

**PATIENT CONTROLLED ANALGESIA (PCA) POLICY
FOR ADULT AND PAEDIATRIC PATIENTS**

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User Group	All Staff who are involved in the care of patients with analgesia

The Trust is committed to promoting an environment that values diversity. All staff are responsible for ensuring that all patients and their carers are treated equally and fairly and not discriminated against on the grounds of race, sex, disability, religion, age, sexual orientation or any other unjustifiable reason in the application of this policy, and recognising the need to work in partnership with and seek guidance from other agencies and services to ensure that special needs are met.

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Acute Pain Service West Herts NHS Trust

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For Out of Hours Service and Covering Annual Leave

The Clinical Nurse Specialist will hold the Acute Pain bleep during working hour's site specific.

The 1st on call anaesthetist will cover out of hours and Bank Holidays, please be aware that you may not receive immediate response as they may be otherwise engaged. If there is no response, try the on call anaesthetic registrar for ICU.

1. Introduction

This policy covers the care and maintenance of Patient Controlled Analgesia systems (PCAs) within West Hertfordshire Hospitals NHS Trust (WHHT). Part one of this policy is applicable to adult patients, part two to paediatric patients.

Wards and departments must be deemed competent in caring for patients receiving PCA by the ward / department manager. The manager holds responsibility for arranging training for their staff in the use of PCAs.

2. Aims

The aims of this policy are:-

- To provide education and the rationale behind the uses of the PCA pump
- To provide consistent and effective pain relief through education
- To maintain patient safety and comfort by reducing and preventing side effects and problems in the first instance and managing them effectively if they do occur.

3. Education and Training

3.1 Training and education is available via the 'WHHT Learning Package for Nurses caring for Adult Patients using Patient Controlled Analgesia Systems' provided by the Acute Pain Service (APS). The ward manager will identify any candidates needing training. Training should be booked through the training department. Updates for training will be required every two years when new competency sheets will be issued. It is the responsibility of the individual nurse and ward managers to assess staff training needs.

3.2 Patients receiving a PCA can only be cared for in an area where there are registered nurses who have been deemed competent in caring for patients receiving PCA.

3.3 The Acute Pain Team (APT) advise that all wards that accept patients with PCA should have an Acute Pain Link Nurse who has been deemed competent in caring for patients receiving PCA. It is the ward manager's responsibility to identify their ward Link Nurse.

4. Patient Selection

PCA can be used for any patient with acute pain, where repeated doses of intramuscular or intravenous opioids would otherwise be anticipated. This will include post-operative patients and patients with acute painful conditions such as pancreatitis and sickle cell disease etc.

4.1 Contra-indications for PCA:

- Patient refusal
- Physical inability to operate the PCA demand button
- Impaired mental status
- Head injury
- Insufficient numbers of trained staff to ensure patient safety

4.2 Extra care should be exercised in the selection of patients if they have:

- A history of obstructive airway disease
- Marked electrolyte imbalance
- Opioid dependence
- Previous history of opioid related side effects

4.3 Age Related Considerations

Old age should never be considered a barrier for PCA use. However, the physical ability, attitudes and characteristics of the elderly population should be taken into consideration when deciding if a PCA is appropriate.

A characteristic of some elderly people may be that they expect to experience pain following surgery¹. Explaining the negative effects of pain does not always encourage them to use more analgesia and they may experience better pain relief if the Health Care Professional administers their pain relief via an alternative method, rather than a PCA machine.

4.4 Personality Traits

Not everyone benefits from PCA. It is beneficial for patients who like to maintain control of their environment, but some patients do not want to accept this responsibility. Some people like to block out potentially unpleasant experiences² and are more likely to expect the Health Care Professional to take responsibility for their pain relief. These people are unlikely to use the PCA to its full potential. If PCA is not being used effectively, it can be equivalent to no pain relief at all; therefore the method of pain relief should be reviewed. Contact the APT Monday – Friday 9.00 – 17.00, outside these hours contact the first on call anaesthetist, an alternative mode of analgesia may be decided upon.

Many people fear addiction to analgesia and may have been exposed to negative reports of opioids from the media. This fear may have taken years to develop and rarely subsides with a brief discussion about the use of opioids for pain relief^{3,4}. This may affect their willingness to utilise the PCA to its full potential.

Patients' appropriateness for PCA will be decided by the anaesthetist or Acute Pain Clinical Nurse Specialist after discussion with the patient and ward nurse.

5. Patient Information

Patients in whom PCA is planned should receive an explanation of the technique by the Anaesthetist / Nursing staff. This should then be reinforced when appropriate in the recovery unit. Ward staff should also provide the patient with verbal information about the PCA. The written information 'Pain after Surgery' can be obtained from the ward and / or pre assessment clinic.

It is sometimes possible to highlight and address any concerns the patient may have when counselling them for PCA use⁵.

6. PCA Prescription

6.1 The PCA must be prescribed on the PRN side of the prescription chart, including the route, drug concentration, bolus size and lockout period; this should be signed and dated by the prescriber e.g:-

Drug: Morphine sulphate via PCA	Dose: 1mg bolus	
Additional Instructions 50mg morphine in 0.9% Sodium Chloride Total 50ml pre filled syringe	Route IV	Date: 25/12/2010
Signature: <i>Jo Brown</i>	Max. Frequency 5min. lock out	

Any loading doses should be prescribed as 'stat doses' on the front of the drug chart, in the once only section.

6.2 For adults a standard pre-filled syringe of morphine sulphate solution should be used:- morphine sulphate 50mg in a total of 50ml of 0.9% sodium chloride. Using pre filled syringes that the Trust purchases, is aimed at reducing the risk of needle stick injury and error of incorrect dilution. If these are not available, Pharmacy should be contacted for further guidance.

6.3 Other opioids may be used as an alternative if morphine is not appropriate for the patient, but must be discussed with an Anaesthetist or the Acute Pain CNS first. See Appendix 1 and 2.

6.4 The pumps should only be programmed by an Anaesthetist, Acute Pain CNS, trained recovery staff or a member of staff who has been specifically trained by the Acute Pain CNS and deemed competent to do so.

6.5 PCA syringes can be changed by any qualified nurse who has been assessed as competent in administering intravenous medication and successfully completed the 'WHHT Learning Package for Nurses caring for Adult Patients using Patient Controlled Analgesia Systems'.

6.6 Additional doses of opioids (loading doses) should only be administered by the Anaesthetist or Acute Pain CNS. Qualified nursing staff in recovery who have been deemed competent by the Recovery Unit Sisters, may administer loading doses as prescribed for patients in recovery.

6.7 Naloxone should always be prescribed on the PRN side of the drug chart when a PCA is in use. It should be administered to keep the patients respiratory rate greater than 8 breaths per minute.

Naloxone 400 micrograms made up to a total of 8mls with 0.9% sodium chloride.

Give 2mls (100 micrograms) observe effect; repeat every 2 minutes if required, Naloxone has a short duration of action, maximum dose of 10 mg. A continuous intravenous infusion may be required^{8,9}.

7. Multi-modal Analgesia

Using only one approach to managing pain can be ineffective for many patients; several different pains may contribute to their overall symptoms⁷. A balanced approach, using several analgesics with differing mechanisms of action, has been shown to be more effective and to reduce the risk of side effects of opioids. A combination of different drugs that act at different stages of the pain pathway maximise the amount of pain relief. All drugs should be correctly prescribed on the patients drug chart before administration.

Where possible PCA should be given concurrently with paracetamol pr/iv/po and/or a Non Steroidal Anti Inflammatory Drug, (NSAID) via an appropriate route, ensure NSAID's are not contraindicated, (see BNF for contraindications⁸). It is not advisable to give diclofenac (Voltarol®) intramuscularly as it is very painful and can cause abscesses and local necrosis at the intramuscular injection site⁶. Paracetamol and/or a NSAID should be given on a regular basis in conjunction with the PCA if prescribed.

No other opioids including codeine, dihydrocodeine, tramadol or compound analgesics i.e. co-dydramol should be administered whilst the patient is receiving PCA, (this will minimise the risk of respiratory depression) unless advised by Anaesthetist or Acute Pain CNS and concurrent administration must be stated on the drug chart.

8. Equipment

8.1 PCA delivery is via the Graseby 3300 machine that requires a 50 ml syringe clearly identified with the drug and concentration, patients' details, date and time infusion commenced. An appropriate giving set with anti-syphon and anti-reflux properties must be used and a labelled PCA line, these can be obtained from the recovery unit if required.

8.2 The opioid of choice and purchased as pre filled syringes for PCA use is Morphine Sulphate 1mg/1ml in a 50 ml syringe these are available to order from Pharmacy. These pre filled syringes can

be used for patients over 50 kg, for patients under 50 kg the correct morphine concentration will have to be prepared by the nursing or medical staff.

8.3 The PCA must have a dedicated Vygon PCA administration line which has an anti syphon valve at the distal end that attaches to the syringe. Its other property is, at the proximal end (patient end) there is a side port with anti reflux valve where maintenance fluids or other infusions that are compatible with the morphine, may be attached. The use of the side port helps prevent premature blockage of the cannula and reduces the need for separate flushing of the cannula or the need for a second cannula.

8.4 All IV cannulas and lines must be changed according to hospital policy, 48 hours for solution sets¹⁰. The giving sets for PCAs are kept in recovery. The Graseby 3300 pump can be obtained from the Medical Electronics Library 09.00 – 17.00 Monday to Friday and from recovery out of hours. The morphine sulphate syringe should be obtained from the ward / department controlled drug cupboard the patient is in at the time.

8.5 The patients' cannula should be secured with a transparent dressing. The administration line tubing can then be secured to the patient if required. The cannula should be easily visible and accessible (see 9.4 below).

9. Monitoring and Documentation

9.1 All patient vital signs /clinical observations for the duration of the PCA should be recorded on the front of the patients observation chart.

9.2 Frequency for monitoring vital signs

Monitor	First hour	Next 2 hours	Next 4 hours	Remainder of time while on PCA
Respiratory rate	¼ hrly	½ hrly	1hrly	1-2hrly
Sedation score	¼ hrly	½ hrly	1hrly	1-2hrly
Blood Pressure	¼ hrly	½ hrly	1hrly	According to clinical need
Heart Rate	¼ hrly	½ hrly	1hrly	According to clinical need
Pain Score	¼ hrly	½ hrly	1hrly	According to clinical need

The patients' respiratory rate and sedation score should be monitored 1-2 hourly for the duration of the PCA according to clinical need; this is necessary due to the side effect profile of opioids.

9.3 The following observations are also mandatory when a patient is receiving opioids via a PCA and should be documented 2-4hrly in the appropriate place on the PCA observation chart or more frequently if clinically indicated.

Pain score*
Nausea and vomiting score
Cumulative dose of morphine
Number of demands on the PCA machine

* Pain score should always be assessed on movement e.g. coughing, deep breathing. If the pain score is greater than 1 (0 = none 3 = severe) at any time this must be addressed and reassessed in ½ hour and then recorded hourly until a score of 1 or below has been established.

Pain cannot be treated adequately if it is not assessed regularly

9.4 IV cannula site to be checked 4 hourly for inflammation, redness etc. If indicated the cannula should be re-sited.

9.5 The Acute Pain Team aim to visit the patients daily if possible Monday to Friday. In the absence of the Acute Pain Nurse the 1st on call anaesthetist should be contacted to deal with any pain management problems that the patients' clinical teams cannot manage.

9.6 All patients receiving PCA should have a Pain Service Audit Sheet stored in recovery. The Recovery staff should fill this in if the patient has been nursed in Recovery. The audit form ensures that the patient will receive appropriate follow-up care by the Acute Pain Team.

9.7 If patients with PCA are returning to the wards from the Intensive Care Unit (ICU), ICU staff should inform the Acute Pain Nurse regarding the patients transfer.

10. Side Effects and Problems

10.1 Nausea and vomiting

The incidence of postoperative nausea and vomiting depends on many factors including the anaesthetic used, the type and duration of surgery and the patient's sex. The aim is to prevent postoperative nausea and vomiting from occurring. The nurse or doctor should evaluate the response to any anti-emetic after administration and if the patient is still nauseated after 30 minutes a different type of anti-emetic should be prescribed and administered. A combination of two antiemetic drugs acting at different sites may be needed in resistant postoperative nausea and vomiting.

The following are recommended by the APS:

1st drug of choice – CYCLIZINE 50mg IV/IM/PO 8 hourly (maximum 150 mg in 24 hours)

2nd drug of choice – ONDANSETRON 4mg IV/IM/PO 8 hourly or 8mg 12 hourly (maximum 16 mg in 24 hours)

If postoperative nausea and vomiting (PONV) persists when the above are given regularly then contact the APS or anaesthetist.

PCA should not be stopped because of nausea and vomiting unless prior discussion with the APS has taken place.

Patients with a high risk of PONV can be prescribed one anti-emetic on a regular basis and one on an as required basis. (Refer to PONV algorithm, appendix 3)

10.2 Respiratory Depression and Over Sedation

10.2.1 If the respiratory rate is 8 or below and sedation score 1 or 2;

- Remove the hand set from the patient
- Commence ¼ hourly respiratory rate and sedation scoring
- Commence and maintain continuous pulse oximetry
- Give oxygen as necessary according to prescription, keeping saturations above 90%
- Inform Acute Pain Team and/or 1st on-call anaesthetist

10.2.2 If the sedation score is 3 irrespective of respiratory rate or respiratory rate 6 or below:

- Stop PCA
- Administer high flow oxygen at 10-15 litres via a non-rebreathe bag and mask. This may be administered without prescription in accordance with Trust oxygen policy.¹¹
- Fast bleep the 1st on-call anaesthetist or anaesthetic registrar. Also clinical team managing patient.
- Commence pulse oximetry
- Commence ¼ hourly observations of respiratory rate and sedation score.
- Ensure a qualified nurse remains with the patient.
- Prepare naloxone injection (400mcg diluted with 0.9% sodium chloride for injection to 8ml)
- Give 100mcg/2ml every 2 minutes and observe effect. Repeat assessment of sedation score and respiratory rate.
- If sedation score remains 3 or respiratory rate of 6 or below, repeat administration of naloxone every 2 mins to keep respiratory rate above 8.

WHHT Guidelines for Administration of Naloxone for Adult Patients Receiving Patient Controlled Analgesia and Opioid Epidural Analgesia¹².

For APNOEA give prescribed Naloxone and initiate Basic Life Support Guidelines.

10.3 Inadequate Analgesia

If a patient has a pain score of greater than 1 (0=none 3=severe) on movement, action needs to be taken.

There are several interventions that can be used and the choice will depend on the assessment of the patient. This should, where possible, be negotiated with the patient. These are:

- Re-educate patient in using PCA
- Give prescribed multimodal analgesia
- Has the handset become disconnected from back of PCA pump?
- Arrange for morphine bolus via PCA to be given (only given by anaesthetist or Acute Pain Team. Recovery Nurse, once prescribed, in recovery only)
- Reassure / Re-position patient.
- Always check the IV site for patency and IV line that all clamps are open. That there is no extravasations or signs of infection

PCA should not be stopped because of inadequate analgesia without prior discussion with the APS. The bolus dose may need to be increased, discuss with Acute Pain Team or Anaesthetist on-call.

10.4 Urinary Retention

Contact the F1 team doctor for advice; the patient will need an assessment and may require a urinary catheter.

10.5 Mobility

Using a PCA does **not** prevent patients from mobilising. It is when the patient first starts to mobilise that they may need to use the PCA more. The Graseby 3300 PCA pumps may be disconnected from the electrical mains supply and can run on battery power for a short period of time (up to 7 hours depending on battery charge). However to recharge the battery the pumps should always be plugged in when possible.

PCA should not be stopped because the patient needs to mobilise.

10.6 Pruritis

If problematic for the patient, contact the doctor, APT to assess the patient. Chlorphenamine may be prescribed, as required, 10mg im/iv given over 1 minute, 4 times in 24 hours, or 0.2micrograms/kg/hr dose of naloxone may be required¹⁵. If a higher dose of naloxone is given this will reverse the analgesic effect of the opioid.

10.7 Constipation

Patients receiving opioid analgesia may require a laxative prescribed regularly or the appropriate health education to help manage any constipation.

10.8 Pump Problems

If the pump alarms, the cause for the alarm will appear on the pump screen. Check the cause by reading the screen then silence the alarm. Refer to Manufacturers Guidelines (found in The Acute Pain Resource Folder) to resolve these problems. Ensure PCA line is not clamped in PCA lid and that all line clamps are open.

If a fault code appears:-

- **Turn off the pump immediately and remove it from the patient**
- Call the APT / Anaesthetist to initiate another PCA pump if the ward staff are not trained to do so.
- Medical Electronics Library should be informed of the type of fault as soon as possible. Document the pump number and fault code that appeared on the pump. Attach this information to the pump to assist in the correct pump being serviced.
- Consider if an Incident Form needs to be completed e.g. incorrect dose of morphine being administered.

11. Discontinuation

If a patient is comfortable and pain free, it is likely that the patient's analgesia is at a correct level. It is not necessarily an indication for stopping the PCA. However, once a patient is able to eat and drink and their PCA opioid usage is minimal this may be an appropriate time to consider changing the analgesia to oral medications.

The PCA opioid should be discontinued after discussion and agreement with the patient. The patient should be able to transfer onto oral medication. It is not advisable to stop PCA analgesia in favour of intramuscular analgesia.

Initially after stopping the PCA analgesia oral analgesia should be given regularly. The multimodal rules (see section 7 above) also apply to oral analgesia. If the patient has not been taking supplementary analgesia such as paracetamol and / or NSAIDs (if no contraindications), commence this prior to stopping the PCA. This will reduce the level of mild or strong opioid analgesia the patient will require.

After discontinuation of the PCA, the pain score should continue to be documented on the front of the Patient Observation chart with every set of observations, remembering that pain is the 5th vital sign. This is vital in order to assess that the alternative oral analgesia continues to control the patient's pain adequately.

Any remaining opioid in the PCA syringe when discontinued must be destroyed, put into gauze/paper towel and put into the clinical waste bin/sharps bin, as per 'WHHT, Medicines Management Policy, incorporating, The Policy for Prescribing, Administration and Supply of Drugs'¹³.

When the PCA has been discontinued the PCA pump should be decontaminated and returned to the Medical Equipment Library at WGH and Recovery Unit at SACH.

PCA should not be discontinued within 24 hours of surgery without prior discussion with the APS, unless the patient is being discharged home.

12. Decontamination of PCA machine

The pump may be cleaned in lines with 'WHHT Decontamination Policy including Management of Blood and other Body Fluid spillage.'¹⁴

13. Successful outcome criteria

- Patient indicates that their pain level is at a level acceptable to them
- Patient indicates that they are satisfied with this method of analgesia
- Patient indicates that they have participated in their own pain management
- There is written evidence that the patient has a pain score of 0 or 1

14. Monitoring Compliance and Effectiveness

- Annual Audit
- Acute Pain Team will audit all patients with PCAs on a daily basis (other than weekends and bank holidays when it is down to the on call anaesthetist) any deviations from the policy will be reported and monitored through Clinical Governance Meetings.

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Appendix 1

Guideline on preparing Fentanyl PCA

Pump used	Graseby 3300 PCA
Concentration after dilution	Fentanyl IV 20 mcg per 1 ml
Drug	Fentanyl 1000 mcg (Two 10ml 500 mcg amps. total 20ml)
Dilute with	30 mls Normal Saline 0.9% (to a total of 50ml)
Bolus dose	20 mcg /1 ml
Lockout time	5 minutes

Please note:

The anaesthetist / Acute Pain CNS are responsible for assessing and making the decision to use IV Fentanyl via the PCA. A valid prescription needs to be written before administration.

The Trust does not purchase Fentanyl in pre-filled syringes. It will therefore have to be prepared in the clinical area.

Most wards do not stock IV Fentanyl on a regular basis; therefore it needs to be ordered in the ward controlled drug order book in the normal way for ordering controlled drugs. Ensure availability of Fentanyl stock whilst PCA in use.

Nurses who have successfully completed the Trust IV training course may make up subsequent syringes, if competent. If the nurse is not IV trained or not feeling competent to do so, the Acute Pain CNS or out of hours the on call anaesthetist may be asked.

Appendix 2

Guideline on preparing Pethidine PCA

Pump used	Graseby 3300 PCA
Concentration after dilution	Pethidine IV 10 mg per1 ml
Drug	Pethidine 500 mg
Dilute with	Normal Saline 0.9% made up to a total of 50 mls
Bolus dose	10 mg / 1 ml
Lockout time	5 minutes

Please note:

The anaesthetist / Acute Pain CNS are responsible for assessing and making the decision to use IV Pethidine via the PCA. A valid prescription needs to be written before administration.

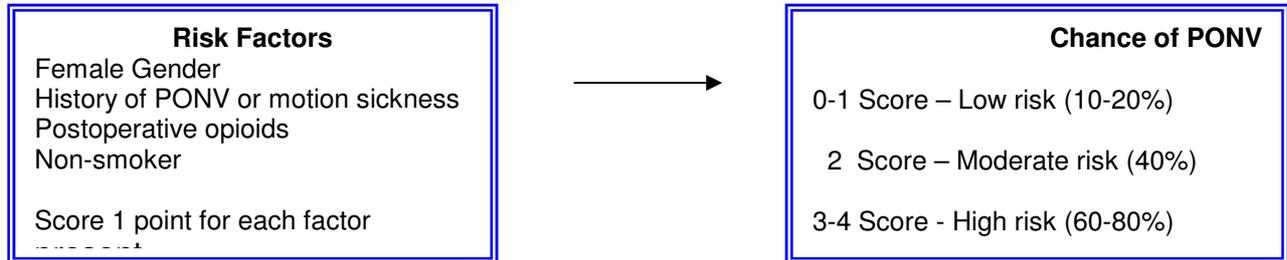
The Trust does not purchase pethidine in pre-filled syringes. It will therefore have to be made in the clinical area.

The ward may not stock IV pethidine on a regular basis; therefore it needs to be ordered in the ward controlled drug order book in the normal way for ordering controlled drugs. Ensure availability of pethidine stock whilst PCA is in use

Nurses who have successfully completed the Trust IV training course may make up the subsequent syringes if competent. If the nurse is not IV trained or not feeling competent to do so, the Acute Pain CNS or out of hours the on call anaesthetist may be asked.

Appendix 3

Guidelines for the management of postoperative nausea and vomiting (PONV) in adult patients



Score predictability is no more than 70% accurate (Apfel et al 1999)

Prophylaxis intra-operative

Risk	Prophylaxis
Low	None
Moderate	Cyclizine 50mg IV 20 min. before end of surgery
High	Combination of Cyclizine 50mg IV and Ondansetron 4 mg IV

The above table is for guidance. Doctors may use their discretion to allow for individual patient characteristics

Prescription for postoperative period

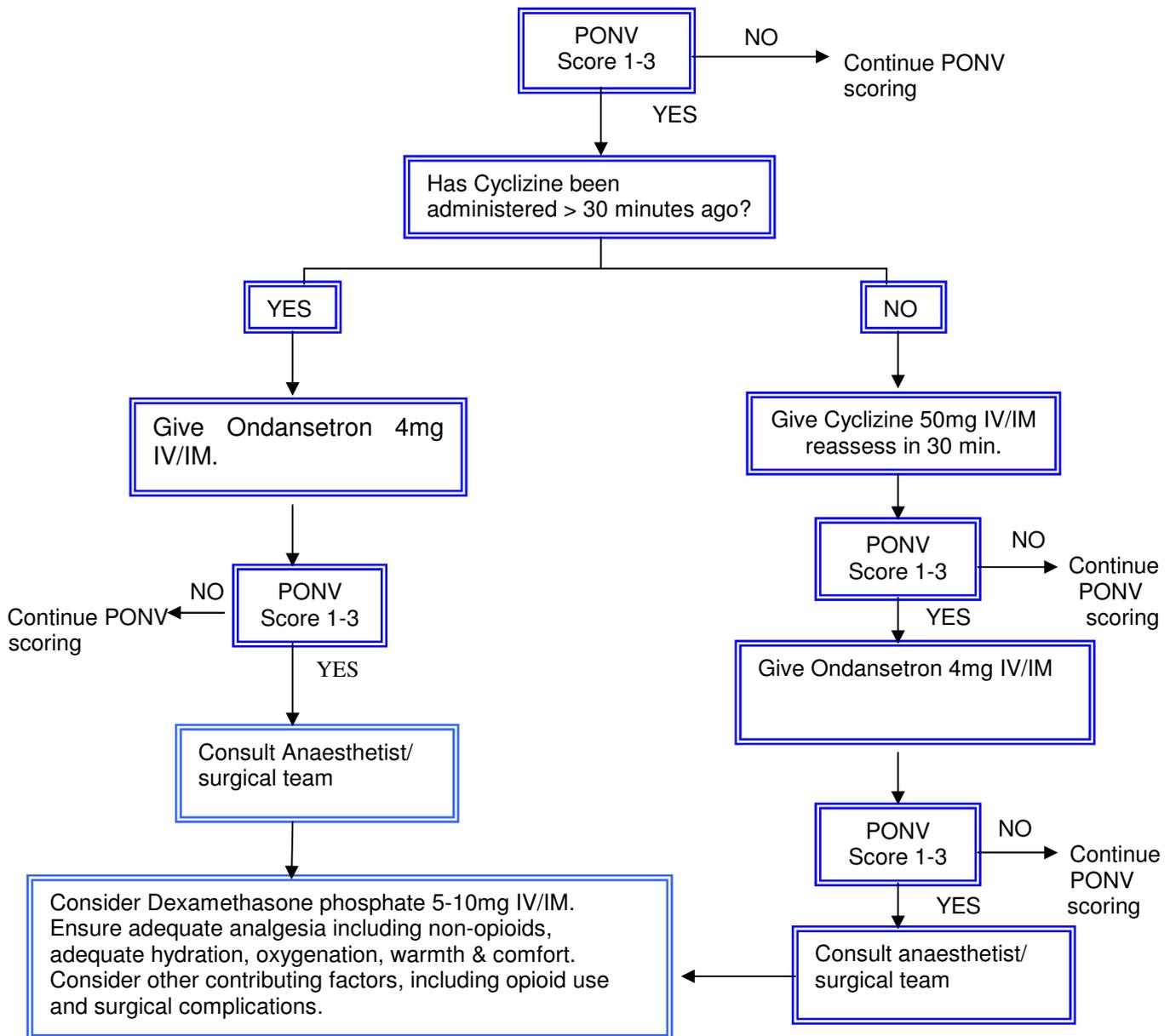
Risk	Prescription
Low	Cyclizine 50 mg IV/IM/PO 8 hrly PRN
Moderate to High	Cyclizine 50 mg IV/IM/PO 8 hrly PRN and Ondansetron 4 mg IV/IM/PO 8 hrly PRN

Other contributory Factors
Length of surgery Type of surgery eg. gynaecological, abdominal, laparoscopic. Type of anaesthetic eg. inhalational anaesthesia.

Treatment of PONV – Recovery and Ward

<p>PONV score</p> <p>0 – None 1 – Mild 2 – Moderate 3 – Severe</p>

- | |
|--|
| <ul style="list-style-type: none"> <input type="checkbox"/> Maximum dose in 24 hours for Cyclizine – 150mg <input type="checkbox"/> Use 25mg -50mg slow IV injection of Cyclizine in elderly as this may cause confusion <input type="checkbox"/> Maximum recommended dose of Ondanestron 16 mg in 24 hours. <input type="checkbox"/> Keep IV cannula in situ until PONV score is 0. |
|--|



- ❑ PONV can cause dehydration, electrolyte imbalance, disrupt surgical wounds and delay recovery.
- ❑ Consider regular dosing if PONV scores remain high. Review after 48 hours.
- ❑ Consider oral route of anti-emetic if appropriate.
- ❑ For contraindications and side effects see BNF.

PART 2
PATIENT CONTROLLED ANALGESIA (PCA) POLICY
FOR CHILDREN

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The 1st on call anaesthetist will cover out of hours and Bank Holidays, please be aware that you may not receive immediate response as they may be otherwise engaged. If there is no response, try the on call anaesthetic registrar for ICU.

1. Introduction

This policy covers the care and maintenance of Patient Controlled Analgesia systems (PCAs) within West Hertfordshire Hospitals NHS Trust (WHHT). Part two of this policy is applicable to Paediatric patients.

Wards and departments must be deemed competent in caring for patients receiving PCA by the ward / department manager. The manager holds responsibility for arranging training for their staff in the use of PCAs.

2. Aims

The aims of this policy are:-

- To provide education and the rationale behind the uses of the PCA pump
- To provide consistent and effective pain relief through education
- To maintain patient safety and comfort by reducing and preventing side effects and problems in the first instance and managing them effectively if they do occur.

3. Education and Training

3.1 Training and education is available via the 'WHHT Learning Package for Nurses caring for Paediatric Patients using Patient Controlled Analgesia Systems' provided by the Acute Pain Service (APS). The ward manager will identify any candidates needing training. Training should be booked through the training department. Updates for training will be required every two years when new competency sheets will be issued. It is the responsibility of the individual nurse and ward managers to access staff training needs.

3.2 Patients receiving a PCA can only be cared for in an area where there are registered nurses who have been deemed competent in caring for patients receiving PCA.

3.3 The Acute Pain Team (APT) advise that all wards that accept patients with PCA should have an Acute Pain Link Nurse who has themselves been deemed competent in caring for patients receiving PCA. It is the ward manager's responsibility to identify their ward Link Nurse.

4. Patient Selection

PCA can be used for any patient with acute pain, where repeated doses of intramuscular or intravenous opioids would otherwise be anticipated. This will include post-operative patients and patients with acute painful conditions such as sickle cell disease.

4.1 Contra-indications for PCA:

- Patient/ parent/carer refusal
- Physical inability to operate the PCA demand button
- Impaired mental status
- Head injury
- Insufficient numbers of trained staff to ensure patient safety

4.2 Extra care should be exercised in the selection of patients if they have:

- Marked electrolyte imbalance
- Opioid dependence
- Previous history of opioid related side effects

4.3 Age Related Considerations

Children who are suitable for using PCA are identified by the anaesthetists before they have their operation. The Child must (a) have the physical ability to push the button of the handset. (b) have a basic understanding of what happens when the button is pushed.¹⁶

4.4 Personality Traits

Not everyone benefits from PCA. It is beneficial for patients who like to maintain control of their environment, but some patients do not want to accept this responsibility. Some children like to block out potentially unpleasant experiences² and are more likely to expect the Health Care Professional or an adult to take responsibility for their pain relief. These children are unlikely to use the PCA to its full potential. If PCA is not being used effectively, it can be equivalent to no pain relief at all; therefore the method of pain relief should be reviewed. Contact the APT Monday – Friday 9.00 – 17.00, outside these hours contact the first on call anaesthetist, an alternative mode of analgesia may be decided upon.

Many parents and carers fear addiction to analgesia and may have been exposed to negative reports of opioids from the media. This fear may have taken years to develop and rarely subsides with a brief discussion about the use of opioids for pain relief^{3,4}. This may affect their willingness for their child to utilise the PCA to its full potential.

Patients' appropriateness for PCA will be decided by the anaesthetist or Acute Pain Clinical Nurse Specialist after discussion with the patient, parent/carer and ward nurse.

5. Patient Information

Children in whom PCA is planned should receive an explanation of the technique by the Anaesthetist / Nursing staff. This should then be reinforced when appropriate in the recovery unit. Ward staff should also provide the patient with verbal information about the PCA. The written information can be obtained from the ward and / or pre assessment clinic.

It is sometimes possible to highlight and address any concerns the patient and child may have when talking to them before the PCA is started.

6. PCA Prescription

6.1 The PCA must be prescribed on the PRN side of the prescription chart, including the route, drug concentration, bolus size and lockout period; this should be signed and dated by the prescriber e.g:-

6.1a Children over 50 KG may receive a prefilled syringe of Morphine sulphate 50 milligrams (mg) pre diluted up to 50 ml with 0.9% sodium Chloride and prescribed as below.

Drug: Morphine sulphate via PCA	Dose: 1mg bolus	
Additional Instructions 50mg morphine in 0.9% Sodium Chloride Total 50ml pre filled syringe	Route IV	Date: 25/12/2010
	Signature: <i>Jo Brown</i>	
Max. Frequency 5min. lock out		

Any loading doses should be prescribed as 'stat doses' on the front of the drug chart, in the once only section.

6.1b Children less than 50 KG – The body weight of the child in mg diluted up to 50 ml with 0.9% sodium chloride e.g. 35 kg child use 35 mg of morphine made up to a total volume of 50 mls with 0.9% sodium chloride. This gives a concentration of 20 micrograms/kg/ml (or concentration of 700 micrograms/ml)

Drug: Morphine sulphate via PCA	Dose: 700 micrograms = 1ml	
Additional Instructions 35mg morphine made up to 50 ml With 0.9% Sodium Chloride	Route IV	Date 25/12/2010
Signature: <i>Jo Brown</i>	Max. Frequency: 5 min lock out	

Any loading doses should be prescribed as 'stat doses' on the front of the drug chart, in the once only section.

6.2 For children over 50 Kg a standard pre-filled syringe of morphine sulphate solution should be used:- morphine sulphate 50mg in a total of 50ml of 0.9% sodium chloride. Using pre filled syringes that the Trust purchases, is aimed at reducing the risk of needle stick injury and error of incorrect dilution. If these are not available, Pharmacy should be contacted for further guidance.

6.3 Other opioids may be used as an alternative if morphine is not appropriate for the patient, but must be discussed with an Anaesthetist or the Acute Pain CNS first. Do not use Appendix 1 and 2 consult with the anaesthetist if the child has a morphine allergy.

6.4 The pumps should only be programmed by an Anaesthetist, Acute Pain CNS, trained recovery staff or a member of staff who has been specifically trained by the Acute Pain CNS and deemed competent to do so.

6.5 PCA syringes can be changed by any qualified nurse who has been assessed as competent in administering intravenous medication and successfully completed the 'WHHT Learning Package for Nurses caring for Paediatric Patients using Patient Controlled Analgesia Systems'.

6.6 Additional doses of opioids (loading doses) should only be administered by the Anaesthetist or Acute Pain CNS. Qualified nursing staff in recovery who have been deemed competent by the Recovery Unit Sisters, may administer loading doses as prescribed for patients in recovery.

6.7 Naloxone should always be prescribed on the PRN side of the drug chart when a PCA is in use. It should be administered to keep the patients respiratory rate above normal ranges which can be see below.

Age Ranges	2-5 years	5-12 years	12 years
Respirations (breath per minute)	25-30	20-25	15-20

Naloxone IV injection:

1 month – 12 years: 5-10 micrograms/kg if no response subsequent dose of 100 micrograms/kg (max 2mg)

12 – 18 years: 1.5 – 3 micrograms/kg if response inadequate, give increments of 100 micrograms every 2 minutes (check CBNF)

7. Multi-modal Analgesia

Using only one approach to managing pain can be ineffective for many patients; several different pains may contribute to their overall symptoms⁷. A balanced approach, using several analgesics with differing mechanisms of action, has been shown to be more effective and to reduce the risk of side effects of opioids. A combination of different drugs that act at different stages of the pain pathway maximise the amount of pain relief. All drugs should be correctly prescribed on the patients drug chart before administration.

Where possible PCA should be given concurrently with paracetamol iv/po and/or a Non Steroidal Anti Inflammatory Drug, (NSAID) via an appropriate route, ensure NSAID's are not contraindicated, (see CBNF for contraindications¹⁷). It is not advisable to give diclofenac (Voltarol®) intramuscularly as it is very painful and can cause abscesses and local necrosis at the intramuscular injection site⁶. Paracetamol and/or a NSAID should be given on a regular basis in conjunction with the PCA if prescribed.

No other opioids including codeine, dihydrocodeine, tramadol or compound analgesics i.e. co-dydramol should be administered whilst the patient is receiving PCA, (this will minimise the risk of respiratory depression) unless advised by Anaesthetist or Acute Pain CNS and concurrent administration must be stated on the drug chart

8. Equipment

8.1 PCA delivery is via the Graseby 3300 machine that requires a 50 ml syringe clearly identified with the drug and concentration, patients' details, date and time infusion commenced. An appropriate giving set with anti-syphon and anti-reflux properties must be used and a labelled PCA line, these can be obtained from the recovery unit if required.

8.2 The opioid of choice and purchased as pre filled syringes for PCA use is Morphine Sulphate 1mg/1ml 50 ml syringe these are available to order from Pharmacy. The 50 ml syringe is used for patients over 50 kg in weight for patients under 50 kg the correct concentration must be prepared by the nursing or medical staff as 6.1b above.

8.3 The PCA must have a dedicated Vygon PCA administration line which has an anti syphon valve at the distal end that attaches to the syringe. Its other property is, at the proximal end (patient end) there is a side port with anti reflux valve where maintenance fluids or other infusions that are compatible with the morphine, may be attached. The use of the side port helps prevent premature blockage of the cannula and reduces the need for separate flushing of the cannula or the need for a second cannula.

8.4 All IV cannula and lines must be changed according to hospital policy, 48 hours for solution sets¹⁰. The giving sets for PCAs are kept in recovery. The Graseby 3300 pump can be obtained from the Medical Electronics Library 09.00 – 17.00 Monday to Friday and from recovery out of hours. The morphine sulphate syringe should be obtained from the ward / department controlled drug cupboard the patient is in at the time required.

8.5 The patients' cannula should be secured with a transparent dressing. The administration line, tubing can then be secured to the patient if required. The cannula should be easily visible and accessible (see 9.4 below).

9. Monitoring and Documentation

9.1 All patient vital signs /clinical observations for the duration of the PCA should be recorded on the 'Paediatric Patient Controlled Analgesia Systems (PCAs) Guide'

9.2 Frequency for monitoring vital signs (as per care plan)

Monitor	First hour	Next 2 hours	Next 4 hours	Remainder of time while on PCA
Respiratory rate	¼ hrly	½ hrly	1hrly	Hourly
Sedation score	¼ hrly	½ hrly	1hrly	Hourly
Blood Pressure	¼ hrly	½ hrly	1hrly	According to clinical need
Heart Rate	¼ hrly	½ hrly	1hrly	Hourly
Pain Score	¼ hrly	½ hrly	1hrly	Hourly

The patients' respiratory rate and sedation score should be monitored 1-2 hourly for the duration of the PCA according to clinical need this is necessary due to the side effect profile of opioids.

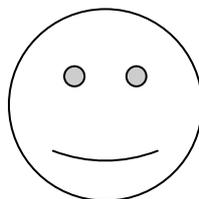
9.3 The following observations are also mandatory when a patient is receiving opioids via a PCA and should be documented 1-4hrly in the appropriate place on the 'Paediatric Patient Controlled Analgesia Systems (PCA) Guide' or more frequently if clinically indicated.

PCA number of demands, number of good demands, total amount of drug given
Nausea and vomiting score
Itching (pruritis) score

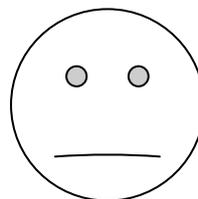
Pain score should always be assessed on movement e.g. coughing, deep breathing. If the pain score is greater than >1 (0 = none 3 = severe) at any time this must be addressed and reassessed in ½ hour and then recorded hourly until a score of 1 or (<1) below 1 has been established.



Face 0
No pain



Face 1
Hurts just a bit



Face 2
Hurts quite a bit



Face 3
Hurts a lot

Pain cannot be treated adequately if it is not assessed regularly

9.4 IV cannula site to be checked 4 hourly for inflammation, redness etc. If indicated the cannula should be re-sited.

9.5 The Acute Pain Team aim to visit the patients daily if possible Monday to Friday. In the absence of the Acute Pain Nurse the 1st on call anaesthetist should be contacted to deal with any pain management problems that the patients' clinical teams cannot manage.

9.6 All patients receiving PCA should have a Pain Service Audit Sheet started in recovery. The Recovery staff should fill this in if the patient has been nursed in Recovery. If the Anaesthetist starts

the PCA on the ward then the Anaesthetist should complete the form. The audit form ensures that the patient will receive appropriate follow-up care by the Acute Pain Team.

9.7 If a paediatric patient with PCA are returning to the wards from the Intensive Care Unit (ICU) or a tertiary hospital, staff should inform the Acute Pain Nurse regarding the patients' transfer.

10. Side Effects and Problems

10.1 Nausea and vomiting

The incidence of postoperative nausea and vomiting depends on many factors including the anaesthetic used, the type and duration of surgery and the patient's gender. The aim is to prevent postoperative nausea and vomiting from occurring. The nurse or doctor should evaluate the response to any anti-emetic after administration and if the patient is still nauseated after 30 minutes a different type of anti-emetic should be prescribed and administered. A combination of two antiemetic drugs acting at different receptor sites may be needed in resistant postoperative nausea and vomiting.

The following are recommended by the APS:

1st drug of choice – **CYCLIZINE**¹⁷ IV

- 6 - 12 years - 25 mg up to 3 times daily
- 12 – 18 years - 50 mg up to 3 times daily

Diluted in water for injection (5-10ml) and given by slow IV injection over 2-5 minutes

2nd drug of choice – **ONDANSETRON**¹⁷

- 2 - 12 years: 100 micrograms/kg (maximum 4 mg) as a single dose before, during, or after induction of anaesthesia. Give by slow IV injection over 2-5 minutes
- 12-18 years: 4 mg, as single dose at induction of anaesthesia given by slow IV injection over 2-5 minutes

If postoperative nausea and vomiting (PONV) persists when the above are given regularly then contact the APS or anaesthetist.

PCA should not be stopped because of nausea and vomiting unless prior discussion with the APS/ anaesthetist has taken place.

Children with a high risk of PONV can be prescribed one anti-emetic on a regular basis and one on a as required (prn) basis.

10.2 Respiratory Depression and Over Sedation

10.2.1 If the respiratory rate becomes low for the Childs age and saturation <94%¹⁶ :-

Age Range	5-12years	12years and over
Respiration (breath per minute)	20	15

- Remove the hand set from the child
- Commence ¼ hourly respiratory rate and sedation scoring
- Commence and maintain continuous pulse oximetry
- Give oxygen as necessary according to prescription, keeping saturations above 94%
- Inform Ward Paediatric registrar, 1st on-call anaesthetist and/or Acute Pain Team.

10.2.2 If the sedation score is 3 irrespective of respiratory rate:

0=Awake 1=Drowsy 2=Asleep (rousable) 3=Asleep (unrousable)

- Stop PCA
- Inform Ward Paediatric registrar and Anaesthetist on call, Paediatric crash team if applicable
- Start Paediatric Basic Life Support
- Administer high flow oxygen at 10-15 litres via a non-rebreathe bag and mask. This may be administered without prescription in accordance with Trust oxygen policy.¹¹
- Commence pulse oximetry
- Commence ¼ hourly observations of respiratory rate and sedation score.
- Ensure a qualified nurse remains with the patient.
- Prepare naloxone injection

AGE	Naloxone IV injection
1 month – 12 years	5 -10 micrograms/kg if response inadequate give a subsequent dose of 100 micrograms/kg (max. 2mg) ¹⁷
12 years – 18 years	1.5 - 3 micrograms/kg if response inadequate, increments of 100 micrograms every 2 minutes ¹⁷
If a continuous intravenous infusion is required: 1 month – 18 years	5 - 20 micrograms/kg/hour, adjust according to response ¹⁷

WHHT Guidelines for Administration of Naloxone for Adult and Paediatric Patients Receiving Patient Controlled Analgesia and Adults only receiving Opioid Epidural Analgesia¹².

10.3 Inadequate Analgesia

If a child has a pain score of greater than 1 (0=none 3=severe) on movement, action needs to be taken.

There are several interventions that can be used and the choice will depend on the assessment of the child. This should, where possible, be negotiated with the child. These are:

- Re-educate patient in using PCA
- Give prescribed multimodal analgesia
- Check has the handset become disconnected from back of PCA?
- Arrange for morphine bolus via PCA to be given (only given by anaesthetist or Acute Pain Team. In recovery only the recovery nurse may give a bolus once prescribed,)
- Reassure / Re-position patient.
- Always check the IV site for patency, IV line that all clamps are open, extravasations and signs of infection

PCA should not be stopped because of inadequate analgesia without prior discussion with the APS. The bolus dose may need to be altered, discuss with Acute Pain Team or Anaesthetist on-call.

10.4 Urinary Retention

Contact the paediatricians for advice; the patient will need an assessment and may require a urinary catheter.

10.5 Mobility

Using a PCA does **not** prevent patients from mobilising. It is when the patient first starts to mobilise that they may need to use the PCA more. The Graseby 3300 PCA pumps may be disconnected from the electrical mains supply and can run on battery power for a short period of time (up to 7 hours depending on battery charge). However to maintain battery charge the pump should always be plugged in when possible.

PCA should not be stopped because the patient needs to mobilise.

10.6 Pruritis

If problematic for the patient, contact the doctor, APT to assess the patient. Chlorphenamine may be prescribed, as required,

AGE	Chlorphenamine Maleate IV injection ¹⁷
6 – 12 years	5 - 10 mg, repeated if required up to 4 times in 24 hours . Give IV injection over 1 minute
12 – 18 years	10 – 20 mg repeated if required up to 4 times in 24 hours (Max 40mg in 24 hours). Give IV injection over 1 minute

Naloxone may be required. If a higher dose of naloxone is given this will reverse the analgesic effect of the opioid.

10.7 Constipation

Patients receiving opioid analgesia may require a laxative prescribed regularly or the appropriate health education to help manage any constipation.

10.8 Pump Problems

If the pump alarms, the cause for the alarm will appear on the pump screen. Check the cause by reading the screen then silence the alarm. Refer to Manufacturers Guidelines (found in The Acute Pain Resource Folder) to resolve these problems. Ensure PCA line is not clamed in PCA lid and that all line clamps are open.

If a fault code appears:-

- **Turn off the pump immediately and remove it from the patient**
- Call the APT / Anaesthetist to initiate another PCA pump if the ward staff are not trained to do so.
- Medical Electronics Library should be informed of the type of fault as soon as possible. Document the pump number and fault code that appeared on the pump. Attach this information to the pump to assist in the correct pump being serviced.
- Consider if an Incident Form needs to be completed e.g. incorrect dose of morphine being administered.

11. Discontinuation

If the child is comfortable and pain free, it is likely that the patient's analgesia is at a correct level. It is not necessarily an indication for stopping the PCA. However, once a child is able to eat and drink and their PCA opioid usage is minimal this may be an appropriate time to consider changing the analgesia to oral medications.

The opioid PCA should be discontinued after discussion and agreement with the child. The child should be able to transfer onto oral medication. It is not advisable to stop PCA analgesia in favour of intramuscular analgesia.

Initially after stopping the PCA analgesia oral analgesia should be given regularly. The multimodal rules (see section 7 above) also apply to oral analgesia. If the patient has not been taking supplementary analgesia such as paracetamol and / or NSAIDs (if no contraindications), commence this prior to stopping the PCA. This will reduce the level of mild or strong opioid analgesia the patient will require.

After discontinuation of the PCA, the pain score should continue to be documented on the Patient Observation chart with every set of observations, remembering that **pain is the 5th vital sign**. This is vital in order to assess that the alternative oral analgesia continues to control the child's pain adequately.

Any remaining opioid in the PCA syringe, when discontinued, must be destroyed by putting into gauze/paper towel and put into the clinical waste bin/sharps bin, as per 'WHHT, Medicines Management Policy, incorporating, The Policy for Prescribing, Administration and Supply of Drugs'¹³.

When the PCA has been discontinued the PCA pump should be decontaminated and returned to the Medical Equipment Library at WGH.

12. Successful outcome criteria

- Patient indicates that their pain level is at a level acceptable to them
- Patient indicates that they are satisfied with this method of analgesia
- Patient indicates that they have participated in their own pain management
- There is written evidence that the patient has a pain score of 0 or 1

13. Monitoring Compliance and Effectiveness

- Annual Audit
- Acute Pain Team will audit all patients with PCAs on a daily basis (other than weekends and bank holidays when it is down to the on call anaesthetist) any deviations from the policy will be reported and monitored through Clinical Governance Meetings.

Paediatric References

16. Morton NS., Saunders WB., Acute Paediatric Pain Management. A practical Guide. Harcourt Brace and Company Ltd. P254. 1998

17. BNF for children, 2008. Published by BMJ Publishing Group Ltd. Tavistock Square, London, WC1H 9JP, UK