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Onwong'a, Indrah G. M.

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NURSES' KNOWLEDGE RELATED TO PAIN ASSESSMENT FOR CRITICALLY ILL PATIENTS AT A PUBLIC SECTOR HOSPITAL IN JOHANNESBURG

Indrah G.M. Onwong'a

A research report submitted to the
Faculty of Health Sciences, University of the Witwatersrand, Johannesburg
in partial fulfilment of the requirements for the degree
of
Master of Science in Nursing

Johannesburg, 2014

DECLARATION

I, Indrah G.M. Onwong'a, declare that this research report is my own work. It is being submitted for the degree of Master of Science (in Nursing) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature …….

……day of …… 2014

Protocol Number **M130524**

DEDICATION

My heartfelt appreciation to my mom and dad for their inspiration, my sisters, special friends, and my fiancée for their continued love and support throughout my studies at the University of the Witwatersrand, Johannesburg.

ACKNOWLEDGEMENTS

I thank the Almighty God for life this far and blessings during this time of study. Everything I have achieved is through His power.

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- To Helen Perrie for her expertise contribution in the verification of the research instrument.
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ABSTRACT

Discrepancies exist between how pain is assessed in ICU patients able and unable to self report. There are pain assessment scales and guidelines that have been developed over the years for pain assessment. However, little is known regarding ICU nurses' knowledge and current practices in the provision of pain management in the critically ill.

The purpose of this study was to investigate intensive care nurses' knowledge and practices related to pain assessment for critically ill patients. A quantitative non-experimental, descriptive cross-sectional design was used to achieve the objectives. ICU nurse participants (n=79) were drawn from the five (5) adult ICUs in a public tertiary hospital. Data were collected using a self-administered questionnaire by Rose et al. 2011. Descriptive and inferential statistics were used to analyze the data.

There was a significant difference in the nurses who used a formal pain assessment tool for patients able to self-report (mean percentage, 72.1%) compared to patients unable to self-report (mean percentage, 52.0%) with a statistical significance (p=0.0027). However, there was no difference in the perceived importance of the use of pain scale. Nurses assessed pain frequently and were more confident in patients able to self-report than patients unable to self-report (p=0.0001). Behaviors most frequently considered indicative of pain were Restlessness (mean percentage 48.1%), and ventilator alarms (mean percentage, 47.4%). Pain assessment was considered extremely important for post-operative ICU patients and (mean percentage, 91.1%) and trauma ICU patients (mean percentage, 87.0%). Most frequently occurring barriers were unavailable pain assessment tools, lack of designated area for charting pain and hemodynamic instability. Enablers were pain prioritization in ICU and motivated staff. Most of the nurses had received pain education on various topics; however a few (29.7%) were extremely satisfied.

Based on the research findings, despite participant's perceived importance of pain assessment for patients who can self-report and those who cannot self-report, nurses were less familiar with formal pain assessment tools for patients unable to self-report and less confident in their pain assessment. Hence, a wide gap of the two groups of patients.

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CHAPTER ONE
OVERVIEW OF THE STUDY

1.0 INTRODUCTION

The term comfort, in nursing, entails implementing measures which will enhance a better experience for patients even in the most critical state of illness. In the early development of nursing, Florence Nightingale said for comfort to be achieved the nurse has to put the patient in the best condition for nature to act upon them (Selanders, 2010). Kolcaba, Tilton & Drouin (2006) defined comfort as an individualised holistic enhanced feeling of well being with a sense of being strengthened. One of the major stressors, or experiences, that alter patients' comfort in the Intensive Care Unit (ICU) is pain in whatever intensity: mild, moderate or severe. The pain perception in patients is diverse and may be altered by factors such as culture, environment, mood, pathology and experience (Morton & Fontaine, 2013). Most ICU patients erroneously believe pain is expected in ICU therefore do not report it to the nurses, who may to some extent lack awareness of patient's discomfort due to pain (Stanik-Hutt, 2003).

This study sought to investigate Intensive Care nurses' knowledge and practices relating to pain assessment for critically ill patients. It is important to focus on pain assessment as the fundamental step in adequate pain management. The findings may lead to identifying the limitations in pain assessment and management, which have been recommended in previous research by Shannon & Bucknall (2003). Consequently, ICU patients will be given improved pain control and current Evidenced Based Practice (EBP).

Pain in itself is a distressing sensation. The International Association of the Study of Pain (IASP), (2011) defines pain as an unpleasant, sensory, emotional and subjective experience associated with tissue damage. Puntillo, Li and Miaskowski, (2008) emphasise that pain is what the patient experiencing it says it is. Pain control goes beyond medication and sedation. Caring is at the heart of nursing and it is the critical care nurses' responsibility to ensure the patients' experience is not aggravated.

It has been reported that nurses with advanced pain education, knowledge and experience have exceptional skills in pain assessment and management (Wang & Tsai, 2010). A recent study by Rose, Haslam, Dale, Knetchet, Frase, Pinto, McGillon & Watt-Watson, 2011), found ICU nurses less confident in their ability to accurately assess pain in patients unable to communicate their level of pain, but more confident in those able to self-report. Pain assessment tools developed for the purpose of assessment for patients able to self-report have long been validated and their reliability well established, unlike the scales for those unable to self-report which are still in progress of validation. These tools are a global initiative and ICUs in Africa, in this case South Africa, are yet to adapt and integrate into practice these extremely important pain assessment scales for patients who are unable to communicate in ICU. Hence, the importance of establishing how these two groups of patients in ICU, assess their pain intensity.

1.1 BACKGROUND OF THE STUDY

The unique role of the nurse is to care for the patient to achieve comfort, around the clock, to recovery. Relieving pain by adequate management is of one the many roles the nurse advocates for the patient to obtain optimal comfort. Critical care nurses have the responsibility of ensuring, despite the patient's condition or outcome, pain is adequately assessed and managed.

A survey of 14, 447 inpatients in the National Health Service (NHS) trusts in England (2007), reported 67% of patients experienced pain whilst in hospital, despite relief efforts (Health Report, 2007; Subramanian, Allock, James & Lathlea, 2011). Intensive Care Units (ICUs) were not an exception. Another study reports 78% of critically ill patients received inadequate pain management (Puntillo, White, Morris, Perdue, Stanik-Hutt, Thompson & Wild, 2001). The IASP (2011) notes that patients unable to communicate verbally are not nullified from experiencing pain. The contributing factors to pain include: illnesses, injuries, surgery, anxiety, invasive and non-invasive procedures (Morton & Fontaine, 2013).

Pain assessment and management is a long standing challenge for ICU nurses (Wang & Tsai, 2010) and may be influenced by the patients themselves, critical care nurses, other clinicians, organisational factors (Rose, Smith, Gelinas, Haslam, Dale, Luk, Burry, McGillion, Mehta & Watt-Watson, 2012) and families (Wang & Tsai, 2010). Patients in

ICU present a unique challenge as they cannot verbally communicate due to intubation, motor impairments, altered level of consciousness and sedation (Puntillo, Morris, Thompson, Stanikk-Hutt, White & Wild, 2004). Moreover, sedation management is inextricably linked to pain management. ICU nurses today are required to provide adequate pain assessment and management whilst coping with life threatening illnesses of critically ill patients (Subramanian et al. 2011).

Appropriate pain assessment is the first key step to providing adequate relief (Gelinas, Fortier, Viens, Fillion, Puntillo, 2004). The Numerical Rating Scale (NRS), McGill pain questionnaire, face scale and visual analogue scale are for patients able to self-report their pain intensity. Conversely, the behavioural pain scale (BPS), the Critical Care Pain Observation Tool (CPOT), the Nonverbal Adult Pain Assessment Scale (NVPS), Pain Assessment Algorithm and Pain Assessment and Intervention Notation Algorithm (Gelinas, 2010) are for patients unable to self-report their pain intensity. However, it has been established that nurses use these tools infrequently and lack confidence in accurate pain assessment (Rose, et al, 2011). The choice of pain assessment scale used may reflect in the ICU nurses' knowledge of pain (Puntillo, Pasero, Li, Mularski, Grap, Erstad, Varkey, Gilbert, Medina & Sessler, 2009) and currently no single behavioural pain scale has been found to be superior. Research has shown BPS and CPOT have been validated in studies where the CPOT's validity has improved (Gelinas, Arbour, Michaud, Vaillan & Desjardian, 2011a).

Pharmacological management is the main pain intervention in ICU and includes: opioids, non-opioids, analgesics and sedatives (Morton & Fontaine, 2013). Non-pharmacological interventions involve relaxation techniques, distraction and massage (Morton and Fontaine, 2013). Unrelieved pain has several consequences which lead to morbidity and mortality, increased heart pressure, decreased respiration, anxiety, altered sleep that may lead to delirium, decreased gastric emptying, suppressed immunity (Morton & Fontaine, 2013) and to atelectasis (Desai, 1999; Rose et al. 2011) which could result in longer ICU support.

However, ICU nurses have failed to address pain limitations (Gelinas et al. 2004, Wang & Tsai, 2010). Research has shown nurses lack adequate pain knowledge and administer inadequate analgesia. Wang & Tsai (2010) reported the analgesic knowledge scores for nurses were lower than 30%, which inferred nurses' ability to integrate pain knowledge

into clinical scenarios needed strengthening. There were inconsistencies, as 85.4% of ICU nurse respondents thought patients overestimated their pain, but research has established that nurses underestimate pain (Rose et al. 2011). Moreover, there is the continued lack of pain score documentation in ICU (Gelinas et al. 2004), for example, a study conducted in Quebec reported a pain score was documented for only 3/183 pain episodes in 52 patients (Gelinas et al. 2004). This may have been attributed to a lack of pain assessment tools.

Nurses may want to improve the quality of pain management but might be hindered by the health system, as prescription in most countries is done by doctors (Wang & Tsai, 2011, Subramanian et al. 2011). The "nurses maintain their role is mostly limited to assessment and medication administration." Literature recommends that Intensive Care nurses should be provided with ongoing knowledge on pain management courses (Wang & Tsai, 2010) and the need for further inter-professional education on pain assessment tools and strategies for critically ill patients (Rose et al. 2011). Additionally, there is need for further research to assess the validity of the pain assessment tools and the impact on pain management in clinical practice (Gelinas et al. 2011a, Rose et al. 2011), as well as overcoming the barriers and challenges to pain management (Wang & Tsai, 2010; Subramanian et al. 2011). This can lead to improved pain assessment and management.

1.2 PROBLEM STATEMENT

Inadequate pain assessment and management can bring about severe complications and longer stays in ICU. Most often, nurses focus on haemodynamic monitoring over pain assessment and management, despite awareness that these should be and are a priority of care. Discrepancies exist between how pain is assessed in ICU patients who can self-report their pain intensity and those who cannot. Behavioural pain assessment tools and guidelines published for pain assessment developed over the years are available, however, little is known regarding ICU nurses' knowledge and current practices during pain assessment in the provision of pain management in the critically ill. Therefore it is important to address the gap that exists.

The study will attempt to answer the following questions:

- What is the level of knowledge related to pain assessment amongst ICU nurses caring for critically ill patients?

- What are the pain assessment practices amongst ICU nurses caring for critically ill patients?
- What are the barriers for pain assessment amongst ICU nurses caring for critically ill patients?

1.3 PURPOSE OF THE STUDY

The purpose of this study is to investigate Intensive Care nurses' knowledge and practices relating to pain assessment for critically ill patients at a major public sector hospital in Johannesburg.

1.4 RESEARCH OBJECTIVES

The objectives of this study were:

- To examine the level of knowledge related to pain assessment amongst ICU nurses caring for critically ill patients.
- To determine pain assessment practices amongst ICU nurses caring for critically ill patients.
- To identify the barriers for pain assessment amongst ICU nurses caring for critically ill patients.

1.5 SIGNIFICANCE OF THE STUDY

Effective pain management depends on the use of standardised pain assessment guidelines for ICU patients, as pain can necessitate longer ICU admission which is not psychologically, physiologically, socially or economically suitable for the patient. Continued individual development of pain knowledge, integration of pain theory and practice is encouraged for the professional ICU nurses in order to practice current evidence based practice (EBP). Guidelines intended to assist the ICU nurse, which recommend frequent pain assessment with some validated scoring tools for critically ill patients, exist. Reports show, lack of knowledge and confidence in using the pain assessment scales may reflect in the choice of pain management (Rose et al. 2012).

It is time pain assessment and management in critically ill patients was prioritised. In view of this, the result of this study may help the Nursing Health Care and Education systems understand ICU nurses' knowledge and current practices in assessment of pain, therefore addressing their limitations and ultimately improving patient comfort. Additionally, it may have an impact on the current education curriculum on pain, hence the need to investigate Intensive Care nurses' knowledge and practices relating to pain assessment for critically ill patients in the ICU.

1.6 PARADIGMATIC PERSPECTIVE

A paradigm is a world view, a general perspective on complexities globally (Polit & Beck, 2012). Inquiry for human paradigms are often characterised in terms of the ways in which they respond to basic philosophical questions (Polit & Beck, 2012). The researcher therefore based the study on the following meta-paradigms.

1.6.1 Meta-Paradigm

A meta-paradigm is defined as the most global perspective of a discipline and is usually an enclosed unit or frame within which a more restricted discipline develops. The meta-paradigmatic view in nursing reflects the central concepts of the discipline of nursing which includes the person, environment, health and nursing. The meta-paradigm in this study will be extracted from the following theory.

1.6.2 Katharine Kolcaba's Theory of Comfort

Kolcaba et al. (2006) define comfort as a state being experienced by the recipients of the comfort measures. Comfort measures are nursing interventions used to address specific comfort needs of the recipients indulging in physiological, spiritual, social, financial, environmental and physical interventions; it is much more than simply the absence of pain or other physical discomfort (Kolcaba, 1994; Kolcaba et al., 2006). Kolcaba addresses three main types of comfort: relief, ease and transcendence. In health care and ICU in particular, achieving ultimate comfort is a positive sign of progressing towards complete healing and can only be achieved with the help of critical care nurses, who are in the position to care for the patient on a 24 hourly basis.

Kolcaba et al. 2006 points out that comfort care encompasses three components: appropriate and timely intervention in order to achieve the comfort needs of the patients, a mode of delivery that projects caring and the intent to comfort. The theory also describes the concept of health seeking behaviours that patients and families engage in, which may be internal or external. The following are the meta-paradigm concepts of nursing as defined by Kolcaba, which were also based in this study.

- **The person**

The person is the recipient of care, in this case the ICU patient who is critically ill and may have life threatening conditions and able or unable to self-report. The patient unable to self-report may be unconscious, unresponsive to stimuli and unable to participate in their care because of their condition and interventions such as endotracheal tubes, sedation and other therapies. Most patients in ICU experience moderate to severe pain and it is the ICU nurse's responsibility to ensure the patient, as an individual, is comfortable by ensuring ultimate pain relief. Comfort from pain entails both mental and physical aspects and is associated with a nurturing activity in this case pain management after the ICU nurse has properly and skilfully assessed the patient's level of pain. This is to ascertain if the patient is in pain and if so the intensity, or level and the implications if no immediate intervention. The critical care nurse is therefore central to this study, being with the patient 24 hours a day, positioning him/her as an advocate to ensure ultimate pain relief hence comfort.

- **The environment**

The environment comprises all the internal and external surroundings of the person and has an influence on the wellbeing of the person. In this study, the environment is the ICU setting where critically ill patients are admitted and are usually on life support of at least one if not more technological equipment depending on the setting. Some of the technological interventions render the patient unable to participate in care and particularly in this study, pain intensity levels. In the process of ensuring comfort in ICU, nurses need to remember the patient and the mechanical ventilator are in synchrony, but require treating as different or same entities depending on the patient's condition. Due to technology the noise levels in ICU, especially from the mechanical ventilators and cardiac

monitors alarms' can be very disturbing. In addition, apart from the critical care nurses, there are different health care providers who from time to time to check on the patient for example, radiologists, doctors, physiotherapists, health sciences students and specialist doctors. This may increase the pain threshold thus altering patient comfort.

- **Health**

Health is a state and a process of being and becoming integrated as a whole person; it is a quality of life. In ICU settings, health is defined from the initial illness to progressive continuum achievement of stability in different levels and then ultimate health. In every stage of progressive health the measures are to address specific comfort needs of patients in regards to pain relief. These comforts need to ensure social, financial, psychological, spiritual, environmental and physiological wellbeing of the patient. The ICU nurse should be aware of the consequences of unrelieved or inadequately relieved pain which compromises the patient's health and can sometimes lead to other serious complications or even death. One important aspect to keep in mind in ICU is the fact that therapeutic interventions, for instance endotracheal suctioning amongst others, leads to altered patient comfort, yet is aimed at contributing to the progressive healing process. ICU nurses are positioned to be advocates in order to achieve maximum comfort in terms of pain relief, psychological preparation before painful procedures and prevention of unnecessary pain.

- **Nursing**

Nursing is the deliberate assessment of comfort needs, design or comfort measures administered by critical care nurses. For pain to be adequately managed, skilled and knowledgeable assessment has to be performed. In this way the presence and intensity of pain is assessed and the right kind of intervention administered. Pain assessment and reassessment can be intuitive, subjective or both. In subjective, the nurse can ask the patient the intensity of pain being experienced, or the patient can use other means such as writing or pointing to a pain scale. The objective assessment involves the patient who cannot self-report the intensity of pain being experienced and can be done by using assessment scales or observation of change of behaviour due to discomfort.

The ICU nurse has the obligation of ensuring maximum comfort by adequate pain relief because she/he is responsible for accurate pain assessment, documentation which guides the doctor in prescribing pain medication, as well as other interventions and administration of the prescription. These comfort measures are designed to maintain homeostasis and manage pain. Often the ICU nurse is required to use his/her knowledge and experience to make decisions on the issues surrounding pain such as adjustment of analgesic dose, the frequency of pain administration when necessary (PRN) and administration of other interventions that haven't been ordered to ensure maximum patient comfort. Other interventions the nurse can administer include massage, environmental adaptations to enhance peace, music therapy, reminiscence and hand holding.

1.6.3 Theoretical Assumptions

The following theoretical assumptions were applicable to this study:

- Comfort is a desirable holistic outcome, which is relevant to the nursing discipline in ICU.
- ICU patients strive to have their basic needs and pain management met. It is an active endeavour.
- Pain, being a major stressor in ICU, is not as well prioritised by ICU nurses as expected.
- The pain assessment scales and guidelines, particularly for patients who cannot self-report, are not used often in ICU.

In order to enhance comfort for ICU patients undergoing pain, the critical care nurse must administer the most appropriate intervention in a caring manner with an intentional and comforting approach. Comfort care for pain assessment and management is proactive, directive and longed for and calls for ICU nurses' knowledge, skills, competence and time for each individual patient. The developed pain assessment scales assist nurses globally and for the purpose of this study, South Africa, to assess the intensity of pain for patients who can and cannot self-report pain. Being a caring discipline, nursing and in particular ICU nursing, needs to address the overwhelming limitations of pain assessment and management to achieve ultimate patient comfort in ICU.

1.6.3.1 Operational definitions

Definitions for the purpose of this study are as follows:

- **Pain**

An unpleasant sensory and emotional experience associated with tissue damage or treatment, which can be determined by raised blood pressure, raised pulse rate, pupil dilatation and facial grimacing in critically ill unconscious patients.

- **Critically ill patient**

This is a patient who is able or unable to self-report. The patient unable to self-report is insensible or incapable of responding to sensory stimuli, which may be determined by a Glasgow Coma Scale of <7/15 points. It may be chemically induced by the use of paralysing agents such as Norcuron or Tracrium.

- **Intensive Care unit**

This is a specifically designated area in a hospital offering facilities for the prevention, diagnosis and management of patients with more than one system organ failure. In this study, it includes the general ICU, Trauma ICU, Cardiothoracic ICU, Coronary ICU and the Neurological ICU of a university-affiliated public sector hospital.

- **Intensive Care nurse**

A person registered with the South African Nursing Council (SANC) who has undergone an accredited course in Intensive Care nursing and registered in that capacity. It may also refer to a registered general nurse with SANC who has worked in the ICU for at least six months.

- **Assessment**

This refers to the critical analysis of physiological and behavioural parameters in unconscious patients to determine their level of pain. It involves gathering, analysis and synthesis of relevant parameters upon which the Intensive Care nurse will base her decision of whether a critically ill patient is in pain.

- **Pain management / Implementation**

It involves the administration of analgesia or non-pharmacological interventions to relieve pain after assessment, according to the unit protocol or prescription, documentation of the procedure and follow-up to determine if the patient's pain is relieved.

1.6.4 Methodological Assumptions

Assumptions describe concepts and are principles accepted as being true based on logic or custom, without proof (Polit & Beck, 2012). Methodological assumptions are statements taken to be true even without scientific verification (Burns & Grove, 2007). The researcher believes in nursing being a caring, practicing discipline that ensures ultimate comfort. Nurses make clinical decisions based on a body of knowledge and information from experience, research outcomes, observation, or through education. Nursing as a practice has evolved over the years due to research outcomes that bring into perspective better practice and changes in the care of patients. Nursing research has also evolved for the better over the years, so that the practice is Evidence Based. This has tremendously improved the kind of care patients receive.

According to Polit and Beck (2012), research conducted in a disciplined framework, in this case ICU nursing, is the most refined way to acquire knowledge in that area. This is referred to as disciplined nursing, which combines logical reasoning to create more reliable methods of acquiring evidence. Research findings are carefully looked into and integrated into practice. The current emphasis on Evidenced Based Practice (EBP) requires ICU nurses to base their clinical practice, to the greatest extent possible, on research findings rather than routine or traditional experience. This applies to the ICU context, where patients need to be taken care of in terms of pain assessment and

management according to latest findings in research. This is due to the fact that the subject of pain in ICU has been greatly researched with little implications into practice.

The researcher conducted the study with the intention of making recommendations for better practices of pain assessment and management in ICU, to be integrated into current clinical practice in ICU in South Africa and the rest of the world. The outcome of the research may also address limitations in the current gap in pain assessment.

1.7 OVERVIEW OF THE RESEARCH METHODOLOGY

The research methodology refers to the blueprint that guides the study to have control over factors that could interfere with the desired outcome (Burns & Grove, 2007). A non-experimental quantitative descriptive cross-sectional design was utilised to achieve the objectives of the study. The study respondents were ICU trained and registered nurses affiliated to five adult Intensive Care Units at a 1,200 bed capacity university-affiliated hospital and tertiary/quaternary institution in Johannesburg, using a self-administered questionnaire by Rose et al (2011). The five (n=5) ICUs included the medical-surgical ICU, Neurosurgical ICU, Trauma ICU, Coronary ICU and Cardio-thoracic ICU.

Ethical clearance and permission to conduct the study was sought 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 point in time.

After permission was granted by the hospital and ICU managers, consent was obtained from the ICU trained 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 12 used for analysis purposes. Reliability of the study was maintained by ensuring the principal researcher was the sole collector of data, the sample size was achieved purposively and the data was verified by a medical statistician to ensure exactness of the findings. Validity of the research was achieved by ensuring the data collection instrument was verified by ICU clinical and education experts, to fit into the South African context.

1.8 PLAN OF THE RESEARCH ACTION

The study will be presented as follows:

Chapter One:	Overview of the research study
Chapter Two:	Literature review
Chapter Three:	Research design and research methods
Chapter Four:	Data analysis and results
Chapter Five:	Summary, discussion of results, conclusions and recommendations

1.9 SUMMARY

This chapter gave an overview of the study. Firstly, the background was described, followed by the problem statement, the research questions, the purpose of the study, the objectives, operational terms defined, the researchers assumptions discussed, an overview of the methodology, validity and reliability and finally the plan of the research outlined.

The following chapters will include an in-depth description of the literature review in relation to the title of the study, the research design and methods, data analysis and results described in detail and finally the summary, discussion of results, conclusions and recommendations will be outlined.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Patients in the ICU environment are normally on life support, mostly unconscious, with communication almost impossible, thus restricting participation in their care. The main goal of care for critical care nurses is to ensure ultimate patient comfort, which is unachievable if the patients experience pain, without adequate control, during their stay in ICU. Despite a wide range of research on pain, it is still a major problem and stressor in the ICU. This chapter, begins with a description of what pain is in critically ill patients, followed by patient's satisfaction of pain assessment and management, pain assessment and management in the critically ill patient, non-pharmacologic interventions, sedation management consequences of unrelieved pain, knowledge related to current practices of pain assessment, pain documentation, education of pain and guidelines, the barriers and enablers of pain assessment and management in ICU.

2.2 PAIN IN THE CRITICALLY ILL PATIENT

Similar to other aspects of care, adequate pain management is of particular importance to ICU patients (Aslan, Badir, Selimen, 2003) to achieve ultimate comfort. The IASP (2011) defines pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage." Pain is subjective and a globally experienced phenomenon in health care (Subramanian et al. 2011) and the ICU is no exception. Patients' who can or cannot self-report experience pain and therefore pain is best described from their perspective.

Pain in the critically ill can be classified as acute or chronic. Morton & Fontaine (2013) define acute pain as having a known cause and resolves within a given period, whilst chronic pain is caused by physiological mechanisms, which are not well understood and may last for long periods. Most critical care patients experience acute pain as it has an identified or known cause, for instance pain experienced during endotracheal suctioning is

expected to end when the procedure is over (Puntillo et al. 2008). Both acute and chronic pain can be somatic, visceral, or neuropathic in origin (Urden, Stacy, Lough, 2006). Somatic pain has a well-defined location, visceral pain has a diffuse location and neuropathic pain involves an abnormal sensory process caused by changes in the nerve cell excitability (Urden et al. 2006).

Pain experiences in ICU vary from patient to patient. Due to the severity of conditions, there has been a notion that patients cannot recall their painful experiences whilst in ICU (Morton & Fontaine, 2013). However studies have shown that ICU patients may experience pain during their stay (Egerod, Albarran, Ring, Blackwood, 2013) and they recall painful experiences as moderate to severe in intensity (Payen, Bru, Bosson, Lagrasta, Novel, Deschaux, Lavagne, Jacquot, 2001, Puntillo et al, 2004). Young, Siffleet, Nikoletti & Shaw (2007), point out that patients are reluctant to indicate they are experiencing pain because of preconceived expectation of pain and the fact the nurses seem too overwhelmed with work to attend to their analgesic demands. Hence, most critically ill patients believe that pain in ICU is to be tolerated (Stanik-Hutt, 2003).

Sources of pain in the ICU are multifaceted, with tissue damage the most common (Siffleet, Young, Nikoletti & Shaw, 2006). Many studies have reported that ICU patients are likely to experience pain during admission, by virtue of their disease pattern (Bakley & Page, 2000; Cade, 2008), therapeutic interventions and routine procedures they are subjected to (Summer & Puntillo, 2001; Gaoucin et al, 2004; Cade, 2008). Sometimes a patient experiences pain from different sources presenting a challenge for Intensive Care nurses, depending on the individual's condition. Other causes of pain include medico-surgical conditions treated in ICU such as myocardial infarction, thoracic related conditions, angina, neuro-surgical conditions, multiple trauma conditions and extensive burns (Morton & Fontaine, 2013). Additionally infections, organ distention, ischemia, prolonged immobility, wounds and inflammations may prompt pain (Stanik-Hutt, 2003).

Invasive and non-invasive procedures, depending on the different ICUs, are also a major source of pain. Procedural pain is described by Puntillo, White, Morris, Perdue, Stanik-Hutt, Thomson & Wild (2001) as a sharp, stinging, stabbing, shooting, bad, tiring/exhausting and awful experience for the patients, which cannot be avoided as it is essential for the well-being and recovery of the patient, making critical care nurses efforts

of pain control difficult. The most common procedures that cause pain in the ICU include chest tube insertion and removal, patient turning, wound debridement (Morton & Fontaine, 2013), endotracheal tube insertion, non-invasive ventilating devices, invasive monitoring lines, central venous catheters and suctioning (Morton & Fontaine, 2013, Czarnecki, Turner, Collins, Doellman, Wrona & Reynolds, 2011). The fact that these procedures are essential, assessment and pre-medication, particularly for the very painful procedures, is advocated (Puntillo et al. 2001, Morton & Fontaine, 2013). Moreover, many therapeutic procedures potentially produce pain and anxiety, which should be assessed and addressed prior to commencement (Czarnecki et al. 2011). It can be stated that critical care patients suffer from significant procedural pain whilst in ICU, but are unable to report its intensity.

In view of this, pain pre-medication prior to performing these procedures is important and can be well justified by critical care nurses. In a Canadian study conducted by Rose et al, (2011) the majority of nurses rated pain as moderately to extremely important for procedures such as repositioning (92.1%), suctioning (81%), wound care (97.1%0, drain removal (90.0%) and line insertion (93.6%). In their study in Australia, Young et al (2007) found positioning, drain removal, deep breathing and coughing exercises increased pain intensity. Nurses are aware of most procedures that cause pain, however in the American Thunder Project II most patients in the study did not receive any form of analgesic or sedative before a procedure (Puntillo et al, 2001) and pain assessment was only regarded important for suctioning and turning (Rose et al, 2011).

Siffleet et al. (2006) point out that when patients are psychologically prepared, generally the pain threshold and experience is reduced. Puntillo et al. (2001) state that pain assessment and management should be individualised and re-emphasise administration of pre-emptive pain management. If not given, it may reflect on the unawareness of the extent to which pain is associated with several common procedures by health care professionals (Siffleet et al. 2006). Furthermore, the American Society of Pain Management Nursing (ASPMN) does not condone procedures performed without comfort assessment and management plan, as per individual patient's needs (Czarnecki et al. 2011).

2.3 CRITICALLY ILL PATIENT SATISFACTION OF PAIN ASSESSMENT AND MANAGEMENT

For some time, the global health sector has been making developments on EBP. An evidenced based protocol evaluation paper outlined, in line with EBP, protocol based care is an approach to implementation of standardised care (Rycroft-Malone, Fontenia, Bick, & Seers, 2008). Protocol based care is a mechanism intended to expand the nurses' role in the clinical area (NHS, 2002a; Rycroft-Malone et al. 2008), which is more diversified autonomy for practice in particular for ICU nurses in relation to pain management. It is essential for all critical care nurses to execute high quality care to critically ill patients (Urden et al. 2006).

Primarily, care in the ICU should follow an evidence-based approach (Coyer, Wheeler, Wetzig & Couchman, 2007) as this promotes patient satisfaction and ultimate patient comfort. One of the comfort measures in the critical care setting is alleviating pain (Coyer et al. 2007). Quality care with regard to pain involves detailed information on patients' pain assessment and whether pain standards are being achieved (Gunnigberg & Idvall, 2007). A study conducted in Sweden, on the quality of post-operative pain management of nurses in general, reported that patients who experienced intense levels of pain were less satisfied with the quality of care of pain management by the nurses (Gunningberg & Idvall, 2007).

Most patients admitted to ICU present with life threatening conditions. They may remain for long periods needing long-term life support and various forms of treatments, such as sedatives and analgesics for compliance with mechanical ventilators and for comfort (Granja, Lopes, Moreira, Dias, Costa-Pereira & Carneiro, 2005). Pain is one of the contributing factors of discomfort, anxiety, depression and lack of sleep in the ICU (Morton & Fontaine, 2013). Improving pain assessment and management is simply the most effective step to take, as it is the cornerstone of the health care's humanitarian mission (Joint commission, 2003). There is an emerging agreement that the failure to treat pain adequately and appropriately is substandard and unethical and subject to legal and professional action (IASP, 2011), therefore ICU nurses should aim to improve and maintain high standards of pain assessment and management in line with current EBP.

Heyland, Groll & Manfred (2005) & Hofhuis, Van Stel, Schrijvers, Rommes & Bakker (2009) state that patients in ICU require health-related quality of life (HR-QOL) which is recognised as an outcome measure of care. Additionally, the prediction of long-term consequences by use of psychological, physical factors and social interactions are becoming recognisably important for the patient and family, as well as the doctors and nurses (Graf et al, 2003; Wu A et al, 2004; Hofhuis et al. 2009). The Portuguese study of Granja et al. (2005), conducted in 10 ICUs, on HR-QOL of patients' memories of their stay after discharge, found 64% reported pain as one of the most stressful experiences in ICU. This is very high and only explains that patient's quality of life is indeed compromised.

In an evaluation study conducted in Toronto, Canada, most ICU patients reported their pain management was unsatisfactory during phase 1 of the study (Topolovec-Vranic, Canzian, Innis, Pollmann-Mudryi, McFarlan & Baker, 2010). After implementing the Non-Verbal pain scale (NRVS), pain assessment for uncommunicative patients increased from 29% to 51%. This improvement followed pain education for nurses and increased documentation of pain assessment, which are important components of high-quality pain management (Simpson et al, 2002; Topolovec-Vranic et al, 2010). Gordon, Dahl, Miaskowski, McCarberg, Todd, Palce, Lipman, Bookfinder, Sanders, Turk & Carr (2005) elaborate that all patients should be routinely screened for pain and recorded when present. Likewise, detailed information about the findings on patient's pain assessments are to be considered, if the patient's pain management standards are to be met when considering potential areas for improvement (Gunningberg & Idvall, 2007).

Wells, Pasero & McCaffery (2008) recommend health institutions to develop interdisciplinary approaches to pain assessment and management, which focus on an individualised plan of care for pain control in collaboration with the patient and if unconscious with the family. Consideration of earlier pain experiences for a particular patient may facilitate an adequate assessment of their pain (Gunningberg & Idvall, 2007).

Furthermore, quality of care can also be defined from an ethical background. It is an integral part of a patient's human rights to receive pain care (Cousins, Brennan & Carr, 2004). Herr, Coyne, Key, Manworren, McFaeery, Merkel, Kelly-Pelosi, Wild (2006) point out that the ethical principles, for instance beneficence and non-maleficence, constrains critical care nurses in providing adequate pain management for all patients regardless of

whether they are able or unable to self-report. The principle of autonomy is destroyed if there is unrelieved pain ignoring the patient's right to self-determination of his/her health care (Cousins et al. 2004). The principle of justice directs the type of quality of care that should be provided to all patients with compassion and unrestrictive in any way (Herr et al. 2006). In addition, the principle of justice can aid in the assessment of the huge humanitarian costs of intense pain and place pain as a high priority (Cousins et al., 2004). Therefore, as Cousins and colleagues (2004) argue, the current lack of a strong application of these principles questions the ethical foundations of current health care.

As quality improvement, data has shown that patients are dissatisfied with pain management in ICU (Stanik-Hutt, 2003); prioritisation of pain management is mandatory particularly implementing pain assessment and management improvement measures. For instance, unit standards for pain can be established, thus preventing pain, as it is easier to control, administering analgesics as prescribed and having sufficient trained ICU nurses. In addition, there should be constant evaluation of the quality of pain assessment and management from patients and nurses perspectives and regular auditing of pain documentation (Gunningberg & Idvall, 2007).

The American Pain Society revised its guidelines of quality improvement in terms of the indicators in the critically ill patient. Their emphasis shifted from the processes to outcomes. Gordon et al. (2005) outlines the quality indicators of pain assessment and management, which include: documentation of pain intensity using a scale frequently, a multimodal approach to treat the pain, relieving pain to facilitate function and a good quality of life. In addition, the "efforts to improve quality of pain management must go beyond assessment, communication of pain, implementation and evaluation of improvements in pain treatment that are timely, safe, evidence based and multimodal" (Gordon et al. 2005). Quality communication between critical care nurses and doctors, families and amongst nurses cannot be over-emphasised (Weinert et al. 2001; Guttomson, Chlan, Weinert & Savik, 2010). Untreated pain means decreased quality of life, hence decreased patient satisfaction (Innis, Bikaunieks, Petryshen, Zellermeyer, Ciccarelli, 2004).

2.4 PAIN ASSESSMENT IN THE CRITICALLY ILL PATIENT

Routine pain assessment in a critically ill patient is a basic process for the ICU nurse (Paulson-Conger, Leske, Maidl, Hanson & Dziaduelweck, 2011), as most patients admitted to ICU experience mild to severe pain. Brooker (2006) defines assessment as the first stage of the nursing process and requires the nurse to collect relevant data about the patient to ensure care is individualised rather than generalised. Furthermore, the first step to providing adequate pain relief in critically ill patients is a systematic and consistent assessment and documentation of pain (Arif-Rahu & Grap, 2010). Most ICU patients however cannot communicate their pain intensity levels and therefore limit the critical care nurses caring for them to clinical judgment, behavioural signs and at times, physiologic signs, in their pain assessment (Coyer et al. 2011).

Nurses have the greatest responsibility of assessing critical care patient's pain, as they are the most proximal in care; they continuously make decisions relating to the patient's pain intensity and assess the need for analgesia (Subramanian et al. 2011). Regular intervals of pain assessment help establish the presence of pain, therapeutic effectiveness, any side effects and need for dose adjustment (Morton & Fontaine, 2013). Furthermore, adequate appropriate treatment of pain mostly depends on a standardised, systematic approach to guide the commencement of drug therapy (Lindenbaum & Milia, 2012). Additionally, an individual's pain experience influences cognitive, emotional and behavioural responses to pain (Arif-Rahu & Grap, 2010).

Whilst pain assessment is subjective it should also be a pre-requisite for adequate pain control (Urden et al. 2006). Nurses, being the patients' 24-hour care provider amongst other health care personnel, are in a position to assess and adequately manage pain in critically ill patients. This may not however be the case, as research has shown that nurses have failed to address pain limitations in ICU by assessment, compared to current recommendations, in order to achieve an ultimate patient pain relief (Shannon & Bucknall, 2003, Herr et al, 2006).

According to Pasero et al. (2009), most health care institutions should execute an Evidenced –Based Practice approach to pain assessment. Pain assessment in patients who can verbally communicate their level of pain is not as difficult, but attempts should be

made to provide the patient with methods to assist them communicate their pain to determine the severity, if not intensity, of pain being experienced (Puntillo et al. 2009). The patient's response may just involve a simple yes, no or vocalisation (Herr et al, 2006). Various tools have been developed, established and validated over the years, for the purpose of pain assessment in patients who can verbally communicate.

However, only a small percentage of patients in ICU are able to self-report. The issues surrounding pain assessment in critically ill patients are intricate, as a considerable number of mechanically ventilated ICU patients cannot self-report the intensity of pain being experienced due to accompanying sedatives or neural damage (Payen, Bosson, Chanques, Mantz & Labarera, 2009). The American Society of Pain Management Nursing recommends guidelines for pain assessment in intubated or unconscious patients, which include a self-report if possible, potential causes of pain, observation of patient behaviour, surrogate reporting, use of analgesics (Herr et al, 2006; Pudas-Tahka, Axelin, Aantaa, Lund & Salantera, 2009), physiological approaches (Morton & Fontaine, 2013) and the pathology of the disease (Pasero et al. 2009).

The importance of critical care nurses being conversant with pain assessment cannot be over-emphasised. They are also responsible for drug administration, titration of intravenous drug infusions and integration with non-pharmacological interventions to relieve or control pain (Cade, 2008).

2.4.1 The Subjective Component of Pain Assessment for the Critically ill Patient

In pain assessment, the most reliable resource of information is the patient (Aslan, et al. 2003), in accordance with the definition of pain being what the patient says it is (Puntillo, et al. 2004) or it being a subjective experience. Attempts should be made to provide patients with methods that can assist them communicate their pain to determine the severity (Puntillo et al. 2009). There are various well established pain assessment scales for patients who are able to self-report pain, which include: the McGill pain questionnaire (short-form, the brief pain inventory (Wisconsin), the Face scale, the Visual Analogue Scale (VAS, the Verbal Rating Scale (VRS) and the Numerical Rating Scale (NRS) **(Refer to Annexure 1).** The NRS is used most often (Puntillo et al., 2009). The scales' reliability and validity have long been established in recent findings and Ahlers, Gulik, Veen, van

Dongen, Bruns, Belistser, de Boer, Tibboel and Knibble, (2008) tested the inter-rater reliability and validity and came up with the same findings.

Apart from using the scores of the pain scale, it is important for the nurse to determine the characteristics of the pain being experienced. The PQRST mnemonic is used to determine the cause of pain and the appropriate treatment to be administered (Urden et al, 2006).

- **P-Provocative or palliative/aggravating factors,** which includes the location of the pain and what brings about the pain, for instance turning or breathing, or what relieves the pain.
- **Q-Quality,** which includes the quality of pain; if the pain is dull, sharp, stabbing etc.
- **R –Region/Location radiation,** which includes the radiation, or not, of the pain and the symptoms accompanying the pain.
- **S-Severity and other symptoms,** which includes the rating of the pain on a scale of 0-10.
- **T-Time,** which includes when the pain began, its history and if it is constant.

Puntillo et al. (2009) have suggested ways of assisting the ICU patient to use a self-assessment instrument for pain. This involves ensuring the tool is obvious, including descriptive words for pain intensities, showing the tool to the patient, explaining its purpose, providing hearing aids and reading glasses if necessary, giving the patient enough time to process instructions and respond. Ventilated patients can be asked to point on the NRS scale if they are able.

2.4.2 Objective Component of Pain Assessment for the Critically ill Patient

Pain is a prevalent stressor in critical care patients and at the same time a challenge to its assessment, management and evaluation (Puntillo et al, 2009). As much as the patient's self-report is accredited as "gold standard," alternative methods must be utilised particularly when the patient cannot report the intensity of pain being experienced, for example if sedated, anaesthetised, having received a neuromuscular blockade (Jacobi, Fraser, Coursin, Riker, Fontaine, Wittbrodt, Chalfin, Masica, Bjerke, Coplin, Crippen,

Fuchs, Kelleher, Mark, Nasraway, Murray, Perruzi & Lamb, 2002) or unconscious due to illness.

These methods must be adapted to conform to the communication abilities of the critical care patient (Gelinas & Johnston, 2007). Several studies have emphasised the importance of accurate pain assessment in the non-verbal patient (Odhner, Wegman, Freeland, Steinmetz, Ingersoll, 2003, Puntillo, 2007, Gelinas & Johnston, 2007, Rose et al, 2011) in ICU as this is the basis for effective pain management. Additionally, studies have shown the magnitude of the problem and the need for it to be specific to each critically ill patient regardless of the fact they cannot self-report pain. Critical care nurses are guided by institutional, hospital or unit guidelines or protocol during pain assessment.

A number of pain assessment scales have been developed over the years to assist ICU nurses with an effective and uniform way of assessing pain in the critical patients. These scales incorporated behavioural changes (Lindenbaum & Milia, 2012. The preference of the tool for assessment may reflect the clinician's knowledge of what pain is and how clinicians convert pain from an individual experience to words perceived by others (Puntillo et al. 2009). The implementation of these tools by ICU nurses is challenging, in particular due to limitations displayed from research findings (Gelinas & Johnston, 2007). As much as the reliability and validity of these tools have been studied, documentation of their feasibility and clinical utility has been limited (Gelinas, 2010) and whilst there are outstanding characteristics for implementation of the scales, further studies are recommended.

Selecting the most suitable pain assessment scale consideration, depends on the type or condition of the patient involved, the ability to communicate with the nurse and the ICU nurse's skill of interpretation of physiological indicators or pain behaviour (Jacobi et al. 2002). Furthermore, the use of physiological indicators as the single sign of the patient being in pain should be critically regarded, because despite the fact these indicators may change in the presence of pain, several other factors for instance, a patient's condition, may be influencing the change (Pudas-Tahka et al. 2009). Whilst assessment tools and pain protocols may be a series of tick boxes and summarising the intensity level of pain the patient is experiencing, they should not forget the patient (Plunder et al. 2002; Partison,

2006; Rycoft-Malone et al. 2008). Communication with the patient should continue whilst the critical care nurses make decisions about the pain management.

The following is a description of the pain assessment scales for patients unable to self-report.

Behavioural pain scale (BPS) (Payen et al, 2001) was designed from a survey of ICU nurses and literature review of infant and children pain scales, for critically ill patients (Pudas-Tahka et al. 2009) based on three items: facial expression, movements of upper limb and compliance with mechanical ventilation. Each item of the scale has four descriptions and a score from 1, for no response and 4, for full response (Payen et al, 2001). There have been attempts to validate the tool ever since Young et al. (2007) first piloted it on 44 mechanically ventilated patients and Aissaoui, Zeggwagh, Zekraoui, Abidi & Abougal (2005) on 30 patients. The BPS offers ICU nurses a simple, objective tool to titrate analgesia therapy in the ICU for critically ill patients (Payen et al, 2001). Critical care nurses decide which domain of this scale is being displayed, or expressed by the patient at that particular time.

The Critical Care-Care Observation Tool (CPOT) (Gelinas, Fillion, Puntillo, Viens & Fortier 2006) contains four behavioural domains: facial expressions, body movements, muscle tension and compliance with the mechanical ventilator. The CPOT was developed using elements of existing pain assessment from existing scales such as BPS, focusing on the patient's self-report (Gelinas et al. 2006). Each behaviour is scored on a scale from zero to 2, for a possible score which ranges from zero to 8 and descriptions given to explain the behaviour expected, enabling consistent scoring within the four domains. The tool has had various validation attempts by the original developers and other authors: Gelinas and Johnson (2007), Gelinas, Harel, Fillion, Puntillo, & Johnston (2009), Gelinas 2010 and Gelinas, Arbour, Michaud, Vaillant & Dasjardins (2011). Further attempts to assess the feasibility of the tool have recently been undertaken by Rose, Haslam, Dale, Knechtel & McGillion (2013), who reported that the CPOT increased the frequency of pain assessment and may influence administration of opioid analgesics.

The Non-Verbal Adult Pain Scale (NVPS) (Odhner et al. 2003) was developed for sedated patients, with categories which include: Face, activity (movement), guarding,

physiological signs I (vital signs, systolic blood pressure, heart rate and respiratory rate) and physiological signs II (skin, papillary response, perspiration, flushing, diaphoretic and pallor) (Odhner et al. 2003). Descriptors are assigned for rating purposes.

Pain Assessment and Intervention Notation Algorithm (P.A.I.N) (Puntillo, 2004) was developed for the purpose of a research study on pain assessment and analgesic practices of nurses (Puntillo, 1997; Puntillo, Stannard, Miaskowski, Kehrle & Gleeson, 2002). It has 12 behavioural aspects (movements, facial indicators, and posturing or guarding) and eight physiological indicators of pain (heart rate, blood pressure, respiratory rate, perspiration and pallor) (Pudas-Tahka et al. 2009). There are three steps: firstly - assess pain, secondly - assess process and thirdly - analgesic intervention. The tool still lacks reliability.

Pain Assessment Algorithm (Blenkham et al, 2002) was designed for critical care patients unable to verbally communicate. It comprises of tachycardia, hypertension, sweating, hypertension with pupil dilatation and/or facial grimacing, writhing or distressed movements. Unfortunately, this tool has not been clinically tested (Pudas-Tahka et al. 2009) and lacks validity and reliability.

The validity and reliability of these tools have been attempted and further studies have been recommended for better reliability however, documentation of the feasibility of each tool and clinical utility is still limited (Gelinas, 2010). The BPS and CPOT have proved to have better reliability and validity in recent studies.

2.5 PAIN AND SEDATION MANAGEMENT IN THE CRITICALLY ILL PATIENT

2.5.1 Pain Management in the Critically ill Patient

Patients unable to communicate their level of discomfort during pain assessment are at high risk of poor pain management (Paulson-Conger, Leske, Maidl, Hanson & Dziadulewicz, 2011). Although there is a considerable body of research on different aspects pain, it is still a challenge for critical care clinicians, in particular critical care nurses (Li, Puntillo, & Miaskowski, 2008). Furthermore, the lack of vigorously tested valid and reliable pain scales has been linked to inadequate pain management in high-risk

patients (Li et al. 2008). Effective pain assessment leads to adequate pain management in the critically ill patient and so pain management in ICU should be prioritised. The two broad aspects of pain management in ICU are pharmacological and non-pharmacological interventions.

2.5.1.1 Pharmacological management of pain in the critically ill patient

This refers to drug management of pain. Due to the scarcity of knowledge on the pharmacological agents used for pain relief, management decisions have to be based on known physicochemical, pharmacokinetic and pharmacodynamic characteristics along with known information from other critically ill patient populations and settings (Erstad, Puntillo, Gilbert, Grap, Li, Medina, Malarski, Pasero, Varkey & Sessler, 2009). An important concept to apply in pain management is multimodal analgesic intervention, which focuses on using agents with different modes of actions (Yost & Gropper, 2010). Several routes can be used to administer pain medication and according to Morton & Fontaine (2013), the most appropriate route in ICU is the intravenous (IV), as it is more dependable compared to other routes which include, gastrointestinal, intramuscular route (IM), rectal route, subcutaneous (SC) and parenteral route.

The pillar to pain relief in ICU patients is intravenous opioids for instance Morphine, Hydromorphone, Fentanyl (Tietze, Parsons, Jones, Doucete, 2012) and Remifentanil (Erstad et al. 2009). Opioids mediate analgesia by interacting with various central and peripheral receptors (Jacobi et al. 2002) and as long as their administration is in equivalent doses, the effect does not vary, although the pharmacokinetics, metabolism and side effects do. The route of delivery depends on the patient's condition (Tietze, Parsons & Jones, 2012). The use of opioids is mainly to relieve severe pain in critically ill patients and the choice should be based on its potency, pharmacokinetics and side effects (Yost & Gropper, 2010). There is a likelihood of critically ill patients developing opioid tolerance and withdrawal in ICU and consideration given to this if unresponsiveness is due to nociceptive input, tolerance development or the outcome of an ongoing psychological process (Erstad et al. 2009).

The second class of pharmacological intervention is the non-opioid drugs, classified as weak or strong non-opioids. The non-opioid drugs provide an analgesic effect by non-

selective competitive, competitive inhibition of cyclooxygenase (COX), a critical enzyme in the inflammatory cascade (Jacobi et el. 2002). The weak analgesics include Paracetamol, Ibuprofen and Diclofenac amongst others (Yost & Gropper, 2010); the strong non-opioids are mostly Ketamine and Dexamedetomidine, which are used for moderate pain (Tietze et al, 2012). The non-opioid drugs usually act by inhibiting the release of prostaglandins but their significant side effects can limit their use in the critically ill patients (Yost & Gropper, 2010).

Another class of drugs for pain management is the regional epidural analgesics, used when the opioid side effects overwhelm, or when unable to control pain in patients particularly the elderly (Lindenbaum & Milia, 2012). The use of an epidural needs more skill and knowledge of the techniques surrounding it and the nurse must be well versant with the anesthetic techniques (Lindenbaum & Milia, 2012).

Critical care nurses need to understand the pharmacological aspects of a drug and how to reverse it in the event of overdose. The knowledge in each drug is important as the choice of drug administered for a particular patient may reflect the level of knowledge of analgesic medication. In addition, knowledge on the antidotes of these drugs, such as morphine, is essential as is also advocated for just in case of an adverse reaction. Indeed the management of pain in the ICU patient is demanding as the ICU nurses are also coping with the ever-advancing life-threatening conditions of critically ill patients (Subramanian et al. 2011). Nevertheless, every ICU nurse should establish an individualised therapeutic plan for every patient and communicate with the rest of the team to maintain consistency in administration (Jacobi et al. 2002). Critical care nurses should also keep in mind they are patient's advocates in care and in this case, pain control advocates (Erstad et al. 2009).

2.5.1.2 Non-pharmacologic therapy/ complementary interventions

In order for patients to experience comfort in ICU particularly from pain, a multidisciplinary approach is encouraged (Rowe & Fletcher, 2008). Complementary interventions include other forms of therapy such as relaxation techniques and music therapy for relieving pain apart from drugs. According to Erstad et al (2009), they are supposed to inhibit or regulate the ascending transmission of a noxious stimulus from the periphery or to stimulate the descending inhibitory control from the brain.

Consales, Chelazzi, Rinaldi, & Gaudio (2006) and Rowe & Fletcher (2008) point out that this approach involves frequent communication and explanation to the patient, the rest of the health care providers and family. Rowe & Fletcher (2008) suggest it may simply be performing some basic needs, which are a necessity on a daily basis such as hydration and feeding in order to prevent symptoms of hunger and thirst. Other interventions include proper positioning if need be, eliminating any irritating physical stimulation and application of heat and cold therapy techniques (Jacobi et al. 2002).

Additionally, safety intervention measures should be observed, for example procedures such as taking a blood sample for arterial blood gas analysis, checking and adjusting the ventilator. Firm reassurance and informing the patient are some of the measures, which can control pain for ultimate comfort. ANZCA, 2005, Shi et al. 2003 and Coyer, et al. (2007) add that strategies such as distraction, hot and cold treatments and transcutaneous nerve stimulation can help in relieving pain along with medication. Non-pharmacological interventions must be individualised for each patient (Coyer et al. 2007) as they may not work for all.

Erstad et al (2009) point out three cognitive behavioural interventions, music therapy, relaxation interventions such as jaw relaxation, sensory and procedural information, for critically ill patients experiencing pain and support them because they are relatively easy to apply in ICU. This gives the patient ample time to be prepared psychologically before the procedure thus improving the coping mechanisms. Erstad et al (2009) also points out that complementary interventions are less expensive, easy to provide as they need no technical skills and safe, however they have to be used with analgesics, as the effectiveness in how they work is uncertain.

2.5.2 Sedation assessment and management

Pain and sedation management are inextricably linked. Sedation broadly encompasses sedatives and analgesics in the critical care units (Egerod, Chastensen, 2006). Sedation management forms an entire component for the ICU patients, attempting to relieve anxiety therefore enhancing comfort (Aitken, Marshall, Elliot & McKinley, 2008) and lessens self-extubation and agitation (Payen, Chanques, Mantz, Hercule, Auriant, Leguillou, Binhas, Genty, 2007). Furthermore, sedation reduces the critically ill patient's awareness of the

ICU environment reducing response to external stimuli (Rowe & Fletcher, 2008). According to Weinert et al. (2001), Egerod (2006); Aitken et al. (2008), the decision to sedate a patient depends on three factors, which include environmental factors such as noise, patient factors such as tolerance, nurse related factors such as knowledge and work related practices such as communication.

As much as sedation may play a cardinal role in the care of the critically ill patient, it also has adverse effects. Opioids can produce sedation effects but not totally, as they may not diminish the awareness or fugue of stressful events as patients recall their stay in ICU as unpleasant and frightening (Jacobi et al. 2002). Jacobi and colleagues state that sedation management should be provided only after analgesic management has been administered. Conversely, Guttormson and colleagues (2010) point out that sedation protocols and assessments have a higher independence and control over sedation administration practices for critical care nurses. This proves these protocols can bring about "gold standardisation" for sedation assessment and management.

Various sedation assessment scales have been established but none has been recommended as gold-standard in ICU (Jacobi et al. 2002). They include the Ramsay scale, the Riker-Sedation Agitation Scale (SAS), the motor activity assessment scale (MAAS), the Vancour Interaction and Calmness Scale (VICS) and the Comfort Scale. Sedation assessment is goal orientated, focusing on the heart rate variability, lower esophageal contractility and the patient's electroencephalogram (EEG) (Jacobi et al. 2002). Moreover, regular sedation assessment and the effectiveness of the therapy should be encouraged through a systematic review of standardised pain and sedation management practices. (Jackson et al. 2010; Woien, Vaeroy, Aamodt & Bjork, 2012).

Sedation therapy includes drugs such as Benzodiazepines and Propofol and a central alpha-agonist such as Clonidine, which block the attachment and encoding of new information and any potential unpleasant experiences (Morton & Fontaine, 2013), which is defined as anterograde amnesia but does not induce retrograde amnesia (Jacobi et al. 2002). Propofol and Benzodiazepines are used more frequently than the barbiturates (Egerod et al. 2006). Jacobi et al. (2002) recommends that sedatives such as Midazolam or diazepam should be administered for rapid sedation, especially for acutely agitated critically ill patients. Additionally, the sedative dose should be titrated to a required end-point with daily

adjustment to minimise prolonged sedation of ICU patients. Critical care nurses are instructed to use international, published or unit guidelines for sedation management.

Of the 1360 patients in a study conducted in France by Payen et al. (2007), the number of sedation and analgesia assessments was significantly smaller than the use of sedatives and opioids meaning many patients were not assessed whilst receiving pain or sedation treatment. Forty three percent of the patients were not assessed for analgesic administration, whilst 53% were not assessed for sedation treatment. Additionally, the use of sedative drugs was found to be higher in patients with cardiovascular failure and respiratory failure. Sedation should be minimised in ICU as, it has been established that the excessive use of analgesics and sedatives lengthens dependence on mechanical ventilation and an increased risk of developing brain dysfunction (Girard et al, 2008, Pisani et al, 2009, Devlin et al, 2010; Woien, et al. 2012).

Sometimes the use of both pain medication and sedative medication may have a synergistic adverse effect on the patient (Puntillo, 2007). The challenge is to select the right combination of drugs to avoid the adverse effects otherwise patients may be under medicated, overdosed or mis-dosed (Puntillo, 2007). Whilst an inadequate level of sedation may lead to problems such as anxiety, accidental extubation or physical harm, over sedation may also lead to prolonged dependence on mechanical ventilation (Aitken et al. 2008). Conversely, whilst novice ICU nurses are likely to give sedatives more often the experienced nurses will administer medication after assessing and dealing with the cause of agitation in the patient (Guttormson, et al. 2010). Furthermore, research has shown that pain is not managed well, particularly in sedated patients, posing a great danger to ICU patients even though there are available consistent ways of sedation assessment (Cade, 2008).

2.6 CONSEQUENCES OF UNRELIEVED PAIN IN THE CRITICAL PATIENT

Ineffective management of pain is a sign of poor medical practice and services, which may result to serious consequences (Brennan, Carr, Cousins, (2007). The effects of unrelieved pain can be either physiological or psychological and can have economic and social implications. These effects may originate from chronic or acute pain. Uncontrolled acute pain commonly leads to pathophysiological neural alteration eventually evolving into

chronic pain (Brennan et al. 2007), which in turn leads to physiologic, family and social consequences and may be referred to a disease entity (IASP, 2002, Sidall & Cousins, 2004; Brennan et al. 2007). Research has shown that pain originating from any form of injury may place patients at risk of developing several complications (Puntillo et al. 2004).

The pathophysiological effects depend on the system affected for instance, in the cardiovascular system, tachycardia, hypertension and increased cardiac workload is likely to ensue. Moreover, pain induced reflex responses may alter respiratory mechanisms, ventilation perfusion mismatch, cause contraction of the skeletal muscles, muscle spasms and rigidity (Puntillo et al. 2004, Thomas, 2008). Far from being benign, there is growing evidence that pain can suppress immune function and enhance tumor development and metastasis in animals (Puntillo et al. 2004). The stress response in pain may initiate hyperglycemia and increase catecholamine, cortisol and antidiuretic hormone secretions (Thomas, 2008), which results in slow and poor wound healing (Paulson- Conger et al. 2011). The renal system is also affected as oliguric-urine retention develops (Thomas, 2008). Other complications include neurohumoral changes and neuronal remodelling (Dunwoody et al. 2001; Gelinas, Tousignant-Leflamme, Tanguay & Bourgault, 2011b).

Psychologically, unrelieved pain causes long lasting psychological distress, which impacts negatively on the patient's clinical outcome (Gelinas et al. 2011b). A report from World Health Organization (WHO) explains that people who have chronic pain are four times more likely to suffer from depression than those without pain (Gorge et al. 1998; Brennan et al. 2007). In addition, chronic pain has been associated with low socio-economic status (Brennan et al. 2007). If there is persistent pain in a patient admitted to the ICU, the period of recovery is prolonged which impacts heavily on the financial burden for the hospital bill. Furthermore, unrelieved pain cultivates anxiety of movement hence the patient tends to avoid self-mobilisation, which may lead to complications such as Deep Vein Thrombosis (DVT), pulmonary embolus and pneumonia (Arbour, 2003; Pasero & McCaffery, 2005; Paulson-Conger et al. 2011).

Understanding the pain experience of an individual undergoing a procedure, to plan appropriate treatment is predicated on the use of a valid pain assessment method (Kehlet et al, 1995, Hamill et al. 1999; Puntillo et al. 2004). Caring and ensuring that the patient is

comfortable is at the heart of nursing as a profession and more specific attention should be given to pain assessment to provide the most appropriate pain management therapy.

2.7 KNOWLEDGE RELATED TO CURRENT PRACTICES OF PAIN ASSESSMENT, SEDATION AND MANAGEMENT.

The quality care for ICU patients mostly depends on the critical care nurses' knowledge and the pain assessment and management skills delivered. However, it has been reported that ICU nurses lack knowledge in pain assessment and management (Wang & Tsai, 2010). Critical care nurses may focus on other priorities of care that are obvious by sight, such as respiratory management, thus compromising effective pain management (Cullen et al. 2001; Young et al. 2007). Extensive literature has shown that despite numerous researches on pain in ICU, there is still lack of knowledge in many aspects of pain (Shannon & Bucknall, 2003, Wang & Tsai, 2010). The ICU nurse requires adequate skills in pain assessment, management, communication and medication titration accompanied by strong commitment and accountability to assess and individualise pain treatment for every patient in ICU (Wang & Tsai, 2010).

Studies involved with ICU nurses' knowledge have found consistent responses of inadequate knowledge. In a study for Coronary Artery Bypass Graft (CABG), ICU nurses mostly rated their pain knowledge levels as excellent, despite the fact they scored moderately, with no recent pain related in service training attended as evidenced by findings (Watt-Watson, Stevens, Garfinkel, Streiner & Gallop, 2001). In another study in Taiwan by Wang & Tsai (2010), the correct answer rate for the integral knowledge scale on pain was 53.7%. The knowledge scores were generally low because in the 37 questions, 10 had a correct answer rate lower than 30%, whilst eight were knowledge related. Conversely, in the United Kingdom, Wilson (2007) found specialist nurses, including Intensive Care nurses, had more extensive knowledge of pain assessment and management than the general nurses did, which was prompted by feelings of insufficiency and lack of control being in a specialised unit.

Whilst critical care nurses should be striving for self-awareness in pain and other evidenced based practices, Watt-Watson et al. (2001) point out there have been reports of knowledge deficits alongside misbeliefs about pain management in critical care nurses.

Efforts of continuous in-service education of pain will be in vain due to lack of interest and so concurrent changes in practice will not be evident (Wilson, 2007). Lindenbaum & Milia (2012) add that pain knowledge is vital as critical care nurses need to have a profound understanding of interactions between pain, drugs and physiologic processes for adequate pain assessment and management.

Whilst there are researched and documented negative physical and psychological consequences to severe pain, nurses lack adequate pain knowledge, they underestimate pain and provide inadequate analgesia (Rose et al. 2011). Many studies have revealed that pain assessment in the critical care setting is inadequate due to underestimation of patients' pain, incomplete pain assessments and challenges in assessing the pain (Gelinas et al. 2004, Puntillo et al. 2009, Rose et al. 2011). According to Rose et al (2012), ICU nurses do not consider pain assessment for patients with decreased level of pain, which shows a lack of caring attitude and pathophysiologic knowledge on what the patients may be experiencing.

Despite the availability of pain assessment tools, they are rarely used by critical care nurses in ICU. For instance, Idvall & Ehrenberg (2002) and Gunnigberg & Idvall (2007) stated that less than 10% of nursing records had notes of systematic assessment of pain with use of a pain assessment tool. Rose et al (2011) reports that only 45.7% of nurses used one or more pain assessment tools for patients unable to self-report. This may be indicative of lack of sufficient knowledge of how to use the scales. Another reason, as Haslam, Dale, Knechtel, & Rose (2012) point out, may be the lack of well-validated behavioural pain scales particularly for non-verbal patients; ICU nurses will spend a significant amount of time charting the pain behaviours in a narrative fashion.

In addition, research has shown that most critical care nurses are not conversant with current EBP, which may explain why there are still high inadequacies of knowledge regarding pain assessment and management plus, they are unhappy with the latest protocol and guidelines for pain assessment and management (Payen, et al. 2007, Rose et al. 2011). The nurses further indicated they need a clinical facilitator to remind them regularly of the guidelines (Subramanian et al. 2011) creating a major obstacle to adopting these tools (Rose et al. 2012).

Reportedly, there are inconsistencies in the knowledge of pain as 85.4% of nurse respondents thought critically ill patients over rated their pain, whilst 97.2% agreed the patients were the most reliable sources of individual pain intensity (Guttomson et al. 2010). Routine pain is reported during nurse-to-nurse handover but not specific pain scores or descriptions (Rose et al. 2011). Additionally, it is not understood as to why nurses under medicate patients in terms of prescribed analgesia (Watt-Watson et al. 2001), for example one third of nurses in a study conducted in Toronto reduced the pain medication and administered only 47% of the prescribed medication. The adequacy of critical care nurses' knowledge has been analysed in terms of assessing pain, managing clinical pain, knowledge of analgesics and evaluation of the outcome of pain and the outcome is below average (Wang & Tsai, 2011).

In conclusion, the way forward may be to revise the education curriculum on the subject of pain both during training and in the working years, as has been recommended by many researchers (Shannon & Bucknall, 2003, Guttomson et al. 2010, Rose et al. 2012). Increased continuous professional education on pain requires integration into the ICU for the existing trained staff to keep them up-to-date.

2.8 PAIN DOCUMENTATION IN ICU

One of the key aspects to improving and enabling pain control is documentation, which results in communication and continuity of pain management (Chanques et al. 2006; Haslam et al, 2012). Documentation is the key to quality improvement and efficient accountability to pain assessment and management. There is very little research on documentation of pain assessment in the critically ill patients, particularly for those patients who cannot self-report (Gelinas et al. 2004). Of importance is that regular pain assessment and its documentation in medical records is part of quality pain management (Sayers et al. 2000; Innis et al. 2004).

In a recent study conducted in a Canadian ICU, the nurse respondents' responses were that assessment and documentation is equally important (Rose et al. 2012). Contrary, nurses' documentation of ICU patient's pain scores was in the first two hours of every shift, whilst the adjustment of scores made in response to pain caused by procedures were not documented (Woien et al. 2012). Nurses tend not to be specific about documenting of pain

in their records for instance, in a study of 183 pain episodes nurses only reported the patient had pain or was uncomfortable, no intensity specified and the use of a pain scale was indicated only in three of 183 pain episodes (Gelinas, et al. 2004). This shows that critical care nurses do not understand the importance of documentation and their awareness of pain, right prioritisation and the importance of pain preventative measures will be evident (Simpson et al. 2002, Kim & Park 2005, Topolo vec-Vranic et al. 2002; Haslam et al. 2012).

Documentation habits may be lacking because the adoption of recent scales for pain assessment has taken time, prompting nurses to chiefly document pain for nonverbal patients in a narrative form (Haslam et al. 2012). According to McGibson & Peter, (2008) and Haslam et al. (2012), ICU pain documentation involves tick boxes and scoring systems for assessment records. Narrative documentation of pain assessment findings are used to articulate interventions that cannot be recorded in flow-sheets (Haslam et al. 2012). It is important that narrative descriptions be standardised otherwise every critical care nurse will have their own terminology, which brings about confusion and is time consuming as others try to understand the meaning.

Gunningberg & Idvall (2007) recommend good documentation of pain at least three times a day until treatment ceases. Stanik-Hutt (2003) further recommends the critical care settings should select a method for measuring and documenting pain, for inclusion as a fifth vital sign to be recorded on flow-sheets. Gelinas et al (2004) point out that for pain to be well documented it should be assessed and reassessed when monitoring a patient's progress. Contrarily, Gelinas and colleagues (2004) reported about 40% of pain episodes were not reassessed but effectiveness of pain intervention was reported as 60%. It has been shown there is a weighty difference in what the patients' report as their worst moment of pain and what nurses have written in the records within a 24 hour period (Gunningberg & Idvall, 2007).

Haslam et al. (2012) recommends the development a pain wordbook of pain assessment descriptions may amend both recognition and pain documentation consequently facilitating appropriate analgesic administration. For instance, documentation of the intensity of pain using a pain scale seems impossible even with an active process (Gunninberg & Idvall, 2007). This renders addressing pain assessment and management limitations a challenge.

2.9 PAIN EDUCATION AND GUIDELINES IN ICU

There is emphasis by Ward et al. (1998) and Watt-Watson et al. (2001), on whether it is necessary to examine the patient's outcome in order to establish if initiatives such as nurse education programmes do change pain management practices. According to Rose et al. (2011), the perceptions of pain assessment are influenced by the extent of pain education, number of topics covered during ongoing professional education and pre-licensure nursing qualification. Literature reveals critical care nurses have requested continuous training in pain assessment and management, including the epidural anaesthesia, for more awareness and better decision-making (Subramanian et al. 2011). They have further stated they need clinical facilitators to remind them of current pain research (Aziata & Adejuno, 2013b).

Some of the topics taught in short courses include: painful conditions and procedures, pharmacological pain management principles and pain physiology mechanisms. A survey done by Rose et al (2012) found the priority topic covered during professional development is pain assessment methods and tools for the ICU nurses, followed by pharmacological pain management principles, pain pathophysiology, then pain practice recommendations, non-pharmacological pain management and lastly physiological implications of unrelieved pain. Guttormson et al. (2010) recommends that with sedation, education should also be incorporated, involve sedative medications, symptom management and discussion of critical care nurses' attitudes toward sedation of mechanically ventilated patients.

Research has shown that when nurses are well trained and receive constant education about a procedure they tend to improve their practices (Wang & Tsai. 2010). An intervention study by Innis et al. (2004) showed a tremendous improvement on patient satisfaction rates after short training between the first and second time by 20%, increasing the nurses' knowledge by 12% and documentation by 48%. In addition, in a study where 84.3% of the nurses reported to attend pain education, they were unlikely to limit the administration of opioids in fear of addiction (Haslam et al. 2012).

Besides in-ward training, a curriculum change in the nursing school education is necessary. In a recent Ghanaian study nurses reported that the time allotted for pain education during nurse training is inadequate. Moreover, they reported inadequate clinical supervision and

inadequate curriculum content on pain assessment and management (Aziata & Adejumo, 2013b). This may apply to many countries globally, where there is little time for pain education and updates on current research and EBP.

2.10 BARRIERS AND ENABLERS OF PAIN ASSESSMENT AND MANAGEMENT IN ICU

2.10.1 Enabling Factors for Pain Assessment and Management.

Enablers are factors that make pain assessment and management possible, easier, effective or adequate. Some of the enablers from previous research include prioritisation of pain assessment in ICU by all health care providers, prescription of the right form of analgesia with the right dosage and a motivated critical care team interested in providing adequate pain relief (Rose et al 2011). Other enablers include adequate prescription of analgesia, a motivated critical care team and use of standardised pain assessment tools guidelines and protocol (Haslam et al, 2012). In addition, continuous professional education of pain in the ICU has been found to be an enabler to ameliorate pain management (Aziata & Adejumo, 2013b).

2.10.2 Barriers to Effective Pain Assessment and Management

Conversely, there are several identified barriers to effective pain assessment and management. Innis et al. (2004) and Carr (2008) confirm the most common barrier to successful pain management is the failure to first assess pain and lack of accountability. Puntillo et al. (2009) and Wang & Tsai, (2010) acknowledge the interference of optimum pain management attributed to the patient, family, health care team and health care system. In addition, Carr (2008) points out that inadequate pain knowledge, lack of documentation and unwillingness to raise the priority of pain assessment and management are main obstacles to its improvement. Furthermore, lack of communication between patients and nurses (Shannon & Bucknall, 2003, Rose et al. 2011) and between nurses and physicians regarding the patient's pain (Erdek & Pronovost, 2004) leads to inadequate pain management.

Reportedly nurses want to improve the quality of pain management but are hindered by the health system (Erdek & Pronovost, 2004). In most countries, doctors write prescriptions, according to most government policies and hospitals, hence nurses are paralysed in prescribing medication (Wang & Tsai, 2011). Nurses maintain their role is mostly limited to assessment and medication administration. Contrarily, Subramanian et al (2011) argue that nurses depend on experts', such as anesthetists and doctors, opinions in managing pain and the findings of a Canadian study revealed that 38 % of nurses frequently call physicians to modify medications (Cook, 2006; Subramanian et al, 2011).

Additionally, technology is one major barrier to pain management in ICU, because the patient may be unable to control movements normally used to express pain (Shannon & Bucknall, 2003). The patient is dehumanised and the focus is on monitoring the ventilators and other technology. In a survey conducted by Rose et al. (2011), hemodynamic instability, patient sedation and nursing workload stood out as the most frequent impacting barriers to pain management.

Of equal importance is a multi- disciplinary clinical approach working towards the ultimate care of pain management to provide evidence-based practices(EBP) to the already underrated pain (Innis et al. 2004, Puntillo et al, 2009, Aziata & Adejumo, 2013a). This is lacking in most ICUs. According to Subramanian et al. (2011), the nurses complained that "junior doctors take long to establish effective pain control," however adequate analgesic prescription requires effective multidisciplinary communication of a patient's progress.

Other barriers to pain management include the fear of patient drug addiction, for example morphine and Pethidine (Aziata & Adejumo, 2013a), time constraints and honouring family wishes with regard to culture and religion. Brennan et al. (2007) point out that culture, religious hindrances and entrenched political and legal barriers encourage inadequate pain management. Health care professionals generally fear patients may become dependent on drugs such as morphine (Watt-Watson et al. 2001, Brennan et al. 2007). In Wang & Tsai's study (2010), 34% of the nurses did not believe the pain intensity was rising in those patients who repeatedly requested pain medication and were only asking because they were developing drug dependence. In the Ghanaian qualitative study by (Aziata & Adejuno, 2013b), nurses reported they did not see the need for participation

in ward rounds, as their opinions were not appreciated, showed lack of interest and had an increased workload which could be done instead.

However, one major challenge facing critical care nurses today is providing adequate pain management whilst coping with life threatening conditions of critically ill patients (Subramanian et al. 2011). Although this may be the case, clearly there is the need for improvement of pain assessment and management by increasing in-service training, education of pain and strengthen enablers and overcoming the barriers to pain assessment and management. The topics for pain education should include pain assessment, pharmacological and non-pharmacological management strategies, legal and ethical issues, barriers to pain management addiction and management of pain (Mayer et al. 2001; Innis et al. 2004), sedation management and quality improvement in accordance to evidence base. Additionally, health care institutions should promote patient and family education during the course of therapy (Morton & Fontaine, 2013). Ultimately, this promotes progressive quality of life and ultimate patient comfort.

2.11 SUMMARY

This chapter describes pain in the critically ill patient with the main sources being the ICU condition, invasive and non-invasive procedures. Pain assessment and management satisfaction is also described, as well as the subjective and objective components of pain assessment, pharmacological, non-pharmacological and sedation management. The major consequences of pain affect aspects such as the psychological, physiological, economic and social. It has been found that nurses lack adequate knowledge to pain assessment and management in current practice. ICU nurses' pain documentation has been questioned in research and there is lack of interest in the current guidelines of pain assessment and management. Finally the major enablers to effective pain assessment and management are adequate analgesic prescription, motivation and education; the major barriers are lack of prioritisation of pain, accountability and organisation barriers.

Chapter 3 will address the research methodology in this study.

CHAPTER THREE

RESEARCH DESIGN AND RESEARCH METHODS

3.1 INTRODUCTION

Chapter Three describes the research methodology used in this study which focuses on the research design and methods. The research methods consist of the study setting, target population, sample, sampling method and data collection process. The research instrument used in the data collection, the methods of data analysis, pilot study, ethical considerations, validity and reliability of the study are also described.

3.2 PURPOSE AND OBJECTIVES

For consistency, the purpose and objectives of this study are repeated.
The purpose of this study was to investigate Intensive Care nurses' knowledge and practices related to pain assessment for critically ill patients, at a major public sector hospital in Johannesburg.

In order to meet this purpose the following, objectives were set:

- To examine the level of knowledge related to pain assessment amongst ICU nurses caring for critically ill patients
- To determine pain assessment practices amongst ICU nurses caring for critically ill patients
- To identify the barriers for pain assessment amongst ICU nurses caring for critically ill patient

3.3 RESEARCH DESIGN

A study design guides researchers on how to collect, analyse and interpret observations and serves as a logical model for the various stages of the research. A quantitative, non-

experimental, descriptive, cross-sectional design was utilised in this study. The most appropriate means to collect the data was a self-administered survey.

Quantitative research: Quantitative research involves an empirical investigation of phenomena that lend themselves to precise measurement and quantification, often involving rigorous and controlled design (Polit & Beck, 2012). Quantitative design was ideal for this study as it was explaining pain assessment, with data collection done numerically.

A non-experimental design: non-experimental research is when the researcher collects data without introducing an intervention, also called observational study (Polit & Beck, 2012). The study is usually carried out in its natural location and no manipulation of variables is involved (Creswell, 2009). A non-experimental design was ideal for this study as it took place in the natural location, i.e. in the five (n=5) ICUs in the selected hospital and there was no manipulation in terms of involvement of treatment or any intervention given to respondents.

A descriptive study: A descriptive design observes, describes and documents aspects of a situation as it naturally occurs. It sometimes serves as a starting point for generating hypothesis or developing a theory (Polit & Beck, 2012). In addition, it is used to gain more information in a particular or specific area of study and may be used to develop a theory and no manipulation of variables is involved (Burns & Grove, 2007). Methods, which describe phenomena in a descriptive research include, structured and unstructured interviews, interviews and questionnaires. Protection against bias is achieved by connecting conceptual and operational definitions of variables, sample selection and size, valid and reliable measuring instruments and the data collection methods (Burns & Grove, 2007). In this study, descriptive design was ideal as it was used to gain more information on the nurses' knowledge relating to pain assessment in critically ill patients and justified current practice on pain assessment. A self-administered questionnaire was used to collect data to avoid bias.

Cross-sectional study: As the conducting of this study was over a short period of time it was cross-sectional. The aim of the cross-sectional study design is usually to describe a

population and to find the prevalence of the outcome of interest (Polit & Beck, 2012). Cross-sectional studies provide information concerning a certain situation at a given time.

3.4 RESEARCH METHOD

Research method refers to the steps, procedures and strategies for gathering and analysing data. They include the study setting, data collection strategies, population, sample and sampling methods and data analysis (Polit & Beck, 2012, Burns & Grove, 2007).

3.4.1 Research setting

The study was carried out in five (n=5) adult ICUs at a university affiliated tertiary and quaternary public hospital in Johannesburg, Gauteng Province. It is also a referral hospital, with five Intensive Care Units (n=5) for critically ill patients with different profiles, offering a full range of services both inpatient and outpatient to Gauteng and other neighbouring provinces.

The researcher considered these five Intensive Care Units to be homogenous as they represent highly specialised public sector Intensive Care Units, which accept critically ill patients from both medical and surgical disciplines. Two of the units accept patients from the cardiothoracic and neurosurgical specialities and one unit receives only trauma-related injuries.

The hospital has a 1200 bed capacity with the number of official ICU beds ranging from seven to 12 beds per unit. Assigned nurses to patients generally follow a 1:1 nurse-patient ratio in the acute period of illness. Nurses practicing in these units have access to specialist health care professionals and technical support on a 24 hour basis and have contact with a variety of critically ill patients. The researcher, as of October 2012, began working in the different ICUs and so gaining access to the facility during data collection was not difficult.

3.4.2 Target population

A target population is the integral population, which the researcher usually samples from an accessible population and hopes to generalise the study findings (Polit & Beck, 2012).

The target population in this study comprised nurses working in the five ICUs in the selected institution and who met the inclusion criteria, being responsible for medication administration as per the doctor's prescription. They include the nurses working in the cardiothoracic ICU 29 (n=29), coronary care unit 22 (n=22), neurosurgical ICU 36 (n=36), trauma ICU 30 (n=30) and general ICU 33(n=33).

A preliminary record review undertaken in February 2013 indicated there were approximately 105 Intensive Care trained registered nurses working in these ICUs.

3.4.3 Sample and sampling method

According to Creswell (2009), a sample is the subset of the target population, whilst sampling is the process of selecting the sample that is representative of the target population. Thus, a sampling method is the process in which a group of people are selected in this case, ICU nurses, events behaviours, or other elements representative of the population under study (Burns & Grove, 2007).

Non-probability purposive sampling

This is actual data collection involving the sample size for the research and establishes the level of knowledge and describes the practices related to pain assessment amongst ICU nurses. According to Burns & Groove (2007), non-probability purposive sampling focuses on particular characteristics of a population of interest to answer research questions. Also called judgemental sampling, the researcher selects the research respondents based on whom they think is appropriate for the study and who are well informed about a certain topic (Polit & Beck, 2012).

The selection of research respondents from the target population, in this case trained ICU nurses, involved requesting a list of all the critical care trained nurses from the ICU managers. From these lists, each nurse was approached, given information about the study and requested to participate. Those who agreed were selected as the respondents for the study.

Following discussion with a statistician, a sample size of 80 (n=80) was decided upon, as shown in the equation below, to ensure good representation of the population from which the sample was drawn.

The assumption is that from the previous study the prevalence of the critical care nurses who were confident in assessing pain and current practices for patients able to self-report and for those unable to self-report averaged at 70%, therefore *p*=0.7, error is 10%.

Statistical formula: $\mathbf{n^* = \frac{Z^2 \times p(1-p)}{d^2}}$ **Z=1.96 (95% confidence interval)**

p=0.7, d= 10 %(0.1), N=105

$$\mathbf{n^* = \frac{1.96^2 \times 0.7(0.3)}{0.1^2} = \frac{0.806736}{0.01} = 80.6736}$$

Sample size for the study will be **80** critical care nurses

The inclusion criteria for prospective respondents included:

- 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 registered general nurse including permanent and agency nurses working in the selected public sector institution;
- More than six months clinical experience in the selected Intensive Care unit.

The exclusion criteria included enrolled nurses and auxiliary nurses, as their sub-professional category of nursing staff are not expected to have the skills and in-depth knowledge of pain assessment and management of critically ill patients.

3.4.4 Data collection

Data collection is the process of gathering information to address a research problem in accordance to the research objectives (Creswell, 2009).

3.4.4.1 Pilot study

A pilot study is a small-scale version of the main research designed to test the methods of the larger study (Polit & Beck, 2012). Its purpose is to help the researcher to fine-tune the study before the main inquiry and to determine whether the methodology, sampling, instruments and analyses are adequate and appropriate (De Vos, Delport, Strydom & Fouche., 2005).

The conducting of a pilot study prior to commencement of the main study was for fine-tuning before the main data collection: assessing if the content was well understood, any flaws, length of completing the questionnaire and if it was applicable to the respondents. Following statistical consultation, the data collection questionnaire was used on ten (n=10) respondents at the selected study site.

The ten randomly selected ICU nurses received information about the study and requested to complete the questionnaire. Data was analysed to refine the research instrument and the data collection process prior to the main study. The ICU nurse respondents in the pilot study were asked to comment on the questionnaire's assertiveness, which was positive and only required minor adjustment after the results. On demographic data, the usual shift was dual, that is day and night and so a third option of both day and night shift was added as most were adding both in the pilot study. Most nurses did not fully understand the comprehensive questionnaire and therefore a lengthy explanation was required before administering the questionnaire for completion. No further changes were made as no difficulties were encountered. The main study did not include the results of the pilot study.

3.4.4.2 Data collection Process

Permission was sought from the CEO of the hospital being requested to participate in the study **(Refer Appendix J**). Once obtained, permission from the nursing services manager was sought and thereafter the ICU unit managers were approached, informed about the research, research purpose and its significance to practice and their permission sought. The researcher visited the ICUs (n=5) and observed the respective allocation list for selection of nurse respondents. The Intensive Care nurses who agreed to participate received an information letter outlining the study and its procedures (**Refer Appendix B**) and a consent form to complete **(**R**efer Appendix C**). The respondent placed the completed questionnaire into an envelope and posted it in a sealed box in the respective Intensive

Care Unit. At the end of the data collection period, which was one month, the researcher alone opened the boxes.

3.4.5 Research instrument

A questionnaire is a list of research or survey questions given to research respondents with the aim of obtaining some peculiar or particular information (Burns & Grove, 2007). The main purpose of using a questionnaire in a study is to collect data in an appropriate way, for the data to be precise for analysis, to make questions varied and to minimise, as much as possible, bias in the study (Burns & Grove, 2007).

In this study, a survey questionnaire **(Refer Appendix A)** developed by Rose et al. (2011) and identified in literature, was used to achieve the study objectives

The self-administered survey questionnaire contains three parts. The first section contains 36 items to elicit information on current pain assessment practices for critically ill patients (16 items); nurses perceived importance of pain assessment (7 items); nurses perceived importance of behavioural indicators (one item with 24 behaviours listed); enablers and barriers to effective pain management, documentation and management (3 items); pain education and beliefs of nurses (5 items). The second section asks about the nurses demographic variables (9 items), whilst the third section, includes a separate description of guidelines of existing practices for documenting pain assessment, such as the numerical rating scale to be used by patients who are able to rate pain. For the unconscious patient who is unable to communicate pain, nurses are encouraged to document pain behaviours such as facial expression and vocalisation. However, no specific tool was recommended and the required pain assessment frequency was every four hours or more, depending on the critically ill patient's situation (Rose et al. 2011).

The developers assessed face and content validity in the sample of the original study (Rose et al. 2011) and experts in pain, Intensive Care and survey methodology reviewed and rated the instruments clarity, content validity and comprehensiveness, based on the method described by Burns & Grove (2007). Additionally, a sample of 237 critical care nurses in five ICUs in Toronto, Canada, tested it in the original study, which yielded a response rate of 59.1% (Rose et al. 2011). One subsequent national study (Rose et al. 2012) was found,

which utilised this questionnaire on an independent sample of Intensive Care nurses, however these authors did not comment on reliability of the instrument.

After verification by two ICU experts, some questions were excluded whilst others were edited to fit the South African context:

- Question 26b was removed as the registered nurses association is only in Ontario not in South Africa;
- Question 26c was removed as the clinical practice recommendations of the American Society of Pain Management Nursing for pain assessment in the nonverbal patient is only available to subscribed members of the society;
- Question 31 was edited to have only diploma and degree qualifications because the study respondents are ICU trained and have either of the two qualifications;
- Question 33 was edited to have day, night and both day and night shifts as there are no evening and rotational shifts in South Africa, (most of the nurses in the hospital also work both day and night on a frequent basis);
- Questions 35a and 35b were excluded as the number of ICUs are already known because the study is to be conducted in one hospital;
- Questions 36 and 37 were excluded, as it was known the hospital was a teaching academic hospital serving a wide population of people across the country.

3.4.6 Data analysis

According to Burns and Grove (2007), data analysis is done in order to decrease, organise and give meaning to data. The collected raw data was transferred to an Excel spread-sheet then validated for mistakes and accuracy with the original data. The biostatistician was consulted for assistance with the data analysis.

Data management ensured that data collection was within the planned time-period. Since the questionnaires were coded during data collection process, data was entered and double-checked onto Microsoft Excel for data cleaning and coding purposes by finding missing entries, extreme values and inconsistencies, which was to minimise or to reduce their

impact on the results of the study. Data was then imported from Excel to statistical software "STATA" version 12 for analysis purposes. One questionnaire was found faulty and so the sample size used for analysis was (n=79).

The demographic data was 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. The McNemar's test described and compared the pain assessment practices in patients able to and unable to self-report pain and to assess the differences in the perceived importance and frequency of pain assessment for common procedures reported to be painful.

After statistical consultation, a student t-test was used to compare the associations between pain assessment practices and nurse variables, such as years of clinical experience and their education. Chi-square or Fisher's Exact test will be used to show the associations between other nurse demographic variables and responses. For the open-ended questions, the researcher read all the responses and found common themes, which were used to come up with the frequencies and percentages.

3.5 Validity and reliability of the instrument

While validity of an instrument determines how well the instrument reflects the construct being examined (Burns & Grove, 2007), reliability is the degree to which an instrument can be depended upon to yield consistent results if used over and over again on the same people, or if used by different researchers (Polit & Beck, 2012). The following were observed to ensure achievement of validity and reliability of the instrument.

- Face and content validity was assessed by the developers in the sample of the original study (Rose et al. 2011) and experts in pain, intensive care and survey methodology reviewed and rated the instruments clarity, content validity and comprehensiveness based on the method described by Burns et al. (2006). In addition, two ICU and education experts in the current setting assessed face and content validity to ensure representativeness of the questionnaire.

- The researcher was the only person who conducted data collection and high compliance was highly observed.

3.6 RELIABILITY AND VALIDITY THE STUDY

The process by which the data was collected enhanced the validity and reliability of the study.

The reliability of the study was maintained by the following:

- Maintaining the consistency of data collection through compliance with the data collection instrument.
- The data collection process was done entirely by the researcher
- Data collection within the stipulated time, which was one month beginning on the 1st of August 2013.
- Data was verified by the statistician for accuracy and a large sample was utilised.

Validity of the study was maintained by the following:

- ICU nurse experts and specialists assessed the instrument (Rose et al, 2011) for verification.
- Random sampling method was used to prevent bias.
- A non-threatening environment was created by assuring respondents that participation was voluntary, anonymity would be ensured and withdrawal from the study was applicable without any consequences.
- The instrument was handed to the participant alone and when completed it was placed in a sealed box, which was only broken after the data collection process was finished for data analysis to take place.
- A pilot study was also conducted on ten (n=10) respondents to enhance the validity and reliability of the study.

3.7 ETHICAL CONSIDERATIONS

Ethical consideration is of vital importance when conducting research of any kind, therefore the rights of the participant's and others must be protected (Burns & Grove, 2007). Additionally, ethical research generates sound knowledge for practice. In view of this, ethical review and clearance adherence is necessary to ensure a balance between benefits and risks of the study and should bestow more benefits than risks and prevent any research misconduct. In respect of this, the following ethical considerations were applied to the study:

- The research proposal and the instruments were submitted to the postgraduate Committee (Faculty of Health Sciences) of the University of the Witwatersrand for permission to undertake the research. Permission was obtained **(Refer to Appendix G).**

- The research proposal and instruments were submitted to the Committee for Research on Human Subjects of the University of the Witwatersrand to ensure compliance with the ethical standards. The committee issued a clearance certificate **(Refer to Appendix H**).

- Permission to conduct the research was obtained from the participating Hospital management and the Department of Health, Gauteng **(Refer to Appendix J and I).**

- Before inclusion in the study, written informed consent was obtained from the ICU nurse respondents **(Refer to Annexure E and F).**

- Anonymity of the respondents was guaranteed by not recording names. Consent forms and instruments were separated at the time of data collection to maintain the anonymity.

- Confidentiality was guaranteed by only the researcher and her supervisor having access to the raw data.

- Respondents were allowed to withdraw from the study at any time without penalty.

3.8 SUMMARY

In this chapter the research methodology of the study has been described. The design, the study setting, eligibility criteria, the population and sample described, data collection and analysis discussed, methods to ensure validity and reliability described and related to this study, ethical considerations and the pilot study discussed. The validation of the research instrument used in data collection was also discussed.

The next chapter will discuss data analysis and the results of the study.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter describes the method of data handling and approach used for data analysis of the results. After collection, raw data was entered onto a Microsoft excel spread sheet for analysis. Data was cleaned to correct any errors made during entry and data files were set within the computer package "STATA" version 12. A statistician from the Medical Research Centre then verified the data.

The results from the study were described and analysed using descriptive and inferential statistics to achieve study objectives. Descriptive tests (frequency and percentages) were used to synthesise total questionnaire scores and the nurse respondents' demographic data, with bar charts and graphs used to present the study results. The statistical inferential tests used included McNemar's Test for symmetry, the Fischer's Exact Test and Student t-test. Testing was done at statistical significance $p<0.05$. Findings will be discussed on construct, scale and item levels.

This chapter describes the analysis of data using descriptive and inferential statistical tests and interpretation findings.

4.2 APPROACH TO DATA ANALYSIS

Descriptive statistics were used to present the interpretation of the demographic data of Intensive Care nurse respondents: years of experience as a registered nurse, years of experience as an ICU nurse, education qualification, employment status, usual shift rotation, the primary specialty of the ICU most experienced and if the nurse has a combined specialty in ICU. Frequency distributions, percentages and cross tables were used to provide an overall presentation and description of the data. Percentages in these findings were taken to the nearest whole number. Descriptive statistics were employed to describe and synthesise the distribution of the ICU nurses' responses on pain assessment practices in ICU for patients who can self-report, those unable to self-report and both.

Data was analysed on scale, construct and item levels. The instrument used was the 'Pain Assessment and Management Questionnaire for Critically Ill Patients.' The instrument measures the pain assessment practices and knowledge of ICU nurses for critically ill patients able or unable to communicate their level of pain. The questionnaire responses are on a Likert scale with the rating option of 1, 2, 3, 4, or 5, reflected as never (0%), seldom (1-25%), sometimes (26-50%), often (51-75%) and routinely (>75%), or not at all important, minimally important, somewhat important, moderately important and extremely important. However there are variations in some of the items, for instance items Q2 and Q8 with a Yes or No response, Items Q7 and Q15 with a scale of six (6), items Q1 and Q7 with four (4) responses of doctor, nurse, patient and relatives and items Q26 and Q27 with Yes, No and Unsure responses. There were items like Q4, Q10, Q13, Q15B, Q23, Q24, Q25 and Q39 which were either second parts of an item or independent items as open responses to be described by the nurses' from their own perception or knowledge.

The response questions on a scale of 1 to 5 were collapsed in to two to facilitate presentation of the data, i.e. (not minimally important, minimally important, somewhat important) versus (moderately important and extremely important) or (never, seldom, sometimes versus less frequent, often and routinely), as recommended by the statistician, in consultation with the researcher's supervisor. The open-ended questions were evaluated independently of each other and grouped common phrases and frequencies together, with percentages worked out and presented as tables. Of note was that a larger percentage of nurse respondents answered moderately important and extremely important. The level of statistical significance was set at $p<0.05$. A bio-medical statistician, from the Medical Research Centre, analysed the data using the statistical package 'STATA' version 12.

Due to the homogeneity of the sample, the findings may be of interest to other public sector ICUs, clinical practice, research and education of ICU nurses.

4.3 FINDINGS AND RESULTS

4.3.1 Demographic Data

This section related to the critical care nurses' demographic data which comprised six (6) items: years of experience as a registered nurse, years of experience as a critical care nurse practicing in ICU, education qualifications, employment status, the ICU specialty the nurse is most experienced in and if most experienced in Multi-Disciplinary ICU. **Table 4.1** summarises the results of the process of the total sample (n=79) for discussion of data.

Table 4.1 Demographic data of nurse respondents (n=79)

Demographic Data	Frequency	Percentage
Years of experience as RN		
< 2 years	7	9.0%
2 – 5 years	19	24.0%
> 5 – 10 years	18	23.0%
> 10 years	35	44.0%
Years of experience as ICU nurse		
< 2 years	18	23.0%
2 – 5 years	22	29.0%
> 5 – 10 years	14	17.0%
> 10 years	24	31.0%
Qualifications		
Diploma	55	70.0%
Degree	24	30.0%
Employment status		
Full-time	76	96.0%
Part-time	2	3.0%
Casual	1	1.0%
Usual shift rotation		
Day	25	32.0%
Night	8	10.0%
Both day and night	46	58.2%
Primary speciality by ICU type most experienced		
Surgical only	8	11.0%
Medical only	16	21.0%
Cardiovascular	27	36.0%
Neuroscience	15	20.0%
Burns	-	-
Trauma	9	12.0%
Multi-Disciplinary ICU experience	46	**58.0%**

Most of the nurses (46.8%, n=37) had two (2) to ten (10) years of experience as registered nurses which was a combination of two groups, 2 to 5 years (24.0%, n=19) and >5 to 10 years (22.8%, n=18). Most of the respondents (44.0%, n=35) had more than ten (10) years of experience in the nursing profession. Of the total sample of (n=79), the majority (51.3%, n=40) had less than five (5) years substantial experience in ICU, followed by (30.8%, n=24) with more than ten (10) years of ICU experience and (17.1%, n=14) who had five (5) to ten (10) years' experience in ICU. A diploma in nursing was the highest qualification for the majority (70.0%, n=55) of the ICU nurse respondents. The majority (96.2%, n=76) of the respondents were fulltime nurses employed at the hospital with 58.2% (n=46) working both day and night shifts on a regular basis, followed by 31.7% (n=25) regularly working day shift.

A few (36.0%, n=27) of the nurse respondents indicated they had more experience in cardiovascular ICU, which comprised the coronary and cardiothoracic ICU in this study, followed by the medical ICU with 21.3% (n=16) and Neuroscience ICU 20.0% (n=15). This may have been attributed to the fact that the nurses in some units were more willing than others to participate in the study. None of the respondents indicated having primary experience in the Burns ICU, which may be because there is no special unit in the hospital. The majority (58.0%, n=46) of respondents indicated having further experience in the Multi-Disciplinary ICU which includes Medical-Surgical, Cardiothoracic, Neurosurgery, Trauma, Burns, Coronary, Paediatric and Burns ICUs.

4.3.2 Pain Assessment

4.3.2.1 Patients ABLE to self-report pain intensity

Pain assessment for critically ill patients who can self-report, formed the first part of the questionnaire with six (6) items (Items Q1 to Q6), to which responses were on how nurses assess pain for patients able self-report their pain intensity obtained through the self-administered questionnaire.

Item Q1 on the data collection instrument enquired about the person in ICU who provides the most accurate pain intensity for a patient who can self-report. Findings revealed the majority (62.0%, n=49) of respondents indicated patients able to self-report provided the

most accurate level of their pain, whilst 36.7% (n=29) indicated nurses as the most accurate providers of the patient's level of pain; none thought the relatives provided accurate pain intensity. **Figure 4.1** displays the findings**.**

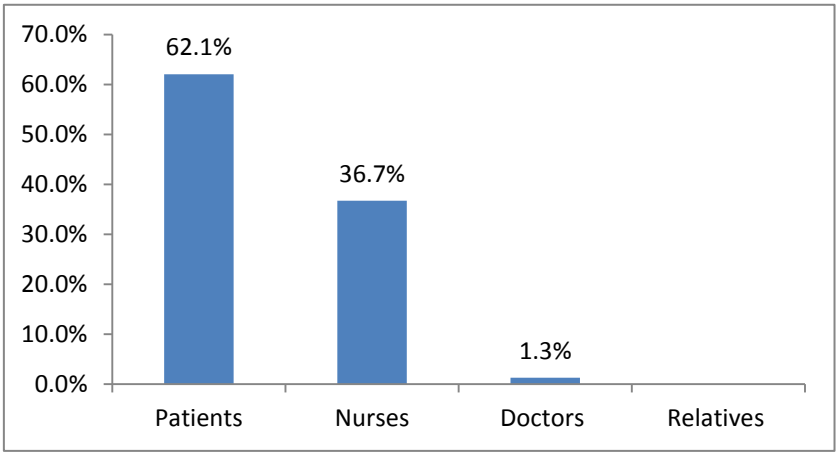

Figure 4.1 Frequencies obtained for most accurate provider of patient's pain

In item Q2, the data collection instrument enquired about the use of a pain assessment tool for patients able to communicate. Findings in this study indicated the majority (72.1%, n=57) of respondents, used a pain assessment tool whilst 27.9% (n=22) did not. Findings are displayed in **Figure 4.2.**

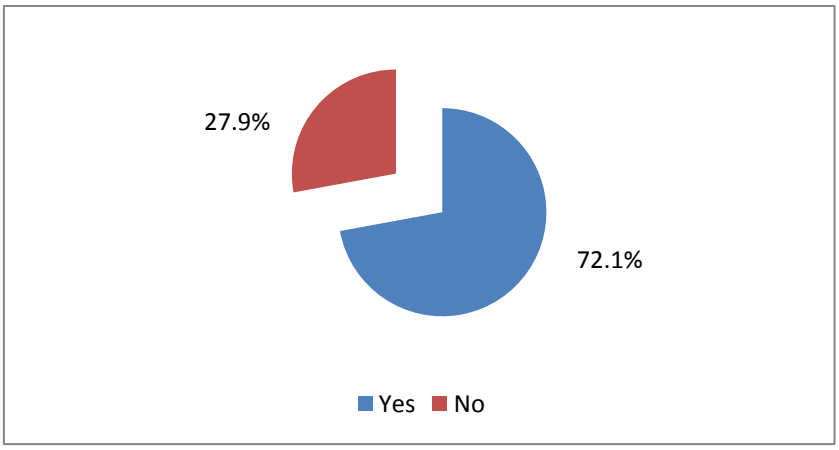

Figure 4.2 Frequencies obtained for use of pain assessment tool

Table 4.2 Frequencies obtained for pain assessment tools in current use for patients able to self-report (n=79)

Item	Statement	Participant's Responses					
		No response		Yes		No	
		n	%	n	%	n	%
Q2.1	Numerical Rating Scale (NRS)	-	-	47	**59.5**	32	40.5
Q2.2	Face Scale	-	-	14	**17.7**	65	82,3
Q2.3	Visual Analogue Scale (VAS)	-	-	9	11.4	70	88.6
Q2.4	McGill Pain Questionnaire	-	-	1	1.3	78	98.7
Q2.5	Verbal Rating Scale (VRS)	-	-	18	**22.8**	61	77.2
Q2.6	Brief pain Inventory	-	-	-	-	79	100.0
Q2.7	Other	-	-	-	-	-	-

Of the majority (72.1%, n=57) who reported using a pain assessment tool on patients able to self-report, the NRS (59.5%, n=47) was used most frequently, followed by the VRS (22.8%, n=18) and the Face Scale (17.7%, n=14). There was an option for specifying any other pain assessment tool the ICU nurses may use apart from those already listed, but none were indicated. **Table 4.2** displays the findings**.**

Table 4.3 Frequency and importance of a pain assessment tool (n=79)

Item	Statement	No response		Least frequent <50%		Moderately frequent 51-75%		Routinely/ most frequent > 75%	
		n	%	n	%	n	%	n	%
Q3.0	Frequency of use of a pain assessment tool	3	3.0	24	**30.0**	13	17.0	39	**50.0**
Q4.0	Importance of a pain assessment tool	4	5.0	14	**20.0**	10	12.0	50	**65.0**

Item Q3 on the data collection instrument enquired on how frequently ICU nurses use a pain assessment tool for patients able to self-report. Findings in this study indicated an average of 50.0% (n=39) of the nurses routinely (>75% of the time) used a pain assessment tool for patients who can self-report. A small number (30.0%, n=24) used a pain assessment tool less than 50% of the time. **Table 4.3** displays the findings**.**

Table 4.4 Frequencies obtained from respondents for other methods of pain assessment for patients who can self-report (n=79)

Responses	Frequency (*n*)	Percentage %
Raised values of Vital Signs (BP,HR, RR)	7	**9.0**
Post-operative pain	1	1.0
Patients reports verbally/reports	14	**18.0**
Observe patient behaviour	9	**11.0**
By touching and patient responds to pain	1	1.0
Facial expression	3	4.0
GCS >2/9	1	1.0
No responses	**56**	**71.0**

The second part of item Q3, on the data collection instrument, was an open ended question enquiring about any other methods, other than pain tools, used by ICU nurses to assess pain in patients able to self-report. Findings indicated respondents depended on the patient's verbal report (18.0%, n=14) and by observing patient's behaviour (11.0%, n=9). The majority (71.0%, n=56) did not indicate any other method of pain assessment that they use for patients able to self-report. **Table 4.4** presents the findings**.**

Item Q4 on the data collection instrument enquired how the respondents' perceived the importance of using a pain assessment tool for patients able to self-report. Findings indicated the majority (66.8%, n=50) of respondents considered the use of a pain assessment tool to be extremely important, whilst 20.0% (n=15) indicated using a pain assessment tool for patients able to self-report was of least importance (<50% of the time). **Table 4.3** presents the findings**.**

Item Q5 on the data collection instrument enquired how frequently nurses assessed and documented pain for a stable patient able to self-report. Findings indicated a few (33.0%, n=25) respondents assessed and documented < every 1 Hour, followed by 28.0% (n=22) who assessed >every 1 hour to <4 hours) and 19.0% (n=15) >every 4 hours to <8 hours. However, 13.0% (n=10) did not assess and document pain at all. **Figure 4.3** illustrates the findings**.**

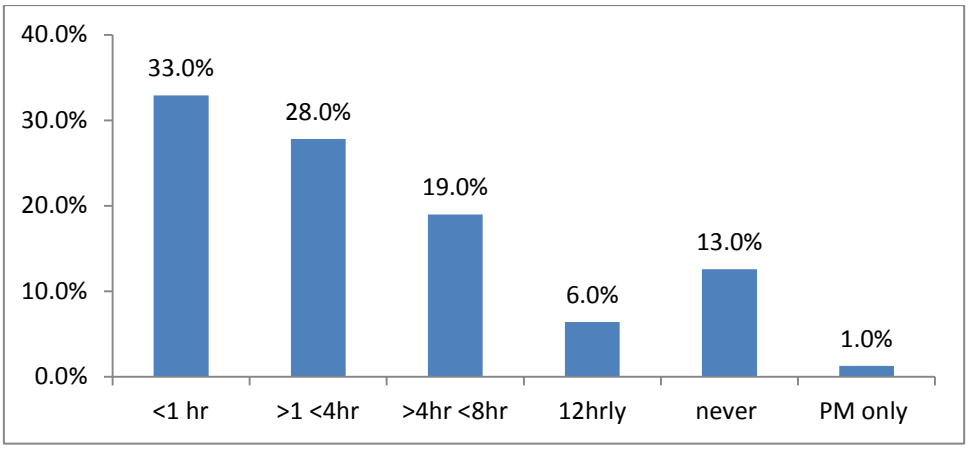

Figure 4.3 Frequency of assessment and documentation of pain

Item Q6 on the data collection instrument enquired into the nurses' opinion of the importance of frequent pain assessment and documentation of patients able to communicate. Findings in this study revealed the majority (70.9%, n=56) of respondents considered it extremely important, a few (16.5%, n=13) indicated it to be of least importance and 12.6% (n=10) to be moderately important. **Figure 4.4** displays the findings**.**

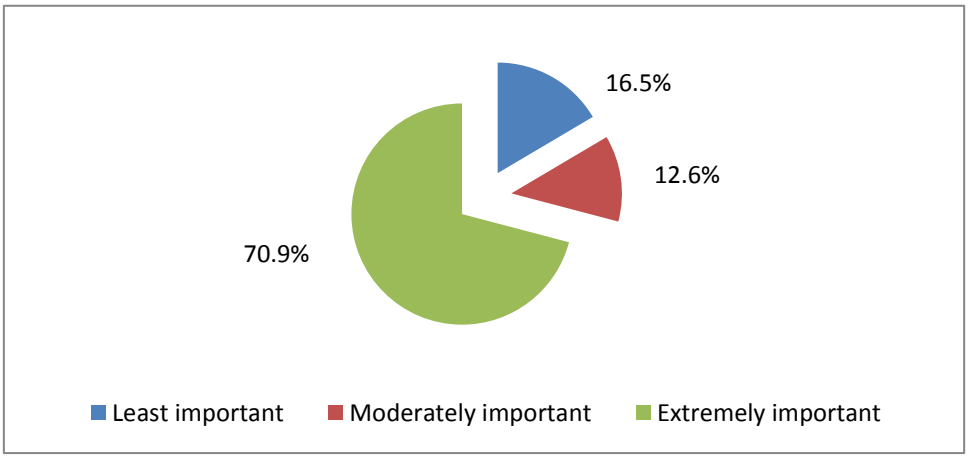

Figure 4.4 Frequencies obtained for importance of assessment and documentation of pain for patients who can self-report (n=79)

4.3.2.2 Patients UNABLE to Self Report their Pain Intensity

Pain assessment for patients unable to report their pain intensity verbally or via other means, formed the second part of the questionnaire, which comprised six (6) items (Q7 to Q12).

Item Q7 on the data collection instrument enquired about the person who provides the most accurate rating of pain intensity in patients unable to report verbally or via other means. Findings revealed the majority (64.1%, n=50) of respondents indicated nurses as the most accurate providers of pain level in patients who cannot self-report, whilst a small number (31.0%, n=24) indicated patients being the most accurate in reporting their pain intensity. Figure 4.5 displays the findings.

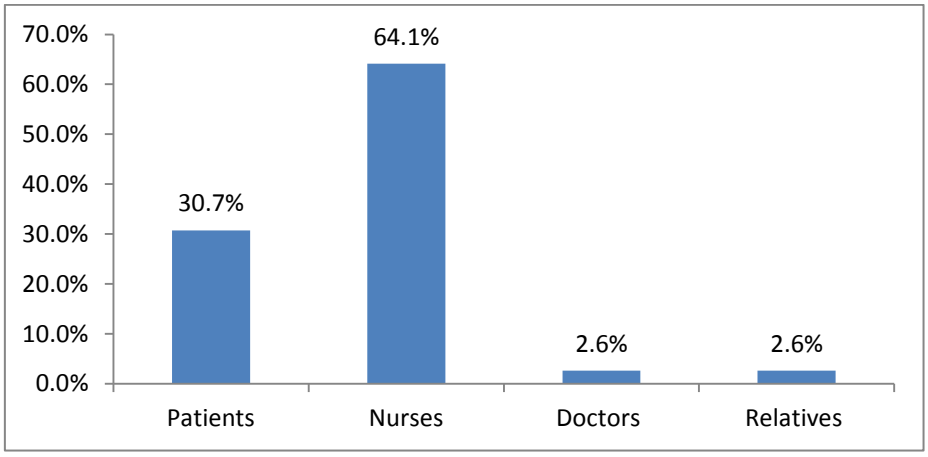

Figure 4.5 Importance of most accurate rating of pain intensity

Item Q8 on the data collection instrument enquired about the use of a pain assessment tool for patients unable to self-report their pain intensity. The majority (52.0%, n=40) of the nurse respondents used a pain assessment tool, whilst most (48.0%, n=37) did not. **Figure 4.6** displays the findings**.**

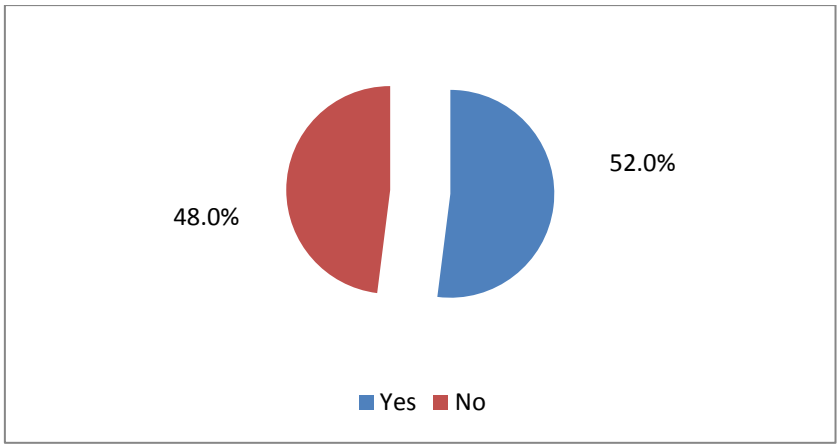

Figure 4.6 Frequencies obtained for use of pain assessment tool for patients unable to self-report (n=79).

Table 4.5 Frequencies for assessment tools, currently in use, for pain assessment of patients unable to report

Item	Statement	Participant's Responses					
		No responses		Yes		No	
		n	%	n	%	n	%
Q8.1	Adult Non Verbal Pain Scale (NVPS)	-	-	13	**16.5**	66	83.5
Q8.2	Pain Behaviour Assessment Tool (PBAT)	-	-	9	**11.4**	70	88.6
Q8.3	Behavioural Pain Scale (BPS)	-	-	15	**18.9**	64	81.0
Q8.4	Behavioural Pain Rating Scale (PBRS)	-	-	4	5.1	75	94.9
Q8.5	PAIN Algorithm	-	-	6	7.6	73	92.4
Q8.6	Critical-Care Pain Observation (CPOT)	-	-	6	7.6	73	92.4
Q8.7	Checklist of Non-Verbal Pain Indicators (CNP)	-	-	6	7.6	73	92.4
Q8.8	Other: Paper Scale, Vital Data & Sedation Agitation Score	75	95	3	4.0	1	1

Items Q8.1 to Q8.8, on the data-collecting instrument, enquired about the pain assessment tools currently in use for patients unable to self-report. Findings from the study indicated the majority (52.0%, n=40) of respondents used at least one pain assessment tool for patients unable to communicate, 18.9% (n=15) use the BPS, 16.5% (n=13) use the adult

NVPS and 11.4% (n=9) use the Pain Behaviour Assessment Scale. Other pain assessment scales respondents used, apart from those already listed, were the Pain Scale, Vital Data Scale and Sedation Agitation Scale (4.0%, n=3). **Table 4.5** presents the results.

Table 4.6: Frequency & importance of use of a pain assessment scale

Item	Statement	No response		Less often <50%		Moderately 51-75%		Routinely >75%	
		n	%	n	%	n	%	n	%
Q9	Frequent use of a pain assessment tool	3	3.0	29	**37.0**	17	22.0	30	**38.0**

Item Q9 on the data collection instrument enquired about the frequency of the use of a pain assessment tool for patients unable to self-report. Findings indicated 38% (n=30) of respondents used a pain assessment tool routinely (>75% of the time), whilst 37.0% (n=29) used a tool less often (<50% of the time). **Table 4.6** displays the findings

Table 4.7 Other methods used for pain assessment in patients unable to self-report

Responses	Frequency (n=79)	Percentage %
Change in Vital signs only	7	**8.9**
Change in behaviour only	5	**6.3**
Both Vital signs and behavioural change	12	**15.2**
Physical signs of pain e.g. sweating, redness and swelling around wound, clinical picture & assess patient's response	3	3.8
No responses	**52**	**65.8**

Item Q10 on the data collection instrument was an open-ended question enquiring about other methods of pain assessment apart from the pain assessment tools for patients unable to self-report. The alternative techniques included the use of change in Vital Signs and Behavioural Change in combination (15.2%, n=12), change in Vital Signs (8.9%, n=7) only and change in behaviour (6.3%, n=5) only. However 65.8% (n=52) did not describe any other methods of pain assessment, despite the fact few identified the pain assessment tools they use, as displayed in **Table 4.5**. Table 4.7 presents the findings.

Item Q11 on the data collection instrument enquired about the importance of the use of a pain assessment tool for patients unable to self-report their pain intensity. Findings indicated the majority (64.0%, n=50) of respondents considered it extremely important to use a pain assessment tool, however 26.0% (n=20) rated the use of a pain assessment tool least important. **Figure 4.7** displays the findings**.**

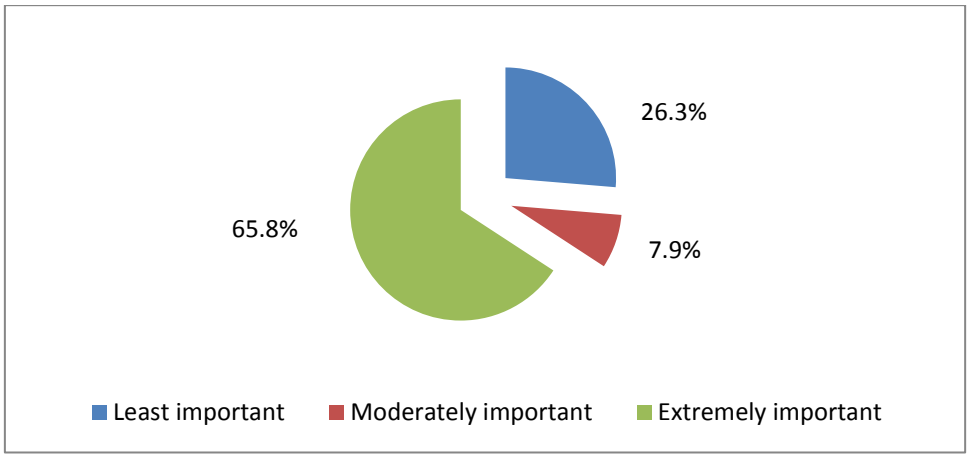

Figure 4.7 Importance of pain assessment tool for patients unable to self-report

Item Q12 on the data collection instrument enquired about the frequency of pain assessment and documentation for patients unable to self-report. Findings indicated a few (38.7%, n=29) assessed and documented >every 1 hour to < 4 hours and 22.7% (n=17) assessed and documented < every1 hour and 17.3% (n=13) assessed and documented >4 hours to <8 hours. **Figure 4.8** presents the findings.

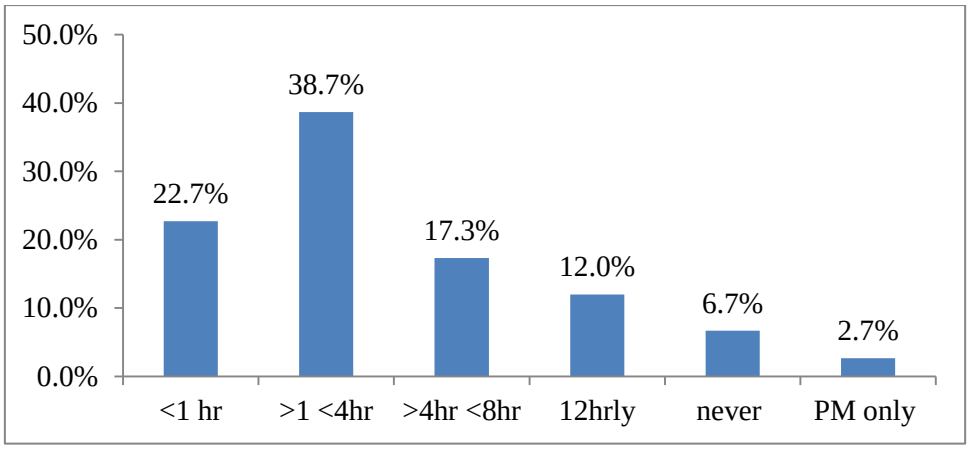

Figure 4.8 Frequency of pain assessment and documentation for stable patients unable to report pain.

4.3.3 Pain Behaviours

Table 4.8 Nurses' perceptions of behaviour potentially indicative of pain (n=79)

Item	Statement	Participant Responses							
		Not reported		Least frequently < 50%		Moderately frequent 51-75%		Most Frequently > 75%	
		n	%	n	%	n	%	n	%
Q13a	Closing eyes	8	8.1	31	**41.0**	21	27.0	19	24.0
Q13b	Rigidity	9	9.0	23	30.0	31	42.0	16	20.0
Q13c	Vocalisation	7	8.9	18	25.0	29	40.3	25	34.7
Q13d	Brow lowering/ frowning	7	8.9	17	23.6	34	47.2	21	29.2
Q13e	Fighting	3	3.8	20	26.3	32	42.1	24	31.5
Q13f	Ventilator/ activation of alarms	3	3.0	22	28.0	18	22.0	36	**47.0**
Q13g	Splinting	6	7.6	23	31.5	19	26.0	31	42.5
Q13h	Grimacing	2	2.0	23	29.0	18	23.0	36	**46.0**
Q13i	Wincing	8	10.1	23	32.4	19	26.8	29	40.9
Q13j	Clenching	3	3.8	20	26.3	24	31.5	32	42.1
Q13k	Sighing	4	5.1	28	37.3	19	25.3	28	37.3
Q13l	Slow cautious movements	5	6.4	19	25.7	30	40.5	25	33.8
Q13m	Retraction of upper limbs	7	8.9	26	36.1	26	36.1	20	27.8
Q13n	Trying to climb out of bed	4	5.1	26	34.7	22	29.3	27	36.0
Q13o	Repeat touch of body part	1	1.3	19	24.4	26	33.3	33	42.3
Q13p	Pulling of ET tube	6	7.6	29	39.7	21	28.8	23	31.5
Q13q	Striking staff	5	6.0	35	**47.0**	18	22.0	21	25.0
Q13r	Attempting to sit up	2	2.5	24	31.2	29	37.7	24	31.2
Q13s	Thrashing limbs	7	8.9	28	38.9	23	31.9	21	29.2
Q13t	Resists passive movements	4	5.1	25	33.3	25	33.3	25	33.3
Q13u	Not following commands	3	3.8	37	**42.7**	20	27.3	19	26.2
Q13v	Withdrawing	4	5.1	29	37.3	25	33.3	22	29.3
Q13w	Guarding	3	3.8	25	32.9	19	25.0	32	42.1
Q13x	Restlessness	2	2.0	16	20.0	24	30	36	**48.0**
Q13y	Arching	-	-	18	22.8	24	30.4	37	**46.8**

Items Q13a to Q13y of the data collection instrument enquired about behaviours the nurse respondents considered potentially indicative of pain in a patient in ICU. These behaviours have been incorporated into the pain assessment scales for patients unable to self-report (Refer to **Appendix 1**). Findings revealed Behaviours, routinely considered indicative of pain (>75% of the time), to be: restlessness (48.0%, n=37), ventilator/ activation of alarms (47.0%, n=36), arching (46.0%, n=36) and grimacing (46.0%, n=37). Behaviours considered the least indicative (<50% of the time) of pain included: striking staff (47.0%, n=35), not following commands (42.7%, n=37) and closing eyes (41.0%, n=31). **Table 4.8** presents the findings.

Table 4.9 Other behaviour indicative of pain (n=79)

Responses	Frequency (n)	Percentages %
Shivering	1	1.3
Sign language	4	**5.0**
Aggressive	2	**3.0**
Uncooperative	1	1.3
Repetitive hitting of bed cot sides	2	**3.0**
Crying	2	2.5
Despondency	2	2.5
No responses	**65**	**82.3**

The second part of item Q13 was an open question (optional) asking the nurse respondents to identify any other behaviour they felt was indicative of pain, which was not listed on the questionnaire. Respondents identified sign language (5.0%, n=4), aggressiveness (3%, n=2) and repetitive hitting of the bed cot sides (3.0%, n=2). **Table 4.9** displays the findings**.**

Table 4.10 Importance of pain assessment and documentation (n=79)

Item	Statement	No response		Somewhat Important		Moderately Important		Extremely Important	
		n	%	n	%	n	%	n	%
Q14	Importance of frequent pain assessment and documentation	-	-	4	5.0	10	12.7	65	**82.3**
Q15	Importance of physiological indicators for pain assessment	1	1.1	7	8.9	9	11.5	62	**78.5**

Item Q14 on the data collection instrument enquired about the importance of frequent pain assessment and documentation. Findings indicated the majority (82.3%, n=65) of respondents rated pain assessment and documentation as extremely important. Item Q15 on the data collection instrument enquired about the importance of physiological indicators for pain assessment. The majority (78.5%, n=62) of respondents indicated physiological indicators as extremely important for pain assessment, whilst 8.9% (n=7) rated them as least important. **Table 4.10** presents the findings

Table 4.11 Physiological indicators of pain

Responses	Frequencies (n=79)	Percentage %
Elevated vital signs (BP, HR, Temp, RR)	67	**84.8**
Hypercapnia	1	1.3
Diaphoresis	7	**8.9**
Decreased saturation	1	1.3
Increased CVP	2	2.5
Internal bleeding	1	1.3
Imbalanced electrolytes	1	1.3
Swelling	1	1.3
No response	**40**	**50.6**

Item Q15B on the data collection instrument was an optional open-ended question enquiring about the physiological indicators that were indicative of pain. Findings revealed that (84.8% (n=67) of the respondents identified elevated Vital Signs (Blood pressure, Heart rate, Temperature and Respiratory rate) from baseline data were indicative of pain, whilst 8.9% (n=7) considered Diaphoresis. However an average of 50.6% (n=40) of the nurses did not identify any physiological indicators of pain. **Table 4.11** displays the findings**.**

4.3.4 Patient Categories and Procedures

The patient categories and procedures reported to be painful formed the third part of the questionnaire, in relation to pain assessment practices in ICU.

Table 4.12 Importance of pain assessment for different categories of ICU patients (n=79)

Item	Statement	No response		Least important		Moderately important		Extremely important	
		n	%	n	%	n	%	n	%
Q16a	Post-Operative ICU patients	-	-	5	6.3	2	2.5	72	**91.1**
Q16b	Medical (Non-surgical) ICU patients	2	2.5	7	10.1	12	14.0	58	73.4
Q16c	Patients with a GCS < 8	2	2.5	10	12.0	16	20.0	51	65.5
Q16d	Trauma ICU patients	2	2.5	6	7.5	4	5.0	67	**85.0**
Q16e	Burn ICU patients	3	3.8	8	10.5	3	3.9	65	**85.5**
Q16f	End-of-life care ICU patients	3	3.8	18	23.1	5	6.4	55	70.5
Q16g	Patients receiving sedatives	2	2.5	20	25.9	9	11.7	48	62.3

Items Q16a to Q16g on the data collection instrument enquired about the importance of pain assessment for different categories of patients in ICU. Findings from the study revealed post-operative ICU patients were considered extremely important by the majority (91.1%, n=72) of the respondents, followed by burns ICU patients (85.5%, n=67) and trauma ICU patients (85.0%, n=67); however, 23.1% (n=18) considered it of least importance to assess pain in end-of-life patients. **Table 4.12** presents the findings.

Table 4.13 Importance of assessment of the need for pre-emptive analgesia prior to common ICU procedures (n=79)

Item	**Statement**	Participant's Responses							
		No response		Least Important		Moderately Important		Extremely Important	
		n	%	n	%	n	%	n	%
Q17a	Patient positioning	1	1.3	24	**30.0**	17	21.3	37	47.4
Q17b	Endotracheal suctioning	-		28	**35.4**	16	20.3	35	44.3
Q17c	Wound care	-	-	14	17.7	13	16.5	52	**65.8**
Q17d	Drain removal	-	-	15	19.0	17	21.5	47	**59.0**
Q17e	Invasive line placement	1	1.3	18	21.7	9	12.0	51	**65.0**
Q17f	Spontaneous breathing (weaning trial)	2	2.5	41	53.0	18	22.2	18	22.3

Items Q17a to Q17f enquired about the importance of assessment of the need for pre-emptive analgesia prior to common ICU nursing procedures reported to be potentially painful. Findings from the study revealed the majority (65.8%, n=52) of nurses rated pain assessment as extremely important for wound care, invasive line placement (65.0%, n=51) and drain removal (59.0%, n=47). However, patient assessment prior to patient repositioning (30.0%, n=24) and endotracheal suctioning (35.4%, n=28) were rated least important. **Table 4.13** displays the findings**.**

Table 4.14 Frequency of pre-emptive assessment for analgesia prior to potentially painful procedures (n=79)

Item	Statement	Non response		Least frequently <50%		Moderately frequent 51-75%		Most frequently >75%	
		n	%	n	%	n	%	n	%
Q18a	Patient positioning	1	1.3	29	**37.3**	20	24.4	29	**37.0**
Q18b	Endotracheal suctioning	-	-	29	**36.7**	24	30.4	26	32.9
Q18c	Wound care	-	-	14	17.7	21	26.6	44	**55.7**
Q18d	Drain removal	1	1.3	21	25.7	20	25.6	37	**47.4**
Q18e	Invasive line placement	2	2.5	25	32.5	18	23.4	34	**44.2**
Q18f	Spontaneous breathing(weaning trial)	2	2.5	39	**50.7**	19	23.4	19	23.4

Items Q18a to Q18f on the data collection instrument, enquired about the frequency of pain assessment for the need of pre-emptive pain prior to procedures reported as painful. Findings revealed pain assessment for the need of pre-emptive analgesia was done routinely (75% of the time) prior to procedures such as wound care (55.7%, n=44), drain removal (47.4%, n=37) and invasive line placement (44.2%, n=34). However, 50.7% (n=39) of nurses reported that pain assessment was least practiced (<50% of the time) before weaning trials, patient positioning (37.3%, n=29) and Endotracheal suctioning (36.7%, n=29). Table 4.14 displays the findings

Table 4.15 Frequencies obtained for pain management discussions (n=79)

Item	Statement	Participant's Responses							
		No response		Least frequently <50%		Moderately frequent 51-75%		Extremely/ Routinely frequent >75%	
		n	%	n	%	n	%	n	%
Q19	Pain management discussion nurse-nurse report	1	1.3	13	16.3	25	31.1	40	**51.3**
Q20	Pain scores discussion nurse-nurse report	-	-	27	**34.2**	25	31.7	27	**34.2**
Q21	Pain management and pain scores discussed in medical rounds	1	1.3	28	**35.9**	26	32.0	24	30.8
Q22	Frequency of doctors prescribing analgesia targeted to a pain score or parameters	1	1.3	34	**43.6**	18	22.1	26	33.0

Item Q19 on the data collection tool enquired as to how frequently pain management was discussed in nurse-nurse reports. The majority (51.3%, n=40) of nurses indicated it was discussed routinely (>75% of the time). Item Q20 on the data collection instrument enquired about how frequent pain scores were discussed in nurse-nurse reports. Findings indicated only a few (34.2%, n=27) of the nurse respondents rated nurse-nurse discussions on pain scores occurring routinely (>75% of the time). Item Q21 enquired about the frequency of pain management and pain score discussions in medical ward rounds. A small number (35.9%, n=28) of respondents indicated it to be discussed less than 50% of the time. Item Q22 enquired about how frequent doctors write prescriptions targeted to a pain score or other pain assessment parameter. Findings indicated most (43.6%, n=34) of the nurse respondents reported doctors prescribed pain medication against a pain scale less than 50% of the time. **Table 4.15** displays the findings**.**

Table 4.16 Consequences of unrelieved pain (an optional question)

Responses	Frequency (n=79)	Percentage %
Poor patient-nurse relationship	1	1.3
Self-extubation	2	2.5
Calm	2	2.5
Heart conditions e.g. cardiac arrest, aneurysm & rupture, DVT , hypertension	6	7.6
Patient un-cooperation	15	**18.9**
Unstable parameters	13	**16.5**
Misdiagnosis/ mismanagement	11	**13.9**
Contractures	1	1.3
Respiratory conditions e.g. lung collapse, Lower respiratory tract infections	3	3.8
Psychological distress	9	11.3
Post- op Complications	4	5.1
Chronic pain	1	1.3
Poor prognosis/death	6	7.6
Shock	1	1.3
Difficulty weaning	5	6.3
Costly/ longer ICU stay	5	6.3

Item Q23 of the data collection instrument, an optional question, enquired about the consequences of unrelieved pain, based on the nurse respondents' knowledge. The ICU nurse respondents identified some of the consequences of unrelieved pain to be patient uncooperativeness (18.9%, n=15), unstable parameters (16.5%, n=13) and misdiagnosis/mismanagement (13.9%, n=11). **Table 4.16** presents the findings

4.3.5 Barriers and Enablers to Pain Assessment and Management

Table 4.17 Barriers to pain assessment and management (n=79)

Item	Statement	Participant's responses							
		Not reported		Less frequently < 50%		Moderately frequent 51-75%		Most frequently > 75%	
		n	%	n	%	n	%	n	%
Q24a	Nursing workload	1	0	49	62.8	17	21.8	12	15.4
Q24b	Lack of availability of pain assessment tools	1	1.3	50	63.1	14	17.8	14	**17.8**
Q24c	Lack of education /familiarity with assessment tools	2	2.3	50	64.9	15	18.2	12	14.6
Q24d	Patient instability e.g. unstable haemodynamic	1	1.3	38	47.4	27	34.4	13	**16.9**
Q24e	Patient inability to communicate	2	2.3	48	62.2	16	20.0	13	16.5
Q24f	Lack of protocols/guidelines for pain assessment	2	2.3	50	64.6	14	16.2	13	**16.9**
Q24g	Low priority of pain of pain management by ICU team	-	-	55	69.7	14	17.7	10	12.7
Q24h	No designated area of charting pain	-	-	51	64.6	14	17.7	14	**17.7**
Q24i	Sedation interfering with pain management	-	-	50	63.3	18	22.8	11	13.9
Q24j	Poor documentation of pain assessment and pain management	2	2.3	53	66.5	17	22.1	7	9.1
Q24k	Poor communication of pain and analgesic management priorities with the ICU team	1	1.3	57	73.1	13	16.7	8	10.1
Q24l	Lack of protocol /guidelines for pain management	1	1.3	57	71.2	11	13.9	11	13.9
Q24m	Insufficient analgesia dosage prescribed	-	-	51	64.6	18	22.8	10	12.7

Items Q24a to Q24m on the data collection instrument, enquired about the barriers to pain assessment and management in ICU patients. The nurse respondents were required to rate how frequently the listed responses affected their ability to assess and manage pain. Findings revealed the most frequently occurring barriers (>75% of the time) were lack of availability of pain assessment tools (17.8%, n=14), lack of designated area for charting

pain assessment (17.7%, n=14), patient instability/unstable haemodynamic (16.9%, n=13) and lack of guidelines or protocol for pain assessment (16.9%, n=13).

Table 4.18 Other barriers to pain assessment and management (Item 24)

Responses	Frequency (n=79)	Percentage %
Language barrier	1	1.30
Own discretion to pain	1	1.30
Incompetent shift leaders	1	1.30
Medical work load	1	1.30
Delayed IV access	1	1.30
Under-sedation	2	2.50
Under-dosage	2	2.50
Sustained head injury	1	1.30
Bad ICU experience	1	1.30
Uncooperative patient	2	2.50
Low pain threshold	1	1.30
No Responses	65	82.2

Item Q24n to Q24p enquired the respondents to indicate in their own words about any other barriers, other than those listed on the questionnaire. Findings revealed under-sedation (2.53%, n=2), under-dosage (2.53%, n=2) and uncooperative patient (2.53%, n=2). **Table 4.18** presents the findings**.**

Table 4.19 Enablers to pain assessment and management (n=79)

Item	Statement	Participant's Responses							
		Not reported		Less frequent <50%		Moderately frequent 51-75%		More frequently >75%	
		n	%	n	%	n	%	n	%
Q25a	Pain assessment and management is unit priority	-	-	17	21.5	26	32.9	36	**45.6**
Q25b	Enthusiastic and motivated staff	2	2.3	20	26.6	23	28.1	34	**43.0**
Q25c	Standardised assessment tools are in use	-	-	31	39.2	22	27.9	26	32.9
Q25d	Protocols and guidelines are in use	-	-	30	37.9	20	25.3	29	36.3
Q25e	Doctors prescribe adequate doses of analgesia	1	1.3	26	32.3	24	30.5	28	35.9
Q25f	On-going education in pain provided	1	1.3	27	33.6	19	24.1	32	41.0
Q25g	APN (s) are employed in ICU	2	2.3	22	27.4	23	28.8	32	**41.6**

Q25h	Hospital pain service consults in ICU	3	3.8	50	**52.2**	19	23.0	17	21.2

Items Q25a to Q25h on the data collection questionnaire, enquired about how frequently the listed items facilitated delivery of effective pain practices. The enablers considered to occur routinely (>75% of the time) include: prioritisation of pain assessment and management in ICU (45.6%, n=36), followed by enthusiastic and motivated staff (43.0%, n=34 and advanced nurse(s) practitioners employed in ICU (41.6%, n=32). However, hospital pain service consults in ICU (52.2%, n=50) and standardised pain assessment tools in use (39.2%, n=31) were rated as least frequently occurring enablers for pain assessment. **Table 4.19** presents the findings**.**

Table 4.20 Other enablers to pain assessment and management (n=79)

Enablers to pain	Frequency (n=79)	Percentage %
Different analgesics available	1	1.30
Effective analgesic administration	1	1.30
No responses	77	97.5

Item Q30i to Q30k on the data collection instrument, enquired about any other enablers to pain assessment and management apart from those listed on the questionnaire. Nurse respondents identified availability of different analgesics (1.30%, n=1) and effective analgesic administration (1.30%, n=1). **Table 4.20** presents the findings

4.3.6 Pain Education and Beliefs

Item Q26 on the data collection instrument, enquired if the nurses had read the Society of Critical Care Medicine (SCCM) guidelines for management, sedation and analgesia. The majority (54.1%, n=40) indicated having not read the SCCM guidelines, 31.1% (n=23) had read them, whilst 14.8% (n=11) were unsure. **Figure 4.9** presents the findings.

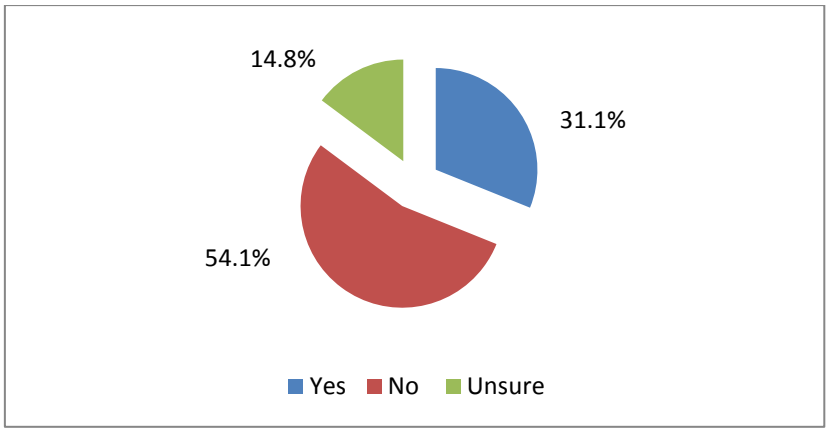

Figure 4.9 Frequencies obtained for having read the SCCM guidelines (n=79)

Table 4.21 Pain education and beliefs

Item	Statement	Participant's Responses							
		Not reported		Yes		No		Unsure	
		n	%	n	%	n	%	n	%
Q27a	Pain physiology mechanisms	1	1.3	54	68.3	18	23.1	6	7.3
Q27b	Pain assessment methods and tools in the critically ill patient	-	-	59	**74.7**	16	20.3	4	5.1
Q27c	Physiological consequences of unrelieved pain	1	1.3	57	72.1	18	23.1	3	3.5
Q27d	Psychological consequences of unrelieved pain	-	-	57	72.3	17	21.5	5	6.3
Q27e	Painful conditions and procedures	2	2.3	64	**83.1**	9	10.2	4	4.4
Q27f	Pharmacological pain management/strategies	-	-	63	**79.7**	12	15.2	4	5.1
Q27g	Non-Pharmacological pain strategies	2	2.5	55	71.4	16	20.3	6	5.8
Q28h	Practice recommendations and guidelines	1	1.3	45	56.4	17	21.8	16	20.5

Items Q27a to Q28h on the data collection instrument, enquired about different topics of pain for professional development the nurse respondents may have received. Findings revealed the most frequently covered topics to be painful conditions and procedures (83.1%, n=64), pharmacological pain management strategies (79.7%, n=63) and pain assessment methods and tools for critically ill patients (74.7%, n=59). However, a small but significant number of the nurse respondents had not received any professional education on important pain topics, which included: pain physiology mechanisms (23.1%,

n=18), physiological consequences (23.1%, n=17) and practice recommendations and guidelines (21.8%, 17). **Table 4.21** presents the findings.

Table 4.22 Nurses' satisfaction with professional development education on pain

Item	Statement	Participant's responses							
		Not reported		Least satisfied		Moderately satisfied		Extremely satisfied	
		n	%	n	%	n	%	n	%
Q28	Satisfaction of received professional development education on pain for critically ill patients	2	0	24	31.2	30	38.9	23	**29.8**

Item Q28 on the data collection questionnaire enquired about how satisfied the nurse respondents were after receiving professional development education related to pain for the critically ill patients. The majority (70.1%, n=54) of respondents were least to moderately satisfied, with only (29.8%,n=23) being extremely satisfied. **Table 4.22** presents the findings

4.3.7 Inferential Statistical Tests

This section discusses the results of comparative and inferential statistics conducted to investigate the relationships between current pain assessment practices and knowledge of Intensive Care nurses. The responses were collapsed on frequency of use of pain assessment tools (item Q3 and item Q9), pain assessment prior to painful procedures (item Q17 and Q18), barriers and enablers of pain assessment (items Q24 and item Q30) and perceived relevance of behavioural indicators (item Q13), so that two categories (often and routinely) versus (seldom, never and sometimes) were created, where 1= seldom, never and sometimes and 2= often and routinely.

When testing for the difference in pain assessment and practices for patients able and unable to self-report pain (item Q3 and item Q9), McNemar's Test of Symmetry was applied. Data were analysed to determine whether the difference, in mean total scores, between patients able to and unable to self-report were statistically significant. Frequency distributions and p-values were calculated using two sample paired responses of patient assessments in the 2x2 tables of the McNemar's Test for Symmetry. Findings yielded a p

value greater than 0.05 (p>0.05) in these paired associations. The categories seldom, never and sometimes (=1) were collapsed into disagree, whilst often and routinely (=2) into agree. **Tables 4.23** and **4.24** show the results of this process

Table 4.23 Shift in pain assessment and practices from patients able to and unable to self-report per item for the total group (n=79).

Item	Statement	Able to self-report	Unable to self-report		p-values: McNemar's tests for symmetry
			Disagree	Agree	
Q2 & Q8	Do you use a pain assessment tool?	Disagree Agree	55 40	20 22	0.003*
Q3 & Q9	How frequently do you use a pain assessment tool?	Disagree Agree	23 50	10 40	0.289
Q4 & Q11	In your opinion, how important is a pain assessment tool?	Disagree Agree	0 10	21 39	0.000*
Q6 &Q14	In your opinion, how important are frequent assessment and documentation of pain?	Disagree Agree	0 18	16 47	0.000*

Key: *=statistical significance

Findings in these paired associations yielded a p-value of less than 0.05 (p=<0.05) in three of the four items: the use of a pain assessment scale (p=0.003), importance of a pain assessment scale (p=0.000) and importance of frequent assessment and documentation of pain (p=0.000); no significant difference was found in the frequency of use of a pain assessment tool (p=0.289). This suggests differences in the three items found statistically significant in pain assessment practices for patients able and unable to self-report. However there was similarity of pain assessment practices by nurses in the frequency of the use of pain assessment scales for both patients able and unable to self-report.

When testing for the difference in the perceived importance and frequency of pain assessment for painful procedures (Item Q17 and Q18), using McNemar's Test, the response was similar to the latter. Findings in these paired associations yielded a p-value of less than 0.05 (p<0.05) in three of the six items, namely endotracheal suctioning (p=0.038), wound care (p=0.048) and drain removal (p=0.005). This statistical significance suggests there is a difference between importance and frequency of pain assessment in these

suggested painful procedures. Consequently, there is a discrepancy between what the nurses perceive as important and what they actually practice in pain assessment. However, there was a similarity of the importance and frequency of pain assessment in suggested painful procedures, which were patient re-positioning and spontaneous breathing, or Ventilator weaning. Results of this process are shown below in **Table 4.24**.

Table 4.24 Shift in importance of assessment of need and frequency for pre-emptive analgesia prior to selected procedures for the total sample (n=79)

Item	Statement	Importance of assessment need	Frequency of assessment need		p-values: McNemar's tests for symmetry
			Disagree	Agree	
Q17a &Q18a	Patient re-positioning	Disagree Agree	23 34	12 42	0.305
Q17b & Q18b	Endotracheal suctioning	Disagree Agree	28 51	8 32	0.038*
Q17c & Q18c	Wound care	Disagree Agree	14 66	7 58	0.048*
Q17d & Q18d	Drain removal	Disagree Agree	14 64	12 52	0.005*
Q17e & Q18e	Invasive line placement	Disagree Agree	18 58	10 48	0.029
Q17f & Q18f	Spontaneous breathing	Disagree Agree	40 36	10 26	0.246

Key: *=statistical significance p=0.05

When testing for associations between nurse demographics, namely years of clinical experience as a registered nurse, as an Intensive Care Nurse and qualification, responses were assessed using the Fisher's Exact Test. An overview of this process is provided in **Tables 4.25 to 4.29**, followed by a summary of significant findings of Fisher's Exact Test for categorical variables in **Table 4**.30.

Table 4.25 Summary for Fisher's exact test obtained for pain assessment practices for patients able and unable to self-report by nurse respondents' years of clinical experience and qualification

Item	Statement	Fisher's Exact Test		
		Years of Experience		Qualification
		Registered Nurse	Intensive Care Nurse	
Q1	Who provides the most accurate pain intensity	0.364	0.783	0.089
Q2	Use of a pain assessment tool	0.449	0.629	1.000
Q2.1	Numerical rating scale (0-10) (NRS)	0.706	0.134	0.806
Q2.2	Face scale	0.722	0.538	0.750
Q2.3	Visual Analogue Scale (VAS)	0.740	0.837	0.263
Q2.4	McGill Questionnaire	1.000	0.179	0.304
Q2.5	Verbal Rating Scale (VRS)	0.070	**0.009***	0.393
Q3	Brief Pain Inventory	0.729	0.690	0.368
Q4	Frequent use of a pain assessment tool	0.120	0.299	0.898
Q5	Importance of a pain assessment tool	0.988	0.270	**0.037***
Q6	Frequency of pain assessment & documentation	0.224	0.767	**0.029***
Q7	Who provides most accurate pain intensity	0.230	0.099	0.520
Q8	Use of a pain assessment tool	0.225	0.370	1.000
Q8.1	Adult Non Verbal Pain Scale (NVPS)	0.390	0.437	1.000
Q8.2	Pain Behaviour Assessment Tool (PBAT)	0.116	0.051	0.581
Q8.3	Behavioural Pain Scale (BPS)	0.877	0.217	0.006
Q8.4	Behavioural Pain Rating Scale (BPRS)	**0.050***	0.701	0.361
Q8.5	PAIN algorithm	0.682	1.000	0.661
Q8.6	Critical-care Pain Observation Tool (CPOT)	0.184	0.720	0.647
Q8.7	Checklist of non-verbal pain indicators (CNP)	0.313	**0.042***	0.831
Q9	Frequent use of a pain assessment tool	0.478	0.374	0.647
Q11	Importance of a pain assessment tool	**0.002***	**0.023***	0.596
Q12	Frequency of pain assessment & documentation	0.401	0.119	0.831
Q14	Importance of pain assessment & documentation	**0.011***	0.581	0.527
Q15	Importance of physiological indicators	0.935	0.960	1.000

Table 4.26 Summary for Fisher's exact test obtained for pain behaviours for patients able and unable to self-report by nurse respondents' years of clinical experience and qualification

Item	Statement	Fisher's exact test		
		Years of Experience		Qualification
		Registered Nurse	Intensive Care Nurse	
Q13a	Closing eyes	0.975	0.801	0.791
Q13b	Rigidity	0.470	0.997	0.167
Q13c	Vocalisation	0.096	0.247	0.918
Q13d	Brow lowering/frowning	0.132	0.325	0.540
Q13e	Fighting	0.160	0.727	0.610
Q13f	Ventilator/alarm activation	0.551	0.700	0.313
Q13g	Splinting	0.451	0.412	0.119
Q13h	Grimacing	0.510	0.399	0.133
Q13i	Wincing	0.852	0.953	0.079
Q13j	Clenching	0.333	0.682	0.112
Q13k	Sighing	0.679	0.238	0.662
Q13l	Slow cautious movements	0.656	0.553	**0.020***
Q13m	Retraction of upper limbs	0.384	0.492	0.187
Q13n	Trying to climb out of bed	0.253	0.512	0.084
Q13o	Repetitive touching of area of the body	0.487	0.405	0.384
Q13p	Pulling of ET tube	0.977	0.933	**0.027***
Q13q	Striking staff	0.654	0.920	0.750
Q13r	Attempting to sit up	0.112	0.659	0.364
Q13s	Thrashing limbs	0.654	0.879	0.857
Q13t	Resistance to passive movements	0.149	0.233	0.613
Q13u	Not following commands	0.769	0.400	0.142
Q13v	Withdrawing	0.390	**0.031***	0.520
Q13w	Guarding	0.091	0.239	0.854
Q13x	Restlessness	0.295	0.131	0.781
Q13y	Arching	0.193	0.883	0.653

Key: *=statistical significance

Table 4.27 Summary for Fisher's Exact Test obtained for pain assessment for patient classification, management and documentation by years of clinical experience and qualification.

Item	Statement	Fisher's exact test		
		Years of Experience		Qualification
		Registered Nurse	Intensive Care Nurse	
Q16a	Post-op patients	0.596	0.430	0.066
Q16b	Medical (non-Surgical) ICU patients	0.722	0.974	0.464
Q16c	Patients with GCS <8	0.629	0.955	0.949
Q16d	Trauma ICU patients	0.910	0.633	0.841
Q16e	Burns ICU patients	1.000	0.740	0.681
Q16f	End of life ICU patients	0.711	0.689	0.119
Q16g	Patients receiving sedatives	0.250	0.788	0.540
Q17a	Patient repositioning	0.265	0.804	0.058
Q17b	Endotracheal suctioning	0.061	**0.047***	0.086
Q17c	Wound care	0.772	0.502	**0.048***
Q17d	Drain removal	0.813	0.674	0.113
Q17e	Invasive line placement	0.381	0.163	0.214
Q17f	Spontaneous breathing (weaning) trial	0.109	0.949	0.636
Q18a	Patient positioning	0.823	0.985	0.149
Q18b	Endotracheal suctioning	0.385	0.309	0.544
Q18c	Wound care	**0.039***	0.152	0.598
Q18d	Drain removal	0.398	0.857	0.480
Q18e	Invasive line placement	0.966	0.338	0.526
Q18f	Spontaneous breathing (weaning) trial	0.545	0.563	0.087
Q19	Pain management discussion in nurse-nurse report	0.318	0.937	0.950
Q20	Frequency of pain discussions in nurse-nurse reports	**0.021***	**0.049***	0.094
Q21	Frequency of pain management and scores discussions in medical rounds	0.095	0.519	0.841
Q22	Frequency of doctors writing orders for analgesia targeted to a pain score	0.345	0.993	0.374

Key: *=statistical significance

Table 4.28 Summary for Fisher's Exact Test obtained for pain assessment for barriers and enablers for pain assessment and management by nurse respondents' years of clinical experience and qualification.

Item	Statement	Fisher's exact test		
		Years of Experience		Qualification
		Registered Nurse	Intensive Care Nurse	
Q24a	Nursing workload	0.871	0.579	0.536
Q24b	Lack of availability of pain assessment	0.085	0.581	0.294
Q24c	Lack of education/familiarity with assessment tools	0.983	0.865	0.160
Q24d	Patient instability	0.434	0.662	0.309
Q24e	Patient inability to communicate	0.332	0.779	0.660
Q24f	Lack of protocols/guidelines for pain assessment	0.282	0.277	0.683
Q24g	Low priority of pain management by ICU team	0.926	0.903	0.578
Q24h	No designated pain chart	0.054	0.658	0.757
Q24i	Sedation interfering with pain management	0.252	0.240	0.920
Q24j	Poor documentation of pain assessment and management	0.822	0.428	0.562
Q24k	Poor communication of pain & analgesic management priorities	0.479	0.140	0.120
Q24l	Lack of protocols /guidelines for pain management	0.755	0.085	**0.026***
Q24m	Insufficient analgesia prescribed	0.466	0.229	0.606
Q25a	Pain is a unit priority	0.743	0.650	0.835
Q25b	Enthusiastic and motivated nurses	0.646	0.558	0.714
Q25c	Standardised pain assessment tools in use	0.173	0.566	0.204
Q25d	Protocols and guidelines are used	0.848	0.539	0.242
Q25e	Doctors provide adequate analgesia dose	0.730	**0.046***	0.107
Q25f	On-going education in pain	**0.048***	0.094	0.598
Q25g	Advanced practice nurse(s) employed in ICU	0.555	0.222	0.197
Q25h	Pain service consults in hospital	0.463	0.122	0.429

Key: *=statistical significance

Table 4.29 Summary for Fisher's Exact Test obtained for pain education topics received, by nurse respondents' years of clinical experience and qualification

Item	Statement	Fisher's exact test		
		Years of Experience		Qualification
		Registered Nurse	Intensive Care Nurse	
Q26	Have you read the Society of Critical Care medicine guidelines	0.650	0.370	0.451
Q27a	Pain topic: Pain physiology	0.338	0.213	0.431
Q27b	Pain assessment methods and tools in critically ill patients	0.757	0.576	0.668
Q27c	Physiological consequences of unrelieved pain	0.369	0.083	0.055
Q27d	Psychological consequences of unrelieved pain	0.281	0.139	**0.028***
Q27e	Painful conditions & procedures	0.202	0.773	0.083
Q27f	Pharmacological pain management/strategies	0.770	0.426	0.054
Q27g	Non-pharmacological pain management/ strategies	0.691	0.319	0.503
Q27h	Practice recommendations	0.944	0.791	0.293

Key: *=statistical significance

Table 4.30 Summary of significant findings of Fishers Exact Test for frequencies obtained, by nurses respondents' years of clinical experience and qualification

Categorical variable	Item	Fisher's Exact Test
Years of experience as RN	Q8.4	0.050
	Q11	0.002
	Q14	0.011
	Q18c	0.039
	Q20	0.021
	Q25f	0.048
	Q28	0.003
Years of experience in ICU	Q2.5	0.009
	Q8.7	0.042
	Q11	0.023
	Q13v	0.031
	Q17b	0.047
	Q20	0.049
	Q25e	0.046
Qualification	Q5	0.037
	Q6	0.029
	Q7	0.032
	Q13p	0.027
	Q17c	0.048
	Q24l	0.026
	Q27d	0.028

Table 4.30 presents a summary of the significant findings of the Fisher's Exact Test for selected categorical variables for nurse respondents' years of clinical experience and qualification.

The collected data were analysed to determine the following:

- Whether the difference in the construct scores were significant by years of clinical experience. Fisher's Exact Test was employed to proportionate the data by categories (<2yrs, >2 to 5yrs, >5 to 10yrs and >10yrs). Findings indicated that of the sixteen (16) pain assessment items, by years of clinical experience, only one (1) item (Q11) and one (1) sub-item (Q8.4) were statistically significant ($p<0.05$) as a registered nurse, which contrasted with one (1) item (Q11) and three (3) sub-items (Q2.5, Q8.7 and Q13v) statistically significantly ($p>0.05$) different as an Intensive Care nurse. No difference was observed in the remaining pain assessment items. Results of this process are summarised in **Tables 4.25 and 4.26.**

- Whether the difference in construct scores were significant for years of clinical experience. Fisher's Exact Test was employed to proportionate the data by two categories (<2yrs, >2 to 5yrs, >5yrs to 10yrs and >10yrs). Findings indicated that of pain classification, management and documentation, three items and sub-items by years of clinical experience, only one (1) item (Q20) was statistically significant ($p<0.05$) as registered nurses, which contrasted by one (1) item (Q20) and one (1) sub-item (Q17b), statistically significant as an Intensive Care nurse. No difference was observed in the remaining pain assessment items. Results of this process are summarised in **Table 4.27**.

- Whether the difference in construct scores were significant by qualification. Fisher's Exact Test was employed to proportionate the data by categories (diploma and degree). Findings indicated that of the sixteen (16) pain assessment items or sub-items by qualification, three (3) items (Q5, Q6, and Q7) and one (1) sub-item (Q13p) were statistically significantly ($p<0.05$). No significant difference was observed in the remaining pain assessment items. Results of this process are summarised in **Tables 4.25 and 4.26**.

- Whether the difference in construct scores were significant by qualification. Fisher's Exact Test was employed to proportionate the data by categories (diploma and qualification). Findings yielded that of the patient classification, management and discussion, three items and sub-items by qualification, only one (1) sub-items (Q17c) was statistically significantly ($p<0.05$) different. No significant difference was observed in the remaining patient classification, management and documentation items. Results of this process are summarised in **Table 4.27.**

- Whether the difference in construct scores were significant by years of clinical experience. Fisher's Exact Test was employed to proportionate the data by categories (<2yrs, >2 to 5yrs, >5 to 10yrs, and >10yrs). Findings indicated that of the barriers and enabling two items and sub-items by clinical experience, only one sub-item (Q25f) was statistically significantly ($p<0.05$) different for registered nurse, which contrasted with one sub-item (Q25e) statistically significantly ($p<0.50$) different as an Intensive Care nurse. No significant difference was observed in the remaining barriers and enabling

items for pain assessment and management. Results of this process are summarised in **Table 4.28**.

- Whether the difference in construct scores were significant by qualification. Fisher's Exact Test was employed to proportionate the data by categories (diploma and degree). Findings yielded that of the barriers and enabling two items and sub-items, only one sub-item (Q24l) was statistically significantly ($p<0.05$) different. No significant difference was observed in the remaining barriers and enabling items for qualification. Results of this process are summarised in **Table 4.29**.

- Whether the difference in construct scores were significant by years of clinical experience. Fisher's exact Test was employed to proportionate the data by categories (<2yrs, >2 to 5yrs, >5 to 10yrs, and >10yrs). Findings indicated that of the two items and sub-items for pain education, only one (1) item (Q28) was statistically significantly ($p<0.50$) for registered nurses, whereas no significant difference was observed as an Intensive Care nurse. No significant difference was observed in pain education items for years of clinical experience. Results of this process are summarised in **Table 4.29**.

- Whether the difference in construct scores were significant by qualification. Fisher's Exact Test was employed to proportionate the data by two categories (diploma and degree). Findings yielded that of the three items and sub-items indicated for pain education, only one sub-item (Q27d) was statistically significantly ($p<0.05$) different. No significant difference was observed in pain education items for qualification. Results of this process are summarised in **Table 4.29**.

Findings for the selected categorical variables, by remaining nurse respondents' demographic variables, namely employment status, usual shift rotation and primary speciality by type of ICUs are discussed in the next section. Results of this process are shown in **Tables 4.31 to 4.35**. Summary of the statistically significant findings for selected categorical variables obtained from the Fisher's Exact Test are provided in **Table 4.36.**

Table 4.31 Summary for Fisher's Exact Test obtained for pain assessment for patients able and unable to self-report by nurse participant's employment status, usual shift rotation and speciality type of ICU

Item	Statement	Fisher's exact test		
		Employment status	Usual shift rotation	Specialty type of ICU
Q1	Who provides the most accurate pain intensity	1.000	0.776	0.593
Q2	Use of a pain assessment tool	0.186	0.930	0.189
Q2.1	Numerical rating scale (0-10) (NRS)	0.307	0.185	0.054
Q2.2	Face scale	1.000	0.282	0.276
Q2.3	Visual Analogue Scale (VAS)	1.000	0.499	0.121
Q2.4	McGill Questionnaire	1.000	1.101	0.227
Q2.5	Verbal Rating Scale (VRS)	1.000	0.615	0.207
Q3	Brief pain Inventory	0.562	0.548	0.703
Q4	Frequent use of a pain assessment tool	0.185	0.180	0.289
Q5	Importance of a pain assessment tool	0.603	0.128	0.623
Q6	Frequency of pain assessment & documentation	0.429	**0.030***	0.475
Q7	Who provides most accurate pain intensity	1.000	0.484	0.341
Q8	Use of a pain assessment tool	0.106	0.126	0.600
Q8.1	Adult Non Verbal Pain Scale (NVPS)	1.000	0.249	0.769
Q8.2	Pain Behaviour Assessment Tool (PBAT)	0.308	1.000	0.592
Q8.3	Behavioural Pain Scale (BPS)	1.000	0.574	0.436
Q8.4	Behavioural Pain Rating Scale (BPRS)	1.000	0.214	0.376
Q8.5	PAIN algorithm	1.000	0.824	0.239
Q8.6	Critical-care Pain Observation Tool (CPOT)	1.000	0.171	0.387
Q8.7	Checklist of non-verbal pain indicators (CNP)	1.000	0.567	0.768
Q9	Frequent use of a pain assessment tool	0.180	0.316	0.538
Q11	Importance of a pain assessment tool	**0.048***	0.790	0.307
Q12	Frequency of pain assessment & documentation	0.854	0.413	0.307
Q14	Importance of pain assessment & documentation	**0.042***	0.480	0.575
Q15	Importance of physiological indicators	**0.015***	0.915	0.784

Key: *=statistical significance

Table 4.32 Summary for Fisher's Exact Test obtained for behavioural indicators of pain by nurse participant's employment status, usual shift rotation and speciality type of ICU

Item	Statement	Fisher's exact test		
		Employment status	Usual shift rotation	Specialty type of ICU
Q13a	Closing eyes	0.333	0.690	0.482
Q13b	Rigidity	0.182	0.504	0.511
Q13c	Vocalisation	0.887	0.682	0.567
Q13d	Brow lowering/frowning	0.619	0.620	0.761
Q13e	Fighting	0.611	0.470	0.694
Q13f	Ventilator/alarm activation	0.074	**0.011***	0.655
Q13g	Splinting	0.462	0.902	0.492
Q13h	Grimacing	**0.045***	0.389	0.702
Q13i	Wincing	0.649	0.140	0.538
Q13j	Clenching	0.583	0.259	0.799
Q13k	Sighing	0.414	0.689	0.358
Q13l	Slow cautious movements	0.839	0.326	0.955
Q13m	Retraction of upper limbs	0.145	**0.014***	0.475
Q13n	Trying to climb out of bed	0.277	0.456	0.358
Q13o	Repetitive touching of area of the body	**0.045***	0.672	0.710
Q13p	Pulling of ET tube	0.318	0.282	0.239
Q13q	Striking staff	0.398	0.359	0.687
Q13r	Attempting to sit up	0.788	0.145	0.066
Q13s	Thrashing limbs	0.341	0.608	0.395
Q13t	Resistance to passive movements	0.512	0.545	0.838
Q13u	Not following commands	0.610	0.280	0.360
Q13v	Withdrawing	0.827	0.663	0.562
Q13w	Guarding	0.113	0.911	0.803
Q13x	Restlessness	0.655	0.938	0.940
Q13y	Arching	1.000	0.461	0.890

Key: *=statistical significance

Table 4.33 Summary for Fisher's Exact Test obtained for patient categories and procedures by nurse participant's employment status, usual shift rotation and speciality type of ICU

Item	Statement	Fisher's exact test		
		Employment status	Usual shift rotation	Specialty type of ICU
Q16a	Post-op patients	0.117	0.457	**0.049***
Q16b	Medical (non-Surgical) ICU patients	**0.017***	0.080	0.562
Q16c	Patients with GCS <8	0.208	0.480	0.366
Q16d	Trauma ICU patients	**0.028***	0.223	0.803
Q16e	Burns ICU patients	0.201	0.167	0.402
Q16f	End of life ICU patients	0.655	0.557	0.132
Q16g	Patients receiving sedatives	0.764	0.352	0.696
Q17a	Patient repositioning	0.352	0.883	0.174
Q17b	Endotracheal suctioning	0.917	0.246	0.995
Q17c	Wound care	0.721	0.710	0.425
Q17d	Drain removal	0.795	0.849	0.910
Q17e	Invasive line placement	1.000	0.266	0.243
Q17f	Spontaneous breathing (weaning) trial	0.407	0.869	0.831
Q18a	Patient positioning	0.929	0.704	0.374
Q18b	Endotracheal suctioning	0.874	0.634	0.715
Q18c	Wound care	0.581	0.337	0.959
Q18d	Drain removal	0.781	**0.001***	0.699
Q18e	Invasive line placement	1.000	0.068	0.303
Q18f	Spontaneous breathing (weaning) trial	0.394	0.743	0.239
Q19	Pain management discussion in nurse-nurse report	0.456	0.891	0.882
Q20	Frequency of pain discussions in nurse-nurse reports	0.858	0.815	0.698
Q21	Frequency of pain management and scores discussions in medical rounds	0.703	0.792	0.242
Q22	Frequency of doctors writing orders for analgesia targeted to a pain score	**0.037***	0.098	**0.038***

Key:*=statistical significance

Table 4.34 Summary for Fisher's Exact Test obtained for barriers and enablers of pain assessment by nurse participant's employment status, usual shift rotation and specialty type of ICU

Item	Statement	Fisher's exact test		
		Employment status	Usual shift rotation	Specialty type of ICU
Q24a	Nursing workload	0.395	0.981	0.507
Q24b	Lack of availability of pain assessment	0.766	0.124	0.166
Q24c	Lack of education/familiarity with assessment tools	0.519	0.208	0.173
Q24d	Patient instability	0.428	0.755	0.170
Q24e	Patient inability to communicate	0.875	0.781	0.339
Q24f	Lack of protocols/guidelines for pain assessment	0.210	0.342	0.500
Q24g	Low priority of pain management by ICU team	1.000	0.635	0.822
Q24h	No designated for pain chart	0.917	**0.027***	0.735
Q24i	Sedation interfering with pain management	0.712	0.317	**0.020***
Q24j	Poor documentation of pain assessment and management	0.950	0.231	0.282
Q24k	Poor communication of pain & analgesic management priorities	1.000	0.547	0.912
Q24l	Lack of protocols /guidelines for pain management	0.866	0.116	0.647
Q24m	Insufficient analgesia prescribed	0.370	0.741	0.951
Q25a	Pain is a unit priority	0.274	0.418	**0.001***
Q25b	Enthusiastic and motivated nurses	0.385	0.072	0.604
Q25c	Standardised pain assessment tools in use	0.441	**0.002***	0.116
Q25d	Protocols and guidelines are used	0.788	0.074	0.54
Q25e	Doctors provide adequate analgesia dose	0.149	0.930	**0.024***
Q25f	On-going education in pain	1.000	0.959	0.053
Q25g	Advanced practice nurse(s) employed in ICU	0.196	0.047	0.523
Q25h	Pain service consults in hospital	0.757	0.508	0.302

Key:*=statistical significance

Table 4.35 Summary for Fisher's Exact Test obtained for pain education topics by nurse participant's employment status, usual shift rotation and speciality type of ICU

Item	Statement	Fisher's exact test		
		Employment status	Usual shift rotation	Specialty type of ICU
Q26	Have you read the Society of Critical Care medicine guidelines	0.816	0.344	0.238
Q27a	**Pain topic:** Pain physiology	**0.027***	0.602	0.556
Q27b	Pain assessment methods and tools in critically ill patients	0.243	0.069	0,211
Q27c	Physiological consequences of unrelieved pain	0.238	0.709	0.633
Q27d	Psychological consequences of unrelieved pain	0.220	0.286	0.714
Q27e	Painful conditions & procedures	0.265	**0.025***	0.633
Q27f	Pharmacological pain management/strategies	0.300	0.685	0.963
Q27g	Non-pharmacological pain management/ strategies	0.425	0.606	0.865
Q27h	Practice recommendations	0.384	0.108	0.124
Q28	Satisfaction of developmental education related to critically ill patients pain	0.739	0.447	0.074

Key: *=statistical significance

Table 4.36 Summary of significant findings obtained from the Fisher's Exact Test for selected categorical variables

Categorical variable	Item	Fishers' exact test
Employment status	Q11	0.048
	Q13h	0.045
	Q13o	0.045
	Q14	0.042
	Q15a	0.015
	Q16b	0.017
	Q16d	0.028
	Q22	0.037
	Q27a	0.027
Usual shift rotation	Q 6	0.030
	Q13f	0.011
	Q13m	0.014
	Q18d	0.001
	Q24h	0.027
	Q25c	0.002
	Q27e	0.025
Specialty by type of ICU	Q16a	0.049
	Q22	0.038
	Q24i	0.020
	Q25a	0.001
	Q25e	0.024

Table 4.30 presents the summary of the significant findings of the Fisher's Exact Test for selected categorical variables for nurse respondents' employment status, usual shift rotation and speciality by type of ICU.

The collected data was analysed to determine the following:

- Whether the difference in the construct scores were significant by employment status. A Fisher's Exact Test was employed to proportionate the data by categories (full-time, part-time and casual). Findings indicated that of the sixteen (16) pain assessment items by employment status, only three items (Q11 and Q14) and three (5) sub-items (Q13h, Q13o, Q15a) were statistically significantly ($p<0.05$) different. Findings indicated of the seven patient classification, management and documentation items and sub-items by employment status, only one (1) item (Q22) and two (2) sub-items (Q16b and Q16d) were statistically significantly ($p<0.50$) different. Findings indicated of the three pain education items and sub-items, only one (1) sub-item (Q27a) was statistically significantly ($p<0.05$) different. No

significant difference was observed in pain education items for qualification. Results of this process are summarised in **Tables 4.31 to 4.35.**

- Whether the difference in the construct scores were significant by usual shift rotation. Fisher's Exact Test was employed to proportionate the data by categories (day, night and both day/night). Findings indicated that of the sixteen (16) pain assessment items by usual shift rotation, only one item (Q6) and two sub-items (Q13f and Q13m) were statistically significantly ($p<0.05$) different. Findings indicated of the seven (7) patient classification, management and documentation items and sub-items by usual shift rotation, only one (1) sub-item (Q18d) was statistically significantly ($p<0.50$) different. Findings indicated of the three pain education items and sub-items, only one (1) sub-item (Q27c) was statistically significantly ($p<0.05$) different. No significant difference was observed in pain education items for usual shift rotation. Results of this process are summarised in **Tables 4.31 to 4.35.**

- Whether the difference in the construct scores were significant by specialty by type of ICU. Fisher's Exact Test was employed to proportionate the data by categories (cardiothoracic, medical, surgical, trauma and neurosciences). Findings indicated of the seven (7) patient classification, management and documentation items and sub-items by specialty type of ICU, only one (1) item (Q22) was statistically significantly ($p<0.50$) different. Findings indicated of the two barriers and enablers for pain assessment and management three sub-items (Q24i, Q25a and Q25e) were statistically significantly ($p<0.05$) different. No significant difference was observed in pain education items for qualification. Results of this process are summarised in **tables 4.31 to 4.35**.

A student t-test was employed to compare the associations between pain assessment practices and nurses demographic variables, such as years of experience and education qualification.

Measurement of central tendency and variation (mean and standard deviation) were used to summarise the data. Findings for selected demographic categorical variables, namely years of experience as a registered nurse, years of experience as an Intensive Care Nurse and

qualifications are discussed in the next section. Summary of mean scores for comparison of pain assessment, pain behaviours, patient categories and procedures, barriers and enablers and pain education topics are provided in tables.

Table 4.37 Student t-test employed for years of experience as RN

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q2	Use of a pain assessment tool for patients able to self-report	1 2	57 22	2.965 3.318	1.034 0.894	0.353	0.894
Q2.1	Numerical Rating scale (NRS)	1 2	47 32	3.043 3.094	0.977 1.058	0.051	0.826
Q2.2	Face scale	1 2	14 65	2.857 3.108	1.167 0.970	0.251	0.401
Q2.3	Visual Analogue scale	2 1	70 9	3.043 3.222	1.013 0.972	0.179	0.617
Q2.5	Verbal Rating Scale (VRS)	1 2	18 61	2.500 3.230	1.043 0.938	0.730	**0.006***
Q8.1	Adult Non-Verbal Rating Scale (NVRS)	1 2	13 66	2.923 3.091	1.115 0.988	0.168	0.585
Q8.2	Pain behavioral Assessment tool	2 1	70 9	3.157 2.333	0.958 0.118	0.824	**0.020***
Q8.3	Behavioral Pain scale	2 1	64 15	3.109 2.867	0.978 1.125	0.243	0.423
Q8.4	Behavioral Pain Rating Scale	1 2	5 74	2.000 3.135	1.225 0.956	1.135	**0.013***
Q8.5	PAIN algorithm	2 1	73 6	3.096 2.667	0.988 1.211	0.429	0.317

Key: *=statistical significance

Table 4.37 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by years of experience as a registered nurse. Of the total sample (n=79), the mean score obtained for group 1 ranged from 2.000 to 3.157 and the Standard Deviation ranged from 0.958 to1.225, with contrast of the total mean score obtained for group 2 ranging from 2.333 to 3.318 and Standard Deviation ranging between 0.894 and 1.211. The difference for both group 1 and 2 ranged from 0.051 to 1.135. Three items were statistically significant ($p<0.05$): Verbal Rating Scale ($p=0.006$), Pain Behavioural Assessment tool (0.020) and Behavioral Pain Rating Scale (0.013). Hence, the mean scores between groups 1 and 2 for Q2.5, Q8.2 and Q8.4 are equal whilst the others that are not statistically significant, are unequal.

Table 4.38 Student t-test employed for years of experience in ICU

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q2	Use of a pain assessment tool for patients able to self-report	1 2	57 22	2.544 2.591	1.135 1.221	0.047	0.872
Q2.1	Numerical Rating scale (NRS)	1 2	47 32	2.681 2.375	1.105 2.212	0.306	0.249
Q2.2	Face scale	1 2	14 65	2.429 2.585	1.158 1.158	0.156	0.649
Q2.3	Visual Analogue scale	2 1	70 9	2.529 2.778	1.164 1.093	0.249	0.545
Q2.5	Verbal Rating Scale (VRS)	1 2	18 61	2.222 2.656	0.808 1.223	0.434	0.162
Q8.1	Adult Non-Verbal Rating Scale (NVRS)	1 2	13 66	2.308 2.606	1.109 1.162	0.298	0.397
Q8.2	Pain behavioral Assessment tool	2 1	70 9	2.643 1.889	1.117 1.269	0.754	0.064
Q8.3	Behavioral Pain scale	2 1	64 15	2.609 2.333	1.177 1.047	0.276	0.407
Q8.4	Behavioral Pain Rating Scale	1 2	5 74	2.000 2.595	1.225 1.146	0.595	0.267
Q8.5	PAIN algorithm	2 1	73 6	2.548 2.667	1.155 1.211	0.119	0.810

Key: *=statistical significance ($p<0.05$)

Table 4.38 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by years of experience as an Intensive Care Nurse. Of the total sample (n=79), the mean score obtained for group 1 ranged from 2.000 to 2.681) and the Standard Deviation from 0.808 to 1.225, in contrast of the total mean score obtained for group 2 ranging from 1.889 to 2.778 and Standard Deviation between 1.047 and 1.269. The difference for both group 1 and 2 ranged from (0.047-0.595). No items were found to be statistically significance ($p<0.05$) by years of experience hence both groups not equal.

Table 4.39 Student t-test employed for the education qualification

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q2	Use of a pain assessment tool for patients able to self-report	2	24	1.292	0.464	0.019	0.865
		1	55	1.273	0.449		
Q2.1	Numerical Rating scale (NRS)	2	24	1.375	0.495	0.043	0.723
		1	55	1.418	0.498		
Q2.2	Face scale	2	24	1.792	0.415	0.045	0.638
		1	55	1.836	0.356		
Q2.3	Visual Analogue scale	2	24	1.855	0.204	0.104	0.186
		1	55	1.958	0.356		
Q2.5	Verbal Rating Scale (VRS)	2	24	1.708	0.464	0.092	0.378
		1	55	1.800	0.404		
Q8.1	Adult Non-Verbal Rating Scale (NVRS)	2	24	1.792	0.415	0.063	0.494
		1	55	1.855	0.356		
Q8.2	Pain behavioural Assessment tool	2	24	1.875	0.338	0.016	0.840
		1	55	1,891	0.315		
Q8.3	Behavioural Pain scale	2	24	1.833	0.381	0.033	0.732
		1	55	1.800	0.404		
Q8.4	Behavioural Pain Rating Scale	2	24	1.875	0.338	0.089	0.140
		1	55	1.964	0.189		
Q8.5	PAIN algorithm	2	24	1.833	0.381	0.130	**0.045***
		1	55	1.964	0.189		
Q8.6	Critical Care Pain Observation tool (CPOT)	2	24	1.875	0.338	0.089	0.218
		1	55	1.964	0.270		
Q8.7	Checklist of non-verbal pain indicators	2	24	1.958	0.204	0.042	0.718
		1	55	2.000	0.544		
Q9	Frequent use of a pain assessment scale (Unable)	2	24	3.167	1.685	0.306	0.463
		1	55	3.473	1.698		
Q12	Frequency of pain assessment and documentation (Unable)	2 1	24 55	3.167 3.473	1.685 1.698	0.306	0.463

Key: *=statistical significance ($p<0.05$)

Table 4.39 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by qualification of nurses (Diploma or Degree). Of the total sample (n=79) the mean score obtained for group 2 ranged from 1.292 to 3.473 and the Standard Deviation from 0.204 to 1.685, with contrast of the total mean score obtained for group 1 ranging from 1.273 to 3.473) and Standard Deviation between 0.189 and 1.698. The difference for both group 1 and 2 ranged from 0.016 to 0.306. Only one sub-item was statistically significant ($p<0.05$): Q8.5 on PAIN algorithm ($p=0.045$), consequently, the mean scores between group 1 and 2 were equal. No other item was statistically significant ($p<0.05$), hence unequal.

Table 4.40 Importance of pain assessment for classification of ICU patient

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q16a	Post-operative patients	2	24	4.708	0.751	0.092	0.649
		1	55	4.800	0.848		
Q16b	Medical surgical ICU patient	2	24	4.667	0.565	0.248	0.347
		1	55	4.418	1.228		
Q16c	Patients with GCS <8	2	24	4.542	0.779	0.305	0.295
		1	55	4.236	1.319		
Q16d	Trauma ICU patients	2	24	4.875	0.448	0.384	0.151
		1	55	4.491	1.260		
Q16e	Burn ICU patient	2	24	4.875	0.448	0.602	0.063
		1	55	4.273	1.533		
Q16f	End of life ICU patients	2	24	4.833	0.482	0.870	**0.007***
		1	55	3.964	1.490		
Q16g	Patients receiving sedatives	2	24	4.542	0.932	0.687	**0.043***
		1	55	3.855	1.508		

Key: *=statistical significance

Table 4.40 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by qualification as a nurse (Diploma and Degree). Of the total sample (n=79), on the importance of pain assessment for classifications of patients, the mean score obtained for group 1 ranged from 3.855 to 4.800 and the Standard Deviation from 0.848 to 1.533, with contrast of the total mean score obtained for group 2 ranging from 4.542 to 4.875 and Standard Deviation between 0.448 and 0.932. The difference for both group 1 and 2 ranged from 0.092 to 0.870. Two items were statistically significant ($p<0.005$): Q16f End-of-life ICU Patients ($p=0.007$) and Q16g Patients receiving sedatives (0.043). Consequently, the mean scores between groups 1 and 2 were equal, whilst the others that were not statistically significant, were unequal in the perceived importance of pain assessment for different patients.

Table 4.41 Importance of assessment for the need of pre-emptive analgesia prior to:

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q17a	Patient repositioning	2 1	24 55	4.458 3.600	0.721 1.498	0.858	**0.009***
Q17b	Endotracheal Suctioning	2 1	24 55	4.208 3.545	1.062 1.476	0.663	0.051
Q17c	Wound care	2 1	24 55	4.750 4.200	0.608 1.129	0.550	**0.028***
Q17d	Drain Removal	2 1	24 55	4.708 4.018	0.550 1.284	0.690	**0.014***
Q17e	Invasive line placement	2 1	24 55	4.583 3.964	0.776 1.514	0.620	0.062
Q17f	Spontaneous breathing	2 1	24 55	3.292 2.855	1.398 1.615	0.437	0.254

Key: *=statistical significance

Table 4.41 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by qualification as a nurse on the Importance of pain assessment prior to suggested painful procedures. Of the total sample (n=79) the mean score obtained for group 1 ranged from 2.855 to 4.200 and the Standard Deviation from 1.129 to 1.165, with contrast of the total mean score obtained for group 2 ranging from 3.292 to 4.750 and Standard Deviation between 0.550 and 1.398. The difference for both group 1 and 2 ranged from 0.437 to 0.858. Three items were statistically significant ($p<0.005$): Q17a Patient positioning ($p=0.009$), Q17c Wound care ($p=0.028$) and Q17d Drain removal ($p=0.014$). Consequently, the mean scores between groups 1 and 2 were equal, whilst the others that were not statistically significant, were unequal in the perceived importance of pain assessment for the need of pre-emptive analgesia.

Table 4.42 Importance of assessment for the need of pre-emptive analgesia prior to:

Item	Statement	Group	n	Mean	SD	Diff.	T-test: p-value
Q18a	Patient repositioning	2 1	24 55	4.083 3.527	0.974 1.451	0.556	0.091
Q18b	Endotracheal Suctioning	2 1	24 55	3.917 3.582	1.139 1.357	0.335	0.294
Q18c	Wound care	2 1	24 55	3.917 3.582	1.139 1.357	0.336	0.294
Q18d	Drain Removal	2 1	24 55	4.417 3.836	0.830 1.302	0.580	**0.048***
Q18e	Invasive line placement	2 1	24 55	4.125 3.564	1.076 1.596	0.561	0.120
Q18f	Spontaneous breathing	2 1	24 55	3.667 3.018	1.167 1.533	0.648	0.068
Q20	Frequency of pain scores discussed nurse-nurse report	2 1	24 55	3.750 3.764	1.327 1.201	0.014	0.964
Q21	Frequency of pain scores discussed during medical rounds	2 1	24 55	3.792 3.655	1.215 1.220	0.137	0.647
Q22	Frequency of doctor prescription against a pain score	2 1	24 55	3.500 3.473	1.504 1.425	0.027	0.939

Table 4.42 presents the summary of mean total scores for comparison of pain assessment practices for patients who are able and unable to self-report pain by qualification as a nurse on the importance of assessment for the need of pre-emptive analgesia prior to suggested painful procedures. Of the total sample (n=79), the mean score obtained for group 1 ranged from 3.018 to 3.836 and the Standard Deviation from 1.302 to 1.596 with contrast of the total mean score obtained for group 2 ranging from 3.667 to 4.417 and Standard Deviation between 0.830 and 1.167. The difference for both group 1 and 2 ranged from 0.335 to 0.648. One item was statistically significant ($p<0.005$): Q18d Drain removal (0.048). Hence the mean scores between groups 1 and 2 were equal, whilst the others that were not statistically significant were unequal in the perceived importance of pain assessment for the need of pre-emptive analgesia.

The other items Q20, on the Frequency of Pain Scores discussed during nurse-nurse reports, Q21 during medical ward rounds and Q22 Doctor Prescription against a pain score were not found to be statistically significant ($p<0.05$)

4.4 DISCUSSION OF FINDINGS

The purpose of this study was to evaluate and describe Intensive Care nurses' knowledge and practices, related to pain assessment for critically ill patients, at a major public sector hospital in Johannesburg.

In this study, the first part of the questionnaire elicited how the nurse respondents' assess pain for critically ill patients who are able to self-report. This also reflected on their knowledge in regards to their pain assessment practices. Six (6) items (Q1 - Q6) supported the results and discussion of the findings in this part of the questionnaire.

The majority (62.0%, n=49) of the respondents indicated patients as the most accurate providers of their pain intensity in those who are able to self-report (Item Q1), with 72.0% (n=57) of respondents using a pain assessment tool on these patients (Item Q2). For those who used a pain assessment scale, the majority (60.0%, n=47) rated the NRS as most popularly for patients able to self-report. These findings were similar to a study conducted overseas (Canada), where Rose et al. (2011) reported 98.6% (n=138) of the respondents used a pain assessment scale for patients able to self-report, with 95% (n=133) using the NRS. Another study, which consistently shares these findings, was conducted in Uganda by Kizza (2012), where the majority (56.5%, n=96) of nurses indicated patients who can self-report as the most accurate providers of their pain intensity. In addition, the NRS in the same study was the most frequently used, although no percentages and frequencies are presented (Kizza, 2012).

The majority (50.0%, n=39) of the respondent's used a pain assessment scale routinely (more than 75% of the time) with (70.9%, n=56) perceiving pain assessment and documentation as extremely important for patients able to self-report their pain intensity (Items Q3, Q4 and Q6). These findings were consistent with a similar study conducted overseas by Rose et al. (2011), who reported that 94.2% (n=132) of the respondents in their study perceived pain assessment and documentation as extremely important for critically ill patients able to self-report.

In this study, the next part of the questionnaire elicited how nurse respondents assessed pain for critically ill patients unable to self-report their pain intensity. This also reflected

on their knowledge in regards to pain assessment practices. Six (6) items (Q7 to Q15) supported the results and discussion of findings in this part of the questionnaire.

The majority of respondents (64.1%, n=50) reported that nurses were the most accurate providers of pain intensity for a critically ill patient unable to self-report (Item Q7). The majority (52.0%, n=40) of the respondents used a pain assessment scale for these patients with the BPS (18.9%, n=15) being the most frequently used tool (item 8). Although most of the respondents (48%, n=37) did not use a pain assessment scale for patients unable to self-report pain intensity, (47%, n=37) described other methods used (Item Q10). The techniques commonly used were the combined use of Vital signs and behavioural change (15%, n=12). Some of these findings were consistent with a similar study conducted by Rose et al. (2011). Most (45.7%, 64) of the respondents in the study used a pain assessment tool for patients unable to self-report with the most frequently used tool being the BPS (20.7%, n=29). The majority (54.3%, n=76) of nurse respondents (54.3%, n=76) did not use a formal pain assessment scale, however 67.1% (n=51) described approaches they used for unable to self-report, which included assessment of vital signs in combination with various pain behaviours (62.7%).

The majority of the respondents (65.8%, n=50) perceived the use of a pain assessment tool as extremely important for patients unable to communicate their level of pain (Item Q11), with (38.7% , n=29) practising pain assessment and documentation every one (1) to four (4) hours.

It is important to note that a self-report regardless whether the patient can self-report or cannot self-report is very important as it's the only accurate subjective report for all patients. However, the nurses only considered a self-report for patients able to report (62%, n=49) as the most accurate whilst (64.1, n=50) indicated that nurses as the most accurate in giving a self-report for patients unable to self-report. In addition, much as 65.8%, n=50) considered a pain assessment tool as extremely important only (52%, n=40) used a formal pain assessment tool for patients who cannot self-report. This may reflect on the lack of adequate knowledge of the current pain assessment tools for patients unable to self-report.

In this study, the next part of the questionnaire aimed at eliciting the respondent's perceptions & knowledge of the behaviours of critically ill patients considered to be indicators of pain (Item Q13a to Q13y). These behaviours have been incorporated into the

pain assessment scales for patients unable to self-report. Twenty five (25) items supported the results and discussion of findings in this part of the questionnaire.

The behaviours most frequently considered routinely indicative of pain by respondents were restlessness (48.0%, n=37), ventilator or activation of alarms (47.0%, n=36), arching (46%, n=36) & grimacing (46.0%, n=36). Behaviours considered least indicative of pain (less than 50% of the time) were striking staff (47.0%, n=35), Not following commands (42.7%, n=37) and closing eyes (41.0%, n=31). Some of these findings were consistent and others inconsistent with the Canadian study by Rose et al. (2011). The consistent findings included grimacing (63.6%) routinely indicative of pain and not following commands (87.8%) as indicative of pain less than 50% of the time. Inconsistencies were seen in the activation of alarms, which in this study was ranked as indicative of pain more than 75% of the time, whilst in Rose et al. (2011) it was ranked at less than 50% of the time. The inconsistencies may indicate that not all the nurses use a formal pain assessment scale for patients unable to report.

The respondents (78.5%, n=62) indicated physiological indicators of pain assessment as extremely important. They were also required to indicate the physiological indicators of pain in part two of item Q15B of the questionnaire. (84.8%, n=67) of the respondents indicated that elevated vital signs were indicative of pain. All the participants indicated elevated vital signs (HR, Pulse, RR) as indicative of pain. However, none indicated reduced vital signs as indicative of pain. Studies have shown that vital signs may increase or not during procedural pain but should only be used as a cue for further pain assessment (Young et al. 2007)

In this study, the next part of the questionnaire aimed at eliciting pain assessment practices for classification of critically ill patients in ICU, management and documentation (Items Q16a to Q16g, Q17a to Q17f, Q18a to Q18f, Q19, Q20, Q21 and Q22). Twenty three (23) items supported the results and discussion of findings.

The majority of the respondents (91.1%, n=72) considered pain assessment as extremely important for post-operative ICU patients. Burns ICU patients (85.5%, n=67) and Trauma ICU patients (85.0%, n=67) were considered as extremely important. These findings were

consistent with the study by Rose et al. (2011), where nurses considered pain assessment equally important for burns ICU patients and trauma patients.

As for the conditions previously reported as painful in ICU, wound care was considered extremely important by 65.8% (n=52) of the respondents. For wound care (55.7%, n=44) pain assessment for the need of pre-emptive analgesia was done routinely (>75% of the time). The majority of the nurses considered spontaneous breathing (weaning trial) (50.7%, n=41) as least important (less than 50% of the time). This was consistent with Rose et al. (2011), who reported wound care (97.1%) as extremely important for the need of pre-emptive analgesia. Moreover, Rose and colleagues also reported 72.9% of nurses rated spontaneous breathing as least important.

In this study, the next section of the questionnaire aimed at eliciting barriers and enablers to pain assessment and management for critically ill patients (Items Q24a to Q24p) and (items Q25a to Q25h). Twenty seven (27) items supported the results and discussion of findings

Respondents reported availability of pain assessment tools (17.8%, n=14), lack of a designated area for charting pain (17.7%, n=14), Unstable hemodynamics (16.9%, n=13 and lack of protocols or pain guidelines (16.9%, n=13) as most frequently affecting pain assessment and management. The least frequently occurring barriers to pain assessment & management were poor communication of pain analgesic and management priorities (73.1, n=57). The enablers considered to be present (more than 75% of the time) were pain assessment and management prioritisation (45.6%, n=36), enthusiastic and motivated staff (43.0%, n=34) and presence of Advanced Practitioner Nurse in ICU (41.6%, n=32). Some of these findings were consistent with Rose et al. (2011), who reported the most frequently occurring enablers as prioritisation of pain assessment and management by the Intensive Care team (56%, n=40).

In this study, the final section of the questionnaire was professional development in relation to pain education. Ten (10) items (Q26, Q27a to Q27h, and Q28) supported the results and discussion of findings.

The majority of the respondents (54.1%, n= 40) had not read or were not aware of the evidence based guidelines by the Society of Critical Care Medicine for pain management. Topics most frequently covered during professional development were: painful conditions and procedures ((83.1%, n=64), pharmacological pain management strategies (79.7%, n=63) and pain assessment methods and tools in the critical ill patient (74.7%, n=59). Some of these findings were consistent with Rose et al. (2011), where the most frequently covered topics were painful conditions and procedures (66.9%), pharmacological pain management strategies (62.8%). The least covered topics were non-pharmacological pain strategies ((71.4%, n=55), Pain physiology mechanisms (68.3%, n=54) and practice recommendations and guidelines (56.4%, n=45). Similarly Rose et al. (2011) reported non-pharmacological pain management (45.9%) as one of the least covered topics of pain by the respondents.

Inferential statistical tests utilised in this study included the McNemar's Test, Fisher's Exact Test and Student t-test. The McNemar's test was employed to test for the differences in pain assessment practices for Q2 & Q8, Q3 & Q9, Q4 &Q11 and Q6 & Q14 and the perceived importance and frequency of pain assessment for painful procedures for Q17 & 18 at statistical significance (p=0.05). There were differences in the use of a pain assessment tool, the importance of a pain assessment tool and the importance of frequent pain assessment and documentation for patients who can and cannot self-report. However, findings suggested a similarity in the frequency of the use of a pain assessment tool for both groups of patients. A discrepancy was evident between what the nurses perceived as important and what they practiced, differences in suggested painful procedures such as endotracheal suctioning (p=0.038), wound care (0.048) and drain removal (p=0.005). Patient repositioning (p=0.305) and spontaneous breathing (p=0.246) were found to have similarities. Hence, the mismatch between what was perceived as important and what was practiced.

The Fisher's Exact Test tested for associations between categorical variables and responses. Seven items had differences in construct scores by years of experience as a registered nurse with statistical significance ($p<0.05$): Q8.4 - Behavioural Pain Rating Scale, Q11- Importance of a pain assessment tool for patients unable to self-report, Q14 - Importance of frequent pain assessment and documentation for patients unable to self-report, Q18c - Importance of pain assessment prior to wound care, Q20 - Frequency of

pain discussions in nurse-nurse reports, Q25f - Ongoing education in pain and Q28 - Satisfaction of developmental education of pain for critically ill patients. For the years of experience in ICU, seven items were different in construct scores: Q2.5-Verbal Rating Scale, Q8.7-Checklist of Nonverbal Pain indicators, Q11-Importance of a pain assessment tool for patients unable to self-report, Q13v-withdrawing, Q17b-importance of pain assessment prior to endotracheal suctioning, Q20- frequency of pain discussion nurse-nurse report, Q25e-doctors providing adequate analgesia dose. Seven items different in construct scores by qualification of nurse either diploma or degree which were, Q5-frequency of pain assessment and documentation for patients able to self-report, Q6-Importance of frequent pain assessment and documentation, Q7- the person that provides the most accurate level of pain for patients unable to self-report, Q13p- Pulling of endotracheal tube, Q17c-Wound care, Q24l-lack of protocols/guidelines for pain management and Q27d- psychological consequences of unrelieved pain.

The Fisher's Exact Test was also employed to test for associations between other categorical variables, namely employment status, usual shift rotation and specialty by type of ICU. The results suggested differences in nine items by employment status for patients able and unable to self-report: Q11-Importance of a pain assessment tool, Q13h-Grimacing, Q13o-Repetitive touching of area of body, Q14-Importance of frequent pain assessment and documentation for patients unable to self-report, Q16b-Importance of pain assessment in medical-surgical ICU patients and Q16d-Trauma ICU patients, Q22-Frequency of Doctor's writing orders for analgesia against a pain score, Q27a-Pain physiology. The results by usual shift suggested differences in nine items for both groups of patients: Q6-Importance of frequent pain assessment and documentation, Q13f-Ventilator or alarm activation, Q13m-Retraction of upper limbs, Q18d- Drain removal, Q24h-No designated area for pain chart, Q25c-Standard pain assessment tools in use, Q27e-Painful conditions and procedures. Five items had differences by specialty in ICU for critically ill patients: Q16a-Importance of pain assessment for Post-Op patients, Q22-Frequency of Doctors writing orders for analgesia against a scale, Q24i-Sedation interfering with management, 25a-Pain as a priority and 25e-Doctors provide adequate analgesia dose. In other words, a difference was observed in the significant items above, but none in other items.

The student t-test was employed to compare the associations between pain assessment practices and nurses demographic data namely years of experience as a registered nurse, years of experience as Intensive Care Nurse and the qualifications. For the years of clinical experience as a registered nurse, Verbal Rating Scale, Pain Behavioral Assessment tool and Behavioral Pain Rating Scale were three items statistically significant ($p<0.05$). For years of clinical experience as an Intensive Care Nurse there were no items found to be statistically significance, hence all items were unequal. For the years of qualification of nurse (Diploma or degree) one item was statistically significant namely the Pain algorithm. All statistically significant items suggested equal mean scores between the two groups of patients.

4.5 SUMMARY

This chapter discussed the descriptive and inferential statistics used to describe and analyse the data collected. The data and interpretation were presented in form of Pie charts, bar graphs and tables.

Overall, there was a discrepancy in how ICU nurses assess patients who can and cannot self-report. Nurses (62.9%, n=49) indicated patients who can self-report are the most accurate providers of pain intensity, whilst 64.1% (n=50) indicated nurses are the most accurate providers of the pain intensity in patients unable to self-report. It is also evident that nurses were more confident in the use of pain assessment tools for patients able to self-report than for those unable to ($p=0.0001$).

The study also showed there were inconsistencies with the behaviours indicative of pain. For instance, whilst the highest percentage of the behaviour (restlessness) (48.0%, n=37) was considered to be the most frequently occurring behaviour, (31.2%, n=24) of respondents rated restlessness as a moderately frequent indicator of pain and 20.8% (n=18) rated it as less frequently indicative of pain. This shows a form of disagreement in the nurses

The majority (91.1%, n=72) of respondents considered pain assessment as extremely important for post-operative patients. The need for pain assessment for pre-emptive

analgesia for wound care was considered extremely important by 65.8% (n=52) of respondents and the assessment was done routinely (>75% of the time).

The lack of pain assessment tools (17.9%, n=14) was rated as the most frequently impacting on pain assessment and management for critically ill patients in ICU, whilst prioritisation of pain assessment by the ICU team was rated as the most frequently occurring enabler for effective assessment and management of pain.

The majority (54.1%, n=40) of the respondents were not aware of the SCCM guidelines of pain. This may have been attributed to the fact that these guidelines may only be accessible by subscribed members of SCCM. The most frequently covered topic was painful conditions and painful procedures (83.1%, n=63).

The results from the open ended questions were evaluated independently and grouped common phrases together. The frequencies and percentages were calculated and presented as tables. The findings were incorporated into the rest of the study findings.

The inferential statistics used included the McNemar's Test for Symmetry, Fisher's Exact Test and the Student t-test at statistical significance of ($p<0.05$):

- The McNemar's Test was employed to compare pain assessment practices for the two groups of critically ill patients and differences in perceived importance of potentially painful procedures. Three items were statistically significant for pain assessment practices and three others in the perceived importance of suggested painful procedures in ICU for patients able and unable to self-report.
- The Fisher's Exact Test was used to test associations between nurse demographic variables and questionnaire responses. Forty two items were found to be statistically significant for patients who can and cannot self-report. Hence a difference was observed.
- The Student t-test was employed to compare mean scores of responses related to pain assessment practices with nurse demographic variables. Twelve items were found to be statistically significant. Hence, total mean scores for both groups were equal.

Chapter Five will discuss the limitations of the study, the summary of research findings and conclusions and recommendations for further research.

CHAPTER FIVE

SUMMARY, DISCUSSIONS OF RESULTS, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

This final chapter of the research presents the summary of the study, discussion of main results and conclusion of the study. This is followed by a discussion of the limitations of the study and recommendations for clinical practice, education, future research and the institution 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 investigate intensive care nurses' knowledge and practices related to pain assessment for critically ill patients at a major public sector hospital in Johannesburg.

5.2.2 Objectives of the Study

The objectives of the study were:

- To examine the level of knowledge related to pain assessment among ICU nurses caring for critically ill patients
- To determine pain assessment practices among ICU nurses caring for critically ill patients
- To identify the barriers for pain assessment among ICU nurses caring for critically ill patient

5.2.3 Methodology

Prior to conducting the study, ethical clearance (**Appendix H)** protocol number (M130524) was obtained and permission to conduct the study from relevant authorities; Hospital Chief Executive officer (**Appendix J)** Deputy Director of Gauteng province, Department of Health **(Appendix I**) and University of the Witwatersrand, postgraduate committee, Faculty of Health Sciences (**Appendix G)** . Five adult intensive care units at a tertiary public sector academic hospital were used to conduct the study; Multi-Disciplinary ICU, Neurosurgery, Cardiothoracic, Coronary and Trauma ICUs.

A pilot study which consisted of 10 respondents was conducted prior to the main study to refine the methodology and data collection instrument. A statistician from Medical Research Centre was consulted prior to data collection and a sample size of (n=80) was decided upon. This was to ensure a Confidence Interval of 95% accuracy to achieve ($p<0.05$) testing. However, during data entry and cleaning one of the 80 questionnaires, code 68 was found to be, faulty and the researcher consulted the Medical Research Centre statistician and it was agreed upon that questionnaire code 68 should be left out of the data analysis. So the sample size came down to (n=79).

To meet the study objectives, a non-experimental descriptive, cross-sectional design was employed. The instrument used for data collection was adapted from Canada by Rose et al. (2011): Pain assessment and Management for the critically ill Patient. Verification was done by two intensive care specialists and education experts for its applicability to South Africa. The questionnaire contained seven major parts with predominant Five (5) point Likert scale: Part one was pain assessment and management practices for patients able to self-report and patients unable to self-report, part two was on pain behaviours, part three was on the categories and procedures, part four was on the barriers and enablers, part five was on pain education, part six was the demographic data and the last part had provision for the sample of pain assessment scales for patients that can self-report and those who cannot self-report. After verification some questions were edited while others were excluded to fit the South African context **(**Refer **Appendix A**). Data collection was done for three months: July, August and September 2013. After further consultation with the biostatistician descriptive and inferential statistics were used to analyze the data. Inferential

statistical tests included the McNemar's teat, Fisher's exact test and the student t-test. Statistical significance level was at ($p<0.05$).

5.3 SUMMARY OF MAIN RESEARCH FINDINGS

The purpose of this study was to investigate intensive care nurses' knowledge and practices related to pain assessment for critically ill patients in the five adult ICUs in a public academic sector hospital. In this study a self-administered questionnaire was utilized to collect data from ICU trained nurses who had been working in the respective units for at least 6 months. This study was part of a main study done in Canada by Rose et al. (2011). The demographic data for ICU trained nurses (n=79) working in the (n=5) ICUs was collected. They were asked to sign a consent form in agreement to participate in the study and then complete the 25 minute questionnaire for pain assessment and management. The main findings of the study for demographic data are as follows:

Of the (n=79) ICU nurse respondents, (44.0%, n=35) had >10 years of experience as registered nurses while (31.0%, n=24) of the ICU nurses had >10 years of experience as ICU trained nurses. A majority (52.0%, n=40) a combination of (<2yrs and 2-5yrs) had less than five (5) years of experience in ICU. ICU nurses with a diploma (70.0%, n=55) formed the largest number of nurses in the study while a few (30.0%, n=24) had a degree. Of the total nurse respondents (n=79). (96.0%, n=76) were full time ICU nurses with (58.2%, n=46) working both day and night shifts on a regular basis. Of the (n=79) respondents, the ICU nurses (36.0%, n=27) with Cardiovascular experience formed the largest number of the nurses in the study. (58.0%, n=46) had more than one or combined ICU specialty.

A majority (62.0%, n=49) of the nurses considered patients able to self-report as the most accurate providers of their pain intensity while majority (64.1%, n=50) indicated that nurses are the most accurate providers of the pain intensity of the patient who cannot self-report. Some of the findings were concurrent with a study by Kizza (2012), where majority (56.5%, n=96) of the nurse respondents reported patients able to self-report are the most accurate determinants of their pain level.

Further findings indicated that nurses considered pain assessment and documentation extremely important (>75% of the time) for patients able to self-report (70.9%, n=56) and patients unable to self-report (65.8%, n=50) as relatively equal. However, the use of a formal pain assessment tool was more frequently used by majority (72.1%, n=57) nurses in patients able to self-report compared to a lesser majority (52.0%, n=40) for patients unable to self-report. This showed that nurses were less confident in the use of a pain assessment stool for patients unable to self-report. These findings were relatively consistent with a study conducted by Rose et al. (2011) where only a few nurses used a formal pain assessment scale for patients unable to self-report.

Of the nurses (72.0%, n=57) who used a formal pain assessment tool, a majority (60.0%, n=47) nurses indicated a popularity in the use of the NRS. This concurs with two studies on pain assessment practices where NRS was rated as the most frequently used tool for patients who can self-report. One of the studies was conducted in Canada (Rose et al. 2011) and the other in Uganda (Kizza, 2012). The NRS is said to be in more frequent use than the other self-report tools as it has been intensely tested for validity and reliability (Puntillo et al. 2009). One of the recent inter-rater reliability and validity test was done by Ahlers et al. (2008).

On the other hand, of the nurses (50.0%, n=39) who used a formal pain assessment tool for patients unable to self report the BPS (18.9%, n=15) was the most frequently used tool. Most of the behavioural pain assessment tools are just gaining popularity and familiarity as so far the BPS by (Payen et al. 2001) and the CPOT by Gelinas et al. (2006) have been proven to have higher reliability and validity comparing to the other tools. Although, further testing of the tools is recommended. Of importance to note as of this study and others is that the pain assessment tools have an infrequent usage in ICU nurses much as majority (74.7%, n=59) have received education on pain assessment methods and tools. This may be attributed to the fact that as reported in this study that hospital pain service consults in the ICU (<50%) of the time and the interpretation of theoretical knowledge to practice. In addition the preference of the tool of choice for pain assessment may reflect the knowledge of what pain is and how clinicians convert from an individual experience to others perception (Puntillo et al. 2009).

Nurses who did not use a formal pain assessment tool for patients able to self-report depended on the patient's own report (18.0%, n=14). None used the PQRST mnemonic for pain assessment of patients who can communicate. These findings are concurrent with a similar study by Rose et al (2011) where nurses found to use both behaviour change and vital signs to detect pain. In a qualitative study by Puntillo et al. (2008); Haslam et al. (2012) ICU nurses' perspectives confirmed that nurses use physiological signs, behavioural symptoms or a combination of the two to assess the presence of pain in a patient who cannot self-report.

The key to improving and enabling pain control is documentation (Chanques, Sebbane, Barbotte, Viel, Eledjam & Jaber, 2007). Majority (70.9%, n=56) responded that it was extremely important to frequently assess and document pain in a patient able to self-report their pain intensity while (64.0%, n=50) indicated that it was routinely (>75% of the time) to use a pain assessment tool for patients unable to communicate with (38.0%, n=29) assessing and documenting pain (>every 1 hour -< every 4 hours). This is in concurrent with the study by Rose et al. (2012) where ICU nurses reported that pain assessment and documentation was extremely important. Contrasting to this practice, studies have shown the lack of pain documentation in ICU. For instance, a study reported of the 183 pain episodes nurses only reported the presence of pain without the pain score or intensity in only 3 out of 183 pain episodes (Gelinas et al. 2004)

The behaviours that were frequently considered to be indicative of pain included restlessness (48.0%, n=37) found in most of the behavioural tools, Ventilator/ activation of alarms (47.0%, n=36), Arching (46.0%, n=36) and Grimacing (46.0%, n=36) found in seven of the pain assessment tools. These findings were similar with two other studies done overseas one by Aslan Badir & Selimen (2003) in Turkey where restlessness was pointed out by the nurses as the most frequent behaviour indicative of pain. The other is a Canadian study by (Haslam et al. 2012) who also reported restlessness and grimacing as the most frequently behavioural indicators of pain in ICU. Behaviours considered least indicative of pain (<50%) of the time were striking staff (47.0%, n=35), not following commands (42.7%, n=37) and closing eyes (41.0%, n=3). Inconsistencies were seen in the activation of alarms where in this study it was ranked as indicative of pain more than (75% of the time) while in Rose et al. (2011) it was ranked at less than (50%) of the time. From the findings in this study on behavioural indicators of pain, there was evidence of

inconsistencies in the behaviors that are frequently indicative of pain. The fact that these tools have been in cooperated in the pain assessment tools shows that nurses are not well aware of the pain assessment tools, which may be a major obstacle to these tools' adaptation in the adult ICU.

Majority (78.5%, n=62) of the nurses indicated physiological indicators as extremely important for the detection of pain. Among the (n=79) nurses, (84.8%, n=67) indicated that changes in vital signs (BP, HR, Temp, RR) as physiological indicators of pain. These Findings are similar to two Canadian studies done by Haslam et al. (2012) and Rose et al. 2012 where change or increase in BP, HR, RR were considered by most nurses as physiological indicators of pain. In contrast findings by Gelinas et al. (2010) revealed that vital signs remained quite stable during procedures that were considered painful. In other studies blood pressure and heart rate could either elevate during painful and non-painful procedures or remain stable (Young et al. 2007). Gelinas et al. (2011a) reported that when vital signs increased they were not related with the patient's self-report of pain limiting the validity for pain assessment purposes. Hence, Vital signs should be used as a cue to start further pain assessment for patients who cannot communicate their pain intensity (Herr et al. 2006). The results in a single study also refuted the single use of physiological indicators for pain assessment as it is unreliable (Young et al. 2007).

The ICU patients that nurses thought pain assessment was extremely important included Post-Op ICU patients (91.1%, n=72), Burns ICU patient (85.5%, n=67) and trauma ICU patient (85.0%, n=67). Similarly, Rose et al. (2011) reported pain assessment to be extremely important for trauma ICU patients.

Procedural pain is tiring, exhausting and awful for ICU patients (Puntillo et al. 2001) but inevitable as it is necessary for the patients comfort and recovery. It has also been well documented that pre-medication before these procedures are very important (Puntillo, 2007, Morton & Fontaine, 2013). In the current study the procedures that were considered extremely important (>75% of the time) and most frequently practiced for pain assessment for pre-emptive analgesia were: wound care (65.8%, n=51), invasive line placement (65.4%, n=51) followed by drain removal (59.5%, n=47). Some of these findings concur with two other studies done overseas where respondents rated wound care, drain removal and line insertion as extremely important. These were all reported by Rose et al. (2011)

while drain removal alone as increasing pain was reported by Young et al. (2007). Much as these procedures are known to intensify pain, ICU nurses overlook by not assessing nor administering pre-medication as indicated by Puntillo et al. (2001) and Rose et al. (2011) where suctioning and turning were not regarded of least importance for pain assessment. Majority (53.3%, n=41) nurses considered spontaneous breathing (weaning trial) (53.3%, n=41) as least important (<50% of the time). This may be attributed to the fact that nurses may find it difficult to detect pain in patients who are very unconscious and focus more on monitoring haemodynamics.

Majority (51.3%, n=40) indicated that pain management discussion was routinely (75% of the time) discussed during nurse-nurse ward rounds while most (43.6%, n=34) indicated that doctors least frequently (<50% of the time) prescribe analgesia targeted to a pain score or parameters. This concurs with a study done overseas where the respondents indicated that majority of the nurses reported that pain scores discussed often or routinely during nurse-nurse handover while (42.0%, n=33) nurses indicated that doctors prescribed analgesia to a pain score or any other assessment parameters (Rose et al. 2012) less than 50% of the time. This may explain situations where ICU patients are either overdosed or under-dosed with analgesia.

Patient uncooperativeness (18.9%, n=15), unstable parameters (16.5%, n=13) and misdiagnosis/ mismanagement (13.9%, n=11) were considered as the major consequences of unrelieved pain. Studies have shown that pathophysiological consequences of pain includes hypertension, increased cardiac work load, altered respiratory mechanisms (Thomas 2008), poor wound healing (Paulson-Conger et al. 2011), psychological distress (Gelinas et al. 2011), and immobility which may lead to DVT and pneumonia (Arbour, 2003, Pasero & McCaffery , 2005; Paulson-Conger et al. 2011).

The lack of availability of pain assessment tools (17.8%, n=14), lack of a designated area for charting pain assessment (17.7%, n=14) and lack of protocols/ guidelines for pain assessment (16.9%, n=13) were considered the greatest barriers to pain assessment and management. Sedation was considered a barrier but less frequent (<50% of the time). According to current EBP sedation should be minimized in ICU) as it may interfere with pain assessment and management (Chanques et al. 2007) hence sedation medication should be administered only after analgesic management (Jacobi et al. 2002)

Pain assessment and management as a unit priority (45.6%, n=36), enthusiastic and motivated staff (43.0, n=34) and advanced practice nurse (s) employed in ICU (41.1%, n=32) were the greatest enablers to pain assessment and management. Some of these findings are concurrent with the present study where Haslam et al. (2012) reports a motivated critical care team and Rose et al. (2011) reports prioritization of pain as an enabler to pain assessment and management.

A majority of the nurse respondents (54.1%, n=40), responded not having read the SCCM guidelines for the management of sedation and pain analgesia. This may be due to the fact that the documents of SCCM are only available to subscribed members which most of the nurses do not have access to. Contrasting findings, although a larger sample size of (n=802) only (8%, n=67) of the nurses were familiar with the sedation and analgesia guidelines of the society of SCCM (Rose et al. 2011). It has been reported that nurses are not keen in the latest protocols and guidelines for pain assessment and management (Payen et al. 2007). While nurses need to be self directive in learning pain assessment guidelines, a recent qualitative study, nurses also indicated that they need a clinical facilitator to remind them from time to time (Subramanian et al. 2011) creating a major obstacle to adopting pain guidelines (Rose et al. 2012).

Most (41.0%, n=32) nurses indicated to have received or attended ongoing professional education on pain related topics. The most frequent pain education topics attended by ICU nurses in this study were: Pain conditions and procedures (83.1%, n=64), Pharmacological pain management/ strategies (79.7%, n=63) and pain assessment methods and tools for critically ill patients (74.7%, n=59). Of importance to note is that much as (74.7%, n=59) of the nurses had received education on pain assessment tools for critically ill patients a majority ranging (81.0% - 92.94%) of the nurses did not use the pain assessment tools during pain assessment for patients unable to self-report. (73.1%, n=57) of the nurses indicated that they had received education on the physiological consequences of unrelieved pain but in an open ended question on the physiological indicators of pain (Item 20), an average (50.6%, n=40) respondents did not indicate any physiological indicators of pain.

Inferential tests used were the McNemar's test for symmetry, Fisher's exact test and student t-test for the response of pain assessment practices for critically ill patients. The McNemar's test was used to compare associations of pain item scores. Eight items were

found to be statistically significant ($p<0.05$). The Fisher's exact test was used to compare item scores of the demographic data. Forty two items were found statistically significant level ($p<0.05$). Seven items were for the years of experience as an ICU nurse, seven for the Years of experience in ICU, Seven for the education qualification, nine for the employment status, seven for the usual shift and five for the primary specialty most experienced. The student t-test was used to compare mean scores for demographic variables with pain practice responses which included years of experience as a registered nurse, years of experience in ICU, level of education, employment status, usual shift and primary shift. Three items were found to be statistically significant ($p<0.05$) for years of experience as a Registered Nurse (RN) and eight items were found to be statistically significant for education qualification and two items for primary specialty with more experience in.

5.4 LIMITATIONS OF THE STUDY

The following were the limitations acknowledged by the researcher in this study:

- A quantitative study with a small sample size (n=79) ICU nurses
- Five (n=5) intensive care units at a single centred public tertiary academic hospital in Gauteng, South Africa.
- Most of the nurse respondents were not aware of most if not all of the international pain assessment tools particularly those for patients unable to self-report. This is evidenced by the fact that the researcher had to explain to the respondents of the different pain assessment tools for patients able and unable to self-report and the few who indicated on the findings.
- Due limited period of time, the researcher was not able to include patients in the study and or families or other health care practitioners like doctors to complement with what the nurses' responses.
- It was difficult to collect data in trauma ICU for reasons not well known and understood by the researcher. Only (12%, n=9) participated in the study.

Generalization of the current research findings were confined by the above mentioned limitations. However, replica studies may be conducted in other public sector hospitals to complement or contrast these findings.

5.5 CONCLUSION

This research is based on Katharine Kocaba's (Kolcaba et al. 2006) theory of comfort which is based on ensuring that the patient receives the ultimate comfort whilst in hospital in this case ICU for an overall speedy recovery and satisfaction of care. Pain is one of the dominant factors that lead to discomfort in ICU. For the enhancement of comfort by relieving pain ICU nurses must administer the most appropriate intervention. It also emphasizes that pain assessment and management should be pro-active, directive and longed for. Hence, ICU nurses require adequate pain knowledge, skills, integration competence and time for each individual patient. The purpose of this study was to evaluate and describe intensive care nurses' knowledge and practices related to pain assessment for critically ill patients.

Nurses have been proximally placed to patients in that they are the best advocates for patients due to the fact that they spend twenty four hours with them. There is transparent handing over since ICU operates on a 1:1 nurse to patient ratio. Therefore effective pain assessment and management is highly dependable on ICU nurses. The results in this study showed that there is a disparity between pain assessment practices for critically ill patients who can self-report their pain intensity and those patients who cannot self-report. This is noticeable by how confident nurses were in using pain scales, familiarity of pain assessment tools for patients able to self-report, the frequency and importance of pain assessment and the vitality in a patient's self-report of their pain intensity compared to the patients who cannot self-report.

Overall, pain assessment was rated extremely important for post-operative patients, trauma and burns ICU patients. Further findings in this study showed that assessment for the need of pre-emptive analgesia was very important for procedures like wound care, drain removal and invasive line placement. However, procedures like suctioning which have been reported to be among the most painful in ICU were rated as among the least importance for pre-emptive analgesia in this study. This reflects on the inadequate knowledge on painful procedures in ICU.

Generally, there were inconsistencies in the behaviours that were considered potentially indicative of pain and have been in cooperated in to the pain assessment behavioural tools.

This may be evidence of lack of awareness, interest, or knowledge of the use of these tools which are yet to be well adopted into the ICUs in South Africa and globally. In addition, nurses indicated that there was lack of pain assessment tools availability in the units which was a major negative impact on how pain is assessed and managed. Furthermore, the need for prioritization and team work in patient analgesic prescription was reported as most doctors prescribed without using a pain scale. There were also minimal discussions reported of pain scales during nurse-nurse hand-over. Continuous professional development on pain topics was greatest for painful conditions and procedures, pharmacological pain management strategies and pain assessment methods for critically ill patients.

From the findings of this study, it is established that indeed ICU patients both able and unable to report experience pain during their stay. Most of the nurse respondents were not aware or well versant with the pain assessment scales for patients unable to self-report pain. This was reflected in their responses, as most did not use a formal pain assessment scale for patients unable to report while they are comfortable with using a formal scale on patients able to report in ICU. Most of the nurses had attended one or more pain education topics in continuous education. However, this was not reflected in their responses in practice. If the pain theory can be translated into practice pain assessment will be adequate improving pain management hence improved patient care and comfort.

Most of the findings above were supported by studies conducted abroad with only one conducted in Uganda, Africa. Few studies on pain have been conducted in South Africa but none on the knowledge and practices of pain of pain assessment in the critically ill patients that can self-report and those patients who cannot self-report in ICU.

5.6 RECOMMENDATIONS OF THE STUDY

Evidenced Based Practice (EBP) has been on the rise in the clinical area of nursing. ICU nursing is a very important specialty that focuses on critically ill patients where a larger percentage is unable to participate in their care much less communicate their level of pain. To determine the level of pain the patient is experiencing is vital in order to administer the right amount of treatment and integrate with other non-pharmacological interventions.

Moreover, it is extremely important to be able to integrate acquired pain knowledge into practice (Wang & Tsai, 2010).

The disparity in the two patient populations' pain assessment in ICU should be addressed (Shannon & Bucknall, 2003) and gradually none should exist hence holistic care and ultimate patient outcome. This is because a patient's self-report is the most important in providing their pain level. The behavioural pain assessment tools must be well adopted into practice and can only be done if ICU nurses are interested and aware of the pain guidelines up to date, if they are able to use the pain assessment tools on a regular basis and document pain intensity more frequently (Rose et al. 2011)

Furthermore identifying enablers and overcoming the barriers can greatly lead to effective pain assessment and management which eventually brings about an increased quality of life (Gunnigberg & Idvall, 2007). The findings of this study forms the basis of the following recommendations in relation to nursing practice, for nursing education and for nursing research.

5.6.1 Recommendations for Clinical Practice

It is very vital that the ICU nurses are well versant with the pain assessment tools for both groups of patients particularly those who cannot self-report since their pain assessment tools are still in the process of validation. From the findings in this research it was evident that there was lack of awareness of pain assessment tools (17.9%, n=14), protocols and guidelines for pain assessment (16.9%, n=13) on table 4.17. These are also rated amongst the greatest barriers to pain assessment by the ICU nurse respondents in this study. Much as there is perceived importance of the use of a pain assessment scale by majority (52.0%, n=40) of the nurses on figure 4.6, there was little use of the pain assessment tools for patients unable to self-report compared to the popular use in patients able to self-report. this discrepancy only explains why it has been reported that ICU patients who have been discharged from ICU report that pain is the most dominant stressor during their admission (Gelinas & Johnston, 2007). Moreover, only (31.1%, n=23) had read the SCCM guidelines for pain. Therefore, the ICU team in each unit which should include the ICU nurses, doctors and significant other should develop guidelines and protocols for pain assessment and management for critically ill patients. The guidelines and protocols should entirely

depend on the special needs for these patients who cannot self-report their pain intensity. In addition these guidelines should be merged or adopted from the international guidelines of pain to suit the South African context like for example the behaviours or physiological indicators of pain.

A supportive environment is also very necessary for the facilitation of adequate and effective pain assessment and management. There is evidence of insufficient analgesic dosage prescription. From table 4.17 (35.5%, n=28) respondents reported that under – prescription is present more than 50% of the time thus between moderately frequent to more frequent of the time. This is unsafe for the patient. It has also been shown in this study from table 4.15 that pain scores are less frequently discussed among nurses as reported by (34.9%, n=27) respondents. In medical rounds pain scores are discussed less than 50% of the time as indicated by (35.9%, n=28) and most (43.6%, n=34) indicated that doctors prescribe against a pain scale or parameter less than 50% of the time. Clearly an ICU operates best on the basis of a multi-disciplinary approach. This may involve the ICU nurse, the doctors, pharmacists, intensivists and significant other. Interdisciplinary approach of practice and education should be encouraged for patients unable to self-report.

There are procedures that have been reported in literature from research and in this study to be potentially painful as in table 4.13. Wound care (65.8%, n=52), Invasive line placement (65.8, n=51) and drain removal (59.5%, n=47). These procedures are therapeutic and are inevitable. Pain has also been reported to be a major stressor in ICU and occurs very frequent in critically ill patients. In this study it was noted that a majority of the nurses considered pain assessment extremely important for Post-operative patients (91.1%, n=72), Trauma patients (87.0% n=67) and Burn patients (85.5%, n=65). One of the barriers was lack of a designated area for pain assessment and management (17.9%, n=14). This study also concluded that nurses were less confident in assessing patients who cannot self report compared to those who can self-report. In light of the above nurses are to be made aware of that prior to all procedures particularly those that have been reported to be potentially painful and if pain is present pre-emptive analgesia administered, nurses should regularly assess pain to rule out or determine the intensity for effective management and pain should be made the ‘fifth vital signs’ on all the ICU charts to promote documentation of pain assessment and management. In addition every ICU patient should be assessed pain and reassessed after pain management.

5.6.2 Recommendations for Intensive Care Nursing Education

Findings from this study show that majority (70.1%, n=54) were less satisfied with pain education. Only (29.8%, n=23) were extremely satisfied. It then clearly shows that pain education in ICU for nurses needs to be revised, improved and practiced more frequently to suit the educational needs of the ICU nurses. Studies by Wang & Tsai (2010) and Rose et al. (2011) have reported insufficient pain knowledge in ICU nurses which leads to ineffective pain assessment and management. Recommendations for further nursing education would be on the following:

- ICU pain education should begin from the training level where the nurse educators and clinical facilitators should work hand in hand to initiate a clinical and theory pain curriculum for students during their training in the university and college. All the topics should be covered and on employment to ICU pain assessment and management training done at the beginning and on a regular basis. The critically ill patient who cannot self-report pain must be a point of focus and not generalizing the two groups of patients since they have different needs.

- The inconsistencies of pain education with a range of (11.7%, n=9 to 23%, n=18) having not attended any pain topics, reveals a clear need for intensive pain education. Further, regular and research based pain topics which are up to date need be tackled. These topics include; pain physiology mechanisms, pain assessment mechanisms in the critically ill patients, physiological consequences of unrelieved pain, psychological consequences of pain, painful conditions and procedures, pharmacological pain management, non-pharmacological pain management and practice guidelines and recommendations as seen in table 4.17. This will keep the ICU nurses well informed which will lead to current practices in pain management according to EBP. In addition to the pain related topics that are offered in the ICU, the facilitators should ensure a practical learning session where case studies can be utilized every now and then to score pain. Thus an integration of theory then examples of pain assessment and management cases of patients and even take away assignments and discussions so that pain is also an extremely important priority in the units most of the times. This also includes pain workshops, training and conferences and may be used for clinical evaluations for ICU nurses.

- From the current research findings of this study, there was a significant difference in the use of a pain assessment tool for patients able to self-report (72.1%, n=57 compared to patients who cannot self-report (52%, n=40). There was also a clear indication of less awareness of the pain assessment tools for patients who cannot self-report to those who can self-report. Majority (74.7%, n=59) nurses had received pain education related topics for instance pain assessment tools and guidelines. However, very few (4%-18.9%) used a specific internationally recognized pain assessment tool for patients unable to report. It is therefore recommended that pain education also focus on the current pain assessment tools that are internationally recognised as valid and reliable. These are the Behavioural Pain Scale and the Critical –Care Pain Observation Tool.

5.6.3 Recommendations for Further Research

From the research findings, nurses were more competent and confident in pain assessment of critically ill patients who are able to self-report compared to those who cannot (p=0.0001). This is in regards to the pain assessment tools and other pain assessment practices. Furthermore no other studies were found to have been conducted in South Africa on Knowledge and current practices of pain in the critically ill patient. This may be considered a platform for the researcher's Doctor of Philosophy (PhD) for a bigger study, using an intervention study for the pain guidelines, protocols and tools for ICU practice.

Since this study was a quantitative research, a qualitative or mixed method approach may be used in future research to get an in-depth view of pain assessment for critically ill patients among ICU nurses caring for them. An observation study may be applied in future studies as may expound the understanding of pain assessment, management, practices, barriers and enablers in ICU. In addition, the study respondents were only ICU. Future research may include patients in the study to understand and compare responses of both patients and nurses in ICU. Furthermore, doctors may also be included in future research since a multi-disciplinary approach to pain assessment and management is highly encouraged.

Since the study was done in one academic public sector hospital, future studies may consider conducting the study in other public health institutions and or private sector of a

larger sample size of ICU nurses of hospitals in South Africa to support findings of this study.

Being the first time to use the data collection instrument in South Africa, further research can use the same instrument to enhance its reliability and validity.

5.6.4 Recommendations for the Institution

From the study findings, the ICU nurses have a lot of basic needs in regards to knowledge that is required to be enhanced by further looking into pain assessment and management in ICU in order to improve patient outcome. There is need for capacity and team building in terms of pain management by further and regular staff training, putting a policy on regular professional development on pain related topics every six months to a year, increased ICU pain consultations, more involvement in ICU/pain conferences, seminars and workshops. This will keep the nurses updated with current Evidenced Based Practice.

In conclusion of this research report, this chapter has provided a summary of the study, a presentation of main findings of the study, the conclusion and recommendations of the study. From the research findings, there is a disparity between pain assessment for patients able to self-report and those unable to self-report. The recommendations outlined based on the research findings may open channels of addressing the limitations that have been long present in pain assessment and management for critically ill patients in ICU.

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APPENDIX A

QUESTIONNAIRE

PAIN ASSESSMENT AND MANAGEMENT FOR THE CRITICALLY-ILL

Are you currently practicing as a nurse in an adult ICU?

Yes →We value your response	No→please return the questionnaire uncompleted in the envelope provided

The following questions relate to patients ABLE to communicate verbally or via other means

1. In your opinion, who provides the most accurate rating of pain intensity? (Please select only one response

Doctor	Nurses	Patients	Relatives

2. Do you use pain assessment tool for patients able to communicate?

Yes	No

If **YES** please identify the tool(s) **<u>you</u>** currently use (indicate all that apply)

(Examples of pain scales can be found at the end of the questionnaire for you to consult)

2.1 0-10 Numerical rating scale (NRS)	2.2. Face scale
2.3 Visual Analogue Scale (VAS)	2.4 McGill Pain Questionnaire (short form)
2.5 Verbal Rating Scale (VRS)	2.6 Brief pain inventory (Wisconsin)
2.7 Other (Please identify)	

3. How **frequently** do you use a pain assessment tool for patients **ABLE** to self-report	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%0**	**Often (51-75%)**	**Routinely (>75%)**

3B. If you do NOT use a pain assessment tool, please describe your method of assessing pain for patients able to self-report_____

_____

4. In your opinion, how **important** is a pain assessment TOOL (e.g. Numerical rating score)?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**

5. How **frequently** do you assess **AND** document pain for a stable patient **ABLE** to report pain?

<Q1H	>Q1H-<4QH	>Q4H-<Q8H	Once Q12H shift	Never	PM only

6. In your opinion, how important are **frequent** assessment and documentation of pain in patients **ABLE** to communicate?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**

The following questions relate to patients **UNABLE** to communicate verbally or via other means

7. In your opinion, who provides the most accurate rating of pain intensity? (Please select only one response

Doctor	Nurses	Patients	Relatives

8. Do you use pain assessment tool for patients **UNABLE** to communicate?

Yes	No

If **YES** please identify the tool(s) **<u>you</u>** currently use (indicate all that apply)
(Examples of pain scales can be found at the end of the questionnaire for you to consult)

8.1 Adult Non-Verbal Pain Scale (NVPS) (Ohdner)	8.2 Pain Behavior Assessment Tool (PBAT) (Puntillo 2004)
8.3 Behavioral Pain Scale (BPS) (Payen)	8.4 Behavioral Pain Rating Scale (BPRS) (Mateo)
8.5 PAIN Alogarithm (Puntillo, 1997)	8.6 Critical-Care Pain Observation Tool (CPOT) Gelinas
8.7 Checklist of non-verbal Pain indicators (CNP) Feldt)	8.8 Other (Please Identify)

9. How **frequently** do you use a pain assessment tool for patients **UNABLE** to self-report	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%0**	**Often (51-75%)**	**Routinely (>75%)**

10. If you do **NOT** use a pain assessment tool, please describe your method of assessing pain for patients unable to self-report_____
_____

11. In your opinion, how **important** is a pain assessment TOOL (e.g. behavioral pain score)? For patients who are **UNABLE** to communicate	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**

12. How frequently do you assess AND document pain for a stable patient UNABLE to report pain?

<Q1H	>Q1H-<4QH	>Q4H-<Q8H	Once Q12H shift	Never	PM only

13. Which of the following behaviors do you consider indicators of pain?	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%)**	**Often (51-75%)**	**Routinely (>75%)**
a. Closing eyes					
b. Rigidity					

c. Vocalization						
d. Brow lowering/Frowning						
e. Fighting						
f. Ventilator/activation of alarms						
g. Splinting						
h. Grimacing						
i. Wincing						
j. Clenching						
k. Sighing						
l. Slow cautious movements						
m. Retraction of upper limbs						
n. Trying to climb out of bed						
o. Repetitive touching of area of body						
p. Pulling of ET tube						
q. Striking staff						
r. Attempting to sit up						
s. Thrashing limbs						
t. Resistance to passive movements						
u. Not following commands						
v. Withdrawing						
w. Guarding						
x. Restlessness						
y. Arching						

13B. Please identify other behaviors you feel are indicative of pain (Optional

_____

_____

14. In your opinion, how **important** are **frequent** assessment and documentation of pain in patients **UNABLE** to communicate?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**

15. **A.** In your opinion, how **important** are physiological indicators (e.g. tachycardia) for assessment of pain?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**

15**B**. Please identify physiological indicators you feel are indicative of pain: (Optional)

_____

The following questions relate to pain assessment practices for **ALL** critically-ill patients

16. How **important** is assessment of pain for the following classifications of ICU patient?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**
a. Post-operative ICU patient					
b. Medical (non-surgical) ICU patients					
c. Patients with a GCS<8					
d. Trauma ICU patients					
e. Burn ICU patients					
f. End-of-life ICU patients					
g. Patients receiving sedatives					

17. How **important** is assessment of the need for pre-emptive analgesia prior to following procedures?	**Not at all important**	**Minimally important**	**Somewhat important**	**Moderately important**	**Extremely important**
a. Patient repositioning					
b. Endotracheal suctioning					
c. Wound care					
d. Drain removal					
e. Invasive line placement					
f. Spontaneous breathing (weaning trial)					

18. How **frequently** do you assess the need for pre-emptive analgesia prior to the following procedures?	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%)**	**Often (51-75%)**	**Routinely (>75%)**
a. Patient positioning					
b. Endotracheal suctioning					
c. Wound care					
d. Drain removal					
e. Invasive line placement					
f. Spontaneous breathing (weaning0 trial					
19. How **frequently** is pain management discussed during nurse-nurse report?					
20. How **frequently** are pain scores discussed during nurse-nurse report?					
21. How **frequently** is pain management and pain scores discussed during medical rounds?					

22. How **frequently** do doctors write orders for analgesia targeted to a pain score or other assessment parameters?					

23. To your knowledge, what are the consequences of unrelieved pain? (Optional)_____
_____

BARRIERS to PAIN ASSESSMENT and MANAGEMENT

24. Please score each item as to the **frequency** that they affect **<u>your</u>** ability to **assess** and **manage** pain.	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%)**	**Often (51-75%)**	**Routinely (>75%)**
a. Nursing Workload					
b. Lack of availability of pain assessment tools					
c. Lack of education/ familiarity with assessment tools					
d. Patient instability e.g. unstable hemodynamics					
e. Patient inability to communicate					
f. Lack of protocols/guidelines for pain assessment					
g. Low priority of pain of pain management by ICU team					
h. No designated area of charting pain					
i. Sedation interfering with pain management					
j. Poor documentation of pain assessment and management					
k. Poor communication of pain and analgesic management priorities with the ICU team					
l. Lack of protocol/ guidelines for pain management					
m. Insufficient analgesia dosage prescribed					

n. Other (Please identify)_____

o. Other (please identify)_____

p. Other (please identify)_____

25. Please identify the **frequency** with which	**Never (0%)**	**Seldom (1-25%)**	**Sometimes (26-50%)**	**Often (51-75%)**	**Routinely (>75%)**

the following **ENABLE** delivery of effective pain practices					
a. Pain assessment and management is unit priority					
b. Enthusiastic and motivated staff					
c. Standardized assessment tools are in use					
d. Protocols and guidelines are in use					
e. Doctors prescribe adequate doses of analgesia					
f. Ongoing education in pain provided					
g. Advanced practice nurse(s) are employed in ICU					
h. Hospital pain service consults in the ICU					

i. Other (please identify)_____

j. Other (please identify)_____

k. Other (please identify)_____

PAIN EDUCATION

26. **A**. Have you read the Society of Critical care Medicine Guidelines for the management of Sedation and analgesia	yes	No	Unsure

27. Have you received education on the following topics during you professional development as a critical care nurse?

a. Pain Physiology mechanisms	yes	No	Unsure
b. Pain assessment methods and tools in the critically ill patient	yes	No	Unsure
c. Physiological consequences of unrelieved pain	yes	No	Unsure
d. Psychological consequences of unrelieved pain	yes	No	Unsure
e. Painful conditions and procedures	yes	No	Unsure
f. Pharmacological pain management/strategies	yes	No	Unsure
g. Non-pharmacological pain management/strategies	yes	No	Unsure
h. Practice recommendations/ guidelines	yes	No	Unsure

	Not at all satisfied	Minimally satisfied	Somewhat satisfied	Moderately satisfied	Extremely satisfied
28. if you did receive professional development education related to pain for the critically-ill, how satisfied were you					

DEMOGRAPHIC DATA

29. How many years of experience do you have as a registered nurse?

<2years	>5-10years
2-5 years	>10years

30. How many years of experience do you have as a critical care nurse (practicing in ICU)?

<2years	➢ 5-10years
2-5 years	>10years

31. Qualifications (Tick what applies)

Diploma	Degree

32. Employment status

Full-time	Part-time	Casual

33. Usual shift rotation

Day	Night

34. Please identify the primary specialty of the ICU type in which you are most experienced

Surgical only	Cardiovascular	Burns
Medical only	Neuroscience	Trauma

Combined ICU (e.g. medical/ surgical/Trauma) Please identify combined specialties _____

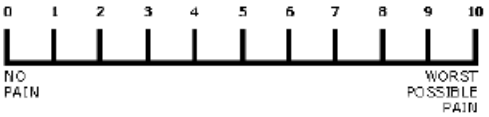
Please tick of would like to be emailed a copy of the summary results and provide your email contact address_____

THANK YOU VERY MUCH for taking the time to complete the questionnaire.
To assist us with reporting study findings please take the time to ensure you have answered all the questions

APPENDIX B

Pain Scale Tools for Patients *Able* to Self-Report Pain

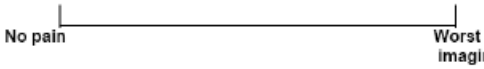
Numerical Rating Scale (NRS)



Verbal Rating Scale (VRS)

Pain Scale	Description
0	No Pain
1	Mild Pain
2	Moderate Pain
3	Severe Pain

Visual Analog Scale (VAS)



FACES Scale

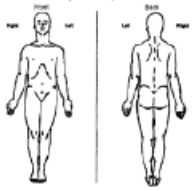


Brief Pain Inventory (Wisconsin)

1. Throughout our lives, most of us have had pain from time to time (such as minor headaches, sprains, and toothaches). Have you had pain other than these everyday kinds of pain during the last week?

☐ Yes ☐ No

2. On the diagram, shade in the areas where you feel pain. Put an X on the area that hurts the most.



3. Please rate your pain by circling the one number that best describes your pain at its *worst* in the last week.

0 1 2 3 4 5 6 7 8 9 10

No Pain — Pain as bad as you can imagine

4. Please rate your pain by circling the one number that best describes your pain at its *least* in the last week.

0 1 2 3 4 5 6 7 8 9 10

No Pain — Pain as bad as you can imagine

5. Please rate your pain by circling the one number that best describes your pain on the *average*.

0 1 2 3 4 5 6 7 8 9 10

No Pain — Pain as bad as you can imagine

6. Please rate your pain by circling the one number that tells how much pain you have *right now*.

0 1 2 3 4 5 6 7 8 9 10

No Pain — Pain as bad as you can imagine

7. What treatments or medications are you receiving for your pain?

McGill Pain Questionnaire (short-form)

SHORT-FORM McGILL PAIN QUESTIONNAIRE
RONALD MELZACK

PATIENT'S NAME: _____ DATE: _____

	NONE	MILD	MODERATE	SEVERE
THROBBING	0	1	2	3
SHOOTING	0	1	2	3
STABBING	0	1	2	3
SHARP	0	1	2	3
CRAMPING	0	1	2	3
GNAWING	0	1	2	3
HOT-BURNING	0	1	2	3
ACHING	0	1	2	3
HEAVY	0	1	2	3
TENDER	0	1	2	3
SPLITTING	0	1	2	3
TIRING-EXHAUSTING	0	1	2	3
SICKENING	0	1	2	3
FEARFUL	0	1	2	3
PUNISHING-CRUEL	0	1	2	3

NO PAIN — WORST POSSIBLE PAIN

PPI

0 NO PAIN
1 MILD
2 DISCOMFORTING
3 DISTRESSING
4 HORRIBLE
5 EXCRUCIATING

© R. Melzack, 1984

APPENDIX C

Pain Scale Tools for Patients *Unable* to Self-Report Pain

Adult Nonverbal Pain Scale (Ohdner)

Categories	0	1	2
Face	No particular expression or smile	Occasional grimace, tearing, frowning, wrinkled forehead	Frequent grimace, frowning, wrinkled forehead
Activity (Movement)	Lying quietly, normal position	Seeking attention through movement or slow, cautious movement	Restless, excessive activity and/or withdrawal reflexes
Guarding	Lying quietly, no positioning of hands over areas of body	Splinting areas of the body, tense	Rigid, stiff
Physiologic I (Vital Signs)	Stable vital signs (no change in past 4 hrs)	Change over past 4 hrs in any of the following: SBP >20 mm HG, HR >20/min, RR >10/min	Change over past 4 hrs in any of the following: SBP >30 mm HG, HR >25/min, RR > 20/min
Physiologic II	Warm, dry skin	Dilated pupils, perspiring, flushing	Diaphoretic, pallor

Behavioural pain Scale (BPS) (Payen)

Item	Description	Score
Facial Expression		
	Relaxed	1
	Partially tightened (e.g., brow lowering)	2
	Fully tightened (e.g., eyelid closing)	3
	Grimacing	4
Upper limbs		
	No movement	1
	Partially bent	2
	Fully bent with finger flexion	3
	Permanently retracted	4
Compliance with ventilation		
	Tolerating movement	1
	Coughing but tolerating	2
	Ventilation for most of the time	
	Fighting ventilator	3
	Unable to control ventilation	4

Pain Behaviour Assessment Tool (Puntillo, 2004)

Facial Responses	Verbal Responses	Body Movement
• Grimace • Frown • Wince • Eyes closed • Eyes wide open with eyebrows raised • Looking away in opposite direction of the pain • Grin/smile • Mouth wide open to expose teeth and tongue • Clenched teeth exposing slightly open mouth • None • Unable to assess • Other	• Moaning • Screaming • Whimpering • Crying • Using protest words • Verbal complaints of pain • None • Unable to assess • Other	• No movement • Rigid • Arching • Clenched fists • Shaking • Withdrawing • Splinting • Flailing • Picking/touching site • Restlessness • Rubbing/massaging • Defensive grabbing • Pushing • Guarding • Unable to assess • Other

Directions: Observe behaviours for up to 1 min, focusing on facial responses. Mark all behaviours observed.

Checklist of Non-Verbal Pain Indicators (Feldt)

Nonverbal behaviour	At rest	With Movement	Total
Vocalizations			
Grimaces			
Bracing			
Rubbing			
Restlessness			
Verbal complaint			

Behavioural Pain Rating Scale (Mateo)

Pain Behaviours	Pain Scale 0	1	2	3
Restless	Quiet	Slightly restless	Moderatley restless	Very restless
Tense muscles	Relaxed	Slight tenseness	Moderate tenseness	Extreme tenseness
Frowning or grimacing	No frowning or grimacing	Slight frowning or grimacing	Moderate frowning or grimacing	
Patient Sounds	Talking in normal tone or no sound	Sighs, groans, moans softly	Groans, moans loudly	Cries out or sobs

PAIN Algorithm (Puntillo, 1997)

Are potential pain-related behaviors present?

Movements	yes	no
No movement		
Slow, decreased, hesitant, cautious		
Restlessness		
Seeking attention through movements		
Vocalizations		
Facial Indicators		
Grimacing, frowning, wincing		
Drawn around mouth and eyes		
Teary/crying		
Wrinkled forehead		
Posturing / Guarding		
Rigid		
Splinting		
Tense, stiff		

Are potential physiological pain indicators present?

Physiological Indicators	yes	no
Increased heart rate		
Decreased heart rate		
Increased blood pressure		
Decreased blood pressure		
Increased respiratory rate		
Decreased respiratory rate		
Perspiration		
Pallor		

The Critical-care Observation Tool (CPOT) (Gelinas)

Indicator	Description	Score	
Facial expression	No muscular tension observed	Relaxed, neutral	0
	Presence of frowning, brow lowering, orbit tightening, and levator contraction	Tense	1
	All of the above facial movements plus eyelid tightly closed	Grimacing	2
Body movements	Does not move at all (does not necessarily mean absence of pain)	Absence of movements	0
	Slow cautious movements, touching or rubbing the pain site, seeking attention through movements	Protection	1
	Pulling tube, attempting to sit up, moving limbs/thrashing, not following commands, striking at staff, trying to climb out of bed	Restlessness	2
Muscle tension	No resistance to passive movements	Relaxed	0
Evaluation by passive flexion	Resistance to passive movements	Tense, rigid	1
And extension of upper extremities	Strong resistance to passive movements, inability to complete them	Very tense or rigid	2
Compliance with the ventilator (intubated patients)	Alarms not activated, easy ventilation	Tolerating ventilator or movement	0
	Alarm stops spontaneously	Coughing but tolerating	1
	Asynchrony: blocking ventilation, alarms frequently activated	Fighting ventilator	2
OR			
Vocalization (extubated patients)	Talking in normal tone or no sound	Talking in normal tone or no sound	0
	Sighing, moaning	Sighing, moaning	1
	Crying out, sobbing	Crying out, sobbing	2
Total, range			0-8

APPENDIX D

From: Louise Rose [mailto:louise.rose@utoronto.ca]
Sent: 04 March 2013 15:06
To: Shelley Schmollgruber
Cc: Shelley Schmollgruber
Subject: RE: expressed interest in research

Dear Shelley
We would be happy to grant you permission to use our survey tool. We have had several requests and are asking that our team is acknowledged in any presentations or publications that arise from use of the tool. We are also requesting copies of presentations and publications be sent to me for our records.
I would love to see a copy of your proposal and please do not hesitate to contact me if I can be of further assistance.

Kind regards
Louise

From: Shelley Schmollgruber [mailto:schmoll@iafrica.com]
Sent: Friday, March 01, 2013 2:17 PM
To: Louise Rose
Cc: shelley.schmollgruber@wits.ac.za
Subject: expressed interest in research
Importance: High

Dear Professor Rose,

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 an aspect of your work. It is entitled " Survey of Assessment and management of pain for critically ill adults. ICCN, vol. 27, pp. 121-128.

On behalf of myself and 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 late 2013 to very early 2014.

I am looking forward to your response.

Kind regards

APPENDIX E

NURSES' KNOWLEDGE RELATED TO PAIN ASSESSMENT FOR CRITICALLY ILL PATIENTS IN LEVEL I INTENSIVE CARE UNITS IN JOHANNESBURG

NURSES' INFORMATION SHEET

Dear Colleagues,

My name is Indrah Gandih I am an Intensive care nursing student, and I am currently registered for an MSc (Nursing) at the University of the Witwatersrand, Department of Nursing Education. As part of my course requirement I am expected to conduct a research project under supervision. I intend to investigate intensive care nurses' knowledge related to pain assessment of critically ill patients, with an intention of making recommendations for clinical practice and education of intensive care nurses. I would like to invite you to consent in my including you in the sample of ICU nurses. As would be interested in your viewpoints as an 'expert' or experienced intensive care nurse or nurse manager.

Should you agree to participate, I will request you to complete a self-administered questionnaire on "pain assessment and management for the critically- ill patients". I will schedule an appointment at a date and time convenient to you. The required procedures should take no longer than 15 minutes to complete.

Participation in the study is entirely voluntary. You may choose not to participate or withdraw from the study at any time. Anonymity and confidentiality are guaranteed as research codes will be used.

I appreciate that you will derive no direct benefits from participating. However, I hope that the completed study will clarify the roles and responsibilities of intensive care nurses in managing patient's pain in the adult intensive care units.

The Human Research and Ethics Committee (Chairman: Prof. Cleaton Jones (011 717 2301) and Postgraduate Committee of the University of the Witwatersrand, Gauteng, Department of Health and this Institution, Charlotte Maxeke Johannesburg Academic Hospital have approved the study and its procedures.

Thank you for taking the time to read this information letter. Should you require any more information you are welcome to contact me at the telephone numbers listed below.

Yours sincerely,

Indrah Gandih
(MSc Nursing Student-Cell 072092765

APPENDIX F

NURSES' KNOWLEDGE RELATED TO PAIN ASSESSMENT FOR CRITICALLY ILL PATIENTS IN LEVEL I INTENSIVE CARE UNITS IN JOHANNESBURG

NURSES' CONSENT FORM

_____ (Nurse's name) give permission to be included in the study.

I have read and understood the contents of the information sheet and I have been given the opportunity to ask questions I might have regarding the procedure, data collected and my consent to my being included in the study.

_____ _____

Date Signature

_____

(Witness)

APPENDIX G

APPROVAL POSTGRADUATE COMMITTEE

APPENDIX H

M130524

R14/49 Ms Indrah GM Onwong'a

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M130524

NAME: (Principal Investigator)	Ms Indrah GM Onwong'a
DEPARTMENT:	Department of Nursing Education CM Johannesburg Academic Hospital
PROJECT TITLE:	Nurses' Knowledge Related to Pain Assessment for Critically ill Patients at a Public Sector Hospital in Johannesburg
DATE CONSIDERED:	31/05/2013
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Shelley Schmollgruber
APPROVED BY:	Professor PE Cleaton-Jones, Chairperson, HREC (Medical)

DATE OF APPROVAL: 21/06/2013

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 Secretary in Room 10004, 10th floor, Senate House, University.

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**.

Principal Investigator Signature Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES

APPENDIX I

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

OUTCOME OF PROVINCIAL PROTOCOL REVIEW COMMITTEE (PPRC)

Researcher's Name (Principal Investigator)	Indrah Gandih
Organization / Institution	Department of Nursing Education, School of therapeutics, Faculty of Health Sciences
Research Title	Nurses knowledge related to pain assessment for critically ill patients at a public sector hospital in Johannesburg
Protocol number	P0307213
Date submitted	01/07/2013
Date reviewed	17/07/2013
Outcome	Approved
Date resubmitted	N/A
Date of second review	N/A
Final outcome	N/A
Date of final outcome	N/A

Provincial Protocol Review Committee (PPRC) comments:

- **Recommended**

Approves/ ~~not approves~~

Bafeng.

Dr Bridget Balafeng, PPRC: Chairperson

Date 25/07/2013

APPENDIX J

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

CHARLOTTE MAXEKE JOHANNESBURG ACADEMIC HOSPITAL

Enquiries:
Ms. L. Mngomezulu
Tell: (011): 488-3793
Fax: (011): 488-3753
02nd December 2013

Ms. Indrah Gandih
Master of Science (Nursing)
University of Witwatersrand

Dear Ms. Gandih

RE: "Nurses knowledge related to pain assessment for critically ill patients at a major public health hospital in Johannesburg"

Permission is granted for you to conduct the above research 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.

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.

Approved / ~~not approved~~

Ms. M.M. Pule
Acting Chief Executive Officer

APPENDIX K

Gill Smithies

Proofreading & Language Editing Services

59, Lewis Drive, Amanzimtoti, 4126, Kwazulu Natal

Cell: 071 352 5410 E-mail: moramist@vodamail.co.za

To	Ms I.Gandhi
Address	Wits Dept of Nursing Education
Date	27/01/20147/12/2013
Subject	Intensive Care nurses' knowledge and practices relating to pain assessment for critically ill patients
Ref	SS/gs/006

I, Gill Smithies, certify that I have proofed and language edited:

Chapters 1 to 5: Intensive Care Nurses' knowledge and practices relating to pain assessment for critically ill patients,

to the standard as required by Wits Dept. of Nursing Education.

Gill Smithies

7/12/2013