

## Remifentanil Patient Controlled Analgesia (PCA) for a Woman in Labour

Unique Identifier	NMP200/SSM/092 – v02.00
Document Type	Clinical Guideline
Risk of non-compliance	may result in significant harm to the patient/DHB
Function	Clinical Practice, Patient Care
User Group(s)	Auckland DHB only
• Organisation(s)	Auckland District Health Board
• Directorate(s)	Women’s Health, Perioperative
• Department(s)	Maternity, Anaesthesia
• Used for which patients?	All maternity women
• Used by which staff?	All clinicians in maternity including access holder lead maternity carers (LMCs)
• Excluded	
Keywords	
Author	–Senior Medical Officer - Anaesthesia
Authorisation	
• Owner	Director – Women’s Health
• Delegate / Issuer	Service Clinical Director – L9 Anaesthesia
Edited by	Document Control
First issued	01 October 2015
This version issued	13 September 2019 - updated
Review frequency	3 yearly

### Contents

1. Purpose of guideline.....	2
2. Definitions .....	2
3. Pharmacodynamics and pharmacokinetics .....	2
4. Indications and contraindications for remifentanil PCA .....	3
4.1 Indications .....	3
4.2 Contraindications.....	3
4.3 Precautions.....	3
4.4 Side effects .....	3
5. Patient education and consent.....	4
6. DPreparing the woman and a dedicated IV line.....	4
7. Prescribing the remifentanil PCA and setting up the dedicated pump .....	5
8. Monitoring during the use of the remifentanil PCA .....	6
9. When to contact the anaesthetist and troubleshooting .....	7
10. Discontinuing the remifentanil PCA .....	7
11. Supporting evidence.....	8
12. Associated documents .....	9
13. Disclaimer.....	9
14. Corrections and amendments .....	9

## 1. Purpose of guideline

The purpose of this guideline is to facilitate the safe and effective use of remifentanyl patient controlled analgesia (PCA) for a woman in labour.

Although remifentanyl is a category C drug for use in pregnancy, it is increasingly being recognised as a valid form of analgesia for a woman who may be unable to have an epidural for labour, for either medical reasons or maternal preference.

Once prescribed, in accordance with the Auckland DHB *Medications - Prescribing* policy, any medication should be administered and documented in accordance with the Auckland DHB *Medications - Administration* policy (see [Associated documents](#)).

## 2. Definitions

<b>PCA</b>	Patient controlled analgesia
<b>IV</b>	Intravenous
<b>Bolus dose</b>	Amount of medication the woman receives when the demand button is pressed
<b>Lock out</b>	The time between one successful bolus and until the woman can have the next bolus dose
<b>Anti-reflux valve</b>	A valve device placed within an IV line to prevent inadvertent backflow and potentially an inadvertent bolus of the drug from the infusion
<b>Anti-syphon valve</b>	A valve to reduce the risk of inadvertent free flow which may be due to lack of complete syringe engagement within the pump

## 3. Pharmacodynamics and pharmacokinetics

Metabolism of remifentanyl occurs via non-specific esterases (enzymes) within the blood and tissues. Liver or renal dysfunction does not affect metabolism of remifentanyl, and its clearance generally correlates to total body water.

After some degree of maternal metabolism, remifentanyl crosses the placental barrier and can cause respiratory depression in a newborn. A neonate has the same ability to metabolise remifentanyl as the mother, so any effects of the drug from placental transfer is short-lived. There is very little evidence assessing the impact of remifentanyl on breastfeeding success, but because the half-life is extremely short, it is unlikely to cause any prolonged effects in a breastfed newborn, unlike pethidine labour analgesia.

Remifentanyl is a short acting opioid analgesic drug. It provides effective labour analgesia following intravenous administration via a patient controlled analgesia (PCA) pump and is maximally effective within one to two minutes, with an onset within 30 seconds.

Whilst remifentanyl crosses the placenta, it is readily metabolised by the mother and the baby. It may be associated with transient respiratory depression in the newborn, which improves within minutes. Approximately 10 minutes after a PCA dose has been administered, there is virtually no drug effect, regardless of how long the PCA is used.

As with all opioid analgesics, remifentanyl may cause side effects such as drowsiness, respiratory depression, itching, nausea and vomiting.

## 4. Indications and contraindications for remifentanyl PCA

Remifentanyl PCA may be offered to a woman in whom an epidural is contraindicated or refused, or where other forms of pain relief are not appropriate or have provided insufficient analgesia.

Prior to institution, the use of the remifentanyl PCA should be discussed between the obstetric, anaesthetic and midwifery carers of the woman.

### 4.1 Indications

Analgesia during labour when one or more of the following conditions exist:

- Contraindications to regional anaesthesia (epidural or spinal anaesthesia)
- Coagulopathy, thrombocytopenia or anticoagulation
- Sepsis
- Spinal cord or vertebral pathology
- Intrauterine death or termination of pregnancy for fetal abnormalities
- Maternal request
- Perineal tear repairs in conjunction with local anaesthetic infiltration, where regional anaesthesia is contraindicated.

### 4.2 Contraindications

- Allergy to remifentanyl (or other opioids)
- Inability to provide one to one midwifery care or lack of provision for continuous monitoring throughout labour
- Administration of opioids (e.g. morphine or pethidine) in the preceding two hours
- Epidural and intrathecal opioid administration

### 4.3 Precautions

- Special care should be taken with a woman with severe cardiac or respiratory disease, or obstructive sleep apnoea
- Entonox can be used concurrently with a remifentanyl PCA; however, care must be taken to ensure that the woman does not become excessively sedated.
- Remifentanyl PCA can be used throughout labour and delivery and can be used to augment local anaesthetic infiltration for perineal repair.

### 4.4 Side effects

- Drowsiness
- Skeletal muscle rigidity
- Bradycardia
- Hypotension
- Respiratory depression and apnoea
- Nausea and vomiting
- Pruritus
- Shivering

## 5. Patient education and consent

Since remifentanyl is not licensed for pregnancy and labour, informed consent should be taken prior to commencing a remifentanyl PCA. This should be facilitated by consulting the *Pain Relief in Labour - Remifentanyl Patient Controlled Analgesia (PCA)* information leaflet (see [Associated documents](#)).

Ideally, discussion about the use, risks, side effects and benefits associated with a remifentanyl PCA should be discussed with the woman antenatally. However, there may be late presentation or changes in the maternal clinical condition that precludes an epidural for labour. In this situation, the woman should be counselled about the safety profile and benefits of the remifentanyl PCA. A woman considering this form of analgesia should be given the *Pain Relief in Labour - Remifentanyl Patient Controlled Analgesia (PCA)* information leaflet.

The PCA should be described in terms that the woman can understand and include the following points:

- Use of remifentanyl for labour analgesia is an unlicensed indication;
- Potential side effects and reporting these to the midwife;
- Potential side effects on the neonate;
- Requirement for oxygen administration and continuous oxygen saturation monitoring
- How and when to press the PCA button i.e. at the **start** of the contraction, as the remifentanyl peak effect is within one to two minutes, with a rapid offset.

Document the discussion with the patient in the clinical record, including her consent.

## 6. DPreparing the woman and a dedicated IV line

A woman requiring remifentanyl PCA for labour should be permitted only clear fluids during her labour, in addition to regular ranitidine until the delivery of the placenta (see [Associated documents](#)).

Baseline monitoring should be commenced and documented on the CR5825 Maternity Vital Signs Chart before the PCA is started, including the level of consciousness (see [Clinical forms](#)). If baseline oxygen saturations on air are below 93%, it should be discussed with the duty consultant anaesthetist, prior to commencement of the PCA.

Ability to administer oxygen is mandatory whilst the PCA is in situ. Oxygen administration at 2 L/min via nasal cannulae should be applied to the woman prior to the commencement of the PCA.

A non-rebreather mask should be present in the delivery room, and an AmbuBag and naloxone should be present on the resuscitation trolley.

No other systemic opioids should be administered in the preceding two hours prior to commencing the remifentanyl PCA, or whilst the PCA is in progress.

A PCA requires a dedicated IV line with an extension set with an antisiphon and antireflux valve. No drugs or other fluids, including flushes, should be administered via this dedicated line, thus preventing inadvertent bolus administration of the drug.

## 7. Prescribing the remifentanil PCA and setting up the dedicated pump

The duty anaesthetist is responsible for prescribing the PCA, which should be prescribed using CR8675 Patient Controlled Intravenous Analgesia (PCIA prescription) and should be inserted into the woman's medication chart.

Only the anaesthetist may institute changes in the remifentanil bolus dose. Any such changes to the dosing of the bolus dose should be clearly documented and timed on the prescription. This is the responsibility of the duty anaesthetist.

The remifentanil PCA for labour follow up form (kept with the pump) should be completed and returned to the 'epidural follow-up tray' on the Delivery Unit.

An ampoule of naloxone (400 microgram/mL) should be prescribed in conjunction with the PCA, for administration to the woman should her respiratory rate be <8 breaths/min.

The dedicated remifentanil PCA pump is kept in the silver case in the anaesthetic department on Level 9. The plug can be found with the pump. The pump and the plug should be returned to the department as soon as possible after use.

A copy of instructions on how to set up the pump is found within the dedicated silver case in which the pump is stored, and on the L9 Anaesthesia intranet site.

The duty anaesthetist is responsible for setting up the remifentanil PCA pump: 40 microgram/mL concentration of remifentanil (2 mg diluted in 50 mL sodium chloride 0.9%). This should be labelled appropriately. An extension set with a dedicated antisiphon and antireflux valve should be used in conjunction with the **dedicated infusion line** to prevent inadvertent siphoning or bolus of drug to the woman.

Remifentanil is stable for 24 hours at room temperature after reconstitution.

The demand dose is based on **estimated lean body weight**, rather than total body weight. This can be determined with the following calculation (Kokong et al, 2018):

$$\text{Estimated lean body weight (kg)} = (\text{height (m)} - 1) \times 100$$

E.g. 1.65 m patient:  $(1.65 - 1) \times 100 = 65$  kg lean body weight

The bolus dose range is 0.2 to 0.8 microgram/kg with a fixed lockout time of three minutes (Hinova & Fernando, 2009; Muchatuta & Kinsella, 2013).

The regimen should normally be commenced at a 0.2 microgram/kg bolus dose and be increased incrementally as needed. Adequacy of analgesia and dosage should be regularly reviewed as the labour progresses.

## 8. Monitoring during the use of the remifentanil PCA

A midwife who is aware of the potential complications of a remifentanil PCA **must** be present in the room **at all times**.

The anaesthetist should remain with the patient for 20 to 30 minutes after the PCA is set up and whilst analgesia is being established, and for the same period after dose changes have been instituted. The anaesthetist should continue to review the woman during her labour to ensure that there are no adverse effects and that she has adequate pain relief, and provide support to the midwifery and obstetric team.

Only the woman is permitted to press the PCA button.

Respiratory rate should be recorded at five minute intervals for 30 minutes both when the PCA is commenced and each time a change in the PCA prescription is instituted. If the initial observations are satisfactory, then frequency of respiratory rate can be reduced to 30 minute intervals.

A full set of observations should be recorded half hourly on the CR5825 Maternity Vital Signs Chart and must include level of consciousness and respiratory rate in addition to oxygen saturations, blood pressure and heart rate.

Continuous pulse oximetry is mandatory for the duration of the remifentanil PCA, and for 20 minutes after its cessation. Oxygen via nasal cannulae (minimum 2 L/min) should be continued throughout the duration of the remifentanil PCA regardless of the oxygen saturations.

If such monitoring is unable to be provided then the PCA cannot be commenced or should be discontinued.

If there are any concerns regarding the PCA, side effects or patient observations, the duty anaesthetist or Delivery Unit anaesthetic consultant should be contacted.

Only an anaesthetist is allowed to change the remifentanil syringe. Care should be taken that the remifentanil syringe is not allowed to run out. The midwife should notify the duty anaesthetist when 15 mL remifentanil remains in the syringe pump to allow adequate time for it to be replaced without an interruption in analgesia.

Fetal monitoring should be carried out as for any labouring woman receiving opioid analgesia, as per the Auckland DHB *Fetal Surveillance Policy*.

## 9. When to contact the anaesthetist and troubleshooting

### When to contact the anaesthetist (duty anaesthetic registrar or consultant)

- Level of consciousness correlating to 'abnormal'; or she is frequently drowsy
- RR < 10 breaths/min
- Oxygen saturations of < 95% despite administration of oxygen
- Maternal bradycardia HR < 50/min or systolic BP < 90 mmHg
- PCA pump troubleshooting
- When the PCA pump contains less than 15 mL (so as to ensure that there is timely replacement of the remifentanil PCA syringe, and to ensure that the woman is not subject to a period of inadequate analgesia)

### If concerned about patient observations:

- Remove PCA handset from the woman
- Rouse the woman and ask her to take deep breaths, administer oxygen via non-re-breather mask
- If the woman is hypotensive or has a bradycardia then she should be placed into full left lateral position and a fluid bolus considered
- Check blood pressure at 2.5 minute intervals
- Call anaesthetic registrar or consultant to attend immediately
- If respiratory rate < 8 breaths/min or excessive sedation administer naloxone 400 microgram IV at one minute intervals until there is improvement
- In the unlikely event of respiratory arrest a 777 'adult code blue' should be called

### Other trouble-shooting

- If the woman is still in pain or is developing side effects, such as itching or nausea contact the anaesthetic registrar or delivery unit anaesthetic consultant

## 10. Discontinuing the remifentanil PCA

Once discontinued, the PCA line should be disconnected and the IV line removed, **without flushing the line** (as this may cause inadvertent bolus of any remaining remifentanil, which may be present in the line). Oxygen saturation monitoring should continue 20 minutes after cessation of the PCA.

When the remifentanil PCA is discontinued, appropriate ongoing analgesia should be considered for the woman.

The completed remifentanil PCA follow up form, with a patient sticker, should be placed in the epidural follow up tray for follow up by the pain team the next day.

## 11. Supporting evidence

- Babenco, H. D., Conard, P. F., & Gross, J. B. (2000). The pharmacodynamic effect of a remifentanil bolus on ventilatory control. *Anesthesiology: The Journal of the American Society of Anesthesiologists*, 92(2), 393-393.
- Hinova, A., & Fernando, R. (2009). Systemic remifentanil for labor analgesia. *Anesthesia & Analgesia*, 109(6), 1925-1929.
- Kan, R. E., Hughes, S. C., Rosen, M. A., Kessin, C., Preston, P. G., & Lobo, E. P. (1998). Intravenous remifentanil placental transfer, maternal and neonatal effects. *Anesthesiology: The Journal of the American Society of Anesthesiologists*, 88(6), 1467-1474.
- Kokong, D. D., Pam, I. C., Zoakah, A. I., Danbauchi, S. S., Mador, E. S., & Mandong, B. M. (2018). Estimation of weight in adults from height: a novel option for a quick bedside technique. *International Journal of Emergency Medicine*, 11(1), 54.
- Marr, R., Hyams, J., & Bythell, V. (2013). Cardiac arrest in an obstetric patient using remifentanil patient-controlled analgesia. *Anaesthesia*, 68(3), 283-287.
- Muchatuta, N. A., & Kinsella, S. M. (2013). Remifentanil for labour analgesia: time to draw breath. *Anaesthesia*, 68(3), 231-235.
- Pruefer, C., & Bewlay, A. (2012). Respiratory arrest with remifentanil patient-controlled analgesia—another case. *Anaesthesia*, 67(9), 1044-1045.
- Saravanakumar, K., Garstang, J. S., & Hasan, K. (2007). Intravenous patient-controlled analgesia for labour: a survey of UK practice. *International journal of obstetric anaesthesia*, 16(3), 221-225.
- Shen, M. K., Wu, Z. F., Zhu, A.B., He, L. L., Shen, X. F., Yang, J. J., & Feng, S. W. (2013). Remifentanil for labour analgesia: a double-blinded, randomised controlled trial of maternal and neonatal effects of patient-controlled analgesia versus continuous infusion. *Anaesthesia*, 68(3), 236-244.
- Tveit, T. O., Halvorsen, A., Seiler, S., & Rosland, J. H. (2013). Efficacy and side effects of intravenous remifentanil patient-controlled analgesia used in a stepwise approach for labour: an observational study. *International journal of obstetric anaesthesia*, 22(1), 19-25.
- Ultiva® (Remifentanil) Data Sheet. (2014). Auckland: GlaxoSmithKline NZ Ltd.
- Volikas, I., Butwick, A., Wilkinson, C., Pleming, A., & Nicholson, G. (2005). Maternal and neonatal side-effects of remifentanil patient-controlled analgesia in labour. *British Journal of Anaesthesia*, 95(4), 504-509.



## 12. Associated documents

- Fetal Surveillance Policy
- Intravenous Fluid Prescription - Adult
- Medications - Administration
- Medications - Allergies & Adverse Drug Reactions (ADRs): Identification, Documentation & Reporting
- Intravenous Medications and Infusions Administration CVICU
- Medications - Prescribing
- Pain - Patient Controlled Intravenous Analgesia (PCIA) - Adult
- Ranitidine in Labour

### Clinical forms

- Remifentanil PCA follow up form (available on L9 Anaesthesia intranet site)
- CR5825 Maternity Vital Signs Chart
- CR8675 Patient Controlled Intravenous Analgesia (PCIA prescription)

### Patient information

- Pain Relief in Labour - Remifentanil Patient Controlled Analgesia (PCA) (available on National Women's Health website and L9 Anaesthesia intranet site).

## 13. Disclaimer

No guideline can cover all variations required for specific circumstances. It is the responsibility of the health care practitioners using this Auckland DHB guideline to adapt it for safe use within their own institution, recognise the need for specialist help, and call for it without delay, when an individual patient falls outside of the boundaries of this guideline.

## 14. Corrections and amendments

The next scheduled review of this document is as per the document classification table (page 1). However, if the reader notices any errors or believes that the document should be reviewed **before** the scheduled date, they should contact the owner or [Document Control](#) without delay.