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KNOWLEDGE OF EPIDURAL ANALGESIA AMONG LABOUR WARD NURSING STAFF AT CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

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

of

Master of Medicine in Anaesthesia

Johannesburg, 2015

DECLARATION

I, Nezisa Nongqo, declare that this research report is my own work. It is being submitted for the Degree of Master of Medicine in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other university.

Signature

Signed at: University of the Witwatersrand, Johannesburg

On this date:

PRESENTATIONS

This work was presented at the South African Society of Anaesthesiologists' annual congress at Sun City in March 2014.

ABSTRACT

Epidural analgesia has become the gold-standard for providing labour analgesia. Internationally 40-60% of labouring women receive epidural analgesia. At Chris Hani Baragwanath Academic Hospital (CHBAH) currently less than 10% of parturients receive epidural analgesia. Greater involvement of nursing staff is needed for this service to expand. Nurses should have the necessary knowledge if they are to be involved in the provision of labour epidurals.

All 50 nurses working in the CHBAH labour ward at the time of the study were invited to complete a previously validated, self-administered questionnaire. The questionnaire included demographic data and a knowledge test. The demographic section assessed personal and professional details and identified sources of knowledge related to epidural analgesia. The knowledge test was comprised of 22 questions divided into five knowledge subsections relating to epidural analgesia: spinal cord anatomy and physiology, epidural pharmacology, assessment of sensory and motor blockade, complications of epidural analgesia, and the general management of a patient receiving epidural analgesia. The data was collected during working hours.

Of the 50 questionnaires handed out, 45 were returned resulting in a 90% response rate. Of these, 43 questionnaires were usable. The majority of the participants were in the 30-39 years age range. The median number of years worked in labour ward was 11 (range 0.5 - 30 years). Forty four percent of the nurses had a three year diploma in nursing and 33% had a four year diploma in nursing. Sixty five percent of nurses cared for less than five patients with epidurals per month. Eighty four percent of nurses had received no specific education regarding labour epidurals. The overall knowledge of nurses working in the CHBAH labour ward, labour ward high care and labour ward admissions was poor with a median score of 4 out of a total score of 22. The results for the subsections were as follows: anatomy and physiology of the spinal cord with a median score of 1 (range 0-4), epidural pharmacology with a median score of 1 (range 0-4), assessment of sensory and motor blockade with a median score of 0 (range 0-5), complications arising from epidural analgesia with a median score of 0 (range 0-3) and general management of epidural analgesia with a median score of 2 (range 0-3). Urgent educational programs and teaching need to be instituted in order to improve the nurses' knowledge.

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Jude 1:25

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1 CHAPTER ONE: OVERVIEW OF THE STUDY

1.1 INTRODUCTION

In this chapter an overview of this study is provided. A background to the study, the problem statement, the aim and objectives, the research assumptions, demarcation of the study field, the ethical considerations, research methodology, the significance of the study, the validity and reliability and an overview of the research report are presented.

1.2 BACKGROUND TO THE STUDY

Childbirth is the most painful event that women are likely to experience. Pain relief in labour is a right for all women irrespective of race or creed and it remains each pregnant woman's prerogative whether to exercise it or not (1).

Uncontrolled labour pain may have several negative effects such as an increase in maternal stress responses (that can decrease the supply of oxygen to the baby), an increase in the risk of post-partum depression and post-traumatic stress disorder (PTSD), a delay in maternal bonding, interference with breast-feeding and an increase in the risk of developing chronic pain conditions. These can impact significantly on the experience of childbirth and future pregnancies. (2-4)

Labour pain management has evolved from the days of Fanny Longfellow, the first woman in United States of America to receive inhaled ether for relieving labour pains in 1847, to include pharmacological agents such as parenterally administered opioids, inhalational agents like nitrous oxide and epidural analgesia. Non-pharmacological labour analgesic methods, such as hypnosis, acupuncture and transcutaneous electrical nerve stimulation, have also been evaluated and found to have varying efficacy. (5-8) Overall, research generally points to epidural analgesia as being the gold standard for labour pain management (8-10).

Approximately 60% of women per year select either epidural or combined spinal-epidural analgesia for pain management during labour in the United States of America (11).

Comparatively, in Australia, 40% of women per year choose epidural analgesia to facilitate the birthing process (12).

In 1993 it was reported that 87% of hospitals in Canada use epidural analgesia to control post-operative pain (13). Despite on-going controversies, epidural rates have increased with 25% of women in the United Kingdom receiving epidural analgesia in labour (8). The increasing frequency of epidural techniques used to manage pain necessitates that more registered nurses must have the required knowledge and skills to manage these patients safely (11). Furthermore, it is known that nurses' attitudes, knowledge and practice regarding labour pain management influences the parturients' experience of the birthing process (12, 14).

A review of the literature highlighted that there are few studies assessing nurses' knowledge regarding epidural analgesia.

Vandendriesen et al (15) showed that the knowledge of midwifery staff working in the labour ward in a public teaching hospital that had more than 5000 deliveries per year was suboptimal (51%) despite most of the nurses having received formal education regarding epidural analgesia.

A survey of registered nurses' knowledge and attitudes regarding postoperative epidural analgesia conducted in a military teaching hospital by Sandie et al (16) revealed that knowledge levels were low. Nurses with more years of experience and those who had received pain management education during their training achieved higher scores (16).

An Australian study conducted by Bird et al (14) describing nurses assessment skills and knowledge of managing patients with epidural infusions found that the theoretical knowledge of the nurses in this study exceeded their clinical skills and decision making.

In 2009 Bird et al (12) conducted a further study to determine the level of knowledge of epidural analgesia among registered nurses. This study found that knowledge varied from fair to good for different aspects of epidural analgesia.

The only South African study assessing nurses' knowledge of epidural analgesia that could be identified was conducted in 1989 by Dorfling et al (17).

Knowledge of anatomy, physiology and the adverse effects of epidural analgesia was poor but knowledge regarding the preparation for and assisting with the insertion of an epidural catheter ranged from fair to good (17).

Historically, at Chris Hani Baragwanath Academic Hospital (CHBAH) labour ward, epidural analgesia used to be a service offered and administered by the obstetricians. The service was limited by lack of staff and limited equipment and was offered only to parturients with specific indications. The obstetricians, with the assistance of nurses with advanced midwife training, would insert the epidural and administer a single shot bolus of local anaesthetic.

The parturient would then be monitored for an hour and then sent to the labour ward if stable. Continuous infusions were not utilised because of lack of staff with advanced midwife training who were needed to monitor and nurse the parturients. This service, although far from ideal, worked well from the late 1970's until the late 1980's when a parturient (who was also a known staff member in the CHBAH labour ward) suffered an epidural related complication that led to her demise. (18)

After this event the nursing staff became resistant to assist with epidural placements and the monitoring of those parturients and this incident still influences the nursing staff's perceptions of epidural analgesia.

A need to improve the provision of the epidural services in the obstetric department was identified and in 1993 the service was officially taken over by the Department of Anaesthesiology. To date, the service is still being offered by the Department of Anaesthesiology. Although there still remains some resistance from the nursing staff, the service is being expanded and adequately trained nursing staff who will assist with the care of a parturient receiving epidural analgesia is essential. (18)

1.3 PROBLEM STATEMENT

Epidural analgesia services are offered at CHBAH labour ward, which has on average 2000 vaginal deliveries per month (19) and an average of 12 to 15 epidurals per week (20).

Nurses contribute to the management of patients with epidural analgesia in the labour ward and it is therefore important to ascertain their level of knowledge regarding epidural analgesia as it impacts on patient outcomes. There is currently no information regarding the levels of knowledge of epidural analgesia among the CHBAH nursing staff in the labour ward.

Although the Department of Anaesthesiology officially took over the labour epidural analgesia service in 1993, a very limited service was rendered following the death of the nurse receiving epidural analgesia in the 1980's as nurses became resistant to the service and only recently has there been a resurgence. The epidural services are currently being administered by anaesthetists. Because of the high volume of the patients giving birth, the anaesthetist is often not able to monitor all of the parturients receiving epidural analgesia and the labour ward nursing staff is required to care for these patients.

Furthermore, in 1993 the South African Nursing Council (SANC) issued a policy statement regarding epidural pain control by registered nurses and midwives which stated that epidural analgesia was viewed as part of the registered nurse's scope of practice (21). No current research was identified that reflected the level of knowledge of South African nurses regarding epidural analgesia.

1.4 AIM AND OBJECTIVE

1.4.1 Aim of the study

The aim of this study was to determine the level of knowledge of epidural analgesia of labour ward nursing staff at CHBAH.

1.4.2 Objectives

The primary objectives of this study were to:

- describe the level of knowledge of participants regarding epidural analgesia
- describe the sources of knowledge regarding epidural analgesia used by participants
- describe the level of confidence of participants in caring for patients receiving epidural analgesia.

The secondary objectives of this study were to:

- compare test scores with the years of nursing experience
- compare test scores with the years of experience of working in the labour ward
- compare test scores of registered nurses with those of staff nurses.
- compare test scores with level of confidence in caring for patients receiving epidural analgesia

1.5 RESEARCH ASSUMPTIONS

The following definitions were used in this study.

Knowledge: the information and skills acquired through experience or education; the theoretical understanding of a subject (22).

Adequate knowledge: will be a score of ≥70% as in many other nursing studies (23-25).

Labour ward nursing staff: refers to nurses of differing professional categories that look after parturient in the labour ward. In this study this included registered nurses and staff nurses. Staff nurses are referred to as enrolled nurses. It is important to note that both registered and staff nurses currently practice under Regulation 2598 (amended 15 February 1991) in terms of the previous Nursing Act of 1978. Labour ward staff will include those working in the labour ward, labour ward high care and labour ward admissions as they rotate between these three areas.

Parturient: a woman in active phase of labour (26).

1.6 DEMARDACTION OF STUDY FIELD

This study was conducted at CHBAH labour ward. This hospital is located in Soweto, Johannesburg and has 2888 beds. It is an academic public hospital which is affiliated to the University of the Witwatersrand. CHBAH is the largest hospital in Africa.

On average the hospital has 32 000 deliveries annually and approximately 700 patients receive labour epidural analgesia.

1.7 ETHICAL CONSIDERATIONS

Approvals to conduct the study were obtained from the relevant authorities. The study was conducted in adherence to the principles of the Declaration of Helsinki (27) and the South African Good Clinical Practice Guidelines (28).

1.8 RESEARCH METHODOLOGY

1.8.1 Research design

A descriptive, contextual, cross-sectional study was done using a self-administered questionnaire.

1.8.2 Study population

The study population consisted of nurses working in the labour ward at CHBAH.

1.8.3 Study sample

In consultation with a biostatistician a study sample of 40 labour ward nurses was calculated using nQuery advisor version 7. A convenience sampling method was used in this study. Inclusion and exclusion criteria were defined.

1.9 DATA COLLECTION

A self-administered questionnaire with a demographics section and a knowledge test section was used to collect data. The labour ward staff were approached at work to complete the questionnaire. The questionnaire was personally distributed to the nurses in an envelope. The researcher was present during the completion of the questionnaire to prevent contamination of information.

1.10 DATA ANALYSIS

Data was captured on a Microsoft Excel® 2010 spread sheet and analysed using STATISTICA version 12.5 in consultation with a biostatistician and descriptive and inferential statistics were used.

1.11 SIGNIFICANCE OF THE STUDY

Epidural analgesia is currently utilized by approximately 12 to 15 parturients per week. Epidural analgesia has been described as the gold standard for the management of pain during labour (8-10). The epidural service in CHBAH is likely to expand in keeping with international trends and in order to ensure safe practise, nurses working in the labour ward will be required to have a good knowledge of all aspects of epidural analgesia related care.

Labour ward nursing staff at CHBAH play a vital role in the control of pain during labour. This study may facilitate an understanding of the levels of epidural analgesia knowledge amongst nursing staff caring for the parturients in the labour ward. Information regarding labour ward nurses current knowledge of epidural analgesia may assist in structuring appropriate educational programs regarding epidural analgesia.

1.12 VALIDITY AND RELIABILITY

Measures were taken to ensure validity and reliability of the study.

1.13 STUDY OUTLINE

This study will be presented as follows:

Chapter One: Overview of the study

Chapter Two: Literature review

Chapter Three: Research methodology

Chapter Four: Data analysis and discussion of the results

Chapter Five: Summary, limitations, recommendations and conclusion.

1.14 SUMMARY

An overview of the study was presented in this chapter. A background to the study, the problem statement, the aim and objectives, the research assumptions, demarcation of the study field, the ethical considerations, research methodology, the significance of the study, the validity and reliability and an overview of the research report are presented. In the following chapter a review of the literature relevant to this study is presented.

2 CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

In this chapter the literature relevant to this study is reviewed. The physiology of labour pain, including the stages of labour, the negative effects of labour pain, methods of managing labour pain, maternal attitudes to labour pain and practicalities of epidural analgesia administration and its complications are discussed. This is followed by a discussion of the education and training of South African nurses, their responsibilities regarding epidural analgesia and studies evaluating nurses' knowledge of epidural analgesia.

2.2 BACKGROUND

Women's experience of pain during labour varies greatly, with some feeling very little or no pain and others experiencing extreme pain, reported as being the most severe pain that a woman experiences in her life (29, 30). Many factors influence a woman's experience of pain during labour; these include her level of fear and anxiety, her position during labour and her mobility. There are a variety of non-pharmacological and pharmacological interventions available for pain relief during labour and woman should feel free, within reason, to choose whatever intervention or interventions they feel would best assist them through the process. Education during pregnancy and in early labour about the benefits and potential risks of the different methods of pain control should assist women in making their choice. (31)

Epidural analgesia has become more and more popular for pain relief during labour. A medical practitioner is responsible for inserting the epidural catheter and administering the first dose of analgesia via the catheter.

In 1993, the SANC issued a policy statement stating that it viewed epidural analgesia as part of the registered nurses' scope of practice (21, 32). Prior to that there was ambivalence as to the nurses' role in administering epidural analgesia.

According to the policy statement registered nurses have to take on the responsibility of not only monitoring patients receiving epidurals but also administering top-up doses to patients. In order to ensure patient safety and as nurses are held accountable for all their actions they need a sound knowledge base regarding all aspects of epidural analgesia. (21, 30)

2.3 PHYSIOLOGY OF LABOUR 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" (33).

Pain during labour is attributed to a complex and subjective interaction of multiple factors (psychological, social, physiological, and spiritual). It is also influenced by the individual's own emotional interpretation of the physical stimuli they experience during labour and delivery (27,35,38). In the following section the mechanisms and pathways of pain in general are discussed as well as how labour pain is mediated in the parturient.

The neural mechanisms of labour pain are similar to other forms of acute pain. Acute pain occurs when tissue injury occurs. A large number and variety of chemical mediators are liberated including hydrogen ions, noradrenaline, bradykinin, histamine, potassium ions, prostaglandins, purines, cytokines, 5-hydroxytryptamine, leukotrienes, nerve growth factor and neuropeptides. These substances in turn stimulate the small A delta and C afferent pain fibres. (32,33)

The terminals of small A delta and C afferent fibres act as receptors for nociception from superficial structures (skin and subcutaneous tissue), deep structures (muscle, fascia) and viscera. These afferent pathways pass within nerve fibres to the dorsal horn of the spinal cord where they either terminate superficially or pass more deeply into the dorsal horn laminae. The dorsal horn neurones act as an area of central convergence of information which is central and peripheral, excitatory and inhibitory. (33)

When the peripheral stimulus is adequate, there is temporal and spatial summation of the postsynaptic excitatory potential and the action potential threshold of the spinal neurones are exceeded (33).

This depolarisation of the dorsal horn neurone is mediated by neurotransmitters (released from A delta and C afferent pain fibres), excitatory amino acids (aspartate and glutamate), substance P and neurokinin (33).

The excitatory amino acids attach to N-Methyl-D-Aspartate acid receptors while the neuropeptides attach to the tachykinin receptors (34, 35). Spinal release of excitatory amino acids is associated with the release of nitric oxide which plays a role in spinal nociception (36).

Action potentials generated within the dorsal cell neurone may participate in local spinal reflexes in which anterior and anterolateral horn cells stimulate skeletal muscle and sympathetic outflow. The action potential is also relayed centrally via the spinothalamic tract, from which the impulse is modulated successively by the reticular formation in the brainstem (integrative function), thalamus (level of arousal), hypothalamus and limbic systems (attention, mood and motivation). (37)

Nociception is modulated at the level of the dorsal horn by descending spinal tracts, which receive input from higher centres and the limbic system via stimulation of structures in the midbrain. Endogenous opioids are involved in the spinal modulation of nociception. (36 -38)

Proenkephalin is the precursor for met-enkephalin and other enkephalins which act by interaction with δ-opioid receptors and dynorphin derived from prodynorphin interacts with κ-opioid receptors (36-38).

The anti-nociceptive effect is produced by attenuation of the primary afferent nociceptive input, by inhibition of propagation of the action potential along the dorsal horn cell or by reducing the release of excitatory neurotransmitter substances from primary afferent terminals (36-38).

There are also other inhibitory systems that do not involve opioids. There appears to be a system of “on-cells and off-cells” originating in the medulla that are able both to enhance and to suppress nociceptive transmission (36-38).

The cerebral cortex, although not of primary importance in the perception of pain, may regulate and discriminate subcortical input (36-38).

It may mediate cognition and motivation and affective features of pain, utilising information based on past experience and emotions. In this way, the expression of pain, and the individual's pain behaviour, is influenced by previous experience, personality, perceptual factors and ethnic and cultural background. (37-40)

2.4 PAIN DURING LABOUR STAGES

2.4.1 First stage

The source of uterine nociception is not fully defined. Evidence indicates that, in the first stage of labour, pain is primarily mediated by mechanical distension of the lower uterine segment with a contribution from mechanical dilatation of the cervix and the muscle contraction itself. Uterine contractions result in stretching and injury which lead to excitation of nociceptive afferents. (37)

The uterus and cervix are supplied by sensory nerves that accompany the sympathetic nerves in the uterine and cervical plexus, the inferior hypogastric plexus, the middle hypogastric plexus, the superior hypogastric plexus and the aortic plexus. Nociception is transmitted via unmyelinated C visceral fibres. They pass through the lower thoracic and lumbar sympathetic chains to the posterior nerve roots of the 10th, 11th and 12th and L1 nerve root to make synaptic contact with the interneurons in the dorsal horn. Chemical mediators that may be involved in the excitation of these fibres include bradykinin, leukotrienes, prostaglandins, serotonin, substance P and lactic acid. (37, 41, 42)

Contraction pain is slowly transmitted and poorly localised. It is referred to the dermatomes supplied by T10, T11, T12 and L1. During the early first stage this is felt as a dull ache over the area supplied by T11 and T12. As labour progresses, the pain becomes increasingly severe and is referred to the abdomen, lower lumbar and upper sacrum, areas supplied by T10 and L1. (37)

2.4.2 Second stage

The distension of the lower segment and cervix continues to cause pain with a similar pattern to the first stage and it is worsened by the increasing pressure exerted by the presenting part within the pelvis as it descends (36).

The pain is usually described as sharp and localised to the perineum, anus and rectum. It is thought to come from traction and pressure on the parietal peritoneum, uterine ligaments, urethra, bladder, rectum, lumbosacral plexus, fascia and muscles of the pelvic floor. (37)

Neuropathic pain may arise from direct pressure exerted by the presenting part on the lumbosacral plexus. Stretching of the vagina and perineum causes stimulation of the pudendal nerve derived from S2, S3 and S4 via fine, myelinated A delta fibres. As discussed above, impulses pass to the dorsal horn cell and then via the spinothalamic tract to the brain. Segmental and supra-segmental reflex responses that arise from the pain of labour have a multi-systemic affect that may affect both the parturient and foetus negatively. These changes are reversible when the pain is alleviated. (4, 37)

2.4.3 Third stage

The third stage of labour follows once the foetus has been delivered and ends after the complete delivery of the placenta and its membranes. The pain in this stage is related to the continuous uterine contractions which normally stop after the delivery of the placenta. After the delivery of the foetus, the uterus continues to contract decreasing the surface area of the attached placenta which causes it to detach from the uterine wall and to be pushed out from the uterus. (43)

2.5 NEGATIVE EFFECTS OF LABOUR PAIN

The negative effects of labour pain are multi-systemic and will be discussed in the following section.

2.5.1 Respiratory system

Pain during labour results in hyperventilation. The respiratory rate increases as labour progresses and may eventually lead to maternal hypocarbia and a respiratory alkalosis leading to a compensatory metabolic acidosis. The resultant left shift of the haemoglobin-oxygen dissociation curve reduces tissue oxygen transfer, which may already be compromised by the increased oxygen consumption associated with labour. All these changes may lead to foetal hypoxia. (3, 44)

2.5.2 Cardiovascular system

Pain causes a stress response leading to direct activation of the sympathetic nervous system and indirect activation of noradrenaline and adrenaline secretion by the adrenal medulla. This leads to an increase in heart rate, stroke volume, myocardial contractility and peripheral vasoconstriction. (4)

These haemodynamic alterations result in increased myocardial workload and oxygen consumption and decreased placental perfusion. These changes are not problematic when the parturient and foetus are healthy, but they may severely compromise a less well foetus especially when there is poor placental function. It has been shown that women with high levels of circulating catecholamines have a higher incidence of abnormal foetal heart rate patterns. (4, 37)

2.5.3 Endocrine and metabolic alterations

Adrenocorticotrophic hormone (ACTH) and β-endorphin are released from the anterior pituitary in response to pain. There is a progressive rise in plasma β-endorphin which correlates with the intensity of pain and cervical dilatation. Plasma cortisol levels also increase during labour, although to a lesser degree than those of β-endorphin. This pituitary response may be increased by anxiety. (45-47)

There is increased sympathetic activity as the adrenal medulla releases high concentrations of noradrenaline and adrenaline in response to the pain of labour. Excessive, sympathetic activity may result in uncoordinated uterine action, prolonged labour and abnormal foetal heart rate patterns. (4)

There is also an increase in the catabolic hormones glucagon, growth hormone, renin and anti-diuretic hormone, with a decrease in the anabolic hormones insulin and testosterone. A metabolic acidosis can readily develop as a consequence of physical exertion (lactic acid), which is aggravated by starvation (ketone acids). The respiratory alkalosis mentioned previously causes reduced buffering ability and can result in a metabolic acidosis. (4, 40)

A metabolic acidosis can occur due to the increased metabolic rate which results from the sympathetic response and the physical work involved in a painful labour and may be complicated by psychological stress. A metabolic alkalosis may develop due to vomiting and dehydration. Severe metabolic acidosis will lead to an accumulation of lactate in the foetus. (4)

“A painful labour also causes an increase in cortisol levels which are associated with:

- increase in protein catabolism
- hyperglycaemia
- decrease in insulin secretion
- sodium and water retention consequent to an increase in the secretion of antidiuretic hormone
- increase in serum potassium
- increase in fat metabolism
- increase in ketone production.” (4)

Thus, the metabolic consequences of a painful labour are deleterious to mother and foetus, and these effects will depend on the severity of the pain and stress. (4)

2.5.3 Gastrointestinal system

Activation of the autonomic nervous system also delays gastric emptying and reduces intestinal peristalsis. Acid aspiration is a well-recognised cause of maternal mortality and the risk is enhanced when there is an increase in gastric volume. (4)

2.5.4 Central nervous system

The psychological effects of pain, fatigue, anxiety and fear are interrelated and the central nervous system effects are closely linked to all the systems in the body via the sympathetic and parasympathetic nervous systems. A traumatic labour may interfere with the mother's emotional response to her baby. In extreme cases the experience may have the effect of discouraging future pregnancies or in some cases it may produce a post-traumatic stress syndrome. (4)

2.6 MANAGEMENT OF LABOUR PAIN

2.6.1 Non- neuraxial analgesia

Analgesia for labour can be broadly classified into non-neuraxial and neuraxial methods. The non-neuraxial methods can be further divided into non-pharmacological and pharmacological labour pain management techniques. The following paragraphs will contain a brief discussion of these techniques with emphasis on epidural analgesia.

2.6.2 Non-Pharmacological labour pain management techniques

Various modalities of non-pharmacological analgesic methods have been evaluated in studies and found to have a positive impact on the pain and anxiety associated with childbirth. These methods have variable efficacy but have been shown to have some positive influence on the likelihood of unassisted vaginal delivery, reduction in the amount of analgesia required intra-partum and on maternal satisfaction. These methods include: continuous one-on-one support during labour, breathing and relaxation, touch and massage, hydrotherapy, acupuncture, transcutaneous electrical nerve stimulation and sterile water blocks. (7, 48-51)

2.6.3 Pharmacological labour pain management techniques

Inhalational analgesia

Nitrous oxide and low dose flurane derivatives are well known inhalational labour analgesics. These drugs are associated side effects such as nausea, vomiting, dizziness and drowsiness. (52)

Systemic opioid-analgesia

Systemic opioids are the most widely used analgesic during labour due to their low cost, fairly easy accessibility and ease of administration. The concern with systemic opioids is that they have sedative effects and can cause respiratory depression in both the mother and the foetus. The analgesia they offer is often incomplete as parturients still experience some breakthrough pain during labour contractions. (53, 54)

2.6.4 Neuraxial analgesia

Epidural analgesia is a central nerve block method accomplished by injection of an analgesic agent close to the nerves that transmit pain. Epidurals are commonly utilised for pain relief in labour. Numerous studies have shown that epidurals provide superior analgesia but may be associated with an increased rate of instrumental/assisted vaginal deliveries. Studies have shown that epidural analgesia is not associated with higher caesarean section rates or any negative effects on the baby soon after delivery. (52)

Some of the undesirable effects of epidural analgesia include a prolonged second stage of labour, need for augmentation of labour, low blood pressure secondary to sympathetic inhibition and peripheral vasodilation, motor weakness, urinary retention and fever (54).

The administration of an epidural entails injecting an analgesic agent, often a local anaesthetic, into the lower segment of the potential space around the spine (epidural space) near the nerve fibres that transmit painful stimuli from the contracting uterus and birth canal. The local anaesthetic blocks sodium channels in nerve membranes, inhibiting the propagation of nerve impulses along these fibres and may take up to 20 minutes after administration to work. The degree of the effect of the local anaesthetic injected into the epidural space is concentration specific. Administration of a low-dose anaesthetic (e.g. 0.125% bupivacaine) partially selectively blocks painful stimuli whilst motor function is preserved, whereas higher doses of anaesthetic can cause complete sensory and motor blockade resulting in decreased mobility in labour. (54)

Epidural solutions are administered either by intermittent injections (bolus), continuous infusion or via a patient-controlled pump. The choice of drugs and dosage varies from institution to institution. Protocols regarding the care of women using epidural analgesia also vary between hospitals. (54)

More recently, epidural solutions made up of a combination of a low concentration local anaesthetic with a variety of other analgesics (commonly opiates) have been adopted, which provides an analgesic effect while allowing the woman to maintain some motor function, permitting her to move and bear down during labour. (54)

A combined spinal epidural (CSE) has the advantages of both spinal analgesia (a quicker onset of pain relief) and epidural analgesia (sustained pain relief throughout the duration of labour). CSE involves a single injection of local anaesthetic and/or opiate into the cerebral spinal fluid as well as the insertion of the epidural catheter. (54)

Epidural analgesia allows the woman to remain alert and mobile during labour. Reported maternal complications include hypotension, urinary retention and postural puncture headaches. Severe sudden hypotension may cause a clinically significant decrease in utero-placental blood flow diminishing the delivery of oxygen to the baby. (54)

This may be detrimental for distressed or compromised foetuses. Intravenous fluids (as a crystalloid or colloid preload or co-load) may decrease the risk of a drop in maternal blood pressure. Commonly reported side-effects include itchiness, drowsiness, shivering and fever. Urinary retention may necessitate the insertion of a urinary catheter. Accidental puncture of the dura occurs in approximately 1% of parturients and may result in a severe headache known as postdural puncture headache. This usually resolves spontaneously; however, a blood patch may be needed when the headache is persistent. This involves a sterile injection of a 15 to 20 ml sample of the woman's own fresh blood into the epidural space. An epidural blood patch will lead to complete resolution of the headache in 60% of parturients. (31, 54)

2.7 MATERNAL ATTITUDES TO LABOUR PAIN

In 2007, a study was conducted to determine the knowledge and expectations of labour among 30 primigravid women attending a level one antenatal care facility in the public health sector in Cape Town. Through qualitative analysis of data gathered from semi-structured interviews they explored themes which included previous painful experiences, knowledge of labour, expectations and attitudes toward labour pain, and knowledge of biomedical analgesia. They found that patients were poorly informed about the process of labour with only 10 describing the warning signs of the onset of labour, the mode of delivery and the possible need for caesarean section. (55)

With respect to pain in labour, 28 women stated that they had previously experienced pain. The mean score on the 10-point Likert-type scale for the worst pain experienced in the past was 6.3 (range 0-10). Nineteen participants thought labour would cause the worst imaginable pain. (55)

Half of the participants expressed labour pains to be a “good thing”. The majority of the participants, including those who thought labour pains to be good, felt that pain should be relieved and not be allowed to get too severe or to last for too long. (55)

Half the participants expected to be able to cope with the pain of labour. All the women were poorly informed about biomedical methods of labour pain relief. (55)

In conclusion, the women participating in the study were found to be poorly prepared for the experience of childbirth. The researchers recommended that antenatal programmes should incorporate sensitive education regarding the process and pain of labour and the methods available to alleviate pain. (55)

The experience of pain in labour is also affected by factors such as antenatal education, culture, parturient attitudes to the unborn child, and the presence of support such as a doula, supportive family member or spouse. Studies on the influence of antenatal education show that both knowledge and expectations of the pain of labour influence the subsequent experience of childbirth. (56-58) Pain during labour may negatively affect maternal-child bonding (4, 59). Antenatal education is known to reduce anxiety and enhance coping and feelings of control. This leads to a positive experience of childbirth whilst anxiety about the labour pain has been shown to be a strong predictor of negative experiences in labour. (60)

2.8 PRACTICALITIES OF EPIDURAL PLACEMENT

2.8.1 Anatomy of epidural placement

The pain from uterine contractions and cervical dilation is relieved by blocking the T10 – L1 spinal segments, whilst the relief of pain from vaginal and perineal distention require the blockade of the S2- S4 sacral dermatomes. This is usually achieved via placement of a lumbar epidural block. (54, 61)

Lumbar epidural block is usually administered with the patient in the sitting or lateral position. A 17 or 18 gauge epidural needle placed in between the L3 to L4 or L4 to L5 vertebral spaces under sterile conditions is used to locate the epidural space into which a 19 or 20 gauge flexible catheter is inserted. The epidural needle is then withdrawn out of the epidural space whilst the catheter is kept in-situ. A sterile adhesive dressing is used to secure the catheter in place. (54, 61)

A 2 ml mixture of bupivacaine with adrenaline is used to exclude intrathecal or intravascular catheter placement as unintentional injection into the intravascular compartment can lead to systemic toxicity and unintentional intrathecal injection can lead total spinal anaesthesia, both scenarios can result in the death of the mother and the baby if not recognised early. After excluding the malposition of epidural catheter, epidural analgesia is commenced by injection of a bolus dose of an anaesthetic or analgesic into the epidural space. Maintenance of the analgesia achieved can be done via a continuous infusion or intermittent bolus injections. After delivery when there is no further need for analgesia the catheter is removed. (54, 61)

The epidural space begins at the base of the skull and ends at the sacral hiatus. Its lateral boarders are the vertebral pedicles, while the anterior and posterior boarders are the dura mater and ligamentum flavum, respectively. The epidural space contains fat, veins, lymphatic vessels and nerve roots that cross it. (54, 61)

Traditionally, the epidural space was described as one continuous space but recently the thinking has changed and the space is now thought to be a potential space with septations or crevices formed by layering of epidural contents (fat). (54, 61)

Vertebral spinous processes form the midline and in the cervical and lumbar areas they are horizontal, while the thoracic vertebrae (specifically T4 through T9) are angulated downward. While the level of the epidural placement is determined by the surgical site, the safest location is below the L3 vertebra where accidental spinal cord injury can be avoided. A generally accepted landmark for placing a lumbar epidural is the L4-5 interspace, identified by drawing a horizontal line between the posterior superior iliac crests. In the majority of individuals, the distance from the skin to the epidural space is approximately 4–6 cm. (54, 61)

2.8.2 Side effects of drugs administered via the epidural and complications of epidural placement

Common side effects of neuraxial analgesia include hypotension, pruritus and less commonly foetal bradycardia and maternal hyperthermia. The hypotension is caused by local anaesthetic blockade of the sympathetic nervous system resulting in vasodilation of peripheral vessels leading to a decrease in preload and cardiac output. Placental perfusion is dependent on maternal blood pressure as uterine blood flow is not autoregulated, therefore, maternal blood pressure and foetal heart rate should be monitored closely for 30 minutes after the initiation of a neuraxial block. The mother should be positioned in an inclined lateral position to avoid aortocaval compression and hypotension should be treated timeously with small bolus doses of an intravenous vasopressor, for example ephedrine or phenylephrine. (54)

Pruritus can occur after epidural or systematic opioid administration, the mechanism of which is poorly understood. The incidence and severity are dose related. Symptoms are usually worst during the first 30 minutes after opioid administration and are usually self-limiting, however, severe symptoms can be treated with a single intravenous dose of naloxone (40 to 80 μg) or nalbuphine (2.5 to 5 mg). (54)

Foetal bradycardia can occur within 15 to 45 minutes of epidural analgesia induction and is thought to be caused by a decrease in maternal plasma epinephrine levels following the initiation of labour epidural analgesia. Clark et al (62) hypothesized that “the acute decrease in circulating epinephrine concentration may result in temporary imbalance of uterine tocolytic/tocodynamic forces, resulting in uterine hypertonus, decreased uterine perfusion, and ultimately, foetal bradycardia”.

The bradycardia usually resolves with conservative therapy, including discontinuation of exogenous oxytocin and the administration of an intravenous fluid bolus. The uterine hypertonus associated with the initiation of neuraxial analgesia can be treated with nitroglycerine. (63, 64)

Maternal fever may occur when labour epidural analgesia is more than six hours in duration. The mechanism is unknown and may be a result of increased heat production, decreased heat loss or alterations in thermoregulation caused by epidural analgesia. (65-67)

Parturients receiving epidural labour analgesia have an increased risk for developing urinary retention should be regularly observed during labour for bladder distention, particularly if the patient complains of suprapubic pain during contractions or breakthrough pain. Urinary retention should be treated promptly with the insertion of a urinary catheter. (54)

Complications of neuraxial analgesia include unintentional dural puncture with an epidural needle (incidence approximately 1.5%) resulting in post-dural puncture headache which depending on its severity can be treated with simple analgesia and bed rest or the administration of an epidural blood patch . More serious complications of neuraxial analgesia include respiratory depression/arrest, total spinal anaesthesia, systemic local anaesthetic toxicity secondary to inadvertent intravascular injection of local anaesthetic, and neuraxial infection. (54)

2.8.3 Contra indications to epidural placement

Contraindications to neuraxial blockade include patient refusal, fixed cardiac output states, pre-existing coagulopathy, infection at the intended site of catheter placement and hypotension. Relative contraindications include untreated systemic infection and pathology of the lumbar spine. (54)

2.8.4 Monitoring motor and sensory level of epidural blockade

Regular monitoring and documentation of the parturients' vitals, level of sensory and motor blockage as well as epidural bolus doses or infusion rate, total amount used, inspection of epidural insertion site, patency of intravenous access and integrity of pressure areas is required for the timeous detection of potentially serious complications.

The Bromage Scale is an accepted tool for the measurement of motor block and the sensory dermatome model for assessing the level of sensory blockade (52).

An increasing degree of motor weakness can mean excessive epidural drug administration, however, other equally serious complications such as dural penetration of the catheter, or the development of an epidural haematoma or abscess must be excluded and appropriate treatment protocols for such a scenario should be in place to prevent irreversible spinal cord damage (52).

An epidural abscess or haematoma should be excluded whenever a motor blockade does not resolve soon after discontinuation of an epidural infusion. Urgent identification and appropriate management is required as severe permanent neurological damage can ensue if intervention is not timeous. (52)

2.9 EDUCATION AND TRAINING OF SOUTH AFRICAN NURSES

Nurses working in labour ward are in a position to influence a parturient's experience of labour by supporting them and ensuring that the experience is as comfortable as possible. This may include discussing analgesia options with the patient.

In South Africa there are different categories of nurses who undergo different training and this will impact on their knowledge of pain management. The education and training of South African nurses will be discussed briefly in this section.

Registered nurses' training has evolved over the years. Previously nurses had the choice of following a three year diploma course or a four year degree. The degree course included training as a midwife and psychiatric nurse. Nurses that completed the diploma course could go on and do postgraduate diplomas such as midwifery. Since 1985 nurses follow a four year comprehensive course that can be completed at either diploma or degree level. Completion of this course leads to registration as a registered nurse (general, psychiatry, community) and midwife. (68)

There are two categories of enrolled nurses in South Africa namely, staff nurses and auxiliary nurses (previously known as nurse assistants). Staff nurse registration follows a two year diploma course and auxiliary nurses require one year, on-site training for registration. (68)

Historically a nurse could train as a midwife only, however this training was discontinued in the early 1970s.

The Nursing Act No.33 of 2005 defines nursing categories as follows:

- "A professional (registered) nurse is a person who is qualified and competent to independently practice comprehensive nursing in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such practice.
- A midwife is a person who is qualified and competent to independently practice midwifery in the manner and to the level prescribed and who is capable of assuming responsibility and accountability for such a practice.
- A staff nurse is a person educated to practice basic nursing in the manner and to the level prescribed.
- An auxiliary nurse or an auxiliary midwife is a person educated to provide elementary nursing care in the manner and to the level prescribed." (67,69)

The training of the different categories of nurses does vary resulting in differing outcomes. It is also important to note that the different categories of nurses function legally within overlapping scopes of practice. (21)

A profession that is nationally registered requires a description of its scope of practice to ensure that only persons registered in that profession are permitted to conduct action related to the practice. Description of practice indicates how far a specific profession can expand itself. (21)

2.10 THE NURSING SCOPE OF PRACTICE

The Scope of Practice (R 2598 as amended) describes the professional ethical responsibilities of all categories of South African nurses (69). These regulations however are not specialisation specific. Scribante et al (21) interpreted the scope of practice for South African critical care nurses in 1995.

Their interpretation of clause "c" for registered nurses "the treatment and care of and the administration of medicines to a patient, including the monitoring of the patient's vital signs and of his reaction to disease conditions, trauma, stress, anxiety, medication and treatment" is particularly pertinent to this study and can be similarly interpreted for nurses working as midwives. They state that nurses should have an in-depth knowledge of the treatments and medications prescribed for patients including the indications, effects, interactions and complications. Although the regulations neither specify nor limit the route of medication administration it was not within the registered nurses scope of practice to administer epidural medication. (21)

However, in 1993 SANC issued a policy statement regarding epidural pain control by registered nurses and midwives which included epidural analgesia as part of the registered nurses scope of practice. SANC does however not approve of registered nurses or midwives topping-up or adjusting continuous infusions for the purpose of anaesthesia. (70)

The Scope of Practice (R 2598 as amended) as pertaining to enrolled nurses has no clause regarding the administration of medication. It does however state that "an enrolled nurse shall entail the following acts and procedures as part of the nursing regimen planned and initiated by a registered nurse or registered midwife and carried out under his direct or indirect supervision" and clause "c" states "caring for a patient, and executing a nursing care plan for a patient, including the monitoring of vital signs and the observation of reactions to medication and treatment". This clause appears not to exclude enrolled nurses from looking after a patient who is receiving epidural analgesia. The South African Society of Anaesthesiology (SASA) Guidelines for Practice (section 2.12) also do not specifically exclude an enrolled nurse from caring for a patient who has epidural analgesia as long as they are trained i.e. the "trained observer" and have basic life support training. (69, 71)

2.11 SOUTH AFRICAN NURSING ASSOCIATION (SANA)

Following the release of the policy statement by SANC regarding epidural pain control by registered nurses and midwives as part of the registered nurses scope of practice, the now defunct SANA made the following suggestions in 1994:

- epidural analgesia for pain management should only be undertaken by registered nurses or midwives with at least one year of continuous midwifery or intensive care training or two years of general nursing training;
- these persons should be deemed clinically competent in the management of epidural analgesia by their peers;
- ideally nurses involved with this procedure should have attended an epidural analgesia training course. (70)

2.12 SASA GUIDELINES FOR PRACTICE

Regarding epidural analgesia, the SASA Guidelines for Practice (72) are clear with respect to monitoring and clinical observation of patients receiving epidural analgesia, the availability of an anaesthetist and the topping-up and management of continuous infusions.

Regular and appropriate monitoring of the effects of the block and the physiological status of the patient is essential and should be done by a registered nurse or a trained observer who is trained in “measures related to basic life support” and in the use of the monitoring equipment used on the patient. This person is required to understand the equipment and to use their experience and expertise to react appropriately should any untoward event occur. (72)

The anaesthetist concerned should personally convey all orders and routines to be followed to this person, preferably in writing. The anaesthetist ultimately remains responsible for the procedure and should be available immediately should any complication related to the epidural analgesia occur. (72)

According to SASA, registered nurses may top-up or adjust continuous infusions. The responsible anaesthetist must however confirm any changes, at least verbally, and ensure that the person doing this is competent to do so. (72)

2.13 PRESCRIPTION FOR EPIDURAL ANALGESIA

According to the SANC, accepting a prescription is an ethical consideration (SANC, 1994: Policy on Ethical Considerations No 7: 15) and a nurse can refuse to implement a prescription if, in her professional capacity she deems this not to be safe or in the patients best interest.

Regarding epidural analgesia the following information is essential for an acceptable prescription.

- The prescription for both top-up and adjustment of continuous infusions must be very specific and must include the number of millilitres, the dose and the strength of the drug with which the epidural must be topped-up or the dose and rate per hour in millilitres to which the continuous infusion can be adjusted.
- Monitoring which includes the blood pressure, heart rate of both the mother and the foetus, respiratory rate, level of analgesia and intensity of block i.e. the ability to move lower limbs.
- In the case of hypotension or other epidural analgesia related side effects the anaesthetist should be very specific about the action he would expect the registered nurse, midwife or trained observer to take. These instructions must be in writing and "standing orders" are not acceptable. (70)

2.14 ROLE OF THE REGISTERED NURSE OR MIDWIFE

The registered nurse or midwife should be in attendance, if possible, during insertion of the epidural catheter. The patient's vital signs should be monitored and documented as should the depth of catheter insertion. The depth of the catheter should be checked regularly and specifically prior to top-up. Monitoring of the patients reaction to the analgesic or anaesthetic agents administered is essential. (70)

SANC and SASA concur that the registered nurse or midwife should not administer the first dose of epidural analgesia or any bolus dose of an anaesthetic agent as this carries significant risks. These nurses may also not mix epidural medication containing an anaesthetic agent but they may otherwise mix analgesia for epidurals providing a prescription is available and that the medication is checked with a second registered person. (70)

Geyer (70) concludes that nurses are accountable for their acts and omissions and that registered nurses and midwives have "an obligation to keep abreast of the advances in epidural anaesthetic techniques and to update her knowledge at all times". The author only addressed the role of the registered nurse and the midwife but no the staff nurse.

As epidural analgesia during labour is gaining popularity worldwide it necessitates that nurses have a competent level of knowledge and the skills to care for the patients receiving epidural analgesia and should also be able to identify and manage emergencies related to epidural placement and usage.

2.15 NURSES KNOWLEDGE OF EPIDURAL ANALGESIA

Many studies have shown that knowledge has a direct impact on the care delivered to patients by nurses and midwives (12, 73, 74). Knowledge has been identified as a key factor in the ability to accurately assess and correctly respond to changes in the condition of a patient (12, 14, 75). A lack of knowledge regarding epidural analgesia may have serious implications for the delivery of safe care to patients.

Over the years, numerous studies examining nurses' knowledge of pain management have shown this knowledge to be lacking. As nurses are responsible for the management of patients receiving epidural analgesia, an in-depth knowledge of the procedure and the medications administered is required to ensure patient safety. (12, 14, 16)

A review of the literature has revealed very few studies assessing nurses' knowledge regarding epidural analgesia either internationally or locally.

2.15.1 International studies

A study by Vandendriesen et al (15) revealed that the knowledge of midwifery staff working in the labour ward of a public teaching hospital that had more than 5000 deliveries per year was suboptimal. Although most of the midwives had received formal education regarding epidural analgesia, only 51% managed to achieve a pass score. A weak correlation was found between years of experience and score achieved. The authors suggested that either the current educational programs were inadequate or that factors other than training and knowledge may influence practice.

A survey of registered nurses' knowledge and attitudes regarding post-operative epidural analgesia conducted in a military teaching hospital by Sandie et al (16) revealed that knowledge levels were low. Nurses with more years of experience and those who had received pain management education during their training achieved higher scores.

Of these nurses only 51% felt that they had an adequate knowledge to make them feel comfortable managing patients receiving epidural analgesia. Despite this 100% of the nurses said that the hospital should offer nurses more education on this subject. There was no formal pain management and/or epidural in-service educational program available at the time. (16)

An Australian study conducted by Bird et al (14) to describe nurses assessment skills and knowledge of managing patients with epidural infusions found that the theoretical knowledge of the nurses in this study exceeded their clinical skills and decision making capacity. Nurses from surgical areas and those with clinical experience and/or who had completed a self-directed learning package scored higher on the survey than other nurses. The authors suggested comprehensive, context specific education regarding the management of epidural infusions to improve nurses' critical thinking and clinical decision making skills. Strategies suggested included the use of self-directed learning packages, clinical skills demonstrations and supervised practice. (14)

In 2009 the authors of the above study and another researcher conducted a study to determine the level of knowledge of epidural analgesia among registered nurses as part of a larger study seeking to identify predictors of epidural analgesia knowledge. (12) This study found that knowledge relating to general nursing management of a patient receiving epidural analgesia, assessment of blockade and spinal cord anatomy and physiology was good with the registered nurses and midwives achieving 77%, 75% and 69% respectively for these questions. However, they fared less well for the questions pertaining to complications of epidural analgesia and the pharmacology related to the procedure with scores of 56% and 57% respectively being achieved. All the sites in this study had the support of an acute pain service for the management of pain. The authors recommended that prior to caring for patients receiving epidural analgesia all registered nurses and midwives should attend an epidural educational program. (12)

Bird et al (12) used a self-administered, descriptive survey at four regional teaching hospitals. The study sample was made up of 633 registered nurses and midwives.

They developed a research tool that includes demographics and a knowledge test comprised of five knowledge subscales:

- spinal cord anatomy and physiology
- epidural pharmacology
- assessment of sensory and motor blockade
- complications
- general nursing management.

They had a 99.7% response rate and results showed that nurses' knowledge in some areas was lacking. Only 57% answered correctly to the questions relating to epidural pharmacology, suggesting that almost half of respondents did not know the answers to the questions in this subscale. (12)

In the epidural complications subscale a similar result was found, with participants correctly responding to only 56% of the questions. The participants showed fair knowledge relating to spinal cord anatomy and physiology, with 69% of these questions being correctly answered in this subscale. Knowledge was good relating to the remaining two subscales, with 75% of questions about assessment of sensory and motor blockade correctly answered and 77% correctly responding to questions in the general nursing management subscale. (12)

One of the limitations of the study is the context of the study because the participating hospitals were all Australian state hospitals. Therefore, care must be taken when generalising the results to the private sector. A further limitation involves the services provided at the hospital sites as they all had acute pain services. Therefore, the study results should not be generalised to those institutions that do not have an acute pain service. There is also evidence to suggest that pen and paper tests may reflect knowledge levels but not what is actually done in clinical practice. (12, 14)

2.15.2 South African study

In 1989 a study was conducted by Dorfling (17) to determine to what extent midwives were required to manage epidural analgesia and what the knowledge level of the nurses was regarding epidural analgesia.

The study was conducted in two public and three private labour wards in Johannesburg. All the participants had in excess of four years of experience as midwives, however, none of them had received any formal training regarding the management of epidural analgesia. (17)

Knowledge of anatomy and physiology relating to epidurals was poor with less than 25% of the participants being aware of which segments are anaesthetised with epidurals. Knowledge regarding preparation for and insertion of an epidural catheter ranged from average to good. Only 16.7% thought it necessary to determine the epidural space with the anaesthetist. This is important as the midwife cannot undertake to maintain an epidural without personally checking if the catheter is in the right position. (17)

Knowledge regarding the test dose was also poor, with less than 50% of the participants understanding the reason for a test dose or an aspiration test. Knowledge of adverse reactions was very poor (17).

2.16 SUMMARY

In this chapter an overview of epidural analgesia including the physiology of labour pain, the stages of labour, the negative effects of labour pain, methods of managing labour pain and maternal attitudes to labour pain were discussed. This was followed by a discussion of the education and training of South African nurses, their responsibilities regarding epidural analgesia and studies evaluating nurses' knowledge of epidural analgesia. In the following chapter the methodology used in this study will be presented.

3 CHAPTER THREE: RESEARCH METHODOLOGY

3.1 INTRODUCTION

In this chapter the research methodology used in this study will be described in depth. The problem statement, aims and objectives, ethical considerations, research methodology, data analysis and the validity and reliability are discussed.

3.2 PROBLEM STATEMENT

Epidural analgesia services are offered at CHBAH labour ward, which has on average 2000 vaginal deliveries per month (19) and an average of 12 to 15 epidurals per week (20). Nurses contribute to the management of patients with epidural analgesia in the labour ward and it is therefore important to ascertain their level of knowledge regarding epidural analgesia as it impacts on patient outcomes. There is currently no information regarding the levels of knowledge of epidural analgesia among the CHBAH nursing staff in the labour ward.

Although the Department of Anaesthesiology officially took over the labour epidural analgesia service in 1993, a very limited service was rendered following the death of the nurse receiving epidural analgesia in the 1980's as nurses became resistant to the service and only recently has there been a resurgence. The epidural services are currently being administered by anaesthetists. Because of the high volumes of the patients giving birth, the anaesthetist is often not able to monitor all of the parturients receiving epidural analgesia and the labour ward nursing staff are required to care for these patients.

Furthermore, in 1993 the South African Nursing Council (SANC) issued a policy statement regarding epidural pain control by registered nurses and midwives which stated that epidural analgesia was viewed as part of the registered nurse's scope of practice (21). No current research was identified that reflected the level of knowledge of South African nurses regarding epidural analgesia.

3.3 AIM AND OBJECTIVES

3.3.1 Aim of the study

The aim of this study was to determine the level of knowledge of epidural analgesia of labour ward nursing staff at CHBAH.

3.3.2 Objectives

The primary objectives of this study were to:

- describe the level of knowledge of participants regarding epidural analgesia
- describe the sources of knowledge regarding epidural analgesia used by participants
- describe the level of confidence of participants in caring for patients receiving epidural analgesia.

The secondary objectives of this study were to:

- compare test scores with the years of nursing experience
- compare test scores with the years of experience of working in the labour ward
- compare test scores of registered nurses with those of staff nurses
- compare test scores with level of confidence in caring for patients receiving epidural analgesia

3.4 ETHICAL CONSIDERATIONS

Permission to conduct the study was obtained from the Human Research Ethics Committee (Medical) (Appendix A) of the University of the Witwatersrand the Postgraduate Committee (Appendix B). Written consent was sought from the hospital's Medical Advisory Committee (Appendix C) and the Labour Ward Nursing Manager (Appendix D) and verbal consent was obtained from the Head of the Department of Obstetrics and Gynaecology.

The nursing staff in the labour ward were approached, the study was explained and the researcher invited them to take part in the study. Those who agreed received an information letter (Appendix E) and a self-administration questionnaire (Appendix F). Written consent was not requested as consent was implied by agreeing to complete the questionnaire.

Anonymity was ensured as the questionnaire did not contain any identifiable information, only a study number. Confidentiality was maintained as only the researcher and supervisors had access to the raw data. The collected data will be stored for six years after the completion of the study.

If it was found that the knowledge of the nurses regarding epidural analgesia in labour was not appropriate an in-service workshop would be organised.

The study was conducted in adherence to the principles of the Declaration of Helsinki (74) and the South African Good Clinical Practice Guidelines (75).

3.5 RESEARCH METHODOLOGY

3.5.1 Research design

A descriptive, contextual, cross-sectional study was done using a self-administered questionnaire (Appendix F).

Brink et al (76) describe descriptive studies as "studies in which phenomena are described, or the relationship between variables is examined; no attempt is made to determine cause-and-effect relationships." This study was descriptive because it looked at the level of knowledge amongst the labour ward nursing staff as it currently exists.

De Vos (77) refers to contextual studies as studies done in a small scale world. The study was contextual as it was done at one academic public hospital.

Brink et al (76) define a cross-sectional study as "a research study that collects data on participants at one point in time." This was a cross-sectional study as it was only carried out once on the selected sample of nurse in the labour ward.

3.5.2 Study population

The study population consisted of nurses working in the labour ward at CHBAH.

3.5.3 Study sample

Sample statement and size

In consultation with a biostatistician a study sample of 40 labour ward nurses was calculated using nQuery advisor version 7. A two sided 95% confidence interval for a single mean will extend 3.099 from the observed mean, assuming that the standard deviation is known to be 10.00 and the confidence interval is based on the large sample Z statistic.

Sampling method

A convenience sampling method was used in this study. According to Brink et al (76) convenient sampling is a "non-probability sampling procedure that involves the selection of the most readily available people or objects for a study." The nursing staff were approached at their work place during their working hours.

Inclusion and exclusion criteria

The study included all nursing staff in the labour ward with a minimum of one month's experience.

Nursing staff declining to participate in the study or who were sick or on annual leave were excluded.

3.5.4 Research questionnaire

With permission from the authors (Appendix G) a self-administered questionnaire (Appendix F) developed by Bird et al (12) was used to collect data. The original questionnaire was evaluated by a panel of 10 experts, the Cronbach's Alpha was 0.76. The questionnaire was adapted for the South African context by five anaesthesiologists and a midwife with expertise in epidural analgesia.

The changes to the original questionnaire include the following.

- Gender was standardised to female patients, as the original questionnaire was not specific to labour epidurals.
- Medications were changed to reflect those used at CHBAH.

- Two nursing management questions were added on the recommendation of the postgraduate committee.

The questionnaire consists of demographic and knowledge sections. The following data was collected in the demographic section:

- age
- qualifications
- specific education regarding epidurals
- sources of epidural knowledge
- number of years worked as a qualified nurse
- Number of years worked in labour ward
- average number of epidurals cared for each month
- confidence about caring for patients with epidurals.

The knowledge section was divided into five subsections with 22 questions.

- Anatomy and physiology (four questions).
- Pharmacology (four questions).
- Assessment of sensory and motor blockade level (five questions).
- Complications (three questions).
- Management of epidurals (six questions).

3.5.5 Data collection process

Once permission to conduct the study had been obtained, the labour ward nursing staff were informed of the study and the academic purpose of the study was explained by the researcher. A questionnaire (Appendix F) and an information letter (Appendix E) were given to all nurses who agreed to participate in the study.

All participants were assured of confidentiality and anonymity. All data was handled confidentially as only the researcher and supervisors had access to the raw data. No identifying information was asked of participants on the questionnaire thereby ensuring anonymity. Participants were informed that they could decline to participate or withdraw from the study at any time without penalty.

The researcher and one of the study supervisors remained in the labour ward while the participants completed the questionnaire to ensure that participants did not discuss the answers with each other and thereby contaminate the data.

Following completion, the participants placed their questionnaire in a sealed envelope and placed it in the collection box. The collection box with the questionnaires was taken by the researcher and stored in a safe place.

3.6 DATA ANALYSIS

Data was captured on a Microsoft Excel® 2010 spread sheet and analysed using STATISTICA version 12.5. The data collected from the knowledge tests was analysed in consultation with a biostatistician. Descriptive and inferential statistics were used. Categorical variables were summarised using frequencies, percentages and ranges. Continuous variables were summarised using medians and ranges as they were not normally distributed. Fisher's exact test was used for comparisons between categorical variables. A p-value of < 0.05 was considered statistically significant.

3.7 VALIDITY AND RELIABILITY OF THE STUDY

According to Botma et al (78) validity indicates that "the conclusions of the study are justified based on the design and interpretation" and reliability represents "the consistency of the measure achieved".

Validity and reliability were ensured in this study by the following:

- using an appropriate study design
- using a previously validated questionnaire
- five anaesthesiologists and one midwife with expertise in epidural analgesia assisted in adapting the questionnaire for the South African context, the Chronbach Alpha Value of the original questionnaire may have been affected because of the adjustments made to the questionnaire
- the sample size was calculated in consultation with a biostatistician

- data contamination was prevented as the researcher and a supervisor were present when the questionnaires were completed
- data was analysed in consultation with a biostatistician.

3.8 SUMMARY

In this chapter the research methodology used in this study will be described in depth. The problem statement, aims and objectives, ethical considerations, research methodology, data analysis and the validity and reliability are discussed. The results and discussion are presented in the following chapter.

4 CHAPTER FOUR: DATA ANALYSIS AND DISCUSSION OF RESULTS

4.1 INTRODUCTION

This chapter contains the results and the discussion thereof. The results are presented as per the research objectives which are repeated below.

The primary objectives of this study were to:

- describe the level of knowledge of participants regarding epidural analgesia
- describe the sources of knowledge regarding epidural analgesia used by participants
- describe the level of confidence of participants in caring for patients receiving epidural analgesia.

The secondary objectives of this study were to:

- compare test scores with the years of nursing experience
- compare test scores with the years of experience of working in the labour ward
- compare test scores of registered nurses with those of staff nurses.

4.2 SAMPLE REALISATION

All 50 nurses working in the CHBAH labour ward at the time of the study were invited to complete a previously validated, self-administered questionnaire.

Of the 50 questionnaires handed out 45 were returned, yielding a response rate of 90%. Of these, only 43 were included as two were returned blank. Participants not answering a particular demographic question were excluded from that analysis

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4.3 RESULTS

Data was collected at CHBAH in November 2012. Adequate knowledge was defined as a score of ≥ 70% (competency score). All percentages are rounded off to whole numbers. Questions in the questionnaire that were not answered were taken as incorrect.

4.3.1 Demographics

The majority of participants, 13 (30%), fell in the 30 to 39 years age range. The most frequently indicated highest nursing qualification was a 3 year diploma in nursing with 19 (44%) participants selecting this qualification. A large number of the participants, 36 (84%), indicated that they had not received any epidural analgesia training.

Exposure to parturients who received epidural analgesia was low with 11 (26%) participants having not cared for these parturients at all and 28 (65%) caring for < 5 parturients receiving epidural analgesia per month. Table 4.1 displays the demographic data pertaining to the age groups, qualifications, epidural training and exposure of participants to epidural analgesia per month.

Table 4.1 Age groups, qualifications, epidural training and exposure

Demographic	Number of participants	Percentage (%)
Age group		
<20	7	16
20-29	11	26
30-39	13	30
40-49	10	23
50-59	1	2
60	0	0
Not indicated	1	2
Qualifications		
MSc Nursing	0	0
BSc Nursing	2	5
3yr diploma in nursing	19	44
4yr diploma in nursing	14	33
1yr diploma in midwifery	0	0
Staff nurse	8	19
Epidural training		
Yes	7	16
No	36	84
Exposure to epidural analgesia per month		
None	11	26
< 5	28	65
5-10	1	2
> 10	0	0
Not indicated	3	7

Of the 43 participants only 39 (91 %) answered the question on the years of nursing experience. The majority of the participants, 17 (44%), had ≤ 5 years nursing experience as shown in Figure 4.1. The mean number of nursing experience was 7yrs, with a range of 2 months to 26 years.

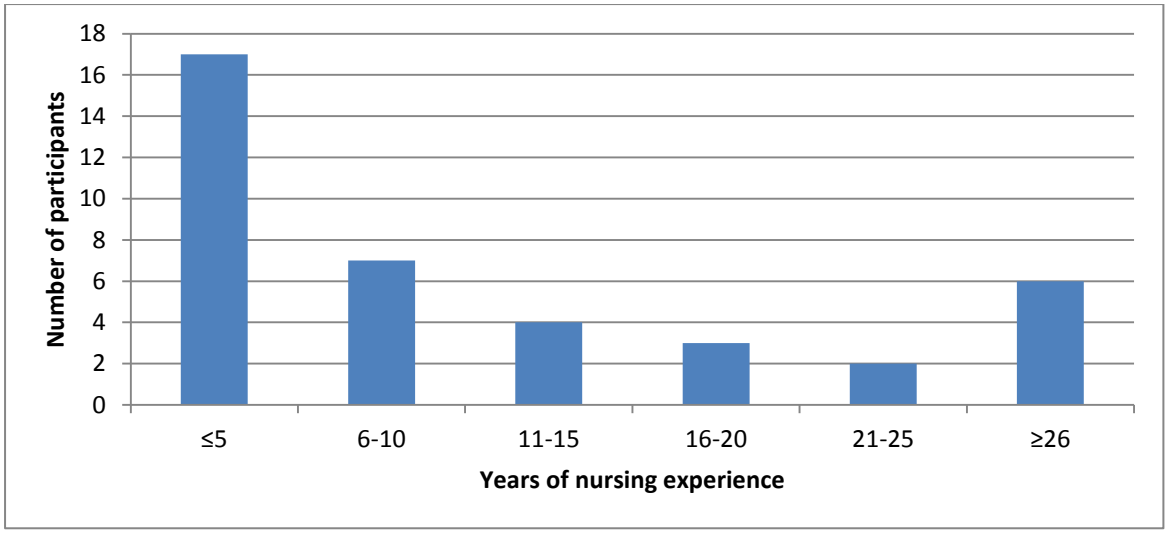


Figure 4.1 Years of nursing experience of participants

Figure 4.2 shows participants' years of experience working in the labour ward. Eight participants did not answer this question. The majority of the participants 15 (43%) had < 1 year of experience working in the labour ward. The mean number of years worked in labour ward was 11 years, with a range of 6 months to 30 years.

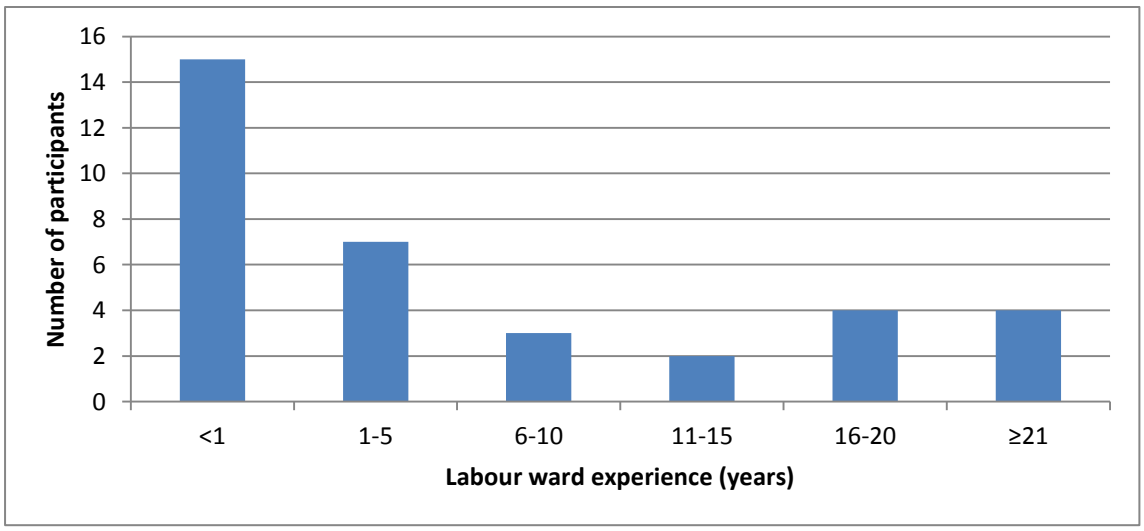


Figure 4.2 Years of labour ward nursing experience of participants

4.3.2 Primary objective: Describe the level of knowledge of participants regarding epidural analgesia

The overall knowledge of the participants for the questionnaire was poor with the overall median score being 7.5 out of 22 (34%). The lowest score attained was in the assessment of sensory and motor blockade and the complications section. Table 4.2 shows a summary of the epidural knowledge scores per subsection.

As a score of ≥ 70% (a total score of 15.4 out of 22) was considered a pass mark, only 11 (26%) participants were considered to have adequate knowledge in this study and 32 (74%) participants were considered to have inadequate knowledge.

Table 4.2 Epidural knowledge scores

Section and question description	Correct, n (%)	Incorrect, n (%)	Median score (range)	Overall Percentage (%)
Spinal cord anatomy and physiology				
9: Location of epidural space	18 (42)	25 (58)	1 (0- 4)	32%
10: Level of sensory block	4 (9)	39 (91)		
11: Definition of dermatome segment	31 (72)	12 (28)		
12: Identification of dermatome segment	2 (5)	41 (95)		
Epidural pharmacology				
13: Commonly used epidural drug groups	19 (44)	24 (56)	1 (0-4)	37%
14: Action of local anaesthetic agents	24 (56)	19 (44)		
15: Action of epidural opioids	2 (5)	41 (95)		
16: Recognition of complication	19 (44)	24 (56)		
Assessment of sensory and motor blockade				
17: Knowledge of control area	4 (9)	39 (91)	0 (0-5)	28%
18: Performing sensory assessment	16 (37)	27 (63)		
19: Correct statement	7 (16)	36 (84)		
20: Assessment of motor block	21 (49)	22 (51)		
21: Recognition of motor block	13 (30)	30 (70)		
Complications				
22: Signs of epidural haematoma	11 (26)	32 74)	0 (0-3)	30%
23: Signs of local anaesthetic toxicity	20 (47)	23 (53)		
24: Cause of hypotension	9 (21)	34 (79)		
General nursing management				
25: Management of inappropriate motor block	22 (51)	21 (49)	2 (0-6)	42%
26: Management of uneven sensory block	24 (56)	19 (44)		
27: Management of high sensory block	15 (35)	28 (65)		
28: Management of epidural catheter removal	11 (26)	32 (74)		
29: Management of epidural	17 (40)	26 (60)		
30: Benefits of maternal analgesia	16 (37)	27 (63)		

4.3.3 Primary objective: Describe the sources of knowledge regarding epidural analgesia used by participants

The participants could choose more than one source from where they acquired their knowledge and therefore the numbers add up to more than the 43 participants and more than 100%. All participants answered this question.

The most frequently reported sources of knowledge of epidural analgesia were clinical experience indicated by 16 (37%) participants, followed by other nursing colleagues chosen by 10 (23%) participants and the least frequently reported was medical journals selected by 2 (5%) participants. The sources of knowledge are shown in Table 4.3.

Table 4.3 Epidural analgesia knowledge sources

Source	Number	Percentage
Textbooks	8	19
Nursing journals	4	9
Medical journals	2	5
Congress	3	7
Medical colleagues	5	12
Nursing colleagues	10	23
Clinical experience	16	37
Part of clinical experience	7	16
Other	6	14

4.3.4 Primary objective: Describe the level of confidence of participants in caring for patients receiving epidural analgesia

Forty participants completed this question. The majority of the participants, 22 (55%) indicated that they felt confident in caring for patients receiving epidural analgesia and 8 (20%) indicated that they felt insecure. The level of confidence of participants in caring for patients receiving epidural analgesia is reflected in Table 4.4.

Table 4.4 Level of confidence of participants in caring for patients receiving epidural analgesia

Level of confidence	Number	Percentage
Very confident	8	20
Confident	14	35
Neutral	10	25
Insecure	6	15
Very insecure	2	5

4.3.5 Secondary objective: To compare test scores with the years of nursing experience

Four participants did not indicate their years of nursing experience and were therefore excluded from this analysis. A p value of 0.25 showed that there was no association between years of nursing experience and score achieved in the knowledge test. This is shown in Table 4.5.

Table 4.5 Comparison between test scores and years of nursing experience

	< 5 years nursing experience	≥ 5 years nursing experience
≥ 70% (pass)	5	5
< 70% (fail)	8	21

P = 0.25

4.3.6 Secondary objective: To compare test scores with years of experience working in the labour ward

Eight participants did not indicate their years of labour ward experience and were therefore excluded from this analysis. A p value of 0.99 showed that there was no association between years of labour ward experience and score achieved in the knowledge test as shown in Table 4.6.

Table 4.6 Comparison between test scores and years of labour ward experience

	< 5 years labour ward experience	**≥ 5 years labour ward experience**
≥ 70% (pass)	15	9
< 70% (fail)	7	4

P = 0.99

4.3.7 Secondary objective: Compare the test scores of registered nurses to those of staff nurses

There was no statistically significant difference in the test scores obtained by registered nurses to those of staff nurses. Two participants did not indicate their qualifications. This is shown in Table 4.7.

Table 4.7 Comparison of test scores of registered nurses with those of staff nurses

	Staff Nurse	**Registered Nurse**
≥70% (pass)	3	7
<70% (fail)	5	26

P=0.38

4.3.8 Secondary objective: Compare test scores to the level of confidence in caring for parturients receiving epidural analgesia

When the level of confidence was compared with the scores achieved, the following was found:

Table 4.8 Comparison of level of confidence to the test scores obtained

Level of confidence	Number of participants
Confident	**22**
Pass	7
Fail	15
Neutral	**10**
Pass	2
Fail	8
Insecure	**8**
Pass	1
Fail	7

P=0.39

When a Fischer's exact test was done, no association was found between the level of confidence and the scores achieved. The 10 participants who reported a neutral level of confidence were removed from this analysis.

4.4 DISCUSSION

Labour analgesia is topical and it has been shown to impact positively on both the mother and the foetus, facilitating the early bonding between mother and new born post-partum (2-4). International trends show that more and more women choose to deliver under epidural analgesia and it is the gold-standard of pain management for women in labour. In keeping with current trends the labour ward epidural service at the CHBAH is expanding to meet the demands of the high turnover of parturients giving birth there.

The increasing demand for the epidural analgesia service in the CHBAH labour ward to facilitate the delivery process means that more registered nurses must now possess the necessary knowledge and skills to assist in the safe management of these patients (11).

The SANC states that in order to perform their duties efficiently, nurses must be afforded the capacity to do so by being equipped with adequate knowledge (21, 32).

It is therefore important to determine the level of knowledge of labour ward nursing staff regarding epidural analgesia at the CHBAH so that any knowledge deficits may be addressed to facilitate the safe management of parturients receiving epidural analgesia.

The questionnaire used in our study was based on the one used by Bird et al (12) in their 2009 study. It was, however, modified for the South African context and specifically for the context of the hospital where the study was done. The number of questions per section is not always consistent with those of the original author's questionnaire. A further discrepancy is the population in the two studies. In the study by Bird et al (12) only registered nurses completed the questionnaire whereas in our study staff nurses were also included as they attend to patients receiving epidural analgesia in the labour ward. Furthermore the data in the original study reported mean values and standard deviations thereby indicating that their data was normally distributed which was not the case in our study, making direct comparisons between the two studies difficult.

The participants in the Bird et al (12) study achieved higher scores in all the sections that the participants in our study. The participants in the original study obtained 69% for knowledge of spinal cord anatomy and physiology; 57% for epidural pharmacology; 75% for assessment of motor and sensory blockade; 56% for the complications and 77% for the nursing management whereas our participants scored 31%, 37%, 28%, 31% and 41% respectively for the sections.

Although low the highest score obtained by our participants was for the section on general nursing management which may be explained by the fact that very few of them had received any specific training regarding epidural analgesia, only 7 (16%), and that most of their knowledge came from "on the job" learning when caring for these patients. The low score for this section may also be explained by the fact that many of the participants had limited exposure to epidural analgesia with 26% having no exposure and 65% being exposed to less than five patients per month.

Approximately 700 parturients a year were receiving labour epidural analgesia at CHBAH at the time of this study.

Considering that there are about 32 000 deliveries annually this is not a large number of epidurals which may account for the participants lack of exposure to this procedure. Furthermore, the nurses at this hospital have been resistant to this form of pain relief since a colleague died from complication in the 1980s.

The limited labour ward experience of many of the participants (less than one year for 15 [38%] participants) as well as the lack of specific epidural analgesia training may further account for the low scores obtained.

Despite the low scores achieved, the majority of participants 22 (55%) indicated that they felt confident when caring for patients receiving epidural analgesia which may indicate that they "don't know that they don't know". This requires urgent intervention in the form of formal education sessions and "on the job" practical teaching regarding epidural analgesia.

Although comparing the pass rate of registered nurses to those of staff nurses was a secondary objective and therefore possibly under powered to find a difference between the two, no difference was found (p=0.38). Three of the eight staff nurses achieved a score of 70% or greater and seven of the 26 registered nurses achieved equal to or greater than 70%.

A study conducted by Sandie et al (16) looking at the knowledge and attitudes of non-anaesthesia nurses regarding post-operative epidural analgesia showed that the nurses in their sample had an overall deficit in the knowledge of epidural analgesia. The knowledge section evaluated epidural pharmacology, management and the adverse effects of epidural analgesia. Their sample had a mean of 6 years of nursing experience with a range of 3 months- 26 years. The majority of respondents 79% reported receiving some form of pain education during their nursing and 54% had attended in-service education on post-operative epidural analgesia. The test scores showed a 78% overall correct score on the true/false questions and 38% on multiple choice questions. The authors concede that the multiple choice questions' scores were probably reflective of the respondents' knowledge as opposed to the true/false questions which tend to give an advantage as respondents have a 50% chance of answering correctly regardless of knowledge whereas with multiple choice questions a respondent needs to know the subject fairly well to select the correct choice.

Vandendriesen et al (15) conducted a survey in 1998 on labour ward midwifery staff assessing epidural knowledge and practice at a public teaching hospital in Australia. The results of the survey revealed suboptimal levels of knowledge regarding epidural analgesia. Although the Vandendriesen et al (15) study sample was smaller than ours, there are some similar characteristics to ours. The age range was similar to ours and they had similar nursing experience duration, however, even though they had received some epidural training they scored low on the epidural survey that had MCQs examining the same epidural knowledge themes.

A 1989 study by Dorfling (17) in Johannesburg which included midwives with more than four years labour ward experience but who had received no formal epidural analgesia training also found poor knowledge. As the questions were different to those in our study it is difficult to make a comparison.

Recent studies showing the levels of epidural knowledge amongst the labour ward nursing staff at the various maternity units in South African public hospitals for local comparison could not be identified.

The concern with the findings of our study is that the majority of the labour ward nursing staff at CHBAH do not have adequate knowledge to manage epidural patients. The knowledge deficit from their test scores reflects that they cannot appreciate the impact of epidurals on the normal physiology of their patients and the alteration thereof from the epidural pharmacological effects and as such cannot anticipate complications and be prepared to treat them timeously and effectively. Patient safety is then put at risk and this contravenes the nursing scope of practise.

4.5 SUMMARY

The results of this study have been presented in this chapter and discussed as per the research objectives. Descriptive and inferential statistics were used in the analysis of these findings.

In the next chapter a summary, the limitations, recommendations and a conclusion are discussed.

5 CHAPTER FIVE: SUMMARY, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 INTRODUCTION

In this chapter a summary, limitations, recommendations and the conclusion of the study are provided.

5.2 STUDY SUMMARY

The aim of this study was to determine the level of knowledge of epidural analgesia of labour ward nursing staff at CHBAH.

The primary objectives of this study were to:

- describe the level of knowledge of participants regarding epidural analgesia
- describe the sources of knowledge regarding epidural analgesia used by participants
- describe the level of confidence of participants in caring for patients receiving epidural analgesia.

The secondary objectives of this study were to:

- compare test scores with the years of nursing experience
- compare test scores with the years of experience of working in the labour ward
- compare test scores of registered nurses with those of staff nurses.

5.2.1 Summary of the methodology used in the study

A descriptive, contextual, cross-sectional study was done. A convenience sampling method was used in this study. The study population consisted of nurses working in the labour ward at CHBAH. All 50 nurses working in the labour ward at the time of the study were invited to participate and the sample size was realised by the response rate.

A self-administered questionnaire with a demographics section and a knowledge test section was used to collect data.

With permission of the authors, the questionnaire used was based on a questionnaire developed by Bird et al (10) and was adapted for the South African context.

The knowledge section was divided into five subsections with 22 questions in total assessing anatomy and physiology (four questions), pharmacology (four questions), assessment of sensory and motor blockade level (six questions), complications (three questions) and management of epidurals (four questions).

The labour ward staff were approached at work and informed of the study purpose via an information letter. It was explained that the participants would remain anonymous and that there would be no consequence to participating or declining to participate in the study. A questionnaire was given to nurses consenting to participate in the study. Informed consent was not sought as completion of the questionnaire was considered as implying consent.

The questionnaire was personally distributed to the nurses in an envelope. The researcher was present during the completion of the questionnaire to prevent contamination of information. Once completed, the questionnaire was inserted back into the envelope and sealed, and then placed in a box for collection by the researcher. Blank questionnaires were excluded from the study and those that had questions that were unanswered were taken as incorrect answers.

5.2.2 Summary of the results

Of the 50 questionnaires handed out, 45 were returned resulting in a 90 % response rate. Of these, only 43 questionnaires were analysed as two questionnaires were returned completely blank and thus were excluded. The majority of the labour ward nurses (30%) fell into the 30 to 39 years age range. The most common qualification was a three year diploma in nursing as indicated by 44% of the sample. The median number of years worked in labour ward was 11 years, with a range of 6 months to 30 years. The majority of nurses (91%) cared for less than five patients receiving epidural analgesia per month.

The majority of nurses (84%) had received no specific education regarding epidural analgesia. The overall knowledge of the nurses was poor with the average score being 34% (range 0 to 95%).

The scores obtained for the subsections were as follows: anatomy and physiology of the spinal cord, 32%; epidural pharmacology, 37%; assessment of sensory and motor blockade, 28%; complications of epidural analgesia, 30% and general management of a patient receiving epidural analgesia was 42%.

5.3 LIMITATIONS

A limitation of the study was the generalisability of the study results as it was conducted contextually at CHBAH and should thus be interpreted with caution.

The questionnaire was originally designed for registered nurses and in our study it was completed by both registered nurses and staff nurses as both these categories attend to parturients receiving epidural analgesia.

As the study was specifically powered for the primary objectives and not the secondary objectives, comparisons made should be interpreted with caution.

Limited exposure of the labour ward nurses to epidurals may have contributed the poor knowledge levels in this study as 91% of nurses attended to less than five parturients receiving epidural analgesia per month.

5.4 RECOMMENDATIONS

5.4.1 Nursing education

Specific epidural training for labour ward nurses is required. This education should focus on all aspects of epidural analgesia.

Regular refresher courses on epidural analgesia need to be put in place to assist in the long term retention of information.

Protocol posters for management of epidural emergencies should be strategically placed in the labour ward where the nurses can view them frequently and easily.

5.4.2 Further research

A follow up study to assess the efficacy of the educational programmes put in place to improve the labour ward nursing staff epidural knowledge is needed after the nurse education has been implemented.

A qualitative research study to assess the current labour ward nursing staff attitudes to epidural analgesia as the attitude was previously influenced by the death of a nursing staff member secondary to labour epidural complications.

5.5 CONCLUSION

The level of knowledge regarding epidural analgesia amongst the CHBAH labour ward nursing staff is poor. As labour epidural analgesia is becoming more popular, expansion of the service at CHBAH will require more involvement and support from the nurses; therefore they need to be appropriately educated for this task.

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Appendix A: Ethics clearance certificate

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG
Division of the Deputy Registrar (Research)

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
R14/49 Nezisa Nongqo

CLEARANCE CERTIFICATE	M120241
PROJECT	Knowledge of Epidural Analgesic among Labour Ward Nursing Staff at Chris Hani Baragwanath Academic Hospital
INVESTIGATORS	Nezisa Nongqo.
DEPARTMENT	Department of Anaesthesia
DATE CONSIDERED	24/02/2012
DECISION OF THE COMMITTEE*	Approved unconditionally

Unless otherwise specified this ethical clearance is valid for 5 years and may be renewed upon application.

DATE 29/06/2012 CHAIRPERSON .....
(Professor PE Cleaton-Jones)

*Guidelines for written 'informed consent' attached where applicable
cc: Supervisor : Mrs Helen Perrie

DECLARATION OF INVESTIGATOR(S)
To be completed in duplicate and **ONE COPY** returned to the Secretary at Room 10004, 10th Floor, Senate House, University.
I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to ensure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee. **I agree to a completion of a yearly progress report.**

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES...

Appendix B: Postgraduate clearance certificate

Faculty of Health Sciences
Medical School, 7 York Road, Parktown, 2193
Fax: (011) 717-2119
Tel: (011) 717-2076

Reference: Ms Salamina Segole
E-mail: salamina.segole@wits.ac.za
10 July 2012
Person No: 675603
PAG

Dr NP Nongqo
1514 N 910
Mdantsane
East London
5219
South Africa

Dear Dr Nongqo

Master of Medicine (in the specialty Anaesthesia): Approval of Title

We have pleasure in advising that your proposal entitled "*Knowledge of epidural analgesia among labour ward nursing staff at Chris Hani Baragwanath Academic Hospital*" has been approved. Please note that any amendments to this title have to be endorsed by the Faculty's higher degrees committee and formally approved.

Yours sincerely

Mrs Sandra Benn
Faculty Registrar
Faculty of Health Sciences

Appendix C: Hospital board certificate to conduct research at CHBAH

GAUTENG PROVINCE
HEALTH
REPUBLIC OF SOUTH AFRICA

MEDICAL ADVISORY COMMITTEE
CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

PERMISSION TO CONDUCT RESEARCH

Date: 25 September 2012

TITLE OF PROJECT: knowledge of epidural analgesia amongst labour ward nursing staff at Chris Hani Baragwanath Academic Hospital

UNIVERSITY: Witwatersrand

Principal Investigator: Dr N Nongqo

Department: Anaesthesiology

Supervisor (If relevant): Dr H Perrie

Permission Head Department (where research conducted): **The principal investigator needs to get the permission of the senior Nursing Service Manager in Obstetrics at CHBAH**

Date of start of proposed study: October 2012
Date of completion of data collection: November 2012

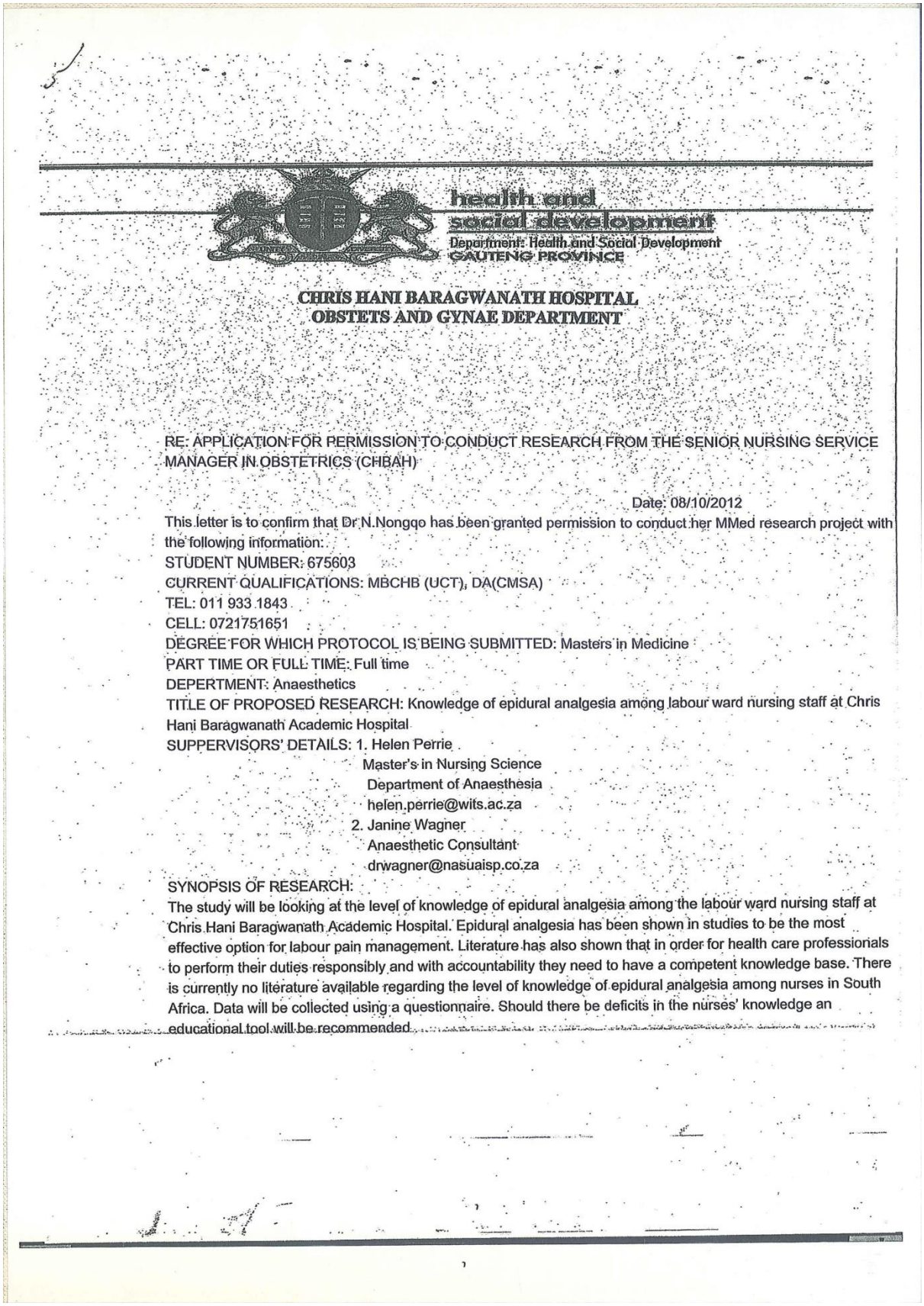
The Medical Advisory Committee recommends that the said research be conducted at Chris Hani Baragwanath Hospital. The CEO /management of Chris Hani Baragwanath Hospital is accordingly informed and the study is subject to:-

- Permission having been granted by the Committee for Research on Human Subjects of the University of the Witwatersrand.
- the Hospital will not incur extra costs as a result of the research being conducted on its patients within the hospital
- the MAC will be informed of any serious adverse events as soon as they occur
- permission is granted for the duration of the Ethics Committee approval.

.....
Recommended
(On behalf of the MAC)
Date: 25 September 2012

.....
Approved/Not Approved
Hospital Management
Date: 02/10/12

Appendix D: Permission to conduct research from the Senior Obstetric Nursing Services Manager



health and social development
Department: Health and Social Development
GAUTENG PROVINCE

CHRIS HANI BARAGWANATH HOSPITAL
OBSTETS AND GYNAE DEPARTMENT

RE: APPLICATION FOR PERMISSION TO CONDUCT RESEARCH FROM THE SENIOR NURSING SERVICE MANAGER IN OBSTETRICS (CHBAH)

Date: 08/10/2012

This letter is to confirm that Dr N.Nongqo has been granted permission to conduct her MMed research project with the following information:
STUDENT NUMBER: 675603
CURRENT QUALIFICATIONS: MBCHB (UCT), DA(CMSA)
TEL: 011 933 1843
CELL: 0721751651
DEGREE FOR WHICH PROTOCOL IS BEING SUBMITTED: Masters in Medicine
PART TIME OR FULL TIME: Full time
DEPERTMENT: Anaesthetics
TITLE OF PROPOSED RESEARCH: Knowledge of epidural analgesia among labour ward nursing staff at Chris Hani Baragwanath Academic Hospital
SUPPERVISORS' DETAILS: 1. Helen Perrie
Master's in Nursing Science
Department of Anaesthesia
helen.perrie@wits.ac.za
2. Janine Wagner
Anaesthetic Consultant
drwagner@nasuaisp.co.za

SYNOPSIS OF RESEARCH:
The study will be looking at the level of knowledge of epidural analgesia among the labour ward nursing staff at Chris Hani Baragwanath Academic Hospital. Epidural analgesia has been shown in studies to be the most effective option for labour pain management. Literature has also shown that in order for health care professionals to perform their duties responsibly and with accountability they need to have a competent knowledge base. There is currently no literature available regarding the level of knowledge of epidural analgesia among nurses in South Africa. Data will be collected using a questionnaire. Should there be deficits in the nurses' knowledge an educational tool will be recommended.

health and social development
Department: Health and Social Development
GAUTENG PROVINCE

CHRIS HANI BARAGWANATH HOSPITAL
OBSTETS AND GYNAE DEPARTMENT

ETHICS CLEARANCE: Granted
POST GRAD CLEARANCE: Granted

20/10/2024

Ms T. N. Sibiya
Deputy Manager
CHBAH- Mother & Child Depatment
09/10/2012

Appendix E: Information letter

Information Letter

Dear Colleague,

My name is Nezisa Nongqo. I am a registrar in anaesthesia and currently studying for a Masters Degree in Medicine at the University of the Witwatersrand. I am conducting a research study, and would like to invite you to participate in my study.

The purpose of this study is to describe the knowledge levels of labour ward nursing staff regarding epidural analgesia. The study will hopefully contribute to clinical practice and education of labour ward nursing staff if necessary.

Should you agree to participate in the study I will ask you to complete a questionnaire. This should not take you more than 25-30 minutes to complete. I will obtain permission from your unit manager for you to complete the questionnaire during "on duty" time and I will personally bring you the questionnaire. You will remain anonymous as the questionnaires will ask no identifying information from you and will not be marked for identification in any way. Completed questionnaires will be placed in sealed unmarked envelopes which I will personally collect from you.

Confidentiality will be maintained as only my supervisors and I will have access to the completed instruments and results of the study will be reported in general terms with no identifying information. Your participation is voluntary. You may choose not to participate, or to withdraw from the study at any time with no repercussions. Results of the study will be made available to you if you so wish.

I appreciate that you will not benefit directly from participation in this study. However, I hope that the results of the study will help to clarify educational needs of nurses regarding epidural analgesia.

The relevant people and research committees of the University of the Witwatersrand and your health care institution have approved this study. Should you wish to contact me, or require any further information, please do not hesitate to contact me on cell number 072 175 1651 or the chairman of the Human Research Ethics Committee, Professor Cleaton-Jones on 011 717 1234.

Thank you for taking the time to read this information letter.

Yours sincerely

Nezisa Nongqo

Appendix F: Questionnaire

KNOWLEDGE OF EPIDURAL ANALGESIA AMONG LABOUR WARD NURSING STAFF AT CHRIS HANI BARAGWANATH ACADEMIC HOSPITAL

Please answer the following questions:

SECTION 1: DEMOGRAPHIC INFORMATION

1. **Age**

< 20 years	
20 - 29 years	
30 - 39 years	
40 - 49 years	
50 - 59 years	
≥ 60 years	

2. **Nursing Qualification**

MSc Nursing	
BSc Nursing	
3 year diploma in Nursing	
4 year diploma in Nursing	
1 year diploma in Midwifery	
Staff nurse	
Other	

If “other” please specify

……

……

3. Have you ever had any specific training regarding epidural analgesia?

YES	NO

4. How have you acquired your knowledge regarding epidural analgesia?

Text books	
Nursing Journals	
Medical Journals	
Congresses	
Medical Colleagues	
Nursing colleagues	
Clinical experience	
Part of curriculum when training	
Other	

If "other" please specify

……

……

5. For how many years have you worked as a qualified nurse? …….years

6. How many years or months of labour ward nursing experience do you have?

Years	
Months	

7. On average how many patients receiving epidural analgesia do you care for each month?

None	
< 5	
5 - 10	
> 10	

8. How confident do you/would you feel caring for a patient receiving epidural analgesia?

Very confident	
Confident	
Neutral	
Insecure	
Very insecure	

SECTION 2: EPIDURAL KNOWLEDGE QUESTIONNAIRE

Spinal cord anatomy & physiology

9. The epidural space is a potential space located just outside the

1) Pia Mater
2) Dura Mater
3) Arachnoid Mater
4) Epi Mater

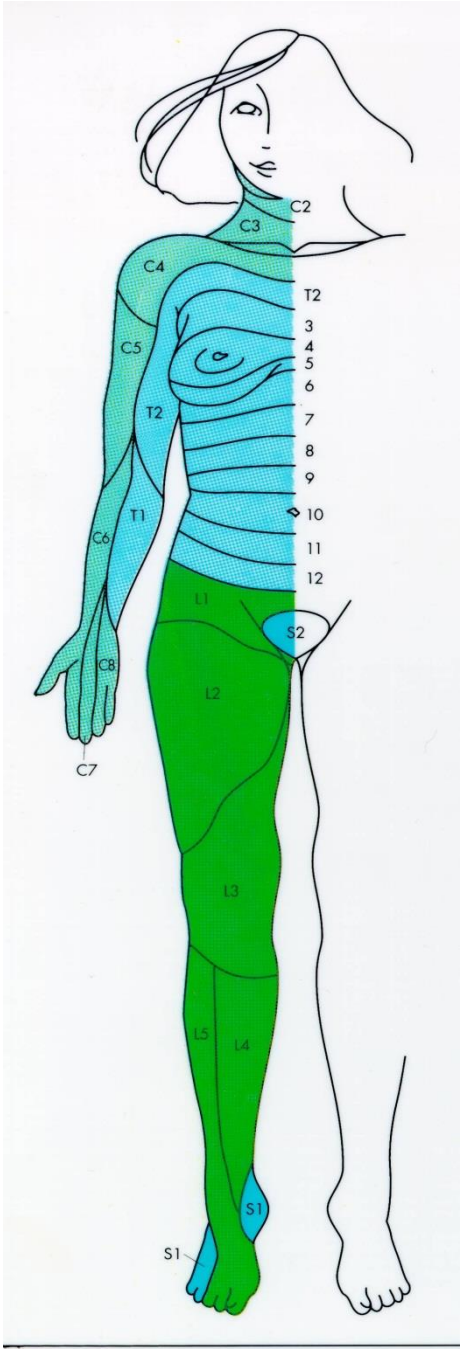
10. If an epidural catheter is inserted at the T5 level where would you expect to detect the sensory block?

1) Abdomen
2) Thorax
3) Legs
4) Arms

11. What is a dermatome segment?

1) A skin segment supplied by a cranial nerve
2) A skin segment supplied by a mu receptor
3) A skin segment supplied by NMDA receptor
4) A skin segment supplied by a spinal nerve

12. Referring to the Human Dermatome Chart provided, which dermatome segment corresponds to the medial aspect of the lower leg?



1) L4
2) L5
3) L1
4) S1

Epidural Pharmacology

13. The drug groups commonly used for epidural analgesia are:

a) Opioids
b) NSAID's
c) Local Anaesthetics
d) Neuroleptics

(Indicate your response from the choices below)

1) a, b
2) a, c
3) a, b, c
4) a, c, d

14. Local anaesthetic agents when injected into the epidural space, result in the blockage of:

a) Nicotinic receptors of muscles
b) Sensory information back to the spinal cord
c) Nerve impulse conduction directing peripheral muscle activity
d) Sympathetic activity

(Indicate your response from the choices below)

1) b, c, d
2) a, b, c
3) a, c
4) a, b, d

15. Epidural opioids potentially cause:

a) Nausea
b) Motor blockade
c) Pruritus

d) Respiratory depression

(Indicate your response from the choices below)

1) a, b
2) a, c, d
3) a, b, d
4) All of the above

16. Which epidurally administered drug is most likely to cause respiratory depression?

1) Fentanyl Citrate
2) Lignocaine
3) Bupivacaine
4) Ropivacaine

Assessment of sensory and motor blockade

17. When conducting sensory blockade assessment, which of the following areas is used as a control as it would not be blocked by the local anaesthetic agent?

1) The fingers
2) The cheek area
3) The forearms
4) The feet

18. Your patient has just had a successful vaginal delivery under epidural analgesia.

When performing sensory blockade assessment, you would:

a) Utilize a control area
b) Commence testing at the level of the hip
c) Test the left side of the body only
d) Identify the upper and lower margins of the block

(Indicate your response from the choices below)

1) a, b
2) b, c, d

3) a, d

4) All of the above

19. Which of the following statements is correct?

1) A human dermatome chart is used to determine degree of motor blockade.

2) Motor blockade assessment is determined by using ice.

3) The Bromage Assessment Scale is used to determine the degree of motor blockade.

4) Patients are asked to stand to determine motor blockade.

20. You have just performed a motor blockade assessment on Mrs C. You identify that she is able to move both of her feet, knees and has full flexion of each hip. You would document your findings as:

1) No motor blockade

2) Partial motor blockade

3) Almost complete motor blockade

4) Complete motor blockade

21. Your re-assessment of Mrs C two hours later reveals that she can move both of her feet but cannot flex her left knee or hip. She can flex her right knee and hip. You would document your findings as:

1) L = none R = none

2) L = partial motor blockade R = almost complete

3) L = partial motor blockade R = none

4) L = almost complete motor blockade R = partial motor blockade

Complications

22. The classic signs of epidural haematoma include:

a) Increasing density of motor blockade

b) Decreasing density of motor blockade

c) Increasing intensity of sensation

d) Decreasing intensity of sensation

e) Back pain

(Indicate your response from the choices below)

1) a, d, e

2) b, c, e
3) a, c, e
4) b, d, e

23. You suspect that your epidural catheter may have migrated intravascularly. The early signs of intravascular local anaesthetic toxicity include:

1) Restlessness, slurred speech, pruritus, tinnitus
2) Numbness around the mouth, restlessness, constipation, pruritus
3) Nausea and vomiting, pruritus, constipation
4) Restlessness, numbness around the mouth, slurred speech, tinnitus

24. Your epidural patient has just received a bolus dose of the local anaesthetic agent by the doctor. She has a lumber epidural in-situ and has now become hypotensive. Her sensory block height is S2 -T2. The most likely cause of his hypotension would be?

1) Blocking of the Parasympathetic Nervous System by the local anaesthetic agent
2) Stimulation of the Parasympathetic Nervous System by the local anaesthetic agent
3) Stimulation of the Sympathetic Nervous System by the local anaesthetic agent
4) Blocking of the Sympathetic Nervous System by the local anaesthetic agent

General nursing management

25. You have assessed your epidural patient to have a partial motor blockade of the right lower limb and an almost complete motor blockade of the left lower limb. Your intervention would be:

1) Not mobilise this patient at this time
2) Mobilise this patient as normal
3) Mobilise the patient only to the toilet
4) Mobilise this patient with the help of another nurse

26. You have assessed your epidural patient as having an uneven sensory block but no pain. Your intervention would be:

1) Turn the infusion off
2) Turn the infusion rate up
3) Continue to observe
4) Position the patient head down

27. Your patient's epidural sensory block has extended to T2. You would:

a) Lay the patient flat

b) Turn the infusion off or decrease the rate and notify the doctor

c) Assess respiratory function and motor function of the upper limbs

d) Sit the patient up (if not contraindicated)

(Indicate your response from the choices below)

1) a, b
2) c, d
3) a, c
4) b, c, d

28. Before removing your patient's epidural catheter you would:

a) Check for anticoagulant therapy

b) Check that there is a doctor in order to remove the catheter

c) Check observations

d) Check Hb

(Indicate your response from the choices below)

1) a, b, c
2) a, b, d
3) b, c, d
4) All of the above

29. If a patient has an epidural inserted for labour analgesia they:

a) will not be able to deliver vaginally and will need a caesarean section

b) will have a significantly prolonged labour

c) may need to have an assisted delivery with forceps or vacuum

d) none of the above

30. Please select the incorrect statement regarding the benefits of maternal analgesia during labour:

a) facilitates early bonding between mother and foetus

b) decreases the risk of chronic pain syndromes post delivery

c) there is an increased incidence of Post-Traumatic Stress Disorder

d) None of the above

Thank you again for assisting in this project

Appendix G: Permission to use Epidural Knowledge Questionnaire

From: Wendy Chaboyer [mailto:w.chaboyer@griffith.edu.au]
Sent: 24 January 2012 09:05
To: Juan Scribante
Cc: kalrissan@bigpond.com
Subject: Annette's knowledge test URGENT!!!

Dear Juan,
My SINCERE apologies... I thought I had dealt with this prior to Xmas. I now realise we had had another request from a different group and we dealt with it, and I mixed that request up with yours. Annette is VERY pleased that her instrument may be used by your team. Attached is the instrument. Please feel free to contact Annette on Kalrissan e-mail above. I incorrectly used her 'old' e-mail when I responded to you in December.

I also include a description of how the instrument was developed, which may assist you as well.

Again, I am very sorry for my confusion and tardiness with responding to you.

(Annette, I know Juan and her South African team of researchers).
(See attached file: Epidural Survey 2006 For others.doc)(See attached file: Dev of an epi know test instrument for RNs and Mw.doc)
Kind regards
Wendy

Professor Wendy Chaboyer
Director, NHMRC Centre of Research Excellence in Nursing Interventions for Hospitalised Patients (NCREN)
Research Centre for Clinical and Community Practice Innovation (RCCCPI)
Griffith Health Institute
Gold Coast campus
GRIFFITH UNIVERSITY, Qld, 4222
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----- Forwarded by Wendy Chaboyer/Staff/Griffith on 24/01/2012 04:50 PM -----