's degree as the highest qualification were more likely to rank "*altered level of consciousness*" as the least important condition** as opposed to higher rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate (OR 1.30; CI 0.34-2.26; p = 0.008) analysis level and when adjusting for age of nurses and years of experience.

The results show that **nurses with a diploma as the highest qualification were more likely to rank "*improper placement of invasive devices*" as the most important condition** as opposed to lower rankings in comparison to nurses with an advanced diploma

as the highest qualification both on a univariate (OR1.21; CI 0.25-1.67; p = 0.014) analysis level and when adjusting for age of nurses and years of experience.

Nurses with a diploma as the highest qualification were more likely to rank '*presence of agitation*' as the most important condition as opposed to lower rankings in comparison to nurses with an advanced diploma as the highest qualification both on a univariate (OR -1.22; CI -2.16-0.28); p = 0.011 and multivariate (OR -1.53; CI -2.61-0.46; p = 0.001) analysis level.

Nurses with a baccalaureate as the highest qualification were more likely to rank 'presence of agitation' as the most important condition as opposed to lower rankings in comparison to nurses with an advanced diploma as the highest qualification both an a univariate (OR -1.27; CI -2.10-0.27; p = 0.008) and multivariate (OR -1.85; CI -2.61- 0.46 ; p = 0.001) analysis level.

Nurses with less than 10 years of experience in nursing were more likely to rank 'presence of pain' as the most important condition as opposed to lower rankings in comparison to nurses with more than 10 years of experience in nursing both on a univariate (OR -1.37; CI -2.14- 0.60; p = 0.000) and multivariate level (OR -1.87; CI –2.92-0.83; p = 0.000) analysis level.

Nurses with a baccalaureate as the highest qualification were more likely to rank 'presence of pain' as the least important condition as opposed to higher rankings in comparison to nurses with an advanced diploma as the highest qualification both on a

univariate (OR -1.09; CI 0.13-2.05; p = 0.0026) and multivariate level (OR -1.75; CI – 0.36-2.29; p = 0.002) analysis level.

The results also show that the age of nurses, their years of experience and their highest qualification were not predictive of their rankings on the importance of the presence of delirium.

In this study, the final section of the questionnaire presents the content analysis of one-open ended questions about respondent's opinions on delirium assessment in their units. Findings indicated that more than one-quarter (27%) of the nurses suggested that they wanted to "*learn more*" about delirium assessments, a marginal (7%) number commented that they found the study '*interesting and wanted to know more'*.

4.5 SUMMARY

This chapter presented the descriptive and inferential statistical tests that were used to describe and analyse the data. The data and interpretation of results were presented, tables and figures were drawn to provide a clear presentation of the results.

In the following chapter the findings of the study will be discussed.

CHAPTER FIVE

SUMMARY OF THE STUDY, MAIN FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This concluding chapter of the research report presents the summary of the study, main findings are discussed and the limitations are described. This is followed by recommendations for clinical nursing practice, education and future research based on the findings of this study.

5.2 SUMMARY OF THE STUDY

5.2.1 Purpose of the Study

The purpose of this study was to determine nursing practices regarding delirium assessments in the adult intensive care units of an academic hospital in Johannesburg, in order to make recommendations for clinical practice and education.

5.2.2 Objectives of the Study

The objectives of the study were to:

- Explore current practices and frequencies in assessing delirium and sedation in ICU
- Identify possible barriers to and enablers of delirium assessment

- Determine ICU nurses' perceptions towards delirium assessment

5.2.3 Methodology

Ethical clearance (M170541) was granted by the Human Research Ethics Committee of the University of Witwatersrand (Appendix D) before data collection commenced. Permission was also obtained from the Chief Executive Officer and the Nursing Services Manager of the hospital, allowing the researcher to collect data at the hospital (Appendix F). The five adult Intensive Care units included in the study were: General ICU, Trauma ICU, Cardiothoracic ICU, Neurosurgical ICU and Coronary Care ICU.

A small pre-testing procedure was conducted in August 2017 before commencement of the main study. The questionnaire was used on five (n=5) nurses respondents in another suitable ICU (private) adult ICU that was not included in the main study at the selected study site. Its main purpose was to verify suitability for use of the survey questionnaire for the South African context.

Data were collected between August and September 2017 by the use of a survey questionnaire (Appendix A) developed in America by Devlin (Devlin *et al*., 2008). The modified survey contained 15 questions divided into two sections. The first section (9 questions) comprised of dichotomous and continuous questions to assess current clinical practices, use of validated screening tools, importance of delirium assessment, and barriers to delirium assessment, sources of training and current opinions of delirium assessment practices. The final section had five questions that collected biographic and workplace data

about the respondents. The researcher used the quantitative-descriptive survey and cross-sectional design in order to answer research question.

Data was analysed with the assistance of a biomedical statistician in the postgraduate research office of student support at the Faculty of Health Sciences. Statistical tests included the Proportions test and factor analysis, univariate and multivariate logistic regression and Chi-square tests. Testing was done on the 0.05 ($p<0.05$) level of significance.

5.3 SUMMARY OF THE RESEARCH FINDINGS

The *first objective* was to explore current practices and frequencies in assessing delirium and sedation in ICU. Only one-fifth (20%) of nurses in this study reported that their unit protocol specified the frequency with which delirium should be assessed. When compared with sedation, a close majority (51%) of the nurses reported that their unit had a sedation protocol, 87% reported that they assessed sedation level frequently. In addition, a close majority (51%) of the nurses reported that the most frequently used methods to assess delirium was "*ability to follow commands*", followed by 41% who reported "*agitated related events*" as most frequently used. Only one quarter (24%) of nurses reported that they used CAM-ICU, when compared to, 15% and 12% for use of ICDSC and psychiatric consultation, respectively. Only 20% of the nurses considered delirium as the most important condition routinely assessed.

The *second objective* was to identify possible barriers to and enablers for delirium assessment. Barriers to delirium assessment in order of ranked priority, were intubation (57%), sedation level (27%) and lack of confidence to use delirium assessment tools

(22%). Most (56%) nurses had never received education or attended a lecture (19%) on delirium. In this current study only a marginal (<10%) of the nurses reported that teaching sedation and assessment tools at the bedside improves outcomes, and only 7% reported at inability to complete delirium assessments. However, the latter finding may be an underestimation on the part of these nurses as noted in an earlier response that 22% reported a *"lack of confidence to use delirium assessment tools*".

The *third objective* was to determine ICU nurses perceptions toward delirium assessment. Only one-fifth (20%) of nurses in this study were in agreement that delirium is an undiagnosed problem, and yet about half (44%) were in agreement that delirium requires active caregiver intervention. However, a close half (44%) of the nurses agreed with the statement that *"patients with delirium usually have symptoms that are consistent over the entire shift*". However, this latter finding is contradictory to the DSM-IV features definition of delirium, which states that it develops over a short period and fluctuates during the day (APA, 2013).

5.4 LIMITATIONS OF THE STUDY

The researcher acknowledges the following limitations in this study:

- The findings of this study cannot be generalised to other populations as the study was contextual and conducted in only one hospital in one province.
- The investigation of practices on delirium assessment in ICU looked at the perceptions of nurses' without comparing same with medical doctor's opinions.
- The use of non-probability convenience sampling and a relatively small sample
- The perceptions and practices of nurses may not be representative of patient care

In consideration of these limitations, the findings of this study cannot be generalised unless replication of the study is carried out on a larger scale including adult intensive care units in other public hospitals.

5.5 CONCLUSION

This study represents the first findings of nurses' practices and perceptions on delirium assessment in South Africa. The results of the study showed that although many nurses are educated in the speciality area of clinical practice they lack knowledge of the principles of best practice guidelines when it comes to delirium assessment and prevention. Most nurses placed emphasis on "*altered level of consciousness*" as the most important condition that may occur in a patient. According to the best practice guidelines "*altered level of consciousness*" is an important consideration because it is usually linked to the Glasgow Coma Scale, but it is only one of the four features in terms of current APA (2013) definition of ICU-delirium, which is also applied in the best practice international guidelines. These findings are not in agreement with the best practice delirium guidelines by the National Institute for Health Care Excellence (NICE, 2010). In this study, the major barrier for nurses to delirium assessment was patient's intubation, which is in agreement with other similar studies (Glynn & Conny, 2015; Rowley-Conwy, 2017; Devlin et al., 2008). The findings in this study also showed a lack of nursing knowledge not only on delirium assessment but also on sedation assessment as well. The nurses perceived that delirium is an underdiagnosed problem, yet most critically ill patients present with hypo-active delirium than others subtypes of delirium. These findings are in agreement with the other similar studies by Spiller *et al.* (2006) and Elliot (2015). In light of these findings delirium assessment remains a challenge for nurses working in these South African intensive care units hence it can be concluded that the current nurses' practices in this

South African do not help but actually are a hindrance for delirium assessments in the intensive care units.

5.6 RECOMMENDATIONS OF THE STUDY

Based on the findings of the study the following recommendations for clinical practice, nursing education and further research are suggested.

5.6.1 Recommendations for Clinical Nursing Practices

The following recommendations for practice are made:

- There should be a evidence based protocols and guidelines on sedation level assessment that indicate that delirium should be assessed in every intensive care unit as recommended by the Society of Critical Care Medicine.
- There should be an inter-disciplinary team work in all the intensive care unit on the implementation of delirium assessment guidelines where physician will take in to account the assessment done by nurses on delirium.
- There should be a program based on the intervention promoting the implementation of delirium assessment in the intensive care unit.

5.6.2 Recommendations for Intensive Care Nurses Education

The following recommendations were made for nurse's education:

- There should be a well-established educational program in all the intensive care unit on sedation level and delirium assessment, this educational program should be

based on the importance of sedation level and delirium assessment, recommended tools for assessment and how to use them.

- There should be an in-service training on CAM-ICU and ICDSC in all the intensive care unit.
- Collaborative partnerships should be established with educators who are responsible for directing education programs to new intensive care nurses to ensure education is aligned to clinical practice.

5.6.3 Recommendations for Further Research

The results of this study highlight potential areas for further study including:

- This study should be repeated using the same method and instrument in a different setting in another province, different hospitals or even private sector hospital. This will help to generalise the findings of this study.
- Study that investigates the proper intervention needed in order to encourage delirium assessment and sedation assessment in the intensive care units by nurses
- Further research can also be conducted on the appropriate educational program on delirium assessment that will help promote implementation of regular delirium assessment in the intensive care unit.

This chapter concludes the research report. This study was conducted with the purpose of determining nurse's practice regarding delirium assessment in the intensive care unit of an academic public hospital in Gauteng. The findings from this study provide evidence that support a theory practice gap in the South African setting where best practice guidelines on the management of delirium in the ICU setting are not being implemented.

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APPENDIX A

DELIRIUM ASSESSMENTS IN ADULT INTENSIVE CARE UNITS: DO NURSING PRACTICES HINDER OR HELP

DATA COLLECTION INSTRUMENT

*Delirium is defined as an acutely changing or fluctuating mental status, inattention, disorganised thinking, and an altered level of consciousness (Devlin *et al.* 2008).

1. Of the following conditions that may occur in an ICU patient, please RANK (1 to 5) **the order of importance in which you feel they should be assessed by nurses over the average shift** by placing a "1" beside the factor that you think is the most important to evaluate and a "5" beside the factor that you think is LEAST important to evaluate.

	Rank
Altered level of consciousness	
Improper placement of invasive devices	
Presence of agitation	
Presence of delirium	
Presence of pain	

2. My ICU has a sedation protocol or guideline

Yes	No	Not sure

3. Does your ICU sedation protocol specify a frequency by which delirium should be assessed?

Yes	No	Not sure

4. For the ICU patients whom you care for, **how often do you assess a patient's level of sedation and presence of delirium?** For example it you usually assess for the presence of delirium frequently than place a tick beside "presence of delirium" in the "frequently" column.

	Never	Rarely	Frequently	Always
Level of sedation				
Presence of delirium				

5. For **the ICU patients, for whom you DO assess level of sedation and/or for the presence of delirium, please indicate the frequency per every 12-hour shift** that you conduct each assessment. For example it you usually assess for the presence of delirium twice per shift then place a tick beside x "2-3" in the "Presence of Delirium column"

Per 12-hour shift	Level of Sedation	Presence of Delirium
X 1		
X 2-3		
X 4-6		
x>6		

6. For **the ICU patients, for whom you assess the presence of delirium**, please indicate how frequently you use each of the following in your delirium assessment. Note: Please indicate frequency per every 12-hour shift. If you do not assess for delirium in your ICU patients, please indicate "never use" under each column.

Per 12-hour shift	Ability to follow commands	Agitated related to events	Confusion Assessment Method-ICU (CAM-ICU)	Intensive Care Delirium Screening Checklist	Psychiatry consult	Other (please specify)
Never heard of						
Never use						
Rarely						
X 1 time						
X 2 to 3 times						
X 4 to 6 times						
X more than 6 times						

7. From the following list of factors that might prevent you from assessing **your patient for the presence of delirium**, please RANK the TOP 3 in order of importance by placing a "1" beside the factor that you think is MOST common or significant and a "3" beside the factor that is third most important.

	Rank
Delirium assessment tools are too complex to use	
Difficult to interpret in intubated patients	
Do not feel confident in my ability to use delirium assessment tools	
Do not feel that using delirium assessment tool improves outcome	
Inability to adequately document delirium assessments	
Inability to complete assessment in the sedated patients	
Not enough time to perform assessment (too time consuming)	
Nurses are not required to screen for delirium in my ICU	
Physicians already complete delirium assessments	
Physicians do not use my assessment in their decision-making	
Other (**please specify**)	

8. I have received education regarding ICU sedation assessment and ICU delirium assessment by the following means: (Please insert a response in **ALL** applicable boxes below)

	Sedation assessment	Delirium Assessment
Have never received education		
Live, out of hospital CE lecture		
Live, in hospital lecture or in-service delirium assessment tools		
Other **(please specify)**		
Inability to complete assessment in the sedated patient		

9. Please indicate your agreement with the following statements that pertain to delirium in the ICU by placing a tick in the column that most closely aligns to your agreement.

	Strongly agree	Moderately agree	Strongly disagree	Moderately disagree	Neither agree nor disagree
Delirium is an underdiagnosed problem					
Delirium is a problem that requires active interventions on the part of caregivers					
Delirium is associated with higher patient mortality					
ICU patients with delirium are rarely agitated					
Initiation of antipsychotic therapy (Halodol) should be the initial intervention for all patients with delirium					
Delirium is challenging to assess in ICU patients					
Patients with delirium usually have symptoms that are consistent over the entire nursing shift					

Is there anything else you would like to tell us about delirium assessment in the ICU setting?

Thank you for your response to these questions. Now that we have this information we would like to know something about you. Please complete the following questions:

10. What is your age?

20 to 29 years	
30 to 39 years	
40 to 49 years	
50 to 59 years	
60 and more years	

11. What is your HIGHEST nursing qualification

Diploma	Advanced diploma	Baccalaureate	Masters	Doctorate

12. How many years have you worked in an ICU setting?

More than 6 months and less than 1 year	
1 – 5 years	
6 – 10 years	
>10 years to 15	
>15 to 20 years	
>21 years	

13. Which type of ICU do you primarily work in?

General ICU	
Trauma	
Neurosurgery	
Cardiothoracic	
Coronary	

14. Which of the following best describes your current position (check all that apply)

Professional nurse	
ICU registered nurse	
Shift leader	
Charge nurse	
Nurse manager	
Clinical Educator	
Nurse Practitioner	
Clinical Nurse Specialist	

THANK YOU FOR COMPLETING THE SURVEY!

APPENDIX B

DELIRIUM ASSESSMENTS IN ADULT INTENSIVE CARE UNITS: DO NURSING PRACTICES HINDER OR HELP

PARTICIPANTS' INFORMATION LETTER

Dear Colleague,

My name is Kandindi Kamanda, I am a student at the University of the Witwatersrand, in the Department of Nursing for the Master of Science degree in (intensive care) Nursing. I hope to conduct a research project and would therefore like to invite you to consent to my including you in my sample of nurses that I hope to study in the intensive care units. The aim of my study is to describe nursing practices regarding delirium assessments in adult intensive care units, with an intention of making recommendations for clinical practice and education of such nurses.

Should you agree to participate in this study you will be asked to sign a consent form to confirm your willingness to participate in the study, I will then provide you with a survey questionnaire asking you to respond to questions related to delirium assessment in the intensive care units. I anticipate this should take no more than 15 to 20 minutes of your time.

Participation in the study is entirely voluntary. You may choose not to participate or withdraw from the study at any time, which will not affect the position that you are exercising in this institution. Anonymity and confidentiality will be ensured by using a code number instead of your real name and no personal information will be reported in the study so as to protect your identification.

I appreciate that you will derive no direct benefit from participating in the study. However, I hope that the completed study will clarify the practices of nurses regarding delirium assessment in the intensive care units. Results of the assessment will be given to you should you so wish.

The appropriate people and research committees of the University of the Witwatersrand, Gauteng Department of Health and Charlotte Maxeke Johannesburg Academic Hospital (CMJAH) have approved the study and its procedures.

Thank you for taking time to read this information letter or listening to it content, Should you require any more information regarding the study or your rights, you are free to contact me in the Department of Nursing Education or on the following telephone number 078 4634809 or e-mail: 843861@students.wits.ac.za

Yours sincerely
Mr Kandindi Kamanda
(MSc Nursing student)

APPENDIX C

DELIRIUM ASSESSMENTS IN ADULT INTENSIVE CARE UNITS: DO NURSING PRACTICES HINDER OR HELP

PARTICIPANT'S CONSENT FORM

I, …… (name) give permission to be included in the research study.

I have read with understanding the content of the information sheet and I have been given the opportunity to ask questions I might have regarding the procedure and my consent to me being included in the study.

Date …… Signature……..

APPENDIX D

Ethical Clearance Certificate

R14/49 Mr Kamanda Kandindi

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M170541

NAME: (Principal Investigator)	Mr Kamanda Kandindi
DEPARTMENT:	Nursing Education Charlotte Maxeke Johannesburg Academic Hospital
PROJECT TITLE:	Delirium Assessment in Adult Intensive Care Units: Do Nursing Practices Hinder or Help
DATE CONSIDERED:	26/05/2017
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Dr Shelly Schmollgruber
APPROVED BY:	Prof P Cleaton-Jones, Chairperson, HREC (Medical)
DATE OF APPROVAL:	14/06/2017

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated, from the research protocol as approved, I/we undertake to resubmit the application to the Committee. **I agree to submit a yearly progress report**. The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in May and will therefore be due in the month of May each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX E

Hospital Permission to Conduct Study

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Ms. G. Ngwenya
Office of the Nursing Director
Tell: (011): 488-4558
Fax: (011): 488-3786
31 August 2017

Mr. Kamanda Kandindi
University of the Witwatersrand
Department of Nursing Education
Faculty of the Health Sciences

Dear. Mr. Kamanda Kandindi

RE: "Delirium assessment in adult intensive care units: Do nursing practices hinder or help"

Permission is granted for you to conduct the above recruitment activities as described in your request provided:

1. Charlotte Maxeke Johannesburg Academic hospital will not in anyway incur or inherit costs as a result of the said study.
2. Your study shall not disrupt services at the study sites.
3. Strict confidentiality shall be observed at all times.
4. Informed consent shall be solicited from patients participating in your study.
5.

Please liaise with the Head of Department and Unit Manager or Sister in Charge to agree on the dates and time that would suit all parties.

Kindly forward this office with the results of your study on completion of the research.

Supported / ~~not supported~~
Pule
Ms. M.M Pule
Nursing Director
Date: 31/08/2017

Approved / ~~not approved~~
Dr M. Morokeng
Clinical Director

APPENDIX F

Postgraduate Approval of Study

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

Private Bag 3 Wits, 2050
Fax: 027117172119
Tel: 02711 7172076

Reference: Mrs Sandra Benn
E-mail: sandra.benn@wits.ac.za

18 July 2017
Person No: 843861
PAG

Mr K Kandindi
18 Cavendish Street
Cavendish Glove C4
Brakpan
1541
South Africa

Dear Mr Kandindi

Master of Science in Nursing: Approval of Title

We have pleasure in advising that your proposal entitled *Delirium assessment in adult intensive care units: do nursing practices hinder or help* has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

APPENDIX G

Permission to use study instrument

From: Devlin, John [mailto:j.devlin@neu.edu]
Sent: 28 May 2016 18:44
To: Shelley Schmollgruber
Subject: RE: request for permission

Hi Shelley: You have my permission to use the instrument. Good luck with your research. John

John W. Devlin, Pharm.D., FCCM, FCCP
Professor, Department of Pharmacy and Health Systems Sciences,
Bouve College of Health Sciences, Northeastern University;
Special and Scientific Staff, Division of Pulmonary, Critical Care and Sleep Medicine,
Critical Care Pharmacist, Tufts Medical Center;
Boston, MA

Phone: 617-373-8171
Fax: 617-373-7655
Pager: 617-647-3057
Mobile: 617-285-8610

Faculty Web Page: http://www.northeastern.edu/bouve/directory/john-devlin/

From: Shelley Schmollgruber [mailto:schmoll@iafrica.com]
Sent: Friday, May 27, 2016 3:27 PM
To: Devlin, John <j.devlin@neu.edu>
Subject: request for permission

Dear Dr Devlin.

My name is Shelley Schmollgruber. I am the postgraduate coordinator in the Department of Nursing Education of the University of the Witwatersrand in Johannesburg, South Africa. I am currently supervising a research study and my MSc student has expressed particular interest in your work entitled "Assessment of delirium in the intensive care unit: nursing practices and perceptions" published in the American Journal of Critical Care, 17(6): 555-566.

On behalf of my student I would like to request your permission to use the instrument as we are conducting a similar study in our South African context. Would it be possible to send us a copy of the instrument along with your permission to use the instrument. If you are in agreement we can forward a copy of the proposal to you once our ethics committee has approved the study. We anticipate that the study will be completed by early 2017.

I am looking forward to your response.