Worcestershire Acute Hospitals NHS Trust

Patient Controlled Intravenous Remifentanil Administration for Labour Analgesia

Owner Jaime Greenwood Joanna Marriot Phillip Lo	Consultant Anaesthetist Consultant Anaesthetist Anaesthetic Specialty Trainee
Approved by Obstetric Governance Meeting on:	17th January 2020
Review Date This is the most current document and should be used until a revised version is in place:	15th November 2022

Key Amendment

Date	Amendment	Approved by
17th January 2020	New document approved	Maternity Governance Meeting

Introduction

Epidural anaesthesia is a well-established method to provide analgesia to labouring mothers.
However, it may not be possible or desirable to use an epidural. A Remifentanil PCA can be used as an alternative analgesic option. It has several beneficial characteristics that make it suitable for use during labour, however, safeguards need to be in place to prevent and identify adverse effects of this potent medicine early.

This guideline is for use by the following staff groups:

Anaesthetists
Midwives
Obstetricians
Midwife Support Workers
Anaesthetic theatre staff

Appendices

A. Patient Information Sheet
B. Information for the Anaesthetist
C. Guidance for Midwives
D. Labour Remifentanil PCA Proforma
E. Observation Chart
F. Emergency Management
G. Trouble Shooting

1. Introduction

Remifentanil is an ultra-short acting intravenous opioid which can be delivered by a patient controlled analgesia (PCA) pump. It is extremely potent, has a rapid onset and offset and has a side effect profile similar to other opioids. Its use in maternity units is well documented for the
management of labouring pains, however, it is currently unlicensed.

2. Pharmacology

Remifentanil is an ultra-short acting μ-opioid receptor antagonist. Its potency is a hundred times
that of morphine and so has a rapid onset of action. Its peak effect occurs about 80 seconds after an
intravenous administration; 20 seconds to reach the brain (one arm-brain circulation time) and 60
seconds to reach peak effect site concentration. Remifentanil's duration of action matches labouring
pains well, as a typical contraction lasts 70 seconds.

Remifentanil has a rapid offset of action when given intravenously because it is rapidly hydrolysed by
abundant non-specific plasma and tissue esterases to inactive metabolites. Since Remifentanil has a
high rate of clearance and a low volume of distribution, it is non-cumulative, with a low context sensitivehalf time of 3 minutes.

Remifentanil freely crosses the uterine-placental interface but is metabolised in a similar fashion by
the neonate, with no clinical adverse effects for the neonate at clinically appropriate dosages.
All these factors make Remifentanil a more suitable analgesic agent to use during established labour
when compared to other opioid agents; giving better analgesia, having fewer side effects, avoiding
the pain of intramuscular injections, resulting in better maternal satisfaction.

3. Indications

Alternative analgesia during established labour when an epidural is contraindicated, i.e. due to:

- Patient refusal
- Sepsis
- Coagulopathy
    - Therapeutic anticoagulants
    - Thrombocytopaenia
    - Secondary to acquired pathology: DIC, ITP, massive haemorrhage, PET, HELLP
      syndrome, sepsis
    - Inherited condition: haemophilia, von Willebrand's disease
- Spinal metastases
- Difficult/impossible neuraxial block
    - Previous spinal surgery
    - Abnormal spinal anatomy
    - Extreme BMI

4. Contraindications

- Allergy to opioids
- Other opioids administered within the preceding five hours
- Resting SpO_2 <95% or severe respiratory disease
- Intravenous drug users
- Lack of venous access

- Insufficient monitoring or staffing levels
- Inability of patient to use the PCA system

5. Aim
To provide extra analgesic options to a mother in established labour.

6. Requirements, Procedure and Monitoring
Consultant anaesthetist and obstetrician approval.
Patient must be in established labour.
Patient must be a minimum of 36 weeks gestation.

Procedure
The patient should read the Remifentanil Information Leaflet (appendix A) prior to having a discussion with an anaesthetist. The mother-to-be should be then consented for this therapy and
she must be aware of the possible side effects. Lastly, the patient should be shown how to use the
PCA once it is ready.

Only the mother should operate the PCA button and not birthing partners or midwives on her behalf. Mothers should be encouraged to press the demand button at the start of contractions
rather when the contraction becomes painful. This will allow maximum analgesia to occur at the
height of painful sensations. If pressed too late, maximum analgesia may occur after the pain has
subsided, increasing the likelihood of side effects.

Equipment
Dedicated 20G IV cannula. The PCA must be connected directly to this and no other medications or
fluids must be given through this cannula.
Additional cannula for administration of fluids/emergency drugs.
Pre-programmed pump for Remifentanil PCA.
IV extension set with an anti-syphon and anti-reflux valve.
Drug preparation
This is the responsibility of the anaesthetist.
Remifentanil is stored in the controlled drug cupboard of the anaesthetic room.
Dilute 1mg Remifentanil in a 50ml of 0.9% Sodium Chloride (20micrograms/ml) in a 50ml syringe
Once mixed this solution is stable for 24 hours.

Prescription:
There are three pre-programmed regimes, with different bolus doses of Remifentanil:

- Regime A: 1ml bolus (20micrograms)
- Regime B: 1.5ml bolus (30micrograms)
- Regime C: 2ml bolus (40micrograms)

2 minute lockout period, no background infusion rate.
Start with the 1ml bolus protocol (regime A). If analgesia is not adequate after 30 minutes, consider
increasing the bolus dose.

Apply stickers A (Remifentanil PCA), B (Naloxone PRN), C (Oxygen) to the prescription sheet.

Monitoring

- Patients must be cared for in delivery suite rooms 1 or 2.
- Ensure that 1:1 nursing is available, a trained midwife must be present in the same room at all times.
- An anaesthetist is to be present for the administration of the first five doses.
- Anaesthetist to remain in the delivery suite whilst Remifentanil is being used.
- Paediatrician to be present at delivery. Remifentanil can cause chest wall rigidity requiring the use of Naloxone.
- All observations to be documented on an observation chart (Appendix E).
- Record a set of baseline observations (HR, $Sp0_2$, RR, CTG) prior to using a Remifentanil PCA then
  monitor continuously once it is established.
- Check pain scores, sedation scores and NIBP every 5 minutes for the first 20 minutes, then every half hourly until delivery or more frequently if required.
- NIBP should be taken on the arm which does not have the cannula attached to the Remifentanil PCA.
- Monitor Pain score (0-3): pain free 0, mild pain during contractions 1, moderate pain 2, severe pain 3.
- Monitor Sedation score (0-3): alert 0, slightly drowsy 1, drowsy but responds to gentle stimulus 2, very drowsy and difficult to rouse 3.
- The integrity of PVC, number of attempts/boluses and remaining volume should be documented
  every 4 hours.

Documentation

Ensure that the Remifentanil PCA Proforma (Appendix D), prescription chart and observation chart
are all completed.

Staff

The midwife caring for the patient must be trained in the use of Remifentanil PCAs and ILS trained.

7. Side effects

In common with other opioid agents:

- Nausea and vomiting
- Pruritus
- Sedation
- Most concerning is respiratory depression and desaturations (1 in 10). However, sedation and
- desaturations are usually transient and self-limited.

8. Points of safety

- Mothers can only drink clear fluids and isotonic drinks once a Remifentanil PCA is started.
- Entonox and TENS may be used in addition to a Remifentanil PCA.
- No other opioids should be administered in conjunction to a Remifentanil PCA.
- Always use a dedicated 20G PVC, and do not use this line for any other drug or fluid.
- Non-anaesthetic staff and birthing partners are not to press the PCA button.

- An epidural can be requested at any time during the use of a Remifentanil PCA. However, it must be disconnected from the patient prior to epidural insertion.
- Ensure an Ambu bag is present in the room.
- Remifentanil PCA is only for use until the end of the second stage of labour. It is not to be continued as analgesia for suturing post-delivery.
- Remifentanil PCAs are not indicated for analgesia in intrauterine deaths as constant midwife
  presence and frequent monitoring is not appropriate in these circumstances.
- Once the Remifentanil PCA is no longer needed, remove the cannula without flushing.

Appendix A: Patient Information Sheet

What is a Remifentanil PCA?

A Remifentanil PCA (patient-controlled analgesia) is a method of pain relief. The medicine is given by a pump controlled by you. It is a very strong medicine, similar to Morphine, and is given via a line in your vein. It works very quickly and also wears off quickly meaning that it is good for labouring pains.
Although it cannot provide complete pain relief, many women find it beneficial.

Who can use a Remifentanil PCA?

Most women are able to use a Remifentanil PCA. It is a useful method of pain relief when an epidural cannot be used, e.g. when it is difficult to insert one, if there are abnormalities of the spine and in cases of infection or bleeding problems.
There are a few circumstances when a Remifentanil PCA should not be used. These include if you have an allergy to Morphine-like medicines, if you have a severe breathing problem, if Pethidine or other Morphine-related medicines have been used within the last five hours, and if there is insufficient staff available to monitor you whilst the Remifentanil PCA is being used.

What are its side effects?

The medicine can make you feel sick, dizzy and sleepy. These symptoms will wear off quickly after you stop using the pump but they may be worse in between contractions. One of the main concerns is that the sleepiness may slow your breathing. To reduce the problems that this causes, additional oxygen may be given whilst you use the Remifentanil PCA. You will also have extra monitoring attached to you and have a higher level of midwifery care.
Remifentanil has been demonstrated to be safe for baby, and does not have any additional effects than those of Pethidine.

How is it given?

Remifentanil is given by a special pump controlled by you. This pump is programmed to give a small amount of the medicine when you press a button. There are safety mechanisms which allows only a certain number of administrations to be given over an hour, this reduces the risk of having too much of the medicine. It is connected to a dedicated line in one of your veins and injected directly into your bloodstream.
The effect of the medicine can be felt within 30 seconds and will wear off after a few minutes. As the medicine does not work immediately, the button controlling the pump should be pressed when a contraction starts, NOT when the contraction is at its most painful. This allows time for the medicine

to reach its full effect when the contraction is at its worse and wear off as the contraction is ending.
Pressing the button late can increase the risk of side effects.

When can I ask for a Remifentanil PCA?
It can be used anytime during established labour. If you decide to use a Remifentanil PCA, your
midwife will contact an anaesthetist to discuss the matter further and to answer any questions you
have. It will take a few moments to set up the pump but once it is connected to the line in your vein
it will be ready to use.

Can I use other pain relief medicines with a Remifentanil PCA?
Yes, gas and air (Entonox) and TENS machines can be used with a Remifentanil PCA if required. However, you won't be able to use other Morphine like medicines like Pethidine or Codeine.

If I use a Remifentanil PCA, can I request an epidural if I want one?
Yes, you can opt for an epidural at any time. You will need to be assessed to check that an epidural would be appropriate for you, as routine for all epidurals. The Remifentanil PCA must be discontinued prior to siting the epidural.

Is it safe to breastfeed my baby if I use a Remifentanil PCA?
Yes, Remifentanil is broken down by the body extremely quickly. Once you have stopped using the medicine, very little Remifentanil will be in your system after 10 minutes.

Appendix B: Information for the Anaesthetist

The patient should have been issued with a Remifentanil PCA information leaflet prior to your discussion with her. You must consent her for the therapy and inform her of the possible adverse effects. Once you have assessed the patient and have deemed her appropriate for Remifentanil PCA use, you must educate her to the use of the pump. Reiterate that pump's button should be pressed as soon as a contraction begins and nobody but her should press the button.

Preparation
Please use the Labour Remifentanil PCA Proforma form (Appendix D) as an aide memoire.

Remifentanil is stored in the control drugs cupboard of the anaesthetic room. Add 1mg of Remifentanil to 50ml of 0.9% Sodium Chloride in a 50ml syringe to make a **20micrograms/ml solution**. This is the only concentration of Remifentanil that should be used. You must check the drug and dilutant with the ODP and label the solution appropriately. Remifentanil is stable for 24hours at room temperature after reconstitution.

The PCA pumps, within the Maternity specific tab, have three Remifentanil PCA regimes pre-programmed, with different bolus doses. It is not possible to reprogram the pumps for safety reasons. Start with regime A, 1ml bolus with a 2 minute lockout period and no background infusion. Prime the line with the solution and connect it to the dedicated 20G cannula.

Monitoring
The patient must be monitored in either room 1 or 2 on delivery suite and a trained midwife must be present with the patient at all times when a Remifentanil PCA is in use. You must be present in the room for the patient's first five attempts, monitoring for any adverse effects.

Monitor HR, $Sp0_2$, RR, CTG prior to the Remifentanil PCA is setup, and continuously once it is established. All observations including pain scores, sedation scores and NIBP should be documented every 5 minutes for the first 20 minutes, then every half hourly until delivery or more frequently if required. PVC integrity, number of attempts/boluses and remaining volume should be documented every 4 hours. Record all observations on an observations chart (Appendix E).

Adjustment of dosing
Should the boluses prove to be excessive or inadequate, the bolus volume can be adjusted but must always be one of the three pre-programmed volumes. The Remifentanil concentration must not be adjusted. If excessive sedation/respiratory depression occurs with the lowest bolus volume, the Remifentanil should be stopped and the matter discussed with a consultant anaesthetist.

Appendix C: Guidance for Midwives

Monitoring

- The patient must be monitored in either room 1 or 2 and a trained midwife must be present with the patient at ALL times when a Remifentanil PCA is in use. The anaesthetist will be present in the room for the patient's first five attempts, monitoring for any adverse effects.
- Monitor HR, $Sp0_2$, RR, CTG prior to the Remifentanil PCA is setup, and continuously once it is established.
- All observations including pain scores, sedation scores and NIBP should be documented every 5 minutes for the first 20 minutes, then every half hourly until delivery or more frequently if required.
- PVC integrity, number of attempts/boluses and remaining volume should be documented every 4 hours. Record all observations on an observations chart (Appendix E).

Pain Score

0: No pain
1: Slight pain during contractions
2: Moderate pain during contractions
3: Severe pain during contractions

Sedation score

0: Alert
1: Slightly drowsy
2: Drowsy but responds to gentle stimulus
3: Very drowsy and difficult to rouse

General Points

- Mothers can only drink CLEAR FLUIDS or ISOTONIC DRINKS once a Remifentanil PCA is started.
- Entonox and TENS may be used in addition to a Remifentanil PCA.
- No other opioids should be administered in conjunction to a Remifentanil PCA.
- The pink cannula that the Remifentanil PCA is attached to is NOT to be used for administering any other medicines or fluids.
- Non-anaesthetic staff and birthing partners are NOT to press the PCA button.
- An epidural can be requested at any time during the use of a Remifentanil PCA. However, it must be disconnected from the patient prior to epidural insertion.
- NIBP should be taken on the arm which DOES NOT have the pink cannula for the Remifentanil PCA.
- Additional oxygen should be administered to maintain SpO_2 >95%.
- Ensure an Ambu bag is present in the room.
- Once the Remifentanil PCA is no longer in use, it should be disconnected and the cannula removed WITHOUT flushing.

Criteria for calling an anaesthetist:

- RR <8 breaths/minute
- $Sp0_2$ <90% for >20 seconds despite oxygen administration
- SBP decreases by >25% of baseline or is <90mmHg
- FHR <110bpm
- Maternal HR <50bpm
- Sedation score 3, patient does not respond to voice

- Patient does not want to continue with the Remifentanil PCA
- Difficulty achieving analgesia
- There is a problem with the PCA pump

See appendix F & G for trouble shooting and emergency management procedures.

Appendix D: Labour Remifentanil PCA Proforma Anaesthetist:

Date / / Time:

[Patient sticker]
Name:
Unit number: Signature:
DoB:

PMH: **DH:**

Booking weight:
Indication: **Allergies:**

All prerequisites must be met:

Patient information sheet given
No opioids given within the last 5 hours

Baseline SpO2 >95% on Room Air
Gestation >36wk, established labour

Equipment

Dedicated 20G cannula Remifentanil PCA pump Giving set
Additional cannula for fluids/emergency drugs

Medication

1mg Remifentanil in 50ml 0.9% Sodium Chloride (20micrograms/ml)
Bolus volume: 1ml / 1.5ml / 2ml (***start with 1ml boluses***)
1 bolus/2min. Max 30 boluses/hr, no background infusion
Label Remifentanil solution and put a patient sticker on the bag
Prescription chart completed

Monitoring

Patient monitored in a high care area
A trained midwife present at all times
Anaesthetist present for the first five attempts
Monitor HR, $Sp0_2$, RR, CTG continuously on monitoring
Document all observations, including pain and sedations scores and
NIBP every 5 minutes for thefirst 20 minutes, then every half hourly
Document integrity of PVC, number of
attempts/boluses and remaining volume every 4 hours
Record observations on an observations chart

Post delivery

Time of delivery: _____
Method of delivery: NVD / instrumentation / LSCS
Time Remifentanil PCA stopped: _____
Patient satisfaction (1-10):
Adverse events:

Points of safety:
NIBP to be taken on the arm which DOES NOT have the cannula attached to Remifentanil PCA.
No other opioids should be administered in conjunction to a Remifentanil PCA.
The PCA buttons is MUST only be pressed by the patient.
The dedicated 20G cannula is NOT for administration of any other medicines or fluids.
Once the Remifentanil PCA is not required, disconnect it and remove the cannula WITHOUT flushing.

Appendix E Emergency Management

Over-sedation
Extreme drowsiness is a significant precursor for respiratory depression.

If the patient has a sedation score of 3, i.e. is difficult to rouse:

- Discontinue the Remifentanil PCA
- Call the anaesthetist
- High flow oxygen (15L/min) should be administered via a face mask
- Prepare Naloxone 400mcg
- Other causes of sedation should be ruled out, for example hypoglycaemia, hypoxia, hypercarbia, use of other sedating medication, cerebrovascular event, post-ictal state
- Consider changing the PCA regime to one delivering a smaller dose of Remifentanil

Respiratory depression
Remifentanil is a potent respiratory depressant. Although it has a rapid clearance, extreme vigilance
is required with its use.

If RR<10bpm or saturations <90%:

- Discontinue the Remifentanil PCA
- Attempt to wake the patient
- High flow oxygen (15L/min) should be administered via a face mask
- Call the anaesthetist
- Prepare Naloxone 400µcg
- Consider changing the PCA regime to one delivering a smaller dose of Remifentanil

Respiratory arrest:

- Discontinue the Remifentanil PCA
- Put out a ‘2222’ emergency call
- Administer basic life support
- Put the patient in the left lateral position
- Give 100% oxygen and assisted breaths with an Ambu bag
- Prepare Naloxone 400mcg
- Consider changing the PCA regime to one delivering a smaller dose of Remifentanil

Bradycardia (HR<50bpm):

- Discontinue the Remifentanil PCA
- Treat with Glycopyrollate or Ephedrine

Hypotension (SBP <90mmHg or <25% of baseline):

- Discontinue the Remifentanil PCA
- Reposition the patient: head down, left lateral

- Give a 250ml fluid bolus
- If unresponsive to the above, treat with Metaraminol or Ephedrine

Appendix G: Trouble Shooting

Stop PCA if there are any concerns
If $Sp0_2$ <95%, administer 1-4L oxygen via nasal cannulae
If $Sp0_2$ <95% even with nasal cannulae oxygen, administer oxygen via Hudson face mask

Call anaesthetist if:

- RR <8 breaths/minute
- $Sp0_2$ <90% for >20 seconds despite Oxygen administration
- SBP decreases by >25% of baseline or is <90mmHg
- FHR <110bpm
- Maternal HR <50bpm
- Sedation score 3, patient does not respond to voice
- Patient does not want to continue with the Remifentanil PCA
- Difficulty achieving analgesia
- There is a problem with the PCA pump

If analgesia is inadequate:

- Ensure cannula is patent
- Check that there is no occlusion in the line
- Check that there is no pump malfunction
- Seek advice from an anaesthetist

If the pump is not working properly:
Call the duty anaesthetist

References

Hinova A, Fernando R. Systemic Remifentanil for Labor Analgesia. Anesth Analg. 2009; 109(6): 1925-
9

Evron S, Glezerman M, Sadan O. Remifentanil: A Novel Systemic Analgesic for Labor Pain. Anesth
Analg. 2005; 100: 233-8

Blair JM, Hill DA, Fee JP. Patient-Controlled Analgesia for Labour using Remifentanil: A Feasibility
Study. BJA. 2001; 87: 415-20

Volmanen P et al. Remifentanil in Obstetric Analgesia: A Dose-Finding Study. Anesth Analg. 2002;
94(4): 913-7

Blair JM, Dobson GT, Hill DA. Patient Controlled Analgesia for Labour: A Comparison of Remifentanil
with Pethidine. Anaesthesia. 2005; 60(1): 22-7

Thurlow JA, Laxton CH, Dick A. Remifentanil by Patient Controlled Analgesia Compared with
Intramuscular Meperidine for Pain Relief in Labour. BJA. 2002; 88(3): 374-8

Volikas I, Butwick A,Wilkinson C. Maternal and Neonatal Side-Effects of Remifentanil Patient-
Controlled Analgesia in Labour. BJA. 2005; 95: 504

Kan RE, Hughes SC and Rosen MA. Intravenous Remifentanil: Placental Transfer, Maternal and
Neonatal Effects. Anaesthesiology. 1998; 88: 1467-74

Hill D. Remifentanil Patient-Controlled Analgesia should be Routinely Available for Use in Labour. Int
J Obstet Anesth. 2008; 17: 336-9

Hodgkinson P, Hughes D. Audit of Remifentanil PCA in 612 Labouring Women. IJOA. 2008 S10
Abstracts of free papers presented at the OAA Annual Meeting 15-16th May 2008

Muchatuta K. Remifentanil for Labour Analgesia: Time to Draw Breath. editorial Anaesthesia. 2013;
68(3): 231-5

Contribution List

This key document has been circulated to the following individuals for consultation;

Designation
Maternity Governance Meeting
Dr J Greenwood

This key document has been circulated to the chair(s) of the following committee's / groups for comments;

Committee
Dr J Greenwood (consultant Anaesthetist)

Supporting Document 1 - Equality Impact Assessment Tool

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

		Yes/No	Comments
1.	**Does the policy/guidance affect one group less or more favourably than another on the basis of:**		
	Race	No	
	Ethnic origins (including gypsies and travellers)	No	
	Nationality	No	
	Gender	No	
	Culture	No	
	Religion or belief	No	
	Sexual orientation including lesbian, gay and bisexual people	No	
	Age	No	
2.	**Is there any evidence that some groups are affected differently?**	No	
3.	**If you have identified potential discrimination, are any exceptions valid, legal and/or justifiable?**	No	
4.	**Is the impact of the policy/guidance likely to be negative?**	No	
5.	**If so can the impact be avoided?**	No	
6.	**What alternatives are there to achieving the policy/guidance without the impact?**	No	
7.	**Can we reduce the impact by taking different action?**	No	

If you have identified a potential discriminatory impact of this key document, please refer it to Human Resources, together with any suggestions as to the action required to avoid/reduce this impact.

For advice in respect of answering the above questions, please contact Human Resources.

Supporting Document 2 – Financial Impact Assessment

To be completed by the key document author and attached to key document when submitted to the appropriate committee for consideration and approval.

	Title of document:	Yes/No
1.	Does the implementation of this document require any additional Capital resources	No
2.	Does the implementation of this document require additional revenue	No
3.	Does the implementation of this document require additional manpower	No
4.	Does the implementation of this document release any manpower costs through a change in practice	No
5.	Are there additional staff training costs associated with implementing this document which cannot be delivered through current training programmes or allocated training times for staff	No
	Other comments:	No

If the response to any of the above is yes, please complete a business case and which is signed by your Finance Manager and Directorate Manager for consideration by the Accountable Director before progressing to the relevant committee for approval.