Sláinte Leanaí Éireann
Children's Health Ireland

Crumlin | Temple Street | Tallaght | Connolly

CHILDREN'S HEALTH IRELAND STANDARD OPERATING PROCEDURE FOR THE MANAGEMENT OF PATIENT / NURSE CONTROLLED OPIOID ANALGESIA IN

Area of use:	All of organisation ☐	CHI at Connolly ☐	CHI at Crumlin ☒
		CHI at Tallaght ☐	CHI at Temple Street ☒
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Contents

1.0 Statement

This standard operating procedure (SOP) applies to patients receiving intravenous (IV) Patient/Nurse Controlled Analgesia (P/NCA) opioid infusion for acute pain. In incidences where acute pain is not managed within these recommendations, please liaise with the Pain Team. This SOP is to be used alongside other SOPs and guidelines for intravenous opioid infusions.

Patient Controlled Analgesia (PCA) is a method of self-administration of intravenous analgesia. By means of a mechanical 'trigger', patients initiate the delivery of a small dose of intravenous analgesia. Patients are therefore able to titrate their own analgesia within pre-set restrictions. Nurse controlled analgesia (NCA) is used when the child is too young, physically unable or cognitively impaired and unable to use a PCA.

P/NCA boluses are useful for gaining rapid control of severe pain or for pain of short duration, e.g. dressing change, prior to movement, physiotherapy. A continuous opioid dose may be delivered also if deemed necessary. A P/NCA bolus and/or continuous infusion is only to be administered using an Arcomed AG Syramed SP6000® syringe driver pump.

Exceptions to this SOP:

- The Paediatric Sickle Cell Clinical Guideline will work outside of the standard P/NCA parameters in this SOP.
- Patients requiring IV morphine during chemotherapy will have the scope to extend these parameters as advised by High Risk Neuroblastoma 1.7/Society International Oncology Pediatric Europe Neuroblastoma (2014).

2.0 Scope and Responsibilities

The 'Pain Team' referred to in the document comprises of the following MDT members in CHI Crumlin and Temple Street:

- Consultants and Non-Consultant Hospital Doctors (NCHDs) in Anaesthesiology
- Anaesthesiologist on-call (bleep 8528 CHI at Crumlin; bleep 762 CHI at Temple Street).
- Registered Advanced Nurse Practitioner (RANP – Children's Pain) or Advanced Nurse Practitioner candidate (ANPc) (Bleep 8300 CHI at Crumlin; bleep 830 CHI at Temple Street).
- Clinical Nurse Specialist (CNSp) Children's Pain (Bleep 8200 CHI at Crumlin; bleep 830 CHI at Temple Street).

This SOP is to be followed by all medical and nursing staff involved in the prescribing, preparation, administration and monitoring of IV P/NCA infusions for acute pain. This includes undergraduate intern student nurses and post registration children's nurse students (PRCNS)

The prescription and management of P/NCA infusions is the responsibility of members of the Department of Anaesthesiology and the Pain Service.

It is the responsibility of relevant medical and nursing staff to familiarise themselves and adhere to the contents of this guideline.

Proposed prescribers:

- Consultant Anaesthesiologist
- NCHD in Anaesthesiology
- Consultant Pain Physician
- Consultant Intensivist/NCHD in Intensive Care Medicine
- Registered Nurse Prescriber working under the auspices of the Department of Anaesthesiology
- Consultant in Haematology (benign and malignant) and in Oncology: please inform pain team for review.

It is the responsibility of relevant medical and nursing staff to familiarise themselves and adhere to the contents of this SOP.
Members of the nursing staff authorised to manage IV P/NCA infusions must:

- Have attended a CHI IV study day & smart pump training using Arcomed pump
- Have relevant competencies signed off by preceptor/ Clinical Nurse Education Facilitator (CNEF) Attend in-service training provided by the Department of Anaesthesiology /Pain Service nursing staff (ANP(c)/CNS (p)/CNEF/Centre for Children's Nurse Education).
- Be responsible for monitoring children and notifying medical staff of effectiveness and/or of complications of this treatment.

3.0 Indications for use

- Post-operative pain (P/NCA may be commenced for a child before surgery: contact the pain service for advice)
- Severe acute pain e.g. due to trauma, burns, cancer
- Other painful medical and surgical conditions e.g. mucositis, pancreatitis, Sickle cell disease: see Paediatric Sickle Cell Analgesia Guideline.

Use with caution in the following:

- Non-intubated patients less than 6 months of age
- Patients with airway or haemodynamic instability
- Patients with evolving neurological status
- Patients with apnoea or altered ventilatory status
- Patients with impaired liver and renal function (may have impaired clearance)
- Patients receiving other medications that may cause sedation or respiration depression.

4.0 Prescription and administration of PCA / NCA opioid infusions

- P/NCA must only be administered via drug library of the Arcomed AG Syramed SP6000® syringe driver pump (referred to as 'Arcomed' pump for the purposes of this SOP). This pump has a locking mechanism, which enables the syringe to be locked inside. Please refer to the pump manual and CHI SOP.
- All P/NCA infusions should be prepared as standard concentration infusions (SCI). Details on preparation are contained within individual Morphine P/NCA or Oxycodone P/NCA monographs within CHI Paediatric Formulary. Please access formulary under Morphine PCA-NCA and Oxycodone PCA-NCA

- All prescribing and administration of opioid infusions should be in accordance with CHI Paediatric Formulary. Please see Appendix 1: Dosing Guide and Appendix 2: Sample Prescriptions for prescription guidance.
- Morphine is the preferred opioid in most circumstances. Oxycodone is an alternative when pain is not controlled or children experience significant side effects such as nausea and vomiting or itch, or for children requiring an opioid rotation.
- Keys for the P/NCA infusion pumps are kept together with the Controlled Drug keys on every ward. The Post-Anaesthetic Care Unit (PACU) and theatres also have a set of P/NCA keys.
- The surgical team or the child's physician should be contacted for advice if the pain could be indicative of new or escalating medical or surgical symptoms.
- Only a competent nurse or a member of the pain team (see Section 2 Scope and Responsibilities) can change pump programming.
- Hourly checks and documentation must include the total dose delivered to the patient (background infusion +/- bolus history).
- Non-opiate analgesics such as paracetamol, and NSAIDs (if not contraindicated) should be administered REGULARLY to a child on a P/NCA. This has the potential to minimise opioid requirements and associated side effects.

Some patients may require different opioid regimen/parameters than the standard regimen in this guideline. This is accessible via a password-protected folder on the Arcomed pump. This should only be accessed by the pain service/anaesthesiology team. The pain service (ANP(c)/CNSp or Anaesthesiologist) can be contacted for advice if necessary.

4.1 PCA / NCA Bolus Administration

For rapid relief of pain (or anticipated pain), the prescribed bolus dose must be administered. Bolus doses of opioid infusion can ONLY be administered using the 'bolus button' handset attached to the Arcomed pump or by use of physician bolus on the touchscreen (requires password). Once the P/NCA is running, the bolus volume will be added to the total volume infused. See Standard Operating Procedure for Use of the Children's Health Ireland Patient/Nurse Controlled Analgesia Smart-Pump Drug Library User Quick Guide for further information.

- Only Consultant Anaesthesiologists, Anaesthesiology NCHD's and members of the pain team can use additional boluses using the physician bolus override function on the pump.
- Parents, carers or other relatives must never administer bolus doses of morphine sulphate or oxycodone via the PCA.

Parents/Guardians use of P/NCA infusions

It is important that the child's parents/guardians understand the concept of P/NCA, so they can support their child in its use. Parents should be given an information handout on P/NCA. It is also important that the child's parents are aware that they are NOT to push the demand button for their child:

NCA: inform nursing staff if their child is experiencing pain
PCA: encourage their child to press the demand button when required.

4.2 Background Infusion

If a background infusion is prescribed, it may be adjusted by the nurse within the dose range prescribed, according to the patient's level of pain. This will be limited to a maximum dose of 20 microgram/kg/hour for weight-based dosing and 1mg/hour for non-weight-based 'Adult' dosing.

Increase the background infusion if an accurate pain assessment has been undertaken and: a.
The patient reports moderate to severe despite frequent P/NCA boluses

b. The patient is not sedated Pasero Opioid Induced Sedation Scale(POSS <2)
c. Other analgesic interventions have been tried and have not been effective (regular analgesia, repositioning etc.)
d. The pain service or anesthesiologist has reviewed the patient and deemed it necessary.

Decrease /Stop the background infusion if:

a. Patient is comfortable
b. Minimal boluses are required
c. Patient is tolerating fluids and/or diet
d. Patient is experiencing opioid induced side effects e.g. sedation, low respiratory rate, pupil constriction, nausea and pruritus.

4.3 Changing P/NCA Syringes

- Nurses who have completed the intravenous medication study day and anaesthesiologists can replace opioid infusions.
- Syringes and IV lines should be changed every 24 hours. A few hours outside this limit is permitted if infusion is to stop the same day.
- An anti-syphoning extension set should be used at all times for these infusions.

4.4 Concurrent Drugs

- When patients are receiving opioid infusions, NO oral/rectal/intravenous or intramuscular opioids should be given without prior consultation with the Anaesthesiologist, Consultant in charge or Pain service nursing staff.
- Non-opiate analgesics such as paracetamol, and NSAIDs (if not contraindicated), must be administered REGULARLY to a child on a P/NCA. This has the potential to minimise opioid requirements and associated side effects.
- Other non-opiate analgesics that may also be considered include Clonidine, Gabapentin, and Ketamine.
- An anti-emetic should be prescribed for patients receiving opioid infusions.
- Laxative medication must be prescribed for patients receiving opioids for more than 24 hours and if taking diet.
- An anti-histamine should be considered when prescribing a P/NCA.
- Naloxone should be available when patients are on a P/NCA infusion in the event of an opioid overdose and this is stored on the Resus trolley.

Please contact the pain service for further advice if required.

4.5 Patient Monitoring

Monitoring is required to assess adequacy of pain relief and to monitor for side effects of the medication. All documentation should be recorded in CHI P/NCA Nursing record in addition to PEWS chart. Please see Appendix 3: CHI P/NCA Nursing Record Chart. The need for less frequent observations on patients with longerterm opioid infusions should be discussed with the pain service nursing staff.

4.6 Physiological Monitoring

Continuous:

- **All children must have continuous pulse oximetry** (SpO_2) **monitoring the duration of P/NCA use** Under 12 months' apnoea/ respiratory monitoring to be used 15-30 minutes:
- Always reassess pain 15-30 minutes after an increase in opioid infusion or administration of supplemental analgesia Hourly:
- Heart Rate, Respiratory Rate, Pain Score & Sedation Score (POSS) 4 hourly:
- blood pressure and temperature (more often if clinical condition dictates)

Pain assessment is performed using age and developmentally appropriate pain scales and documented at rest and on movement. This is to be documented in PEWS and indicate which method of assessment is being utilised.

In cases of inadequate pain relief:

- Ensure regular non-opioid analgesia has been administered.
- Check IV cannula site
- Review P/NCA pump settings, level of drug in syringe and delivery record.
- Ensure the patient understands how to use the PCA device
- Seek medical/surgical review
- Out rule urinary retention or excessive anxiety
- The pain service nursing staff or anaesthesiologist on call should be contacted if pain relief is inadequate after utilising P/NCA boluses and supplemental analgesia has been optimised.
- Contact treating clinician if concerned for cause for unmanageable pain.

5.0 Management of Side Effects

5.1 Opioid Induced Sedation

Assess patient using the Pasero Opioid Induced Sedation Scale (POSS) (see Appendix 3: CHI P/NCA Nursing Record Chart). Where over sedation or respiratory depression is suspected, stop P/NCA infusion, stimulate the child and see PEWS score.

5.2 Opioid Induced Respiratory Depression

Opioids can cause respiratory depression by reducing the respiratory effort leading to slow, shallow breaths. Respiratory rates should be monitored as per PEWS for patient's age.

- Pulse oximetry is primarily useful for assessing changes in oxygenation; it is a late indicator of ventilatory depression. SpO_2 readings may remain normal or near normal for minutes after a patient stops breathing. It

eventually falls as the patient stops breathing. Apnoea and respiratory monitoring is used in the under 12 months as a precaution.

- When monitoring respiration, the depth of respiration and respiratory effort following should be taken into account.
- More opioid is required to produce respiratory depression than is required to produce sedation, therefore patients with clinically significant respiratory depression will normally present with signs of sedation first.

N.B Monitoring sedation levels is as important as monitoring respiratory status.

Respiratory depression is considered clinically significant when it is severe enough to require an intervention (i.e. stopping opioid infusion, providing physical stimulation or administering naloxone to reverse it and prevent respiratory arrest).

Management of opioid induced respiratory depression

The treatment of opioid overdose is the administration of an opioid antagonist, naloxone which is available in the resuscitation trolley. Please refer to CHI Paediatric formulary for the appropriate dosing regimen for naloxone:

- **Excess Sedation** (difficulty to rouse, respiratory depression, POSS 3)
- **Resuscitation** (minimal respirations, POSS 3, cardiorespiratory arrest)
- The duration of action of naloxone is about 30 – 45 minutes. Patients who have responded to naloxone should be carefully monitored as the duration of action of opioids may exceed that of naloxone.
- Following Naloxone administration observe patient response and monitor and record respiratory rate, heart rate, and SpO_2 every minute until ventilation and alertness is achieved.
- The patient should be able to open his/her eyes within 1-2 minutes. If the patient does not respond, REPEAT the dose.
- Continue to monitor and record respiratory rate and effort, HR SpO_2 and sedation score every 15 minutes for 2 hours, and pain score every 30 minutes, then hourly for 4 hours.

5.3 Nausea and Vomiting

- There are multiple causes for post-operative nausea and vomiting (PONV) in children, including surgery, anesthesia, prolonged fasting, opioids, antibiotics, other medication, ileus, pain.
- Consider all possible causes of PONV as this may influence antiemetic selection.
- A combination of antiemetic's may be required such ondansetron and cyclizine if nausea continues (see CHI Paediatric Formulary for dosing and administration information).
- In cases where nausea persists, oxycodone HCL could be considered instead of morphine sulphate.

5.4 Constipation

- Constipation is a common side effect of opioid administration. Prevention measures should be started early following commencement of opioid analgesics.
- Treat early with laxatives after 24 hours and if diet is allowed (in some cases will require discussion with primary team): Lactulose and/or Laxido® Paediatric / Movicol® (see CHI Paediatric Formulary for dosing information)

5.5 Pruritus

Pruritus is an occasional side effect of opioids as it can cause a histamine release and it usually settles. Urticarial, wheal formation, pruritus and sneezing are also common reactions usually secondary to opioid induced histamine release (pseudo allergic reactions).

- Antihistamines can alleviate symptoms.
- If these measures fail, it may be advisable to switch to alternative opioid e.g. Oxycodone HCL, please contact the pain service or Anaesthesiologist for advice.

5.6 Urinary Retention

Urinary retention can be a side effect of opioid use. It may also be due to a variety of causes (e.g. pain, bladder spasm, constipation, dehydration, anxiety about using bedpan, epidural blockade). This often requires conservative management e.g. close monitoring of input/output, reassurance, assess for bladder distension, abdominal pain.

If the retention is likely to be opioid induced:

Consider:

- Reducing the rate/bolus and observe.
- Intermittent catheterisation or indwelling catheter may be required if the above measures fail.
- Unless surgically indicated routine catheterisation is not required.

5.7 Central Nervous System Effects

- The central nervous system (CNS) effects of opioids (e.g. euphoria or dysphoria) are usually rare and short lived. This may be more evident if a concurrent IV ketamine infusion is being used.
- Sedation is a central nervous system side effect and can be a preceding sign of respiratory depression.
- Myoclonic jerks can occur because of opioid drugs and they can be mistaken for pain.
- If they persist, the effects may be dose related and a reduction in dose may resolve the symptoms or converting to another opioid may help. If symptoms do not resolve, other causes should be considered, such as side effects of other medication, hepatic or renal dysfunction, infection, electrolyte imbalance.

5.8 Allergic Reaction

- True allergic or anaphylactic reactions are rare. (If they occur an onward referral to Allergy team should be considered).
- In the case of a true allergy, an opioid from a semi-synthetic source, i.e. Oxycodone should be considered.

5.9 Bladder Spasm

- May be associated with bladder or urological surgery or a urinary catheter.
- Consider Oxybutynin chloride. (See CHI Paediatric Formulary for dosing information).

6.0 Stopping P/NCA infusion

The decision to stop the opioid infusion should ideally be made in consultation with the pain service nursing staff or Anaesthesiologist on call.

- Other analgesics should be prescribed.
- Oral opioid may be given an hour prior to stopping the infusion or at the time of stopping the infusion.
- To ensure no residual morphine remains in the line, flush IV cannula with 0.9% w/v Sodium chloride and document on the CHI Patient /Nurse Controlled Nursing Observation chart.
- Any remaining opioid infusion must be disposed of according to CHI medication guidelines.

Opioid weaning should be considered for a patient receiving opioid medications for greater than 5-7 days.

Ongoing opioid requirements after a P/NCA

If ongoing analgesic requirements require an opioid– an immediate release oral opioid can be started, morphine sulphate (Oramorph® or Sevredol®) or Oxycodone HCL (OxyNorm®). (See CHI Paediatric Formulary for advice about converting between IV and oral doses). This may initially be on a regular prescription for 24 hours and then may be changed to a PRN prescription once adequate analgesia has been achieved.
There should be a defined duration and dosage regime considered for every child.

- Ensure **regular** non-opioid analgesia is administered
- **Please seek advice from the pain service.**

7.0 Glossary of acronyms, terms and definitions

Patient Controlled Analgesia (PCA)	• Refers to a method of pain relief in which an infusion device connected to a timing mechanism allows a child to self-administer analgesic drugs. • The patient needs to have the cognitive ability to understand the concept of pressing a button to self-administer analgesia when required. • Lack of normal hand function does not always preclude children from using PCA but adequate physical ability to press a button is required.
Nurse Controlled Analgesia (NCA)	NCA is usually selected for children requiring the administration of opioid analgesia in the following circumstances • Inability to understand the concept of PCA (most children < 6 years of age) Children who do not wish to control their own analgesia. • Children with language barriers who may have difficulty understanding the instructions with PCA. • Children with a cognitive disability unable to understand the concept of PCA. • Children with a physical disability unable to press the demand button.
Bolus Dose	• A bolus dose is the amount of drug the child receives when the handset or demand button is pressed. • This can be reduced at the discretion of anaesthesiology/pain service.
Lockout Period	Lockout time can be set between 5 and 20 minutes. Within this range, longer lockout times are used for Nurse Controlled Analgesia. Shorter lockout times are suitable for Patient Controlled Analgesia (5 minutes). The PCA pump will not deliver a dose during the lockout time even if the button is pressed.

Patient bolus Refused bolus	▯ When the patient/nurse presses the handset and receives a bolus this is recorded as a patient bolus. ▯ When the patient/nurse presses the handset within the lockout time, or when a four hourly threshold dose limit has been reached, the bolus will not be delivered and this is recorded as a refused bolus.
Background Infusion	▯ A background infusion may be prescribed with the P/NCA in a situation where it is anticipated that the bolus-only regimen will not provide adequate analgesia. ▯ The maximum rate for background infusion is 20 microgram/kg/hour or 1mg/hour in patients over 50kg.
Four Hourly Limit	▯ The Four Hourly limit refers the amount of Morphine Sulphate/Oxycodone HCL the patient may receive in a 4-hour period. ▯ NCA 4 hourly limit is between 100-400microgram/kg or 20mg in patients over 50kg. ▯ PCA 4 hourly limit is either 300 or 400 microgram/kg or 20mg in patients over 50kg.

Abbreviations	
Patient Controlled Analgesia	PCA
Nurse Controlled Analgesia	NCA
Advanced Nurse Practitioner/Candidate	ANP(c)
Children's Health Ireland	CHI
Clinical Nurse Specialist	CNSp
Intravenous	IV
Microgram	mCg
Non-Consultant Hospital Doctor	NCHD
Non-Steroidal Anti-Inflammatory Drug	NSAID
Post-Anaesthetic Care Unit	PACU
Standardised Concentration Infusion	SCI
Standard Operating Procedure	SOP
Pasero Opioid Induced Sedation Scale	POSS
Post-Anaesthetic Care Unit	PACU
Post Registration Children's Nurse Student	PRCNS

8.0 Audit and Evaluation

Compliance with key principles or procedures described within this SOP should be audited on an annual basis by the author/ owner or their nominated representative.

- Incident reports involving P/NCA opioid infusions will be monitored and reports will be responded to when they occur as per CHI medication policy.

- Required changes in practice will be identified and actioned within 1 month. A lead member of the pain service will be identified to take change forward where appropriate.
- Lessons will be shared with all the relevant stakeholders. This SOP will be reviewed and updated at least every three years by the document author/owner, or earlier if required due to updated guidance, evidence or legislation.

9.0 Key Stakeholders

The following key stakeholders were involved in developing and/or reviewing this document:

Name	Title	Department
Geraldine Murray	RANP Children's Pain	Pain service, CHI at Temple Street
Sarah Flaherty	RANP Children's Pain	Pain service, CHI at Crumlin
Dr Kay O' Brien	Consultant Anaesthesiologist	Pain service, CHI at Temple Street
Dr Jacinta McGinley	Consultant Anaesthesiologist	Pain service, CHI at Crumlin; Anaesthesiology
Warren O Brien	Nurse Practice Development	CHI at Crumlin
Siobhan Gilboy	Nurse Practice Development	CHI at Temple Street
Fionnuala O'Neill	Nurse Practice Development	CHI
Eimear McGrath	Smart Pump CNEF	CHI at Crumlin
Michael Curtin	Senior Pharmacist	CHI at Temple Street
Karen Lavelle	Medication Safety Officer	CHI at Crumlin
Moninne Howlett	Chief Pharmacy Information Officer	CHI at Crumlin

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11.0 Appendices

Appendix 1: Dosing Guide

Table 1: Nurse Controlled Analgesia - Preparation and Dosing Guide (valid as per April 2023)

NURSE CONTROLLED ANALGESIA (NCA): MORPHINE / OXYCODONE					
Patient Weight	**Infusion Concentration**	**Bolus Dose**	**Lockout time**	**Maximum 4 hour dose**	**Background infusion rate**
<2.5kg	**2.5**mg/50mL	0 - 10 microgram/kg	20 minutes	200 microgram/kg	0 - 10 microgram/kg/hour
>2.5kg - <5kg	**5**mg/50mL	0 - 10 microgram/kg		200 microgram/kg	0 - 10 microgram/kg/hour
> 5kg - <10kg	**10**mg/50mL	0 - 20 microgram/kg		300 microgram/kg	0 - 20 microgram/kg/hour
> 10 - 20kg	**20**mg/50mL	0 - 20 microgram/kg		400 microgram/kg	0 - 20 microgram/kg/hour
>20 - 50kg	**50**mg/50mL	0 - 20 microgram/kg		400 microgram/kg	0 - 20 microgram/kg/hour

>50kg	**50**mg/50mL	0 - 1 mg		20mg	0 - 1 mg/hour

Dosing limits may vary in '*Sickle Cell*' and '*High Dose Morphine with Load'* folders on pump. Please see relevant guideline/protocol.

Table 2: Patient Controlled Analgesia - Preparation and Dosing Guide (valid as per April 2023)

PATIENT CONTROLLED ANALGESIA (PCA): MORPHINE / OXYCODONE					
Patient Weight	**Infusion Concentration**	**Bolus Dose**	**Lockout time**	**Maximum 4 hour dose**	**Background infusion rate**
> 10 - 20kg	**20**mg/50mL	0 - 20 microgram/kg	5 - 20 minutes	400 microgram/kg	0 - 20 microgram/kg/hour
>20 - 50kg	**50**mg/50mL	0 - 20 microgram/kg		400 microgram/kg	0 - 20 microgram/kg/hour
>50kg	**50**mg/50mL	0 – 1 mg		20mg	0 - 1 mg/hour

Dosing limits may vary in '*Sickle Cell*' and '*High Dose Morphine with Load'* folders on pump. Please see relevant guideline/protocol.

Appendix 2: Sample Prescriptions

INTRAVENOUS INFUSIONS - IV Fluids and Medication

Remember to check allergy section at the front of the kardex before prescribing
Where an amendment is necessary, please rewrite the prescription IN FULL.

Patient weight: 2kg

Name: Jane Doe
HCR No: H0111111 D.O.B. 1/1/20XX

Infusion Fluid or Base Solution	Sodium Chloride 0.9%	Final Volume (mL)	Date Prescribed	Prescriber's Signature	Prep. Check	Date / Time	Pump Check	Date / Time
Medication or Electrolyte to be added	Name: Morphine NCA Quantity: 2.5mg	50mL	1 13/3/XX	Dr. J Bloggs Reg. No. 12345 Bleep No. 8111	AA BB	13/3/XX 09:20	AA BB	13/3/XX 09:30
Rate	Bolus: 10 microgram/kg Background infusion: 0-10 microgram/kg/hour Start at 0 microgram/kg/hour		2	Reg. No. Bleep No.				
			3	Reg. No. Bleep No.				
Additional Instructions	Max 4 hour dose limit: 200 microgram/kg Lockout time: 20 minutes	Batch n./EXP (if applicable)	4	Reg. No. Bleep No.				
			Date Cancelled		CANCELLED (complete with full prescriber details)			

Final concentration for infusion is 2.5mg Morphine in 50mL Sodium Chloride 0.9%
Volume of Morphine (10mg/1mL) to be withdrawn from vial:
[(2.5mg ÷ 10mg) x 1mL] = **0.25mL**
Volume of diluent:
50mL-0.25mL = **49.75mL**

INTRAVENOUS INFUSIONS - IV Fluids and Medication

Remember to check allergy section at the front of the kardex before prescribing
Where an amendment is necessary, please rewrite the prescription IN FULL.

Patient weight: 15kg

Name: John O'Sullivan
HCR No: H0222222 D.O.B. 2/2/20XX

Infusion Fluid or Base Solution	Sodium Chloride 0.9%	Final Volume (mL)	Date Prescribed	Prescriber's Signature	Prep. Check	Date / Time	Pump Check	Date / Time
Medication or Electrolyte to be added	Name: Morphine NCA Quantity: 20mg	50mL	1 13/3/XX	Dr. J Bloggs Reg. No. 12345 Bleep No. 8111	AA BB	13/3/XX 09:20	AA BB	13/3/XX 09:30
Rate	Bolus: 20 microgram/kg Background infusion rate: 10 microgram/kg/hour		2	Reg. No. Bleep No.				
			3	Reg. No. Bleep No.				
Additional Instructions	Max 4 hour dose limit: 400 microgram/kg Lockout time: 20 minutes	Batch n./EXP (if applicable)	4	Reg. No. Bleep No.				
			Date Cancelled		CANCELLED (complete with full prescriber details)			

Final concentration for infusion is 20mg Morphine in 50mL Sodium Chloride 0.9%
Volume of Morphine (10mg/1mL) to be withdrawn from vial:
[(20mg ÷ 10mg) x 1mL] = **2mL**
Volume of diluent:
50mL-2mL = **48mL**

INTRAVENOUS INFUSIONS - IV Fluids and Medication

Remember to check allergy section at the front of the kardex before prescribing
Where an amendment is necessary, please rewrite the prescription IN FULL.

Patient weight: 75kg

Name: Smith Jones
HCR No: H03333333 D.O.B. 3/3/20XX

Infusion Fluid or Base Solution	Sodium Chloride 0.9%	Final Volume (mL)	Date Prescribed	Prescriber's Signature	Prep. Check	Date / Time	Pump Check	Date / Time
Medication or Electrolyte to be added	Name: Morphine PCA Quantity: 50mg	50mL	1 13/3/XX	Dr. J Bloggs Reg. No. 12345 Bleep No. 8111	AA BB	13/3/XX 09:20	AA BB	13/3/XX 09:30
Rate	Bolus: 1 mg Background infusion: 0-1 mg/hour Start at 0.5 mg/hour		2	Reg. No. Bleep No.				
			3	Reg. No. Bleep No.				
Additional Instructions	Max 4 hour dose limit: 20 mg Lockout time: 10 minutes	Batch n./EXP (if applicable)	4	Reg. No. Bleep No.				
			Date Cancelled		CANCELLED (complete with full prescriber details)			

Final concentration for infusion is 50mg Morphine in 50mL Sodium Chloride 0.9%
Volume of Morphine (10mg/1mL) to be withdrawn from vial:
[(50mg ÷ 10mg) x 1mL] = **5mL**
Volume of diluent:
50mL-5mL =**45mL**

Appendix 3: CHI P/NCA Nursing Record Chart

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Children's Health Ireland

Patient / Nurse Controlled Analgesia
Record Chart

Full Name:
Addressograph
HCR

Today's Date: **Time:**	**Hospital No:**
Patient Name:	**Anaesthesiologist:**
Ward:	**Procedure:**
Consultant	**Weight:**

Prescribing Guidance Only - always refer to prescription for parameters

PCA or **NCA**

Morphine Sulphate or **Oxycodone HCl** X mg in 50 ml *(See standard concentrations)*

Diluent: NaCl 0.9% w/v or Dextrose 5% w/v

Bolus Dose: 10 microgram/kg or 20 microgram/kg

Background infusion: none 4 microgram/kg 10 microgram/kg 20microgram/kg

4 Hour Dose Limit: 100 /200 /300 /400 microgram/kg in 4 hours = Xmg (max 30 mgs in 4 hours)

Lockout: 5 minutes (PCA) 20 minutes (NCA)

Ward staff check on (a) collection from Recovery or (b) start of shift

Date	Time *(24 hr clock)*	Nurse *(1st Checker)*	NMBI	Nurse *(2nd Checker)*	NMBI

OPIOID TOTALS

Date PCA was discontinued:		**Time:**	
Total Hours		**Total Amount of Opioid**	**Microgram/Mg**

Signature of Nurse: **Date:** **NMBI:**

Please ensure IV Cannula is flushed after stopping infusion **Completed:** ◯

GENERAL INSTRUCTIONS

- No supplementary opiates unless ordered by the Anaesthesiology , palliative care or Pain service.
- Maintain IV access during pain management.
- Please ensure anti-syphon extension set is used
- Specific P/NCA observations should be carried out hourly alongside PEWS as often as required
- Please ensure pulse oximetry is used **at all times** while P/NCA is in use
- In addition, for patients under one year, ensure continuous apnoea/respiratory monitoring
- Please ensure regular analgesia is given as charted
- Utilise non-pharmacological approaches where possible

Sláinte Leanaí Éireann
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Patient / Nurse Controlled Analgesia
Record Chart

Full Name:
Addressograph
HCR

RECORD OF CHANGES TO INFUSION RATES						
Date / Time						
Bolus or Background change						
Current Rate						
Revised Rate						
1: Pain	2: Pain well-controlled		3: Sedation		4: Nausea	5: Pruritus
Reason						
Nurse Signature						
NMBI						

Pain Assessment		FLACC □ CRIES □ Numeric Rating Scale □ Wong-Baker Faces □
0	No Pain	None
1-3	Mild Pain	**NCA:** give bolus 10 minutes before activity **PCA:** encourage bolus 10 minutes before activity
4-6	Moderate Pain	**NCA:** give bolus **PCA:** encourage bolus
7-10	Severe Pain	**NCA or PCA**: Contact Pain Service (Pain uncontrolled with 3 bolus/hr & adjunctive analgesia)

SEDATION ASSESSMENT

PASSERO OPIOID SEDATION SCALE		RECOMMENDED INTERVENTION
S	Asleep, easy to arouse	• Acceptable, No action necessary
1	Awake and alert	• Acceptable, No action necessary
2	Slightly Drowsy; easily aroused	• Acceptable, No action necessary
3	Frequent drowsy, arousable, drifts off to sleep during conversation	• Unacceptable • Monitor respiratory status and sedation until score is less than 3 • Decrease opioid 25% - 50% • Administer non-sedating analgesia • Inform pain service nursing/anaesthesiology staff
4	Somnolent, minimal or no response to verbal and physical stimulation	• Unacceptable • Stop opioid • Call 2222 • Consider Naloxone • Inform pain service nursing/anaesthesiology staff. • Monitor respiratory status and sedation score closely until stable at less than three and respiratory status is satisfactory.

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Patient / Nurse Controlled Analgesia
Record Chart

Full Name:
Addressograph
HCR

Opioid Assessment Tool: for use during P/NCA infusions

Date	Time	SpO_2	HR	RR	POSS	Pain Score Tool: _____		Nausea Score	Pruritus	Background Infusion Rate	Bolus Dose		Total drug amount infused	Volume remaining in syringe (mL)
DD/MM/YY	HH:MM	%	/min	/min	S = asleep 1 = awake/alert 2 = slightly drowsy 3 = frequently drowsy 4 = minimal/no response	Moving	Resting	0 = None 1 = Nausea only 2 = Vomiting 3 = vomit > 3 in last hour	0 = None 1 = Slight 2 = Moderate 3 = Severe	□ microgram (mCg)/kg/hour *or* □ mg/hour	# patient bolus	# refused bolus	□ microgram *or* □ mg	mL
		Complete in PEWS chart												

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Assessment of Competency in the Nursing Management of a Patient Requiring Patient/Nurse Controlled Analgesia

Cardiac SERVICES

Objectives	To demonstrate the ability and knowledge to safely manage Patient/Nurse Controlled Analgesia (P/NCA) using Arcomed SP6000 Infusion Pump
Competence requirements	1. Attendance at local intravenous study day 2. Supervised practice 3. Practical demonstration of setup
Re-assessment	1. If there is a break in service for more than one year, reassessment must take place on return to workplace 2. If staff identify lack of competency due to lack of exposure to use
Assessor	Registered Staff Nurse with competency in managing patients requiring and receiving P/NCA infusions via Cardiac Services Arcomed SP6000 Infusion Pump.

Step 1: Competency Assessment Tool: Arcomed SP6000 Infusion Pump

Instructions for completion: following your pump training, please indicate with a tick ✓ that you can perform the skills listed. Once you have obtained all skills, please process to **Step 2: Competency Assessment Tool: Practical Assessment.**
Note: the pump may only be used for training purposes until all below criteria is achieved.

Please demonstrate the following skills:	**Skill obtained (✓)**
Device Overview	
Locate and Identify the following elements:	
• AC power input	
• Pole Clamp	
• Carry handle	
• Infrared port	
• Key lock	
• On/off switch	
• Lights	
• Rate and data windows and adjustment keys	
• Start/Stop button	
• Hard and soft keys 1 & 2	
• Bolus button	
Programming pump	
• Open pump	
• Power on pump	
• Load and confirm syringe	
• Lock pump	
• Select folder and therapy	
• Input password	
• Set parameters as per prescription	
• Decrease the occlusion limit	
• Start infusion	
• Review data windows and infusion information	
Bolus function	
• Deliver bolus	
• Discuss clinician bolus function	
• Review bolus history	
Standby and power	
• Put pump into standby mode	
• Set timer in standby mode	
• Remove syringe from the pump	
• Power off the pump	

CHI Smart-Pump Team V1, April 2023

Appendix 4: CHI Nurse Competency Assessment Tool

Sláinte Leanaí Éireann
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Assessment of Competency in the Nursing Management of a Patient Requiring Patient/Nurse Controlled Analgesia

Step 2: Competency Assessment Tool: Practical Assessment

Note to assessor: please insert a tick ✓ into the left column below to indicate competency has been demonstrated to you. Identify any criteria not currently at competency level in the further learning needs column below following discussion.

P/NCA Competency Assessment Tool Performance Criteria: Practical Assessment		
Safe Practice	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Locate hospital policies and guidelines related to P/NCA management • Articulate the criteria for choosing P/NCA and indications/contraindications • Read and discuss P/NCA prescription • Understand 'background' continuous infusion versus bolus dose • Explain rationale for giving a bolus and need for changing parameters of infusion • Adhere to 10 rights of medication administration • Discuss process of patient preparation and education • Do not leave medication unattended during preparation • Check for known drug allergy • Observe patient for any adverse drug reaction • *In the event of abnormal findings,* escalate care as per P/NCA guideline and hospital escalation protocol • Dispose of medication and equipment correctly		
Preparing the infusion	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Adhere to medication policy and administration guidelines • Gather equipment • Identify change in preparation practice (NA for new graduates) • Prepare medication as per CHI standard concentration infusion table (NB if you need training in this, please contact CHI Smart-Pump Team) • Label prepared syringe in line with P/NCA guideline • Prime the line (using an anti-syphon line) • Assess patency of IV access device • Connect infusion to the patient		
Programming the P/NCA pump	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Select correct protocol • Modify protocol as required • Confirm all program parameters • Confirm pump programme with a second registered nurse (RN) • Change parameters during infusion		

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Assessment of Competency in the Nursing Management of a Patient Requiring Patient/Nurse Controlled Analgesia

Documentation	Further learning needs identified:	**Competency achieved (✓)**
Observe, assess and record the following and give rationale for same: **Observations:** • Pain score at rest and on movement • Respiratory rate • Oxygen saturation • Sedation score using POSS scale for opioid infusions • Complications or adverse effects **Other documentation:** • PEWS • Bolus demands • Successful bolus doses received • Volume (mL) remaining in syringe • Cumulative total of drug delivered (mL) • Continuous infusion rate (mL/hour) and dose (e.g. mcg/kg/hour) if applicable		
Completion of Infusion	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Appropriately discard remaining drug volume in used syringe **Syringe change:** • Reconfirm all programme parameters with second RN		
Infection Prevention and Control Awareness	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Adhere to 5 moments of hand hygiene throughout care • Adhere to standard aseptic non-touch technique when preparing equipment and drugs, including line manipulations • Ensure patient comfort • Wear appropriate PPE • Dispose of equipment and sharps correctly • Clean infusion pump • Clean reusable equipment in line with infection prevention and control guidelines		
Communication/interpersonal skills	Further learning needs identified:	**Competency achieved (✓)**
Demonstrate the following: • Provide patient and parent appropriate education & explains rationale for use • Answer questions on individual pain management approach • Complete documentation		

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Assessment of Competency in the Nursing Management of a Patient Requiring Patient/Nurse Controlled Analgesia

☐ I have completed Step 1 Infusion Pump training and understand the skills and concepts associated with operation and use of the Arcomed SP 6000 syringe driver.

☐ I have completed Step 2 Practical Assessment and understand the nursing considerations for management of a patient requiring Patient/Nurse Controlled Opioid Analgesia

Staff Name & Grade: _____
BLOCK CAPITALS

Ward: _____

Site: _____

Pump session facilitated by:

Name/Grade: _____ Date: ____/____/20____
BLOCK CAPITALS

Signature: _____

Practical assessment facilitated by:

Name/Grade: _____ Date: ____/____/20____
BLOCK CAPITALS

Signature: _____

Please give completed assessment to your CNEF.