HUTTmaternity
Hutt Valley Maternity Care

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# Epidural Policy

## Purpose

The purpose of this policy is to

- Provide safe and consistent care in labour for women wanting an epidural
- Establish a local approach to care that is evidence based
- Inform good decision making

## Scope

- Anaesthetic staff employed by the Hutt Valley DHB
- All obstetric staff employed by the Hutt Valley DHB
- All midwifery staff employed by the Hutt Valley DHB
- All Hutt Valley DHB maternity access agreement holders

## Prior to insertion of epidural

The midwife must consult with the obstetric consultant on call for delivery suite as per. Referral Guideline code 5009, 2012. This includes a discussion and confirmation of maternal and foetal wellbeing.

- Maternal wellbeing is established by taking Temperature, Pulse, Blood Pressure and Respirations;
- Foetal wellbeing is established by a normal CTG reading as defined by RANZCOG.guidelines prior to epidural insertion.

All women having a labour epidural must be cared for by a midwife who has a current regional certificate

## The Policy

All aspects of the Hutt DHB epidural policy is encompassed in the 'Regional anaesthesia for labour and birth workbook for midwives' (appendix I)

## APPENDIX 1

Regional anaesthesia for labour and birth
Workbook for Midwives
Updated October 2011

**Acknowledgments**

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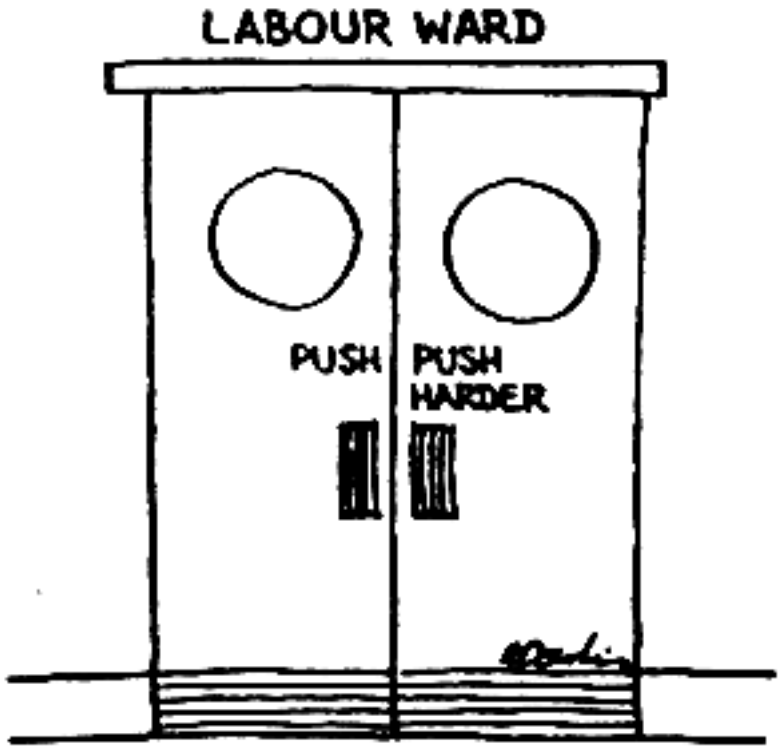

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# Part 1: Overview

## 1 Purpose

This manual provides midwives working in the Central Region (that is the lower North Island) with the latest evidence on regional analgesia in labour.

Epidural rates vary amongst the regions but Wellington has one of the highest in New Zealand. Approximately 48% of pregnant women admitted to Wellington Hospital request an epidural.[105] Any midwife working within the hospital should to be competent to deal with all aspects of labour epidurals, from antenatal education of pregnant women to managing an epidural during labour and afterwards.

## 2 Introduction

Proponents of labour analgesia and regional blocks view epidurals, as a woman's undeniable right to receive effective pain relief if she so chooses. Opponents view them as an unnecessary intervention into a natural process. Whatever our personal opinion on labour analgesia, women should be allowed to make up their own minds.

To make informed choices, pregnant women need to be given accurate information on their options. A woman's response to labour is difficult to predict and many women who do not anticipate wanting an epidural will request one. To prevent giving new information during delivery it is important to discuss all the possibilities in the antenatal period.

This manual aims to equip midwives with the knowledge and skills required to care for these women safely.

## 3 Objectives

The objective of this manual is for midwives in the Central Region to acquire or update the skills and knowledge necessary for the safe and effective management of regional analgesia.

This will be achieved by:

- Gaining the knowledge of anatomy, physiology, and pharmacology relating to epidural analgesia.
- Being equipped to give pregnant women accurate information on epidurals as an analgesic option.
- Having awareness of the indications, contraindications and all potential complications of regional analgesia.
- Having knowledge of the specific care requirements for women receiving regional analgesia.

- Having the knowledge of how to monitor the woman and baby while receiving regional analgesia.

- Gaining the knowledge of how to recognise and manage any resulting adverse effects.

- Knowing the specific requirements of dealing with the epidural catheter, the site and dressings and the removal of the catheter.

- Recognising the importance of documentation throughout the labour.

# 4 Analgesia in Labour

## 4.1 Preparation

### 4.1.1 Antenatal education

Many women in their first pregnancy attend some form of birth preparation class. Here they are taught about pain relief options and also about non-pharmacological techniques that may help to alleviate pain. Attendance at such classes may help women to better cope with the pain of labour.[1] 75% of first time mothers request pain relief in labour [2] full information on the options should be given antenatally.

### 4.1.2 Continuous Labour Support

The support person in general, may be the midwife, the woman's partner or other companion. However within the Regions' facilities, a registered midwife will assume care in labour. It is important to note, that the midwife is not always the woman's LMC (Lead Maternity Carer).

In primary care, the LMC is chosen by the woman and therefore may be any one of the following: (1)a Midwife (2) a General Practitioner who works in conjunction with a midwife in shared care or (3) an Obstetrician LMC who again works in conjunction with a midwife in a shared care arrangement.

This person encourages, soothes, praises and provides physical comfort in the form of massage, heat, acupressure and sometimes acupuncture to improve relaxation and confidence. This has been claimed to decrease anxiety levels, analgesic requirements, duration of labour, and operative deliveries. [8-10]

### 4.1.3 Non-Pharmacological methods

Numerous non-pharmacologic methods are available to women. These options can not be adequately covered within this workbook. A booklet 'Labour Pains-making choices' covering various methods of pain relief is available through the New Zealand College of Midwives.

## 4.2 Pharmacological methods

### 4.2.1 Inhalational Analgesics

Nitrous oxide ($N^2O$) gas is the only inhalational agent still used commonly today. It is most often used as a mixture of 50% N2O and 50% oxygen (Entonox). N2O is self-administered via a mask or mouthpiece, with a safety demand valve to prevent over-sedation of the women. It is a fast-acting analgesic but, because it takes between 45-90 seconds to reach full effect, it must be carefully timed to act by the peak of a contraction. N2O rarely relieves all pain and is relatively ineffective against severe labour pain, but many women who use it report satisfactory analgesia.[18-19] N2O seems more effective than either pethidine or TENS, but is less effective than epidural analgesia[18]. The advantages include its availability, simplicity, and rapid reversibility. Its side effects include light-headedness, drowsiness (rarely to the point of loss of consciousness), confusion, nausea, vomiting, hyperventilation and a metabolic alkalosis. N2O is a "greenhouse" gas and may be phased out of use.

### 4.2.2 Opioids

Opioids in labour can be administered subcutaneously, intramuscularly or intravenously. They can be given as a bolus injection or by a patient-controlled means. Only pethidine and fentanyl are commonly used in New Zealand. Midwives should have completed the intravenous opioid assessment before administering these drugs by the intravenous route.

Pethidine is commonly used opioid due to its availability, familiarity and ease of administration. Its onset of action after an intramuscular injection is about 45 minutes and it is quickly transferred across the placenta to the foetus. The half-life of its active metabolites is up to 60 hours. The majority of studies on its efficacy show it to be a poor analgesic in labour [20, 21]. Pethidine results in sedation but little improvement in pain. Epidural analgesia is consistently more effective and even N2O has been shown to be more effective. There are many side effects associated with its use, including nausea, vomiting, increased gastric volumes, sedation, confusion, and underventilation and hypoxia between contractions. The neonate is also at risk of respiratory depression (particularly if the last dose occurred within 2-3 hours of delivery), decreased Apgar scores, and a longer time to established breastfeeding. Most of the adverse effects on the neonate can be reversed rapidly with naloxone. However it is important to remember that the half-life of Naloxone is much shorter than that of Pethidine. A recent meta-analysis on its place in labour shows very little support for its continued widespread use.[21]Because of this safety profile, Pethidine use has fallen from favour in much of the region including Palmerston North and Whanganui hospitals where fentanyl is preferred.

Fentanyl has a faster onset and shorter duration of action than pethidine. It has no active metabolites. It is occasionally used by a patient-controlled means for women in whom an epidural is contraindicated. Its efficacy seems similar to pethidine with perhaps less severe, but similar, side effects for the women[22]. Neonatal respiratory depression is a risk but is seldom seen in practice. There are few studies on its use in this setting and thus evidence is scarce.

Remifentanil is a new addition to the available opiates. It has an extremely fast onset and offset of action with seemingly minimal transfer across the placenta. It has been used successfully in the management of labour pain in women who

cannot have an epidural, and will probably see more use as experience with it in grows. It is not without complications for the women. Its use requires the active involvement of an anaesthetist.

### 4.2.3 Peripheral Local Anaesthetic Blocks

Paracervical block**.** A paracervical block entails the infiltration of local anaesthetic at various sites lateral to the cervix, which blocks pain transmission from the uterus via the paracervical plexus. It gives good pain relief in the first stage of labour but is ineffective in the second stage. It only lasts about 2 hours and has many, often serious, side effects. It is little used today except in countries where anaesthetists are not routinely available.

Pudendal nerve block. A block of the pudendal nerve can provide analgesia during the second stage of labour, particularly for instrumental deliveries or repairs to the perineum. It has no effect on the pain of uterine contraction. It has a poor success rate and its complications include intravascular injection, haematoma formation and abscess formation. This block relies on the use of large potentially toxic, doses of local anaesthetic. It is seldom performed.

### 4.2.4 Regional Anaesthesia

This includes spinal, epidural and combined spinal-epidural pain relief and the rest of the manual concentrates only on these methods. They are all performed by the injection of local anaesthetic and/or opioid drugs into the epidural or subarachnoid space of the spinal canal. These drugs act to block pain impulses up the spinal cord. Regional analgesia has been shown to be the most effective of the available options for labour analgesia.[1, 3, 23-25, 39] Regional analgesics are performed only in certain centres, and are the most expensive and labour-intensive form of pain relief.

# Part 2: Regional analgesia

## 5 Relevant Anatomy

The spinal cord extends from the foramen magnum at the base of the skull, down to the 1st or at most 2nd lumbar vertebra in most adults. It lies within the bony canal created by the vertebrae. Three dural layers surround the spinal cord: the closely adherent pia mater, then the arachnoid mater and finally the thicker dura mater. The space between the pia and arachnoid mata is the subarachnoid (or intrathecal) space, which contains cerebrospinal fluid (CSF). Outside of the dura lies the epidural space. The posterior portion of the epidural space is bounded by the ligamentum flavum. The epidural space contains the nerve roots that have branched off from the spinal cord, blood vessels and fat.

To reach the epidural space a needle must pass through several layers. First it penetrates the skin, then the supraspinous ligament, followed by the interspinous ligament, and finally the thick, tough ligamentum flavum. The needle also needs to be positioned to make its way between the bony obstructions of the spinous processes posteriorly and the laminae of the vertebrae on each side. The epidural space lies about 4-7cm deep to the skin in most women.

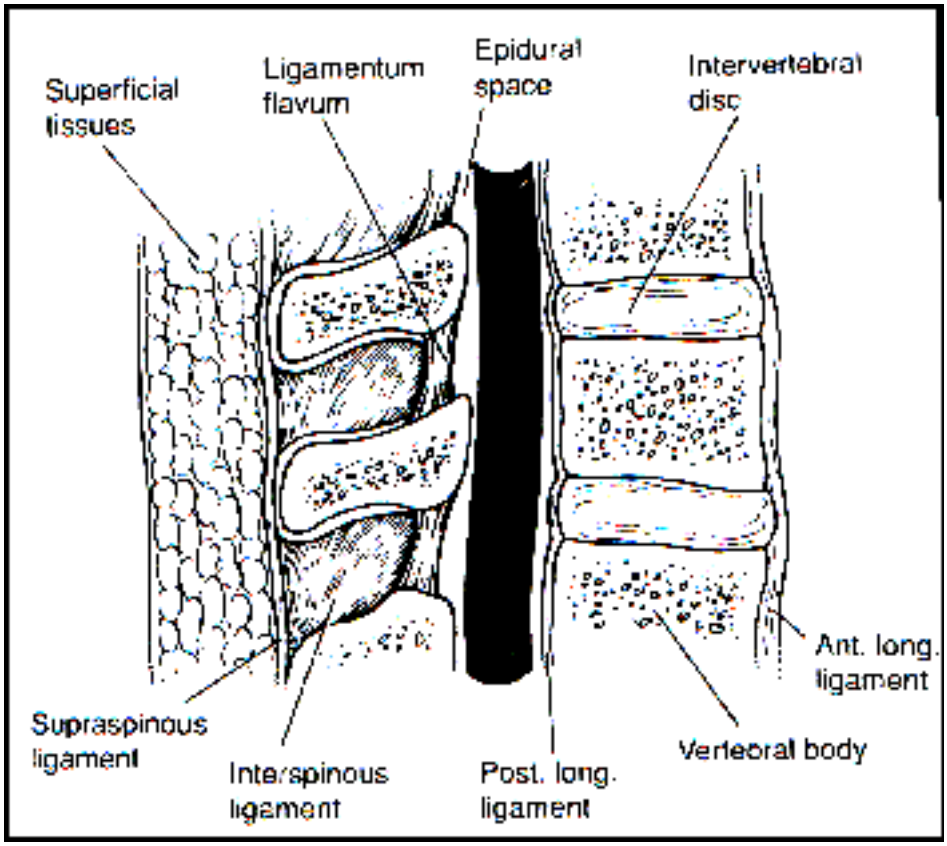

Figure 1: Ligaments for epidural insertion (Cousins MJ, Bridenbaugh PO, 1998, pg. 205)

## 6 Neural Pathways in Labour

The mechanism of labour pain depends on the stage of labour. During the first stage the pain is the result of uterine contraction, and cervical dilatation and effacement. The nerve supply to the uterus and cervix comes from the 11th and 12th thoracic spinal segments (T11 and 12) with variable input from T10 and L1. This pain is described as “visceral” and is felt as a dull, poorly localised aching pain. It is referred to the areas of the corresponding sensory dermatomes and thus manifests as pain in the lower abdomen and back. In the late 1st stage and 2nd stage of labour, the pain from the cervix diminishes as it reaches full dilatation, but now the presenting part descends through the pelvis and perineum resulting in pressure on, and sometimes damage to, the vagina, urethra, cervix, bladder, uterine ligaments, sacrum and perineum. The nerve supply to these areas is mostly via the pudendal nerve to the sacral plexus (S2-4). This is a somatic type of pain mixed in with ongoing visceral pain; in other words it is sharper and better localised. There is often a burning pain referred into the buttocks, thighs and legs from pressure and stretching of the various nerves passing through the pelvis.

To prevent pain throughout labour it is necessary to block nerves from spinal segments T10 to L2 in the 1st stage and then all the way down to S4 in the 2nd stage. For a caesarean section (C/S) the block needs to be denser and much higher because the peritoneum of the abdomen is breached. Therefore for a C/S the block needs to extend right up to T4 to ensure all pain is relieved.

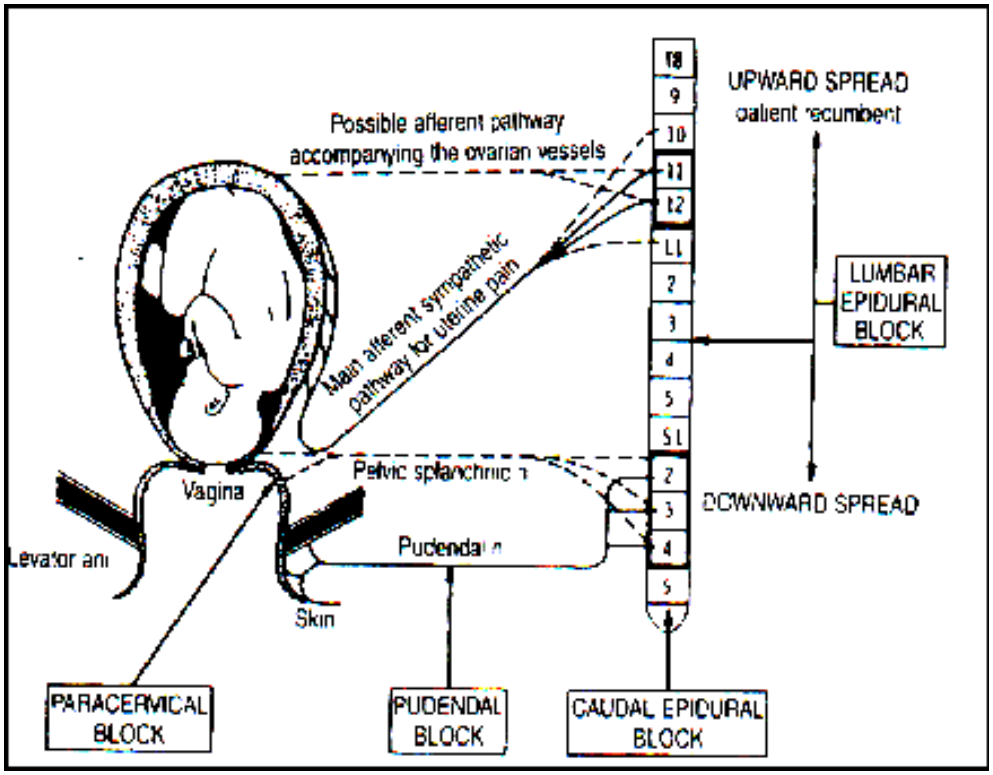

Figure 2: Pain pathways in labour (From Russell R, Scrutton M, et al., 1997, pg. 127)

### 6.1 Severity of Labour Pain

Much work has been done to try to quantify the pain of labour. Pain is an extremely subjective and variable sensation and is influenced by many things. In the case of childbirth these include parity, maternal age (older or younger women posing more difficulties), culture, prior education, socio-economic status, foetal position, oxytocin use and other invasive procedures[26-28].

It is not possible for an observer to assess the intensity of pain a woman is experiencing because the expression and manifestations of pain are so variable[1]. Studies that use various pain scores to get woman to assess their own pain show that the majority score their pain as severe or intolerable[25-31]. The memory of the pain of labour fades fast; it is remembered as 50% better by day 2 and 90% better by 3 months postpartum[32-33].

## 7 Relevant Pharmacology

### 7.1 Local Anaesthetics

Local anaesthetics (LAs) are agents that are capable of entering nerve cells and reversibly preventing them from conducting impulses. The nerve fibres that carry pain are the most sensitive to LAs and are therefore easily blocked. There are many types of LA, but the ones in common use today include lignocaine, bupivacaine and ropivacaine. These LAs vary in their speed of onset, their duration of action, their ability to block various different nerve fibres and their toxicity.

The toxicity of LAs is a result of their actions on the central nervous system (CNS toxicity), and on muscle cells of the cardiovascular system (CVS toxicity). Toxicity occurs after a miscalculation of the dose (overdose), an accidental intravenous injection, or due to accumulation of the drug over time. The CNS is the first to be affected, and presents with numbness of the tongue and mouth, a metallic taste, light-headedness, tinnitus, slurred speech, and muscle twitching which may progress to convulsions and loss of consciousness. The CVS is more resistant, but if the dose is sufficient the result may be various arrhythmias, a low blood pressure and possible CVS collapse.

Lignocaine (Xylocaine) has a speedy onset of action but a fairly short duration of action. It is less toxic to the cardiac system than bupivacaine. It is seldom used in labour epidurals due to its short duration, frequent dosing requirements and more profound motor block and higher drug levels in the fetus.

Bupivaciane (Marcain) takes slightly more time to take effect but lasts longer. It is the most familiar and most commonly used LA in labour. It does have the disadvantage of increased cardiac toxicity in overdose. Its maximum dose is 2mg/kg in any 4-hour period. It is used in concentrations of 0.0625-0.5% (ie. 0.625mg / ml to 5mg / ml), often with the addition of 2ug/ml of fentanyl.

Ropivacaine (Naropin) is a new addition. It is less potent but acts similarly to bupivacaine and has the advantage of causing less motor blockade and of being

less cardiotoxic. In labour it is used as a 0.1-0.2% solution, usually with the addition of fentanyl. This drug is more expensive than bupivicaine.

### 7.2 Opioids

These are drugs, either natural or synthetic, that are derived from opium. They work at specific opiate receptors that are found in the brain and spinal cord, and by so doing relieve pain. They are frequently used together with LA's in epidural and spinal obstetric analgesia and anaesthesia. By doing this we are able to achieve superior pain relief with lower doses of the LA agents. Opioids have several side effects including nausea and vomiting, pruritus, urinary retention and respiratory depression. None of these are common with the type and doses used for labour epidurals. Most of the side effects can, if necessary, be reversed by the opioid antagonist, naloxone.

Fentanyl is the most commonly used opioid in labour epidurals. The other ones that are sometimes used are pethidine and morphine. Sufentanil and diamorphine (heroin) are two others that are not available in New Zealand, but are frequently used in other countries.

## 8 Physiological Effects

The action of LA's and opioids on blocking nerve impulses and pain transmission has some predictable effects.

### 8.1 Sensory block.

LA's easily block the sensations of pain and temperature. Usually a low concentration of LA is enough to remove the pain of a contraction but will leave the sensation of uterine squeezing intact. Labours with an abnormal presentation or an element of obstruction may need a higher concentration to achieve adequate pain relief.

### 8.2 Motor block.

Nerves that carry motor function are larger and more resistant to LA's. They are relatively spared with low concentrations of LA, but as the LA accumulates in a long labour, motor function may become affected. This leads to less maternal mobility.

### 8.3 Autonomic block.

The nerve fibres carrying sympathetic impulses are easily blocked by LA. Sympathetic supply is diminished below the level of the block. This causes blood vessels to dilate and decreases sweating (the woman's legs will feel warm and dry). The vasodilatation can cause a drop in blood pressure, especially if aortocaval compression is also present.

### 8.4 Proprioceptive block

The sensation of proprioception (joint position sense) is important for balance. Although this is not usually blocked with a low dose of LA, a block must still be excluded before a woman with an epidural can ambulate safely (see page 28).

### 8.5 Diminished stress response

Pain from any source will elicit a physiological stress response, and labour is no different. Pain manifests in many ways:

- It results in an increased level of catecholamines, cortisol and other hormones.
- Psychologically there is an increase in fear and anxiety.
- CVS changes occur, including an increase in cardiac output, blood pressure and heart rate.
- The respiratory response is an increase in ventilation and a decrease in carbon dioxide, which can cause a respiratory alkalosis.
- The oxygen demand of the body increases which can result in a metabolic acidosis.

The stress response in labour can cause inco-ordinate uterine action and decreased uteroplacental flow, the end result of which can be a foetal acidosis [34].

These changes may not occur or may not be significant in most uncomplicated labours, but can have detrimental effects in prolonged difficult labours. These changes can be diminished by the use of an epidural[34].

## 9 Benefits

### 9.1 Analgesia

Epidurals provide the most effective analgesia in labour[39]. This pain relief is usually without sedation and thus the women can participate more fully in her labour. This is especially important for those women experiencing severe labour pain, for example those with an abnormal foetal presentation or cephalopelvic disproportion.

### 9.2 Decreased stress response

This is especially helpful in prolonged and complicated deliveries or for women with medical problems. This can be beneficial to the women, the progress of labour and to the foetus (see above).

### 9.3 Perineal analgesia

Regional analgesia allows easier internal examinations, manipulation of the foetus, episiotomies, assisted deliveries and perineal repairs.

### 9.4 Safer conversion to caesarean section

Should an operative delivery become necessary the epidural is already in place, allowing for a more rapid top-up. This will decrease the number of general anaesthetics (GA's) that may be forced in an emergency. GA's are probably not as

safe for women or baby compared to a regional anaesthetic for a caesarean section (C/S) [35, 36].

### 9.5 Decreased premature pushing

In some labours the urge to push becomes irresistible even though the cervix is not fully dilated or effaced, which can have serious consequences. An epidural can relieve this urge and allow for full dilatation before pushing is encouraged.

## 10 Indications for Labour Epidural Analgesia

### 10.1 Maternal indications

- Women' request for epidural pain relief.
- Maternal distress.
- Hypertensive disorders of pregnancy (e.g. Pre-eclampsia). Epidurals decrease the surges in blood pressure that occur during contractions. They have also been shown to maintain and often improve placental perfusion in this setting.
- Cardiovascular disease. Under some circumstances the physiological stress of labour can be detrimental, for example congenital, valvular and ischaemic heart disease. An epidural decreases the stresses put on the CVS during labour.
- Respiratory disease. An epidural can decrease the respiratory demands of labour for patients with severe respiratory disease (e.g. Cystic fibrosis).
- Obesity. Regional blocks enable easier examinations during labour. They also help avoid the hazard of a GA should a C/S become necessary.
- High paraplegia and quadriplegia. This prevents the autonomic instability these patients may otherwise experience in labour.
- Women with an intrauterine death or a foetal malformation. The reduction of labour associated pain may assist in reducing anxiety/stress for these women.

### 10.2 Possible Indications in Labour

- Prolonged labour/ long latent phase where appropriate.
- Induction or augmentation of labour - where syntocinon is often used.
- Inco-ordinate uterine action.
- Pushing against a cervix that is not fully dilated.
- Fetal malposition, such as an occipito-posterior presentation.

- VBAC or trial of labour, for women who have had a previous LUSCS. Should this fail the transition to C/S is easier. The previous reservation that the epidural may prevent the recognition of scar rupture is no longer thought valid, but there must be a heightened awareness by the persons responsible for labour care, of this possibility.

- Instrumental delivery.

- The operative management of a retained placenta.

### 10.3 Possible Fetal indications

- Premature labour and intrauterine growth retardation (IUGR). Epidurals can increase the placental blood supply. They are also useful for any necessary instrumental or operative delivery that may occur.

- Multiple births. These increase the risks of PET, prematurity, and IUGR. The second twin may need version. There is an increased incidence of instrumental and operative deliveries.

- Planned vaginal birth with a breech presentation. Epidural analgesia helps to delay the urge to push until the cervix is fully dilated and the breech is well descended. A working epidural in situ in this situation may mean GA can be avoided should a rapid change in planned mode of delivery occur.

## 11 Contraindications

- Maternal refusal.

- A coagulopathy, which can occur in pre-eclampsia, eclampsia, HELLP syndrome, placental abruption, intrauterine death, infection, major haemorrhage, and amniotic fluid embolus. The risk of performing a regional block in the presence of a coagulopathy is of causing an epidural haematoma (see page 35). In all of the above conditions, blood results (full blood count and a clotting screen) must be obtained before a regional technique is performed. A regional should not be done if: [36-38] [97]

  a. Platelets < 80 $x10^9$ /L. Between 80 & 100 x $10^9$ the anaesthetist makes a decision on what to do depending on other factors involved.

  b. INR>1.5

  c. APTT>upper limit of normal

  d. Administration of Clexane, or other low molecular weight heparins within the last 12-24 hours (depending on the dose).

  e. Administration of intravenous conventional heparin within the last hour

f. Administration of subcutaneous conventional heparin within the last 4 hours.

g. There is a history of bleeding disorder with evidence of defective platelet function or clotting.

- Certain infective disorders, where the risk of performing an epidural increases the risk of abscess formation or meningitis. A regional should not be done if there is:

    a. Infection over the site of epidural placement.

    b. A source of infection elsewhere, which is a relative contra-indication. Patients with chorioamnionitis do not seem to be at increased risk, but as a precaution covering antibiotics should be given[38]. In the case of other infections, such as urinary or respiratory tract, the anaesthetist will make a decision depending on the severity of the infection.

    c. Generalised septicaemia.

    d. A primary episode of active genital herpes.

- Haemodynamic instability. A regional should not be done if there is uncorrected hypotension of any cause.

- Lack of suitably trained staff

- Proven allergy to LA, which is very rare.

### 11.1 Relative contraindications

In these situations the anaesthetists may or may not decide to perform a regional, depending on the individual case.

- Certain cardiovascular system disorders, such as severe aortic stenosis.
- Certain infective disorders, as mentioned above.
- Certain anatomical abnormalities of the vertebral column e.g.spina bifida, previous back surgery, kyphoscoliosis.
- Certain central nervous system disorders, such as raised intracranial pressure.

## 12 Effects of an Epidural on Labour, Delivery and the Foetus

### 12.1 Effects on Labour and delivery

- C/S rate. There is no statistical evidence of a significant effect on the C/S rate (level I evidence) [39-41].

- Length of labour. Epidurals increase the 1st and 2nd stages of labour. The first is only slightly increased and is probably not significant. The second stage is also increased, by an average of 15 minutes (level I evidence) [39-41].

- Augmentation is used more often in women with epidurals (level I evidence) [39-41].

- There is a higher incidence of instrumental deliveries (level I evidence) [39-41]. This link may not be causative. This effect seems less with the low concentration epidurals used today[42-44].

- More women with an epidural get a temperature >38°C (level I evidence) [39-41].

- The timing of epidural insertion is no longer thought to be so important. An early epidural does not increase the risks of an instrumental or operative delivery compared to one inserted later in labour (level I evidence) [45-46]. However, the most appropriate time would be when labour is fully established.

- Stopping an epidural in the second stage does not decrease the chance of an instrumental delivery (level I evidence) [47].

## 12.2 Effects on the fetus.

Regional analgesia can affect the baby in two ways: directly, by the transfer of drugs across the placenta; and indirectly by any changes in the women's physiology that may occur as a result of the epidural. The effects are measured in various ways, such as Apgar scoring, neonatal respiratory function, cord blood pH, the ease in initiating breastfeeding after delivery, and neurobehavioral scoring.

### 12.2.1 Direct effects

The drug doses in modern epidurals are small. There is no doubt that some transfer of drug to the foetus will occur, but adverse effects are seldom seen[60]. The babies born to women who have received an epidural seem to display less effects than those of women who received pethidine during their labour[20, 40, 58]. Their Apgar scores are better, they have less respiratory problems and they feed earlier. There is much controversy amongst health care providers, with regard to suggested observational behavioural differences between babies born to women with an epidural compared to no analgesia at all. In particular when considering the sucking and rooting reflexes of the newborn in both groups. Research in this area is under way; however with so many variables it would be difficult to conclude one way or the other.

### 12.2.2 Indirect effects

- Hypotension. If the women becomes hypotensive after an epidural and this is not promptly corrected, the baby could potentially be harmed. This is why it is so important to actively monitor for and treat hypotension.

- FHR changes. It seems that spinal opioids can result in an increase in the incidence of FHR changes. The cause for this is uncertain, but is likely related to a decrease in circulating catecholamines, which causes the uterus to contract more vigorously. The changes are generally transient and no difference in the neonatal outcome is seen [61-64].

- Placental blood flow. In studies that measured placental blood flow before and after the institution of an epidural, it seems that there is no change except in women with pre-eclampsia, where blood flow has been shown to improve[65].

- Ease of breastfeeding. After a C/S it is clear that feeding is much earlier after a regional anaesthetic than after a GA. Labour epidurals do not significantly delay feeding when compared to other forms of labour analgesia [66-69]. Again, there are conflicting opinions as to whether the use of Epidural in labour and or delivery, delay the infants interest in feeding.

### 12.3 Summary of the effects of labour epidurals

- Epidurals are the most effective form of pain relief in labour.

- There appears to be no increase in the C/S rate, although more research is needed.

- There is an increase in the length of labour, but generally only the length of the 2nd stage is increased. Of course this will vary between women, but as an example an increase in 2nd stage for a primigravis woman may be between 30 to 60 minutes.

- Epidurals are associated with more instrumental deliveries, but this association is not necessarily causative.

- Hypotension occurs more commonly in patients receiving an epidural.

- There is a higher incidence of fever in women with epidurals.

- Apgar scores of babies born to a women with an epidural are better than after pethidine.

- Neonatal behavioural scores are much the same with or without a labour epidural. Although as mentioned there is still heavy debate amongst health care professionals in this regard.

- Fetal heart rate changes may occur more frequently but do not worsen fetal outcomes.

## 13 Preparation for a regional block

Before a regional analgesic technique can be performed, the patient and equipment necessary must be prepared:

- Medical history. The anaesthetist needs to know any relevant medical history, the presence of any allergies, medications, and abnormal blood results.

- Obstetric history. Ideally the woman would be in established labour and the stage of labour is useful to know. The anaesthetist must be informed of any complications of pregnancy or labour, present or past.

- Informed consent. Ideally in writing but this is often not feasible in labour. Verbal consent is considered acceptable. See page 38.

- Identification. The woman's identity must be confirmed verbally and visually before any procedure is performed (an ID bracelet should be worn).

- Attending Midwife. The midwife must be competent in the management of epidurals and must be present throughout the insertion and testing procedure.

- Monitoring. The women's baseline blood pressure (BP), heart rate (HR), respiratory rate (RR) and temperature have been established and documented within the preceding 30 minutes. Fetal wellbeing also needs to be confirmed and repeated no less than four hourly.

- Bladder. The women should be encouraged to void before the epidural is placed and then every 2 to 3 hrs thereafter. If the woman is not able to mobilize ie heavy block or epidural infusion, an indwelling catheter may be required.

- Resuscitation equipment. This must be readily to hand and includes:
    a. A source of positive pressure oxygen.
    b. Hudson mask
    c. Ambu-bag and face mask
    d. Suction
    e. Emergency drugs
    f. Intubation equipment

- Intravenous access. A 16G or larger cannula must be inserted before the epidural is placed.

- Fluid preload. The necessity for this is debated but what is certain is that the patient must be adequately hydrated. A 500-1000ml bolus of normal saline or other crystalloid is considered helpful and safe in most cases. A fluid balance chart must be used to record fluid intake and output.

# 14 Technique of Insertion

## 14.1 Position

- Sitting. The women is seated with her legs over the side of the bed and her feet comfortably on a chair. The hips and shoulders should be aligned. She

should be upright but with her back flexed and her chin on her chest. She can wrap her arms around a pillow to make this position more comfortable.

- Lateral decubitus. The women lies on her left side with her head on a pillow. Her knees are drawn up to her chin and her head is flexed to maximally bend the lower back.

## 14.2 Equipment

The “epidural trolley” contains:

- Pack with sterile gown.
- Epidural pack with sterile cleaning equipment, tray, drape, syringes and needles.
- Sterile gloves in various sizes.
- Epidural sets and combined spinal-epidural (CSE) sets. These contain the appropriate needles and loss-of-resistance (LOR) syringes, epidural catheter and filter.
- Chlorhexidine solution.
- Transparent dressing, e.g. Tegaderm.
- Adhesive tape, e.g. Medipore.
- LA. Lignocaine (Xylocaine) 1%.
- Ampoules of normal saline.
- LA solutions for initial top-up dose +/- fentanyl. Different departments and anaesthetists use a variety of solutions and concentrations – check with local protocols.

## 14.3 Sterility

The block needs to be placed using an aseptic technique. The anaesthetist scrubs his or her hands, and uses a sterile gown and gloves. The skin is widely cleaned with 0.5% Chlorhexidine in alcohol or a povidone-iodine solution. A sterile drape is placed over the back.

## 14.4 Insertion

The desired space is identified, usually L3/4. LA, usually 1% lignocaine, is infiltrated into the skin and along the path of the needle. The Tuohy needle of the epidural (size 16G or 18G) is inserted through the skin and then the LOR syringe, usually filled with saline, is attached and steadily pushed inwards. The epidural space is identified by the feeling of a sudden loss of resistance to injecting the saline as the Tuohy needle pushes through the ligamentum flavum. The epidural catheter is threaded through the needle until 3-5cm is within the epidural space. The patient

often experiences transient paraesthesia as this is done. The needle is removed and the catheter is securely dressed and taped in place. The depth of the catheter is noted by the markings along the catheter. The bacterial filter is attached to the end of the catheter. The catheter is gently aspirated to check for blood or CSF.

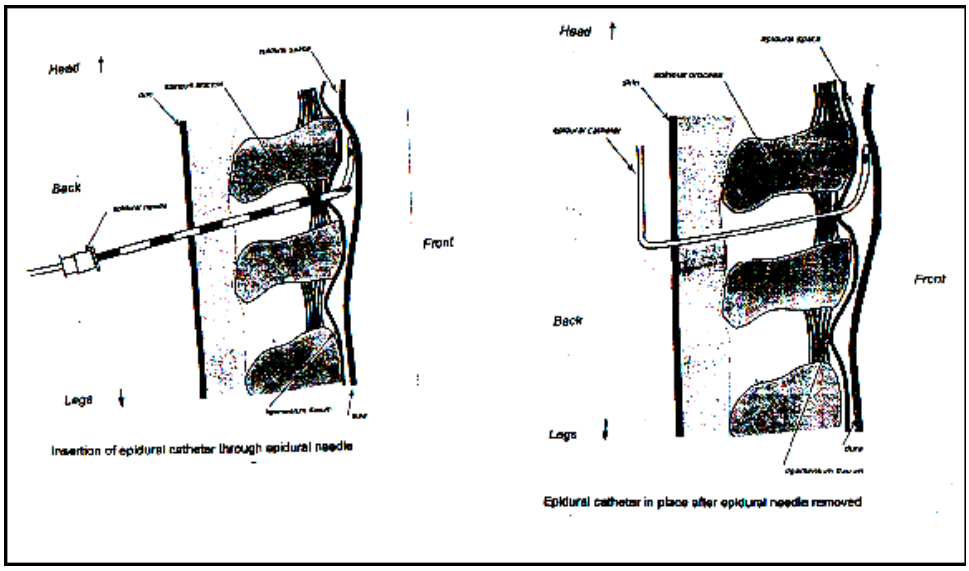

Figure 3: Epidural catheter insertion technique (Source unknown)

## 14.5 Positioning of the woman

The women is returned to a more comfortable position. Ideally she should be lying on her left or right side, but she may also recline in a semi-seated position. The important thing is to prevent aortocaval syndrome, which occurs when she lies flat on her back.

## 14.6 Test dose

A test dose is used to establish whether the catheter has been accidentally placed in the subarachnoid space or within a blood vessel. Various methods have been used to do this but none are really useful. The accepted practice in labour is to use the catheter without a formal test, but to treat every injection through the catheter as a “test dose”. This means that all injections are done slowly and incrementally whilst observing the women for evidence of a toxic reaction (if the catheter is in a blood vessel) or a high spinal (if the catheter is in the subarachnoid space).

## 14.7 Loading dose

This is done in an incremental manner by the anaesthetist. Typically 15-20ml of the LA solution (usually 0.125% bupivacaine with 2 mcg/ml fentanyl or 0.2%ropivacaine with 2 mcg/ml fentanyl) will be given over about 10-15 minutes.

## 14.8 Monitoring

- Blood pressure, heart rate and respiratory rate. These need to be recorded at 5-minute intervals for 20 minutes after the initial epidural loading dose. The woman must not be left alone during this period.

- Fetal wellbeing.

- Level of block height. See page 26.

- Effectiveness of pain relief. An epidural typically takes 20 minutes to reach full effect and the patient should be reassured if it does not instantly start working.

## 15 Other Regional Techniques

### 15.1 Spinal

A spinal is the injection of subarachnoid opioids, with or without the addition of LA. It is simple, has a rapid onset, and is reliable. The disadvantages include its limited duration of action (about 2 hours) and the occasional occurrence of a post dural puncture headache. A spinal may be used for analgesia in advanced labour, instrumental deliveries, removing a retained placenta and for perineal repairs.

### 15.2 Combined spinal-epidural (CSE)

In a CSE a spinal is performed first, followed by the insertion of an epidural catheter. The onset of analgesia is faster than with an epidural alone. The disadvantages are a small increase in post dural puncture headaches and a difficulty in testing the functioning of the epidural catheter at the time of insertion.

## 16 Ongoing Management of Labour Epidurals

Although the ultimate responsibility of the epidural rests with the anaesthetist, the midwife takes over its management once it has been successfully placed and is shown to be working. The anaesthetist must leave the attending midwife with clear written instructions of doses and concentrations to be used for top-ups in the various stages of delivery. There are several important issues.

### 16.1 Maintenance of the epidural block.

There are several ways to manage an epidural once it is in place:

- Patient controlled epidural anaesthesia (PCEA). The advantages of this method are:
  i. The woman has more control over the timing and amount of analgesia she wants or needs.
  ii. With this method maternal satisfaction is highest, pain scores are lowest and the total dose of LA used over time is lowest.
  iii. Midwife workload is substantially lower.
- Continuous infusion. Advantages of this method are;

  i The infusion rate can be altered to ensure a therapeutic levels are maintained

  ii The woman does not have to experience return of the pain sensations when the block wears off, as with a top-up.

  iii Less work load for Midwife when compared to top-ups.

  However it has the disadvantage of increased overall drug use and more motor block when compared to PCEA. Continuous infusion may be

appropriate in certain circumstances in place of PCEA (e.g. cardiac disease) and may be programmed into the PCEA pump by the anaesthetist.

- Intermittent top-ups can be done by the midwife using a written prescription or by the anaesthetist. This method will still have a place if the block achieved with the PCEA or infusion is inadequate (ie for instrumental birth or breakthrough pain) or if there is no pump available .

For details of individual departments see the Appendices for DHB appropriate protocols

### 16.1.1 Prerequisites for a top-up

- The midwife is trained in the management of epidurals.
- The intravenous line is confirmed to be functioning.
- At least one dose has been given via the epidural catheter by an anaesthetist.
- The anaesthetist has prescribed explicit instructions for the top-up.
- Oxygen, resuscitation equipment, emergency drugs and suction are readily available.
- Baseline observations are recorded, including BP, HR, RR, FHR, nature and site of pain, the level of the epidural block and stage of labour.

### 16.1.2 Drugs and doses.

The anaesthetist who inserts the epidural will leave a prescription for what they would like used for any extra top-ups that may be needed should the PCEA or infusion not give adequate pain relief. The exact prescription may differ between individual anaesthetists and hospitals so read the prescription carefully.

- 1st stage of labour. Typically a bolus of the premixed solution to a total of 10ml. Each top-up takes 15-20 minutes to take full effect. Very occasionally this proves inadequate and the prescription should again be consulted. This will often suggest a bigger dose of premixed solution or a stronger dose of LA e.g. 5ml 0.25% bupivacaine.
- 2nd stage of labour. The patient may need a bigger dose of the premixed solution. Again there may be times when this is inadequate, in which case a stronger dose may need to be given.
- Instrumental delivery. This will require a top-up of 5-10ml of bupivacaine 0.5%. This strength of LA results in a further degree of motor block and may cause a drop in BP, which should be monitored for. Many anaesthetists prefer to be present in this situation and so will leave this part of the form blank. If so, call them to administer the top-up.

### 16.1.3 Method.

- Carefully confirm the drug and dose is correct before the injection is done.

- This can be given through the pump as a bolus, or can be given manually.

- All manual top-ups must be done aseptically. Hands are washed, and all injections are made with the bacterial filter in situ. Care must be taken to keep the filter bung clean while it is removed from the filter.

- The patient must be positioned to avoid aortocaval syndrome, preferably lying on her side. She should rotate sides after a few minutes to avoid a one-sided block.

- Before injecting, the catheter should be gently aspirated to look for blood or CSF. If anything is aspirated the top-up should be abandoned and the anaesthetist called

- The top-up is given in 3-5ml increments with 2-3 minute delays in between to exclude a misplaced catheter. A total top-up of 10ml is usually adequate, but a further 5ml may be necessary.

### 16.1.4 Monitoring by the Midwife

The frequency of monitoring varies depending on which maintenance method is being used.

PCEA monitoring requirements where the woman is self-administering

- Blood pressure, heart rate, respiratory rate and block height should be measured hourly and recorded on the PCEA form as well as the partogram.
- Maternal temperature recorded 4 hourly, or more frequently if clinically indicated.
- The FHR is monitored via continuous CTG, but should still be recorded on the Partogram
- The dose of local anaesthetic that has been given is also documented each hour

Infusions

- Blood pressure, heart rate and pain score should be recorded hourly and documented on the epidural form.
- Maternal temperature recorded 4 hourly, or more frequently if clinically indicated.
- The woman should be turned hourly.
- The FHR is monitored via continuous CTG, but should still be recorded on the Partogram
- The infusion rate and dermatome level should be documented hourly.

Intermittent Top-ups

- For intermittent top-ups or where pain relief is inadequate and the PCEA or infusion is interrupted for a manual top-up by the anaesthetist or midwife;
- Maternal BP, HR & respirations and FHR, must be monitored and recorded every 5 minutes for 20 minutes.

Care must be taken when filling in the epidural forms - make sure they are filled in completely and correctly. At present all obstetric units have different charts so make sure you are familiar with your local chart.

Block Height

- The adequacy of the block and block height must be noted and recorded. The top of the block should be kept around T8-10. Using ice or a sharp edge to test sensation against an area not affected by the epidural and determine block height. Use a dermatome chart to assist with this assessment.

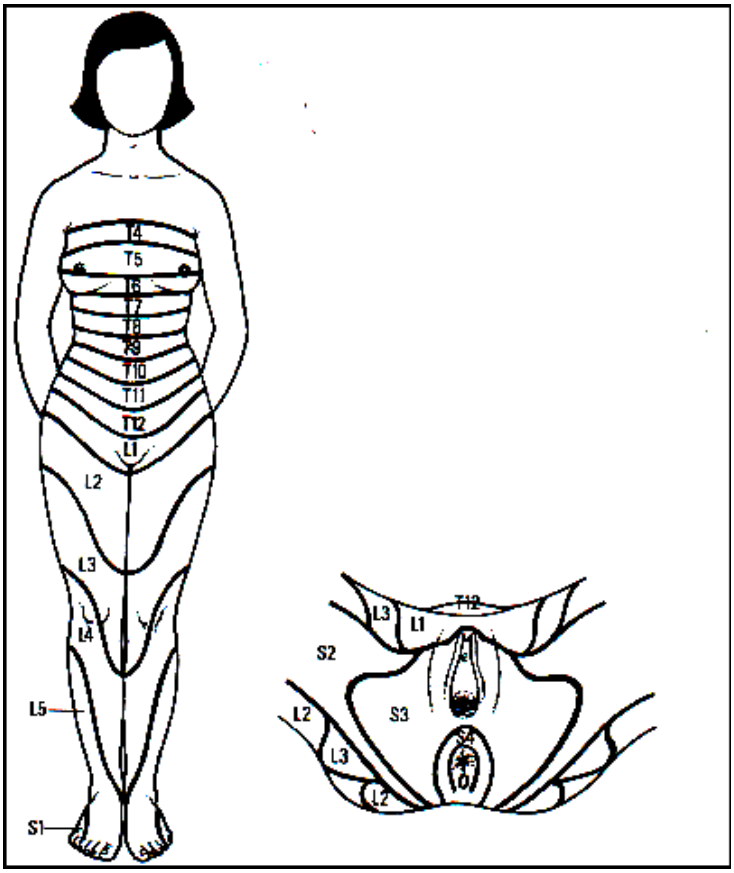


**Figure 4: Dermatomes relevant to epidural analgesia (Waldron, B.A.; 1983; pg 53)**

- If the woman has an epidural infusion running she will also require an IDC to avoid over-distension of the bladder due to reduced mobility and infrequent

**EPIDURAL FORMS MUST BE FILLED IN CORRECTLY & COMPLETELY!**

mobilizing to void be impractical an 'in out' catheter passage may be necessary.

- The epidural catheter should be watched for migration by checking for movement of the depth markings, and the site should be checked for any leakage, redness or swelling.

- The neurological status should be monitored for any decrease in the level of consciousness.

- The women's legs should be protected from continuous pressure or heat, as the sensory loss may make her less able to protect herself. Check position of legs and avoid heat packs or wet linen being left against the skin.

### 16.1.5 Ambulation.

Some women wish to be able to ambulate and assume different positions during their labour. This is often only feasible with low dose PCEA rather than with a continuous infusion due to the increased probability of motor block. Check with local protocols regarding ambulation. If a patient with an epidural wishes to ambulate this may be done, but certain precautions need to be taken.

- The women must wait >30 minutes after insertion of the block.

- The BP must be stable for at least 20 minutes beforehand and must be done sitting and standing to exclude postural hypotension (a drop in BP of >20% after standing).

- A motor block must be excluded by demonstrating that the patient can do a straight leg raise against resistance and a partial knee bend (only attempt with someone supporting the woman).

- The patient must be accompanied and supported in case of a proprioceptive block that could cause her to lose her balance and fall.

### 16.1.6 When to alert the Anaesthetist

**IMPORTANT**

- **NO FOOD IS TO BE CONSUMED ONCE EPIDURAL INSERTED**
- **Maternal BP, pulse, respirations RECORDED HOURLY ON PARTOGRAM EXCEPT AFTER MANUAL TOP UP (when they are required to be done 5minutely for 20 min)**
- **Temperature 4/24 unless otherwise indicated**
- **Woman to be in sitting or lateral position throughout labour**
- **NBM (no food & fluids) once decision for LUSCS made**

### 16.1.7 Removal of the catheter after delivery

- Aseptic technique, with washed hands and sterile gloves.
- Patient positioned on her side with her back flexed.
- The catheter is held close to the skin and gentle traction is applied. This should not be forced if resistance is encountered.
- The catheter is checked for completeness once removed (the blue tip should be present). This should be documented. If incomplete, alert anaesthetist.
- The site is checked for redness, swelling, leakage or tenderness.
- A sterile dressing may be applied, or opsite spray used.

## 17 Trouble Shooting

There are certain problems that crop up commonly in the ongoing management of labour epidurals.

### 17.1 Inadequate analgesia

This occurs in about 5% of labour epidurals. There are many possible causes, and one must work through these systematically.

### 17.1.1 Assess the level of the block

- If the block is <T10 it has receded too far and the patient will need a top-up or increase of the infusion level.

- If the block is only on one side, turn the patient to lie with the painful side down and try a top-up. If this fails, ask the anaesthetist for help.

- If the block is at T10 or above (but <T6) the patient may need a stronger dose of LA. Consult the prescription chart for what to give. If this fails to help, call the anaesthetist.

- If the block is at T6 or above, call the anaesthetist.

- If there is no block at all, call the anaesthetist.

### 17.1.2 Catheter may be misplaced

- Check the epidural site for leakage or swelling.

- The catheter may not be in the epidural space and may need to be replaced.

### 17.1.3 Obstetric cause

- Check for an obstetric cause for the excessive pain, such as an abnormal presentation (OP position), a rapidly progressive labour, a full bladder, a uterine rupture, an abruption and so on.

### 17.1.4 Obstructed catheter

If you are unable to inject through the catheter, it may be kinked. Carefully remove the Medipore strapping (but not the transparent dressing over the insertion site) and straighten the catheter. If there is no kink visible and you still cannot inject, call the anaesthetist.

### 17.1.5 The epidural filter falls off

If you witness this occurring it is acceptable to swab the catheter with Chlorhexidine and cut a few cm's off the end with a sterile blade and reattach the filter. However, if the detachment is not witnessed, call the anaesthetist, as the catheter will have to be replaced. It is better to replace the catheter than to risk introducing an infection. It is far preferable to prevent the detachment from occurring in the first place by ensuring the filter is firmly attached at all times.

## 18 Complications and their Management

### 18.1 Immediate complications.

These may range from minor to life threatening. If recognised early these can usually be successfully treated.

### 18.1.1 Hypotension.

This is due to the combination of the sympathetic blockade below the block, the relief of pain and aortocaval compression. It can occur in 4-30% of labour epidurals and must therefore be looked for. It can decrease placental perfusion if not promptly treated. Should the BP fall by 20% or the systolic BP fall<100mmHg:

- Ensure the patient is in the full left lateral position (prevents aortocaval compression).
- Open up the drip and give 500-1000ml of a crystalloid solution quickly (Normal Saline/ Plasmalyte/Hartmanns).

If the hypotension does not resolve within 5 minutes, or the systolic BP is < 90mmHg

- Give oxygen 5L by Hudson mask.
- Alert the anaesthetist, as vasoconstrictors may be necessary (metaraminol or ephedrine).
- Have colloid ready if required by anaesthetist.
- Consider other causes of hypotension including blood loss (e.g. abruption, uterine rupture), embolic phenomenon (e.g. pulmonary embolus, amniotic fluid embolus), or allergy.

- Ensure the fetus is being monitored and notify obstetric back up if untoward fetal effects ensue

### 18.1.2 Unexpectedly high block (above T6)

A high block may occur if the catheter is accidentally intrathecal (within the cerebrospinal fluid compartment around the spinal cord). It can result in severe hypotension, difficulty in breathing and loss of consciousness. It is a major emergency and therefore requires the following management:

- Immediately declare an emergency and call for assistance, particularly the anaesthetist and other medical staff. Switch off the epidural infusion if present. Get someone to bring the emergency equipment (resuscitation trolley, airway equipment and defibrillator). A cardiac arrest call may be necessary depending on the gravity of the situation.

- Airway. Administer 100% oxygen by Ambu-bag. Assess the airway and breathing. If inadequate you will have to administer bag and mask ventilation until help arrives.

- Assess the CVS. Check the BP and if low open up the drip and give fluid generously. Vasoconstrictors will certainly be needed (Ephedrine, Metaraminol or even Adrenaline).

- Ensure the patient has a left lateral tilt.

- Call for monitoring equipment (automated BP, ECG, pulse-oximeter).

- If the woman suffers a cardiac arrest you will need to begin CPR.

- Emergency C/S may become necessary.

The symptoms will disappear as the block wears off and immediate and effective treatment will avert a tragedy.

### 18.1.3 Bloody tap

A bloody tap occurs when the epidural needle or catheter damages or enters an epidural blood vessel. It happens quite frequently (about 4-10% of cases) because of the engorgement of the epidural blood vessels that occurs in pregnancy. It is often immediately obvious because of blood tracking back out of the catheter. If this occurs the anaesthetist may try to manipulate the catheter out of the vessel, but quite frequently the only solution is to replace the epidural at another level. Sometimes the catheter enters a blood vessel without any blood being visible, which is more hazardous as a toxic reaction to the LA can occur if the entire epidural dose is injected into the blood stream. It is important that whenever LA is given down an epidural catheter, the injecting is done in small (5ml or less) increments with a pause in between. This precaution applies to all top-ups, as on rare occasions the epidural catheter can migrate into a blood vessel at some later stage in labour.

### 18.1.4 Accidental intravascular injection and LA toxicity

If LA is injected accidentally into the blood stream, the resulting toxic reaction that may occur can be recognised by the CNS and CVS symptoms described previously on page 13. It usually manifests as minor CNS changes, but convulsions and CVS collapse may occur. If this happens:

- Stop administration of local anaesthetics
- Call for help, especially the anaesthetist, and call for resuscitation and monitoring equipment (resuscitation trolley, airway equipment, defibrillator, pulse oximeter, automated BP).
- Administer oxygen 5L by Hudson mask.
- Assess the airway. If this is not being maintained you must support it.
- Assess for breathing. If inadequate you must perform bag-mask ventilation.
- Treat convulsions. These are usually transient but if prolonged are treated with diazepam 10mg IV. The anaesthetist will often use thiopentone instead of diazepam.
- If CVS collapse occurs, its treatment is supportive and includes airway management, administration of fluid and inotropes, and prolonged CPR if necessary.
- Consider administering Intralipid® 20% - this is a lipid emulsion that has been shown to reverse LA-induced cardiac arrest and in the treatment of life-threatening toxicity without cardiac arrest. It should be immediately available in all areas where potentially cardiotoxic doses of local anaesthetics are given, along with guidelines for its use. Find out where the intralipid is kept in your unit.

### 18.1.5 Respiratory depression

Respiratory depression may occur due to an unexpectedly high block (see page 37) or as a side effect of opioid drugs. If the RR drops<10:

- Do not give a further top-up.
- Administer Oxygen by Hudson mask.
- Call for the anaesthetist.
- If RR<8 naloxone may be necessary. Naloxone is prepared by drawing 0.4mg (one adult ampoule) into 10ml normal saline (a 40ug/ml solution). This is given 1ml at a time, waiting 1 minute in between to assess for improvement. If the patient is apnoeic 0.4mg should be given immediately and more may be necessary, depending on the response.

### 18.1.6 Dural puncture

The inadvertent puncture of the dura with the epidural needle happens in <1% of epidurals. If it is not recognised it may result in an accidental intrathecal injection and a high spinal. If the dural puncture is recognised, some anaesthetists may feed the epidural catheter intrathecally and use it as a continuous spinal block. This will then be managed for the entire duration of the labour by the anaesthetist and not the midwife. Other anaesthetists will instead perform the epidural at another level. If so, extra care is taken with all top-ups as a higher than usual block may occur[86]. The dural tap should be documented in the notes and the woman informed about what has happened. There is a 70-80% risk she will experience a post dural puncture headache [86] (see page 40). She should be encouraged to stay in hospital at least 24 hours and be assessed by an anaesthetist before being discharged home.

### 18.1.7 Nausea and vomiting

Labour and delivery may themselves cause nausea or vomiting. They may however be due to hypotension or secondary to the opioids in the epidural. If a woman with an epidural complains of feeling unwell, particularly soon after a top-up, the BP must be checked and treated if necessary.

### 18.1.8 Urinary retention.

This is common in labour, with or without an epidural. The woman should be assessed for a distending bladder, as she may not be able to feel it. Especially important if the woman has had a spinal or CSE.

Often forgotten about post delivery, however it is extremely important to remember that bladder sensation is one of the last sensations to return to normal after a regional block.

### 18.1.9 Pruritus.

Pruritus (itching) may be caused by epidural or intrathecal opioids. It is felt especially over the face, neck and trunk. It is not usually severe during labour but may sometimes need treatment (especially after a C/S). The treatment (after consultation with the anaesthetist) is small doses of naloxone. Other treatments include ondansetron and propofol. Antihistamines are not helpful.

### 18.1.10 Hyperthermia.

Hyperthermia is a temperature of over 38°C. This can happen in labour without an epidural but is more common with epidurals. It is thought to be due to the combination of the increased heat production associated with labour and the decrease in sweating and hyperventilation that occurs with an epidural[87-90]. This increase in temperature happens especially in nulliparous women, or in dysfunctional and prolonged labours. It subsides a few hours after delivery and seems to have no adverse consequences to the women or baby. The only concern is that in some units an intrapartum fever results in the unnecessary investigation (and sometimes treatment) of the neonate for sepsis [87, 90], although this is not true for most hospitals [88].

## 18.2 Delayed Complications

### 18.2.1 Post dural puncture headache (PDPH)

A PDPH occurs in <1% of labour epidurals [91]. It is due to the known or unrecognised puncture of the dura during the insertion of the epidural. This causes a leak of CSF through the dural tear. This is thought to cause a drop in intracranial pressure resulting in drag on the cerebral meninges and intracranial blood vessels. It presents about 24-48 hours after delivery. It is especially bad on standing and is associated with photophobia, nausea, vomiting, and neck stiffness.

If a PDPH is suspected the management consists of:

- Alerting the anaesthetist on duty, who will assess the patient and decide if it is indeed a PDPH (40% of women get headaches postpartum even if they have not had a regional procedure).

- Ensuring the patient has complete bed rest, is in a quiet room and has simple regular analgesia (e.g. paracetamol, diclofenac).

- Maintaining good hydration

- Other conservative measures may be tried, such as abdominal binders and oral caffeine.

- If a PDPH is confirmed, an epidural blood patch will often be performed. This is a sterile technique done by an anaesthetist together with a skilled assistant. An epidural needle is inserted into the epidural space and 15-20ml of the patients' blood is injected through it. The blood is presumed to block the tear in the dura. This results in immediate relief in >80% of patients but might need to be repeated.

- After the blood patch the patient should not mobilise for 2 hours.

### 18.2.2 Epidural abscess

An epidural abscess usually presents 7-10 days after an epidural. The clinical signs are severe back pain, local tenderness, fever, a high white cell count, and progressive neurological abnormalities that occur due to compression of the spinal cord by the abscess. The neurological changes may include bladder and bowel dysfunction, sensory changes and motor weakness of the legs. If any of these occur an anaesthetist must be urgently alerted. This is an emergency and must be immediately investigated with a MRI or CT scan. If it is confirmed, the treatment is a decompressive laminectomy. The best results are achieved if treatment is started within 8 hours of the onset of symptoms, otherwise paralysis my result. Because this complication presents late, the midwife may be the one to discover it and should be able to recognise the signs and refer promptly. Although these are rare, there have been cases of this in our region in the last decade[92].

### 18.2.3 Meningitis

Meningitis is also a rare complication. It may occur after the intentional or accidental puncture of the dura, especially if there is a source of sepsis elsewhere. It presents much like a PDPH from which it must be differentiated. It needs urgent treatment.

### 18.2.4 Neurological damage

Neurological injury is a common problem after delivery and occurs in 1 in 2500 women without regional blocks [94-96]. These injuries are mainly caused by damage to nerves by the passage of the foetus through the pelvis, or from instrumental deliveries. They are especially common after a fetal malposition, an obstructed labour, a big baby, a difficult delivery and the use of the lithotomy position. Their recovery can take anything from days to years. Regional blocks may occasionally be the cause (in about 1: 5000-13 000 epidurals [94-96]), usually secondary to damage to a nerve root (a radiculopathy). This presents with paraesthesias (unusual sensations) and numbness over 1-2 dermatomes. Motor damage is rare. They usually recover completely over time.

If a woman complains of any sensory or motor changes after a regional procedure she needs to be referred urgently to an anaesthetist to exclude any ominous causes, such as epidural abscess.

### 18.2.5 Epidural haematoma

An epidural haematoma is a rare complication that occurs when a blood clot forms within the vertebral canal. Like an abscess, a haematoma can put pressure on the spinal cord and result in damage. It presents in the peripartum period with limb weakness and sensory loss, but may be painless. The incidence of these in labour epidurals is far less than that of the general surgical population, and estimated to be about 1:500 000 [97]. In the few cases where it has occurred, a cause for abnormal clotting has usually been identified. This, like an abscess, is an emergency and needs urgent investigation and treatment.

### 18.2.6 Backache

About 50-70% of women complain of backache during pregnancy and about 70% of women complain of it in the first few days post partum, even if they have not had an epidural [98-100]. Backache usually resolves after pregnancy, but in 15% the problem becomes chronic. Previous retrospective trails suggested that the incidence was worse after an epidural, but these have subsequently been disproved. Well-conducted prospective studies have shown that any back problems after delivery are almost certainly not due to the regional block, but rather due to the musculoskeletal and postural changes that occur in pregnancy and delivery[98-100]. Some women will, however, have some local tenderness around the site insertion of the epidural, which resolves over a few days.

## 19 Caesarean Section

### 19.1 Anaesthetic method

There are several choices which may depend on the urgency of the case, whether or not an epidural has been established, and also the choice of the woman and the anaesthetist.

### 19.1.1 Epidural already in situ

If the woman had an epidural inserted during labour, and it worked adequately, it will usually be used for the C/S. The anaesthetist will gradually top it up with a strong solution of LA to achieve almost complete sensory and motor blockade up to the level of T4. Some anaesthetists may choose to insert a spinal anaesthetic instead, especially if the epidural has not been working well.

### 19.1.2 No epidural

- Spinal - most commonly used for both elective and emergency cases
- Combined spinal-epidural (CSE) - can be used if surgery is expected to take longer or for post-op analgesia
- Epidural

### 19.1.3 General anaesthetic.

This is only done under unusual circumstances, as it is not as safe as a regional technique. The reason for a GA might be:

- The woman refuses a regional.
- The surgery is extremely urgent (e.g. severe foetal distress, cord prolapse).
- The regional technique fails.
- Any other contraindication for a regional exists (see page 21).

## 19.2 Possible complications.

These are similar to a labour epidural but may be more common and severe because the dose is bigger and the block needs to be higher. The anaesthetist will be particularly concerned about hypotension, a higher than intended block, breathing difficulty, and of course a failed block.

## 19.3 Recovery room

The obstetric units in the region vary as to where Caesarean sections take place, whether in the unit itself, or in the general theatre complex. Thus each hospital facility will dictate whether a midwife or a recovery room nurse will attend to care post Caesarean section but the same principles and standards apply. The block will take a few hours to wear off and the woman needs monitoring until this happens. The anaesthetist will hand the woman over to the nurse/midwife assigned to recover her and any particular concerns will be highlighted. Monitoring of the patient's haemodynamics, respiratory function, level of consciousness and block height are done regularly. The epidural catheter should be removed just prior to discharge to the ward if not already removed by the anaesthetist in theatre (see page 35). The minimum stay in recovery and the frequency of observations will vary between units. Check your local policy.

## 19.4 Pain relief

### 19.4.1 Spinal Morphine

The anaesthetist will often administer epidural or intrathecal morphine during the C/S. One dose usually lasts 12-24 hours. This, together with simple regular oral analgesics, will usually be sufficient. If not, the anaesthetist or acute pain team should be called to review the patient. If additional opioids are needed, respiratory depression is more likely to occur 6-12 hours after the spinal dose of morphine. The women will need to be monitored for this with hourly RR measurements.

### 19.4.2 Oral analgesia.

All women will be prescribed regular paracetamol and diclofenac unless a contraindication exists. These are most effective if taken regularly. Codeine phosphate may be added if a patient is still uncomfortable, but it will fail to have any effect on about 10% of people. Codeine is metabolised to morphine which is then excreted into the breast milk. The levels are usually very low but if the women is an ultra-rapid metaboliser, much more morphine is produced when taking codeine than normal. This leads to increased levels in the neonate which may lead to respiratory depression and potentially death.[106] Care should be taken to avoid discharging women home on codeine. Tramadol is very effective and experience with it so far shows it to be safe to both women and baby, with minimal amounts excreted in breast milk. It is, however, not yet licensed for use during breast-feeding in New Zealand and the women needs to be informed of this before it is used.

### 19.4.3 Morphine patient-controlled analgesia (PCA).

A morphine PCA can be used whenever the women does not receive spinal morphine, for example after a GA.

### 19.4.4 Epidural infusion.

Occasionally the epidural will be left in place and a continuous infusion of LA is run for 24 hours or more. This gives very effective analgesia but requires more intensive monitoring.

## 19.5 Side effects of analgesia

### 19.5.1 Nausea and vomiting

This may occur as a result of the spinal or PCA morphine. Most patients will improve with the use of one or more types of anti-emetic. The anaesthetist will usually chart metoclopramide and cyclizine. If the patient is still nauseous the pain team should be contacted and ondansetron or tropisetron will be prescribed.

### 19.5.2 Pruritus

This is very common after spinal morphine. It is usually tolerable, especially if the patient knows the reason why it has occurred. If it is severe, the pain team should be alerted. Antihistamines are often not helpful and naloxone is given instead.

### 19.5.3 Urinary retention

This is a possibility after spinal morphine but as all patients having a C/S will have an indwelling catheter for 24 hours; this is usually not a problem.

### 19.6 Timing of Thromboprophylaxis

If the woman is prescribed fragmin or clexane these should not be commenced until at least 2 hours after the epidural catheter has been removed, but usually 4 to 6 hours after. Please check local protocol. Should the first dose of clexane be given whilst the epidural catheter remains in situ (intentionally of inadvertently), the epidural catheter should not be removed until at least 12 hours following the injection.

## 20 Record Keeping

Each step of the process needs to clearly and correctly documented.

### 20.1 Informed consent.

Before undertaking any procedure the patient has a right to know as much as she can about the options available for her care. This will enable her to contribute meaningfully to any decisions that might be made.

She will need to know:

- The purpose of the intervention
- The hoped-for benefits
- How the procedure will be conducted
- What side effects she is likely to experience
- The severity and frequency of the risks
- What alternatives are available

From the perspective of labour analgesia, this information is best given antenatally. It is often almost impossible to give a women who is already in labour and in severe pain, the time and space she will require to make an informed choice. This is particularly true if she is already under the influence of sedative drugs, such as pethidine or nitrous oxide. The preferable option is for information to be made available to her during her pregnancy. The information may be in the form of written material, a video, or may be verbally conveyed.

The source of the information is extremely important. Pregnant women often share information with other women, but this may not always be a reliable source. Anaesthetists can be helpful, but are too often involved in difficult, painful labours to give unbiased advice on how often an epidural is needed. The midwife is the ideal person to inform women on what to expect in labour because they see a wide variety of deliveries. The midwife is also the most likely person to be approached by pregnant women with questions regarding labour analgesia.

The information given should be based on the best current evidence available, and be appropriate to the local practice and population. Information should include pros and cons of each method and possible alternatives.

Under ideal circumstances the women should give written informed consent after being given a full explanation about the procedure. However, this is often difficult to obtain from a distressed woman and under such circumstances verbal consent is acceptable [103-104]. It is sensible to record in the notes that the procedure has been verbally agreed to.

### 20.2 Prescription chart.

The anaesthetist will write the epidural prescription, which includes the medicine name, dose and method of administration. Each time the medicine is administered, the time and dose needs to be recorded.

### 20.3 Response to the therapy

The response to the therapy needs to be documented. In the case of an epidural, this includes the women BP, HR, RR, and level of block, the foetal heart rate and the efficacy of the pain relief. At the time of removal of the epidural, the completeness of the catheter must be recorded.

## 21 Follow-Up

The anaesthetic team should visit all women who have been given a regional block of any kind during delivery. The women will be asked about the efficacy of her regional and her satisfaction with her pain relief. The symptoms of any possible side effects or complications are sought and acted on.

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- A brief history of events leading to the operating room / indication for Caesarean Section
- Anaesthetic type
- The operative procedure/procedures performed
- Drugs & volume of intravenous fluids received prior to transfer to recovery- (including pain relief in labour / pre operative / intra operative. & information regarding post-operative medications charted).
- The estimated blood loss prior to (if applicable) and during surgery (the average blood loss at Caesarean Section is approximately 600mls. This is slightly higher than that expected for vaginal birth - which is usually less than 400mls approximately).
- On going post operative fluid orders
- Vital sign recordings intra-operatively
- Any additional events or complications experienced throughout anaesthesia / surgery
- Urine output
- Instructions relating to the following should be discussed -:

· removal of Epidural Catheter

· further pain relief

· contact details for the anaesthetist from that point

Additional instructions outside normal routine care should be clarified

## 24 Epidural Analgesia Worksheet for Midwives

MIDWIFE:

AREA:

DATE:

**Describe the location of the epidural space.**

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**What are the indications and contraindications for an epidural in labour?**

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**Dermatome**.

a. Define the term

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b. Explain the reasons for a dermatome assessment?

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c. How often is a dermatome assessment performed?

_____

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_____

d. Describe the methods used to assess a sensory block.

_____

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_____

_____

e. Using the dermatome chart provided label the following levels:
    i. T10
    ii. T12
    iii. T6
    iv. T4
    v. What is the significance of these levels?

_____

_____

_____

_____

**Name the medicines commonly used for an epidural analgesia.**

_____

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_____

a. State the actions of these medicines.

_____

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_____

b. List the main side effects associated with them.

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_____

**Insertion of the epidural.**

a. What observations of the women and baby are needed before proceeding?

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a. What safety measures should be available before the siting of an epidural? Explain the reasons.

b. What observations need to be made after the siting of an epidural and how often do they need to be made throughout the labour?

c. What factors need to be taken into consideration when mobilising a woman who has an epidural in place?

**Hypotension and epidural analgesia.**

a. Explain why this can occur.

_____

_____

_____

_____

b. What must you do if this occurs?

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c. Why is maintaining a fluid balance record important?

_____

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**What would you do under the following circumstances?**

a. A woman is still in pain 40 minutes after the epidural has been sited.

_____

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_____

b. Just prior to injecting a top-up you notice blood in the epidural catheter.

_____

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c. The epidural site looks inflamed.

_____

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d. You go to turn the woman and notice the bacterial filter has fallen off.

_____

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_____

e. You go to assist a woman to shower on the postnatal ward and find she still has an epidural catheter in place despite no longer needing this for pain relief.

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f. The woman complains of numbness around the mouth and ringing in her ears.

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**List the documentation required for a woman receiving an epidural.**

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**Describe the typical symptoms of a post-dural puncture headache and the steps you would take if a woman presented with them.**

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# Appendix A;

## 25.1 Palmerston North Hospital

Currently at Midcentral Health in Palmerston North infusions are used to maintain stable analgesia, unless delivery or caesearean section is imminent.

Ropivacaine 0.2% (Naropin 2) is usually used. It comes in 100ml bags, either plain or with premixed fentanyl 2mcg/ml. Bupivacaine 0.125% with fentanyl 2mcg/ml is only used when ropivacaine is unavailable.

Infusions must always be delivered via an Abbott APM (Acute Pain Manager) pump. For safety, the specialised giving set of an APM is coloured yellow, and has no injection ports.

1. The epidural infusion should be started as soon as an adequate epidural block has been established. An infusion is used to maintain a level of block, not to increase it. Do not wait until the block has worn off before starting the infusion.

2. Run ropivacaine 0.2% (Naropin 2) at 6-10 mls/hr. It is usually necessary to start at 8 ml/hr. Bupivacaine 0.125% infusion is run at 10-15 mls/hr.

3. Assess the level of the block with ice every hour, and record in the appropriate space on the epidural chart, every hour.

4. The rate may be adjusted by the midwife according to dermatome level. The aim is to keep the block to T8 – T10. If the level is rising, reduce rate by 2 mls/hr. If the level is falling, increase the rate by 2 mls/hr.

5. Measure and record blood pressure (on epidural chart, or on partogram) every 30 minutes.

6. If there is inadequate analgesia, give a top-up as prescribed by the anaesthetist, then increase the infusion rate. The usual top-up is ropivacaine 0.2% 5mls, which can be repeated after 20 minutes if still inadequate.

7. If transfer to theatre is required, discontinue epidural infusion before transfer and cap epidural filter with a sterile cap.

## 25.2 Wellington Hospital

**Management of PCEA**

- The initial epidural top-up is done as per usual by the anaesthetist after the epidural has been successfully inserted. This is done with the 20ml premixed "Lightmix" syringe. Observations following this should be 5 minutely for 20 minutes and include Blood pressure, heart rate, respiratory rate & FHR .Temperature will have already been taken as part of the baseline observations, prior to the epidural being sited and should continue 4 hourly while PCEA in place (See ongoing monitoring requirements p30).
- The block height should be recorded.
- The PCEA pump is then set up. The pump is the Bodyguard by REM Systems. It is loaded "Bupafen" (premixed 100ml bag of bupivacaine 0.125% with fentanyl 2mcg/ml) which is attached to a purpose-made administration set. The tubing of the set is coloured yellow to differentiate it from intravenous tubing and it has no injection ports to avoid accidental injections via this route.
- There are written reference cards attached to most of the pumps to help with their set up or else the Clinical Co-ordinator can help anyone unfamiliar with how to do it.
- Once the pump is set up the idea is that the woman can self administer her top-ups when she feels she needs to by pressing the button attached to the pump. Mostly this works very effectively so long as the woman is adequately informed of how to proceed after her initial dose starts to wear off.
- The dose protocol is standard and preset into each pump. It is a 5ml bolus with a lockout of 10 minutes and an hourly maximum of 20ml. The anaesthetist who inserts the epidural will provide a written prescription for the PCEA and also for any extra top-ups that may be needed.
- The 10 minute lockout is a safety feature to prevent the risk of overdose. Remember that each dose takes 20 minutes to reach full effect and it would not be appropriate to give an extra dose (i.e. for the woman to push her PCEA button) before at least 10 minutes have passed. The lock-out period prevents a dose being given if the woman does press the button during those 10 minutes. However, a dose should not be needed every 10 minutes (except in exceptional circumstances)! The woman should be advised to only give herself a dose once she feels her pain returning and not if she is pain free. She should equally not wait too long once the pain starts to return as it can be difficult to achieve comfort again with the lockout in place. Most women will feel the need to press the button about every 30-45 minutes.
- The 20ml hourly maximum is another safety feature. Most women will not need nearly this much each hour (the typical use is about 10ml per hour). The higher maximum allows for times when extra is needed, such as catching up after a block has become too low or during times of intense pain (e.g. second stage).
- If the woman has break-through pain despite using the PCEA appropriately, she may need an extra top-up. This can be done through the pump (the anaesthetist will have the correct codes to achieve this) or else can be done by the midwife in the traditional way using a syringe (see sections 16.1.2 to 16.1.4).

## 25.3 Hawke's Bay Maternity

**Currently at Hawkes Bay Hospital, epidural bolus doses are used for women in labour.**

The initial epidural top-up is done as per usual by the anaesthetist after the epidural has been successfully inserted.

- Only Midwives who are epidural designated may top up epidurals.
- Confirm IV is patent.
- Check level of block. If above T6 (xiphisternum) **DO NOT PROCEED**. Contact anaesthetist
- Prescribed local anaesthetic dose is checked with a second midwife / doctor
- Attach syringe to epidural filter and attempt to withdraw, looking for blood or CSF in the catheter. If any present, **DO NOT PROCEED**. Contact anaesthetist.
- Give a Test Dose of 3 ml
- Wait 5 mins and recheck level of block. If satisfactory, continue with top up.
- Blood pressure and pulse is taken every 5 minutes, for 20 minutes
- Hypotension is to be treated as per Obstetric Regional Analgesia record.
- Continuous CTG during top up.

Designated midwives may administer the following solutions via an epidural catheter:

Bupivacaine 0.125%, with or without fentanyl 25mcg. Maximum 10 ml/hour
Bupivacaine 0.25% with or without fentanyl 25 mcg. Maximum 10 ml/hour
Ropivacaine 0.2% with or without fentanyl 25mcg. Maximum 10 ml/hour

**Instrumental Deliveries**

Lignocaine 1.5% plain or bupivacaine 0.5% plain (8-12 ml), may be given, **but only in the presence of a doctor**. (The large dose of local anaesthetic may cause unexpected complications eg convulsions or high block)

- Any problems should be reported to the Anaesthetist on call.

## 25.4; Wairarapa Hospital

### Management of maternity epidural infusions

- The epidural block is established by the anaesthetist, the epidural infusion is then commenced to maintain an adequate block.
- Giving sets-dedicated sets for Bodyguard pump (yellow, no ports)
- Infusate- Premixed bags of narapin 0, 2%/ fentanyl 2mcg/ml
- Pumps- the Bodyguard 575 epidural pump using a preset epidural programme
- The preset programme allows midwives to titrate the rate of infusion between 5-15 mls/hour (usually commenced at 10 mls) The programme allows for additional clinician bolus of 4 mls (lock out time 20 mins). The bolus is prescribed at the discretion of the prescribing anaesthetist.
- The max hourly dose is 20 mls- this includes infusion and potential bolus doses.
- Observations required
- Baseline TPR, then at 5min intervals for 20 mins following loading / bolus dose. Dermatome level at 20 mins
- Routine obs half hourly for first hour, then hourly.

## 25.5; Hutt Valley DHB

Currently at Hutt Valley DHB intermittent top-ups are used to provide effective analgesia.
There are plans however to commence patient controlled epidural analgesia (PCEA) in the near future.
Bupivacaine 0.125% + Fentanyl 2 mcg/ml is the drug of choice for labour. This comes as a premix in 20 ml volume. This is in a prefilled syringe.
The anaesthetist may prescribe a different drug for an assisted birth -- 5-10 mls bupivacaine 0.5% or 2% lignocaine with adrenalin

The anaesthetist is responsible for administering the first dose of the above premix.

The drug is prescribed by the anaesthetist on the appropriate drug chart. The drug is the same but the amount and frequency of dose may differ.

**Monitoring:**

- Respiratory rate, heart rate, blood pressure and foetal heart rate are recorded at 5 min intervals for 20 mins after the initial epidural loading dose. This is documented on the obstetric epidural chart and in the clinical record.
- The above is repeated after each top up is given according to Hutt Valley DHB Policy
- Continuous foetal monitoring with appropriate documentation and referral
- Assessing the level of the block every hour with appropriate documentation and referral
- Effectiveness of pain relief

## 25.6: Whanganui DHB

**Management of maternity epidural infusions:**

- Only Midwives who are epidural designated may administer epidural bolus doses
- The initial epidural block is established by the anaesthetist. An epidural infusion is then commenced to maintain the regional block.
- Pump:

  The Baxter Ipump (Pain Management System) with its continuous mode program is the dedicated epidural pump. This pump allows midwives to titrate the rate of the infusion between 5-15ml/hr, as per anaesthetist prescription (usually commenced at 8-10ml/hr). The pump enables midwives to administer bolus doses as prescribed by the anaesthetist.
- Giving set:

  Dedicated Baxter Ipump epidural set – the tubing is yellow coloured with no injection ports.
- Infusion mixture:

  Bupivicaine 0.125% and fentanyl 2mcg/ml – ready mixed in 100ml bag.

  Ropivicaine 0.2% and fentanyl 2mcg/ml (Naropin) – ready mixed in 100ml bag.
- Monitoring:
  - Baseline maternal blood pressure, temperature, pulse and respiratory and a 20min CTG tracing prior to insertion of epidural.
  - Following initial insertion and/or after every bolus, record blood pressure, pulse and respiratory rate at 5 minute intervals for 20 minutes. Continuous electronic fetal monitoring. Do not leave client during this 20 minutes.
  - Routinely record maternal observations hourly.
  - Assess level of epidural block hourly – with ice.
  - Document maternal observations on *Epidural Anaesthesia* chart or on a partogram and fetal monitoring in clinical records or on a partogram.


## POLICY TITLE

**Purpose**

**Scope**

- **Content**
- **Indications and contra-indications**
- **Risks and precautions**
- **Procedure**

**Documentation**

**Acknowledgements**

**References**

**Appendices**