

https://dspace.org/

The knowledge, attitude and beliefs of doctors and nurses concerning neonatal pain management

Khoza, Sizakele Lucia Thembekile

2013-04-05
http://hdl.handle.net/10539/12628

Downloaded from a DSpace repository. https://dspace.org/

THE KNOWLEDGE, ATTITUDE AND BELIEFS OF DOCTORS AND NURSES CONCERNING NEONATAL PAIN MANAGEMENT

Sizakele Lucia Thembekile Khoza

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

2012

DECLARATION

I, Sizakele Lucia Thembekile Khoza, declare that this report is my own work. It is being submitted for the degree of Master of Science (Nursing) in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree in any other University.

Signature: _____

Sizakele Lucia Thembekile Khoza

_____ day of _____

Protocol Number : M091047

DEDICATION

“For God has not given us a spirit of fear, but of power and of love and of a sound mind.”
(*2Tim 1:7NKJV)*

Katlego, thank you for bringing the above scripture to reality you are such a blessing in my life son. This work is dedicated to all the neonatal patients I have had the privilege of nursing and miracle of seeing live. Especially to Jode Mmusi, whom I have had the pleasure of also mothering into the young man he is today.

ACKNOWLEDGEMENTS

My appreciation and heartfelt thanks goes to the following people:

- My mother, Fezekile Khoza for being a mother; family and friends for believing in me.
- Dr AA Tjale my supervisor and mentor for her expert advice, support and encouragement
- Professor Judith Bruce, you realised the potential and have nurtured it to fruition
- Miss Shelley Schmollguber for partnering with me at the end of this journey
- All my colleagues in the Department of Nursing Education, University of the Witwatersrand for constantly encouraging, praying and supporting me to the end
- To Dr. Rosemary Crouch and the Melon Mentorship program of the Faculty of Health Sciences without which I started this project
- All the nursing staff and doctors, who participated in this study, the time you took to listen to the presentation, complete the questionnaire and even welcome me to your wards gave me courage, thank you.
- Daniel Lopez and all the statisticians from School of Public Health, for statistical support received via the Faculty of Health Sciences Postgraduate Hub

ABSTRACT

Neonatal pain management has received increasing attention over the past four decades, along with the technological advances made in neonatal care which have increased the survival of neonatal patients. Empirical evidence confirms and acknowledges that the life-saving or life supporting procedures neonates are subjected to, during their admission into neonatal intensive care or high care facilities, are often painful. Research into the effects of neonatal pain emphasises the professional, ethical and moral, obligations by neonatal staff to manage neonatal pain effectively, in order to obtain positive patient outcomes both in the short and long term.

This study used a non-experimental, prospective quantitative survey to investigate the knowledge, attitudes and beliefs of nurses and doctors concerning neonatal pain and its management. To answer the research question posed fully a third objective was included to explore current practice on this topic. The entire population (N=150) of neonatal staff working in neonatal wards of two tertiary hospitals in Gauteng, were invited to participate in the study. The data was collected using self administration of the Infant Pain Questionnaire.

The response rate of this study was 35.33% (n=53).Data was analysed using “STATA” 12. Descriptive findings showed that, the majority of the respondents were female, from the professional nurse category, working in neonatal intensive care units with between 0 – 5 years experience in neonatal care. A significant finding was the unavailability of a pain management guideline in the neonatal units as reported on by 64% of the respondents. Despite this pain neonatal pain is recognised and treated. The main concern raised by this is the accuracy of assessment and adequacy of pain management interventions.

The neonatal staff acknowledges and empathise with neonates’ pain experience. Results from comparative analysis using a Fischer’s exact test, showed a statistically significant ($p<0.05$) association between procedural pain ratings and the beliefs held by the participants about the increased frequency of pharmacological intervention implementation on five clinical procedures. This positive attitude towards neonatal pain management is important in ensuring consistent and adequate implementation of guidelines, hence adequate treatment of neonatal pain.

A review of the pain management interventions used in the study setting showed preference for pharmacological pain management interventions for moderate to severe pain. This requires collaboration between the nurse and doctor. This finding was found to be consistent with international pain management standards. The nurses in the study also reported inadequate implementation of

non-pharmacological interventions. This method of intervention use can be enhanced with empirical evidence.

The small sample size and composition of respondents are noteworthy limitations, along with the exclusion of record review as part of this study. The main recommendation is to increase research neonatal pain management utilising existing structures in the practice, education and international resources.

TABLE OF CONTENTS

		Page
	Declaration……..	ii
	Dedication……....	iii
	Acknowledgements .....…….....	iv
	Abstract……	v
	Table of Contents…….....	vii
	List of Figures ……	xi
	List of Tables……....	xii
	Abbreviations…….....	xiii
	Key Table for Bar Graphs – Chapter 4……....	xiv
1.	**Chapter One: Orientation of the Study**.....	1
1.1	Introduction…….....	1
1.2	Background …….....	1
1.3	Problem Statement…….....	2
1.4	Study Purpose…….....	3
1.5	Study Objectives…….....	3
1.6	Significance of the Study……....	3
1.7	Definition of Study Terminology ……..	3
1.8	Overview of Research Methodology…….....	4
1.9	Conclusion …….....	4
2.	**Chapter Two: Literature Review**…….....	5
2.1	Introduction……....	5
2.2	Definition of Pain …….....	5
2.3	The Bio-Physiology of Neonatal Pain …….....	5
2.4	Neonatal Staff Knowledge, Beliefs and Attitudes …….....	6
2.5	Sources and Effects of Neonatal Pain …….....	7
2.6	Neonatal Pain Management …….....	8
2.7	Conclusion …….....	9
3.	**Chapter Three: Research and Methodology**.....	11
3.1	Introduction……....	11
3.2	Research Design …….....	11

		Page
3.3	Research Setting…….....	12
3.4	Research Methods …….....	12
3.4.1	Population …….....	12
3.4.2	Sampling Method and Sample…….....	13
3.4.3	Data Collection …….....	13
3.4.3.1	Procedure …….....	13
3.4.3.2	Instrument …….....	14
3.4.3.3	Validity and Reliability …….....	15
3.5	Data Analysis …….....	16
3.6	Ethical Considerations.…….....	16
3.7	Conclusion …….....	17
4.	**Chapter 4: Data Results**.....	18
4.1	Introduction …….....	18
4.2	Approach to Data Analysis …….....	18
4.3	Study Findings..... …….....	18
4.3.1	Section A: Demographic Data.……..	18
4.3.1.1	Neonatal Units.…….....	19
4.3.1.2	Professional Qualifications.…….....	19
4.3.1.3	Years of Experience.…….....	20
4.3.1.4	Gender.…….....	20
4.3.2	Section B: Infant Pain Questionnaire.…….....	20
4.3.2.1	Respondents' Past Pain Experience……..	20
4.3.2.2	Respondents Views on Neonatal Pain.…….....	21
4.3.2.3	Respondents Opinions about Infant Pain versus Adult Pain Intensity.....	22
4.3.2.4	Pain Management Guideline.…….....	22
4.3.2.5	Rating of Procedural Pain.…….....	23
4.3.2.6	Frequency of Use of Pharmacological Pain Management Interventions.....	24
4.3.2.7	Frequency of Use of Non-Pharmacological Pain Management Interventions.....	25
4.3.2.8	Belief about Implementation of Pharmacological Interventions.....	26
4.3.2.9	Belief about the Implementation of Non-Pharmacological Pain Management Interventions.…….....	27
4.3.2.10	Pre-Procedural Pain Management Interventions.…….....	28
4.3.2.11	Procedural Pain Management Interventions.…….....	29
4.3.2.12	Post-Procedural Pain Management Interventions.……	30

		Page
4.4	Comparative Analysis Findings……....	31
4.4.1	Demographic and Pain Management Guidelines……..	31
4.4.2	Beliefs about Neonatal Pain…….....	34
4.4.3	Neonatal Staff Attitude towards Neonatal Pain.....	34
4.4.4	Knowledge and Pharmacological Pain Intervention.....	35
4.4.5	Knowledge and Utilisation of Non-Pharmacological Pain Interventions.....	36
4.4.6	Neonatal Staff Attitude to Neonatal Pain.....	36
4.4.7	Attitudes and Utilisation of Pharmacological Pain Management Interventions.....	37
4.4.8	Attitudes towards Implementation of Non-Pharmacological Pain Management Interventions…….....	38
4.4.9	Attitudes towards Neonatal Pain. …….....	38
4.4.10	Attitudes and Pain Ratings…….....	39
4.4.11	Attitudes towards Pharmacological Pain Management Intervention.....	40
4.4.12	Attitude toward Non-Pharmacological Pain Management Intervention Utilisation.....	40
4.4.13	Beliefs about Utilisation of Pharmacological Inte5rventions for Neonatal Procedural Pain Management…….....	41
4.4.14	Beliefs about Utilisation Non-Pharmacological Interventions to Manage Neonatal Procedural Pain…….....	42
4.4.15	Current Pain Management Practice……	42
4.4.16	The Association between Pain Management Practices and Beliefs about Pain Management…….....	43
4.4.17	Non Pharmacological Interventions vs Belief Non Pharmacological Interventions.....	44
4.5	Conclusion…….....	
5.	**Chapter Five: Discussion of Study Findings, Limitations and Recommendations**…….....	45
5.1	Introduction…….....	45
5.2	Summary of the Study…….....	45
5.3	Discussion of Findings…….....	46
5.3.1	Respondent's Demographic Profile…….....	46
5.3.2	Objective 1: Neonatal Pain and Pain Management Knowledge….....	48
5.3.3	Objective 2: Attitudes to and Beliefs Held about Neonatal Pain…….....	50
5.3.4	Objective 3: Current Pain Management Practice…….....	52
5.3.5	Conclusion of the Main Findings…….....	53
5.4	Limitations…….....	53
5.4.1	Logistical Limitations…….....	53
5.4.2	The Scope of the Research…….....	53

Page

5.5 Recommendations……..... 54
5.5.1 Clinical Practice……..... 54
5.5.2 Education……..... 55
5.5.3 Research……..... 55
5.6 Conclusion……..... 55

6. **References**……..... 57

Appendix A : Information Sheet ……..…….....
Appendix B : Infant Pain Questionnaire.....
Appendix C : Approval from School of Therapeutic Sciences Post Graduate Committee.....
Appendix D : Ethical clearance certificate: Human Research Health Committee .....
Appendix E : Approval from Gauteng Department of Health: Research Committee .....
Appendix F : Letter of Permission to Collect Data from Neonatal Wards (Charlotte Maxeke Academic Hospital)……..…….....
Appendix G : Letter of Permission to Collect Data from Neonatal Doctors ……...…...
Appendix H : Letter of Permission to Collect Data from Neonatal Wards (Chris Hani Baragwanath Hospital)…….....
Appendix I : Review of Procedural Pain Management Interventions in Current use Compared to International Guidelines……...
Appendix J : Certificate from Language Editor……..….

LIST OF FIGURES

			Page
Figure 2.1	:	Diagram Summarising Research Findings on Neonatal Pain Management..	10
Figure 4.1	:	Participants' Past Pain Experience.....	21
Figure 4.2	:	Comparison of Neonatal Pain Intensity against Adult Pain Intensity.....	22
Figure 4.3	:	Respondent Knowledge of Pain Management Guidelines.....	23
Figure 4.4	:	Respondents'' Rating of Procedural Pain.....	24
Figure 4.5	:	Respondents' use of Pharmacological Pain Management Interventions.....	25
Figure 4.6	:	Respondents' use of Non-Pharmacological Pain Management Interventions.....	26
Figure 4.7	:	Respondent Beliefs about the Implementation of Pharmacological Pain Management Interventions.....	27
Figure 4.8	:	Respondent Beliefs about Implementation of Non-Pharmacological Pain Management Interventions.....	28
Figure 4.9	:	Summary of Pre-Procedural Pain Management Procedures.....	29
Figure 4.10	:	Summary of Procedural (during) Pain Management Procedures.....	30
Figure 4.11	:	Summary of Post Procedural Pain Management Interventions.....	31

LIST OF TABLES

			Page
Table 3.1	:	Part B: Infant Pain Questionnaire…….....	15
Table 4.1	:	Profile of the Respondents.....	19
Table 4.2	:	Respondent Views about Neonatal Pain.....	21
Table 4.3	:	Comparison of Respondent's Profile with The Pain Management Guidelines.....	33
Table 4.4	:	Respondents' Past Pain Experience in Relation to Beliefs about Neonatal Pain.....	34
Table 4.5	:	Respondent Attitudes towards Procedural Pain.....	35
Table 4.6	:	Respondent Professional Qualifications and Implementation of Pharmacological Interventions.....	35
Table 4.7	:	Respondent Professional Qualifications and Implementation of Non Pharmacological Interventions.....	36
Table 4.8	:	Respondents' Procedural Pain Ratings in Relation to Years Worked in Neonatal Care.....	37
Table 4.9	:	Respondent Years of Experience and Frequency of Pharmacological Pain Management Intervention Utilisation.....	37
Table 4.10	:	Respondents' Years of Experience and Frequency of Utilization of Non Pharmacological Pain Interventions.....	38
Table 4.11	:	Respondents' Gender in Relation to Pain Ratings.....	39
Table 4.12	:	Respondent Previous Pain Experience and Neonatal Procedural Pain Ratings.....	39
Table 4.13	:	Respondent Implementation of Pharmacological Pain Management Interventions in Relation to Procedural Pain Ratings.....	40
Table 4.14	:	Respondent Implementation of Non-Pharmacological Pain Management Interventions in Relation to Pain Ratings.....	41
Table 4.15	:	Respondents' Belief about Implementing Pharmacological Interventions to Manage Neonatal Procedural Pain.....	41
Table 4.16	:	Respondent Beliefs about Utilising Non-Pharmacological Pain Interventions for Neonatal Procedural Pain.....	42
Table 4.17	:	Respondent Differences in Pain Management Interventions.....	43
Table 4.18	:	Influence of Respondent Beliefs on Pharmacological Pain Management Interventions.....	43
Table 4.19	:	Influence of Respondent Beliefs on the Implementation of non Pharmacological Interventions.....	44

ABBREVIATIONS

KEY TABLE FOR BAR GRAPHS – CHAPTER 4

Procedure	**Procedure**
1. Endotracheal intubation	ETT intubation
2. Insertion of a chest tube	Insertion of CT
3. Insertion of a feeding tube	Insertion of FG
4. Tracheal suctioning	Suction
5. Lumbar puncture	LP
6. Intramuscular injection	IM
7. Insertion of umbilical catheter (arterial/ venous)	Insertion of UAL
8. Insertion of peripheral intravenous	Insertion of IV
9. Heel stick/ Heel prick	Heel prick
10. Insertion of radial arterial line	Insertion of RAL

CHAPTER ONE

ORIENTATION TO THE STUDY

1.1 INTRODUCTION

In the era of humanitarianism, human rights demand attention, beginning with the unborn child to a dying elderly patient. In holistic nursing care these rights translate to compassionate care focused on interventions that bring comfort to the patient. Comfort is required in response to distress. Distress in this study is a result of neonatal pain. The next five chapters are empirical inquest into neonatal pain and its management. Chapter one presents an overview of the study, beginning with a detailed background of the study derived from the researcher's clinical experience and current literature on neonatal pain management; the statement of the research problem; an explanation of the purpose and objectives of this study; a discussion into the motivation and significance of the study; a description of the context and the research methodology.

1.2 BACKGROUND

Over the past four decades, research articles on neonatal pain and its management have inundated nursing literature, sparking a renewed interest in the topic. Advances in health technology which resulted in the increased survival of neonatal patients, have generated this interest. Furthermore, research into the bio-physiological and psychological aspects of human pain led to the acknowledgement; that the life saving or life -supporting procedures neonates experience during their admission into neonatal intensive care or high care facilities induce pain (Johnston, Stevens, & Craig et al., 1993; Granau, Whitfield, & Petrie et al., 1994 Anand, Coskun, & Thrivikraman et al., 1999;). Although pain is considered to have protective functions, however, evidence exists to confirm that untreated or ineffectively treated pain has both short and long term negative effects on the health of the neonate. Amongst these are the development of complications such as intracranial haemorrhage, decreased immune response, delayed weight gain, prolonged hospitalisation, impaired neonate-parent bonding and the development of psychosomatic conditions such hyperalgesia and allodynia (Walker & Howard, 2002; Sharek, Powers, Koehn & Anand, 2006; Walker, Franck, Fitzgerald, et al., 2009). The changing trends in healthcare incorporated social changes, which emphasise human rights and holistic health care which demanded that all patients receive humane treatment thus challenging effective pain management decisions professionally, ethically and morally.

In response, the neonatal staff from Canada, United States of America, Europe and Australia, formed national and international collaborations to develop research based best practice guidelines to inform effective neonatal pain management (International Evidence-Based Group for Neonatal Pain, 2001; NEOPAIN, 2004; Epidemiology of Neonatal Procedural Pain, 2008). These guidelines advocate for the use of validated neonatal assessment tools. They provide options of scientifically approved interventions to prevent alleviate and treat neonatal pain. Further, these guidelines are instruments to educate and train all neonatal caregivers (nursing, medical, pharmaceutical staff and parents) on pain management (McKechnie & Levene, 2008). Evaluation of the impact of neonatal pain guidelines, in the form of studies conducted on the utilisation and adherence by neonatal staff to guidelines revealed that gaps between theory development and practice still exist with negative consequences for pain management **(**McLaughlin, Hull & Edwards et al., 1993; Porter, Wolf, Gold, Lotsoff & Miller, 1997; Rouzan, 2001; Andersen, Greve-Isdahl & Jylli, 2007; Gradin & Eriksson, 2008**)**. The lack of appropriate knowledge on neonatal pain and the attitudes and beliefs held by neonatal staff about pain were some of the factors identified as contributing to inadequate pain management in neonates. These studies concluded that the implementation of guidelines in managing neonatal pain was influenced by the knowledge, beliefs and attitudes of neonatal staff.

1.3 PROBLEM STATEMENT

Despite the value of clinical guidelines, the researcher has observed the absence of written pain management guidelines. Pain assessment in the absence of guidelines appeared to be an intuitive exercise based on individual healthcare practitioners' identification and interpretation of the infant's signs of pain. Similarly, pain management or pain relief interventions are largely pharmacologic and subject to the prescriber's knowledge of and experience with the available analgesics. The fast-paced, life saving nature of an neonatal intensive care unit is largely focused on restoring and maintaining the lives of high risk critically ill neonatal patients such that neonatal pain appeared to be a last priority need and received little or no attention.

The researcher's search for possible reasons generated anecdotal evidence, suggesting that neonatal staff is not convinced of the significance of neonatal pain. This posed several questions such as whether a neonate in the care of neonatal staff who do not acknowledge its pain and without a guide to pain management, would have its pain identified and attended to. The starting point for this research was therefore the identification of current practice in neonatal pain management and its main aim was to answer the question: what are the beliefs and attitudes and knowledge of neonatal staff concerning neonatal pain management?

1.4 STUDY PURPOSE

The purpose of this study was to review current practice in neonatal pain management and describe the knowledge, beliefs and attitudes of neonatal staff on neonatal pain management in Gauteng hospitals.

1.5 STUDY OBJECTIVES

The objectives of this study were to:

Describe the knowledge of nurses and doctors on neonatal pain

Examine the attitude and beliefs of nurses and doctors regarding neonatal pain

Explore current neonatal pain management strategies

1.6 SIGNIFICANCE OF THE STUDY

Holistic nursing care places the patient at the centre of health care delivery and health care practitioners have an obligation to optimise patient outcomes. It is clear that effective pain management begins with acknowledging pain, in this case that of the neonate. In a local study, Tjale (2007) observed that in order for the health practitioner to render care addressing neonatal pain, a connection needed to occur between the practitioner and the infant. An inventory of the common neonatal pain management strategies currently utilised may provide means to render patient centred care. It is envisaged that a description of health practitioner factors influencing neonatal pain management will add to the body of knowledge in this area. Empirical data generated in this study may serve as a platform for the collaborative development of a research based pain policy to guide neonatal staff through neonatal pain management in the research settings and possibly more widely.

1.7 DEFINITION OF STUDY TERMINOLOGY

The following terms used consistently throughout the report were defined within the context of the study:

Neonate – infants born before 37 weeks of gestation and up to 30 days post delivery

Neonatal procedural pain – includes acute and chronic pain induced and experienced as a result of the named procedures (Porter et al, 1997; Simons, van Dijk & Anand et al., 2003; Dodds, 2003; Carbajal, Rousset & Danan et al., 2008)

Clinical procedures – in this study this term refers to list of pain inducing procedures performed on neonatal patients as listed in the Infant Pain Questionnaire (Question B 6 -13)

Neonatal pain management – assessment of neonatal pain and neonatal pain management techniques (pharmacologic and non pharmacologic)

Doctors – Medical personnel registered with Health Professionals Council of South Africa: consultants, Registrars, and interns

Nurses – Persons registered as professional nurses and enrolled nurses with the South African Nursing Council

Neonatal staff – Combinative term for nurses and doctors working in neonatal wards

Beliefs – personal opinion regarding fact as true or right with or without formal knowledge or proof (Reyes, 2003)

Pharmacological pain management interventions – Medication or drugs (Schedule 2 – 7) administered to reduce or relieve painful stimuli as a result of the identified clinical procedures**.** In this study these are: Pancuronium; Morphine; Midazolam; Diazepam, Fentanyl, Paracetamol, Codeine and Topical anaesthetics

Non-pharmacological pain management interventions – The use of the following therapeutic actions to reduce painful stimuli; oral sucrose administration, swaddling, non-nutritive sucking, breastfeeding and Kangaroo care.

Attitude – behaviour influenced by opinion (McLaughlin et al., 1993; Porter et al., 1997; Dodds 2003; Reyes 2003; Andersen et al., 2007)

Knowledge – formal or informal education guiding practice *(Bellini & Damato, 2009)*

1.8 OVERVIEW OF THE RESEARCH METHODOLOGY

"Research methodology refers to the plan or blueprint used to guide the conduct of a study in such a manner as to maximize control over factors that could interfere with the studies desired outcome (Burns & Grove, 2006:47)". This includes the design and method of the study. A non experimental, quantitative, descriptive, cross-sectional survey was adopted for this study. The respondents, neonatal nurses and doctors allocated to neonatal wards at two tertiary academic hospitals in Gauteng, were invited to voluntarily complete the self-administered Infant Pain Questionnaire.

1.9 CONCLUSION

This chapter introduced the study with the discussion of the background and researcher clinical experience which resulted in the conduct of this research and production of the report. The language used in the study was explained. A brief outline of the research methodology concluded the chapter. Chapter 2 will expand on some of the literature used in Chapter 1 to inform the study. Additional empirical data on neonatal pain and its management will be discussed in detail.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Beginning with a definition of the phenomenon under study, this chapter will present a review of the scientifically generated body of knowledge on pain, especially infant pain. The differing views that have guided pain management in neonatal wards are explored with successes and challenges noted. The argument of the significance of nurses' and doctors' knowledge about pain and its management, how this affects their beliefs and subsequently their attitudes as to how they will assess, treat and evaluate pain in neonatal patients are discussed in this chapter.

2.2 DEFINITION OF PAIN

The International Association for the Study of Pain defines pain "as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage" (Merskey, Albe-Fessard & Bonica et al., 1979:250).The interpretation and experience of pain is subjective, based on an internal construct of pain through the encountered injury and is reported by the person suffering from the pain (Ballweg, 2007). The American Academy of Pediatrics (AAP, 2000) acknowledges that this may limit the neonates' ability to conform to this definition of pain, as neonates do not have the conventional verbal means to report pain. Therefore neonatal patients depend on neonatal staff to assess, recognise, diagnose and manage their pain. In order to do so, neonatal staff needs to have special knowledge and understanding of neonatal physiologic and behavioural responses to pain and relevant interventions to relieve pain. Knowledge and understanding of neonatal pain begins with awareness that neonates do indeed experience pain.

2.3 THE BIO-PHYSIOLOGY OF NEONATAL PAIN

Research into neonatal pain has addressed and in some cases reversed misconceptions about neonatal patients' ability to perceive process, respond to and recall pain (Johnston et al., 1993; Granau et al., 1994; Johnston, Stevens & Yang et al., 1995; Anand, Coskun & Thrivikraman, et al., 1999). In their historical study, Johnston et al. (1995) established that neonates perceive pain based on nociception developed in utero before the age of 24 weeks. The concept of nociception was later confirmed by Diedericks (2006), more than a decade later. The perceived pain stimulus is transmitted slowly from the periphery to the brain over non-myelinated nerve fibres before the age of 30 weeks and faster over myelinated nerve fibres beyond 30 weeks gestation (Johnston et al., 1995; Evan, 2001; Walker & Howard, 2002). These studies found

that the nociceptive sensation was widely distributed in the brain in the absence of an identifiable “brain centre”, and initiated the release of catecholamines and cortisol resulting in a variety of physiological responses to pain, for example, tachycardia, tachypnoea, desaturation, hypertension and hyperglycaemia.

In addition neonatal patients displayed the inability to differentiate between touch and pain stimuli. Hummel and Puchalski’s (2001) research into this phenomenon revealed that this was linked to the close proximity between the neonates’ pain and touch receptors. Based on the above evidence, Ballweg (2007) concluded that the unavailability of descending inhibitory neurotransmitters to modulate pain meant that neonatal patients experienced pain more intense than adults or paediatric patients. Golinau, Krane and Galloway et al. (2000) conducted research to investigate pain pathways resulting in retention of the pain perception on neonatal rat pups found that the pain memory was entrenched in the thalamus, a finding extended to premature infants.

2.4 NEONATAL STAFF KNOWLEDGE, BELIEFS AND ATTITUDES

The existing knowledge, attitudes, beliefs and experiences of neonatal staff in managing neonatal pain are important. Carper in 1978 identified four patterns of knowing held in nursing: empirics, aesthetics, personal knowing and moral knowledge. Empirical knowledge is factual and descriptive. It is the direct or indirect observation and measurement representing objective, verifiable and is research-based. It aims at developing abstract and theoretical explanations. It is expressed in practice as science grounded in scientific theories and knowledge (Van der Zalm & Bergum, 2000: 213).

A quantitative survey by McLaughlin et al. (1993) almost twenty years ago found that increased awareness of neonatal pain was cited as a reason for “the change in the attitude towards the subject, inadvertently resulting in increased assessment and treatment of postoperative pain (1993:13)”. The finding from this study suggested that positive physician attitudes predicted increased use of analgesic agents, because the participants looked, through diligent observations, for indicators of neonatal pain.

Similarly a United States study conducted by Porter et al. (1997) examining nursing and physician beliefs concerning infant pain, found that staff beliefs were informed by their personal experience of pain and substantial experience with the assessment of pain, thus staff who had experienced pain rated neonatal pain to be substantial and requiring attention. This resulted in

vigilant observation of neonatal pain, increased assessment experience and subsequently implementation of interventions to treat the pain by staff.

An additional important finding from these and other similar studies (Porter et al., 1997; Andersen et al., 2007) was a change in practice evidenced by the dissemination of scientific knowledge and documentation of appropriate pain management interventions and how these decreased neonatal morbidity and mortality. This demonstrates that neonatal staff's attitudes, beliefs and knowledge are significant in predicting and reporting the need for use of analgesic agents *(Kumar, Jim & Sisodia, 2011). Fig 2.1 on pg 15 illustrates the interrelationship between these study variables.*

2.5 SOURCES AND EFFECTS OF NEONATAL PAIN

The knowledge that neonates experience pain had an implication for the clinical settings especially in view of technological advances achieved in neonatal healthcare. This meant increased survival rates of extremely and very low birth weight infants. Neonates who have undergone major surgery for congenital malformations and those who received medical treatment for perinatal illnesses such as pneumonia are now admitted to neonatal wards and live to childhood and beyond. This survival is accompanied by various clinical procedures which form part of neonatal health care such as: endotracheal intubation to initiate and give ventilator support; insertion of an intravenous catheter to administer fluids or medication and heel pricks to obtain blood specimens for investigations. These clinical procedures induce pain and require pain management (Anand & Hall, 2008; Belliene, Iantorno & Perrone, 2009). However studies have shown that neonatal pain management remains inadequate and inconsistent (Jacob & Puntillo, 1999; Rouzan, 2001; Dodds, 2003; Reyes, 2003; Andersen et al., 2007).

The awareness of the existence of neonatal pain and its intensity involves knowledge and appreciation of the effects of pain on neonatal patient outcomes. In their study of the evaluation and development of potentially better practices to improve pain management of neonates, Sharek et al. (2006) showed that unrelieved, severe or prolonged pain may hamper the resolution of underlying disease, delay surgical recovery, increase neonatal parental stress and increase healthcare costs. Research found the long term effects of untreated or ineffectively treated pain included psychosomatic conditions such as allodynia, hyperalgesia, stress disorders, touch aversion, failure to thrive, impaired parent-child interaction and developmental regression (Walker & Howard, 2002; Granau, Holsti & Peters, 2006; Abdulkader, Freer, & Garry, 2007; Johnston, Anand & Campbell-Yeo, 2010). To counter these

negative patient outcome findings, Duhn and Medves (2004) proved that effective pain management in neonates increased positive patient outcomes, evidenced by a decrease in hospital length of stay, as these patients experience fewer complications, display fewer incidences of infections and gain weight consistently. In the light of this information, neonatal pain management becomes an ethical and moral obligation for all neonatal staff, nurses and doctors alike.

2.6 NEONATAL PAIN MANAGEMENT

Based on available research it is important that health care professionals work as a team to establish best practice in neonatal pain management. According to the South African Scope of Practice for registered nurses (Regulation 2598 of 1984 as amended), nursing staff responsibilities are the recognition patient (neonate) need of comfort, prevent or minimise pain stimuli and advocate for pain relief when necessary and documents all interventions (Scribante, Muller & Lipman, 1995). The above was reinforced by Reyes (2003) in the findings of a study she conducted to investigate neonatal nurses management of neonatal pain. The paediatrician, paediatric surgeon or neonatologist also has the responsibility of assessing pain in the neonate and prescribing pain relief medication outside the scope of nursing prescription. Together the nurse and doctor explore appropriate and accurate indicators of neonatal pain and undertake the intervention required to ensure the optimal outcome. The pharmacist is responsible for providing information on the safe administration of pharmacologic measures. Parents are essential in providing information to confirm signs of pain and the effects of pain relief strategies.

The globalisation of healthcare has led to the formation international collaborations such as the International Evidence-Based Group for Neonatal Pain, 2001; NEOPAIN, 2004; Epidemiology of Neonatal Procedural Pain, 2008), who develop research-based standards and guidelines for neonatal pain management to ensure consistency and effectiveness. The main recommendation is that neonatal wards are required to have a written policy on neonatal pain management *(*Anand, 2001; AAP, 2000; McKechnie & Levene, 2008). The Joint Commission on Accreditation of Healthcare Organisations *Pain Standards* for 2001 states the following:

- All patients have the right to pain management
- Pain should be assessed in all patients
- Patients and their families should be educated on the pain, its effects and treatment modalities
- Healthcare facilities should have continuous evaluation of their pain management policy

Similarly, Urso, (2007) summarises the content of neonatal pain management guidelines to include the definition of pain and its assessment. Non-pharmacological and pharmacological pain prevention or treatment interventions found efficacy safe for use in neonatal patients included. Educational material to teach health care personnel the role of family in neonatal pain management is included. Urso concludes that the implementation and adherence to the guidelines may produce the desired outcome of minimising the harmful effects of neonatal pain and optimising neonatal patient outcomes.

However, it is not always true that policies translate directly into practice, as studies conducted to test the outcomes of any one of the guidelines in neonatal pain management find inconsistencies between theoretical knowledge and practical knowledge (Andersen et al., 2007; Carbajal, Nguyen-Bourgain & Armenguad, 2008 and Anand & Hall, 2008). Despite the proliferation of research on the topic, there is still very little impact on neonatal pain management in practice. Editorial reflection on neonatal pain by Anand and Hall (2008:827) concludes “neonates are still getting hurt”. Recommendations from these studies, point to the need for investigation into neonatal staff’s knowledge, attitudes and opinions concerning neonatal pain management to find out not only what, but how these health care practitioners provide care.

2.7 CONCLUSION

From this chapter it is evident that there is a need for advocating for use of written neonatal pain assessment and management guidelines in this research setting. And more importantly, is the need for neonatal staff to be aware their knowledge of neonatal pain. This knowledge can be used to self examine beliefs and attitudes towards neonatal pain and how these will affect their clinical decision-making when meeting neonates’ comfort needs.

The following chapter will discuss the research methods used to meet the purpose and objectives of the study.

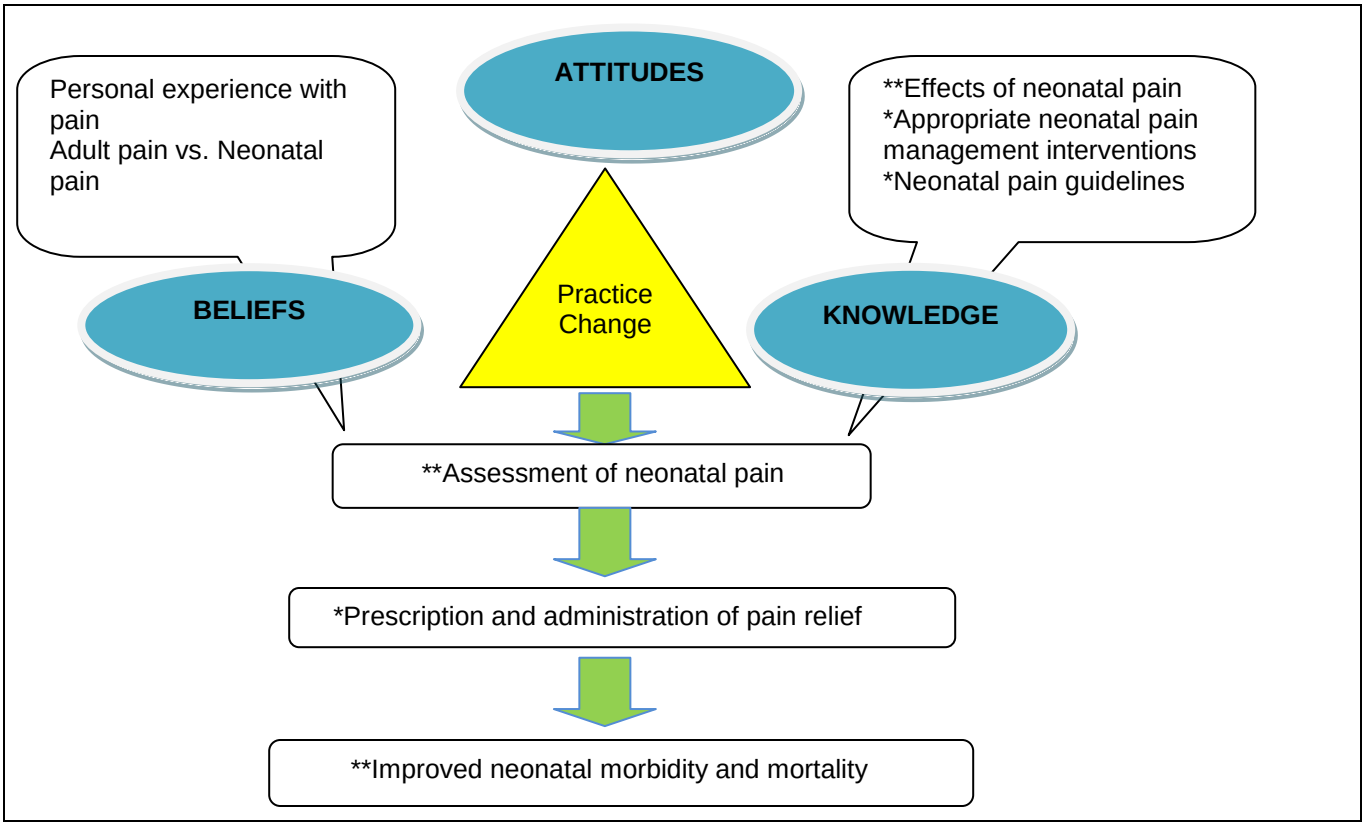


Figure 2.1: Diagram Summarising Research Findings on Neonatal Pain Management

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes in detail the design and methods used to structure and guide this study. The contextual factors of the setting are discussed; respondents and processes implemented during the data collection phase are explained; the components of the instrument used are discussed, including considerations of validity and reliability; ethical principles applied to ensure integrity of the study are explained. In concluding the chapter the approach to data analysis is introduced.

3.2 RESEARCH DESIGN

"Research design refers to the plan, or blueprint, to guide conduct of a study in such a manner as to maximize control over factors that could interfere with the study's desired outcome" (Burns & Grove, 2005:40). The focus of the design is on the aimed outcome of a study, therefore the selection of epistemic approach and paradigm must be appropriate to ensure collection of appropriate evidence to address the research problem or question. Due to the sensitive nature of the subject under investigation and level of inquiry, a non-experimental, quantitative, cross-sectional survey was adopted to address the question: what are the beliefs, attitudes, and knowledge levels of neonatal staff concerning neonatal pain management?

Creswell (2009:12) defines a quantitative approach as "one in which the investigator primarily uses post positivists claims to develop knowledge and to collect data on predetermined instruments which yield statistical data". A descriptive quantitative approach was suitable to serve the study's purpose, which was to collect information from a sample of doctors and nurses concerning neonatal pain management in order to describe the broader, generalised practice in pain management in neonatal care settings.

In order to "… describe and to interpret what is" as per the assertion by Cohen et al. 2001 (in Maree, 2009:155) a cross-sectional survey proved the most appropriate design. A survey is a formal, objective, systemic approach of enquiry, which utilises structured procedures and a formal instrument to describe, test relationships and examine the cause, and effects of interactions amongst variables in their natural setting without the introduction of an intervention, which met this study's objectives (Burns & Grove, 2005; Polit & Beck, 2008). According to LoBiondo-Wood and Haber (2006:240) a survey allows for the collection of

accurate, detailed descriptions of existing variables (knowledge, beliefs and attitudes) and the use of the data generated to justify and assess current practice (neonatal pain management) to plan for the implementation of improved forms of health care practice.

3.3 RESEARCH SETTING

The neonatal wards of two public academic hospitals in Gauteng were purposively selected for this study as they offered a full range of tertiary, secondary and specialised services. It is widely accepted that academic hospitals are at the border where theory meets practice and therefore provide an opportunity for evidence-based practice to occur. Staff employed in the neonatal wards straddles the gap between theory and practice, especially medical doctors who hold joint posts in the government and the university associated with the hospital. Medical and nursing students in the advanced stages of their undergraduate education are allocated to these wards to learn specialised skills pertaining to the care of critically neonates in these wards. These hospitals also oversee the advanced education and training of postgraduate students specialising in neonatal care. Medical staff rotates through the hospitals and wards in a similar pattern, three months per year, according to the allocation as determined by the academic institution.

In combination, these institutions' bed capacity is twenty beds in the intensive care ward and sixty in the high care wards. Critically ill neonates requiring mechanical ventilation support in addition to intensive care as a result of congenital and developmental health problems are admitted into NICU. The high care units admit infants requiring intensive care without mechanical ventilator support, i.e. following extubation with medical symptoms under control. On average, one thousand two hundred infants (1200) are admitted into these wards each month. As part of routine health care these neonatal patients are subjected to a number of the clinical procedures identified in the questionnaire.

The nursing staff in these wards is allocated patient care according to competence and expertise. The design of the work environment allows access of staff to all the procedures listed in the questionnaire. Some of the professional nurses hold a formal advanced qualification in neonatal nursing science.

3.4 RESEARCH METHODS

3.4.1 Population

At the time of the study the total number of medical and nursing staff working in the neonatal wards of the selected academic hospitals was one hundred and sixty eight (N=168). The entire

neonatal staff complement who met the inclusion criteria set for the study was invited to participate in the study. In keeping with the 1:5 doctor to nurse ratio in the health care services a disproportionate sample of one hundred and thirty six (83.00%) nurses and twenty-seven (17.00%) doctors would be representative of the population.

3.4.2 Sampling Method and Sample

To obtain a confidence level of 95%, it was calculated that a sample size comprising of 153 respondents to the self-administered questionnaire was required. In order to realise this sample size, the researcher targeted the entire population of neonatal staff allocated to neonatal wards during the collection period using non-probability purposive sampling. The application of the following inclusion criteria in the selection of the sample was to strengthen the reliability of the information, which would be collected from the respondents.

Inclusion Criteria: All categories of neonatal staff involved in neonatal healthcare delivery for longer than 3 weeks. This was to ensure that staff was involved in most of the procedures identified in the instrument.

3.4.3 Data Collection

3.4.3.1 Data collection procedure

Data was collected from nurses and doctors using a self administered questionnaire, the modified Infant Pain Questionnaire (Annexure B) .The researcher identified the total numbers of the all nurses and doctors working in the neonatal wards. One hundred and fifty (150) information letters (Annexure A) were hand delivered to all the wards by the researcher. The prospective respondents were encouraged to read and retain the information letter for reference. The researcher gave a brief presentation to most of the staff to generate interest in the study and clarify the data collection procedure.

The initial data collection period was over three months 01 March 2010 – 31 May 2010 at both institutions. Familiarity with neonatal staff at the one hospital eased accessibility and facilitated the data collection. This resulted in a relatively higher response rate obtained from the nurse professional nurse population. The Infant Pain Questionnaire was distributed 12 to 24 hours after the invitation. In the second hospital, the information letter and questionnaire were administered concurrently, following a brief presentation to an entire shift at handover. One hundred and fifty questionnaires (150) were distributed in both settings. To accommodate the work schedules of the neonatal staff, the researcher visited the wards at the beginning of the shift or after the first routine care was completed. The respondents were asked to drop the

completed questionnaire and drop it in a box that was left in the wards, by the end of their shift (10-12 hours later). To minimise agreement amongst the respondents the researcher advised respondents to set aside 10-15 minutes to complete the questionnaire in private within the setting (Maree, 2009).

The researcher emptied the box at the end of each shift. The completed questionnaires were coded and kept safe to be accessed by the researcher, supervisor upon request and the statistician.

Data collection was discontinued after 3 months, as no more questionnaires were obtainable from the sites. However, after consultation with a statistician further data collection from the medical staff was necessary in order for respondent numbers to validate data analysis and meet the objectives set for this study. The researcher returned to the locations for another month (October 2010) and targeting ten medical doctors to fulfil the statistical requirements. One more partially completed questionnaire was collected after this period.

3.4.3.2 **Instrument**

The data collection instrument used in this study was moderately adapted Infant Pain Questionnaire (Annexure B) developed by Porter et al (1997) who first used this questionnaire to collect data in their study entitled “Pain and Pain Management in Newborn Infants” (1997:626). Their study was conducted at a time when epistemic evidence of confirming that neonatal staff held the belief that neonatal patients experience procedure related pain in the same way as adult patients, was being widely disseminated. Neonatal staff who participated reported the underutilisation of pharmacologic and non-pharmacologic measures to manage neonatal procedural pain despite their beliefs that more pain management interventions should be utilised (Porter et al., 1997). An open-ended question from Dodds’, study exploring the aspects of neonatal procedural pain, its assessment and management was included to investigate respondents’ views on neonatal pain (Dodds, 2003). In order to review current neonatal pain management practice in the chosen settings the researcher added three questions based on literature review of pain management strategies. The questionnaire had two sections, each designed to elicit information related to the objectives of this study.

The first section of the modified Infant Pain questionnaire consisted of four subscales focusing on the respondents’ demographic characteristics namely: the type of neonatal unit they worked in, professional qualification, years of experience working in neonatal care and gender. The data gathered from the demographic data established population characteristics and allowed

for the conducting of comparative data analysis. This information ensured the collection of authentic, accurate and reliable data to meet the objectives of this study.

Section B of the questionnaire consisted of thirteen (13) items. The first five (5) items (Question 1-5) had nominal responses to elicit the respondents' knowledge, beliefs and attitudes concerning neonatal pain. Questions 6 – 10 were a five point Likert-type scale, the design of which is useful in measuring respondents' opinions or attitudes on a subject (Burns & Grove, 2006; Maree, 2009). In this study, the respondents rated the intensity of the pain associated with the ten identified clinical procedures and reported frequency of pain management interventions; actual or believed. Each response category was assigned a numerical value in the ascending order from 0-4: 0 being the most negative and 4 the most positive. The last three items (Question 11 – 13) required the respondents to indicate the different types of pharmacological non-pharmacological pain management interventions implemented prior to, during and after the identified clinical procedures. Table 3.1 is a summary of the items in the questionnaire and the study objective data collected would address.

Table 3.1: Part B: Infant Pain Questionnaire

Study objective/ Construct	**Question**
Knowledge	1,2,5,6
Attitudes & Beliefs	3,4,9,10
Current Practice	7,8, 11,12,13

3.4.3.3 **Validity and reliability**

The strength of quantitative research lies in the rigor of the design and the collection of data using a psychometrically sound tool. Two concepts are measured and described to illustrate rigor: validity and reliability. "According to DeVon, Block and Moyle-Wright, et al (2007:155) validity is defined as the ability of an instrument to measure the attributes of the construct under study". In this study, translational validity was established using the Trochim's, 2001 (in DeVon et al., 2007) definition, which consists of both face and content validity. Face validity refers to the language and presentation of the tool in relation to participants' context. An expert panel consisting of five nurse educators, a paediatrician and neonatal nurse administered the Infant Pain Questionnaire for review and comment. The proposal was presented in two different research expert groups and the following recommended changes were made to ensure that the questionnaire was easy to read, understandable and applicable to the South African context:

- Replacing the wording on the insertion of peripheral intravenous catheters to intravenous lines.

- Formatting of the tool for readability.

- Separation of the last three questions to specify pain relief and management pre-; during; and post procedure.

Content validity was ensured through use of a validated instrument for data collection. Table 3.1 (pg 22) illustrates that items in the Infant Pain Questionnaire would collect data which to examine all the study's constructs.

Reliability is defined as the measure of true scores and includes an examination of stability or equivalence, referring to "the instrument's ability to measure an attribute consistently" (DeVon et al., 2007: 156). Previous sample specific Crohnbach alpha (ά) coefficients calculated for the Infant Pain Questionnaire are 0.87; 0.80; 0.93; 0.82 and 0.92 in the initial administration of the instrument by Porter et al. (1997) and 0.74 – 0.93 during the instrument validation by Andersen et al. (2007) ten years later. On completion of data collection a sample sub-set of the questionnaires was pulled and used to calculate the alpha coefficient for this study which was found to range between 0.72 – 0.92 (ά < 1), indicating that the instrument has good reliability.

3.5. DATA ANALYSIS

The collected questionnaires were coded and data was captured on an excel spreadsheet. All the questionnaires were included in data analysis. Some of the questionnaires with sections missing, for example demographic data, were analysed under the relevant section. Both nominal and ordinal was analysed using STATA 12. The results of descriptive and exploratory data analysis, which identified patterns in the data, are presented in the chapter 4. Regular consultations with the statisticians were conducted to validate data collected, guide analysis and assist in the accurate interpretation of the results.

3.6 ETHICAL CONSIDERATIONS

"According to Creswell (2009) the establishment, promotion and maintenance of the ethical principles of trustworthiness, credibility and research integrity are important in research". In this study these principles were observed through the following:

- A completed research protocol was be submitted for assessment of research feasibility to the School of Therapeutic Sciences Research Assessor Group. This panel approved the study (Annexure C)

- Ethical clearance to conduct the research was obtained from the University of the Witwatersrand Human Research Ethics Committee (Medical): Annexure D.

- Letters were sent to the Gauteng Department of Health, CEO's of the identified hospitals, departmental heads (medical and nursing) and ward managers, requesting permission to collect data from staff working in neonatal wards.

- Each respondent received a letter informing them about the study (Annexure A) and invited them to participate in the study. Respondent consent to inclusion was stated explicitly at the beginning of the questionnaire (Annexure B).

- Respondent anonymity was assured by the; use of a collection box for questionnaire return and instructions to staff not to identify themselves on the questionnaire, all questionnaires were collected at the end of the shift regardless of being completed or not.

- Voluntary participation, with no penalty for not completing the questionnaire was highlighted in the information letter and by the researcher during the distribution of questionnaires.

- Questionnaires will be kept safely for the 5 year period as stipulated by the university regulations, after which they will be destroyed using a paper shredder. Access to raw data was limited to the researcher, supervisor and statistician.

- Findings of all data analyses were reported in the completed research report.

3.7 CONCLUSION

In this chapter, the blueprint used to plan and implement the research strategy was discussed as well as research ethics, including the rights of participants. In chapter four data is analysed.

CHAPTER FOUR

DATA RESULTS

4.1 INTRODUCTION

Study data were collected using the self-administered, modified Infant Pain Questionnaire developed by Porter et al. (1997). The approach to data analysis and the study findings are presented in this chapter.

4.2 APPROACH TO DATA ANALYSIS

At the end of data collection, completed questionnaires were coded according to the collection site using the abbreviations of the hospital with a random numerical order from one to fifty-three assigned. Data files were manually captured on a Microsoft Excel sheet, cleaned by a statistician and entered for analysis on the computer statistical package STATA 12. Data collected from the closed question items were analysed in the following progressive order to obtain descriptive statistics of the respondents' demographic data, followed by an analysis of the findings on their knowledge, beliefs and attitudes on infant pain and its management. Most of the measurement of data collected was nominal and ordinal .The results were presented as frequency distributions and percentages rounded off to one and two decimal points.

The calculated comparative statistics explain the association and strength of the relationship between the study variables: knowledge of neonatal procedural pain and pain management interventions, beliefs about neonatal procedural pain and attitudes towards neonatal procedural pain and pain management interventions. To facilitate item analysis some of the data categories were collapsed, prior to calculating comparative statistics. The main statistical tests employed in this study were the Fischer's exact test and Chi square analysis. A significance level of 0.05 (p=0.05) was used to determine the significance of associations and to report on the results.

All raw data were included in the analysis. Fifty-three questionnaires (n=53) were received, indicating a response rate of thirty-five (35.33%) percent.

4.3 STUDY FINDINGS

4.3.1 Section A: Demographic Data

Data collected from Section A of the questionnaire described the respondents' demographic data and included four items namely: area of work, their professional qualifications, their years

of experience working with neonatal patients and their gender. These items describe the characteristics of the respondents in relation to the study objectives and to ensure that data collected would be credible. The findings of section A are presented on Table 4.1

Table 4.1: Profile of the Respondents (n= 53)

		Frequency	**Percent %**
Level of Neonatal units	ICU	42	80.77
	H/C	10	19.23
	Total no. of respondents	52	100
Professional Qualifications	Consultant	1	1.89
	Registrar	2	3.77
	Intern	1	1.89
	Professional Nurse	47	88.68
	Enrolled nurse	2	3.77
	Total no. of respondents	53	100
Work experience (Years)	0 – 5 years	24	45.28
	6 -10 years	11	20.75
	11 – 15years	5	9.43
	16 – 20 years	8	15.09
	>21 years	5	9.43
	Total no. of respondents	53	100
Gender	Female	50	94.34
	Male	3	5.66
	Total no. of respondents	53	100%

4.3.1.1 **Neonatal units**

The differentiation of the type of unit in this study was required to ensure that the procedure-related items were sufficiently represented in the instrument. The majority of the respondents (80.77%; n=42) worked in an intensive care unit, with the remainder (19.23%; n=10) working in high care.

4.3.1.2 **Professional qualifications** (n=53)

This sub-item describes the professional profile of the respondents in this study. The majority of the respondents were professional nurses (88.68%; n=47) and minority (3.8%; n=2) were enrolled nurses. Only four (7.55%) were medical doctors in the ranks: consultant (n=1), registrar (n=2) and intern (n=1). (Refer to Table 4.1)

4.3.1.3 **Years of experience** (n=53)

Inclusion of this item was important to describe the association between level of experience and staff knowledge (cognitive and affective) of neonatal pain and its management, learnt through both academic preparation and clinical experience. Based on this an assumption was made that the years of experience in neonatal care would result in increased assessment and appropriate management of neonatal pain. Most of the neonatal staff (45.28%; n=24) had zero to five years experience in neonatal care. The least number of respondents (9.43%; n= 5) have 11 – 15 and above 21 years experience working in neonatal wards. Table 4.1 contains details of this item.

4.3.1.4 **Gender** (n=53)

The majority of respondents (94.34%; n=50) were female and the remainder (5.66%; n=3) male. Two of the males were medical doctors and one a professional nurse. Porter et al. (1997) found that male physicians who had experienced a painful procedure identified and treated neonatal pain more than the female counterparts. The inclusion of this item was related to questions in Section B where respondents indicated whether they had experienced a painful procedure.

4.3.2 **Section B: Infant Pain Questionnaire**

The data from Section B of the questionnaire were analysed using descriptive statistics to synthesise and present findings collected about nurses' and doctors' knowledge and beliefs about neonatal pain. Components of the questionnaire focused on eliciting and quantifying the respondents' beliefs and attitudes concerning neonatal pain management were on a 5- point Likert scale. These items were collapsed into three categories for rating of pain and two categories for practice (use of pharmacological and non-pharmacological pain management interventions) on the ten selected clinical procedures.

4.3.2.1 **Respondents' past pain experience** (n=46)

Close to 90% (89.13%; n= 41) of the respondents (including one doctor) reported previous pain experienced as opposed to 10.87% (n= 5) who had not. A cross tabulation of these results against the mentioned variables will be presented in the comparative statistics.

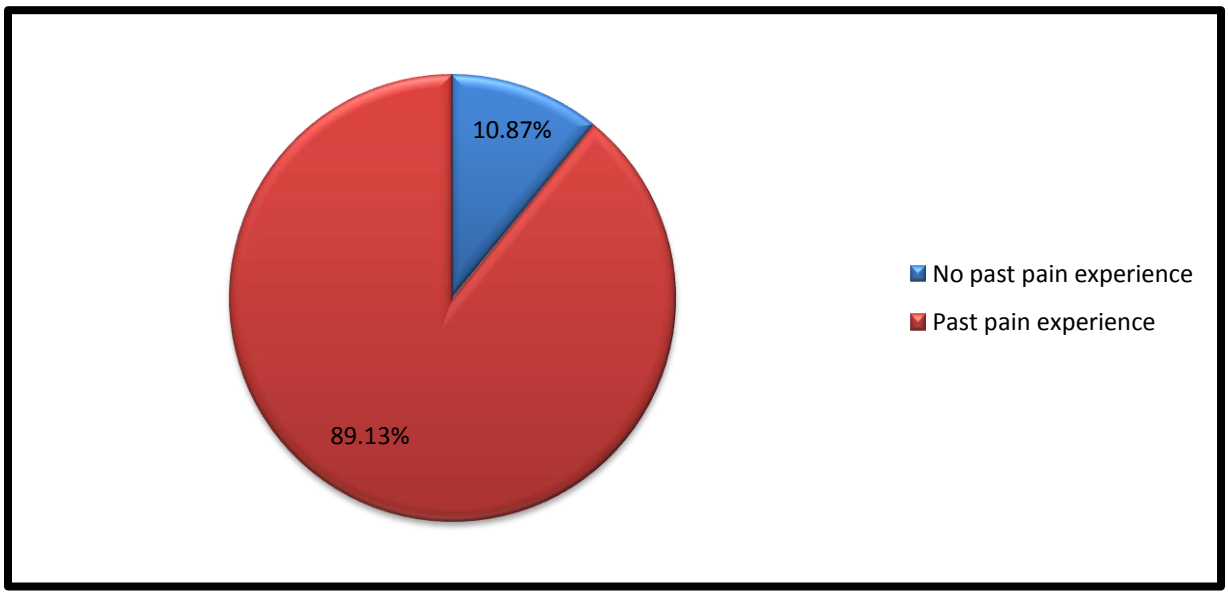


Figure 4.1: Respondents' Past Pain Experience

4.3.2.2 **Respondent views on neonatal pain** (n=52)

Table 4.2 presents the tabulated, summarised and categorised self-reported statements on neonatal pain. Respondents completed the statement "Pain in the neonate is…." (Dodds, 2003:19). The most expressed view (n=11; 21.15%) considered pain in the neonate to be a behavioural response to the ten selected clinical procedures; 13.46% (n=7) respondents described neonatal pain as a physiological change caused by a stimulus and included the identified clinical procedures. The same number of respondents (13.46%; n=7) defined neonatal pain in varying terms which incorporated caregiver and parental reactions to the neonates' expression of pain; 11.54% (n=6) paralleled neonatal pain to the clinical procedures identified in the Infant Pain Questionnaire. The minimum (5.77%; n=3) respondents considered pain in the neonate to be both the behavioural and physiological changes a neonate may experience or express when subjected to painful stimuli.

Table 4.2: Respondent Views about Neonatal Pain

Categories	Frequency	Percentage
No comment	18	34.62%
Pain described as a behavioural response to clinical procedures	11	21.15%
Pain described as a physiological response to clinical procedures	7	13.46%
Other response: Incorporate practitioner beliefs and attitudes; pain relief/ lack of	7	13.46%
Description of pain according to clinical procedures	6	11.54%
Pain described as both physiological and behavioural responses to clinical procedures	3	5.77%
	52	100%

4.3.2.3 **Respondents opinions about infant pain versus adult pain intensity**

Most of the respondents (78.85%; n=41) were consistent in their belief that neonates experienced more pain than adults by agreeing with the statement that neonates experienced more pain than adults and disagreeing with the one stating that neonates experienced less pain than adults (86.27%; n=44). In contrast 21.12% (n=11) respondents reported that they did not believe that neonates experienced more pain than adults and 13.73% (n=7) agreed that neonates experienced less pain than adults.

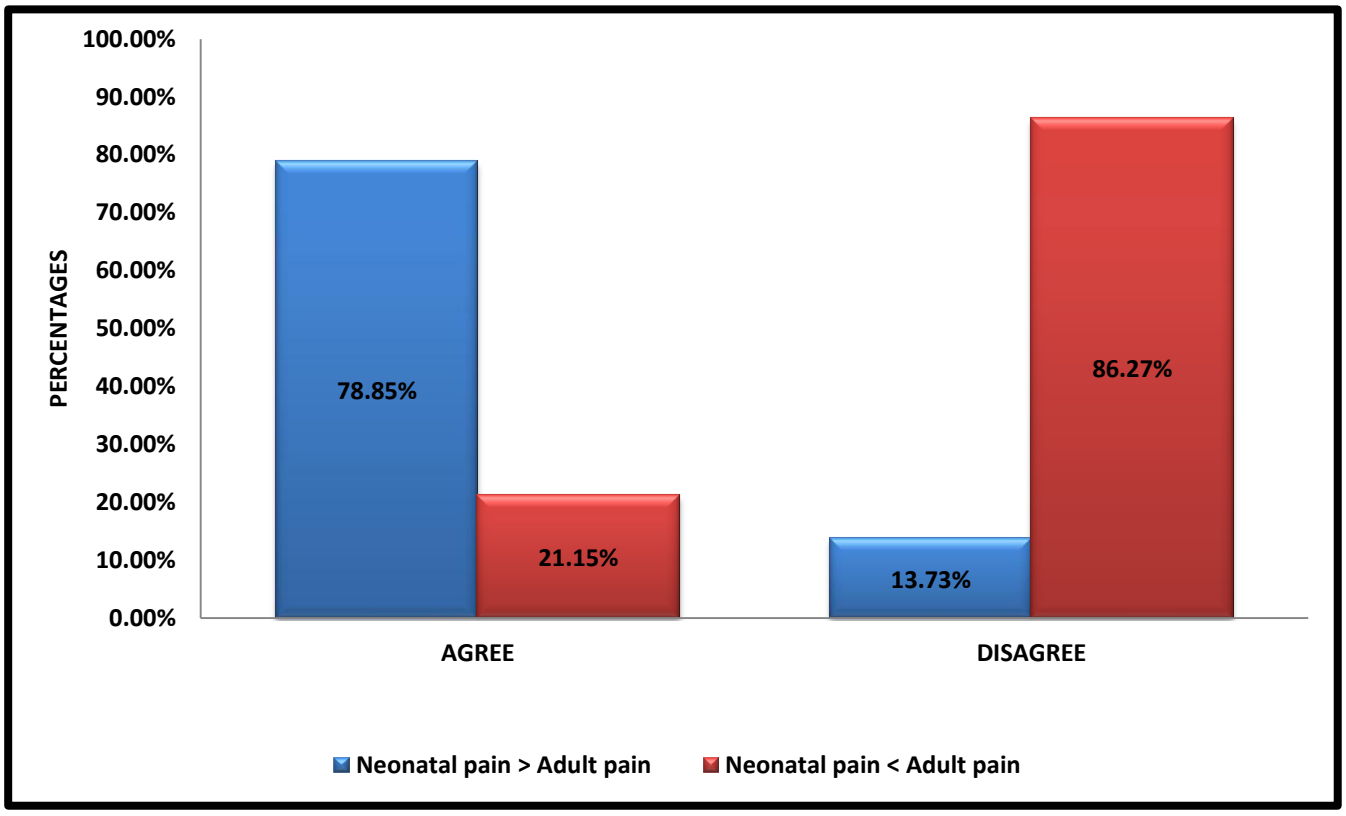


Figure 4.2: Comparison of Neonatal Pain Intensity Against Adult Pain Intensity

4.3.2.4 **Pain management guideline**

This item was included to establish current practice and hence the knowledge informing neonatal pain management in the neonatal unit. The majority of the respondents (64.00%; n=32) indicated an absence of a written pain guideline in the clinical unit they were working in and the remaining 36.00% (n=18) indicated the presence of a guideline.

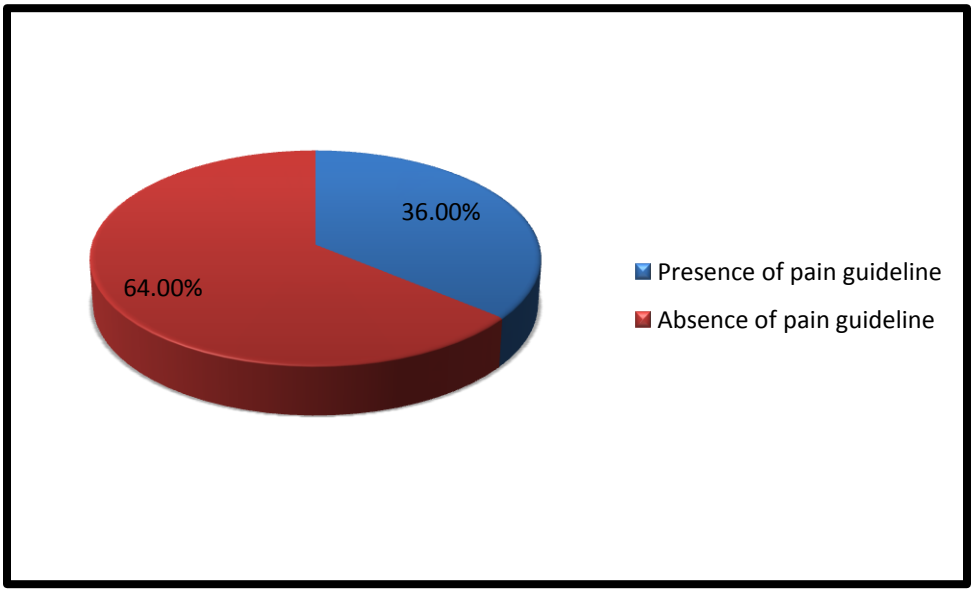


Figure 4.3: Respondent Knowledge of Pain Management Guidelines

The section to follow will present the descriptive results of the Likert scale type and multiple response questions in the questionnaire. The results are presented in graph and table form. The values on the bar graphs are rounded off to one decimal point for presentation.

4.3.2.5 **Rating of procedural pain**

The majority of the respondents (93.9%; n=46) rated the insertion of chest tube as very painful, closely followed by lumbar puncture (89.8%; n=44) and the insertion of a radial arterial line was rated the third most painful procedure by 85.7% (n=42). Most respondents (76.0%; n=38) rated the insertion of a feeding tube as moderately painful whilst 16.0% (n=8) rated the same procedure as painless. The results are presented in Figure 4.4.

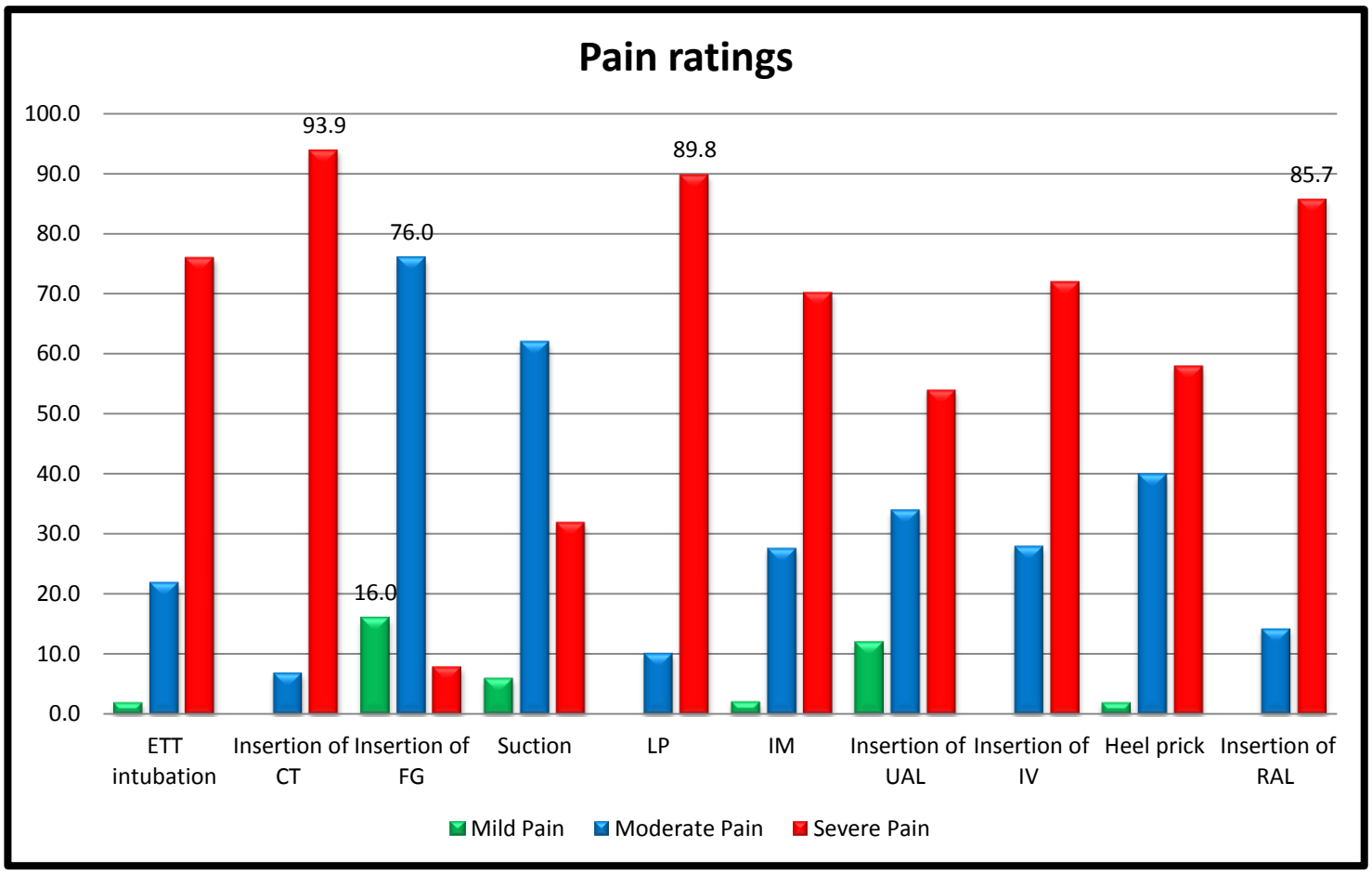
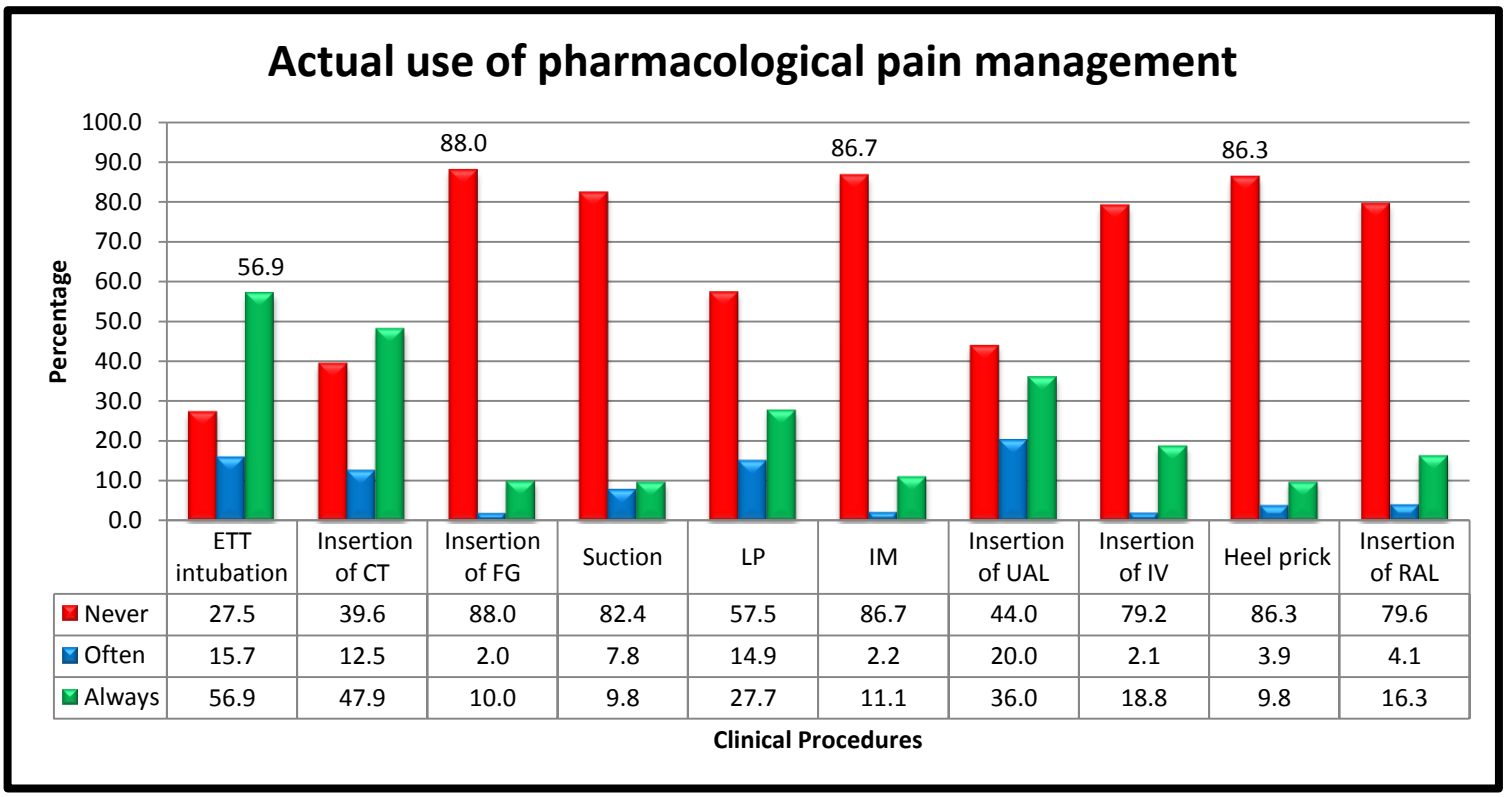


Figure 4.4: Respondent's Rating of Procedure Related Pain

4.3.2.6 **Frequency of use of pharmacological pain management interventions**

This item was included to provide information on the frequency of utilisation of pharmacological pain management interventions for the identified procedures. Procedures which received the most pharmacological pain interventions were endotracheal intubation and chest tube insertion as reported by 56.9% (n= 29) and 47.9% (n=23) of the respondents respectively. The insertion of a feeding tube was never accompanied with a pharmacological pain management interventions as reported on by the majority of the responses (88.0%; n=44). The results are presented below.

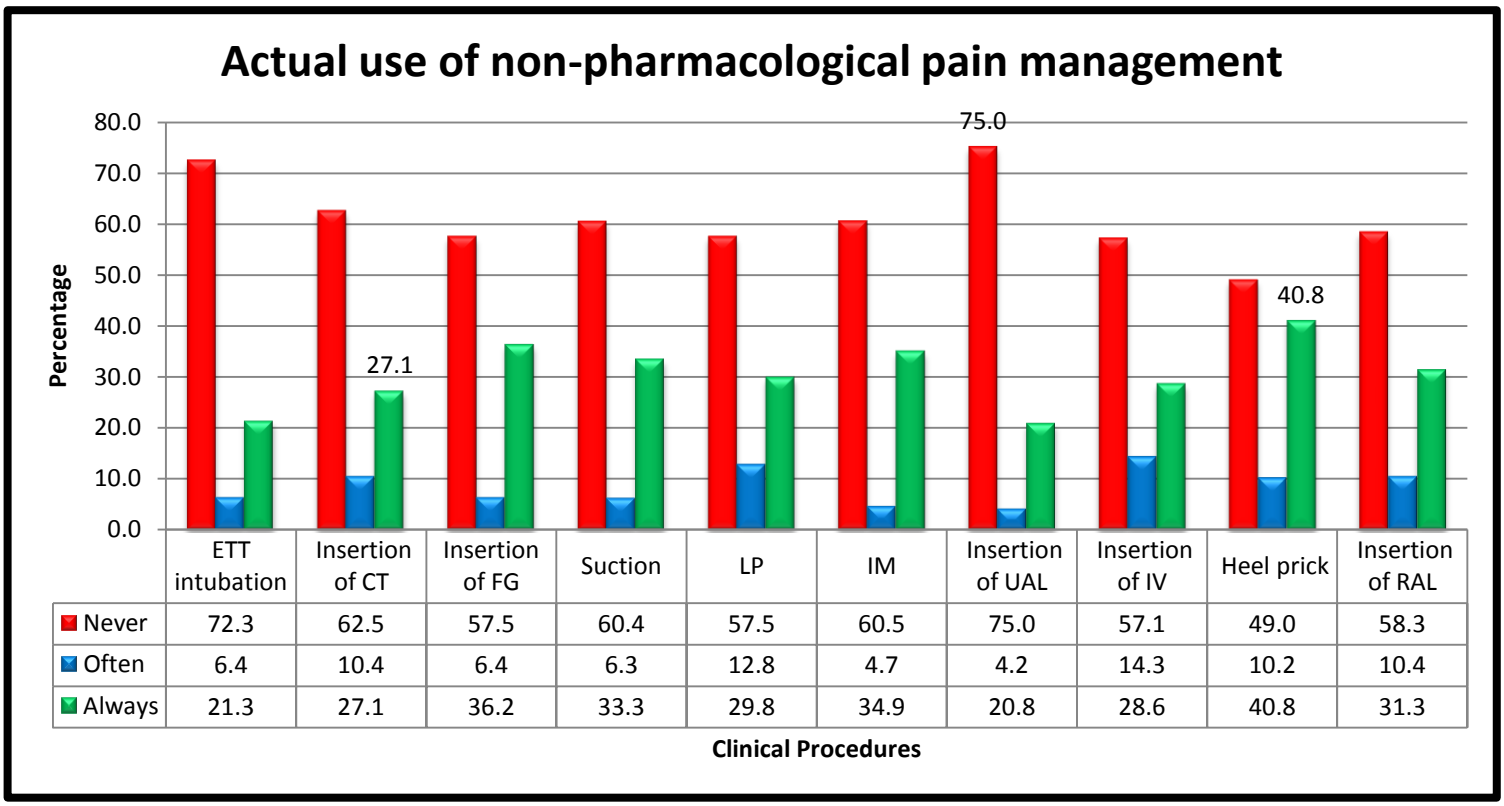


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Never	27.5	39.6	88.0	82.4	57.5	86.7	44.0	79.2	86.3	79.6
Often	15.7	12.5	2.0	7.8	14.9	2.2	20.0	2.1	3.9	4.1
Always	56.9	47.9	10.0	9.8	27.7	11.1	36.0	18.8	9.8	16.3

Figure 4.5: Respondents' Use of Pharmacological Pain Management Interventions

4.3.2.7 **Frequency of use of non-pharmacological pain management interventions**

Figure 4.6 is a presentation of the results of respondents' reported frequency of implementing non-pharmacological pain management interventions. Clinical procedures which were reportedly accompanied by non pharmacological pain management interventions were heel pricks (40.8%; n=20) and insertion of a feeding tube (36.2%; n=17). Seventy-five percent (n=36) of the respondents reported the absence of non-pharmacological pain management interventions with the insertion of an umbilical catheter.

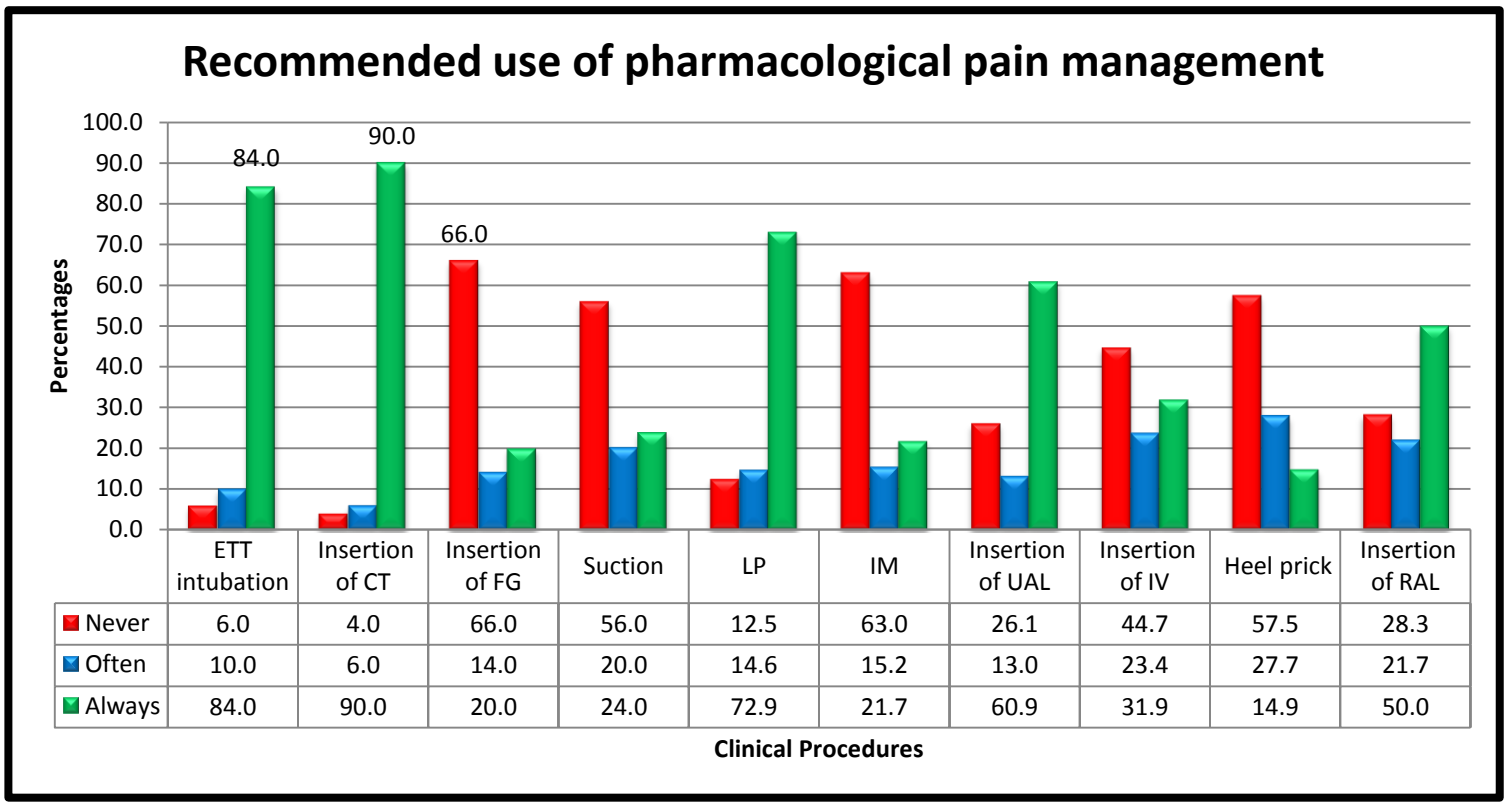


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Never	72.3	62.5	57.5	60.4	57.5	60.5	75.0	57.1	49.0	58.3
Often	6.4	10.4	6.4	6.3	12.8	4.7	4.2	14.3	10.2	10.4
Always	21.3	27.1	36.2	33.3	29.8	34.9	20.8	28.6	40.8	31.3

Figure 4.6: Respondents' Use of Non-Pharmacological Pain Management Interventions

4.3.2.8 **Belief about implementation of pharmacological interventions**

Ninety percent (n= 45) and eighty-four percent (n=42) of the respondents held the belief that pharmacological pain management interventions should always accompany the insertion of chest tubes and endotracheal intubation respectively; respectively 66.0% (n=33) believed that pharmacological pain management interventions should never be implemented with the insertion of feeding tubes (refer to Figure 4.7).

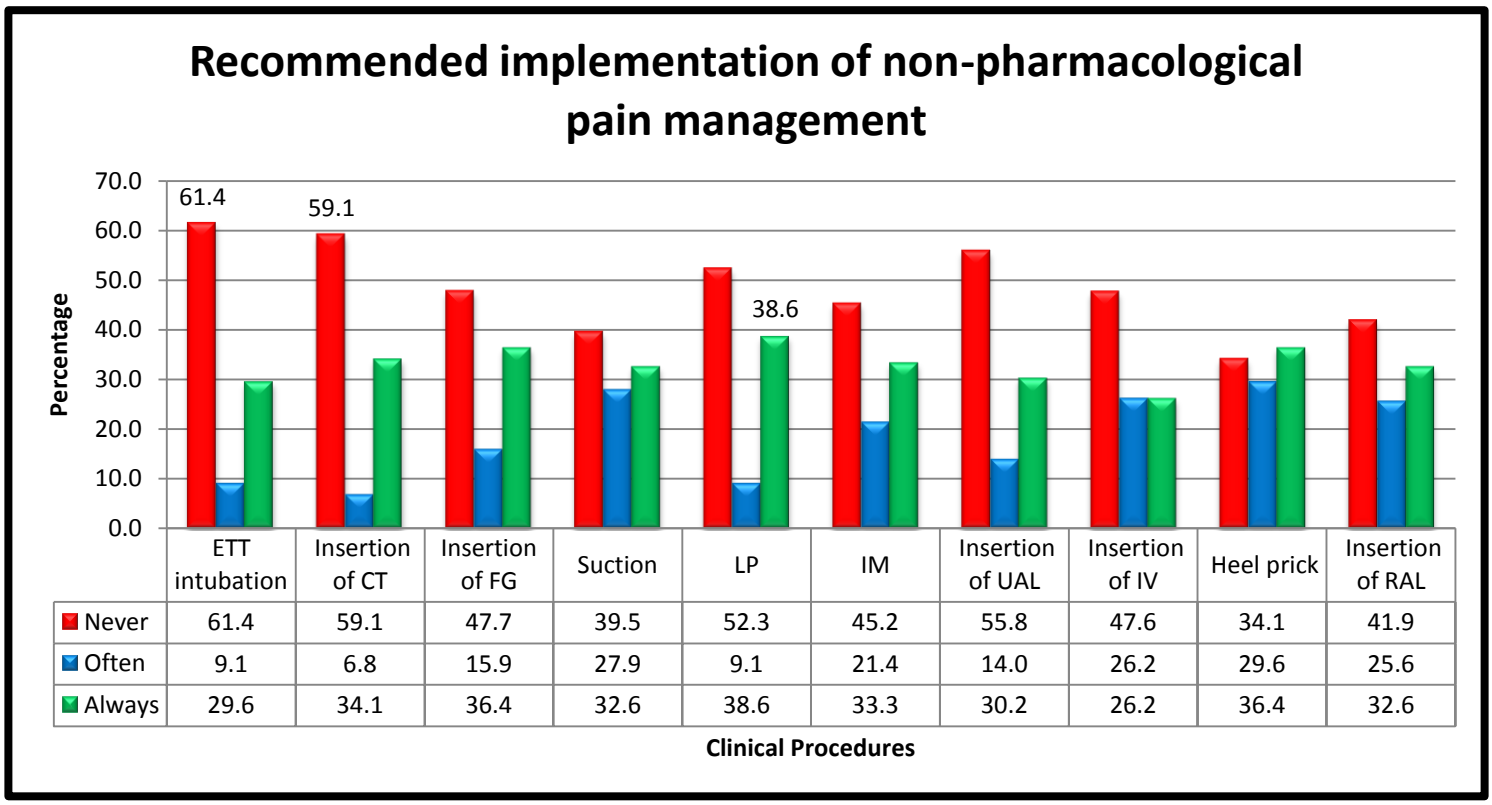


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Never	6.0	4.0	66.0	56.0	12.5	63.0	26.1	44.7	57.5	28.3
Often	10.0	6.0	14.0	20.0	14.6	15.2	13.0	23.4	27.7	21.7
Always	84.0	90.0	20.0	24.0	72.9	21.7	60.9	31.9	14.9	50.0

Figure 4.7: Respondent Beliefs about the Implementation of Pharmacological Pain Management Interventions

4.3.2.9 **Belief about the implementation of non-pharmacological pain management interventions**

The results for this item (refer to Figure 4.8) indicated that most of respondents did not believe in the implementation of non-pharmacological pain management interventions with endotracheal intubations (61.4%; n = 27) and chest tube insertions (59, 1%; n=26). A minority of the respondents (38.6%; n=16) believed that non-pharmacological pain management interventions should always accompany obtaining a blood specimen with a heel prick procedure.

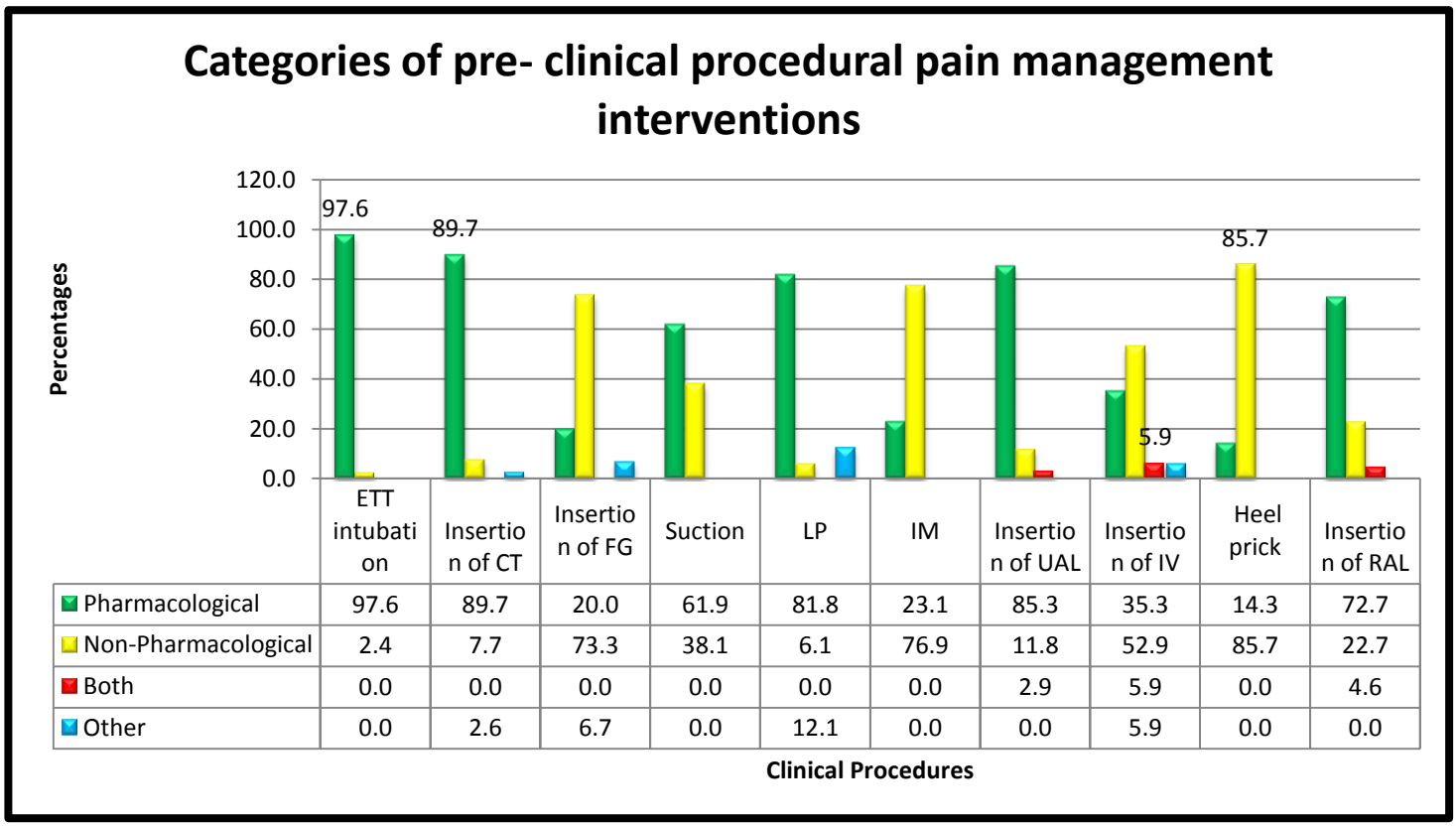


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Never	61.4	59.1	47.7	39.5	52.3	45.2	55.8	47.6	34.1	41.9
Often	9.1	6.8	15.9	27.9	9.1	21.4	14.0	26.2	29.6	25.6
Always	29.6	34.1	36.4	32.6	38.6	33.3	30.2	26.2	36.4	32.6

Figure 4.8: Respondent Beliefs about Implementation of Non-Pharmacological Pain Management Interventions

4.3.2.11 **Pre-procedural pain management interventions**

Close to 100% (97.7%; n=42) of the respondents reported implementing pharmacological interventions to manage pain prior endotracheal intubation. Eighty-five percent of the respondents (85.7%; n=12) reported implementing non-pharmacological interventions to manage prior to obtaining a blood specimen from a heel stick. A minimal (5.9%; n=1) respondents reported combining pharmacological and non-pharmacological pain management methods to manage pre-procedural for the insertion of a peripheral venous catheter was reported.

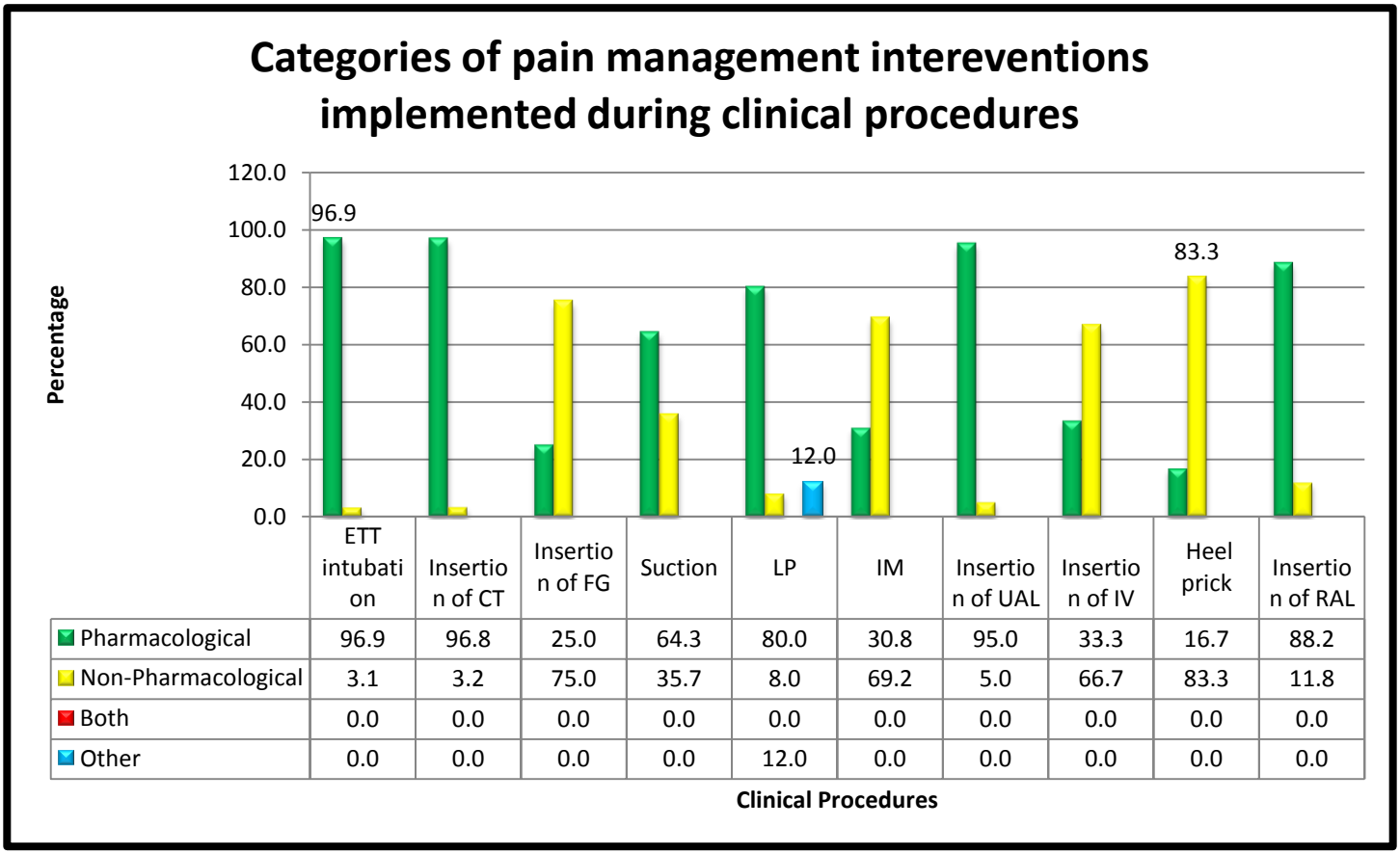


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Pharmacological	97.6	89.7	20.0	61.9	81.8	23.1	85.3	35.3	14.3	72.7
Non-Pharmacological	2.4	7.7	73.3	38.1	6.1	76.9	11.8	52.9	85.7	22.7
Both	0.0	0.0	0.0	0.0	0.0	0.0	2.9	5.9	0.0	4.6
Other	0.0	2.6	6.7	0.0	12.1	0.0	0.0	5.9	0.0	0.0

Figure 4.9: Categories of Pain Management Interventions used Prior to Clinical Procedures

4.3.2.11 **Procedural pain management interventions**

Pharmacological pain management agents were reportedly the most utilised (96.9%; n=31) to manage pain during endotracheal intubation. A majority of the respondents (83.3%; n=10) implemented non-pharmacological pain management interventions during heel prick procedure. Twelve percent (12.0%; n=3) of the respondents made use of topical anaesthetics during the performance of a lumbar puncture. None of the respondents implemented both pharmacological and non-pharmacological pain management interventions during the any of the procedures.

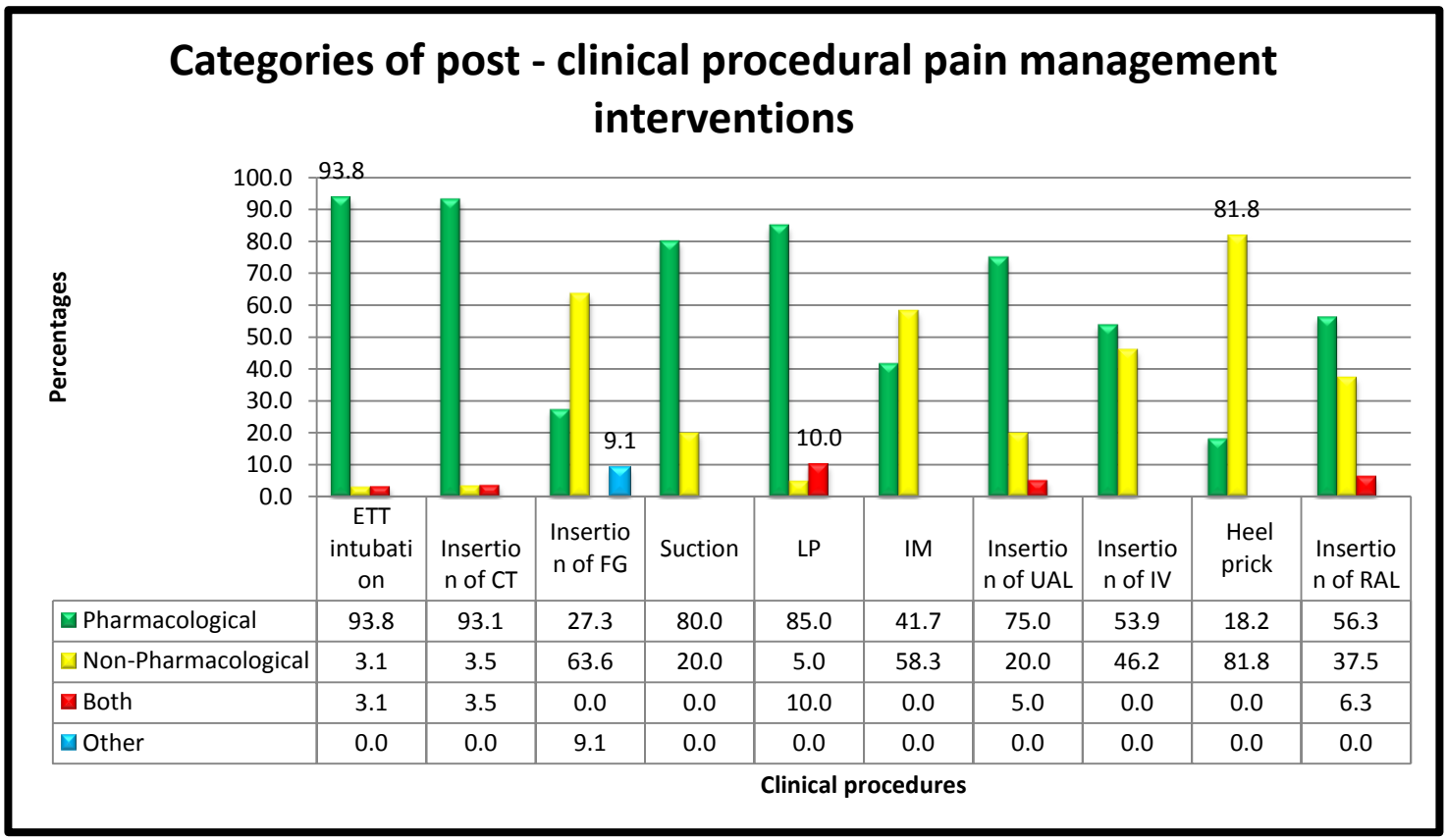


	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Pharmacological	96.9	96.8	25.0	64.3	80.0	30.8	95.0	33.3	16.7	88.2
Non-Pharmacological	3.1	3.2	75.0	35.7	8.0	69.2	5.0	66.7	83.3	11.8
Both	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other	0.0	0.0	0.0	0.0	12.0	0.0	0.0	0.0	0.0	0.0

Figure 4.10: Summary of Clinical Procedural (during) Pain Management Procedures

4.3.2.12 **Post- procedural pain management interventions**

The most favoured method of post procedural pain management was pharmacological with 93.8% of the respondents (n=30) indicating its implementation after endotracheal intubation. Non-pharmacological pain interventions were implemented by 81.8% (n=9) of the neonatal staff following the heel prick procedure. There was a 10.0% (n=2) utilisation of both interventions post a lumbar puncture. Nine percent (9.1%; n=1) reported administering a topical anaesthetic after inserting a feeding tube.



	ETT intubation	Insertion of CT	Insertion of FG	Suction	LP	IM	Insertion of UAL	Insertion of IV	Heel prick	Insertion of RAL
Pharmacological	93.8	93.1	27.3	80.0	85.0	41.7	75.0	53.9	18.2	56.3
Non-Pharmacological	3.1	3.5	63.6	20.0	5.0	58.3	20.0	46.2	81.8	37.5
Both	3.1	3.5	0.0	0.0	10.0	0.0	5.0	0.0	0.0	6.3
Other	0.0	0.0	9.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Figure 4.11: Summary of Post Clinical Procedural Pain Management Interventions

4.4 COMPARATIVE ANALYSIS FINDINGS

The comparative data analyses to test for degrees of association and relationships between the study's variables were computed using Chi square and the Fischer's exact tests. According to Burns and Grove (2005: 518), the Chi square test is designed to test for significant differences between variables. The small sample size and imbalanced data collected in this study necessitated the use of a Fisher's exact test to calculate the exact measure of probability between two variables. The data sets included in the analysis were nominal followed on from the findings of the descriptive findings reported above. The statistical significance of the test was set at 0.05, in keeping with the principles of non-clinical studies. Although STATA 12 produced results that included a 1-sided Fisher's for the imbalanced data tables, however confidence intervals were not calculated.

4.4.1 **Demographic and Pain Management Guidelines**

To determine the existence and strength of relationship between participant demographic variables and their knowledge of pain management guideline comparative statistics were calculated (refer to Table 4.3). The resultant p-values, when greater than 0.05 (p value > 0.05) indicate that participant characteristics; type of unit worked in, professional qualification and years of experience in neonatal care did not influence their knowledge of a pain management guideline. The interpretation is that the neonatal staff in this study managed neonatal pain without the aid of a guideline. To observe trends or clinical significance in these results, the observed and expected frequencies were scrutinised, however the observations were close, confirming the earlier results.

Table 4.3: Comparison of Respondent's Profile with the Pain Management Guideline Knowledge

Demographic Data	Pain management guideline (Section B: Question 5)					
	f – observed frequency *f – expected frequency*		Pearson chi 2 X^2	Pr	Fischer's exact p	1-sided Fischer's
	Yes	No				
1. **Neonatal staff : n=50**						
NICU	15 *14.4*	25 *25.6*	0.1953	0.659	0.730	0.479
H/C	3 *3.6*	7 *6.4*				
2. **Professional qualification: Consultant**						
Registrar	1 *0.4*	0 *0.6*	5.8081	0.214	0.209	
Intern	0 *0.7*	2 *1.5*				
Professional Nurse	1 *0.4*	0 *0.6*				
Enrolled Nurse	16 *15.8*	28 *28.2*				
	0 *0.7*	2 *1.3*				
3. **Years of experience** :						
0 – 5 years	7 *7.9*	15 *14.1*	0.8309	0.934	0.917	
6-10 years	5 *4.0*	6 *7.0*				
11 – 15 years	2 *1.8*	3 *3.2*				
16 – 20 years	2 *2.5*	5 *4.5*				
>21 years	2 *1.8*	3 *3.2*				

4.4.2 Beliefs about Neonatal Pain

Table 4.4 presents the findings of cross tabulations investigating neonatal staffs' beliefs towards neonatal pain compared respondents' previous pain experiences. Respondents' past pain experience did not influence their beliefs that neonates experienced more pain than adults did. The neonatal staff in this study believed that neonates experienced procedural pain regardless of whether they themselves had experienced procedural pain themselves. The results of the 1-sided Fishers' exact results of 0,643 and 0.462, confirmed this finding.

Table 4.4: Respondents' Past Pain Experience in Relation to Beliefs about Neonatal Pain

Beliefs concerning neonatal pain experience Section B	**Past pain experience (Section B: Question 1)**					
	f – observed frequency ***f – expected frequency***		**Pearson chi 2** χ^2	**Pr**	**Fisher's exact p**	**1-sided Fischer's p-value**
	Yes	**No**				
1 Neonatal pain > Adult Pain: Yes	33 *32.9*	4 *4.1*	0.0190	0.890	1.000	0.643
No	7 *7.1*	1 *0.9*				
2 Neonatal pain < Adult Pain: Yes	6 *5.3*	0 *0.7*	0.8907	0.345	1.000	0.462
No	33 *33.7*	5 *4.3*				

4.4.3 Neonatal Staff Attitude towards Neonatal Pain

Neonatal staff professional qualification and preparation, which is assumed to include identification, management and evaluation of pain management interventions, could determine staff attitudes towards neonatal pain. The findings (refer to Table 4.5) of this comparative statistical negate the existence of a relationship between these variables (p value > 0.05). The respondents' professional qualifications had no influence on ratings of pain of the identified procedures.

Table 4.5 Respondent attitudes towards procedural pain

Professional Qualification	Procedural pain ratings	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	6.1032	0.636	0.274
	Insertion of a chest tube	7.1221	0.130	0.330
	Insertion of a feeding tube	3.1175	0.927	0.826
	Tracheal suctioning	10.5656	0.228	0.243
	Lumbar puncture	0.7770	0.942	1.000
	Intramuscular injection	2.2954	0.971	0.897
	Insertion of umbilical catheter	5.3043	0.725	0.754
	Insertion of a peripheral intravenous catheter	6.7100	0.152	0.210
	Heel prick	4.6062	0.799	0.505
	Insertion of radial arterial catheter	1.1395	0.888	1.000

4.4.4 Knowledge and Pharmacological Pain Intervention

The respondents' professional qualifications produced a statistically significant difference (p value = 0.049) in the use of a pharmacological pain management intervention during the insertion of a feeding tube. Thus, the implementation of a pharmacological intervention to manage the pain associated with the insertion of a feeding tube would be dependent on the professional qualification or level of training and responsibility of neonatal staff. The same was not shown with the other nine clinical procedures. (Refer to Table 4.6)

Table 4.6 Respondent Professional Qualifications and Implementation of Pharmacological Interventions

Professional Qualification	Frequency of pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	7.7840	0.455	0.453
	Insertion of a chest tube	12.0009	0.151	0.151
	Insertion of a feeding tube	53.9360	0.000*	0.049*
	Tracheal suctioning	12.9794	0.113	0.347
	Lumbar puncture	6.3481	0.385	0.520
	Intramuscular injection	11.9192	0.064	0.108
	Insertion of umbilical catheter	8.0349	0.430	0.447
	Insertion of a peripheral intravenous catheter	2.3726	0.967	0.775
	Heel prick	4.3865	= 0.821	0.608
	Insertion of radial arterial catheter	7.7850	0.455	0.338

4.4.5 Knowledge and Utilisation of Non-Pharmacological Pain Interventions

Table 4.7 is a presentation of the findings of cross tabulation to determine the strength of relationship between professional qualification and the probable utilisation of non-pharmacological pain management interventions. A p-value of 0.045 indicated that professional qualifications had a bearing on the frequency of non-pharmacological intervention implementation.

Table 4.7: Respondent Professional Qualifications and Implementation of Non-Pharmacological Interventions

Professional Qualifications	Frequency of non pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	2.6501	0.954	0.875
	Insertion of a chest tube	3.2293	0.919	1.000
	Insertion of a feeding tube	21.7230	0.005*	0.045*
	Tracheal suctioning	5.7783	0.672	0.554
	Lumbar puncture	5.8617	0.439	0.345
	Intramuscular injection	5.7304	0.454	0.349
	Insertion of umbilical catheter	14.0698	0.080	0.175
	Insertion of a peripheral intravenous catheter	8.0174	0.432	0.395
	Heel prick	15.3267	0.053	0.105
	Insertion of radial arterial catheter	6.4816	0.593	0.600

4.4.6 Neonatal Staff Attitude to Neonatal Pain

In comparing the years of neonatal ward experience and the ratings of pain on the specified clinical procedures, the results showed no statistical significance (p=>0.05). The number of years worked in neonatal units does not influence respondents' ratings of neonatal pain. Table 4.8 indicates that there were no changes found in the respondent's rating, therefore attitude, of neonatal pain across the range of neonatal care experience.

Table 4.8: Respondents' Procedural Pain Ratings in Relation to Years Worked in Neonatal Care

Years of experience	Procedural pain ratings	Pearson chi 2 X^2	Pr	Fischer's exact p-value
	Endotracheal intubation	7.4077	0.493	0.695
	Insertion of a chest tube	2.6039	0.626	0.787
	Insertion of a feeding tube	3.1374	0.925	0.882
	Tracheal suctioning	4.8658	0.772	0.757
	Lumbar puncture	1.9438	0.746	0.450
	Intramuscular injection	6.7748	0.561	0.783
	Insertion of umbilical catheter	6.3389	0.609	0.577
	Insertion of a peripheral intravenous catheter	2.0524	0.726	0.718
	Heel prick	4.2351	0.835	0.758
	Insertion of radial arterial catheter	0.7919	0.940	0.830

4.4.7 Attitudes and Utilisation of Pharmacological Pain Management Interventions

The relationship between neonatal staff years of experience and their implementation of pharmacological interventions to manage procedure related pain was tested. The p-values, presented on table 4.17, ranged between 0.513 – 0.908, which showed lack of a statistically significant ($p > 0.05$) relationship between these variables. This indicated that there were no changes in neonatal pain management practice between the advanced beginner and expert neonatal staff.

Table 4.9 Respondent Years of Experience and Frequency of Pharmacological Pain Management Intervention Utilisation

Years of experience	Frequency of pharmacological interventions	Pearson chi 2 X^2	Pr	Fischer's exact p-value
	Endotracheal intubation	5.9867	0.649	0.747
	Insertion of a chest tube	4.0137	0.856	0.836
	Insertion of a feeding tube	3.3781	0.908	0.976
	Tracheal suctioning	3.5514	0.895	0.992
	Lumbar puncture	4.9773	0.760	0.832
	Intramuscular injection	5.9538	0.652	0.781
	Insertion of umbilical catheter	13.1499	0.107	0.085
	Insertion of a peripheral intravenous catheter	6.8854	0.549	0.597
	Heel prick	7.1153	0.524	0.557
	Insertion of radial arterial catheter	7.2189	0.513	0.507

4.4.8 Attitudes towards Implementation of Non-Pharmacological Pain Management Interventions

A statistically significance (p=0.010) difference was found between respondents' years of experience and the probability that non pharmacological pain intervention would be implemented for the heel prick procedure. This means that the respondents' years of experience in neonatal care influenced their attitude when deciding on a non-pharmacological pain intervention for heel pricks. The other results did not indicate significant differences between the variables. Refer to Table 4.10

Table 4.10: Respondents' Years of Experience and Frequency of Utilization of Non-Pharmacological Pain Interventions

Years of experience	Frequency of non pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	7.4404	0.490	0.670
	Insertion of a chest tube	10.0872	0.259	0.298
	Insertion of a feeding tube	10.8267	0.212	0.175
	Tracheal suctioning	13.8036	0.087	0.045
	Lumbar puncture	11.2736	0.187	0.223
	Intramuscular injection	10.5631	0.228	0.318
	Insertion of umbilical catheter	7.5447	0.479	0.632
	Insertion of a peripheral intravenous catheter	9.7455	0.283	0.317
	Heel prick	24.1040	0.002*	0.010*
	Insertion of radial arterial catheter	12.2179	0.142	0.202

4.4.9 Attitudes towards Neonatal pain

Table 4.11 is a summary of the results from cross tabulations to measure the relationship between the respondents' gender or sex and their ratings of the intensity of neonatal procedural pain. No statistical significance was found (p>0.05). This indicated that there was no difference in pain ratings between the male and female neonatal staff.

Table 4.11: Respondents' Gender in Relation to Pain Ratings

Gender	Procedural Pain Ratings	Pearson chi 2 χ^2	Pr	Fischer's exact	1-sided Fischer's p-value
	Endotracheal intubation	0.2867	0.866	0.570	
	Insertion of a chest tube	0.2084	0.648	1.000	0.824
	Insertion of a feeding tube	1.0078	0.604	1.000	
	Tracheal suctioning	1.9561	0.376	0.620	
	Lumbar puncture	0.3631	0.547	1.000	0.719
	Intramuscular injection	0.1112	0.946	1.000	
	Insertion of umbilical catheter	0.4782	0.787	1.000	
	Insertion of a peripheral intravenous catheter	0.0450	0.832	1.000	0.636
	Heel prick	0.1406	0.932	1.000	
	Insertion of radial arterial catheter	0.5326	0.466	1.000	0.623

4.4.10 Attitudes and Pain Ratings

The conducting of a cross-tabulation (refer Table 4.12) was to test the hypothesis that previous pain experience will result in higher ratings of neonatal procedural pain by the respondents. The calculation of a Fisher's exact test for probability yielded p-values ranging from 0.170 – 1.000, which lacked statistical significance (p=>0.05). Further asymmetrical distribution of data, which favoured the female respondents, resulted in the calculation of a 1-sided Fischer's exact p-values > than 0.05. Therefore, the respondents reported homogenous pain ratings regardless of personal previous pain experience.

Table 4.12: Respondent Previous Pain Experience and Neonatal Procedural Pain Ratings

Previous pain experience	Procedural pain ratings	Pearson chi 2 χ^2	Pr	Fischer's exact	1-sided Fischer's p-value
	Endotracheal intubation	1.6591	0.436	0.616	
	Insertion of a chest tube	0.4243	0.515	1.000	0.684
	Insertion of a feeding tube	0.5910	0.744	1.000	
	Tracheal suctioning	1.1305	0.568	0.749	
	Lumbar puncture	0.5803	0.446	1.000	0.598
	Intramuscular injection	2.9527	0.228	0.257	
	Insertion of umbilical catheter	4.7009	0.095	0.170	
	Insertion of a peripheral intravenous catheter	2.3656	0.124	0.301	0.156
	Heel prick	0.1394	0.933	1.000	
	Insertion of radial arterial catheter	1.1001	0.294	0.572	0.392

4.4.11 Attitude towards Pharmacological Pain Management Intervention

Testing of the hypothesis that neonatal pain intensity would influence implementation of pharmacologic pain management held true for 90% of the clinical procedures except for the heel prick procedure. The statistically significant finding ($p= 0.014 < 0.05$), means that though neonatal staff acknowledged the painfulness of heel sticks this would not result in increased implementation of a pharmacological intervention to manage the pain. (Refer Table 4.13)

Table 4.13: Respondent Implementation of Pharmacological Pain Management Interventions in Relation to Procedural Pain Ratings

Procedural pain ratings	Frequency of pharmacological interventions	Pearson chi 2 X^2	Pr	Fischer's exact p-value
	Endotracheal intubation	0.8416	0.933	1.000
	Insertion of a chest tube	2.6273	0.269	0.248
	Insertion of a feeding tube	1.5508	0.818	0.474
	Tracheal suctioning	2.4238	0.658	0.660
	Lumbar puncture	2.0522	0.358	0.411
	Intramuscular injection	4.2922	0.368	0.252
	Insertion of umbilical catheter	0.8608	0.930	0.948
	Insertion of a peripheral intravenous catheter	2.8036	0.246	0.259
	Heel prick	12.4932	0.014*	0.036*
	Insertion of radial arterial catheter	3.2129	0.201	0.154

4.4.12 Attitude towards Non Pharmacological Pain Management Intervention Utilisation

Table 4.14 presents the findings to determine the strength of relationship between neonatal procedural pain ratings and the implementation of non-pharmacological pain management interventions. All the p-values are above the statistically set significance level of $p=>0.05$, therefore, there was no association between procedural pain scores use of non-pharmacological pain management interventions for all the procedures.

Table 4.14 Respondent implementation of non-pharmacological pain management interventions in relation to pain ratings

Procedural pain ratings	Frequency of non pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	5.6455	0.227	0.279
	Insertion of a chest tube	0.3958	0.820	1.000
	Insertion of a feeding tube	2.3325	0.675	0.824
	Tracheal suctioning	0.2434	0.993	1.000
	Lumbar puncture	0.9129	0.634	1.000
	Intramuscular injection	1.0325	0.905	0.912
	Insertion of umbilical catheter	5.5527	0.235	0.270
	Insertion of a peripheral intravenous catheter	0.8732	0.646	0.679
	Heel prick	5.8770	0.209	0.121
	Insertion of radial arterial catheter	2.8764	0.237	0.251

4.4.13 Beliefs about Utilisation of Pharmacological Interventions for Neonatal Procedural Pain Management

The findings of a Fisher's exact test to measure the association between the beliefs held by respondents and how these influenced their rating of neonatal procedural pain showed statistical significance (p= <0.05) on 50% of the clinical procedures as presented in Table 4.15. This meant that neonatal staff recognised the pain intensity associated with the identified clinical procedures and believed that the frequency of pharmacological pain intervention utilisation should increase.

Table 4.15: Respondents' Belief about Implementing Pharmacological Interventions to Manage Neonatal Procedural Pain

Procedural pain ratings	Belief – Frequency of pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	1.9273	0.749	0.696
	Insertion of a chest tube	3.9675	0.138	0.292
	Insertion of a feeding tube	10.6022	0.031*	0.026*
	Tracheal suctioning	4.8845	0.299	0.418
	Lumbar puncture	10.2219	0.006*	0.011*
	Intramuscular injection	5.1571	0.272	0.169
	Insertion of umbilical catheter	10.2614	0.036*	0.020*
	Insertion of a peripheral intravenous catheter	10.2391	0.006*	0.003*
	Heel prick	14.0082	0.007*	0.005*
	Insertion of radial arterial catheter	5.2894	0.071	0.053

4.4.14 Beliefs about Utilising Non-Pharmacological Interventions to Manage Neonatal Procedural Pain

To establish whether there is an association between participants' rating of neonatal procedural pain and their beliefs regards implementing non-pharmacological interventions to manage the pain; these two variables were compared statistically. The resultant p values, which ranged between 0.064 and 1.000 showed no statistical significance (p=>0.05) between the variables. The intensity of pain associated with clinical procedure influenced the respondent's clinical decision to utilise non-pharmacological pain management interventions (Refer to Table 4.16).

Table 4.16: Respondent beliefs about utilising non-pharmacological pain interventions for neonatal procedural pain

Procedural pain ratings	Belief: Frequency of non-pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	2.8270	0.587	0.605
	Insertion of a chest tube	3.4282	0.180	0.244
	Insertion of a feeding tube	2.7898	0.594	0.649
	Tracheal suctioning	1.3667	0.850	0.858
	Lumbar puncture	0.8256	0.662	0.493
	Intramuscular injection	1.1366	0.888	1.000
	Insertion of umbilical catheter	9.4904	0.050	0.064
	Insertion of a peripheral intravenous catheter	0.3293	0.848	0.913
	Heel prick	2.7351	0.603	0.704
	Insertion of radial arterial catheter	2.1943	0.334	0.380

4.4.15 Current Pain Management Practice

Table 4.17 presents the findings of a cross tabulation of the two methods to manage neonatal procedural pain. This test for association was performed to establish whether the respondent's choice to manage pain using one method would have increase the probability of using another form of pain management intervention. Statistical significance (p=<0.05) was shown on 60% of the procedures. The pain management interventions decided upon on these procedures were independent of each.

Table 4.17: Respondent Differences in Pain Management Interventions

Frequency of pharmacological interventions	Frequency of non-pharmacological interventions	Pearson chi 2 X^2	Pr	Fischer's exact p-value
	Endotracheal intubation	1.7230	0.787	0.743
	Insertion of a chest tube	3.9924	0.407	0.493
	Insertion of a feeding tube	24.6801	0.000*	0.002*
	Tracheal suctioning	18.3811	0.001*	0.006*
	Lumbar puncture	6.0650	0.194	0.165
	Intramuscular injection	22.2051	0.000*	0.042*
	Insertion of umbilical catheter	5.8174	0.213	0.295
	Insertion of a peripheral intravenous catheter	8.6349	0.071	0.046*
	Heel prick	9.8194	0.044*	0.048*
	Insertion of radial arterial catheter	17.3992	0.002*	0.001*

4.4.16 The Association between Pain Management Practices and Beliefs about Pain Management

The p-value of 0.004 result (Table 4.18) for the calculation of the relationship between the actual implementation of pharmacological interventions and belief when suctioning a neonate indicates no difference between the practice and beliefs held by respondents. The same relationship was not established for 90% of the procedures (p> 0.05).

Table 4.18 Influence of Respondents' Beliefs on Pharmacological Pain Management Interventions

Frequency of pharmacological interventions	Belief – Frequency of pharmacological interventions	Pearson chi 2 X^2	Pr	Fischer's exact p-value
	Endotracheal intubation	4.1033	0.392	0.298
	Insertion of a chest tube	1.4831	0.830	0.809
	Insertion of a feeding tube	7.1172	0.130	0.097
	Tracheal suctioning	13.0558	0.011*	0.004*
	Lumbar puncture	6.6906	0.153	0.101
	Intramuscular injection	7.0391	0.134	0.151
	Insertion of umbilical catheter	4.1893	0.381	0.380
	Insertion of a peripheral intravenous catheter	3.2317	0.520	0.610
	Heel prick	4.0090	0.405	0.471
	Insertion of radial arterial catheter	0.8548	0.931	1.000

4.4.17 Non Pharmacological Interventions vs. Belief Non Pharmacological Interventions

A difference between the actual implementation and belief about the implementation of non pharmacological pain management was not found, as seen on Table 4.19. The cross tabulation calculations yielded p-values greater than 0.05.

Table 4.19 Influence of Respondent Beliefs on the implementation of Non-Pharmacological Interventions

Frequency of non pharmacological interventions	Belief – Frequency of non pharmacological interventions	Pearson chi 2 χ^2	Pr	Fischer's exact p-value
	Endotracheal intubation	3.5966	0.463	0.357
	Insertion of a chest tube	4.2353	0.375	0.363
	Insertion of a feeding tube	6.5428	0.162	0.251
	Tracheal suctioning	0.7889	0.940	0.946
	Lumbar puncture	2.4202	0.659	0.769
	Intramuscular injection	4.9539	0.292	0.219
	Insertion of umbilical catheter	5.0687	0.280	0.322
	Insertion of a peripheral intravenous catheter	4.6779	0.322	0.301
	Heel prick	6.6530	0.155	0.107
	Insertion of radial arterial catheter	3.0924	0.542	0.568

4.5 CONCLUSION

The results from data analysis have been presented in this chapter. First the descriptive statistics in the form of percentages and frequencies, followed by comparative statistical results in p-values obtained from the Fischer's exact test calculations. The majority of the respondents were females from the professional nurse category working in NICU. Most respondents indicated a previous pain experience and agreed with the statement that neonates experienced more pain than adults did. The most significant finding in this study is the absence of a pain management guideline in the neonatal wards as reported on by 32 (64%) respondents.

The most painful procedures were indicated to be endotracheal intubation, insertion of a chest tube and the insertion of a feeding tube was considered the least painful procedures. Painful procedures received pharmacologic pain interventions to manage the pain prior, during and post the procedure. It was also interesting to note that professional nurses' responses were in favour for the implementation of pharmacological interventions more than non pharmacologic intervention. (78.85%; n=41). There was also a significant difference between the frequencies of actual implementation of pain management interventions when compared to the beliefs held by the neonatal staff. This was confirmed by the statistically significant p- values computed using the Fischer's exact test. This will be further discussed in the chapter 5.

CHAPTER FIVE

DISCUSSION OF STUDY FINDINGS, LIMITATIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

The final chapter of this report presents a discussion of the study's key findings guided by the objectives of the study. The challenges experienced during the study are discussed as limitations. In concluding this report, proposed recommendations for health education, clinical practice and research on neonatal pain management arising from the study findings will be outlined.

5.2 SUMMARY OF THE STUDY

This empirical inquest began in Chapter 1 with a statement questioning neonatal pain management in two clinical settings in Gauteng, South Africa. Chapter 2 presented an historical overview of current literature with respect to the definition of neonatal pain. The evidence of the neonates' pain experience and its effects on patient outcomes was described.

The purpose of this study was to review current practice in neonatal pain management and describe the knowledge, beliefs and attitudes of neonatal staff on neonatal pain management in hospitals in Gauteng. To fulfil this purpose the following objectives were identified:

- Describe the knowledge of nurses and doctors about neonatal pain
- Examine the attitude and beliefs of nurses and doctors regarding neonatal pain
- Explore of current neonatal pain management strategies

A non-experimental, descriptive quantitative survey with a self-administered questionnaire to elicit self-reported information was used to address the research purpose. The population of the study consisted of staff working in the neonatal wards of two tertiary academic hospitals in the central and western regions of the Gauteng province. The data collection process yielded a response rate of 35.33% (n=53).

Data was analysed using STATA version 12 to produce descriptive and comparative results. The main findings of this study are described and structured around the objectives.

5.3 DISCUSSION OF THE MAIN FINDINGS

5.3.1 Respondent Demographic Characteristics

The professional nurse population were the major contributors to data collected in this study (88.68%; n=47) while the medical doctors were underrepresented at 7.55% (n=4) of the respondents. This is consistent with the overall demographics of health staff ratio in developing countries (Naicker, Plange-Rhule, Tutt et al., 2009). Eighty one percent respondents work in the neonatal intensive care units (NICU) and the remaining 19% in high care wards. Currently professional nurses form the majority of the staff complement in neonatal wards. The allocation and distribution of work is determined by the severity of patient illness and level of health care required, quantified as acuity (Kisario, Schmollgruber & Becker, 2009). An important dynamic of the provision of care in the intensive care settings is the need for a highly qualified, competent nurse practitioner, a critical thinker able to function autonomously as part of an interdependent multidisciplinary health team (Benner et al., 2009).

Professional registered nurses in South Africa are regulated and function under the prescriptions of the Scope of Practice R2598 of 1984 as amended (SOP). With respect to the purpose of this study, the SOP prescribes that a nurse is responsible for: "the diagnosing of a health need, provision and execution of a nursing regimen to meet the need of a patient or where necessary by referral to a registered person" (Regulation 2598 of 1984 as amended: 3). The South African Nursing Council (SANC) expects professional nurses to deliver holistic nursing care to patients along the continuum of life from birth to death. It is therefore imperative that the nurses working with neonates prevent, reduce and alleviate painful stimuli associated with neonatal procedures. The role of the professional nurse in pain management interventions in the neonatal care setting includes; assessment of the comfort needs of the neonate, observation of patient response to the clinical procedures and to evaluate how these influence patient comfort and rest. Although the SOP of registered nurse precludes a nurse from prescribing schedule five and above pharmacological pain medication (Regulation 2418 of 1984), they should advocate and suggest the prescription of pharmacological agents by a paediatrician based on assessment of the degree of pain. The professional nurse supports and validates the prescription; evaluates the effectiveness of the intervention and reports patient outcomes. The desired outcome is based on the need to enhance neonatal comfort and rest, as evidenced by reduction in the frequency of negative neonatal pain stimulus responses such as desaturation, hypertension and bradycardia. Non-pharmacological pain management interventions fall largely within the prescriptive role of the nurse and may be implemented accordingly.

Based on the above, it is clear that an interdependent relationship forms the foundation for neonatal pain management. This requires each professional to acknowledge the other's scope of practice, value clinical observations and collaborate in decision-making concerning neonatal pain management and interventions to be used. Since the neonatal doctor's presence in the wards is not continuous, there is a reliance on the nurse to manage and confirm neonatal pain and evaluate the effect of pain interventions.

As previously mentioned, the life saving and preserving clinical procedures performed on the neonatal patients in NICU and HICU induce pain. A study by Carbajal, Nguyen-Bourgain and Armenguad (2008:1618) found that infants admitted to NICUs or HICUs may be subjected to "between 16 and 64 painful clinical procedures per day during the first 14 days of intensive care stay". Thus neonatal pain management forms the core of care delivered in the, neonatal intensive (NICU) and high care units (HICU).

Most of the respondents s (45.28%; n=24) had between zero to five years experience in neonatal patient care. The inclusion criteria to this study ensured that participants could be categorised as advanced beginners, proficient practitioners or expert practitioners according to Benner, Tanner and Chesla (1992). Benner's theory on novice to expert asserts that the years of clinical experience lead to an integration of theoretical knowledge to individual patient presentations. Though these professional nurses may not follow didactic procedural guidelines, they use reflection and clinical judgment to attend to individual patient symptoms appropriately. Based on this, an assumption was made that the years of experience in neonatal nursing would result in more astute assessment and appropriate management of neonatal pain.

Another obvious characteristic of the demographic profile of this study's participants is the gender representation. Females comprised 94.34% (n= 50) of the study and the remaining 5.66% (n=3) male. This statistic is a reflection of the gender bias present in the South African health profession. According to the South African Nursing Council 2010 statistics male nurses make up less that 10% of registered nurses (SANC 2010). Inclusion of this sub-item formed the basis of an item included on the Part B of the IPQ referring to previous pain experience. It was hypothesised that female participants would have experienced at least one painful experience.

The individual objectives guiding this study are discussed below.

5.3.2 Objective 1: Describe the Knowledge of Nurses and Doctors on Neonatal Pain

Seventy nine percent (n=41) of the respondents acknowledged that indeed neonates experience pain more intensely than adults. This gave empirical evidence that there is an awareness and therefore knowledge of neonatal pain. This finding concurs with the research results by McLaughlin et al. (1993); Porter et al (1997), and Dodds (2003), indicating an increasing acknowledgement of the neonate's pain experience. This finding is the basis of the assumption made about knowledge in this study. Knowledge of neonatal pain would result in the identification of neonatal pain and will result in increased and effective pain management. This knowledge is acquired formally through the academic preparation and informally through clinical experiential learning. The scope of this knowledge covers the definition, bio-physiological and behavioural aspects of neonatal pain and the various pain management interventions.

An open ended question allowed the respondents to write their description or opinion of what they considered neonatal pain to be. This was done to ascertain the definition of neonatal pain in this study. Most respondents (21.15%; n=11) defined neonatal pain either as non specific behavioural response to a painful stimulus and the minority (13.46%; n=7) as a physiological reaction to pain. Thirty four percent of the respondents did not give their definition of neonatal pain. These definitions of neonatal pain differ from the whole definition of neonatal pain as found in literature (AAP, 2000), which includes both the physiological and behavioural components as described by a minority of the respondents (5.77%; n=3). This leaves one to question; whether these health practitioners will be able to identify neonatal pain accurately and therefore manage the pain adequately?

As proposed earlier, knowledge acquisition on neonatal pain and its management continues in the clinical area through experiential learning and during clinical practice. An item on the availability of neonatal guidelines was included to describe the knowledge acquisition in neonatal wards. Sixty four percent of the respondents reported the absence of a written pain management guideline in their wards. This finding is a concern as it diverges from the consensus statements from collaborative research underpinning evidenced based practice in neonatal pain management (International Evidence-Based Group for Neonatal Pain, 2001; NEOPAIN, 2004; Epidemiology of Neonatal Procedural Pain, 2008). These organisations advocate for the development and implementation of written guidelines in neonatal wards to facilitate continued learning, therefore knowledge acquisition, transference and retention (McKechnie & Levene, 2008; Spence, Henderson-Smart, & New et al., 2010). It can be argued that the absence of a guideline may lead to inconsistent and inadequate pain management dependent on caregiver characteristics.

In recognising and acknowledging neonatal pain the respondents in this study rated the pain associated with the identified procedures as severe for 80% of the procedures and moderate for the remaining 20%.

Comparative analysis between respondents' characteristics, pain ratings and pain management intervention implementation yielded no statistical significance. This meant that the type of neonatal ward, years of experience in neonatal care and gender did not influence how the respondents quantified neonatal pain. This finding deviated from the findings by Porter et al (1997) and Reyes (2003) where a correlation was found between neonatal staff years of experience, ratings of neonatal pain and the implementation of pain management interventions. Porter at al found that male physicians identified and rated neonatal pain as severe; which resulted in increased implementation of pharmacological pain interventions. Reyes established that the more experienced the nursing staff in neonatal care the greater they assessed and implemented pain management interventions appropriately. The findings of this study suggest that neonatal staff is knowledgeable about neonatal pain, however their response to neonatal pain is inconsistent with their knowledge. Halimaa, Vehviläinen-Julkunen and Heinonen (2001) had similar findings in a study investigating neonatal staff knowledge of neonatal pain management. In this setting this finding must be judged based on the legislative parameters of the SANC and Health Professionals Council of South Africa.

A statistical significance (p value = 0.049 and 0.00) was found for the comparative analysis between participant professional qualifications and the utilisation of pharmacological or non-pharmacological interventions to manage the pain associated with the insertion of a feeding tube. Whilst this procedure was rated moderately painful, neonatal staff regardless of professional qualification, even with knowledge and recognition of pain in the neonate during the insertion, did not indicate increased implementation of either pharmacological or non-pharmacological pain relief. Close scrutiny of the descriptive statistics and contextual factors need to be explained. In this setting the professional nurses, major data contributors, are responsible for this clinical procedure. They rated this procedure as moderately painful and reported frequent use of non-pharmacological interventions as opposed to the infrequent use of pharmacological interventions. This association is possibly the result of professional nurses' knowledge and experience which inform and support the choice of non-pharmacological interventions for insertion of a feeding tube.

Previous studies (Andersen et al., 2007, Allagaert, Veyckemans & Tibboel, 2009 & Gradin et al., 2010) on neonatal pain management have shown that knowledge alone does not result in effective neonatal pain management. This alternate view proposes that the

attitudes and beliefs of neonatal staff are factors which influence the clinical decision making and action. As such these factors require further investigation in the South African context.

5.3.3 Objective 2: Examine the Attitude and Beliefs of Nurses and Doctors Regarding Neonatal Pain and Painfulness of Procedures

In this study attitude is defined as the reported behaviour of neonatal staff which is influenced by their opinions. Their beliefs are their personal opinions regarding factual truth or correctness based on formal knowledge or proof. Rephrased, this objective sought to examine the how respondents' informed or uninformed opinions concerning neonatal pain influenced their responses in clinical practice. The following is a presentation of key findings of the descriptive statistics:

- Almost 80% of respondents believed that neonatal patients experienced pain more intensely than adult patients. A conclusion can be made that most participants believed that neonates experience pain.

- The absence or unavailability of a neonatal pain management guideline in the units, as indicated by 32 respondents suggests that pain management is not systematic and may be ineffective. Since effective pain management begins with assessment, preferably using a validated tool (Jacob & Puntillo, 1999; Hamilaa et al. 2001 & Pölki, Korhonen & Saarela et al., 2010), lack of assessment may lead to inadequate pain management. The incongruence between the beliefs and the practice suggests a negative attitude towards neonatal pain management as concluded by Reyes (2003).

- However, in this study the fact that the respondents rated painfulness of the procedures as follows; severely painful; chest tube insertion (93.88%), lumbar puncture (89.80%), radial arterial catheter insertion (85.71%), endotracheal intubation (76.00%), insertion of a peripheral venous line (72.00%), intramuscular injection (70.21%); heel sticks (58.00%) and insertion of an umbilical catheter (54.00%), moderately painful: insertion of a feeding tube (76.00%) and tracheal suctioning (62.00%) suggests a positive attitude towards neonatal pain. These ratings concur with empirical evidence on the painfulness of these procedures (Anand, 1999; Granau, 2001; Stevens; Carbajal, Rousset & Danan et al., 2008; Johnston, 2010).

- The negative attitude to neonatal pain re-appears in the respondents' reports of the frequency with which they implement pain management interventions. The most blatant being the incongruent management of the most painful procedure, lumbar puncture.

The respondents reported the frequent implementation of pharmacological interventions at 27.33% and non pharmacological interventions 29.79% in response to the neonates' pain expression with a lumbar puncture.

- The descriptive analysis of the respondents' beliefs about the frequency of use of pain management interventions shows an increased implementation of the interventions. An example is a 50% increase in the frequent use of pharmacological interventions for the lumbar puncture procedure. This indicates a positive attitude towards neonatal pain and its management.

In order distinguish the attitude and a belief of the neonatal staff in this study, a comparative analysis was performed. The variables in pain rating and frequency of implementation of a pharmacological intervention for were compared on all the procedures. A statistically significant finding (p-value result, $p=0.036 <0.05$) was found on the heel prick procedure. Analysis of this result indicated that the respondents considered this procedure to be severely painful. Their behaviour in reaction to their opinion was associated to the rating of pain, but did not affect their choice to implement a pharmacological intervention. At face value it would seem that nurses are not managing the pain associated with this procedure adequately. In the context of this study the roles of nurses and doctors in pain management intervention prescribing and administration is important to discuss. Obtaining a blood specimen for diagnostic as well as monitoring purposes, for example blood glucose measurement, falls within the scope of nursing care and often takes place in the absence of the medical doctor who is the prescriber of pharmacological pain management interventions. Since this procedure is short in duration and periodic, the doctor may not be present to witness the neonate's response to pain stimulus. The SOP limits the nurse to administer pharmacological interventions without the input of the doctor. Consequently the nurses in this context can only implement non pharmacological interventions to manage the severe pain related to this procedure. Lago, Garetti and Merazzi et al. (2009) support the use of 0.05ml to 0.5ml 24% oral sucrose as an analgesic in preterm infants (31- 37 weeks) undergoing heel pricks, venipuncture and intramuscular injections (moderate to severe pain) in neonatal practice.

Further analysis and examination of the association between the pain ratings and respondents' beliefs about the frequency of pharmacological interventions yielded statistical insignificant results (p value< 0.05) for five of the procedures. These procedures are: the insertion of a feeding tube ($p=0.026$); lumbar puncture ($p=0.011$); insertion of an umbilical catheter ($p=0.020$); insertion of a peripheral venous catheter ($p= 0.003$) and heel sticks (0.005). The respondents rated feeding tube insertion as moderately painful and the other

four procedures as severely painful. Parallel to this were the respondents' beliefs about the increased frequency with which they would implement pharmacological pain management interventions on these procedures. Therefore, it can be concluded that there is a positive association between pain ratings and ideal increased frequency of pharmacological pain management intervention implementation by the respondents. While these findings are inconsistent with Porter's et al. (1997) findings, where the nurse ratings of pain did not change their beliefs about pharmacological intervention use, they are consistent with those of Andersen et al. (2007). One could hypothesise that the increase in knowledge dissemination concerning neonatal pain influences the attitudes and beliefs of neonatal staff in favour of the patients. These results are indicative of a positive attitude towards neonatal pain and its management. This positive attitude is a good foundation for doctor-nurse collaboration to improve and introduce measures to standardise neonatal pain management (Anand, 2001, Gibbins & Fowler, 2007, Spence et al., 2010).

5.3.4 **Objective 3: Explore of Current Neonatal Pain Management Strategies**

Having established the knowledge, beliefs and attitudes of neonatal staff concerning pain management, the focus of the study turned to the review of pain management interventions used currently in this setting. Annexure I presents a summary of the current pain management interventions compared with current international standards. It is clear that the choice of pain management intervention in this setting is largely pharmacological. This is consistent with the international standards for the adequate pain management of moderate to severe pain (Anand, 2007a, Lago et al., 2008). Neonatal staff concerns regarding the side effects of opioids and sedative are addressed in various studies which also recommend dosages, frequency and preferred route for the administration of these agents (Simons et al., 2006; Anand 2007b; Carbajal, Rousset, & Danan, et al., 2008). Anand (2007a) cautions against the presumption that sedatives can be used as analgesia and urges neonatal staff consider the addition of low dose opioids analgesia when treating severe pain, especially for ventilated patients.

Nursing studies addressing neonatal pain management support the implementation of non-pharmacological interventions, particularly with prevention and alleviation of neonatal procedural pain (Halimaa et al., 2001; Spence et al., 2010; Johnston et al., 2010). Most of the non-pharmacological interventions practiced by the nurses in this study are consistent with approved methods, except the use of oral sucrose. In the preliminary data organisation it was observed that this method was only reported for use by a minimum of the respondents. Taddio, Shah and Hancock et al. (2008), proved the effectiveness of this intervention. These authors also addressed the concerns related to the effect of oral sucrose on neonatal glucose homeostasis and found that low doses did not increase the neonates' blood glucose.

5.3.5 **Conclusion of the Main Findings**

The main respondents in this study were female, professional nurses working in NICU with 0-5 years neonatal care experience. The neonatal staff showed insufficient knowledge of neonatal pain and its management evident in the partial definitions of neonatal pain and the reported absence of neonatal pain guideline. A positive finding was noted in the respondents' appropriate rating of all procedures as causing varying degrees (severe-mild) of pain. However, this acknowledgement of pain did not translate into the implementation of appropriate interventions to relieve pain. This can be considered as a negative attitude. Pharmacological interventions are the preferred choice of intervention though the nurses in this context have limited prescriptive scope. In their role as patient advocates nurses are expected upon their assessment findings to suggest to medical staff to prescribe analgesia for their patients. The respondents reported the use of non-pharmacological interventions, within their scope which were both inadequate and inappropriate for the pain intensity of the procedures. These incongruencies could be attributed as a limitation due to legislative boundaries.

5.4 **LIMITATIONS TO THE STUDY**

Limitations of the study are divided into logistical challenges during data collection and the overall scope of this research.

5.4.1 **Logistical Limitations**

High patient turnover, acuteness and severity of illness created the following challenges for data collection:

- Medical practitioners who were too busy to listen to the short presentation following the handing out of the information letter.

- Most of the staff were unable to complete the questionnaire during their shift and some took it home to return the following day and forgot to return the instrument

5.4.2 **The Scope of the Research**

- The small sample size means that these findings cannot be generalised to describe neonatal pain management practice in academic hospital in Gauteng and the factors affecting the implementation of interventions.

- Collapsing of data for comparative analyses, resulted in the reduction of specificity on the reporting of the findings, for example the classification of pharmacological agents or pain relief measures.

- The inclusion of a record review to give an accurate reflection of the current practice may have given an in depth description of neonatal pain management practice in this study and increased the validity of the findings. This was beyond the scope of this report.

- The dearth of South African literature resulted in a biased literature review, which favoured international practice.

5.5 RECOMMENDATIONS

Based on this report the following suggestions are recommended for clinical practice, education and research.

5.5.1 Clinical Practice

- Scholarly conversation on neonatal pain and its management needs to continue between the nurses and doctors. Different opinions and pain management strategies must be accommodated and discussed for learning to take place. This sharing of ideas is the beginning for effective pain management to occur, collaboration amongst neonatal staff must aim at developing pain management guidelines led by evidence based best practice.

- Neonatal pain management guidelines are useful in standardising practice and there is an urgent need for these to be implemented in these settings, an existing guideline can be shared by the two institutions and validated through practice.

- Nursing staff should implement safe non-pharmacological interventions increasingly with confidence. There is empirical evidence supporting the effectiveness of most of these interventions in reducing the adverse effects of pain stimulus and response by nurses.

- Introduction of an accreditation of neonatal units based on the presence and proof of implementation of pain management guidelines. A team approach should be used, consisting of a doctor (prescriber), senior nurse (manager), novice nurse and the advanced practitioner students present in the unit. Documentation of this activity should form part of the accreditation process by the hospital.

5.5.2 **Education**

- The curriculum on pain and its management should include the process of guideline development. During practical learning students, nurses and doctors should be orientated to the implementation and application of these guidelines in practice.

- Multi disciplinary teaching of this subject is instrumental in creating the collaborative relations required for clinical practice.

- Continued learning on the topic should be fostered through conference attendance, short courses on neonatal pain and its management and informal activities such as a journal club.

5.5.3 **Research**

- This report focused only on one aspect of neonatal pain management and used a quantitative method to investigate a complex phenomenon. A qualitative follow-up to this study would add information on neonatal pain management in this setting.

- Pain is a research focus with funding available for studies and academic departments should provide guidance into accessing these funds for students showing interest in this field. Honours and postgraduate students should be encouraged to focus their studies on pain and its management.

- There are a number of existing international collaborations – neonatal networks focusing on neonatal pain management and the academic hospitals where this study was undertaken would benefit from connecting with these networks and becoming part of a community of practice.

5.6 **CONCLUSION OF THE STUDY**

A concern about neonatal pain management in clinical practice motivated this study. An empirical enquiry into this sensitive subject resulted in the choice of a survey as a study design. The analysis of data collected from the neonatal staff working in the two academic hospitals in Gauteng confirmed the observations made by the researcher: that neonatal pain though assessed and managed, is not standardised and may be subjective to the neonatal staff experience with neonatal pain and its management. Participants' responses present positive and negative beliefs and attitudes concerning the neonatal pain. This is evidenced by the recognition of neonatal pain which does not translate to adequate pain management intervention implementation to reduce or relieve pain. The respondents favoured pharmacological interventions even though this lies beyond the prescriptive scope

of the nurses who were the main contributors to this study. Non-pharmacological interventions are used minimally in the study settings. The use of these non-pharmacological could be increased by the implementation of guidelines, which are based on empirical evidence confirming their effectiveness when used appropriately. The interdependent relationship between nurses and doctors requires them to work in collaboration in order to improve neonatal pain management.

On reflection, I realise that neonatal patients are whole beings who develop outside the uterus in the care of neonatal staff therefore they require effective pain management to ensure optimum growth (Tjale & Bruce, 2007). Increased interest in neonatal pain management, especially the harmful effects of unrelieved pain on the physical, psychological and emotional development of the neonates leads to the conviction that quality neonatal care must begin with adequate assessment and management of neonatal pain.

REFERENCES

Abdulkader, H.M., Freer, Y., Garry, S.M., Fleetwood-Walker, S.M., and McIntosh, N. 2007. Prematurity and neonatal noxious events exert lasting effects in infant pain behaviour. *Early Human Development,* 84: 351-355

Allagaert, K., Veyckemans, F., and Tibboel, D. 2009 Clinical practice: analgesia in neonates. *European Journal of Pediatrics*, 168: 765-770

American Academy of Pediatrics, Canadian Paediatric Society. 2000. Prevention and management of Pain and Stress in the neonate. *Pediatrics,* vol 105:454-461

Anand, K.J.S., Coskun, V., Thrivikraman, K. V., Nemeroff, C.B. and Plotsky, P.M. 1999. Long-Term Behavioural Effects of Repetitive Pain in Neonatal Rat Pups. *Physiology & Behavior*, vol. 66(4) pp.627 - 637

Anand, K.J.S. and the International Evidence-Based Group for Neonatal Pain. 2001. Consensus Statement for the Prevention and Management of Pain in the Newborn. *Archives Pediatric and Adolescent Medicine,* vol.155 173-180 < http://archpedi.jamanetwork.com/journal.aspx> [Accessed 05/10/2012]

Anand, K.J.S. , Hall, R.W., Desai, N., Shephard, B, Bergqvist, L.L., Young, T.E., Boyle, E.M., Carbajal, R., Bhutani, V.K., Moore, M., Kronsberg, S.S., and Barton, B.A., for NEOPAIN Trial Investigators Group. 2004. Effects of morphine analgesia in ventilated preterm neonates: primary outcomes from the NEOPAIN randomised trial. *Lancet.* 22;363(9422):1673-82

Anand, K.J.S. 2007a. Pharmacological approaches to management of pain in the neonatal intensive care unit. *Journal of Perinatology*, 27: S4 –S11

Anand, K.J.S. 2007b. Pain Assessment in Preterm Neonates. *Pediatrics*, 119: 605-607 <http://www.ncbi.nlm.nih.gov/pubmed/17332212> [Accessed on 08/10/2012]

Anand, K.J.S., and Hall, R.W. 2008. Love, Pain and Intensive Care. *Pediatrics*, 121: 825-827 <http://www.pediatrics.org/cgi/content/full/121/4/825> [Accessed 08/10/2012]

Andersen, R.D., Greve-Isdahl, M. and Jylli, L. 2007. The opinions of clinical staff regarding neonatal procedural pain in two Norwegian neonatal intensive care units. *Acta Pediatrica* 96: 1000-1003.

Ballweg, D. (2007). Neonatal and pediatric pain management: standards and application. *Paediatrics and Child Health,* 17(S1) S61-S66

Belliene, C.V., Iantorno, L., Perrone, S., Rodriguez, A., Longini, M., Capitani, S. and Buonocore, G. 2009. Even routine painful procedures can be harmful for the newborn. *PAIN*, 147: 128-131

Bellini, S. and Damato, E. G. 2009. Nurses' knowledge, attitude/beliefs and care practices concerning do not resuscitate status for hospitalized neonates. *Journal of Obstetrics, Gynecological & Neonatal Nursing,* Mar-April, 38 (2): 195-205

Benner,P., Tanner, C., and Chesla, C. 1992. From beginner to expert: Gaining a differentiated clinical world in critical care nursing. *Advances in Nursing Science* 14 (3): 13-28. <http://www.sciencedirect.com/science/article/pii/S1524904209000538> [Accessed 20/04/2009]

Benner,P., Tanner, C., and Chesla, C. 2009. Expertise in Nursing Practice: Caring, Clinical Judgment & Ethics. 2nd Edition New York: Springer Publication Company

Burns, N. and Grove, S.K. 2005. The Practice of Nursing Research, Conduct Critique and utilisation 5th Edition Philadelphia: W.B. Saunders Company

Carbajal, R., Nguyen-Bourgain, C. and Armengaud, J-P. 2008a. How can we improve pain relief in neonates? *Expert Reviews. Neurother,* 8(11): 1617-1620

Carbajal, R., Rousset, A., Danan C., Sarah Coquery, S., Nolent, P., Ducrocq, S., Saizou, C., Lapillonne, A., Granier, M. , Durand,P.,Lenclen,R., Coursol,A., Hubert, P., de Saint Blanquat, L., Boëlle,P., Annequin, D.,Cimerman,P., Anand, K.J.S., and Bréart,G. 2008b. Epidemiology and treatment of painful procedures in neonates in intensive care units. *Journal of the American Medical Association* 300(1): 60 – 70

Carper, B. A. 1978. Fundamental patterns of knowing in nursing. *Advances in Nursing Science,* vol. 1, pp. 13-23.

Creswell, J.W. 2009. Research Design: Qualitative, Quantitative and Mixed Methods approaches. 4nd Edition United States: Sage Publications

DeVon, H.A., Block, M.E., Moyle-Wright, P., Ernst, D.M., Hayden, S.J., Lazzara, D.J., Savoy, S.M. and Kostas-Polston, E. 2007. A Psychometric Toolbox for Testing Validity and Reliability. *Journal of Nursing Scholarshi*p*,* 39(2): 155 – 164

Diedericks, J. 2006. Postoperative pain management in the paediatric patient. *South African Family Practitioner.* 48(3): 37 – 42

Dodds, E. 2003. Neonatal procedural pain: a survey of nursing staff. *Paediatric Nursing*, 15(5): 18 – 21

Duhn, L.J. and Medves, J.M. 2004. A Systemic Integrative Review of Infant Pain Assessment Tools. *Advances in Neonatal care,* 4(3): 126-140

Evan, J.C. 2001. Physiology of acute pain in preterm infants. *Newborn and Infant Nursing Reviews,* 1(2): 75 – 84

Gibbins, S and Fowler, L. 2007. A Combined Approach to Pain management in the Surgical Neonate. *Newborn and Infant Nursing Reviews.* 171-174

Golinau, B., Krane, E.L., Galloway, K.S. and Yaster, M. 2000. Acute pain in children: Pediatric acute pain and management. *Pediatric Clinical North America.*47 (3): 559-587

Gradin, M., Eriksson, M., for the NeoOpioid investigators group. 2010. Neonatal pain assessment in Sweden – a fifteen year follow up. *Acta Peadiatrica* 100: 204-208

Granau, R.V.E., Whitfield, M.F., Petrie, J.H. and Fryer, E.L. 1994. Early pain experience, child and family factors, as precursors of somatisation: a prospective study of extremely premature and full term children. *PAIN,* 5(b): 353-359 pg 84

Granau, R.E., Holsti, L. and Peters, J.W.B. 2006. Long-term consequences of pain in human neonates. *Seminars in Fetal Neonatal Medicine* 11: 268-275

Halimaa, S-L., Vehviläinen-Julkunen, K. and Heinonen, K. 2001. Knowledge, assessment and management of pain related to nursing procedures used with premature babies: Questionnaire study of caregivers. *International Journal of Nursing Practice.* 7: 422- 430

Health Professions Council of South Africa (HPCSA) according to the Health Professions Act No. 56 of 1974

Hummel, P. and Puchalski, M. 2001. Assessment and management of pain in infancy. *Newborn and Infant Nursing Reviews,* 1(2): 114-121

Jacob, E. and Puntillo, K.A. 1999. A survey of nursing practice in the assessment and management of pain in children. *Pediatric Nursing*. 25:278 - 286

Johnston, C.C., Stevens, B., Craig, K.D. and Granau, V.E.1993. Developmental changes in pain expression in premature, full-term and two- and four-month-old-infants. *Pain,* 52:201-20

Johnston, C.C., Stevens, B., Yang, F. and Horton, L. 1995. Differential response to pain by very premature neonates. *Pain,* 61: 471-479

Johnston, C.C., Anand, M.F. and Campbell-Yeo, M. for the International Association for the Study of Pain. 2010. Pain in neonates is different. *PAIN* 152: S65-S73

Joint Commission on Accreditation of Healthcare Organisations. 2005. Hospital accreditation standards.: Joint Commission Resources, Inc.: Oakbrooke Terrace, IL

Kisorio, L., Schmollgruber, S. and Becker, P. 2009. Validity and Reliability of the Simplified Therapeutic Intervention Scoring System in Intensive Care Units of a Public Sector Hospital in Johannesburg. *South African Journal of Critical Care,* 25(2): 36-43

Kumar, S. P., Jim, A. and Sisodia, V. 2011. Effects of Palliative Care Training Program on Knowledge, Attitudes, Beliefs and Experiences Among Student Physiotherapists: A Preliminary Quasi-experimental Study. *Indian Journal of Palliative Care*, Jan; 17 (1): 47-53

Lago, P., Garetti, E., Merazzi, D., Pieragostini, L., Ancora, G., Pirelli, A. and Belliene, C.V. on behalf of the Pain Study Group of the Italian Society. 2009. Guideline for procedural pain in the newborn. *Acta Paediatrica,* 98:932 – 939. < http://onlinelibrary.wiley.com/doi/10.1111/j.1651-2227.2009.01291.x/full> [Accessed 05/10/2012]

Latimer, M.A., Johnston, C.C., Ritchie, J.A., Clarke, S.P. and Gilin, D. 2009. Factors Affecting Delivery of Evidence Based Procedural Pain Care in Hospitalized Neonates. *Journal of Gynaecology and Neonatal Nursing,* 38(2): 182 - 194

LoBiondo-Wood, G. and Haber, J. 2006. Nursing Research: Methods and Critical Appraisal for Evidence-Based Practice. 6th Edition Missouri: Mosby Elsevier

Maree, K. 2009. First Steps in Research. 1st Edition Pretoria: Van Schaik

McKechnie, L. and Levene, M. 2008. Procedural Pain Guidelines for the Newborn in the United Kingdom. *Journal of Perinatology* 28(2): 107-111

McLaughlin, C.R., Hull, J.G., Edwards, W.H.,Cramer, C.P. and Dewey, W.L.1993. Neonatal pain: A comprehensive survey of attitudes and practice. *Journal of Pain and Symptom Management*. 8(1), 7-16

Merskey, H., Alber-Fessard, D.G., Bonica, J.J, Carmon, A., Dubner, R., Kerrf, W.L. et al on behalf of the International Association for the Study of Pain.1979. Pain terms: a list with definitions and notes on usage: recommended by International Association on Pain Management Subcommittee on Taxonomy. *Pain.* 6: 249-252

Naicker, S., Plange-Rhule, J., Tutt ,R.C, and Eastwood, J.B. 2009. Shortage of healthcare workers in developing countries: Africa. *Ethnicity and Disease.* Spring;19(1 Suppl 1):S1-60-4

Pöllki, T., Korhonen, A., Laukalla, H., Saarela, T., Vehviläinen-Julkunen, K. and Pietilä, A. 2010. Nurses'attitudes and perceptions of pain assessment in neonatal intensive care. *Scandinavian Journal of Caring Sciences.*24: 49-55

Polit, B. and Beck, C.T. 2008. Nursing Research Generating and Assessing Evidence for Nursing Practice 8th Edition Lippincott Williams & Wilkins: Philadelphia

Porter, F.L., Wolf, C.M., Gold, J., Lotsoff, B.S. and Miller, A.B. 1997. Pain and pain management in newborn infants: a survey of physicians and nurses. *PEDIATRICS,* 100(4): 626-632

Reyes, S. 2003. Nursing Assessment of Infant Pain *Journal of Perinatal and Neonatal Nursing* 17 (4): 291-303

Rouzan, I.A. 2001.An Analysis of Research and Clinical Practice in Neonatal Pain Management. *Journal of the American Academy of Nurse Practitioners.* 13(2): 57-60

Sharek, P.J., Powers, R., Koehn, A. and Kanwaljeet, J.S. 2006. Evaluation and Development of Potentially Better Practices to Improve Pain Management of Neonates. *PEDIATRICS,*118 : S78 – S86

South African Nursing Council. 1984. *Government notice regulation 2598 as amended*. Regulation related to the scope of practice of person registered or enrolled under the Nursing Act, 2005.

South African Nursing Council. 1984. *Government Notice No. R. 2418.* Regulations Relating to the Keeping, Supply, Administering or Prescribing of Medicines by Registered Nurses

Scribante,J., Muller,M.E., and Lipman,J. 1995. Interpretation of the scope of practice of the South African critical care nurse. *South African Journal of Medicine,* 85(5):437-441

Simons, S.H.P., van Dijk, M., Anand, K.J.S., Roofthooft, D., van Lingen, R.A. and Tibboel, D. 2003. Do we still hurt newborn babies? A prospective study of procedural pain and analgesia in neonates. *Archives of Pediatrics and Adolescent Medicine.* 157: 1058 – 1064

Spence, K., Henderson-Smart, D., New, K., Evans, C., Whitelaw, J., Woolnough, R. and the Australian and New Zealand Neonatal Network. 2010. Evidenced-based clinical practice guideline for management of newborn pain. *Journal of Paediatrics and Child Health* 46: 184–192.

South African Nursing Council (SANC), 2010. Distribution by province of nursing manpower versus population of South Africa, 2010. Available at: www.sanc.co.za/stats.htm [Accessed 04/06/2012]
Taddio, A., Shah, V., Hancock, R, Smith, R.W., Stephens, D., Atenafu, E., Beyene, J., Koren, G., Stevens, B. and Katz, J. 2008. Effectiveness of sucrose analgesia in newborns undergoing painful medical procedures. *CMAJ,* 179(1):37-43

Tjale, A.A. 2007. A framework for holistic nursing care in paediatric nursing. Phd Thesis: University of the Witwatersrand

Tjale, A. and Bruce, J. 2007. A concept analysis of holistic nursing care in paediatric nursing. *CURATIONIS*, 30(4): 45-52.

Urso, A.M. 2007. The reality of neonatal pain and the resulting effects. *Journal of Neonatal Nursing* 13, 236-238

Van der Zalm, J. E., & Bergum, V. (2000). Hermeneutic phenomenology: Providing living knowledge for nursing practice. *Journal of Advanced Nursing, 31*(1), 211-218

Walker, S.M. and Howard, F.R. (2002). Neonatal pain. *Pain Review* 9, 69-79

Walker, S.M., Franck, L.S., Fitzgerald, M., Myles, J., Stocks, J and Marlow, N. 2009. Long term impact of neonatal intensive care and surgery on somatosensory perception in children born extremely preterm. *PAIN,* 141: 79-87

ANNEXURE A

- **INFORMATION SHEET**

INFORMATION LETTER and INVITATION TO PARTICIPATE

THE KNOWLEDGE, ATTITUDE AND BELIEFS OF NURSES AND DOCTORS CONCERNING NEONATAL PAIN AND MANAGEMENT

Dear Colleague

My name is Sizakele Khoza, a neonatal intensive care professional nurse currently reading for a Masters degreein Child Health with the University of the Witwatersrand. I am conducting a study to investigate current neonatalpain management practice and describe the knowledge, beliefs and attitudes of neonatal staff concerningneonatal pain and its management in South Africa. The aim of this study is to collect empirical data whichdescribes what informs neonatal pain management and use this to increase awareness of neonatal pain andadvocate for the development of written neonatal pain management guidelines.

I am inviting you to participate in this research by filling in the Infant Pain Questionnaire. Completion of thequestionnaire will require ten minutes of your time. The questionnaires will be handed out at the beginning of theshift to all staff on duty and a collection box left for the return of all questionnaires during the shift. The box willbe collected at the end of the shift. To ensure anonymity and protect your identity, please do not write your nameon the questionnaire and return the questionnaire whether completed or not completed at the end of the shift.

Your participation in the study is voluntary and uncompleted questionnaires carry no penalty. The research findings will be made available to the unit staff and in service training on neonatal pain management arranged on request. A complete copy of the research report will be available at the Faculty ofHealth Sciences Wits Health Sciences library. Oral and poster presentations will be presented at the Universityof the Witwatersrand, Faculty of Health Science research forums, Gauteng Department of Health researchforums and various research presentation forums. An article will be produced for publication in Nursing andmultidisciplinary health journals.

I am available to answer questions and queries regarding aspects of the research and the questionnaire via thefollowing communication modes:
electronically sizakela.khoza@wits.ac.za; telephonically 0839814708,+27114884273 (office hours) and +27119412582 (after hours).

Thank you for reading this information letter and responding to my invitation. Your participation in this research is valuable and appreciated.

Yours sincerely

_____

Sizakele Khoza (Miss)

ANNEXURE B

- **INFANT PAIN QUESTIONNAIRE**

Infant Pain Questionnaire Researcher code: _____

Completion of this questionnaire is voluntary and indicates consent to participate in the research study titled: **THE KNOWLEDGE, ATTITUDE AND BELIEFS OF NURSES AND DOCTORS CONCERNING NEONATAL PAIN AND MANAGEMENT –** SIZAKELE KHOZA

**Instructions: ****Please tick* [√] *a relevant response*

**Kindly submit the questionnaire to collection box by the end of your shift. Please do not take questionnaire away from the unit or discard of it. All questionnaires must be submitted.*

SECTION A: Demographic Data

1. **Unit/ Ward**

NICU		**1**
H/C		**2**

2. **Qualification**

Consultant		1
Registrar		**2**
Intern		**3**
Professional Nurse		**4**
Enrolled nurse		**5**

3. **Level of experience working with neonatal patients (No. of years working with neonatal patients)**

0 – 5 years		1
6 -10 years		**2**
11 – 15years		**3**
16 – 20 years		**4**
>21 years		**5**

4. **Gender**

Female		1
Male		**2**

PART B

1. **Indicate whether you have experienced procedure related pain**

Y	1	*N*	2

2. **Complete this sentence on what you consider neonatal pain to be:**

Pain in the neonate is _____

_____

_____

3. **Indicate whether you believe neonates experience more pain than adults**

Y	1	*N*	2

4. **Indicate whether you believe neonates experience less pain than adults**

Y	1	*N*	2

5. **Is there a pain management guideline in the ward?**

Y	1	*N*	2

Question 6

Rate the painfulness of each of the listed procedures which may or may not be performed on a neonate admitted into you unit.

RATING SCALE

0 =	No pain
1 =	Somewhat painful
2 =	Moderately painful
3 =	Quite painful
4 =	Very painful

Procedure	**0**	**1**	**2**	**3**	**4**
1. Endotracheal intubation					
2. Insertion of a chest tube					
3. Insertion of a feeding tube					
4. Tracheal suctioning					
5. Lumbar puncture					
6. Intramuscular injection					
7. Insertion of umbilical catheter (arterial/ venous)					
8. Insertion of peripheral intravenous line					
9. Heel stick/ Heel prick					
10. Insertion of radial arterial line					

Question 7

Rate how often each procedure is performed with pharmacologic agents (e.g. analgesia, paracetamol, opioids and/or local anaesthetics).

RATING SCALE

0 =	Never
1 =	Rarely
2 =	Often
3 =	Usually
4 =	Always

Procedure	**0**	**1**	**2**	**3**	**4**
1. Endotracheal intubation					
2. Insertion of a chest tube					
3. Insertion of a feeding tube					
4. Tracheal suctioning					
5. Lumbar puncture					
6. Intramuscular injection					
7. Insertion of umbilical catheter (arterial/ venous)					
8. Insertion of peripheral intravenous line					
9. Heel stick / Heel prick					
10. Insertion of radial arterial line					

Question 8

Rate how often each procedure is performed with non pharmacologic measures (e.g. swaddling, pacifier, positioning, warming of heel prior to heel stick)

RATING SCALE

0 =	Never
1 =	Rarely
2 =	Often
3 =	Usually
4 =	Always

Procedure	0	1	2	3	4
1. Endotracheal intubation					
2. Insertion of a chest tube					
3. Insertion of a feeding tube					
4. Tracheal suctioning					
5. Lumbar puncture					
6. Intramuscular injection					
7. Insertion of umbilical catheter (arterial/ venous)					
8. Insertion of peripheral intravenous line					
9. Heel stick/ Heel prick					
10. Insertion of radial arterial line					

Question 9

Rate how often you believe each procedure should be performed with pharmacologic agents (e.g. analgesia, paracetamol, opioids and/or local anaesthetics).

RATING SCALE

0 =	Never
1 =	Rarely
2 =	Often
3 =	Usually
4 =	Always

Procedure	0	1	2	3	4
1. Endotracheal intubation					
2. Insertion of a chest tube					
3. Insertion of a feeding tube					
4. Tracheal suctioning					
5. Lumbar puncture					
6. Intramuscular injection					
7. Insertion of umbilical catheter (arterial/ venous)					
8. Insertion of peripheral intravenous line					
9. Heel stick / Heel prick					
10. Insertion of radial arterial line					

Question 10

Rate how often you believe each procedure should be performed with non pharmacologic measures (e.g. swaddling, pacifier, positioning, warming of heel prior to heel stick)

RATING SCALE

0 =	Never
1 =	Rarely
2 =	Often
3 =	Usually
4 =	Always

Procedure	**0**	**1**	**2**	**3**	**4**
1. Endotracheal intubation					
2. Insertion of a chest tube					
3. Insertion of a feeding tube					
4. Tracheal suctioning					
5. Lumbar puncture					
6. Intramuscular injection					
7. Insertion of umbilical catheter (arterial/ venous)					
8. Insertion of peripheral intravenous					
9. Heel stick/ Heel prick					
10. Insertion of radial arterial line					