ACUTE PAIN CONTROL FOR ADULT PATIENTS

This guidance does not override the individual responsibility of health professionals to make appropriate decision according to the circumstances of the individual patient in consultation with the patient and /or carer. Health care professionals must be prepared to justify any deviation from this guidance.

Introduction

Suitable for all adult patients requiring the effective management of acute pain, covering all WAHT sites.

THIS GUIDELINE IS FOR USE BY THE FOLLOWING STAFF GROUPS:
Doctors
Qualified Registered Nurses
Students and unqualified staff under the guidance of qualified Registered staff.

Approved by Theatre Governance Committee on: 21st January 2026

Approved by Medicines Safety Committee on: 13th September 2023

Review Date 21st January 2029
This is the most current document and is to be used until a revised version is available

It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

Key amendments to this guideline

Date	Amendment	By:
11/09/12	Guideline approved by Clinical Governance Committee	
Nov 12	Two previous documents combined to avoid duplication ANA-005 and ANA-007	Dr Tim Smith
July 2013	Appendix re use of codeine and voltarol	
February 2015	Connection of epidural infusion	Dr Joanna Marriott
August 2017	Document extended for 12 months as per TMC papers approved 22nd July 2015	TMC
December 2017	Sentence added in at the request of the coroner	
June 2018	Document extended for 3 months as per TLG recommendation	TLG
September 2018	Addition of management of local anaesthetic toxicity Additional practices to improve the safe use of epidural infusions Addition of advice for apixaban and edoxaban Addition of pathway to improve post TKR pain control Additional information on rectus sheath analgesia Additional section for lower limb amputation	K Hinton T Smith
October 2018	Document extended for three months whilst review process is complete	Rachael Ward
November 2018	Document approved at Medicines Safety Committee	MSC
2nd December 2020	Amendments made to Document pg 2 bleep for Alex is 1266 not 0266 pg 5 Morphine sulphate liquid should be 2 to 4 hourly NOT 8hourly pg 6 Oxycodone IR (shortec) should be 2 -4 hourly NOT 4 - 6 hourly pg 6 morphine sulphate MR (zomorph) should be 12 hourly NOT 2-4 hourly	Rachael Ward/Dr Hutchinson
26th April 2021	Addition of the word 'Registered' to 'Qualified'	Rachael Ward
December 2022 (Approved 23/11/22 subject to amendments)	Clarification of contact details at ALEX hospital (page 2) Clarification of contact details in case of neuraxial complications Reference to SOBA guidelines for perioperative care of high BMI patients	James Hutchinson
June 2023	Addition of paracetamol maximal doses for patients <50kg. Addition of spinal (intrathecal) morphine, monitoring and chart. Amendments to NRFit epidural connections; recovery staff can connect epidurals, band 6 (or above) epidurally competent nurses can disconnect and reconnect epidurals. Management of high sensory blocks in epidurals for high surgical incisions. Addition of Local Anaesthetic Peripheral Catheter management and chart. Removal of TKR section (see separate 'Enhanced Recovery Protocol')	Elma Wong
13th Sept 2023	Addition of Levobupivacaine 0.125% and Levobupivacaine 0.1% Plus Fentanyl to epidural options	Rachael Ward
17th Dec 2025	Additional wording around PCAs (page 10) and epidurals (page 25)	Rachael Ward

ACUTE PAIN CONTROL FOR ADULT PATIENTS

Principles of Effective Management of Acute Pain

- Everyone including the patient has a role to play in effective pain management. This begins in the pre-operative assessment clinic with information regarding possible methods of post-operative pain management and then with information following admission.
- The patient must be made aware that they must tell the staff that they are in pain. They should call for help early and not wait for the pain to become unbearable or for an event such as a drug or ward round.
- Effective pain control is achieved by **regular assessment** using the tools in these guidelines. Regular analgesia should be given to achieve a level according to that expected on the basis of the cause of the pain and the patient's subsequent response to analgesia. Additional analgesia is given to respond to fluctuations in pain requirements.

Pain control is successful either when the patient has no pain or has mild pain. In this Trust we use the pain scores "0" or "1" to represent this. **See "Assessment of Pain"**

Most acute pain management is achieved effectively using oral medication (with or without peripheral nerve blockade).

The Acute Pain Service is here to educate, facilitate and support effective post-operative pain control

The patient's anaesthetist recommends and initiates the post-operative analgesic process. It is then the responsibility of the ward to implement and assess the effectiveness of that plan using the prescriptions provided and seek advice if these measures should become less than ideal.

How to contact the Acute Pain Service

During daytime hours (Monday to Friday 8am to 4pm) advice and support can be obtained from the Acute Pain specialist nurses on bleep 1266 at the Alexandra Hospital or bleep 238 at Worcestershire Royal Hospital (WRH). Outside of these hours, seek advice from the on-site anaesthetists on bleep 1933 at the Alexandra Hospital (ITU SpR is contacted as first contact but may request anaesthetic consultant is called) or on bleep 700 at WRH.

Patient Information

The patient information leaflet about acute pain is titled "**Acute Pain Control WHAT-PI-0570**"

Section 1 - Assessment of Pain, Sedation & Nausea

Pain and sedation must be assessed and documented regularly to enable effective pain management. Assess and record pain, nausea and sedation whenever pulse rate, blood pressure and respiratory rate are measured. Pain codes should be charted at intervals of one to four hours during the post-operative period and with spinal and epidural analgesia or patient controlled analgesia (PCA) according to care pathways.

Assessment of Pain

Ask the patient: "Do you have any pain when you move?" and if so "Is the pain **mild**, **moderate** or **severe**?" **Severe** pain at rest should also be coded as "3". It is important that these terms are used and that patients are **NOT** asked for a numerical "score".

Pain severity on movement	Code
None	**0**
Mild	**1**
Moderate	**2**
Severe	**3**

verbal rating scale (VRS) with numerical code

If the site of the pain is not consistent with the known problem, then seek advice.

NOTE

We discourage the use of other scoring systems such as visual analogue scales (VAS), numerical rating scales (NRS) of 0 to 10 with descriptors "no pain" to "worst pain imaginable". These can give a pleasing pseudo-scientific feel to the assessment but inevitably lead to confusion in the documentation and use of algorithms, and so result in poor pain management

Record the pain assessment on the "**Pain Assessment Chart WR5591"** document and the and the 'Intentional round' chart.

Assessment of Sedation

Observe the patient and identify which of the following apply as shown on the Observation and Pain Management Chart.

Sedation level	Letter Code
Awake	**A**
Responds to **Voice**	**V**
Responds to **Pain**	**P**
Unresponsive	**U**

Assessment of Nausea and Vomiting

Observe the patient and identify which of the following apply as shown on the Observation and Pain Management Chart.

Nausea and Vomiting	Letter Code
None	**N(o)**
Nausea or persistent vomiting	**Y(es)**

Assessment in Patients who have Communication Difficulties

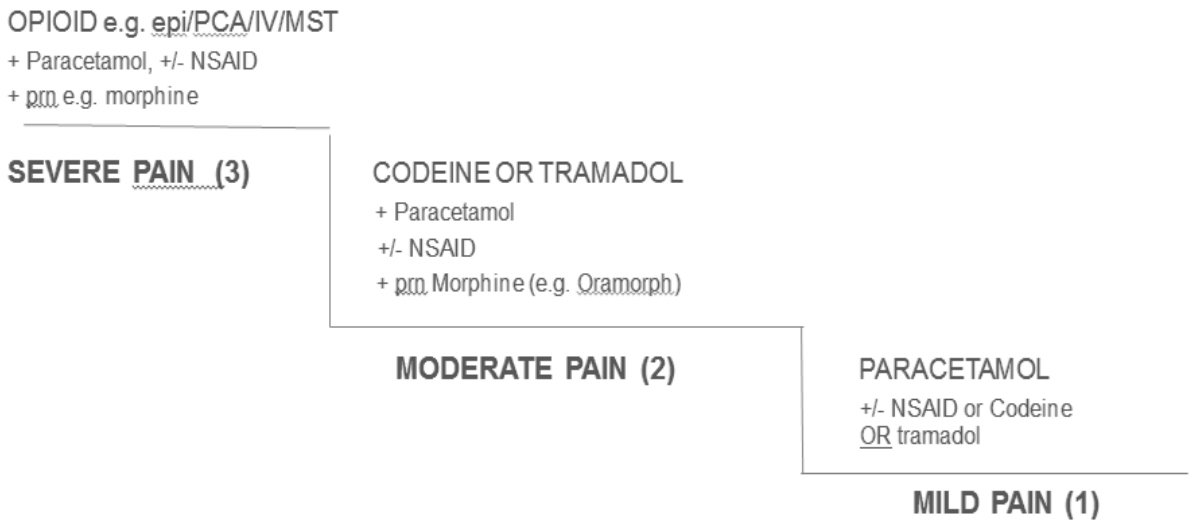
Use the following Trust documents for guidance on the assessment of patients with communications difficulties (e.g. dementia):

- Care Pathway for Dementia, incorporating the Abbey Pain Scale
- Dementia care, Common Principles

The Paediatric Acute Pain Guidelines **(WAHT-ANA-010 "Management of acute pain in children")** provide several non-verbal methods of assessing pain which may be applicable. For further advice on use of these methods for adults contact a member of the Acute Pain Team.

Section 2 – Methods of Pain Control

Always consult the British National Formulary (BNF) for up-to-date prescribing guidance on drug interactions, cautions and contraindications



Oral and Rectal Analgesia

Description
Oral and rectal analgesics are used either alone or as adjuncts to more complex methods of pain relief. Patients are usually "weaned off" potent parenteral opioids onto enteral drugs, which are started prior to discontinuation of the parenteral drugs.

Designated areas of use:
Main theatres, main recovery, all medical and surgical wards, central delivery suite, ITU, and enhanced care units (SECU/VECU).

Indications

- Sole management of **mild** to **moderate** acute post-operative pain
- Adjunct treatment with IV, PCA, epidural, peripheral nerve methods and IM (if other routes not available)

Use of intramuscular opioids should not be routine as the effective dose depends on blood flow at the site of injection, causing the onset, dosage and duration to be unpredictable.

Cautions

- Rectal administration with some bowel surgery

Seek parent team advice
Obtain and document patient consent before rectal administration

- Oral administration following major abdominal surgery

Seek parent team advice

- For patients less than 50kg or above 100kg in weight (seek advice)

Prescription

These are standard initial prescription options for patients weighing between 50kg and 100kg. These may need modifying in the light of patient characteristics including age and comorbidities, and variations in individual response.

Analgesic	Route	Dose	Frequency	Notes
Paracetamol	Oral	1g	4 to 6 hourly	For body weight ≥50kg; maximum 4g/24H. 41 to 49kg; maximum 3g/24H <40kg; maximum 2g/24H
	Intravenous	1g For body weight < 50kg use 15mg/kg	4 to 6 hourly *6 hourly if renal impairment*	Use when oral/enteral route is not appropriate. Maximum 4g/24H For body weight < 50kg maximum 60mg/kg per day.
Codeine	Oral	30mg or 60mg	4 to 6 hourly	
Diclofenac	Oral or rectal OR Rectal	50mg OR 100mg	8 hourly OR 16 hourly	Maximum 150mg/24H (See below) Note: This means that two 100mg doses can be given on the same date so long as they are 16 hours apart and that 16 hours elapse before the next dose of 50 or 100mg (see below)
	Intravenous	75mg	A second dose may be given after 4 hours	Maximum 150mg within 24 hours of initial dose. See data sheet for preparation details. Intravenous paracetamol is **not** a suitable diluent (Madden 2014)
Ibuprofen	Oral	400mg tds	8 hourly	Maximum of 600mg 6 hourly may be used up to 2 days
Morphine sulfate liquid	Oral	10 or 20 mg	2 to 4 hourly	The absorption of morphine by this route (bioavailability) is very variable
Alternatives				
Tramadol	Oral or Intravenous	50 or 100mg	6 to 8 hourly	Maximum 400mg/24H
Oxycodone - immediate release	Oral	5mg	4 to 6 hourly	Maximum 400mg/24H Dose to be increased according to pain severity.

Oxycodone - modified release	Oral	10mg	12 hourly	Up to Maximum 200mg dose NOT WITH OTHER ORAL OPIOIDS OR TRAMADOL
Morphine sulphate – modified release (Zomorph®)	Oral	10 or 20 mg	12 hourly	The absorption of morphine by this route (bioavailability) is very variable
Nefopam	Oral	60mg	8 hourly	Dose to be adjusted as 30mg, 60mg or 90mg

NON-STEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDs)

(Diclofenac, ibuprofen, naproxen)
In conjunction with regular paracetamol, NSAID's are extremely effective in providing analgesia for many patients. Obtain and document patient consent before rectal administration.

Indications

Patients having minor to major surgery in whom no contraindications exist

Contraindications

(See BNF for full up to date list)

- Hypovolaemia
- Hyperkalaemia
- Active peptic ulceration
- Severe liver dysfunction
- Uncontrolled hypertension
- Recent bariatric surgery
- Severe heart failure

Cautions

- Renal impairment – avoid if possible
- Elderly patients
- Asthma
- Diabetes mellitus
- Widespread vascular disease
- History of peptic ulcer disease (consider use of a proton pump inhibitor (PPI) such as omeprazole 20mg once daily)
- Concurrent use of some drugs (including methotrexate, lithium, ciclosporin, anticoagulants) Seek advice from a pharmacist or medicines information (ext 45776)
- Potassium sparing diuretics
- Recent gastrointestinal anastomoses formation

Asthma

10-15% asthmatics develop bronchospasm with NSAIDs. Before prescribing or administering NSAID's, check whether the patient has had breathing difficulties after previous NSAID administration.

Platelet function

NSAIDs interfere with platelet aggregation and vasoconstriction so bleeding time is prolonged and there may be an increased risk of post-tonsillectomy bleeding. In a 2013 Cochrane review, Lewis et al concluded that there is insufficient evidence to exclude an increased risk of post-tonsillectomy bleeding in children but did find that the use of ketorolac reduced the incidence if post-operative vomiting. Surgical blood loss is not always increased. Use with caution if also taking anticoagulants.

Peptic ulceration

NSAID's interfere with the production of protective mucus in the upper gastrointestinal tract, and this may lead to peptic ulceration. The risk in young, fit patients is very low, but higher doses, concurrent use with oral corticosteroids, use in elderly patients and treatment lasting more than 5 days increases the risk. Ideally, NSAIDs should be avoided in patients with a history of peptic ulceration.

Renal function

Urine output should be monitored as part of routine fluid balance. Serum creatinine should be checked at baseline then 2 days after commencement if patient is still an inpatient. Any subsequent reduction in renal function may necessitate stopping the NSAID.

COX_2 inhibitors

COX_2 inhibitors (COXIBs) offer an alternative but are not currently identified for mainstream post-operative analgesia in our Trust. NSAIDs inhibit cyclooxygenase which is a key enzyme in prostaglandin synthesis. NSAIDs inhibit both constitutive (COX_1) and inducible (COX_2). By avoiding the inhibition of COX_1 the COXIBs reduce the risk of peptic ulceration and platelet inhibition. COXIB's are prothrombotic as are NSAID's and prolonged use can cause increased risk of thrombosis. Unfortunately, some COX_2 appears to be present in the kidney and COXIB's may still cause renal dysfunction.

Patient Controlled Analgesia (PCA)

PCA is a safe method for intravenous self-administration of small doses of potent opioids through a peripheral cannula. This requires a dedicated pump and a dedicated PCA giving set. Do not use any other pumps or standard giving sets.
It is recommended that the patient has 2l oxygen via nasal specs to run concurrently with the PCA, unless clinically contraindicated.

Pump-specific Guidance and Training on the setting up and maintaining of the pumps is provided separately from these guidelines

Approved locations for use:
All sites – ITU, SECU/VECU, main theatres, main recovery, day theatre, obstetric suite, obstetric theatre, obstetric recovery
Alexandra Hospital - wards 14, 16, 17, 18
Treatment Centre - ward 1
Worcestershire Royal Hospital – all Surgical, Trauma & Orthopaedic, Gynae and Vascular wards.
Additional locations – sickle cell crises may be managed with a PCA on acute medical wards in Worcestershire Royal Hospital, according to **WAHT-HAE-012 Sickle cell disease - Management guideline for adult patients.** It is the responsibility of the matron looking after that ward to ensure that nursing staff ward familiar with PCA administration are present and will be present on the ward throughout the duration of the PCA administration. A named person must sign the PCA care pathway to confirm this.

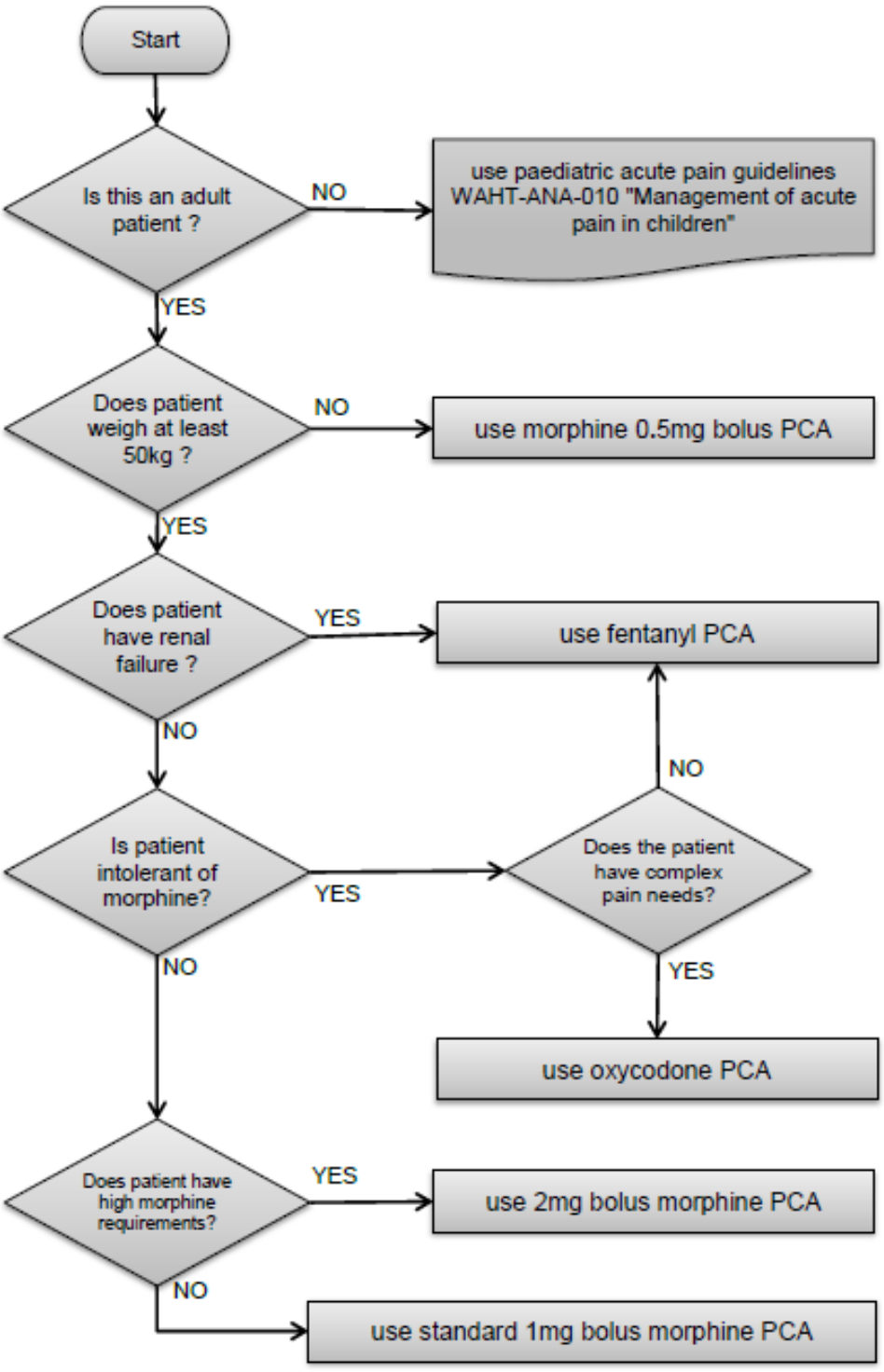
For paediatric wards refer to appropriate paediatric pain guidelines **WAHT-ANA-010 "Management of acute pain in children"**

Clinical situations where PCA may be appropriate
Postoperative or post injury pain requiring parenteral opioids for 24H or more
Acute pain where oral analgesia insufficient or oral route not available.
Acute exacerbations of chronic pain
Procedural pain (e.g. dressing changes)
Cancer pain
Pancreatitis
Following failed epidural analgesia
Following intrathecal opioid analgesia (REDUCE BOLUS DOSE INITIALLY)

Drugs
Morphine sulfate (standard)
Oxycodone,
Fentanyl

It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

Figure 1. Flow chart to guide PCA drug and dosage selection

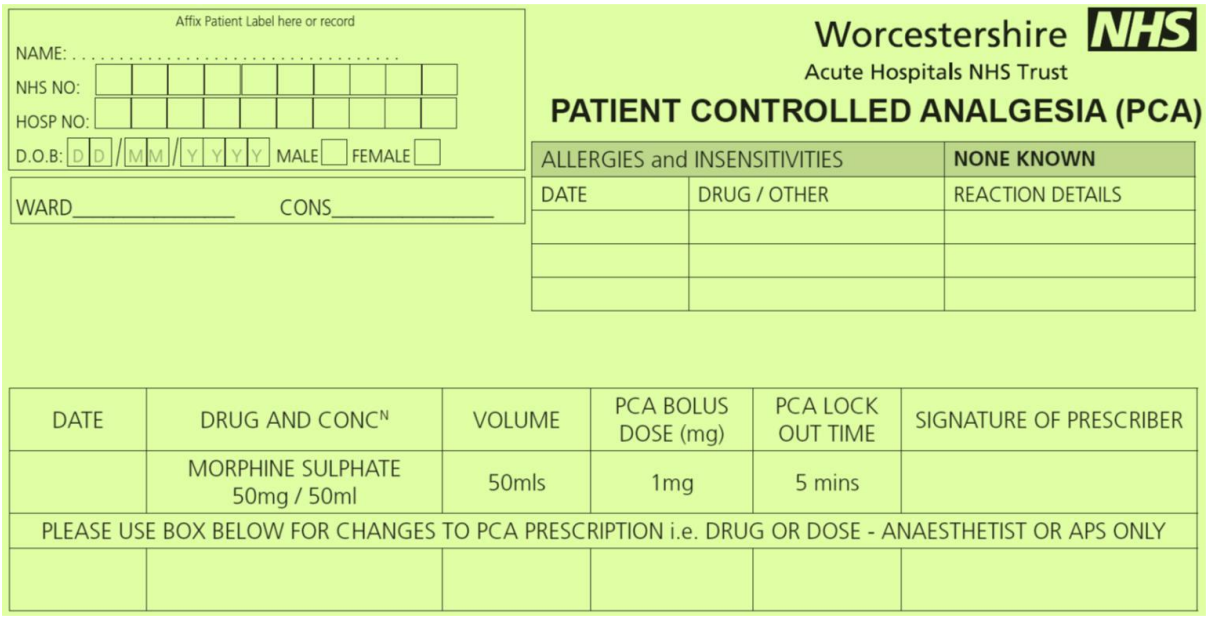


- Morphine 2mg bolus for high morphine requirements
- Morphine 0.5mg bolus for <50kg patients
- Fentanyl 20mcg bolus for morphine intolerance and renal failure

- Oxycodone 0.5mg bolus for morphine intolerance as an alternative to morphine for complex pain patients.

The patient controlled analgesia (PCA) prescription and monitoring sheet below shows the standard prescription for morphine sulfate. Ensure that oxygen therapy and naloxone are prescribed.

Drug	Concentration	Prepared (in Sodium Chloride 0.9% w/v Injection)	PCA bolus dose	PCA lockout time	Background infusion
Standard prescription in pump library					
Morphine Sulfate	1mg/ml	50mg in 50ml	1mg (1ml)	5 minutes	NO
Alternative prescriptions in pump library					
Morphine Sulfate	1mg/ml	50mg in 50ml	0.5mg (0.5ml)	5 minutes	NO
Morphine Sulfate	1mg/ml	50mg in 50 ml	2mg (2ml)	5 minutes	NO
Fentanyl	40mcg/ml	2000mcg in 50ml	20mcg (0.5ml)	5 minutes	NO
Oxycodone	1mg/ml	50mg in 50ml	0.5mg (0.5ml)	5 minutes	NO



Affix Patient Label here or record

NAME: . . . . . .

NHS NO:

HOSP NO:

D.O.B: D D / M M / Y Y Y Y MALE ☐ FEMALE ☐

WARD_____ CONS_____

Worcestershire NHS
Acute Hospitals NHS Trust

PATIENT CONTROLLED ANALGESIA (PCA)

ALLERGIES and INSENSITIVITIES		NONE KNOWN
DATE	DRUG / OTHER	REACTION DETAILS

DATE	DRUG AND CONC^N	VOLUME	PCA BOLUS DOSE (mg)	PCA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	MORPHINE SULPHATE 50mg / 50ml	50mls	1mg	5 mins	
PLEASE USE BOX BELOW FOR CHANGES TO PCA PRESCRIPTION i.e. DRUG OR DOSE - ANAESTHETIST OR APS ONLY					

Our standard opiate is morphine sulfate which is supplied in 50ml ampoules containing 50mg (1mg/ml). An alternative of fentanyl citrate is sometimes used. Use 4 x 500micrograms/10ml ampoules, made up to 50mls with N/Saline.

Prescription for patients with high morphine requirements

DATE	DRUG AND CONC^{N}	VOLUME	PCA BOLUS DOSE (mg)	PCA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	~~MORPHINE SULPHATE 50mg / 50ml~~	~~50mls~~	~~1mg~~	~~5 mins~~	
PLEASE USE BOX BELOW FOR CHANGES TO PCA PRESCRIPTION i.e. DRUG OR DOSE - ANAESTHETIST OR APS ONLY					
	MORPHINE sulfate 50mg/50ml	*50ml*	*2mg (2ml)*	*5 mins*	

Prescription for oxycodone

DATE	DRUG AND CONC^{N}	VOLUME	PCA BOLUS DOSE (mg)	PCA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	~~MORPHINE SULPHATE 50mg / 50ml~~	~~50mls~~	~~1mg~~	~~5 mins~~	
PLEASE USE BOX BELOW FOR CHANGES TO PCA PRESCRIPTION i.e. DRUG OR DOSE - ANAESTHETIST OR APS ONLY					
	OXYCODONE 50mg/50ml	*50ml*	*0.5mg (0.5ml)*	*5 mins*	

Prescription for fentanyl

DATE	DRUG AND CONC^{N}	VOLUME	PCA BOLUS DOSE (mg)	PCA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	~~MORPHINE SULPHATE 50mg / 50ml~~	~~50mls~~	~~1mg~~	~~5 mins~~	
PLEASE USE BOX BELOW FOR CHANGES TO PCA PRESCRIPTION i.e. DRUG OR DOSE - ANAESTHETIST OR APS ONLY					
	~~FENTANYL hydrochloride~~ 2000micrograms/50ml	*50ml*	*20micrograms (0.5ml)*	*5 mins*	

Prescription for patients weighing less than 50kg

DATE	DRUG AND CONC^{N}	VOLUME	PCA BOLUS DOSE (mg)	PCA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	~~MORPHINE SULPHATE 50mg / 50ml~~	~~50mls~~	~~1mg~~	~~5 mins~~	
PLEASE USE BOX BELOW FOR CHANGES TO PCA PRESCRIPTION i.e. DRUG OR DOSE - ANAESTHETIST OR APS ONLY					
	MORPHINE sulfate 50mg/50ml	*50ml*	*0.5mg (0.5ml)*	*5 mins*	

Setting up The PCA can be run either through a separate intravenous cannula or concurrently with a crystalloid or other compatible intravenous infusion. **If the PCA shares a cannula with another infusion, then a Flo-Safer® administration set must be used. It is essential that non-return (one-way) valves are present to prevent backflow of the concentrated opiate into the crystalloid administration set. The Bionector Y-connector is NOT a safe alternative.** Failure to do so risks serious respiratory depression. If you have any doubt, **ask** (anaesthetist or APS nurse).

The pumps have been pre-programmed with setting that simplify the process and limit possible errors. However, this does not guarantee safety, so it is essential that the settings are checked thoroughly before commencing the PCA. No modification should be made to the pre-programmed settings unless it has been discussed with a member of the acute pain team.

Management

Initiating treatment

For a PCA to be effective the concentration of opioid in the blood must be at an effective level. This is usually done during the anaesthetic itself and the level is then topped up by the patient pressing the demand button. If a regional technique (such as a spinal anaesthetic) is used for the operation, then this will be effective for up to several hours afterwards. In this case, the patient will return to the ward without an appreciable level of systemic analgesia. Effective use of a PCA started on the ward without a bolus involves repeated dosing by the patient at the lockout time set until the patient feels that the pain is controlled. The device is then used "on demand" as above. This is especially relevant to patients having spinal anaesthesia. They should start to press the button as soon as the spinal starts to wear off to avoid a period of substandard pain relief. If this happens contact the ward doctor or acute pain nurse.

A lockout of 5 minutes allows a maximum of 12 boluses per hour. It takes, typically, 5 to 7 boluses at 5 minute intervals to successfully initiate PCA pain control without additional boluses

Background infusions

We **DO NOT RECOMMEND** the routine use of background infusions for safety reasons. There is no convincing benefit in most situations.

Observations

These must be documented on page 2 of the Combined PCA Prescription and Monitoring sheet (PF WR1464 Patient Controlled Analgesia) at the following time intervals

½ hourly for first 2 hours
1 hourly for next 2 hours
4 hourly until discontinued

Cautions

- Airway obstruction/obstructive sleep apnoea (unless in ITU)
- Renal failure
- Liver failure

Not suitable for patients that:

- Cannot physically operate the device
- Are reluctant to use the device
- Do not understand the concept of PCA

Contraindications

- Lack of appropriately trained staff to care for the patient
- Lack of consent
- Concurrent intravenous opioid infusion (unless in ICU)
- Severe respiratory disease

Side effects

- Itching and erythema around the site of cannula and along the vein

(This is due to local histamine release and does not usually justify removal, it can be lessened by concomitant intravenous fluids through a Y connector with non-return valves)

- Nausea and vomiting (treat with one or more antiemetic)
- Respiratory depression

Problem	Features	Action
Respiratory depression	Respiratory rate less than 8 per minute	Stop PCA Remove button from patient Call anaesthetist or doctor Check oxygen saturation Administer oxygen Alert patient and encourage to breath Consider naloxone Dilute 1ml naloxone (0.4mg/ml) with 3 ml saline Give in 1ml (0.1mg) increments until respiratory rate 12 or more and sedation 0 or 1. Observe for 20 minutes as naloxone wears off after a few minutes. If this occurs repeat and wait for anaesthetist. Naloxone also antagonises the pain relief. The amount of naloxone given must be titrated to the level of respiratory depression and degree of pain.
Excessive sedation ACVPU is P or U	ACVPU is P ACVPU is U	Stop PCA until score is A or V Seek medical help Administer naloxone 0.2mg and repeat as required. Consider other causes of unresponsiveness
Nausea or vomiting	Nausea or vomiting	See Section 4 – Postoperative Nausea and Vomiting
Local irritation	Redness around intravenous site Swelling around intravenous site Itching around intravenous site	Morphine sometimes causes a mild irritation Seek medical advice Cannula may need re-siting

Intravenous morphine infusions

Intravenous morphine infusions may be required when intravenous opiate is required, and the patient is unlikely to manage a PCA effectively. This requires a dedicated pump and giving set (with non-return valves if the cannula is shared with intravenous fluid infusions).

Pump-specific Guidance and Training on the setting up and maintaining of the pumps is provided separately from these guidelines

Approved locations for use:
All sites – ITU, main theatre, main recovery
Trained nurse to patient ratio of 1:1 or 1:2 is required

Indications
Control of moderate to severe pain

Clinical situations where intravenous morphine infusions may be appropriate
Major surgery or trauma
Palliative care

Contraindications

- Lack of consent
- Lack of appropriately trained staff to care for the patient
- Concurrent administration of opioids by the oral epidural intrathecal intramuscular or transdermal routes
- Airway obstruction/obstructive sleep apnoea
- Renal failure
- Liver failure
- Severe respiratory disease
- Hypovolaemia
- Head injury

Drugs
Morphine sulfate

Drug	Concentration	Prepared	Infusion rate
Morphine sulfate	1 mg/ml	50mg in 50ml	0-10mg/hour

No other opioids or sedatives are to be given whilst a continuous intravenous opioid infusion is in progress unless prescribed by an anaesthetist or acute pain nurse. Initial pain control is achieved with small intravenous boluses of morphine. Pain control is then maintained with a continuous intravenous morphine infusion using a syringe driver. Morphine is eliminated slowly from the body so it can take up to 15 hours for blood levels to reach a steady state after starting or increasing the infusion. Progressive accumulation of morphine and its active metabolites leading to delayed overdose is a risk with this method of pain control.

How to set up the infusion

- Prescribe the infusion on the critical care infusion prescription form and ensure that naloxone is prescribed on the drug chart.
- Ensure oxygen naloxone and CPR equipment available.
- Use a BBraun infuser placed in a locked box. DO NOT use a PCA pump or any intravenous fluid pump.
- Use a separate intravenous cannula or multilumen connector with anti- reflux valves.
- Prepare morphine 1mg/ml by drawing up 50 ml of morphine 1mg/ml solution from a 50ml vial into a 50ml syringe.
- Ensure the infusion line has a clamp and anti- siphon valve.
- Prime the line and clamp it.
- Label the syringe

Guide to dosage

- Set the syringe driver to deliver 1mg/kg morphine intravenously over the first 24 hours
- E.g. For a 60kg patient set the driver to deliver 2.5mg/hour of morphine

$$\frac{60kg \times 1mg/kg}{24H} = 2.5mg/hour$$

Use a lower dose than calculated in obese patients e.g. BMI >30 kg/m2

- For example, use ideal body weight
- Use a lower dose than calculated in patients over 65yrs of age.
- Achieve initial pain control with small separate boluses of intravenous morphine if required

Observations

Pulse oximetry, pulse rate and respiratory rate should be monitored continuously. These and blood pressure, sedation score, pain score and volume remaining in syringe should be documented according to the following schedule

Table 1: Schedule for performing patient observations when on morphine infusion

Location and Timing	Frequency
In recovery	Every 5 minutes until stable then Every 15 minutes Record any bolus(es) given
after arrival on ICU	As per ICU guidance
If pain increases administer bolus	Every 15 minutes for one hour
If patients condition deteriorates	Seek help and Increase frequency of observations

These must be documented on the ICU observation chart

Inspect the intravenous cannula site daily. If it appears infected or inflamed, remove the cannula and site a fresh one if continuous intravenous opioid analgesia is still required

Troubleshooting Guide

Problem	Features	Action
Respiratory depression	Respiratory rate less than 8 per minute	Stop infusion Call Acute Pain nurse/anaesthetist Check oxygen saturation Administer oxygen Alert patient and encourage to breath Consider naloxone Give in 1ml (0.1mg) increments until respiratory rate 12 or more and sedation A or V Observe for 20 minutes as naloxone wears off after a few minutes. If this occurs repeat and wait for anaesthetist.
Excessive sedation ACVPU is P or U	ACVPU is P ACVPU is U	Stop infusion until score is A or V Seek medical help Administer naloxone 0.2mg and repeat as required. Consider other causes of unresponsiveness
Nausea or vomiting	Nausea or vomiting	See Management of Postoperative Nausea and Vomiting
Local irritation	Redness around intravenous site Swelling around intravenous site Itching around intravenous site	Morphine sometimes causes a mild irritation Seek medical advice Cannula may need re-siting

Spinal anaesthesia and analgesia

Spinal (or intrathecal as it is more accurately called) anaesthesia and analgesia is provided using a single-shot technique of local anaesthetic agent with or without an opioid. The local anaesthetic agent is usually heavy (contains glucose to increase density) or plain bupivacaine 0.5% and will typically last for up to 2 hours of surgery and resolve within 6 hours. The opioid will usually be fentanyl, diamorphine or morphine. These are used to improve the quality of intraoperative anaesthesia and prolong the duration of postoperative analgesia. Fentanyl may increase the duration of analgesia by several hours, whilst diamorphine works for 12 hours and morphine for up to 24 hours. The opioids also have some tendency to cause itching particularly in the dermatomes at the margins of the spinal effect. When morphine is used, enhanced post-operative respiratory monitoring is needed because of the risk of respiratory depression.
Please use PF WR5792 Spinal Intrathecal Morphine Form, alongside the pink WR5090 form.

Approved locations for use:
All spinal (intrathecal) injections are inserted in the theatre suites.
All sites – ITU, SECU/VECU, main theatres, main recovery, obstetric suite, obstetric theatre, obstetric recovery
Alexandra Hospital – All surgical wards
Treatment Centre – Ward 1
Worcestershire Royal Hospital – All surgical wards

Drugs & Dosage
As these are all performed in the theatre suites drugs and doses are beyond the remit of this guideline.

Additional requirements
All patients that have had a spinal (intrathecal) block must have oxygen prescribed and patent vascular access maintained by infusion.

Observations
Blood pressure, pulse rate, respiratory rate, oxygen saturation, pain and ACVPU scores must be recorded for each set of observations.
Document these on page 1 of the Spinal Observation Chart (PF WR5090) at the following time intervals

Location and Timing	Frequency
In recovery	Every 15 minutes
after return to ward for first 4 hours	Every hour
4 hours after return to ward until care pathway discontinued	

Side effects
Hypotension
Itching
Nausea and vomiting
Epidural abscess
Nerve damage
Epidural or subdural haematoma
Meningitis
Headache

For the management of complications of neuraxial analgesia/anaesthesia please request anaesthetic support.
WRH: Acute Pain Team (office hours) or 1st on call anaesthetist (bleep 700).
Alexandra Hospital: Acute Pain Team (office hours) or ITU SpR (bleep 1933)

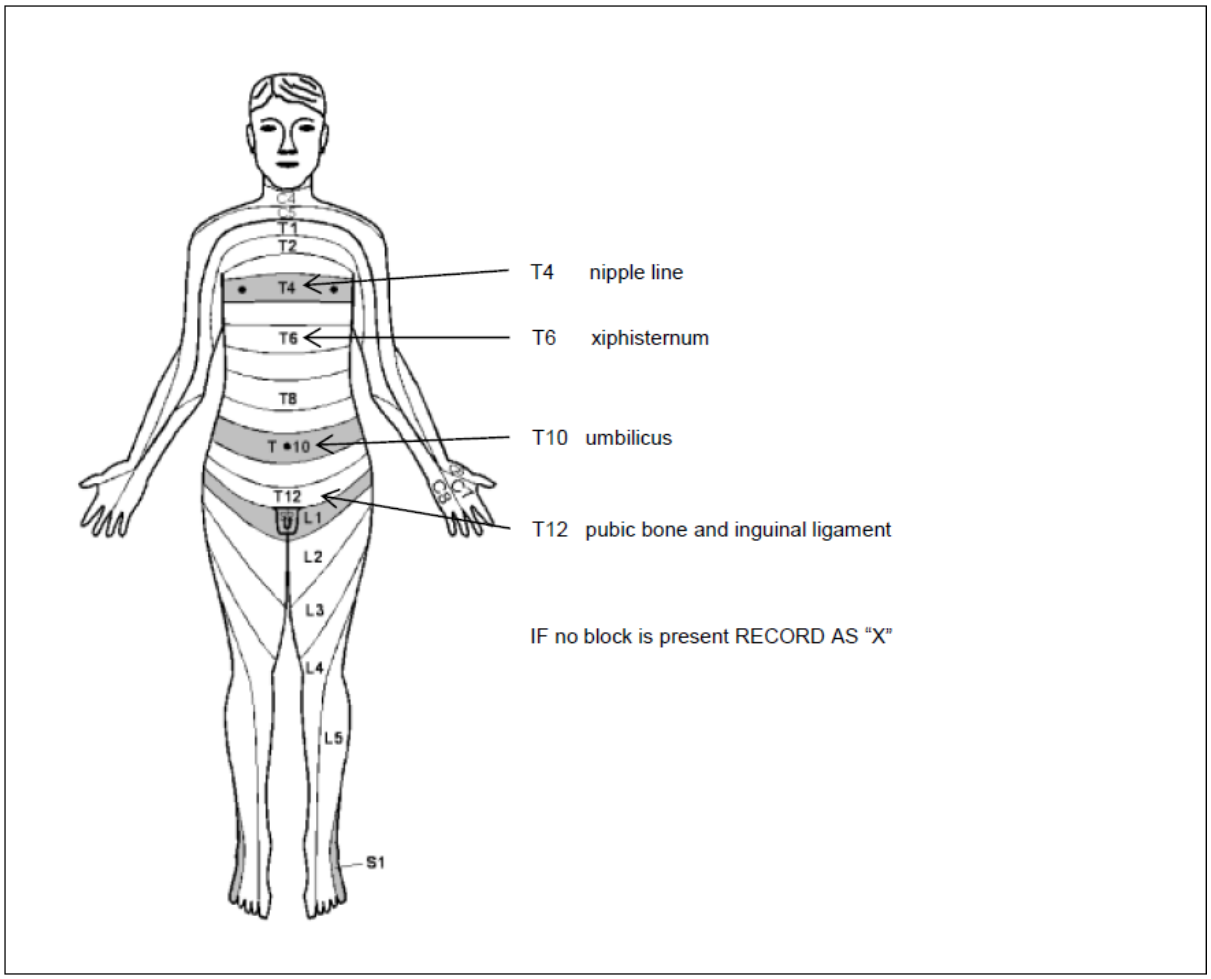
Assessment of block

Motor block score

Test for motor block	Code
Full movement of legs and feet able to straight leg raise	0
Full movement feet just able to move knees	1
Full movement of ankle and feet unable to move knees	2 Inform the Acute Pain Team/anaesthetist at that time
Full leg paralysis unable to move legs or feet	3 Inform the Acute Pain Team/anaesthetist at that time

It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

Sensory Block scoring:



Use 'Coolsticks' or ethyl chloride spray to assess the sensory level (to temperature) of the block. This works well for the purposes of monitoring and recording the block height

Epidural Analgesia and Paravertebral Local Anaesthetic Infusions

Epidural analgesia is a form of regional anaesthesia and is a central neuraxial technique. Epidurals are placed at either the thoracic or the lumbar level depending on the target level for analgesia. Epidural analgesia is the infusion of a mixture of local anaesthetic agent and opioid down a thin (epidural) catheter into the epidural space, the part of the spine through which the nerve roots pass. In this way, nerve conduction is reduced to reduce pain transmission but in addition may affect motor and sensory function too. The reduction in transmission of temperature sensation is one way in which the epidural can be tested.

Patient controlled epidural analgesia is epidural analgesia with the additional option for the patient to add supplementary bolus doses

Epidural analgesia requires specific equipment labelled for that use. This includes a dedicated epidural pump and a specific NRFit epidural giving set (colour coded yellow the same as the epidural care pathway).

The programme will have been set prior to the patient returning to the ward. The rate of infusion can be altered within the prescribed range by ward staff within the limits of the prescription. Only Anaesthetists, the Acute Pain team and epidurally competent band 6 staff (or above) may disconnect and reconnect the epidural line.

Pump-specific Guidance and Training on the setting up and maintaining of the pumps is provided separately from these guidelines.
Infusion or pump issues should be referred to the Acute Pain team (in hours) and the on-call anaesthetist (out of hours)

These infusions MUST NOT be connected to any intravenous administration system
This is VERY DANGEROUS

Approved locations for use:
(At least 1 nurse with up-to-date epidural training must be on duty)
All sites – ITU, SECU/VECU, main theatres, main recovery, obstetric suite, obstetric theatre, obstetric recovery
Alexandra Hospital – All surgical wards
Treatment Centre – Ward 1
Worcestershire Royal Hospital – All surgical wards

Drugs
Bupivacaine 0.1% with fentanyl 2 micrograms/ml (standard)
Bupivacaine 0.125% plain (alternative)
Levobupivacaine 0.1% with fentanyl 2 micrograms (standard)
Levobupivacaine 0.125% Plain (alternative)

Dosage

Drugs and concentration	Supplied as	Epidural infusion rate
Bupivacaine 0.1% Fentanyl 2 micrograms/ml	250 ml epidural bag	0-20ml/hour
Bupivacaine 0.125%	250 ml epidural bag	0-20ml/hour
Levobupivacaine 0.1% Fentanyl 2 micrograms/ml	250ml epidural bag	0-20ml/hour
Levobupivacaine 0.125%	250ml epidural bag	0-20ml/hour

Affix Patient Label here or record

NAME: . . . . . .

NHS NO:

HOSP NO:

D.O.B: D D / M M / Y Y Y Y MALE ☐ FEMALE ☐

WARD_____ CONS_____

For full guidelines please refer to WAHT-ANA-007

Worcestershire NHS
Acute Hospitals NHS Trust

EPIDURAL AND PCEA OBSERVATION CHART

ALLERGIES/ADVERSE DRUG REACTIONS		
NONE KNOWN ☐	SIGNATURE	SOURCE
DATE	DRUG / OTHER	REACTION DETAILS

Assembled, programmed, prescription checked and primed by:
Print and sign: _____ Date /time:_____
Checked, connected and commenced by:
Print and sign: _____ Date /time:_____

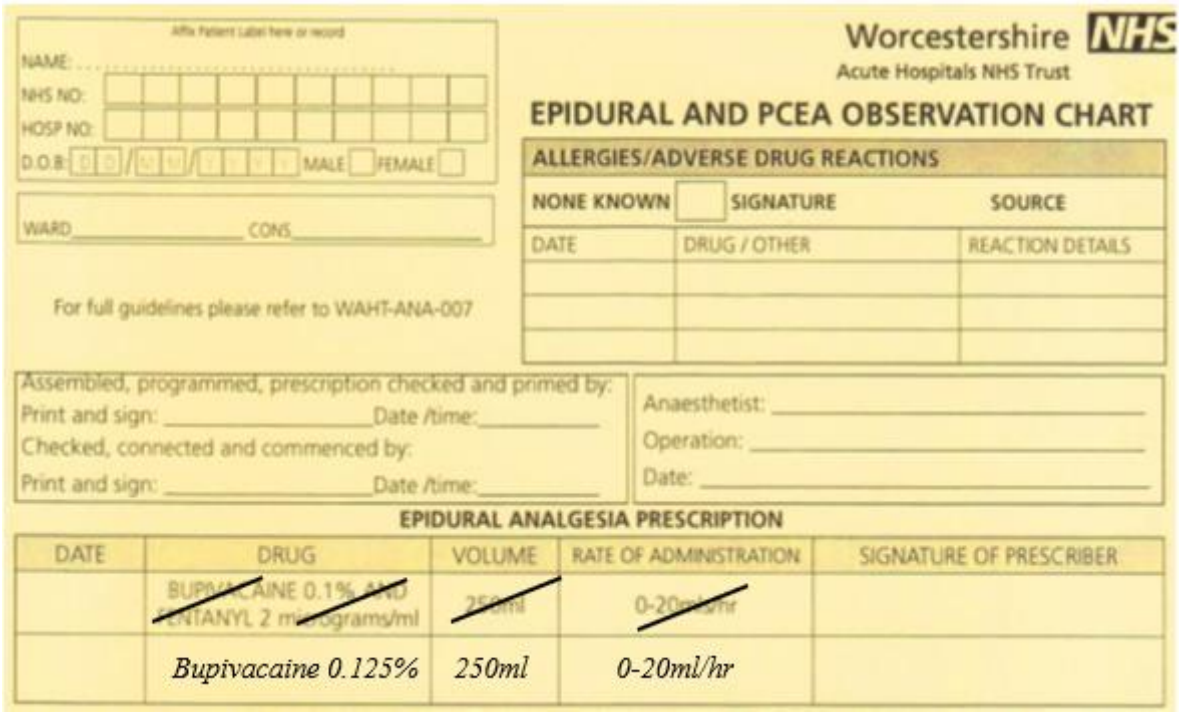
Anaesthetist: _____
Operation: _____
Date: _____

EPIDURAL ANALGESIA PRESCRIPTION

DATE	DRUG	VOLUME	RATE OF ADMINISTRATION	SIGNATURE OF PRESCRIBER
	BUPIVACAINE 0.1% AND FENTANYL 2 micrograms/ml	250ml	0-20mls/hr	

PATIENT CONTROLLED EPIDURAL ANALGESIA (PCEA) PRESCRIPTION

DATE	DRUG	VOLUME	RATE OF ADMINISTRATION	PCEA BOLUS DOSE (ml)	PCEA LOCK OUT TIME	SIGNATURE OF PRESCRIBER
	BUPIVACAINE 0.1% AND FENTANYL 2 micrograms/ml	250ml	0-4mls/hr	4mls	15mins	



Opioid free prescription

Additional requirements
All patients with epidurals must have patent vascular access and oxygen prescribed and available. It is essential that the Ephedrine prescription at the bottom of page 1 of the (**Epidural and PCEA Prescription and Observation Chart (PF WR1742)** is completed.
It is strongly recommended that the patient has a urinary catheter in situ whilst an epidural is running, unless clinical decision not to use one is made and clearly documented by the anaesthetist.
We also advise that additional opioids are not administered alongside a fentanyl/bupivacaine epidural, unless clinical decision is made by Acute Pain Team or Anaesthetist – the primary objective should be to optimise the epidural. Please contact the Acute Pain Team or on call Anaesthetist if help is needed with this optimisation.

Duration
The epidural filters are licensed for 96 hours use. The requirement for the epidural should be reviewed daily. If the epidural is required to continue beyond 96 hours, then the giving set and epidural filter must be changed. Scrupulous attention to infection control must be ensured using an aseptic non-touch technique. The open end of the epidural catheter must not become contaminated during the brief time between removing the old filter and attaching the new filter and administration line. This may be done by band 6 (or above) staff with appropriate training, otherwise seek help from the Acute Pain Team.

Connection of epidural infusion
The epidural infusion line must be connected to the epidural filter by the anaesthetist or recovery staff whilst the patient is still in theatre. A clear occlusive type dressing must be applied over the insertion site and the epidural line and filter, to reduce to risk of epidurals becoming disconnected.

Observations
Blood pressure, pulse rate, respiratory rate, oxygen saturation, pain and ACVPU scores must be recorded for each set of observations.
Motor block recording must continue 4 hourly for the 24hr after epidural removal.
Document these on pages 2 and 3 of the Epidural and PCEA Prescription and Observation Chart (PF WR1742) at the following time intervals

Location and Timing	Frequency
In recovery	Every 15 minutes
after return to ward - first 4 hours	Every hour
after return to ward - 4 hours onwards	Every 4 hours
after epidural bolus - for 30 minutes	Every 5 minutes AND Recheck motor and sensory block at end of 30 minutes
If pain increases	Recheck motor and sensory block

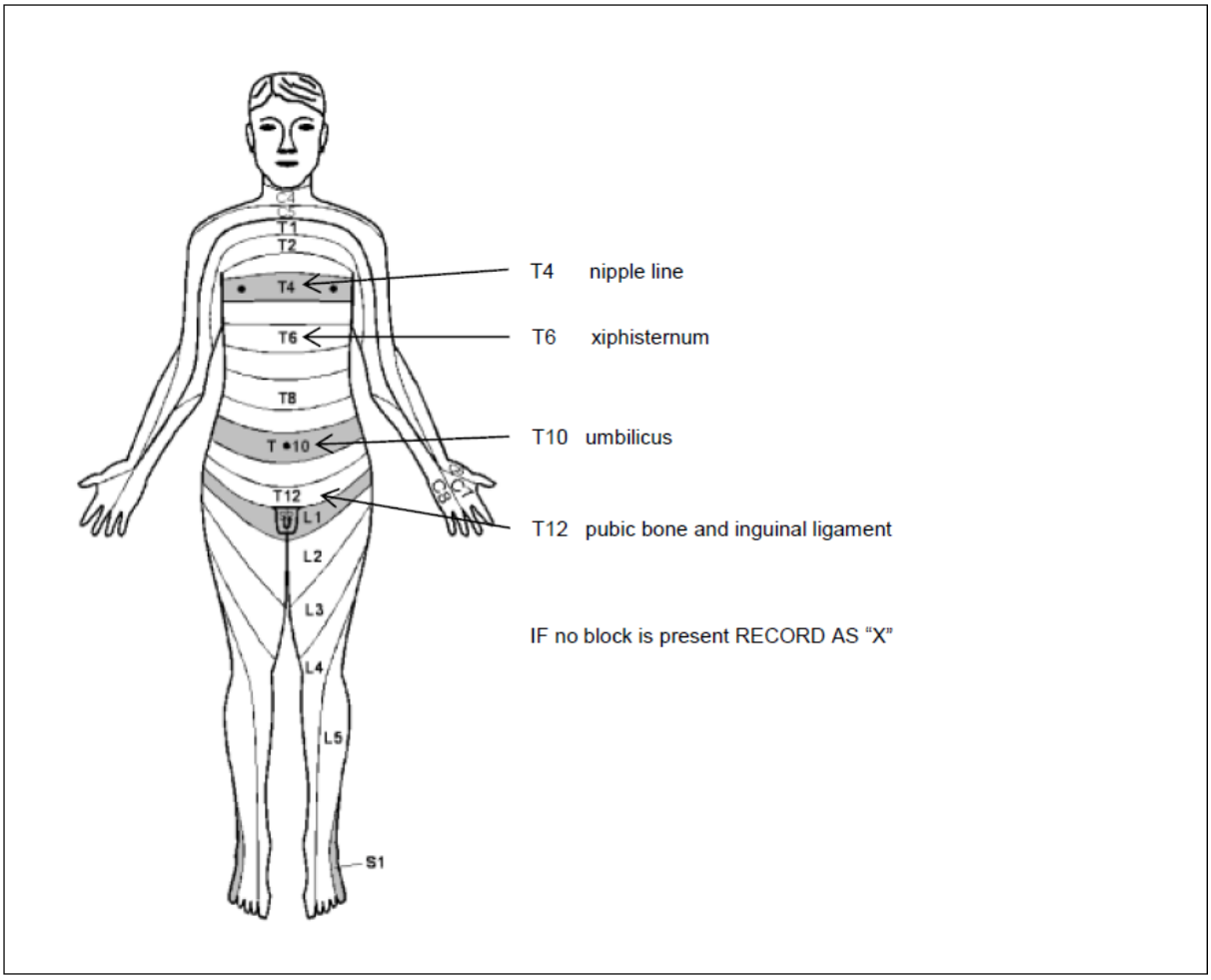
Assessment of block

Motor block

Test for motor block	Code
Full movement of legs and feet able to straight leg raise	0
Full movement feet just able to move knees	1
Full movement of ankle and feet unable to move knees	2 Inform the Acute Pain Team/anaesthetist at that time
Full leg paralysis unable to move legs or feet	3 Inform the Acute Pain Team/anaesthetist at that time

Sensory block

Use 'Coolsticks' or ethyl chloride spray to assess the sensory level (to temperature) of the block. This works well for the purposes of monitoring and recording the block height.



Contraindications

Lack of appropriately trained staff
Lack of consent
Local sepsis near insertion site
Systemic sepsis/bacteraemia
Untreated hypovolaemia
Anticoagulation therapy (see separate section)

Side effects
Hypotension
Itching
Nausea and vomiting
Epidural abscess
Nerve damage
Epidural haematoma

Discontinuation and Removal of Epidurals

Weaning of epidurals is **NOT** recommended. The patient should be established on regular oral analgesia and the epidural can then be stopped. Once the epidural has worn off, if the oral analgesia is effective the epidural can be removed paying attention to the timing of any antiplatelet or anticoagulant administration and the platelet levels. If the oral analgesia is inadequate the epidural will need to be recommenced at the same or a higher rate.

Enoxaparin
Check when patient last had enoxaparin
Prophylactic enoxaparin – remove catheter 12 hours after last dose
Therapeutic enoxaparin – remove 24 hours after last dose
Following epidural catheter removal, wait for 4 hours before giving next dose of enoxaparin

Platelets
If platelet level less than 80 x 10^9/L, give platelet transfusion then recheck level prior to removal.
If patient has immune thrombocytopenia or disseminated intravascular coagulation (DIC), where often giving platelets makes no difference to the platelet count in that patient, seek advice, start platelet transfusion and remove epidural catheter halfway through platelet transfusion.

Anticoagulants
Review drug chart to check that patient is not on any oral anticoagulants. If patient is taking anticoagulants, refer to “anticoagulation and epidurals” in pain guidelines

Clotting Results

Where appropriate (e.g. heparin, warfarin, coagulopathies) check the INR and/or APTTR. DO NOT REMOVE the epidural catheter until the ratio(s) is/are **less than 1.5**

It is essential that the catheter is intact when removed and the presence of the blue tip of the catheter confirmed
Date and document this on the Epidural and PCEA Prescription and Observation Chart (PF WR1742)

For the management of complications of neuraxial analgesia/anaesthesia please request anaesthetic support.
WRH: Acute Pain Team (office hours) or 1st on call anaesthetist (bleep 700).
Alexandra Hospital: Acute Pain Team (office hours) or ITU SpR (bleep 1933)

Treatment		
Prophylactic enoxaparin	Remove catheter at least 12 hours after last dose	Wait at least 4 hours after catheter removal before giving next dose
Therapeutic enoxaparin	Remove catheter at least 24 hours after last dose	Wait at least 4 hours after catheter removal before giving next dose.
Platelets	Platelets > 80 x 10^9/L	OK to remove
Warfarin	INR/APTR <1.5	OK to remove
	INR/APTR >1.5	Treat and repeat
Unfractionated heparin	APTTR <1.5	OK to remove
	APTTR >1.5	Treat and repeat

Accidental disconnection

If the epidural catheter becomes disconnected between the filter and the catheter, then the catheter MUST be removed but only if the above clotting conditions are satisfied. If not, then clean the outside of the open end with 0.5% chlorhexidine in 70% ethanol and apply a non-porous dressing labelled with the time and date to be removed.

The acceptable use of epidural injections and infusions in the presence of impaired coagulation, anticoagulants or antiplatelet drugs

Aspirin/NSAIDs	Given alone proceed normally. ASRA guidelines advise against epidural analgesia if patient also on low molecular weight heparin, unfractionated heparin or warfarin
Thrombocytopenia < 80 x 10^9/L or platelet count falling rapidly	Epidural contraindicated
Abnormal coagulation, increased PTR or APTTR greater than 1.4	Epidural contraindicated
Warfarin therapy INR greater than 1.4	Epidural contraindicated
Clopidogrel within 7 days	Epidural contraindicated

Eptifibatide or Tirofiban within 4 to 8 hours	Epidural contraindicated
Abciximab within 24 to 48 hours	Epidural contraindicated
Intravenous heparin	intravenous heparin infusion in progress; epidural contraindicated. Intraoperative heparinisation acceptable 1hr after epidural catheterisation. Exercise caution if bloody tap or concurrent coagulopathy/aspirin. Avoid an epidural if prolonged heparinisation anticipated post operatively
SC unfractionated heparin thromboprophylactic dose ≤ 10 000 units/day and ≤ twice daily	Wait 4-6 hours since last dose or give heparin after epidural catheterisation. Also check platelet count if been on heparin >4 days
SC unfractionated heparin thromboprophylactic dose > 10 000 units /day or > twice daily	Epidural contraindicated
Normal once daily SC thromboprophylactic dose low molecular weight heparin e.g. enoxaparin 20-40mg /day	Wait at least 12 hours since last dose. Delay first post op dose 4 hours. Subsequent post op doses every 24 hours after that.
"Treatment" dose SC low molecular weight heparin e.g. enoxaparin 1.5mg/kg every 24 hours or enoxaparin 1mg/kg 12hrly	Wait at least 24 hours since last dose
Fondaparinux therapy within 36 hours	Epidural contraindicated
Fibrinolytic/thrombolytic therapy	Epidural contraindicated
Iloprost (trometamol) intravenous infusion in progress	Epidural contraindicated
Dabigatran therapy within 36 hours	Epidural contraindicated
Rivaroxaban therapy within 24 hours	Epidural contraindicated
Apixaban therapy within 48 hours	Epidural contraindicated
Edoxaban therapy within 72 hours	Epidural contraindicated

Use **Nil by mouth and peri-operative medicines use guidelines - WAHT-ANA-014** for detailed guidance

Suggested time intervals for antithrombotic administration before and after central neuraxial blockade (CNB) or catheter removal

Drug	Time interval to discontinue before CNB or catheter removal	Time interval to (re)commence after CNB or catheter removal
Aspirin and NSAIDs	Nil	Nil
Clopidogrel	7 days	4 hours after catheter removal
Prasugrel	7-10 days	6 hours after catheter removal
Unfractionated heparin prophylaxis (subcutaneous)	4-6 hours	1 hour

Unfractionated heparin (iv)	Stop infusion 2-4 hours before (check APTT)	1 hour
LMWH (prophylactic dose)	12 hours	2 to 4 hours
LMWH (treatment dose)	24 hours	2 to 4 hours
Fondaparinux (for prophylaxis)	36 hours	6 hours after surgery/CNB 12 hour after catheter removal
Warfarin	INR 1.4 or less	4 hours after catheter removal
Dabigatran	Use is contraindicated by the manufacturers with postop. Indwelling epidural catheters	6 hours
Rivaroxaban (prophylactic/treatment dose)	18 hours / 48 hours	6 hours
Apixaban	48 hours	5 hours

Davies 2012 and use **Nil by mouth and peri-operative medicines use guidelines - WAHT-ANA-014** for detailed guidance

All patients must have a motor and sensory block assessment prior to antithrombotic medication being given

Clopidogrel & epidural catheters

In the event that clopidogrel is given to a patient before the epidural catheter is removed, inform the Acute Pain Team. Do not give any further doses of clopidogrel. The epidural catheter must not be removed for 3 days after giving clopidogrel unless risk of leaving catheter in (e.g. infection/sepsis) outweighs risk of bleeding. Platelets should be given before the epidural catheter is removed. Remove catheter immediately after platelet transfusion is complete. Do not give clopidogrel until 24 hours after epidural catheter has been removed. Neurological function must be assessed every 4 hours for 48 hours following epidural catheter removal.

Troubleshooting Guide

Features		Action
Inadequate pain relief	Pain score 2 or 3	Increase the rate and/or contact the APS nurse or Anaesthetist to administer a bolus
Block too high NB: All patients should have their epidural sensory block titrated to comfort. Some surgeries with high	Block level T4 or above *If the patient is* ***haemodynamically unstable*** *or sedated*	Stop epidural 5 minute observations until NEWS<3. Repeat the block check after 30 minutes. If no improvement, call APS nurse or Anaesthetist

incisions may require a sensory block of T3/4 to keep the patient comfortable, which should be maintained.	*If a patient is **haemodynamically stable** and is not sedated*	Sit the patient up Halve the epidural rate Repeat the block check after 30 minutes; - If the block is T3 or below continue. - If the block is above T3, stop the epidural and contact the APS nurse or Anaesthetist.
Low blood pressure NB: Hypotension secondary to epidural analgesia frequently occurs without a tachycardia. Epidurals may reduce the tachycardia of hypovolaemia	Systolic BP less than 100 mmHg Systolic BP less than 80 mmHg (or symptoms of nausea, giddiness, fainting or extreme thirst	Administer intravenous fluid Exclude haemorrhage, high block, sepsis. Review infusion rate. Call ward doctor Consider use of ephedrine As above but call anaesthetist urgently
Significant or increasing motor blockade	Blockade increasing without increase in infusion or boluses	Call anaesthetist or APS nurse **DO NOT DELAY** **Use Flow Chart Management of leg weakness during or after epidural infusion**
Intravenous migration of catheter	Tingling lips Dizziness Palpitations Hypotension	Stop epidural Call anaesthetist Refer to LA toxicity section below
Subdural migration of catheter	Isolated block	Stop epidural Call anaesthetist or APS nurse
Nausea or vomiting	Nausea or vomiting	See Section 4 – Postoperative Nausea and Vomiting
Leakage at epidural skin site	Wet dressing (?infected/bloody)	Irritation may be local aseptic skin redness. If pus or blood seek advice of anaesthetist
Respiratory depression	Respiratory rate less than 8 per minute	Stop epidural Ensure epidural is no longer running Administer oxygen Call ward doctor +/- anaesthetist

		Alert patient and encourage to breath
Excessive sedation	Sedation score 2 or 3	Stop epidural Ensure epidural is no longer running Check respiration rate Look for other causes of reduced conscious level Call ward doctor +/- anaesthetist

Local anaesthetic toxicity

Toxic effects usually result from excessive plasma concentrations, which may occur because of inadvertent intravascular administration or overdose.
Signs and symptoms of local anaesthetic toxicity:

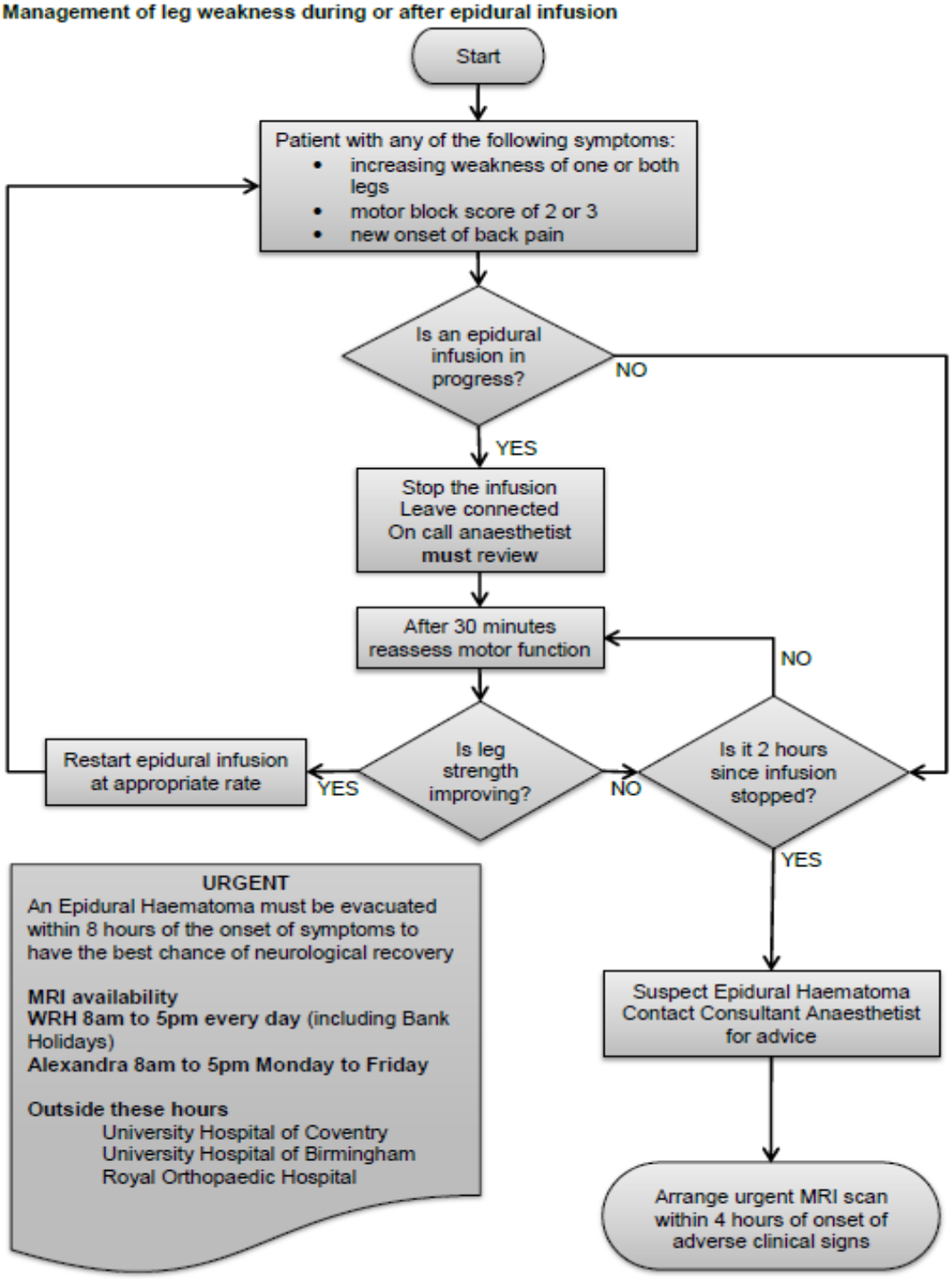
- Light headedness
- Numbness and tingling around the mouth and numbness of tongue
- Tinnitus
- Visual disturbance
- Muscular twitching
- Drowsiness
- Unconsciousness
- Convulsions
- Coma
- Respiratory / Cardiac arrest

Resuscitation equipment, oxygen and appropriate drugs must be readily available wherever local anaesthetic boluses are administered. Immediate management is to stop the administration of local anaesthetic. Treatment of severe local anaesthetic toxicity includes the infusion of lipid, also known as 'lipid rescue'
Intralipid® and administration details are kept in:

- Theatres recovery (countywide)
- Obstetric Theatre
- A&E resuscitation
- Intensive Critical Care Units
- High Care Units (SECU/VECU)

Full details on the management of local anaesthetic toxicity are the 2010 AAGBI guidelines "Management of Severe Local Anaesthetic Toxicity" (kept with the Intralipid® and also at https://www.**aagbi**.org/sites/default/files/la_**toxicity**_2010_0.pdf

Management of leg weakness during or after epidural infusion



Non-epidural catheter techniques

Rectus sheath and local anaesthetic peripheral catheters

Rectus sheath catheters are inserted into the anterior abdominal wall and are used for pain management following abdominal surgery when an epidural catheter is contraindicated or excessive. They are inserted during surgery by either anaesthetist or surgeon. Two catheters are used, one on each side, to be effective. Rectus sheath blocks and catheters work best for incisions in the midline as this is the territory supplied by the nerves they block. They only act on pain originating in the wound and do not cover any visceral pain caused by the surgery within the abdominal cavity and pelvis. They tend to be opioid sparing and reduce the requirement for other analgesia.
There are other parts of the body where a local anaesthetic catheter maybe inserted for pain management i.e. rib and hip fractures, limb amputations.
.

Approved locations for use:

All sites – ITU, SECU/VECU, main theatres, main recovery, obstetric suite, obstetric theatre, obstetric recovery
Alexandra Hospital – All surgical wards
Worcestershire Royal Hospital – All surgical wards

Contraindications
Lack of appropriately trained staff
Lack of consent
Local sepsis near insertion site
Allergy to the local anaesthetic agent
Systemic sepsis/bacteraemia
Untreated hypovolaemia
Anticoagulation therapy (see separate section)

Side effects
Hypotension
Itching
Nausea and vomiting

Signs of local anaesthetic toxicity
tinnitus
double vision
numbness or tingling of the mouth
change in taste or dizziness
bradycardia
unrecognised may lead to coma and death

Drugs
Bolus administration Bupivacaine 0.25% (2.5mg/ml)
Catheter infusion Ropivacaine 0.2% (2mg/ml)

Bupivacaine - A maximum dose of 2mg/kg of body weight is allowed 6 hourly
Ropivacaine - A maximum dose of 3.5mg/kg of body weight is allowed 6 hourly

Dose adjustment for men greater than 90kg and women greater than 70kg

Use Lean Body Weight (LBW) which is calculated using the Janmahasatian Formula as described by the Society for Obesity and Bariatric Anaesthesia (SOBA) whose guidelines have been adopted by the Trust (see SOBA guidance on Perioperative Anaesthetic Care of the Surgical Patient with Obesity)

The Janmahasatian Formula calculates the patient's lean body weight (LBW) excluding fat using one of the following formulae:

Males

LBW = 9270 x TBW / 6680 + (216 x BMI)

Females

LBW = 9270 x TBW / 8780 + (244 x BMI)

To calculate the **Lean body weight (LBW)** you need to know the patient's actual or total body weight (TBW) and their height in metres (H).

Male

$$LBW = 9270 \times \frac{TBW}{6680} + \left(216 \times \frac{TBW}{H^2}\right)$$

Female

$$LBW = 9270 \times \frac{TBW}{8780} + \left(244 \times \frac{TBW}{H^2}\right)$$

So

$$Bupivacaine\ dose\ (in\ mg) = 2\ (mg/kg) \times LBW(kg)$$

Dosage

Drugs and concentration	Supplied as	Bolus	Infusion
Standard prescription			
Bupivacaine 0.25% (2.5mg/ml)	10ml ampoules		20 ml in each catheter every 6 hours
Alternative prescription for patients weighing less than 50kg			
Bupivacaine 0.25% (2.5mg/ml)	10ml ampoules		0.4 ml/kg in each catheter every 6 hours
Infusion using SapphireTM Pump			
Ropivacaine plain 0.2% (2mg/ml)	200ml		10ml/h (20mg/h) via local anaesthetic peripheral catheter

The Rectus Sheath Catheter Prescription Chart **(PF WR5157)** or Local Anaesthetic Peripheral Catheter Prescription Chart **(PF WR5516)** must be used.

Procedure
The overall responsibility for the management of the indwelling catheters remains with the anaesthetist or surgeon who inserted them. Ward staff (both medical and surgical) must follow the written protocols and in the case of any problems contact the Acute Pain Team or on-call anaesthetist.

Only anaesthetists or healthcare professionals who have documented competency in administering local anaesthetic boluses and can recognise the symptoms and signs of local anaesthetic toxicity should perform bolus doses.

Catheter insertion
Catheters can either be inserted using ultrasound guidance by an anaesthetist or under direct vision by the surgeon. The catheter should be secured in place to minimise movement. The dressing should allow easy visibility of the insertion site and catheter. The catheter should be labelled, regarding site and specific use for local anaesthetic only. An antibacterial filter and a bung must be attached to each catheter.
Patients with local anaesthetic catheters must have intravenous access maintained.

Bolus dose administration
Boluses must only be administered by doctors competent in the administration of local anaesthetic agents or a qualified Registered nurse who has attained intravenous drug competency AND who has received additional training and been assessed as competent in bolus-ing rectus sheath and local anaesthetic peripheral catheters. Training is provided by the Acute Pain Team).

1. Ensure the patient has patent intravenous access
2. Check the catheter for signs of infection, leakage or migration
3. Use standard personal protection (apron and gloves)
4. Using an aseptic non-touch technique
    - Remove the bung from the catheter filter and aspirate gently for blood
    - If no blood is aspirated, administer 5ml of the local anaesthetic solution
5. Wait for 2 minutes. During this time, ask the patient to report any tinnitus, double vision, numbness or tingling of the mouth, change in taste or dizziness. If any symptoms develop, do not administer any further bolus of local anaesthetic.
6. If no symptoms then gently aspirate again and if no blood then administer a second 5ml bolus
7. Do this for the remaining dose (standard is four 5ml boluses)
8. Then re-attach a new sterile bung to the filter and sign the prescription chart.
9. If present, repeat for the second catheter

All patients with local anaesthetic regimens must be referred to the Acute Pain Service for on-going care and follow up, using the referral forms attached to the prescription charts. Local anaesthetic boluses will vary in the extent to which they cause loss of sensation in the affected area, with some patients experiencing very little to others experiencing significant sensory block.

It is the responsibility of every individual to ensure this is the latest version as published on the Trust Intranet

Additional requirements

All patients with rectus sheath and local anaesthetic peripheral catheters must have patent intravenous access and oxygen available.
Patients should have simple analgesia such as Paracetamol and NSAIDs (if no contraindications) prescribed plus opioids for breakthrough pain.

Resuscitation equipment, oxygen and appropriate drugs must be readily available wherever local anaesthetic boluses are administered. Intralipid® is stored in main theatres in recovery, also in the obstetric unit, A&E resuscitation, ITU, SECU/VECU. For management of local anaesthetic toxicity please refer to the 2010 AAGBI guidelines "Management of Severe Local Anaesthetic Toxicity" (kept with the Intralipid® and also at https://www.**aagbi**.org/sites/default/files/la_**toxicity**_2010_0.pdf

Observations

Document blood pressure, pulse rate, respiratory rate, oxygen saturation, pain score and ACVPU score for each set of observations at the frequency indicated below.
These must be documented on the **NEWS 2 (PF WR5044 NEWS National Early Warning Score) and Pain and Observation chart (PF WR5591)**, at the following time intervals:

Location and Timing	Frequency
After each bolus	At 15 minutes and 30 minutes
Greater than 30 minutes after last bolus	Standard for NEWS

Inspect the insertion site of the catheter at least once every nursing shift for leakage, signs of inflammation or catheter migration. Seek advice from APS or on call anaesthetists if concerned. The site should be check for a further 24 hours after the catheter has been removed.

Duration

Rectus sheath catheters are usually required for 3 days but can be continued for up to 7 days. The bacterial filters are licensed for 96 hours use. The requirement for the catheter should be reviewed daily. If the catheter is required for longer than 96 hours, then the giving set and filter (but not the catheter) must be changed. Infection control must be assured. The open end of the catheter must not become contaminated during the brief time between removing the old filter and attaching the new filter. If in doubt seek help from the Acute Pain Team (on call anaesthetist/intensivist out of hours).

Discontinuation of the local anaesthetic peripheral/rectus sheath catheters

Prior to removal, a period of 6 hours should elapse after the last bolus dose and pain must continue to be assessed to confirm the adequacy of the alternative analgesia provided.

Catheter removal

This is an aseptic procedure. After removing the dressing and fixation device, apply gentle traction to the catheter and ensure it is intact. Look for presence of tip on catheter.
If there are any signs of infection, send tip for MC+S. Apply a clean dressing for 24 hours.

Peripheral Nerve Blockade

Definition
Peripheral Nerve Blockade (PNB) is the blockade of transmission of pain and sensation in major nerves using local anaesthetic agents with or without adjuncts. This allows more precise targeting of effects than are possible with epidurals, and post-operative care is considerably safer and less labour intensive. Appropriately selected pain relief may also be better.

Indications
- Management of well-localised acute pain expected to resolve within the duration of a single injection (4 to 18 hours dependent on nerve)
- Lower and upper limb surgery
- Inguinal surgery
- Genital surgery
- Pain control for fractured neck of femur (e.g. fascia iliaca block)

Designated areas of use
Main theatres, main recovery, all surgical wards, central delivery suite, ITU, SECU/VECU. For other areas discuss with acute pain nurse or consultant anaesthetist.

Initiating Treatment
Nerve blocks are administered by anaesthetists. Occasionally, indwelling catheters may be used, in which case the Local Anaesthetic Peripheral Catheter Prescription Chart (**PF WR5516**) will be completed and provides specific instructions on their management.

Monitoring treatment (minimum requirements)
Check that damage (e.g. pressure, scalding, extremes of joint movement) does not occur to areas of the body with reduced sensation.
Check that a resolving block does not start to increase. Contact APS nurse or on call anaesthetist without delay.

Managing Problems
Problems that may be encountered with PNB are as follows:
- ❖ Inadequate pain relief
- ❖ Temporary loss of motor function or sensation

If pain relief is inadequate, ensure that oral (rectal) analgesia has been prescribed and administered regularly. If this is inadequate, then consider Patient Controlled Analgesia or Ask for advice as required.

Discontinuing PNB
The block will wear off spontaneously. Once it starts to wear off it can become ineffective quite quickly, so it is important to ensure that replacement (usually oral) systemic analgesia has been administered in plenty of time.

Fascia Iliaca Block

Definition
The fascia iliaca block is a unilateral peripheral nerve block It is performed just 1cm caudal to the inguinal ligament which runs between the anterior superior iliac spine laterally and the pubic tubercle medially. The fascia iliaca compartment contains the femoral nerve and the lateral cutaneous nerve of the thigh (also known as the lateral femoral cutaneous nerve). This is a single shot technique which may be repeated.

Indication
Radiologically confirmed fractured neck of femur.
NICE CG124 recommends adding nerve blocks if paracetamol and opioids do not provide sufficient preoperative pan relief or to limit opioid dosage.

Contraindications
- Patient refusal
- Hypersensitivity to local anaesthetic agents
- Peripheral neuropathy
- Infection at the intended site of injection
- Previous vascular surgery to the iliac, femoral or popliteal arteries

Designated areas of use
Main theatres, main recovery, emergency departments.

Initiating Treatment
Fascia iliac blocks must only be performed by appropriately trained emergency department, orthopaedic and anaesthetic doctors (Parker MJ).

Monitoring treatment (minimum requirements)
Check that damage (e.g. pressure, scalding, extremes of joint movement) does not occur to areas of the body with reduced sensation.
Check that a resolving block does not start to increase. The APS should be contacted without delay

Local Anaesthetic Toxicity
As with other local anaesthetic techniques there is a risk of systemic toxicity (see AAGBI guidance on managing local anaesthetic toxicity for management).

Managing Problems
Problems that may be encountered with fascia iliaca block are as follows:
- ❖ Inadequate pain relief
- ❖ Temporary loss of motor function or sensation

If pain relief is inadequate, ensure that alternative analgesia has been prescribed and administered regularly. If this is inadequate, then consider Patient Controlled Analgesia or Ask for advice as required.

Discontinuing fascia iliaca block

The block will wear off spontaneously. Once it starts to wear off it can become ineffective quite quickly, so it is important to ensure that replacement (usually oral) systemic analgesia has been administered in plenty of time. Alternatively, the block may be repeated.

Peripheral Nerve Blockade catheters

There are times when a single shot peripheral nerve block is inadequate to provide the duration of analgesia required. This may be because of impending surgery or because of operations that take longer for the pain to resolve to a level that can be managed with oral medication. Examples of blocks that may benefit from this include the brachial plexus, subacromial space for shoulder surgery, sciatic nerve for amputations.

A peripheral nerve catheter is placed under standard aseptic precautions, either prior to surgery or by the surgeon at the end of the procedure. A dose of local anaesthetic agent is administered and then may be topped up by continuous infusion or intermittent boluses to maintain analgesia. The Local Anaesthetic Peripheral Catheter Prescription Chart (**PF WR5516**) must be used.

Indications

Patient likely to experience severe pain that is likely to persist beyond the expected duration of the single shot

Contraindications

- Patient refusal
- Hypersensitivity to local anaesthetic agents
- Peripheral neuropathy
- Infection at the intended site of injection

Designated areas of use

Main theatres, main recovery, all surgical wards, ITU, and SECU/VECU. For other areas discuss with acute pain nurse or consultant anaesthetist.

Local Anaesthetic Toxicity

As with other local anaesthetic techniques there is a risk of systemic toxicity (see AAGBI guidance on local anaesthetic toxicity).

Avoid exceeding the maximal dose.

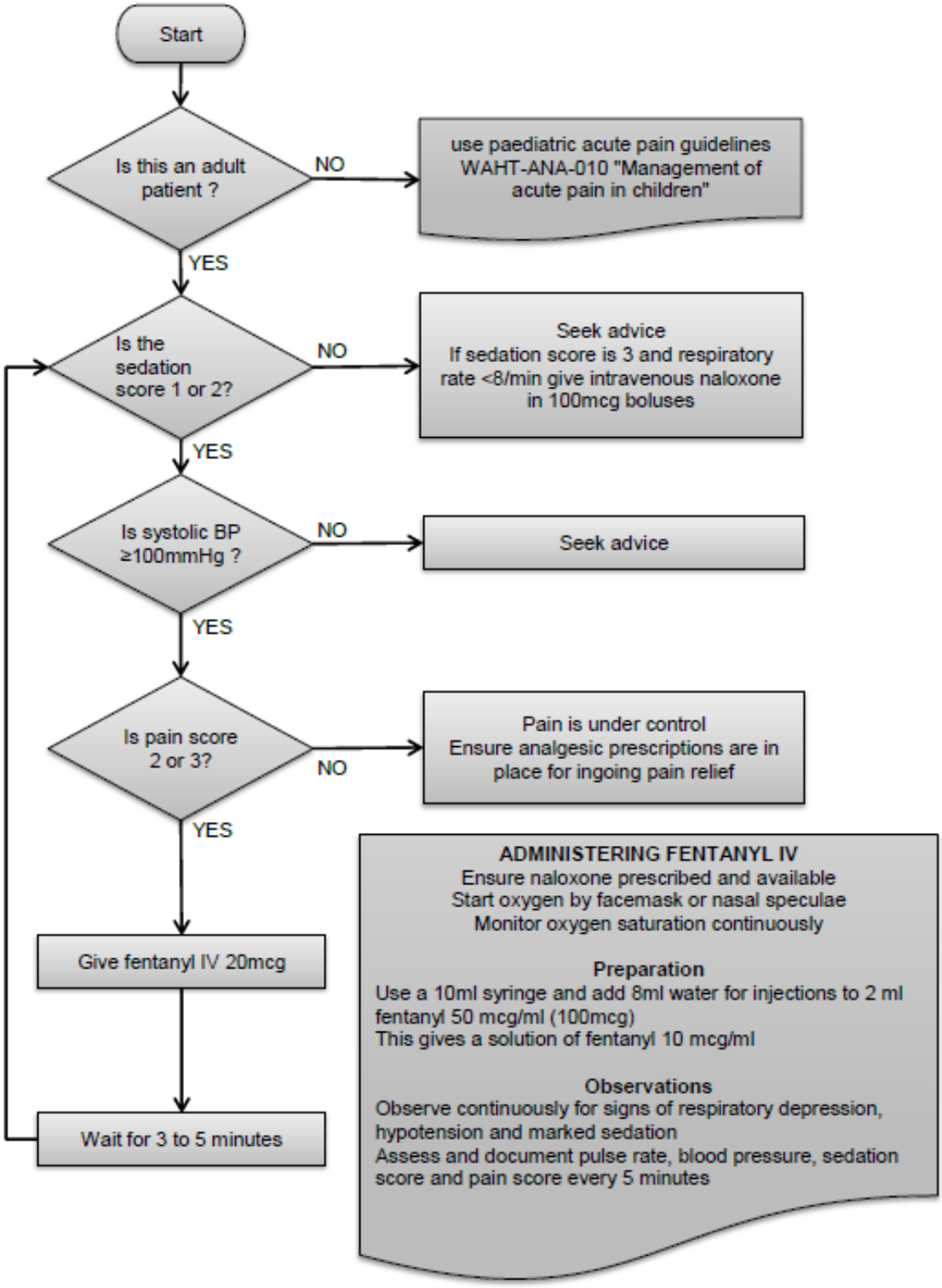
Local anaesthetic agent	Maximum dose	Up to Maximum
Bupivacaine	2mg/kg	150mg
Bupivacaine with adrenaline	2mg/kg	150mg
Ropivacaine	3.5mg/kg	300mg

Infection is another risk, and this should be minimised by:

- Not placing catheters in septic patients
- Using sterile precautions during insertion
- Attaching the bacterial filter to the end of the catheter
- Removing the catheter if the bacterial catheter is disconnected from the catheter
- Monitoring the catheter site for signs of infection (redness, oozing)

Section 3 – Strategies for Effective Pain Management

Intravenous fentanyl bolus administration in theatre recovery room



Acute Neuropathic Pain after Surgery and Trauma

Acute neuropathic affect approximately 2% of post-operative patients. Prompt appropriate treatment may prevent the development of chronic pain which occurs post-operatively in 10-50% of patients.

Clinical features

- Pain is described as:
- Pain
    - Burning
    - Stabbing
    - Lancinating (shooting)
    - Freezing
- Allodynia: pain in response to a stimulus that does not normally provoke pain eg light touch.
- Hyperalgesia: an increased response to a stimulus that is normally painful.
- Dysesthesias: unpleasant abnormal sensations

Pain may be in an area of sensory loss. The pain is poorly responsive to opioids. Wound healing will be normal.

Clinical Context

Acute neuropathic pain may occur after any surgical procedure, but is more common in the following situations:

- after thoracotomy
- after mastectomy
- after amputation
- after nerve injury e.g. brachial plexus, spinal cord
- after major crush injuries or upper or lower limb
- with painful diabetic neuropathy

Management of Acute Neuropathic Pain

Early intervention is paramount. Treatment can and should be initiated by any prescriber and there is no need to wait for a member of the Acute Pain Team.
Acute neuropathic pain is treated by oral medication in conjunction with psychological support. Refer to the Area Prescribing Committee guideline for the management of neuropathic pain

1. Start either amitriptyline or gabapentin
2. Try the other option of amitriptyline or gabapentin
3. Try both together
4. Use tramadol only as a short-term measure for the acute situation
5. Pure opioids (e.g. morphine) are unlikely to achieve much benefit in treating the neuropathic component of the pain
6. Capsaicin cream is non-formulary and unlicensed for this indication

Pharmacology

Analgesic	Route	Dose	Frequency	Notes
Drug	Route	Dose	Frequency	Notes
Amitriptyline	Oral	10mg to 25mg	At night	May be Increased 75mg/24HRS
Gabapentin	Oral	300mg 300mg 300mg	Day 1 Once/24HRS Day 2 Twice/24HRS Day 3 Three times/24HRS	For renal impairment, see BNF
Tramadol	Oral	50 mg to 100 mg	Four times/24HRS	Rescue Treatment 400mg/24HRS maximum

Amitriptyline
Amitriptyline is effective at doses about half that used to treat depression
Contraindications

- Arrhythmias, particularly heart block
- Recent myocardial infarction.

Check 12 lead ECG prior to commencing treatment
There are several important drug interactions as listed in the British National Formulary

Side effects

- Arrhythmias
  - heart block
- convulsions
- drowsiness
- dry mouth
- blurred vision
- urinary retention
- and in the elderly
  - postural hypotension
  - dizziness
  - syncope

The side effects appear within a few hours whilst the analgesic effects take a few days to appear.

Gabapentin.
Gabapentin may be a more appropriate first choice in the elderly (starting with lower doses) and patients with cardiac conduction defects. It is generally well tolerated and there are few interactions with other drugs. Its absorption is reduced by antacids.
Side effects

- Somnolence

- Dizziness

The following should not be started in non-specialist settings without advice from a specialist to do so:

- capsaicin patch
- lamotrigine
- levetiracetam
- morphine
- topiramate
- tramadol for long term use
- venlafaxine.

Patients on Long-Term Opioid Therapy

Patients who have been taking strong opioids for more than two weeks may develop tolerance to and physical dependence on opioids. This does not mean that they are addicts. Reported pain scores are higher and an objective assessment of function may be a better guide to therapy.

Although opioid requirements will often be much higher than in opioid naïve patients, surgery itself may increase or decrease opioid requirements.
The aim is to control pain, whilst avoiding overdose and a withdrawal syndrome.
Do not attempt to withdraw opioids in the perioperative period.

Calculate the patient`s baseline opioid requirement from their pre-admission opioid dose.
To prevent a withdrawal reaction, maintain this baseline opioid requirement using the same drug and route of administration if possible.
If an alternative opioid/route of administration is necessary (e.g. if the patient is “nil-by-mouth”) calculate the equivalent opioid dose using the table below:

Oral morphine to intravenous morphine conversion (conversion ratio 3:1)	
Oral morphine 10mg	intravenous morphine 3.3mg
Oral morphine to transdermal fentanyl *approximate* equivalent dose conversion*	
Total 24hr oral morphine equivalent dose	Transdermal fentanyl patch dose
30mg/day	fentanyl 12 micrograms per hour patch
60mg/day	fentanyl 25 micrograms per hour patch
120mg/day	fentanyl 50 micrograms per hour patch
180mg/day	fentanyl 75 micrograms per hour patch
240mg/day	fentanyl 100 micrograms per hour patch

Be aware that analgesic efficacy is delayed and can take up to 24 hours for full effect.
Additional alternative analgesia will be required during this time.
*If converting to an alternative opioid start at 25% to 50% of the calculated equivalent dose.

PCA

Intravenous morphine PCA with a continuous background infusion is useful if the patient cannot tolerate oral opioids perioperatively. This background infusion is administered by a separate locked pump. **Any PCA with a continuous background infusion must be managed in an ICU setting.**

Set the continuous background infusion to provide 50-100% of the patient`s baseline opioid requirement after equivalent dose conversion. If converting to morphine from another opioid, start at 50% of the equivalent dose. A higher bolus dose will often be required compared to opioid naïve patients.

Adjust the continuous background infusion and bolus dose as required. Keep the background infusion in mg/ hour ≤ the bolus dose in mg.

Use paracetamol, non-selective NSAIDs and local anaesthetic techniques when possible.

Liaise with other health care professionals involved with the patient`s care.

Fentanyl patches
Continue at pre-admission dose. Do not increase patch dose to treat acute pain.
Intra-operatively do not use forced air warming blanket on patient with Fentanyl patch.
NB Fentanyl continues to be absorbed from the skin after patch removal.

Epidural infusions
The standard mixture of bupivacaine 0.1% + fentanyl 2mcg/ml may not contain sufficient opioid to prevent a withdrawal reaction.

Intrathecal opioid analgesia
Standard doses are usually insufficient to prevent a withdrawal reaction because the doses are low and systemic absorption is slow.

Major Lower Limb Amputation

Pre-operative phase
Following decision to amputate:
1. Inform pain team of impending amputation and request a preoperative review as an inpatient.
2. Start regular preoperative paracetamol (and NSAIDs unless contraindicated)
3. Follow management of acute neuropathic pain above.
4. Consider pre-operative epidural analgesia **for patients with severe ischaemic pain**.
5. **If epidural contraindicated**, prescribe breakthrough analgesia such as tramadol or morphine sulphate liquid

Operative phase
1. Offer epidural analgesia at induction, to all major lower limb amputation patients, unless specifically contraindicated. Continue for 48-72h post-operatively.
2. In patients with contraindications to epidural analgesia, consider peripheral nerve blockade:
a. Femoral and sciatic nerve blocks (see Peripheral Nerve Blockade) OR
b. Perioperatively placed indwelling nerve catheters (Peripheral Nerve Blockade catheters) OR
c. Direct local anaesthetic injection (into the sciatic/posterior tibial/peroneal/sural nerves, as applicable)

Postoperative phase:
Acute Pain Team review within 24 hours after completion of surgery
1. Continue the epidural for 48 to 72H after surgery.
2. Continue oral neuropathic pain relief for up to 14 days.
3. Parent team to refer to chronic pain team prior to discharge for outpatient follow-up, if further input is required.

Sickle Cell Disease
Managing the pain of sickle cell disease crises is described in the Trust guideline:
WAHT-HAE-012 Sickle cell disease -Management guideline for adult patients
If using PCA then refer to **Patient Controlled Analgesia (PCA).**

Section 3 – Postoperative Nausea and Vomiting

Post-operative nausea and vomiting (PONV) can be at least as unpleasant as post-operative pain and is typically considered in conjunction with the management of acute pain. Assessment of PONV is described in Section 1.

Nausea and Vomiting	Letter Code
None	**N(o)**
Nausea or persistent vomiting	**Y(es)**

PONV risk prediction
6 factors have been identified as the most reliable independent predictors of PONV (Apfel et al 2012). These are female gender, history of PONV or motion sickness, non-smoker, younger age, duration of anaesthesia with volatile anaesthetics, and postoperative opioids. Obesity has not been found to be an independent risk factor.

Prescription
The preferred antiemetics for PONV are listed in the table below.

Antiemetic	Route	Dose	Frequency
Ondansetron*	Intravenous	4 to 8 mg	8 hourly
Cyclizine	Slow intravenous	50mg	8 hourly
Prochlorperazine	Intramuscular	12.5mg	8 hourly
Metoclopramide	Intravenous	10mg	8 hourly

*First line is usually ondansetron (unless constipation or 'ileus'), followed by cyclizine, then prochlorperazine and then metoclopramide. These are all prescribed on an "as required basis".

It is important to recognise that success in treating PONV is not about picking the "single best" antiemetic for a patient, but rather to combine antiemetics acting in different ways to control all the emetogenic pathways.

So, if the first antiemetic is unsuccessful then give another and another until the nausea is controlled. Allow 5 to 10 minutes for an intravenous agent to work and 20 minutes for an intramuscular one. It should be expected that once these have worn off then give the same combination as achieved success before rather than just giving the last one added.

As an example, if ondansetron was given first and the patient remained nauseous and cyclizine was given next to achieve no further nausea, then when and if nausea returned give both ondansetron **and** cyclizine not just one of the drugs alone. Postoperative morphine is a very common cause of PONV and early or prophylactic antiemetic administration should be considered.
For further advice, contact the acute pain service or an anaesthetist

Monitoring Tool

This should include realistic goals, timeframes and measurable outcomes.

How will monitoring be carried out?
By regular observations by ward nursing staff and samples of patients by the acute pain team. All epidurals and PCA's should be monitored

Who will monitor compliance with the guideline?
The acute pain service

Standards	%	Clinical exceptions
Patients should have "no pain" or "mild pain" Pain score should be recorded for every BP on NEWS 2	100 100	None
All pain assessments ***none*** or ***mild*** **= good** control	≥ 95%	None
Single instance(s) of ***moderate*** or ***severe*** pain **= borderline** control	<5%	None
Any **consecutive** instances of ***moderate*** or ***severe*** pain **= poor** control	**0%**	**None**

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