8. Analgesia during pregnancy, childbirth, the puerperium and lactation

Pregnant women and new mothers are both at high risk of experiencing pain. The antenatal changes in anatomy can result in back pain, pelvic pain and an altered centre of gravity, predisposing women to falls and other injuries. Physiological changes during pregnancy can also result in increased headaches. Giving birth is painful, and the puerperium is a time to recover, regardless of how the infant was delivered. Breastfeeding is also associated with changes that can be painful.

Chronic abdominal pain is present in 10–20% of women up to a year after delivery which has been found to increase postpartum depression threefold. Breastfeeding and bonding with their infant are adversely affected if the mothers experience pain, while immobilisation due to pain can lead to thrombo-embolic disease.

It is possible for pregnant women to be on chronic pain medication for chronic pain syndromes. Pregabalin and gabapentin are unlikely to be major teratogens and can be used for neuropathic pain. Parturients can also be on antidepressants, either for depression or as part of their chronic pain medication regime. Serotonin-norepinephrine reuptake inhibitors and TCAs, has reassuring safety data.

While this group of women frequently require analgesia, pain control is often poorly managed. By focusing on reducing unacceptably high maternal mortality rates in a resource-limited environment, pain may be overlooked. Parturients (and inexperienced healthcare providers) fear the effects of drugs on the developing foetus and the breastfeeding infant. The coding of drugs in terms of safety during pregnancy is complicated, and the use of many drugs is restricted owing to lack of conclusive data, which results in many healthcare providers incorrectly labelling these drugs as unsafe.

8.1 Pregnancy

8.1.1 First trimester

The first trimester is the period with the highest risk of teratogenesis, as organogenesis occurs during this period. However, this period also carries the highest risk for miscarriage during times of stress, which can occur following an injury.

Analgesia following the termination of pregnancy should include NSAIDs and paracetamol. Short-acting opiates can be used for the procedure.

8.1.2 Second trimester

There is a lower risk of teratogenesis during the second trimester, as well as a lower risk of miscarriage following stress. This is also considered the safest period during which to perform a procedure if a delay until after delivery is not a feasible option.

8.1.3 Third trimester

There is a high risk of onset of premature labour during this period, and the wellbeing of the foetus should be considered after any stressful experience. There is minimal risk of teratogenesis during the third trimester as growth occurs during this period. However, all drugs given to the mother may cross over to the foetus via the placenta. Therefore, side effects of drugs on the foetus must be taken into account. Drugs affect the same organ systems in both the mother and the foetus. Analgesia throughout pregnancy is outlined in Table I.

Table I: Analgesia throughout pregnancy

Paracetamol	1 g orally, 6-hourly
Opioids	The prescription of any opiate should be undertaken with due caution. The duration of opioid analgesia should be limited to a maximum of 3–5 days. Opioids should be prescribed with symptomatic relief of constipation. All opioids pose the risk of addiction and neonatal abstinence syndrome should be monitored if opioids are used in the third trimester. Short-acting *oxycodone* up to 5 mg orally, 4–6-hourly. Oxycodone is extremely potent and addictive.
NSAIDs	If pain is not controlled with paracetamol and opiates, a short-course low-dose NSAID may be prescribed, taking into account that the use of NSAIDs in pregnancy is off label. All NSAIDs are to be avoided after 30 weeks' gestation to avoid the risk of premature ductal closure in the foetus. Ibuprofen is safe during lactation. *Ibuprofen* 200 mg orally, 8-hourly

NSAID – nonsteroidal anti-inflammatory drug

8.2 Childbirth

All women should be offered methods of managing pain regularly throughout labour. Appropriate analgesia options should be available at all institutions with birthing facilities.

8.2.1 Analgesia for vaginal delivery

Non-pharmacological methods

Mothers should be allowed to choose methods of pain control that will improve their experience which is subjective. This includes distraction techniques (e.g. breathing exercises and white noise), which may be effective. Labouring in a bath is often helpful, as is the presence of a birthing partner (e.g. mother, sister, friend or partner).

Non-pharmacological adjuncts could decrease anxiety as oxytocin and endogenous endorphins are secreted with a feeling of wellbeing.

Systemic analgesia

There are two ways of administering systemic analgesia:

i. *Opiates:* Morphine provides good analgesia during labour. However, it should not be given within four hours of delivery. Naloxone must also be available for the infant immediately after delivery. Pethidine was offered traditionally, but it is not recommended for use during labour or delivery. The analgesia it provides is relatively ineffective and the perceived benefit is obtained from the resultant sedation and euphoria. It causes respiratory depression in both the mother and infant.

ii. *Patient-controlled analgesia (PCA) pump:* Usually, morphine is used in a PCA pump. The analgesia quality is better, although the side effects are similar to those of pethidine. The use of short-acting opiates in PCA pumps is well described. However, the risk of respiratory depression and respiratory arrest is also a reported feature, and should only be used by specialised practitioners in a monitored environment.

Regional analgesia

An epidural provides high-quality analgesia and the use of low doses allows minimal motor block, rendering the mother more mobile. Hypotension may occur, especially during initiation of the block, and the mother should be monitored regularly (i.e. every five minutes for 30 minutes after initiation or top-up, and thereafter every 30 minutes). Mothers should be encouraged to sit or lie in a position that is comfortable for them, although care should be taken to avoid aortocaval compression (i.e. not fully supine unless a wedge is used to raise the right side at least 15 degrees). Walking should not be allowed unaided, as there may be some motor block and proprioception is lost. Mothers can walk if supported on both sides.

Combined spinal and epidural (CSE) anaesthesia, an intrathecal injection of opiate, is given before the epidural is sited and used. This allows for faster onset of analgesia, but offers no other benefits, requiring special sets and added skill as well as respiratory monitoring. Analgesia during vaginal delivery is outlined in Table II.

Inhalational analgesia

Nitrous oxide is useful during labour in areas close to sea level. It does not completely eliminate the pain of contractions, and should be administered from the very beginning of the contraction until the very end of it. It should be provided in a 1:1 ratio with oxygen, preferably premixed as Entonox®. It should only be administered by the parturient herself in order to avoid overdose

and excessive sedation. It should be avoided in parturients with respiratory compromise, neurological injury (acute or chronic) and pulmonary hypertension.

Table II: Analgesia during vaginal delivery

Non-pharmacological methods
Morphine: 10 mg intramuscularly 4-hourly
PCA pump: morphine 1 mg bolus with an 8-minute lockout
Epidural: 0.1% bupivacaine + fentanyl 2 µg/ml, at 8–10 ml/hour • Top up with 5–10 ml 0.1% bupivacaine (low dose top-up for haemodynamic safety) • If for a CS, top up with 5–15 ml 0.5% bupivacaine, or 5–15 ml 1–2% lignocaine • *CSE:* intrathecal injection 10–15 µg fentanyl (25 µg increases pruritus, NV) as well as the epidural mix, as described (0.1% bupivacaine 10 ml)
Nitrous oxide 50% in oxygen (Entonox®): Self-administered via a face mask

CS – caesarean section, CSE – combined spinal and epidural anaesthesia, PCA – patient-controlled analgesia, NV – nausea and vomiting

8.2.2 Analgesia for caesarean section

A South African study showed more than 80% of patients experienced moderate to severe pain after caesarean section (CS). More than 50% of these patients did not receive the fixed-interval morphine prescribed. Because complete elimination of pain is not likely, complete analgesia should be balanced with the risk of side effects and delayed mobilisation.

Pain after a CS is somatic and visceral. Individualised pain management requires trained and motivated staff and increases the workload impact. Analgesia in resource-limited environments should include freely available, inexpensive drugs with maximal analgesic efficiency and minimal side effects or monitoring for both mother and infant.

Neuraxial block

Neuraxial blocks are recommended for most mothers, unless there are contraindications such as severe hypotension, coagulopathy, raised intracranial pressure (ICP) and local sepsis. This provides analgesia for both the operation itself and approximately 2–3 hours postoperatively.

The addition of fentanyl 10–15 µg or sufentanil 2.5–5 µg improves and prolongs the quality of the block, which allows for less bupivacaine to be used, hence less haemodynamic compromise. Intrathecal opioids reduce the need for intraoperative analgesic supplementation, reduce nausea and vomiting, but increase pruritis.

Intrathecal morphine is the gold standard single dosage. Adding intrathecal preservative-free morphine to bupivacaine can prolong the duration of analgesia for more than 24 hours. If an ultra-low dose morphine (50 µg) is used intrathecally, healthy patients can return to the ward with routine postoperative monitoring. Low dose morphine (100 µg) intrathecally needs 2-hourly respiratory and sedation monitoring for 12 hours in a high care environment.

If intrathecal morphine has been administered, parturients with cardio-pulmonary or neurological comorbidities, a BMI > 40 kg/m^2, known or suspected OSA, chronic opioid use, hypertension or receiving magnesium need continual additional monitoring in a high care environment.

To prevent respiratory embarrassment, postoperative parenteral or oral opioids should not routinely be administered after intrathecal morphine. However, a pain specialist can prescribe additional parenteral or oral opioids for breakthrough pain.

Adding both fentanyl and morphine to the neuraxial block improves the intraoperative quality of the block with the added benefit of excellent postoperative analgesia.

If the spinal block works out after 2–3 hours, the patient has no level of analgesia. Intraoperatively, IV paracetamol and morphine should be considered. If there are no contraindications to NSAIDs (e.g., preeclampsia [PET] or renal insufficiency), excellent analgesia can be obtained from suppositories, IV or IM NSAIDs.

General anaesthesia

Analgesia is often forgotten in the rush of an emergency. The same level of analgesia should be given to mothers as that given to any patient undergoing abdominal surgery.

If it is required that the intubation response be blunted (e.g. in PET), long-acting opiates should be avoided, if possible. Alfentanil or magnesium sulphate is recommended (unnecessary if the patient has been loaded with magnesium recently).

The mother should be kept adequately anaesthetised. Short-acting opiates are used for analgesia. From induction until delivery, the infant is exposed to all the drugs given to the mother. Therefore, the person receiving the infant must be informed if opiates were used and naloxone must be available in the theatre.

Once the infant has been delivered, multimodal analgesia is administered to the mother, as is done with all open abdominal procedures. Local anaesthetic agents can be infiltrated into the wound at the end of the procedure, or a bilateral transversus abdominis plane (TAP) block can be performed. Analgesia during a CS is outlined in Table III.

Table III: Analgesia during a caesarean section

Neuraxial block	Recommended intrathecal injections are as follows: • 2.0–2.2 ml 0.5% heavy bupivacaine (i.e. bupivacaine with dextrose) • 1.8–2.0 ml 0.5% heavy bupivacaine, with 10–15 µg fentanyl or 2.5–5 µg sufentanil • 1.8–2.0 ml 0.5% heavy bupivacaine (i.e. with 50 µg morphine, 10–15 µg fentanyl or 2.5–5 µg sufentanil)

General anaesthesia	If the intubation response must be blunted, the following applies: • *Magnesium sulphate:* 40 mg/kg IV infusion preinduction • *Alfentanil:* 0.5–1.0 mg intravenously, or remifentanil 0.5–1 mcg/kg/min IV until after intubation
Intraoperative analgesia following delivery of the infant	• *Fentanyl:* 50–200 µg intravenously • *Morphine:* 5–10 mg intravenously • *NSAID:* Diclofenac 50–100 mg PR, or Indomethacin 100 mg PR • *Paracetamol:* 1 g intravenously • *Local anaesthetic (infiltration into the wound or TAP block):* 0.25–0.5% bupivacaine, not exceeding a total dose of 2.5 mg/kg (i.e. approximately 50–100 ml)

IV – intravenous, NSAID – nonsteroidal anti-inflammatory drug, PR – per rectum, TAP – transversus abdominis plane

8.3 The puerperium

The use of multimodal analgesia allows for decreased doses of the individual component drugs, which benefit the breastfeeding infant as fewer drugs cross over into the breastmilk.

8.3.1 Analgesia following vaginal delivery

Mothers experience pain from ongoing contractions, vaginal tears, episiotomies and breast pain. They also have headaches from prolonged labour, emotional turmoil, prolonged pushing, dural puncture during insertion of the intrathecal, or inadvertent dural puncture with an epidural needle.

Perineal pain is acute and may be severe. In combination with multimodal analgesia, sitting in ice water or using ice packs may be useful.

Other forms of pain can be managed by using a combination of paracetamol and an NSAID around the clock (this combination is very effective), and adding a short-course opiate as required. The breastfeeding infant should be monitored for sedation if high doses of opiates are used. Parenteral analgesia (including paracetamol) is not superior to oral analgesia and has the added benefit of increased patient mobility.

Codeine is not recommended. Pharmacogenomic metabolic variability in efficiency can lead to high levels of active metabolites, excreted into breastmilk with respiratory depression in the infant.

Oxycodone or dihydrocodeine have similar analgesic potency as codeine with a better side effect profile.

Tramadol also has pharmacogenomic polymorphisms; some patients lack the enzyme to produce the active metabolite, while others are extensive metabolisers. Adverse reactions in breastfed infants may include excessive sleepiness, difficulty breastfeeding or breathing

problems. Therefore, if infants are exposed to tramadol through breastmilk, they should be monitored for excessive sedation and respiratory depression.

8.3.2 Analgesia following a caesarean section

As with all abdominal surgeries, postoperative pain is considerable. Multimodal analgesia should be used and patients should be discharged with oral medication.

Paracetamol given regularly is 20–40% opioid-sparing, while NSAIDs is a key component in multimodal analgesia and is 30–50% opioid-sparing. Gabapentinoids, ketamine and dexamethasone are adjuncts with potential peri-operative analgesic benefits. Analgesia during the puerperium is outlined in Table IV.

Table IV: Analgesia during the puerperium

Following normal vaginal delivery	• *Paracetamol:* 1 g 6-hourly; and • *NSAIDs:* ibuprofen 400 mg 6-hourly, or diclofenac 50–100 mg, 8–12-hourly; and • *Short-course opiates:* such as dihydrocodeine 30–60 mg 4–6-hourly; or • *Oxycodone:* 5–10 mg 6-hourly; or • Combinations containing paracetamol, with or without NSAIDs, and with or without an opioid available. • Check the relative doses of each component, and supplement with individual components, rather than increasing the doses of all of these.
Following a caesarean section	• *Paracetamol:* 1 g 6-hourly; and • *NSAID:* ibuprofen 400 mg 6-hourly, or diclofenac 50–100 mg 8–12-hourly; and • *Short-course opiates if no intrathecal morphine has been given:* These should be nurse administered, such as morphine 10 mg IM/SC 3–6-hourly, as required; or • *PCA:* PCA morphine 1 mg bolus with 8-minute lockout, while in hospital, then an oral short-course opiate; or • *Short-acting oxycodone:* 5 mg 4–6-hourly (oxycodone in lactating mothers is off label); or • *Dihydrocodeine:* 30–60 mg 4–6-hourly; or • *Tramadol:* 50–100 mg 6-hourly

NSAID – nonsteroidal anti-inflammatory drug, PCA – patient-controlled analgesia; IM – intramuscular, SC – subcutaneous

8.4 Lactation

Breastfeeding mothers can experience pain for a number of reasons. Breast pain is common, especially after the first few days, and results from engorgement and cracked nipples.

While most drugs cross into the breastmilk, the concentrations are usually too low to be of concern regarding the wellbeing of the infant if the drugs and the doses are carefully considered. Analgesia for lactating mothers is outlined in Table V.

Table V: Analgesia for lactating mothers

Mild pain	*Paracetamol:* 1 g 6-hourly, with the possible addition of a short-course of low dose NSAID (e.g. ibuprofen 400 mg, 6-hourly)
Moderate pain	Paracetamol + NSAIDs at regular intervals
Severe pain	Paracetamol + NSAIDs + a short-course opiate (i.e. dihydrocodein)

NSAID – nonsteroidal anti-inflammatory drug

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