Waitemata District Health Board

Best Care for Everyone

PAIN MANAGEMENT

A Practical Guide

for Waitemata District Health Board's Healthcare Professionals

1st Edition

Developed by Waitemata Pain Services, Department of Anaesthesiology and Perioperative Medicine, and Department of Pharmacy

Waitemata DHB, Auckland, New Zealand

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PREFACE

"Not knowing how to manage pain is understandable – not caring about a patient's pain isn't!"

This resource is not intended to be a definitive textbook but an easily read, informative and practical guide on how to better manage pain at Waitemata DHB. And let's not pull any punches – we can and should do better! Consistency of approach, understanding pain and effective communication are the mainstays of pain management. It is less about knowing the intricacies of the dorsal horn in the spinal cord, and more about knowing the barriers to good care and how to minimise them.

Each section of this resource contains brief background information and theory (for educational purposes), followed by practical applications and reference to WDHB policies and protocols where available (for guidance purposes). Summary or key points are located at the end of most sections, that contain clinical '*pearls*'. These *pearls* are based on our clinical experience supported by best evidence where available. Sometimes this is limited, and in these cases we will make it clear that this is our best guess approach.

The expansion of medical knowledge and treatment options has made optimal pain management increasingly complex. Patient factors, local clinician and organisational differences add further to the complexity. The overwhelming amount of information can make it challenging for healthcare staff to know what the right thing to do is and how to do it right. Timely and evidence based approaches to manage acute pain are needed. The approach chosen needs to be both logical and systematic, and is much more than the medications that are prescribed in the drug chart. In fact, that's the easy bit! We hope this document will provide a simple to understand resource to help guide and inform optimal and appropriate pain management for your patients.

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WAITEMATA DHB ADAPTATION AND ACKNOWLEDGMENTS

The Waitemata Pain Service has based this document on the National Health Service (NHS) Tayside pain management resource. In adapting the NHS Tayside pain management resource, the advisory team considered differences between United Kingdom and New Zealand environments in terms of hospital practice, systems, legislation and product availability. Some facets of the original resource were removed and extensively revised for Waitemata DHB conditions. Waitemata Pain Services gratefully acknowledges the contribution of NHS Tayside and Auckland District Health Board. The content of this document reflects current Australasian practice and is based on the ANZCA publication: *Acute pain management – Scientific evidence (3rd Edition)*, as well as incorporating information from the Australian, New Zealand, American, Canadian and United Kingdom Pain Societies. The text: *Acute pain management*: *A practical guide (3rd Edition),* by Pamela E. Macintyre and Stephan A. Schug (2007) has been referenced in the development of this document.

INTENDED USE

The Waitemata Pain Service produced this resource for use **within** Waitemata DHB only. The intended purpose of this resource is to provide medical, nursing and allied health staff throughout Waitemata District Health Board (WDHB) with guidance on treating adult patients experiencing pain while in hospital. This resource should be read in conjunction with WDHB policy, protocols and guidelines. Where there are discrepancies between this resource and WDHB documents, refer to the WDHB documents in the first instance.

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Section 1.1: Inpatient hours of service, referral process and key contact details

- **Monday to Saturday, 0800–1600 hours**: Call the Pain Service nurse: ext. 7228.
- **Monday to Saturday, 1600–0800 hours**: Call the on-call anaesthetist: ext. 3540.
- **Sunday and public holidays**: Call the on-call anaesthetic registrar: ext. 3540.
- Referrals must be completed by medical personnel, after discussing referral with the Pain Service nurse. Fax the completed yellow referral form to 2237. Please include the following within your referrals:
    - Diagnosis / causes of pain
    - Treatment given
    - Investigation
    - Analgesia trial / given
    - Past medical history
    - Pain history.

Specific population groups

- **Waitakere Hospital**: Phone the on-call Anaesthesiology (Obstetrics) WKT via operator. Advice can be sought from the Pain Service: ext. 7228.
- **Elective Surgical Centre**: Phone the patient's anaesthetist in the first instance and then discuss with the primary surgeon. Advice can be sought from the Pain Service: ext. 7228.
- **ICU patients**: Please see section 1.4 (p. 15).
- **Emergency and ADU patients**: Please see section 1.5 (p. 15).

Section 1.2: Chronic pain and outpatient hours of service, referral process and key contact details

- **Monday to Friday, 0800–1700**: Call the Waitemata Pain Service nurse: ext. 2193.
- **There is no after hours contact** for the outpatient Pain Service.
- Referral must be completed by medical personnel. For patients who are to be seen as outpatients, complete yellow referral form and fax to 4638 (for current inpatients) OR fax (09) 442 7938 (if GP referral). Referrals can be sent to: Community Building 5, North Shore Hospital. Please include the following within your referrals:
    - How long the patient has had pain
    - What strategies have been put in place to manage the pain
    - Medication prescribed and effects
    - Relevant investigations.

NB: Patients are seen in the clinic setting from between 4 to 20 weeks from placement on the waiting list. The outpatient service has a limited infrastructure to support General Practitioner requests and queries. However, we will aim to accommodate as many as possible. GP requests should be directed to the Administrator at Waitemata Pain Service: ph. (09) 486 8972. For emergency advice out of office hours, call the on-call anaesthetist on: ph. (09) 486 8900 ext. 3540.

Section 1.3: Duties of anaesthetic specialist on pain round

The Pain Service undertakes a ward round every day.

(a) An anaesthesiologist is expected to lead the daily pain round.

(b) The round starts from the Department of Anaesthesiology at 0800 hours. The team consists of an Anaesthesiologist, Pain Nurses, and or Pharmacist and Anaesthetic Registrars or Fellows. At times, medical students and house officers may also attend.

(c) Referrals will come via departmental fax. These will be collated in the pain folder and allocated on the ward round to the clinician most appropriate to review the patient.

(d) The round usually starts on Ward 9 and runs through Wards 8, 7, 4, HDU and ICU. There may also be medical referrals from Wards 3, 5, 6, 10, 11, 14 and 15.

(e) The plan for the round is coordinated on Ward 9. If there are several ward referrals, the medical team may review these patients independently, however there needs to always be at least one medical staff member able to prescribe additional analgesia.

(f) Patients are reviewed if they have PCA, epidural analgesia, wound or nerve catheters, ketamine infusions or have complex pain issues.

(g) Patients with complex medical pain problems will also be reviewed following referrals to the Pain Service.

(h) Acute ward interventions may be actioned by the Pain Service (e.g. epidural analgesia for rib fractures, re-siting nerve catheters etc.).

(i) Each patient seen will have an entry into clinical notes plus completion of Pain Service follow-up form. An electronic form is under development.

(j) It is expected that management plans are communicated to the patient's nurse directly or via the ward nursing coordinator.

(k) If patients have ongoing pain issues, a plan to review in the afternoon should be made in conjunction with the Inpatient Pain Service.

(l) The round finishes when all patients are seen and reviewed. If this is after 1230 hours, the nursing team will continue and ongoing issues will be discussed with the afternoon anaesthesiology coordinator.

(m) **All patient referrals will be reviewed on the day of the referral *if* referral received before 1200 hours.** All patient referrals will be reviewed up until midday on the day of the referral. Appropriate triage will be taken to manage referrals received.

(n) If anaesthesiology specialists require additional input they can contact members of the Pain Service, however they are expected to review, examine and document each consult.

(o) On weekends, all patients are reviewed by an anaesthesiology fellow and/or specialist pain nurse. In general, as the service is limited, complex pain issues are not seen on Saturday or Sunday and will be actioned on the Monday specialist ward round.

(p) Specialists are expected to undertake teaching for medical students, RMOs, registrars and nursing staff as part of the round.

(q) Specialists are expected to support research activities from the Department of Anaesthesiology which require data collection on the ward round.

(r) Specialists will have a close relationship with ward nursing and medical staff, and if there are aspects of reviewed patient care that is concerning, these will be communicated to the ward team or ICU for review.

(s) Specialists are expected to follow departmental and WDHB guidelines unless clinically indicated.

Section 1.4: Intensive Care or High Dependency Unit patients

It is expected that all patients who have invasive analgesia interventions are visited on a daily basis. Despite the highly skilled medical and nursing teams looking after these patients, this is useful because:

- The complexity of patient care may need variation from standardised pain service guidelines.
- Discharge status is essential to know before transfer to ward.
- Technical skills for maintenance of regional analgesia or commencing new interventions may be outside the skill set of some ICU/HDU medical staff.
- Continuity of care is important for anaesthesiology.
- It provides an ongoing close association to discuss other patients of concern on the ward.
- It allows feedback to ICU and HDU of pain related issues on the ward from previous patients or those at risk of being admitted.

Therefore, it is expected that:

(a) All ICU and HDU patients who have epidural, regional analgesia or complex pain issues will be visited daily.
(b) All patients will be discussed with the patient's nurse and where necessary ICU/HDU medical staff.
(c) Where changes from existing management are suggested, it is expected these changes will be documented by ICU/HDU staff.

Below is a suggested guideline for transfer of a patient to ward from ICU and HDU where ongoing Pain Service review is required:

(a) Identify patient needing Pain Service review (e.g. epidural or regional catheter, complex pain problem, history of substance abuse and ongoing pain).
(b) If no Pain Service follow-up form is present, this is to be completed and taken to PACU 1 to be included in the Pain Service folder. If the patient is transferred to the ward during day-shift hours (0800–1600), please phone the pain nurse (ext. 7228).
(c) All HDU and ICU patients must have step-down analgesia prescribed in drug charts.

Section 1.5: Patients referred from emergency department/ADU

All patient referrals will be reviewed on the day of the referral if received before 1200 hours. Appropriate triage will be taken to manage referrals received. Referrals received after this time should be discussed with the anaesthesiology coordinator (ext. 3540). As these are often complex patients, the Pain Service would appreciate direct discussion with the medical staff responsible for ongoing patient care.

Prerequisites for referral include:

- A diagnosis or provisional diagnosis
- An admitting team
- A coordinating ED consultant.

Patients will not be seen if not already reviewed by ED team or admitting medical or surgical team.

All patients reviewed by the Pain Service will have the treatment plan discussed with referring team. This will be documented in case notes.

Guidelines for ED clinicians

- Patients with ongoing complex pain rarely need admission, however each presentation should be assessed individually.
- Treatment plans aim to provide *support* for pain management, not *cure*.
- In general, patients with complex pain are best managed in an outpatient setting; admission should be

limited unless there is a need for active management of a new problem or waiting for a diagnostic test.

- If opioids are prescribed, this should be communicated directly with GP and/or email/letter faxed on discharge.
- There is no place for fentanyl patches or methadone to be initiated in the acute setting. If this is undertaken, the prescribing doctor has a duty of care to ensure this is undertaken via an opioid agreement, the GP is contacted directly and the responsibility for patient follow-up is maintained via ED until a discharge management plan has been agreed upon.
- Referrals to the Outpatient Pain Clinic should in general not be initiated by ED clinicians. The best policy is to make comment in the discharge letter. In many cases, the patient's GP will understand the background better and be in the best position to decide if this is the best option.
- In patients who present regularly, a treatment plan should be developed in conjunction with the patient, home team, Pain Service and ED. This will make treatment consistent, appropriate and minimise stress between medical teams. This should be made available on Concerto.

CHAPTER 2: PAIN MANAGEMENT GENERAL GUIDANCE – ADULT PATIENT

Section 2.1: Overview and adverse outcomes of uncontrolled pain

The modern approach to disease management takes a holistic approach and recognises the importance of the BioPsychoSocial context of the patient. This relates to acute care situations as much as to chronic disease management. Importantly, poorly managed acute pain may lead to ongoing persistent or chronic pain. Persistent pain after surgery is common (e.g. post amputation [30–85%], thoracotomy [5–65%], caesarean section [6–55%] or hernia repair [5–63%]). Much of this is a combination of perceived (nociceptive) pain and neuropathic pain (that is, pain caused by a peripheral or central nervous system lesion or disease). While it is not always easy, it is important to try and manage pain as effectively as possible.

So what do we mean by the **BioPsychoSocial** approach to pain?

Bio = Biological: Pain is modified by the degree of tissue damage, inflammation, tumour growth or swelling. It can be modified by medications, physical therapies (heat and ice) and interventions such as nerve blocks. Age or drug therapy can modify or blunt physiological responses to pain and hence may make its diagnosis more difficult.

Psycho = Psychological: The way the patient copes with pain or the psychological construct that the patient holds makes a huge difference to their ability to manage pain. This can be modified by co-existing depression, anxiety, catastrophising or being fearful of movement. These factors are associated with higher post-operative pain intensity, number of PCA attempts and pain relief dissatisfaction.

Social = Social: The person's position within the family, whānau or wider social structure will dictate how they can cope. This extends to their ability to communicate (e.g. advanced age, dementia or very young) or be understood (e.g. language difficulties, previous CVA or non-English speaking).

So, what is pain? The International Society for the Study of Pain (IASP—the world's leading pain specialty society) defines pain as:

> "*An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage*"

Key points from this definition: It's not nice. It's a horrible sensation. It affects not only how you feel the sensation but also how you respond to it. You can't see pain, and in many cases the cause cannot be clearly seen from tissue damage or broken bones! It's subjective – if the patient says they have pain, they have pain.

So it's not pleasant, but what else can pain cause? Uncontrolled pain may:

- Cause hypertension, tachycardia, sympathetic hyperactivity and possible cardiovascular compromise and fluid retention
- Lead to reduced gastrointestinal activity, ileus (sluggish gut), nausea and vomiting
- Hyperventilation, reduced lung capacities from inability to cough/atelectasis
- Lead to ongoing persistent pain (as we have already emphasised)
- Psychological distress, anxiety, depression and post-traumatic stress disorder
- Compromised sleep pattern
- Augmented stress response – Increased catabolism (ADH, GH, catecholamines, angiotensin – II, IL, IL-6, TNF) and decreased anabolism (reduced insulin) apart from cardiorespiratory compromise, may lead to fluid retention, sodium retention, hyperglycaemia, glucose intolerance, insulin resistance, lipolysis and hypokalaemia

- Impaired wound healing
- Thromboembolic complications and hypercoagulability leading to DVT and pulmonary embolism.

Pain response variability

A number of genetic variants have been discovered which modify the susceptibility to the perception of pain (nociception) as well as response to medications. The reason that our patients exhibit such a wide range of responses to the opioids we prescribe may relate to genetic variants in opioid receptors and transporters (pharmacokinetics) as well as receptors and signal transduction elements (pharmacodynamics).

On a practical level, this explains why codeine may have a limited effect in some and enhanced effect in others. Codeine is metabolised by the cytochrome system – there are genetic variances in this system. In some (slow metabolisers), the conversion to the active drug is so slow it makes it almost ineffective (e.g. 10 % of Caucasians 10%), whereas some metabolise so quickly it can cause overdosage (some African populations). Similar variability occurs with tramadol, methadone and non-steroidal anti-inflammatory drugs (NSAIDs).

So we can see pain is subjective, common and associated with significant effects if not managed well. So how do we assess if our patients are in pain?

Section 2.2: Overview of pain assessment scales

"*Remember pain is the 'Fifth Vital Sign'*"

Pain is difficult to measure and is an individualised response modified by biological/physiological, psychological and social/environmental factors. It can be challenging in patient populations with limited ability to communicate (e.g. old, young and cognitively impaired). Pain has been identified as the 'fifth vital sign' and, in most healthcare institutions, is assessed along with pulse, blood pressure, temperature and respiratory rate. As such, it helps to prioritise pain assessment and these recordings can help guide optimal and appropriate pain management.

What's also really important is the psychosocial background of those healthcare professionals involved in patient care. This can modify how patients are reviewed and managed, and can be a barrier rather than a support.

How can we identify and assess if pain is present and how it's affecting our patients?

The key areas to identify during a pain assessment include the following:

- To find out information which helps determine the **cause** and type of pain
- To help the patient to **describe** their painful experience
- To find out about the **impact** the pain is having on their quality of life and ability to function
- To allow **documentation** of the patient's pain in a standardised way
- To allow **understanding** of what treatments would be helpful and effective
- To find out about the patient's **beliefs**, which may affect their pain management
- To find out whether current treatments are **effective.**

This all sounds fine, but how can we remember this? Medicine is full of acronyms – ABC, CPR, AVPU – and pain is no exception. A systematic approach should be used. The **OPQRSTU** mnemonic can be used to produce a systematic and logical pain assessment.

O nset, when did pain start, duration, periodicity, associated symptoms?

P rovoking or palliating factors

Q uality or descriptor of pain

R egion and Radiation

S everity: Use 0–10 scale or incorporate into pain scoring tools

T reatments: What was effective, ineffective, side effects?

U nderstanding: What do patients understand about pain?

This mnemonic can be used for acute or persistent pain evaluation and does not require complex scoring systems, paper charts, special measuring devices or charts. It is important to note that other pain assessment tools are available. An overview of the various tools and a brief discussion of some of their benefits follow:

1) **Personal report**: Given the definition of pain as being subjective, this is probably the single most important indicator of pain severity and functional impairment. This can take the form of narrative, the patient's own pain descriptors, or completion of pain diagrams. Initially this should be recorded in the A–D planner by both medical and nursing staff then continued to be recorded in patient notes.

2) **Numerical Rating Scale (NRS) – Pain at rest and pain with movement**: Patients are asked to rate their pain both at rest and/or on activity from 0–10, where the anchors are 0 = no pain and 10 is 'the worst pain you have ever experienced'. This is good for the majority of adult patients, but they need to be awake, conscious and able to self-reflect. This correlates well with the visual analogue scale (VAS). A value of 4 or greater usually indicates moderate to severe pain and a reason for intervention.

3) **Functional Activity Score (FAS)**: This is a 3-point scoring system from A) no limitation, B) mild limitation, to C) severe limitation when compared to a standard but clinically important activity. This is based on observation of the patient by nursing staff, with at times feedback from relatives and parents/caregivers.

4) **Verbal Rating Scale or Verbal Descriptor Scale**: Patients are asked to define their pain in one of 4 categories (0 = no pain; 1 = mild pain; 2 = moderate pain; 3 = severe pain). This is useful as it reduces the number of observations and can equate to easily understood concepts.

5) **Visual analogue scale (VAS)**: Patients are shown either a plain 10cm line with 0 and 100 anchors, or 0, 1, 2, etc., on a line up to 100. A higher score indicates greater pain intensity. This also requires a degree of visuospatial coordination to write on a card or use a dedicated ruler. This can be used in children from 3 to 4 years of age. Suggested VAS scores are 0–4mm for no pain, 5–44mm for mild pain, 45–74mm for moderate pain and 75–100mm for severe pain. A reduction of pain score by 30–35mm is deemed to be a clinically meaningful reduction in pain. It also seems that the pain relationships are linear across the range, making analysis more straightforward.

6) **CRIES**: Useful for neonatal post-operative pain, the acronym uses crying, oxygen requirements, increased vital signs, facial expression and sleep on a 0–2 scale for each parameter to assess pain.

7) **NIPS**: Neonatal-infant pain scale for those less than 1 year of age. The parameters observed include facial expression, breathing pattern, arms, legs and state of arousal.

8) **FLACC**: Face, legs, arms, crying and consolability score has been validated over a wider age range from 2 months to 7 years of age.

9) **CHEOPS**: Intended for children aged 1 to 7 years, and assesses cry, facial expression, verbalisation, torso movement, localisation of pain by touch and leg position.

10) **Wong-Baker FACES** scale: Can be used for preschool children (3 years and older) but is also effective for older adults.

11) **Faces Pain Scale – Revised (FPS-R)**: Can be used for children (aged 3 years and older). This is different from the Wong-Baker FACES scale as it contains neutral faces and is grayscale, as there is evidence that suggests children tend to choose based on the colours they like.

12) **LANSS**: This asks 5 questions about characteristics of neuropathic pain and also has 2 examination requirements – the presence of mechanical allodynia and altered pin prick thresholds.

13) **The Abbey Pain Scale**: This is an objective observer-based questionnaire for those with cognitive impairment and uses vocalisation, facial expression, body language, behavioural change, physiological change and physical changes.

14) **PAINAD Scale**: This is another tool used for cognitively impaired individuals using a 5-point scoring system based on breathing pattern, negative vocalisation, facial expressions, body language and consolability.

15) **Universal Pain Assessment Tool**: This tool combines aspects of Wong-Baker, VAS and a Functional Score.

Some of these assessment tools concentrate on measuring intensity alone, whilst others look at a wider range of descriptors. Most rely on measuring intensity (Numerical Rating Score, Visual Analogue Score, Wong-Baker FACES) rather than duration or effect on functionality (Pain Disability Index, Functional Assessment Score). Some tools are targeted at those patients for whom communication is limited (e.g. cognitive impairment, young, sensory loss). Some tools specifically measure pain sub populations (e.g. LANSS for neuropathic pain).

The choice of pain tool used, however, is less important than the consistent and routine use by all health professionals within a particular unit. The appropriate choice of pain assessment tool will be dependent upon the clinical context and, if not apparent, phone the Pain Service for advice. For most adult patients, the typical pain assessment and monitoring process is outlined below.

Section 2.3: Routine pain assessment approach and frequency at WDHB

All patients during their stay in WDHB hospitals should expect to have their pain assessed by staff as part of routine vital signs observation and monitoring (e.g. pulse, blood pressure, temperature and respiratory rate) as outlined in Observations – vital signs including NEWS policy:

- **Routine pain assessment should be conducted using the NRS (rest and activity) and FAS at least once every FOUR hours and in the observation (NEWS), record the following**:
    - Date and time assessed
    - Pain scores and specify
        - (R) = NRS score at rest (zero to ten)
        - (M) = NRS score on movement (zero to ten)
        - (FAS) = FAS score (A to C)

In Table 1, the two most commonly used pain scores at WDHB, the Numerical Rating Scale (NRS) and the Functional Activity Scale (FAS) are outlined.

- **Numerical Rating Scale** (0–10 pain score)
    - This scale should be assessed for pain at rest and on movement. The latter is probably a more valid score. Currently there are no 'standard' movements on which to base these scores, so most are arbitrarily chosen (e.g. pain on coughing, deep breathing, walking, sitting up in bed). The NRS 0–10 pain score has been shown to be valid and reliable in the assessment of acute pain, with its main advantage being its ease of use by both staff and patients.

- **Functional Activity Score** (A–C pain score)
    - The FAS score is being introduced in WDHB and could become the default comprehensive scoring system for post-operative patients after further review.

Table 1: Most commonly used pain scoring and measurement at WDHB

Pain intensity	Pain Score (NRS) at rest and movement	Functional impairment**	Functional Activity Score
No pain at rest – No pain on movement	0	No limitation on activity	A
No pain at rest – Slight pain on movement	1–3	Mild limitation of activity***	B
Intermittent rest pain – Moderate movement pain	4–6	Severe limitation***	C
Continuous pain at rest – Severe pain on movement	7–10		

** Activity relates to procedure outcomes e.g. knee flexion or mobilisation post joint replacement; moving normally in bed; ability to take deep breaths.

*** Relative to baseline activity.

As part of the WDHB pain management programme, the following pain scores should be used routinely for the specific patient population group:

- **Routine adults**
    - Personal report, Numerical Rating Scale (NRS – rest and movement), Functional Activity Score (FAS)
- **Routine adults – post-operative**
    - Personal report, Numerical Rating Scale (NRS – rest and movement), Functional Activity Score (FAS)
- **Cognitively impaired adults**
    - Personal report, Abbey Score, Wong-Baker FACES
- **Cognitively impaired adults – post-operative**
    - Abbey Score, Sedation score, Functional Activity Score, Wong-Baker FACES
- **Routine children**
    - Personal report, Visual Analogue Scale/Numerical Rating Scale (NRS – rest and movement), Faces Pain Scale – Revised (FPS-R), FLACC scale.

As we described previously, pain should be managed using a complex BioPsychoSocial approach and, as such, certain tools should be used in certain situations. Whilst some centres suggest that acute pain should only be assessed in a one-dimensional manner (i.e. pain intensity), there is no doubt that the other factors involved with persistent pain modulation also play some role in acute pain. Hence, a multidimensional overview is needed to truly evaluate and treat acute pain. The more complex tools cannot be used routinely or as part of the first line of evaluation, but they should be considered in more complex acute pain presentations. So, although healthcare professionals may use only the 'simpler' tools (e.g. numerical pain score), it's good to be aware of other measures, where to access them, and the types of patients that may benefit from different assessments.

It is always important to keep in mind that these tools are only one part of the pain assessment process and they do not take away an individual clinician's ability to tailor analgesia specifically to the person in front of them.

If you are unsure of which pain assessment tools to use or have a patient who may benefit from the more complex screening methods, please contact the Pain Service.

Section 2.4: Pain management and treatment post assessment

After obtaining an NRS pain score at rest and on movement and a FAS score, this section outlines the pathway for management and the criteria to help you decide appropriate analgesia requirements. The intervention is based on the **highest score** from the NRS or FAS score, the suggested analgesic intervention and the request of the patient.

NB: The following clinical guidelines are a starting position. Like all guidelines they are used to initiate treatment and will be effective for a large number of our patients. BUT as with all such documents, individual patients, their disease processes and interventions may mean that the guidelines are not appropriate. If a patient needs additional/rescue analgesia, then it is important to ensure that their pain is reassessed within 60 minutes of administration, the effectiveness of the analgesia documented and further intervention taken if necessary. We will discuss this in more detail in the following sections.

Table 2: Analgesic guidelines for varying degrees of pain

Mild Pain (NRS of 0–3 OR FAS A-B)	Moderate Pain (NRS of 4–6 OR FAS C)	Severe Pain (NRS of 7–10 OR FAS C)
Paracetamol 1g PO or IV 6 hourly* **AND / OR** Naproxen SR 500mg 12 hourly PO** or Parecoxib 40mg IV daily*** or Celecoxib100–200mg BD**** MAX 72 hrs then review for all NSAIDs If pain poorly controlled consider progressing to Moderate Pain management guideline →	Paracetamol 1g PO or IV 6 hourly* **AND / OR** Naproxen SR 500mg 12 hourly PO* or Parecoxib 40mg IV daily*** or Celecoxib100–200mg BD **** MAX 72 hrs then review for all NSAIDs **AND** Tramadol# 50–100mg PO/IV 6 hourly If pain poorly controlled consider progressing to Severe Pain management guideline →	Paracetamol 1g PO or IV 6 hourly* **AND / OR** Naproxen SR 500mg 12 hourly PO* or Parecoxib 40mg IV daily*** or Celecoxib100–200mg BD**** MAX 72 hrs then review for all NSAIDs **AND** Tramadol# 50–100mg PO/IV 6 hourly **AND** Immediate release morphine (Sevredol®) 10–20mg PO 1–2 hourly PRN (see immediate release oral opioid protocol below) OR Immediate release oxycodone (OxyNorm®) 5–10mg PO 1–2 hourly PRN OR IV protocol morphine, fentanyl or oxycodone (see WDHB IV opioid protocol)
PONV and opioid induced constipation protocol should be used when opioids are charted. *Prescribe drugs REGULARLY rather than as needed*. For PRN immediate release oral opioids (Sevredol®, OxyNorm®), the prescriber must define the maximum dose in 24hrs. This should consider the patient's age and comorbidities.		

* IV only if unable to tolerate oral intake. Reduce to 1g PO 8hrly if <50kg. Max daily dose 60mg/kg.

** If GI bleed risk use omeprazole 20mg nocte. Caution in those >80y/o, ischaemic heart disease, congestive cardiac failure, renal impairment (EGFR <60). Review NSAIDs every 72 hrs.

*** If unable to take oral intake.

**** High GI risk, low cardiovascular risk and higher bleeding risk.

Only if no history of seizures.

Immediate release oral opioid (e.g. morphine (Sevredol®) or oxycodone (e.g. OxyNorm®) titration and guidance for acute severe pain

Indications for use of rapid release oral opioid:

1) **When treatment for moderate pain as described on the Acute Pain analgesic ladder has been implemented and pain scores of >5 persist (or FAS B or C)**
    - It's just as important to measure and monitor our patients who get rapid release and sustained release oral opioids. This protocol allows titration of medications and also determines monitoring and when to intervene if relief is not effective.

2) **When the patient is able to tolerate medication by the oral route and absorption is not impaired, it is the route of choice for most patients.** If pain is predicted to be severe, or simple opioid analgesics (tramadol, codeine) at maximum doses are ineffective, oral morphine or oxycodone is the next step up the pain ladder. Rapid release oral morphine (Sevredol®) is the most commonly used opioid for acute pain. Oxycodone (OxyNorm®) should be considered if there are significant side effects with morphine and opioids are still required (e.g. nausea, constipation, pruritus, allergy to morphine) OR if the patient has significant renal dysfunction (e.g. eGFR <30 mLs/min).

3) **For breakthrough pain in patients already taking long acting opioids.**

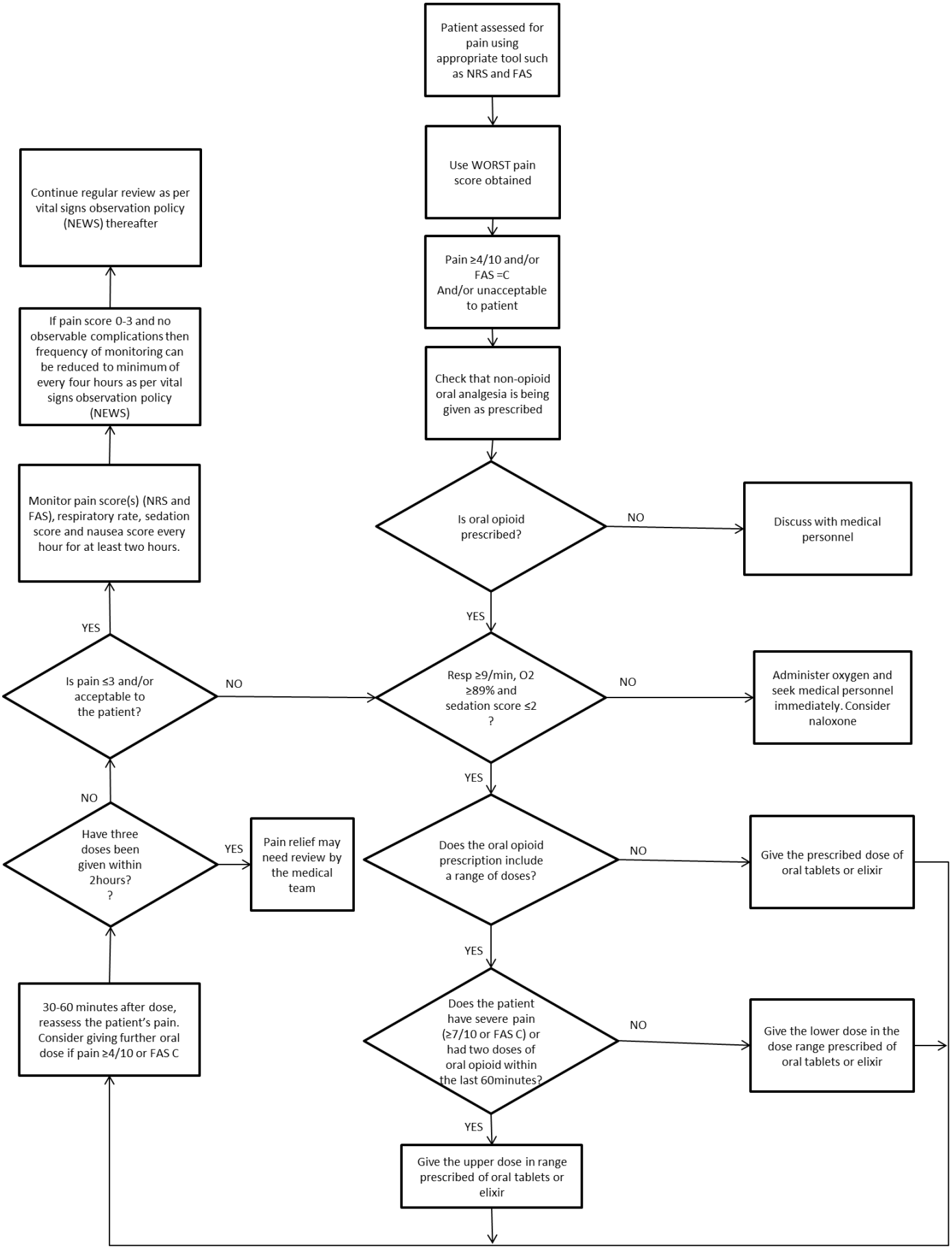
4) **Management of severe acute pain when drug absorption via the oral route is not compromised.**

If oral route is compromised or acute pain is severe, consider using intravenous opioids as outlined by the following protocol: Oral administration and opioid IV protocol – Adults.

Key considerations prior to starting treatment

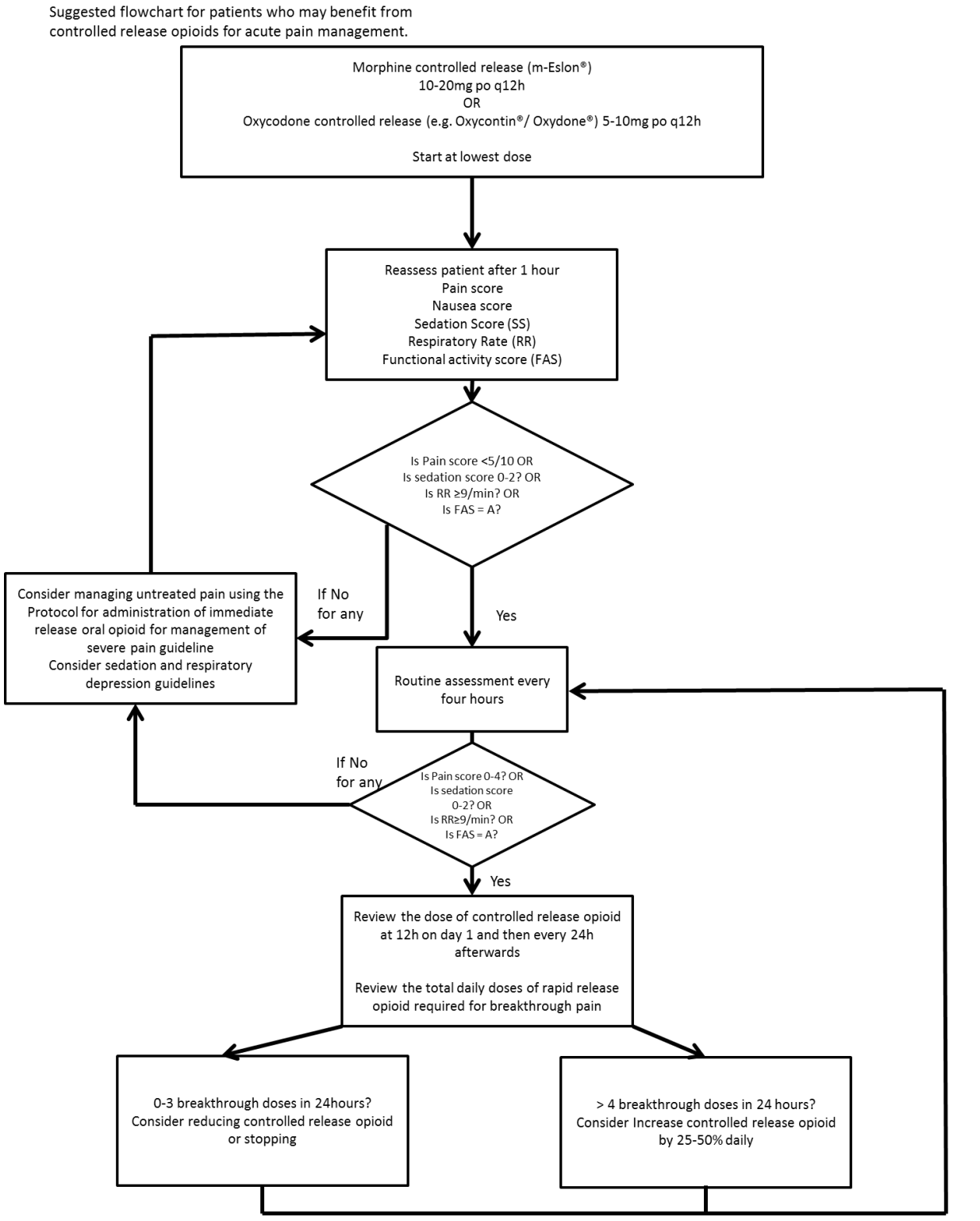
- Patients on pre-operative slow release opioid preparation, e.g. M-Eslon®, methadone or fentanyl patches, should have this continued.
- Continue paracetamol and NSAIDs, if indicated, as adjuncts. In patients >80 years, NSAIDs should be prescribed for limited periods of time (e.g. 3–5 days) and renal function should be monitored (i.e. Urea, Creatinine and eGFR measured after 2 days of treatment). NSAIDs should be stopped if the eGFR drops by 25% from baseline or if eGFR falls below 30 mLs/min.
- Prescribe prophylactic anti-emetic therapy, and consider combinations of anti-emetics if nausea and vomiting persist and ensure that prescriptions are written for regular rather than PRN dosing schedules.
- Opioid induced constipation can be managed or pre-empted by prescribing Lactulose 10–20ml twice daily and Laxsol® 2 tablets twice daily (a pre-printed sticker is available). If recent bowel surgery, confirm with surgeon if laxatives are appropriate before prescribing.

If there are no contraindications and oral immediate release opioids are deemed appropriate, use the following pathway to guide therapy:



Protocol for administration of controlled release oral opioid for management of severe pain (morphine controlled release e.g. M-Eslon® or oxycodone controlled release e.g. Oxycontin/Oxydone®)

Use the following pathway to help you switch from immediate release opioid to controlled release opioids when the total opioid daily dose has stabilised:



Continue observation every 1 hour for at least TWO hours. If the patient is scoring their pain between 0 – 3/10 the frequency can be reduced to minimum 4 hourly. If pain score is reported as 4/10 or above, rapid release opioid should be administered and the patient reassessed within 60 minutes.

Section 2.5: Overview of complications associated with analgesia: Assessment and management

Common complications associated with analgesia (predominantly opioid use) are:

- Oversedation and respiratory depression
- Nausea and vomiting
- Constipation
- Itch.

These complications can be incredibly distressing to the patient. As part of optimal pain management, analgesia related complications must be considered. In this section, we will provide a brief overview of the complications. We will also outline how each of the complications should be monitored and managed.

Section 2.5.1: Oversedation and respiratory depression

Assessment and monitoring

All patients during their stay in WDHB hospitals should expect to have their sedation and respiratory rate assessed as part of routine vital signs observations and monitoring (e.g. pulse, blood pressure, temperature and respiratory rate) as outlined in Observations – vital signs including NEWS policy:

- Assessment of sedation score and respiratory rate should be conducted at least once every FOUR hours and in the observation (NEWS), record the following:
    - Date and time assessed
    - Respiratory rate
    - Sedation score

Table 3: Sedation score

Sedation level	Sedation score*
Awake and alert	0
Occasionally drowsy – Easy to rouse	1
Frequently drowsy – Easy to rouse	2
Somnolent – Difficult to rouse	3

* Normal sleep = S.

The sedation score is a reliable indicator to aid the detection of early opioid induced respiratory depression. When assessing sedation at night or while patients are sleeping, observe if the patient stirs normally when you enter the bed-space. If a patient doesn't stir, check the respiratory rate for 1 full minute, and *if less than 10 breaths per min,* attempt to wake the patient and assess their level of sedation and rousability.

Management of sedation and respiratory depression

Naloxone is an opioid antagonist and is used most often to reverse opioid induced side effects such as oversedation, respiratory depression and pruritus. The goal of administering Naloxone in the context of acute pain or post-operative pain is the carefully titrated reversal of CNS depression, respiratory depression and sedation. Giving too much naloxone or giving it too quickly can reverse analgesia and precipitate severe pain. Additional caution and care should be applied when managing opioid induced sedation and respiratory depression in patients receiving long-term opioids (e.g. chronic pain, opioid substitution programmes for opioid abuse (e.g. methadone, Buprenorphine, Suboxone®) and in palliative care.

See Table 4 for the management of opioid induced ventilatory depression and/or sedation in adult patients.

Table 4: Management of opioid induced ventilatory depression and/or sedation in adult patients

Managing opioid induced ventilatory depression and/or sedation in adult patients						
Stimulation and encouragement to breathe may be all that is required. **In patients using opioids for pain be cautious with naloxone to prevent patients experiencing pain when they regain consciousness. Once patient is stable exclude acute renal impairment as a cause for opioid accumulation.**						
Naloxone presentation: 400 mcg/ml ampoules (0.4 mg/ml) **Dilute 1 x 400 mcg ampoule (0.4mg) naloxone with 9 ml normal saline to produce 10 ml of 40 mcg/ml (0.04mg/ml) solution**.						
Sedation score (SS) 0–3	**Resp rate (RR)**	**Immediate nursing management**	**Who to call**	**Monitoring**	**Opioid management**	**Naloxone** (If no response to naloxone consider other causes of sedation and respiratory depression)
3 Unresponsive	**Any**	**Assess and treat:** Airway, Breathing and Circulation Continuous O2 10L/min via Hudson mask Consider recovery position Ventilation may be required	**777** / **MET Call** **Acute Pain Service** for advice/attend if able	**Continuous assessment and management until** SS < 2 and RR ≥8 then every **15 minutes** until SS < 2 for 2 hours	Withhold further opioid until pain management discussed with Acute Pain Service	**Naloxone rescue to rapidly reverse significant opioid induced sedation and respiratory depression.** Give **100 mcg (2.5ml; 0.1mg)** of diluted 0.04mg/ml naloxone solution IV every 1–2 minutes until SS < 2 and RR ≥ 7 to a maximum of 800 mcg (20ml; 0.8mg). Consider reducing bolus to 40mcg (1ml; 0.04 mg/) as responsiveness increases. Discuss naloxone infusion with ICU. The effect of naloxone boluses may be shorter than the previously administered opioid (naloxone mean half-life = 60 min)
2 Constantly drowsy, easy to rouse but cannot stay awake	**≤ 7**	**Assess and treat:** Airway, Breathing and Circulation Continuous O2 10L/min via Hudson mask Consider recovery position	**House Officer** to attend and review urgently **ICU** for advice and/or review **Acute Pain Service** for advice	**Assessment and management every 5 minutes until** SS < 2 and RR ≥8 then every **15 minutes** until SS < 2 for 2 hours	Withhold further opioid until pain management discussed with **Acute Pain Service**	
	8–9	**Assess and treat:** Airway, Breathing and Circulation Continuous O2 6L/min via Hudson mask	**House Officer** to attend and review **Acute Pain Service** for advice	**Assessment and management every 10 minutes until** SS < 2 then every **15 minutes** until SS < 2 for 2 hours	Withhold further opioid until SS < 2 *and* RR ≥ 10 When opioid restarted consider reducing opioid dose and/or frequency.	**If inadequate improvement once opioids stopped consider cautious naloxone titration to carefully reverse opioid induced sedation and respiratory depression without reversing opioid analgesia.** Consider giving **40 mcg (**1ml; **0.04mg) naloxone**) IV every 1-2 minutes until SS < 2 and RR ≥ 7 to a maximum of 800 mcg (20ml; 0.8mg).
0 – 1 Awake or drowsy but easy to rouse	**≤ 7**		**House Officer** to attend and review **Acute Pain Service** for advice	**Assessment and management every 15 minutes**	Withhold further opioid until RR ≥ 10 When opioid restarted consider reducing opioid dose and/or frequency	
	8–9		**Acute Pain Service** for advice	**Assessment and management every 30 minutes**	Withhold further opioid until RR ≥ 10 When opioid restarted consider reducing opioid dose and/or frequency	
	≥10	Routine management	N/A	Routine management	Continue as prescribed for moderate or severe pain	
After 1600h the duty Anaesthetist covers the Acute Pain Service ext. 3540				**Consider consulting Palliative Care Service if patient is under their care**		

Section 2.5.2: Analgesia related complications: Nausea and vomiting

Opioid related and post-operative nausea and vomiting (PONV) continue to be important sequelae of diseases and therapeutic interventions. Opioid related and PONV can cause prolonged recovery room stay, expanded nursing care, and increased cost and potential surgical complications. More than 25% of patients experience PONV within 24hr of surgery and this can increase to 80% in selected groups. Opioids are a major contributor to nausea and vomiting in many surgical and medical wards.

Risk factors for PONV include:

1) Patient
   (a) Female sex
   (b) Non-smoking status
   (c) History of PONV or motion sickness.

2) Anaesthetic
   (a) Use of volatile GA 0-2h
   (b) Nitrous oxide
   (c) Intra- and post-operative opioid use.

3) Surgical
   (a) Increased duration of surgery
   (b) Surgical type (e.g. laparoscopy, ORL, neurosurgery, breast, squint, laparotomy, plastic).

Table 5: Nausea and vomiting risk factors and likely occurrence of vomiting

Risk factors (Apfel, 2002)	Risk of PONV
0	10%
1	20%
2	40%
3	60%
4	80%

Table 5 can be used to help estimate the risk of vomiting in patients post-operatively. For example, patients who present with >3 risk factors have an 80% chance of vomiting. Retching and vomiting are initiated by brainstem mechanisms, coordinated by the 'vomiting centre' (acetylcholine, histamine-1, opioid and neurokinin-1 receptors). There are various pathways which activate these mechanisms, such as:

- Abdominal vagal afferents
- Afferents from the area postrema (chemoreceptor trigger zone-CTZ) and the nucleus tractus solitarius (dopamine-2, opioid and 5 –HT3 receptors)
- Afferents from the vestibular system
- Psychogenic input from the cortex and limbic system.

Abdominal vagal afferents: Can be activated by 5-HT (may be released by radiation or cytotoxic drugs), CCK Distension, toxins.

Area postrema (CTZ)-direct stimulation: By toxins or drugs circulating in the blood, opioids, anaesthetic agents.

Vestibular system: Motion sickness, anaesthetic agents.

Psychogenic: Emetic history.

Assessment and monitoring

If opioids are used or the patient has undergone a procedure, all patients during their stay in WDHB hospitals should expect to have their nausea and vomiting assessed.

- **Routine monitoring, using the nausea and vomiting score, should be conducted at least once every EIGHT hours and in the clinical notes or fluid balance chart, record the following**:
  - Date and time assessed
  - Vomit output (in mLs), if any
  - Nausea and vomiting score

Table 6: Nausea and vomiting score

Nausea or vomiting	N&V Score
None – No nausea or vomiting	0
Mild – Nausea only	1
Moderate – Vomited ONCE	2
Severe – Vomiting MORE THAN ONCE	3

Table 6 can be used to determine the severity of symptoms and guide treatment.

As with pain assessment, nausea and vomiting can be due to other causes and these should be considered along with perioperative causes. These include sepsis, antibiotic side effects, renal and liver problems, gastrointestinal stasis, pseudo and organic obstruction.

As with all issues related to monitoring and observations, if patients have problematic opioid related and PONV or other causes of nausea and vomiting, the frequency of recordings will increase. The minimum observation frequency is once every eight hours.

Management of opioid related nausea and vomiting

The management of post-operative and opioid related nausea and vomiting has been extensively discussed in the Waitemata DHB nausea and vomiting post-op (PONV) (Adults) medication guideline. An overview to manage PONV is:

1) **Assessment using N&V scoring**: (See Table 6 above).
2) **Address underlying causes and causative factor(s) if possible**: e.g. blocked nasogastric tube, intra-abdominal pathology, ileus, hypoxia, hypovolemic, hypotension, pain, opioids, and antibiotics.
3) **Treatment (act on nausea score 1, 2 or 3)**: As with analgesics, different anti-emetics which work at different sites can be combined if necessary. Use an appropriate route of administration. There are several classes of medications. The order of medications may vary and in some cases we may need to use second line medications not on the initial protocol. The PONV guideline has been approved for the Operating Room and Surgical Ward environments. It can also be used elsewhere where appropriate and when no contraindications exist.

The 4 main classes of medications used in the PONV guideline are considered first line agents. They comprise of:

- 5HT3 antagonists e.g. Ondansetron
- Antihistamines e.g. Cyclizine
- Antidopaminergic e.g. Droperidol
- Steroids e.g. Dexamethasone.

First line agents PONV

The prescriber can allocate priority to the most effective anti-emetic.

Ondansetron

- 5HT3 receptor antagonist
- 4mg PRN q6h
- Doses for treatment of PONV are about 25% of prophylactic dose (e.g. 1–2mg ondansetron)
- Oral (tabs, melts), IV, IM – dose depends on route of administration, decrease dose in moderate/severe liver impairment
- May reduce the analgesic effect of tramadol
- The reported common side effects include headache (NNT = 36), dizziness, flushing, elevated liver enzymes, QTc segment prolongation and constipation
- Anaphylaxis has been reported.

Cyclizine

- IV 12.5–50mg TDS
- Antihistamine
- Can cause drowsiness, dry mouth and tachycardia
- Dystonic reactions have been reported
- Consider reducing dose in the elderly or avoid as confusion and sedation are dose dependent effects.

Droperidol

- Butyrophenone anti-dopaminergic
- NNT = 5 for prophylaxis
- 0.625–1.25mg IV q6h
- May cause sedation, hypotension
- Associated with prolonged QT duration.

Dexamethasone

- 4mg IV q6h (max 2 doses in any 24 hr period)
- Prophylaxis NNT = 4
- Slow IV push – some patients may get perineal ‘burning’ with rapid injection
- Best for prevention rather than treatment of PONV
- Initial dose 4–8mg. Repeat doses smaller 2–4mg q12h.

Second line agents PONV

Additional medications (see below) can be added but are not considered first line.

Prochlorperazine

- Buccal “Buccastem” 3–6mg 12 hourly PRN
- Oral 5–10mg TDS PRN
- IM 12.5mg 12 hourly PRN
- Can cause extrapyramidal symptoms, particularly in children and the elderly.

Hyoscine

- “Scopoderm” (Scopolamine) patch 1.5mg over 72 hours applied behind ear onset around 2–4hr
- May cause dry mouth, papillary dilation, blurred vision
- May worsen closed angle glaucoma and cause sedation in elderly.

Metoclopramide 10mg doses do not provide prophylaxis and higher doses have poor efficacy for PONV and may predispose patient to extrapyramidal side effects. It may be useful for its gastric prokinetic effects but does not appear on the PONV guideline.

Section 2.5.3: Analgesia related complications: Opioid induced constipation

Constipation is defined as infrequent or difficult evacuation of faeces; bowel movements occurring less frequently than every 3–4 days.

Assessment and monitoring

Assessment and monitoring of bowel motions should be conducted at least once per shift as per routine nursing observations and care plans in your area, e.g. ERAS #NOF pathway.

Management of opioid related constipation

The management of opioid induced constipation has been extensively discussed within the Opioid induced constipation – Laxative sticker protocol" and a laxative sticker is available for use. See Table 7 for an overview of management.

Table 7: Overall management of opioid related constipation

Intervention	Background
1. Ensure diagnosis correct	Infrequent or difficult evacuation of faeces; bowel movements occurring less frequently than every 3–4 days
2. Adequate hydration and fibre	1. Optimise oral or intravenous fluid intake 2. Kiwicrush
3. Minimise drugs aggravating constipation	Antacids containing aluminium, antispasmodics, antidepressants, ondansetron, iron tablets, opioids, calcium channel blockers, clonidine, St Johns Wort
4. Regular	Laxsol® (Coloxyl and Senna) 2 tabs BD regularly for 3 days then review
5. Additional – First line	Lactulose 10–20mls twice daily
6. Additional – Second line	Movicol (Lax sachets) 1–3 sachets daily

Additional comments

- All opioids cause constipation to some degree, although it is difficult to predict
- Regular stool softeners and stimulant laxatives should be prescribed if opioids given regularly – EXCEPT in cases of bowel surgery and anastomoses. **In this case, discuss with surgical team**
- Opioid switching should be considered early in constipation secondary to opioid therapy
- Tramadol has fewer effects than other pure mu opioid agonists
- High fibre diet, adequate hydration and fruit are important, but are usually ineffective in opioid induced constipation
- Mobilisation decreases constipation
- Peripheral opioid antagonists (methylnaltrexone, alvimopan or even naloxone) are useful but not yet routinely available in New Zealand. Oxycodone + naloxone combination (Targin) is available in NZ but is not subsidised/listed on PHARMAC HML.

Section 2.5.4: Naloxone for opioid induced pruritus (itch)

Patients receiving opioid analgesia may complain of a generalised itch with no visible rash. This is more common following intrathecal or epidural opioid administration.

Assessment and monitoring

It is most commonly associated with intrathecal morphine, although it can also be seem with oral and parenteral opioid therapy. In general, the symptom of itch will be raised by patients if it is severe enough to be distressing.

As with constipation, it should be formally assessed daily in the morning. If symptoms require treatment, frequency of recording will increase appropriately to at least 8 hourly. This can be reduced to daily when symptoms resolve.

Management of opioid induced pruritus

There is no definitive treatment for opioid induced pruritus. The mechanism is unclear but there is a common pathway with pain transmission.

1) Ensure there are no other causes for pruritus. Medications other than opioid may cause pruritus. These include penicillin, vancomycin, hydroxyethylstarch. In addition, co-morbid diseases may also contribute to itch (e.g. renal failure, cholestasis, hypo/hyperthyroidism, polycythaemia, lymphoma).

2) If secondary to neuraxial opioids
   i. Ondansetron 4–8mg Po/IV 6 hourly, and/or
   ii. Droperidol 0.5–1mg IV 6 hourly, and/or
   iii. Naloxone 80 mcg SC 2 hourly PRN.

3) If secondary to systemic opioids
   i. Loratadine 10mg PO daily and
   ii. Ondansetron 4–8mg PO/IV 6 hourly.

4) Consider opioid rotation or change to non opioid analgesia if severe symptoms.

Section 2.6: Tips for pain assessment and management

There is no shortcut to obtaining a full and comprehensive history and evaluation from your patient. The following points may be useful in helping you address some of your patient's pain issues.

The admitting team has the primary responsibility for completion of the patient's drug chart and for creating an analgesic plan. This is often facilitated by the ward pharmacist. The Inpatient Pain Service provides support and assessment, however it does not take the place of the patient's admitting team. All patients should be prescribed a range of escalating medications that provide a step-up and step-down function. This should be individualised. The guidelines suggested are for the 'average' patient – remember co-morbidities, concomitant medications and acute pathology all modify what you prescribe.

These pain guidelines have been developed to create a degree of consistency of approach and prescribing. They are not intended to be a recipe book! The guidelines should always be taken in conjunction with the clinical situation, the examination findings and primarily what the patient needs and accepts.

Key prescribing pearls

1) **Pain assessment, nausea, sedation scoring and respiratory rate should be carried out and documented prior to starting treatment. Use these to guide pain management and therapy.**
2) **A reported pain score >3/10 should be acted on with an appropriate treatment intervention.**
3) **All patients should have a complete drug history**: Including over the counter medications, traditional medications, herbal and 'natural' supplements identified and documented.
4) **Analgesics should be limited to one drug in each class**: There is no rationale for combining ibuprofen

with diclofenac, or codeine with morphine, or morphine with oxycodone.

5) **If opioids are prescribed, always consider and monitor the following adverse effects** (all opioids produce the same types of adverse effects, but these vary in intensity and type according to specific drug):
    - Respiratory depression
    - Sedation: Irrespective of the route, opioids used for people who are not in pain, or given in doses larger than necessary to control pain, can slow down or even stop breathing. This was observed in healthy volunteers given opioids in clinical trials. Respiratory depression can be kept to a minimum when appropriate regular doses of opioids are given to patients in pain. Changes in sedation level occur before respiratory depression and hence this is a more sensitive and earlier indication of potential opioid excess.
    - Nausea and vomiting
    - Constipation
    - Pruritus/itch
    - Ileus
    - Tolerance, dependence and addiction
    - Opioid-induced hyperalgesia
    - Hormonal sequelae – e.g. reduced testosterone.

6) **Patients at risk of substance abuse need to be identified**: This does not mean analgesics are withheld but importantly they are identified, a specific pathway is initiated and post discharge problematic prescribing is avoided. All patients should be asked about past history of opioid, recreational drug and benzodiazepine use, as well as family history of drug or alcohol use.
    - **The Opioid Risk Tool (ORT)** can be accessed which identifies those patients at increased risk of substance abuse. High scores using this tool do not deny these patients opioids but may modify the follow-up and discharge information. This can be accessed on CeDSS via the intranet: http://staffnet/edss/pain_services/content/treatment/discharge%20medications.asp
    - **If patients are discharged and expected to require opioids for a prolonged period of time an Opioid Agreement form** outlining the risks and benefits of opioid prescribing should be considered. A copy is also forwarded to the GP and patients are informed about single prescribers and single pharmacy use. The Opioid Risk Tool (ORT) and Opioid Agreement form can be found online at Waitemata Pain Service website via the internet: http://www.wps.ac.nz/Portals/9/Documents/Opioid%20Contract%20formv2%200-2012.pdf

Section 2.7: Prescribing pearls for post discharge analgesics

Table 8: General guidance for patient education on pain and its management

Principle	Comments
Know your patient	One size doesn't fit all. You cannot do this without knowing the patient, procedure and rehabilitation. If you don't know, get to know the patient or get someone who does to help you fill out the documentation! Remember, not knowing is understandable, not caring is unacceptable.
Educate patients on realistic outcomes	Prescribing is no substitute for communication. Educating patients on expected outcomes is essential to set realistic goals. Timeframes are based on surgical & patient factors. Patients may benefit from medication information leaflets outlining their post discharge analgesia plan.
Use regular analgesics for a set time and then 'as needed'. Make clear precise requirements	Take the decision-making out of the equation. It is useful to have a tapering schedule, reducing more potent analgesics before simple ones.
Use analgesic ladder principles	Unless contraindicated, use paracetamol, plus NSAID regularly. Limit to 2/52 max then review by GP. In general, use long acting agents over rapid onset/offset ones.
Assess needs on inpatient requirements	If the patient is not using any analgesics there is no need to prescribe morphine. Similarly, someone using morphine 50mg/day post knee replacement won't function with paracetamol only. No new analgesia should be prescribed at discharge that hasn't been used successfully as an inpatient.
Indicate in discharge plan the suggested timeline and review period	1) For simple analgesics prescribe 'regular' for 1/52 then 'as needed' for 1/52. 2) Identify patients at potential risk for opioid abuse using Opioid Risk Tool. Prescribe opioids for 2/52 maximum. Indicate review period and need to review by GP. In general, indicate period of 'regular' and then 'as needed'. Clearly indicate expected duration of opioid use based on patient background, procedure and post-operative rehabilitation.
Outline contacts for post-operative pain issues	In general, problematic pain relief should be assessed initially by the patient's GP. Issues relating to difficult to manage pain should be reviewed in context of surgery and possible complications as well as other patient factors. The Pain Service can be contacted via surgical team or GP in first instance rather than direct contact by patient.
Documentation	It all needs to be clearly documented both in notes and in discharge letter. Importantly this should accompany patient home, as well as emailed to GP. Information included: Medications (including doses of controlled drugs on handwritten CD script), dose, duration, weaning plan, problem contacts, funding approval, other.

CHAPTER 3: PAIN MANAGEMENT MODALITIES

Section 3.1: Patient Controlled Analgesia (PCA)

All nursing staff involved in the care of patients with PCA care must complete clinical skills workbook.

PCA is an effective method of pain relief that allows a patient to self-administer a small dose of intravenous analgesic drugs. It is more effective in reducing pain than IM or SC administration and is associated with higher patient satisfaction. PCA medications in WDHB include morphine, oxycodone, and fentanyl. In general there is little difference in efficacy amongst the different opioid analgesics.

Potential adverse effects

- Respiratory depression: 1–11%
- Nausea: 32%
- Vomiting: 20%
- Pruritus: 10%

PCA prescriptions

Drug: Morphine, oxycodone, or fentanyl.

Bolus dose: The dose given per administration. This is reduced in elderly for most medications.

Morphine 1mg
Oxycodone 1mg
Fentanyl 10–30 mcg

Background infusion: There is no good data supporting a background infusion in uncomplicated post-surgical patients. A background infusion may be used to cover pre-existing opioid needs.

Lockout interval: This is usually 5 minutes. It may be longer in patients with renal impairment.

Nursing protocol

- **Refer to** IV PCA Pump CADD – Solis Guideline
- NB: at the time of printing, the IV PCA Adult guideline is about to be published, so please refer to this in the first instance as it becomes available. For now, refer to the following:

1) Once prescribed, these devices can be programmed and managed by specifically trained nursing staff following completion of competency assessment.
2) While on an IV opioid PCA, other IV opioid, oral rapid release opioid or sedatives should not be prescribed. In *some* cases there may be co-existing slow release (SR) or controlled release (CR) oral opioids charted only by the anaesthetist or pain physician. If there is doubt, please discuss with on-call pain team or anaesthetist.
3) If the patient is in pain *despite* PCA, refer to **PCA troubleshooting pathway** on p. 36. Make sure the IV is working, that the PCA machine is connected, functioning and delivering what is prescribed and, most importantly, assess the patient.
4) PCA devices should be connected to the patient's IV cannula using specific PCA tubing set.
5) If the patient is unable to use the PCA pump effectively, despite education and minimal encouragement from staff, then this technique is not appropriate and an alternative method must be considered. Relatives and support personnel should be educated in its use and instructed never to activate the pump on behalf of the patient. In exceptional circumstances, nursing staff may activate the pump (NCA – Nurse Controlled Analgesia) but this must be documented as appropriate by the Pain Service in the case notes, with reasons for the intervention and plan of management.
6) Monitoring of patients using PCA: Review and document patient's pain score, sedation score, respiratory rate and total opioid dose (in mg or micrograms) hourly for 8 hours and then 2 hourly thereafter. At night,

if the patient is sleeping normally, assessment of respiratory rate and cumulative total opioid dose are all that is required, in addition to the usual vital signs. Formal sedation score is required a minimum of every 8 hours.

PCA troubleshooting pathway

If the patient on a PCA has poorly controlled pain consult the table below.

Table 9: PCA troubleshooting pathway

Priority	Action	Staff responsible	Rationale
1	Review patient	Ward Nurse	Evaluate pain; has the pain changed? Is this pain consistent with their diagnosis / surgery? Does the patient understand how, and is physically able, to use their PCA effectively? Check NEWS score. If unsure, check with House Officer.
2	Review intravenous access (IV)	Ward Nurse	Is the IV patent and free flowing? Kinked or blocked? Tissued? If there is a problem with the IV line: • Assess ability to give rescue medication by other route (e.g. oral medication) • Urgently obtain new IV access if IV not functioning • Opioids can be given subcutaneously while awaiting IV access.
3	Review PCA	Ward Nurse	Ensure PCA pump programmed correctly, activated, patient control cable attached, and medication in bag: • Refill medication • Consider using rescue IV opioid protocol for untreated pain as it may not be possible for patient to 'catch up' using PCA prescription.
4	Review analgesic chart	Ward Nurse	If adjunct analgesics are already prescribed, ensure these are administered whilst assessing patient. Regular adjunct analgesics PLUS PCA may be effective, but missed doses may limit effectiveness of IV PCA.
5	Consider adjunct	House Officer	For pain >4/10 despite actions above, the patient needs House Officer review: (a) After review by House Officer, the House Officer may discuss with the Pain Service/anaesthetic registrar on-call for advice (b) Options include: paracetamol, NSAIDs, tramadol, IV ketamine, gabapentin, TCAs, 'opioid switch'.
6	PCA prescription	Pain Service or anaesthesia registrar on-call	(a) If max hourly dose and pain consistent – double bolus dose – review in 2 hrs (b) If max hourly dose and sedation score 2 and or RR <10 – needs medical review.

PCA step-down guidelines for standard morphine PCA

Step-down can be considered when the patient is eating/drinking and can tolerate oral analgesia.

The doses outlined below are for guidance only. Consider dose reduction in renal insufficiency and the elderly.

- Previous 24 hour morphine PCA requirements can be used as a guide to select suitable step-down analgesia (consult PCA chart).
- Since acute pain usually progressively improves, the estimated dose should be less than the previous 24 hours. In addition, the patient will be prescribed breakthrough analgesia, hence it is safer to prescribe less.
- Step-down is more favourable if daily opioid requirements are stable or reducing.
- Ensure GI function is effective before prescribing long acting sustained release preparations.
- Oxycodone is not the first line drug of choice for step-down from PCA and should only be considered on the advice of the Pain Service or if side effects with morphine have been problematic. Refer to Pain Management Guidelines for conversion details.
- **If discontinuation of PCA is a desirable aim but no oral route is available, contact Pain Service for advice.**

Choice of step-down analgesia

Previous 24 hour PCA morphine total dose ≤20mg

- Paracetamol 1g 6 hourly regularly
- Consider NSAID – e.g. Naproxen 500mg 12 hourly +/- Omeprazole 20mg/day
- Codeine 30mg PRN 4 hourly (Max 240mg/24hrs)

OR

- Tramadol 50–100mg PRN 6 hourly (max 400mg/24hrs).

Previous 24 hour PCA morphine total dose >30mg

- Paracetamol 1g 6 hourly regularly
- Consider NSAID – e.g. Naproxen 500mg 12 hourly +/- Omeprazole 20mg/day
- Tramadol 50–100mg PRN 6 hourly (max 400mg/day)
- Rapid release opioid e.g. Sevredol® 10–20mg q1hrly PRN (limit daily maximum to equal previous 24hr requirement)
- Controlled release opioid e.g. M Eslon® 10–20mg (or 50% previous 24hr oral morphine equivalent) twice daily regularly for 24 hours after stopping PCA, then review.

Clinical example

Your 45-year-old patient has used 100mg IV morphine in 24 hours.
100mg IV morphine = 200mg oral morphine
Give half their oral morphine equivalent as controlled release opioid – i.e. give 100mg as M-Eslon®, charted as 50mg bd.
Breakthrough rapid release opioid should be charted as 1/6th their controlled release daily dose (e.g. 100mg/6 = 16.7mg – round to nearest 5mg and chart as 15mg q1 hour).

Section 3.2: Continuous intravenous infusion of morphine

Some patients on the wards will have continuous intravenous infusions of morphine (+/-) PCA (Patient Controlled Analgesia) boluses for the control of post-operative pain. In some patients this is because they are unable to activate a PCA button. For patients who have been on large oral doses of opioid in the past and cannot tolerate an oral intake, it may be necessary to add a background infusion equivalent to their pre-existing opioid dose and supplement with the PCA bolus. This group of patients may include those on therapeutic opioids for pain, those on the methadone programme or IV drug abusers. In theory, if morphine is given at a constant rate it will eventually reach a steady concentration, where the rate of delivery is equal to the rate of removal by the kidneys and the liver. In practice, however, concentrations of morphine in the blood rise and serious respiratory depression and hypoxia can result some hours or days after the start of the infusion, and can occur in the middle of the night. The other complications of opioid therapy such as nausea, vomiting and sedation can also occur.

In general, continuous opioid infusions should be ***infrequently*** used.

Nursing protocol

- **Refer to** IV PCA pump CADD-Solis guideline
- NB: at the time of printing, the IV PCA Adult guideline is about to be published so please refer to this in the first instance as it becomes available. For now, refer to the following:
  1) The CADD-Solis pump should be used.
  2) All observations must be carried out every **hour**. For patients who are asleep, the respiratory rate, IV site and drug volume observations are recorded hourly and the pain, sedation and nausea scores will be recorded for every hour that they are awake. **CAUTION**: If respiratory rate is **≤8/min** in patients that are asleep, **wake** the patient to assess their level of consciousness and document their sedation score.
  3) Initially the pump will be set at the rate of infusion the clinician thinks is appropriate for the individual patient.
  4) If patient remains in pain, infusion rate may need to be increased. If sedation score = 2–3, switch off pump and re-assess after 30 minutes – infusion rate may need to be adjusted.
  5) The nurse looking after the patient will need to have Infusion Device Training for the particular device that the patient is using.
  6) **IV site** – Check for leaks, obstruction or extravasation. Inform ward doctor.
  7) **Infusion Rate** – Record this in ml/hour every hour.
  8) **Volume Remaining** – Record hourly, including any morphine discarded following stopping infusion.

Section 3.3: Intrathecal (spinal) opioids

Introduction

In the operating room, an opioid may be added to the local anaesthetic solution administered for subarachnoid (spinal) anaesthesia. Commonly used intrathecal opioids are fentanyl and morphine. Their use provides prolonged analgesia even when the effects of the local anaesthetic solution have worn off. This form of analgesia is especially common after caesarean section surgery and major joint replacement.

Fentanyl lasts up to 4 hours, and morphine may last up to 24 hours following intrathecal (spinal) injection, therefore it is essential to monitor as per routine post-operative WDHB protocol (see Clinical practices: Post-operative Care).

Table 10: Common intrathecal opioid dose

Drug	Intrathecal dose	Onset	Duration
Fentanyl	5–25 mcg	5–10 min	1–4h
Morphine	50–200 mcg	45–75 min	18–24h

This is an effective form of analgesia, as small doses (1/10th of the IV dose) can provide good pain relief with minimal side effects. Irrespective of the route of administration, opioids may cause sedation, respiratory depression (3% with PaCO2 >50mmHg and RR<8 /min), nausea & vomiting (25%), pruritus/itch (30% – especially in face with morphine) and urinary retention (35%). It is therefore essential to be aware of the administration of opioids by this route and monitor the patient for the development of side effects, particularly, oversedation and late onset respiratory depression. Late onset respiratory depression is due to rostral spread of the opioids within the CSF and is again more common with morphine and at doses greater than 300mcg. This affects the respiratory centre in the brain and occurs 6–24 hours after administration.

Patients *may* exhibit respiratory depression within the next 24hrs. As with all opioid administration, sedation usually precedes respiratory depression.

Epidural fentanyl and morphine: Occasionally, patients may have received a local anaesthetic and opioid via an epidural peri-operatively without a continuous infusion post-operatively.

An epidural catheter may or may not be present. In these circumstances it is important to continue with observations as described below.

Monitoring patients with intrathecal or epidural morphine:

- Naloxone is to be readily available
- If respiratory rate (RR) is <8/min or if the patient is unrousable (Sedation score = 3) manage according to Table 4
- Observe for respiratory depression
- Pruritus from the use of opioids, particularly intrathecal or epidural morphine, can be very distressing. (See opioid induced pruritus in section 2.6.4).

Section 3.4: Local anaesthetic techniques

Introduction

These techniques are used as part of multi-modal analgesic therapy to enhance analgesia, provide an opioid dose sparing effect and minimise side effects. Techniques may be as simple as topical application or surgical wound infiltration, or extend to the more invasive techniques performed by anaesthetists only. Some of these techniques are described in this section.

Local anaesthetic agents

Short acting agents

Lignocaine: This is strongly hydrophilic but diffuses quickly into nerve tissue as it is usually in high concentration. It is limited as a post-operative agent as it is short acting, even with adrenaline, and with an infusion, tachyphylaxis quickly develops. In spinal anaesthesia, lignocaine has been implicated in Transient Neurological Symptoms.

Long acting agents

Bupivacaine: A racemic mixture of S- and L- enantiomers

Ropivacaine: The S- enantiomer. In potency, is higher than bupivacaine. In obstetric studies, bupivacaine local anaesthetic blocking tendency was 0.6 that of ropivacaine. Hence for post-operative infusions – 0.125% bupivacaine is equivalent to 0.2% ropivacaine.

Most studies do not demonstrate important differences between these long acting agents in regard to quality of analgesia and degree of motor block at equi-anaesthetic doses.

Opioid and local anaesthetic combinations:

Combined agents appear to confer synergy and reduction of side effects, especially those related to local anaesthetics.

Local anaesthetic techniques

Local anaesthetic techniques can be used pre-operatively, intra-operatively and post-operatively. In addition, single injection techniques or catheter systems can be used, whereby infusions or bolus administration, either by nursing staff or patients themselves, can be undertaken.

Pre-operative

Some cases may benefit from administration of regional anaesthesia to areas of pain or in an attempt to reduce postoperative pain:

- Trauma (e.g. femoral nerve, fascia iliaca block for fractures of femur – as part of the ERAS protocol for fractured neck of femur)
- Amputation (pre-operative sciatic nerve block, femoral nerve blocks, or epidural analgesia)
- Management of acute exacerbations of complex pain problems (e.g. limb pain with complex regional pain syndrome).

Intra-operative

Most surgical procedures can have regional anaesthesia to supplement systemic analgesia. This improves pain relief and reduces potential side effects of opioids, NSAIDs and other systemically administered analgesics.

Post-operative

Many procedures can have analgesia continued into the post-operative period using long acting anaesthetics or infusions. In the latter, these can be continuous infusions or intermittent boluses, using patient or nurse activated bolus dosing. In patients needing repeated wound care or dressing, catheters can be used to provide intermittent analgesia +/- anaesthesia. Compared to opioid analgesia, continuous peripheral nerve blockade provides better analgesia, and leads to a reduction in opioid use and reduction in opioid related side effects.

Many regional anaesthetic techniques employ Ultrasound (US) for guidance. These are usually placed within the operating room but may be inserted on the ward, in ED or ICU/HDU. The use of US can lead to a faster, more effective and longer lasting block compared to 'blind-anatomical landmark' or nerve stimulator techniques. It reduces intravascular injection, but has not been shown to reduce nerve injury from blocks.

Summary of local anaesthetic 'regional' techniques

- **Head and neck**
  - Superficial cervical plexus block for thyroid and neck surgery
  - Infra-orbital, supra-orbital and trochlear nerve blocks (e.g. facial and neurosurgery)
  - Mandibular and maxillary nerve blocks for oral surgery
  - Greater and lesser occipital nerve block (e.g. mastoidectomy and otoplasty)
  - Peribulbar, retrobulbar blocks (e.g. ophthalmic surgery)
  - Local infiltration (e.g. tonsillectomy).

- **Chest**
  - Epidural and spinal for thoracic and cardiac surgery (e.g. thoracotomy and sternotomy)
  - Paravertebral
  - Intercostal single blocks and catheters (e.g. thoracoscopy, fractured ribs/sternum)
  - Intrapleural single blocks and catheters.

- **Back**
  - Epidural
  - Spinal (intrathecal e.g. post spine fusion – opioids)
  - Wound catheter.

- **Abdomen**
  - Neuraxial (epidural and spinal)
  - TAP blocks
  - Wound catheters
  - Ilioinguinal, hypogastric nerve blocks
  - Rectus sheath catheters.

- **Pelvis**
  - Neuraxial blocks (epidural and spinal)
  - Ilioinguinal, hypogatric nerve blocks (e.g. hernia repair, caesarean section)
  - Penile block (e.g. circumcision)
  - TAP.

- **Upper limb**
  - Brachial plexus blocks (interscalene, supraclavicular, infraclavicular, axillary, suprascapular approach)
  - Peripheral nerve blocks (radial, median and ulnar nerves).

- **Lower limb**
  - Neuraxial block (epidural and spinal)
  - Lumbar plexus block
  - Fascia iliaca
  - Femoral nerve
  - Sciatic nerve (high and popliteal fossa)
  - Tibial nerve
  - Ankle block.

Prescribing local anaesthetic blocks

1) **Single shot injections**: If performed, these blocks will be documented in the anaesthetic chart and will be handed over to the ward nurse during transfer of patients from PACU. It is important that the ward nurse notes the type of block, degree of analgesia and, importantly, degree of motor block. This should be documented in the handover note and included in the patient's clinical notes.

2) Continuous catheter or other long acting local anaesthetic / intrathecal opioid techniques:
   (a) **Spinal + intrathecal opioid**: A sticker will accompany the drug chart to indicate the administration and timing of intrathecal morphine.

   (b) **Nerve catheter**: Local anaesthetic will be given as continuous infusion, or occasionally by nurse

administered boluses (e.g. rectus sheath catheter). These will return to the ward with either a disposable pump (a 'PainBuster®') or CADD-Solis infusion pump. Each catheter should have a completed Nerve Catheter Analgesia form (however, rectus sheath catheter analgesia is often prescribed as intermittent nurse administered boluses on the patient's main medication chart, e.g. bupivacaine 0.25% 15 ml each rectus sheath catheter every 6 hours).

Complications from local anaesthetic techniques

The complications of these techniques are related to the technical difficulty of the procedures and to the management of local anaesthetic infusions.

Inadequate analgesia

Local anaesthetic techniques can be difficult to perform and may not produce adequate pain relief. Ensure adequate rescue analgesia is administered as prescribed. This should be balanced and consist of regular paracetamol and oral opioid (morphine/oxycodone) OR parenteral opioid (morphine PCA). If success of the block is especially important to prevent potential adverse effects of systemic analgesia, the nerve catheter may need to be re-sited. This can be done in the operating rooms but on occasions a portable ultrasound and equipment can allow this to take place at the bedside in the ward.

Excessive anaesthesia

Whilst local anaesthesia reduces pain, it also removes some protective mechanisms. At times patients feel distressed by complete lack of sensation or are unable to manage a functionally useless limb or cannot detect when it is in an incorrect anatomical position. It is important to educate patients pre-operatively and manage expectations. If patients are on a continuous infusion, this can be changed to a bolus only technique. Limbs should be supported in slings to ensure there is no risk of inadvertent pressure or movement damage. If patients are distressed or have issues with the block, contact the Pain Service for review.

Local anaesthetic toxicity

This is a rare complication. Early symptoms include tinnitus or circumoral tingling and may rapidly progress to convulsions or cardiac arrest. Stop the infusion immediately if any of these signs develop and contact the anaesthetist on-call immediately. In the event of cardiac arrest, call the arrest team in addition to the anaesthetist on-call. (See below for emergency management of LA toxicity.)

Infection

Whilst colonisation of many catheter systems appears to be relatively common (16-60%), frank infection is uncommon (0.25–4%). This colonisation depends on dressing and catheter care and may be reduced by tunnelling the catheter system (6% rate of colonisation).

Signs of infection at the site include redness of the skin, induration and possibly systemic signs of infection. Rarely, a psoas abscess may develop following a lumbar plexus catheter infusion. If any signs of infection are detected, stop the infusion and contact the Pain Service and/or the responsible anaesthetist. This may have implications for the surgical procedure, and further antibiotic prophylaxis/treatment may need to be considered (e.g. femoral nerve and knee arthroplasty).

Risk factors for catheter site infection include: ICU placement, use >48 hours, lack of antibiotic prophylaxis, axillary or femoral location and frequent dressing changes.

Epidural spread of lumbar plexus catheters

It is possible for local anaesthetic to spread rostrally to the epidural space and produce signs and symptoms of an epidural block (see epidural guide for management of high epidural blockade). Contact the Pain Service for review.

Nerve damage

Significant and long standing nerve damage is rare. Patients may experience transient paraesthesiae and areas

of numbness. This is normal during the block and should disappear when catheter is removed. If these symptoms do not resolve 12 hours after the catheter is removed, the patient should be reviewed and examined by the surgical team. If there is concern that the neurology is possibly related to the block then a review by the Pain Service or the anaesthetist responsible for catheter insertion is suggested. It should be noted that some procedures themselves predispose to nerve injury and it may be a result of positioning or surgical trauma rather than the regional anaesthesia.

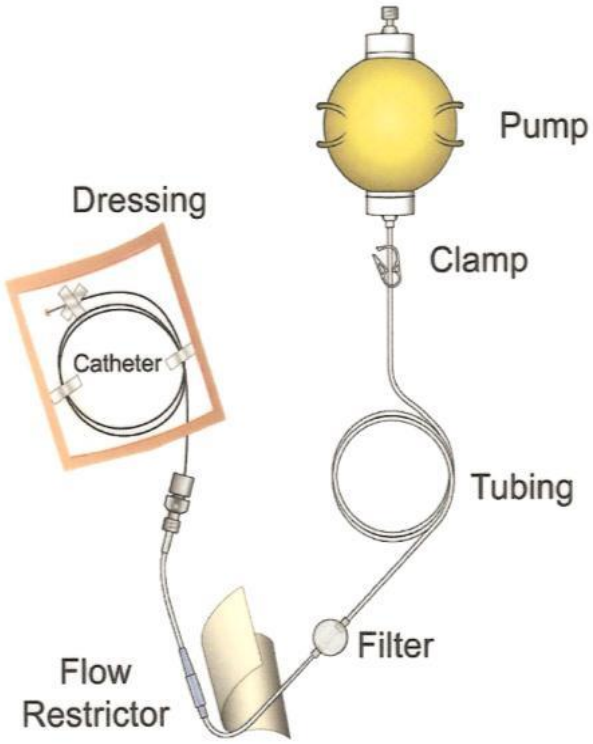
The incidence of transient nerve damage following some anaesthetic procedures has been reviewed. These include interscalene nerve block (2.84%), axillary BPB (1.48%), and femoral nerve block (0.34%).

Permanent nerve problems are much more rare. The long-term complications for brachial plexus blocks range from 0.02% to 0.4%.

Management

- **Refer to** PainBuster® – Pain relief system preparation guideline in the first instance.

Peripheral nerve catheters are simple to care for and need few interventions. They are generally safe in the ward setting. These tend to be either intermittent bolus dosing or background infusions or combinations using patient activated devices. These may be permanent or disposable (e.g. PainBuster®).



The filter must not be taped to the patient's skin and should be kept dry. There is a small hole at the back of the filter, which allows any small air bubbles to escape the system and this can become blocked and will cease to work if it gets wet.

Peripheral nerve catheter pathway

1) Infusions must be prescribed on the Nerve Catheter Analgesia chart (e.g. Ropivacaine 0.2% via PainBuster® 2mls/hr plus 5 ml bolus with 60 minute lockout).
2) Check site daily for signs of infection.
3) Ensure the clamp is open.
4) Perform regular pain, sedation and nausea scores as per pain guidelines.
5) Administer additional analgesia as prescribed and assess efficacy and safety with regular pain, sedation and nausea scores.
6) Mobilise patient as directed and as tolerated by patient. Low dose local anaesthetic solutions should not cause motor block and proprioception should be maintained.
7) Elastomeric pumps (e.g. PainBuster® pumps) are designed to run for up to 60 hours. **The PainBuster®**

pump should not be refilled as this may interfere with the delivery rate of the subsequent infusion.

8) If block appears to be ineffective, ensure adequate alternative analgesia is prescribed and administered according to routine pain observations and assessment then contact Pain Service or on-call anaesthetist who may decide to top up block with local anaesthetic, or place a new nerve catheter.
9) If patients are to be discharged with an infusion catheter, then **please contact the Pain Service**. The patient needs to be given:
    - Clear instructions on when and how to remove catheter
    - A telephone contact to trouble shoot any problems
    - Advice on what to do if there is a complication.

Rectus sheath catheters

- **Refer to** Rectus sheath catheter guideline in the first instance.

These are usually placed intra-operatively by the surgeon during wound closure, or may be placed using ultrasound at the beginning or end of the operation. It is important that they are placed accurately into the posterior rectus sheath space. They are effective in any midline incision but do not work effectively for subcostal, Mercedes type or flank incisions. Blood levels of injected and infused local anaesthetics are similar to brachial plexus blocks so maximum dose rates should be considered. The maximum dose is around 3mg/kg bolus – or around 800mg/d.

Rectus sheath catheters are simple to care for and need few interventions. They are generally safe in the ward setting. These tend to be either intermittent bolus dosing or background infusions or combinations using patient activated devices. These may be permanent or disposable (e.g. PainBuster®). It has been suggested that this block works most effectively if higher volumes are used.

As disposable catheter systems can be expensive, they are usually prescribed as intermittent bolus dosing.

TAP block catheters

These are usually placed post-operatively. They are useful for lateral incisions and can be placed for upper and lower abdominal surgery—e.g. open cholecystectomy, hysterectomy, caesarean section and hernia repairs.

Blood levels of injected and infused local anaesthetics are similar to brachial plexus blocks so maximum dose rates should be considered. The maximum dose is around 3mg/kg bolus – or around 800mg/d. TAP block catheters are simple to care for and need few interventions. They are generally safe in the ward setting. These tend to be either intermittent bolus dosing or background infusions or combinations using patient activated devices. These may be permanent or disposable (e.g. PainBuster®). It has been suggested that this block works most effectively if higher volumes are used. These catheters tend to be single, hence ward pumps or disposable pumps can be used; however, intermittent dosing is also useful.

Suggested TAP catheter management

- When the catheters are inserted, the first dose can be a higher concentration e.g. Ropivacaine 0.375% 20ml into the catheter. This needs to be recorded in the anaesthetic chart via SaferSleep.
- Nurse administered bolus doses must be prescribed on the drug chart (e.g. Ropivacaine 0.2% via TAP catheter. 20mls to each catheter every 6 hours).
- Complete Regional Analgesia Infusion form.
- A Pain Service referral form needs to be completed so these patients are reviewed on the ward.
- Check site daily for signs of infection, leakage or dislodgement.
- Administer additional analgesia as prescribed, and assess efficacy and safety with regular pain, sedation and nausea scores.
- Mobilise patient as directed and as tolerated by patient.
- If TAP catheters appear to be ineffective, ensure adequate alternative analgesia is prescribed and administered according to Pain Management Guidelines then contact Pain Service or on-call anaesthetist.

Section 3.5: Epidural analgesia

- **Refer to** Epidural analgesia (PCEA) in adults in the first instance
- **Refer to** Epidural (PCEA) pump CADD-Solis guideline
- **Refer to** Anticoagulation administration before and after epidural guideline.

Patients receiving epidural analgesia are nursed in the surgical wards, maternity suites, ICU and HDU by staff who have completed competency assessment. However, all nursing, midwifery, anaesthetic technicians and medical staff must be aware of relevant information to safely care for patients with an epidural, or following discontinuation and removal of the epidural catheter.

Brief overview

Epidural analgesia provides an effective method of pain relief where analgesia is targeted at that area of the body from which the pain is originating. This avoids giving systemic analgesics which affect the whole body (oral, IM, IV). Local anaesthetics and opioids are given via a catheter in the epidural space. The dose is set by the anaesthetist with reference to the patient's age, general condition and type of surgery. The complete absence of pain is often difficult to achieve and will inevitably be a balance between analgesia, patient satisfaction, safety and, importantly, available resources.

The combination of low doses of local anaesthetic (bupivacaine or ropivacaine) and opioid (fentanyl) offers superior analgesia than either alone, and at much lower doses. Pethidine alone may be used in certain patients, e.g. obstetrics, following caesarean section.

Epidural analgesia provides superior analgesia in comparison to parenteral opioids and may lead to better outcomes in selected patient populations (e.g. active lung disease, bowel surgery).

Epidural catheters are inserted under aseptic conditions in the operating rooms. The post-operative analgesia is usually a combination of patient activated bolus dose (PCEA) +/- background infusion. It is essential that it is actively managed on the ward and that it is optimised for each patient. It is inserted usually at the level of the dermatome of the skin incision. This level may differ in abdominal surgery where the insertion site may be higher due to requirement to produce splanchnic sympathetic block and improved bowel function.

Complications and side effects of epidural analgesia

1) **Poor analgesia**: Patients may have an epidural which either *was* functioning well and now is working poorly, or an epidural which was never really very effective. In a large prospective study, 1/5 of all patients had a premature termination of treatment, the most common causes being disconnection (10%), inadequate analgesia (3.5%), and sensory or motor deficit (2.2%), and most terminations occurred on day 2.
    - **The 'newly dysfunctional' epidural**:
        - Assess patient and identify if there is any new pathology related to surgery or medical condition.
        - Review the epidural site and ensure catheter is still in place. The blue markings should be visible and can be checked against the documented insertion depth to establish if the catheter is in the correct place, or has dislodged.
        - Ensure the catheter is connected to filter and the pump is functioning and working well, with adequate reservoir of epidural solution (i.e. ensure medication bag is not empty).
        - If still not effective, call the Pain Service or on-call anaesthetist and administer rescue analgesia medication until patient is reviewed. If review is to be some time away, discuss a prescription of IV opioid PCA.
    - **The 'never effective' epidural**:
        - Assess patient and identify if there is any new pathology related to surgery or medical condition.
        - Discuss with Pain Service or on-call anaesthetist and administer rescue analgesia medication.
        - Options may include re-siting the epidural or introducing IV opioid PCA.

2) **Hypotension**: Blockage of autonomic sympathetic fibres can lead to hypotension. In a patient with previous stable CVS function, new hypotension should be assumed to be most likely related to hypovolaemia rather than the epidural. The incidence of problematic hypotension is highly variable and determined in part by location of the clinical setting. If hypotension occurs it will normally respond to intravenous fluids but vasopressors may be required. In some situations, and in order to avoid giving large amounts of intravenous fluids, a low-dose infusion of a vasopressor may be necessary although this would not often be used in a general ward setting.

3) **Permanent neurological damage**: It is difficult to quantify the exact incidence of transient or permanent neurological damage. In some cases, both the surgery and anaesthetic technique exposes patients to potential risk. Case series estimate the risk of transient neuropathy to between 0.013% and 0.023% (Xie, 1991, Tanaka, 1993, Auroy, 1997).

   In a 16-year audit from a single institution comprising 8,210 epidural insertions, there were 2 cases of spinal haematomas and 6 epidural abscesses. One patient needed urgent decompression and there were no long-term sequelae (Cameron, 2007). In higher risk surgical specialties of vascular or cardiothoracic surgery, the risk of permanent neurological injury was 1 in 4,600 cases (Ruppen, 2006). Brull undertook a review of multiple studies in 2007. The incidence of transient neurological deficit was 1 in 5,000 cases. Permanent damage was reported in 0–7.6/10,000. Paraplegia and cauda equina syndrome were seen very uncommonly at rates of 1 in 100,000 and 1 in 40,000 cases respectively. The obstetric literature reports persistent neurological damage affects 1 in 240,000 and transient neuropathies affect 1 in 7,000.

   The Royal College of Anaesthetists audited a little over 700,000 central neuraxial blocks, and reported their findings in 2009 (NAP3 The 3rd National Audit Project of the Royal College of Anaesthetists, January 2009). Of these, 46% were spinals, 41% epidurals, 45% were performed for obstetric indications, and 44% were perioperative. There were 84 major complications reported in the year of the audit, with 52 meeting all the audit inclusion criteria. Interpreted pessimistically, there were 30 permanent injuries, and 'optimistically', 14 permanent injuries. The incidence of permanent injury was 4.2 per 100,000 (1 in 24,000) 'pessimistically' and 2.0 per 100,000 (1 in 54,000) 'optimistically'. Paraplegia or death occurred 1.8 per 100,000 (1 in 50,000) 'pessimistically' and 0.7 per 100,000 (1 in 140,000) 'optimistically'. In the 30 patients with permanent harm, 60% occurred after epidural block, 23% after spinal anaesthesia, and 13% after combined spinal-epidural (CSE). Most complications leading to harm occurred in the perioperative setting. The incidence after epidural or spinal for obstetric indications is extremely low. Approximately 2/3 patients with initially severe complications made a full recovery, however vertebral canal haematoma and spinal cord ischaemia complications had a poor prognosis. Combined spinal epidural techniques (<6% of all blocks) were associated with a disproportionately high number of reports of harm (>13%). Failure to identify and understand the importance of inappropriately weak legs (including unilateral weakness) can lead to avoidable harm.

4) **Postdural puncture headache**: If the dura is punctured during the insertion of an epidural, leakage of the cerebrospinal fluid (CSF) can occur. This can lead to a decrease in CSF pressure and tension on meningeal vessels and nerves, which can result in headache. The signs and symptoms are fairly typical and usually occur 1–2 days after the puncture. The headache is usually bifrontal and/or occipital, worst if the patient sits or strains, and may be associated with nausea and vomiting, photophobia, depression and tinnitus. Initial treatment consists of bed rest, hydration and analgesia (simple or opioids). If these measures are not effective, a 'blood patch' can be performed. This means that another epidural needle is inserted and, in a sterile manner, some of the patient's blood is injected into the epidural space. This effectively seals the hole through which the CSF is leaking. Relief from the headache is almost immediate in 95% of cases, in case of failure it can be repeated.

5) **Total spinal injection**: This again is due to the tip of the epidural catheter going through the dura mater and entering the subarachnoid space, where there is CSF. As volumes of anaesthetic needed for spinal blocks are 1/10th that for epidural analgesia, doses intended for the epidural space quickly become excessive within CSF, and may lead to a decreased level of consciousness, hypotension, bradycardia and possible cardiorespiratory arrest.

Management of suspected total spinal injection

- Turn epidural off
- Urgent review by medical team and call on-call anaesthetist/Pain Service
- Call Pain Service or on-call anaesthetist.

6) **Epidural abscess**: This is a relatively rare complication, which may lead to spinal cord compression and permanent neurological deficit. Prospective studies have found rates in the range 1.5 per 10,000 to 1 in 2,000 cases. Duration of catheter placement appears significant. There were no cases of abscess in catheters placed for 2 days or less, whilst the mean duration for those with an abscess was 11 days. All preparations and injections should be made with a strictly aseptic technique and administered through the standard epidural filter. Epidural abscess can manifest days or weeks after epidural catheterisation or removal. The signs are pyrexia, back or leg pain and unresolving anaesthesia or motor blockade (leg weakness).

Management of suspected epidural abscess

- Call Pain Service or on-call anaesthetist immediately for urgent review
- Ensure that patient's surgical team also reviews the patient and appropriate investigations are actioned (FBC, electrolytes, blood cultures and early discussion with radiology for MRI scan and orthopaedic team review for urgent decompression if required). If the diagnosis of epidural abscess can be made before the onset of any neurological deficit, conservative management (e.g. antibiotics only) may be effective.

The presence of severe or increasing back pain, even in the absence of fever or leg weakness, may indicate an epidural space infection and should be investigated urgently.

7) **Epidural haematoma**: The onset of signs and symptoms of this complication may be sudden. Importantly, in many patients a neurological deficit (especially muscle weakness) may be the first indication of a haematoma. Neurological dysfunction (motor, sensory, bladder or bowel) develops as the haematoma increases in size and compresses nerve roots or spinal cord. The patient may also complain of sharp back or nerve root pain. Immediately after epidural or spinal anaesthesia the first sign may be an unusually dense of patchy block, or one that is unusually slow to resolve. Presentation of an epidural haematoma may be delayed for a few days after catheter insertion or removal. Nursing staff should be aware of the early signs and symptoms of a haematoma and should regularly monitor and record motor and sensory function. The assessment of motor blockage using the Bromage scoring systems ensures early identification of epidural haematoma or abscess.

Many studies have examined this complication. The overall risk appears to be between 1 in 200,000 (Wulf, 1996) to 1 in 3,000 (Horlocker, 2003). The latter was associated with inappropriate low molecular weight heparin administration. In the obstetric population the risk is around 1 in 168,000 (Ruppen, 2006). Epidural haematomas would also cause spinal cord compression—damage to an epidural vein during insertion or removal of the epidural catheter may cause bleeding and haematoma formation. The likelihood of this increases if the patient has a clotting disorder or is fully anticoagulated; therefore epidurals are avoided in these patients. The risk appears to increase in patients who are on NSAIDs and anticoagulants (e.g. enoxaparin, heparin, riveroxaban) together.

Management of suspected epidural haematoma

- **This is an emergency, where surgical evacuation within 8 hours may be warranted.** This presents with an unusually dense motor block, Bromage score 3 and/or back pain and needs **immediate** assessment by the Pain Service or on-call anaesthetist.
- Ensure that the patient's surgical team has been informed, reviewed the patient and appropriate investigations actioned. This would include FBC, electrolytes, blood cultures and early discussion with radiology for MRI scan.
- Review drug chart and ensure NSAIDs, anticoagulants or other medications that interfere with coagulation are not administered.

8) **Respiratory depression**: The rate of reduced respiratory rate (1%) and desaturation (15%) is low and clinically uncommon to lead to important clinical sequelae.
    - While on epidural, all patients should have nasal oxygen as prescribed while resting in bed or sleeping. At other times oxygen may not be required unless clinically indicated.
    - During epidural analgesia, if supplemental opioids or sedatives are prescribed, discuss with anaesthetist or Pain Service.

    Action/treatment

    - Stop epidural
    - Give naloxone as per Epidural Prescription form
    - Immediate review by medical staff
    - See Table 4.

9) **Disconnection**: It is more important to prevent disconnection by firmly adhering dressings on the patient's back and by the tight fixation of the epidural screw connector with Tegaderm or Hypafix tape to 'sandwich' to prevent the yellow epidural connector unscrewing from the filter. Care should be taken by nursing staff to avoid unnecessary tension and strain on the epidural line. No epidural should be removed outside the normal protocol times in relation to any administered anticoagulation or anti-platelet medication, as there will be an increased risk of epidural haematoma (see **Anticoagulation and epidural catheter insertion and removal** on p. 51).

10) **Intravascular injection.** This can potentially occur with catheter migration, but appears to be very uncommon. With the closed systems we use now, aspiration of catheters is uncommon. It should be considered in patients who develop altered levels of consciousness, metallic tastes in mouth, tinnitus, dizziness or hypotension.

    Management of suspected intravascular injection of local anaesthetic

    This is a rare complication. Early symptoms include tinnitus or circumoral tingling and may rapidly progress to convulsions or cardiac arrest.

    Local anaesthetic toxicity is caused by:

    - Overdose of the drug in the epidural space (or other route of local anaesthetic infusion or bolus e.g. nerve catheters, rectus sheath catheters)
    - Rapid absorption of normal drug dose inadvertently injected intravascularly
    - Hypersensitivity to the drug – a very rare occurrence.

    Signs and symptoms include:

    - CNS – Anxiety, agitation, tingling around the mouth, drowsiness, convulsion
    - CVS – Hypotension, cardiac arrhythmias.

    Treatment

    If local anaesthetic toxicity is suspected or any cardiac arrest occurs where local anaesthetic toxicity could be the cause:

    - **Stop infusion** of local anaesthetic immediately
    - **Call 777** for urgent attendance of resuscitation team
    - Oxygen 100% via a non-rebreathing mask or via a bag mask device must be given, assess ABCs and commence CPR if necessary
    - Call the anaesthetic technician on ext. 3177 for Intralipid to be delivered to ward or clinical area
    - Call Anaesthetist on-call on ext. 3540 and Pain Service on ext. 7228 for assistance.

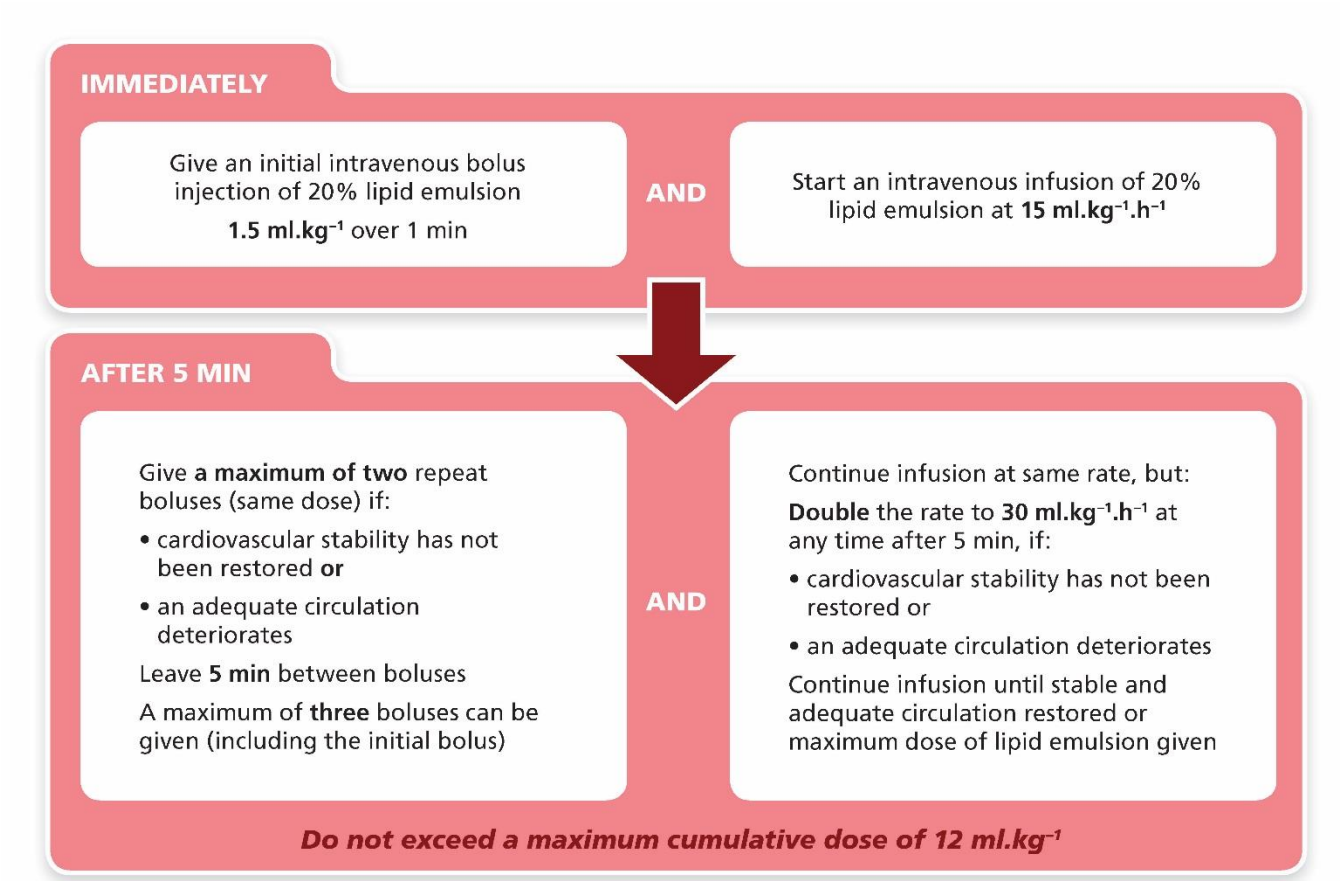
There is basic scientific evidence supported by several case studies for the use of Intralipid 20% solution in the

management of local anaesthetic toxicity.

- In the event of *cardiac arrest*, it should be administered as soon as local anaesthetic toxicity is suspected (see treatment algorithm below – AAGBI safety guideline)
- In patients who are *unstable*, conventional treatments should be used to treat hypotension, bradycardia and tachyarrythmias, and the administration of Intralipid should be considered.

The rationale for using Intralipid is that lipid will bind free local anaesthetic drug and prevent it from causing cardiac arrest or convulsions. There is anecdotal evidence that it may reverse the cardiovascular and cerebral effects if the patient is symptomatic.

Prepared kits of 20% solutions which contain the appropriate syringes and infusion devices can be found in areas where epidural infusions are used. The prepared boxes contain Intralipid, syringes and a laminated sheet with the protocol.



IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
1.5 ml.kg^{-1} over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at **15 ml.kg^{-1}.h^{-1}**

AFTER 5 MIN

Give **a maximum of two** repeat boluses (same dose) if:

- cardiovascular stability has not been restored **or**
- an adequate circulation deteriorates

Leave **5 min** between boluses

A maximum of **three** boluses can be given (including the initial bolus)

AND

Continue infusion at same rate, but:

Double the rate to **30 ml.kg^{-1}.h^{-1}** at any time after 5 min, if:

- cardiovascular stability has not been restored or
- an adequate circulation deteriorates

Continue infusion until stable and adequate circulation restored or maximum dose of lipid emulsion given

Do not exceed a maximum cumulative dose of 12 ml.kg^{-1}

An approximate dose regimen for a 70-kg patient would be as follows:

IMMEDIATELY

Give an initial intravenous bolus injection of 20% lipid emulsion
100 ml over 1 min

AND

Start an intravenous infusion of 20% lipid emulsion at 1000 ml.h^{-1}

AFTER 5 MIN

Give a **maximum of two** repeat boluses of 100 ml

AND

Continue infusion at same rate but **double** rate to 2000 ml.h^{-1} if indicated at any time

Do not exceed a maximum cumulative dose of 840 ml

This AAGBI Safety Guideline was produced by a Working Party that comprised:
Grant Cave, Will Harrop-Griffiths (Chair), Martyn Harvey, Tim Meek, John Picard, Tim Short and Guy Weinberg.

This Safety Guideline is endorsed by the Australian and New Zealand College of Anaesthetists (ANZCA).

Anticoagulation and epidural catheter insertion and removal

- **Refer to** Guideline for anticoagulation administration before and after epidural catheter withdrawal or removal.

Epidural catheter removal: Epidural haematoma is a serious complication and careful attention is required with regards to anticoagulation medication timing and epidural catheter removal. Given the small numbers of cases of epidural haematoma following regional analgesia/anaesthesia, there are no good RCTs to direct management, hence most of the guidelines are based on consensus and best practice. (N.B. spontaneous epidural haematomas probably occur up to 6 times more commonly than those related to anaesthesia.)

Timing: Timing of catheter removal is important. Refer to the WDHB Guideline for anticoagulation administration before and after epidural catheter withdrawal or removal. As with all guidelines, they need to be taken within the individual patient's wider context.

- Check the patient's drug chart for anticoagulants i.e. enoxaparin, heparin or rivaroxaban timing and dose.
- Ensure the clotting and platelet count is normal.
- In general, at least 12 hours should have elapsed since last prophylactic enoxaparin dose before removing the catheter. If the dose was therapeutic, at least 24 hours should have elapsed after the last dose.

If in any doubt, discuss with the Pain Service or phone on-call anaesthetist.

Section 3.6: Entonox®

Entonox® is a premixed gas containing equal proportions of 50% oxygen and 50% nitrous oxide. It is presented in a white cylinder with blue and white shoulders and is very useful for procedural pain, e.g. dressing changes, drain removal or limb manipulation. It is also widely used in the delivery suite.

Entonox® may only be administered by a registered nurse or midwife who has successfully completed the Waitemata DHB competence process.

Indications for use

- Labour ward analgesia
- Dressing changes, removal of packs and drains on ward
- Minor orthopaedic manipulation in ED.

It is contraindicated in

- Impaired level of consciousness or head injury
- Pneumothorax
- Intoxication
- Potential for barotraumas (e.g. recent vitreoretinal surgery, myringoplasty, middle ear pathology, severe COPD or lung cysts, pneumothorax)
- Bone marrow depression
- Bowel obstruction
- First trimester pregnancy
- Pulmonary hypertension
- Suspected decompression illness
- Decreased level of consciousness
- Patient unable or too young to hold mask/mouthpiece by themselves.

Patients prescribed Entonox® daily for greater than 2 weeks should have supplemental folic acid and full blood count.

Administration: Patients are not required to fast. Appropriate education is needed. The patient is encouraged to hold the mouthpiece and breathe slowly and deeply for 3–5 minutes. The prescription should be written in the medication chart under the Medical Gases section (e.g. Entonox® – 50% nitrous oxide/50% oxygen self-administered for duration of procedure – daily).

A comprehensive assessment must be completed prior to administration, with ongoing recording of HR, BP, RR SaO2, pain scores and GCS. Continuous monitoring of pulse oximetry is required. At the end of the procedure give all patients oxygen via a Hudson mask at 6L/min for 10 mins.

Methoxyflurane (Penthrox) inhalers are also useful for this purpose. These are used extensively in the pre-hospital setting, and are currently under review for use in the emergency and ward setting.

CHAPTER 4: MANAGEMENT OF PATIENTS WITH COMPLEX PAIN

Section 4.1: Management of acute pain in the patient with chronic pain

This is often a challenging area. Patients with longstanding pain may be taking a variety of medications and be involved with both pharmacological, activity and psychological interventions. The chronic consumption of opioids can lead to alteration of the sensitivity of the opioid receptors, requiring larger doses to achieve analgesia (tolerance or opioid induced hyperalgesia). There is often reluctance on the part of healthcare professionals to administer opioids to this group of patients even when new pathology is detected.

Early communication with the anaesthetist involved is important, as is communication with the Pain Service nurses, and/or consultants involved in the Pain Service.

Use of regional anaesthesia such as an epidural, nerve block or catheter techniques can result in high comfort levels for these patients. Ketamine infusion may be considered perioperatively.

If a PCA is used, this will need to be set to take into account the patient's normal opioid consumption.

It is essential to offer a consistent message to patients with ongoing persistent pain. The strategy is always management versus cure, and raising expectations about outcomes should be limited. In most settings of acute flare ups of persistent pain, there are important psycho-social factors that may be as important to manage as the presenting biomedical model of pain.

Section 4.2: Guidelines for the use of ketamine infusion in acute pain

> This should not be undertaken without consultation with specialist anaesthetists or Pain Service.

- **Refer to the** Ketamine protocol in the first instance.

Introduction

Ketamine is a general anaesthetic with significant analgesic properties—a characteristic that differentiates it from other anaesthetic induction agents. Ketamine produces analgesia by binding to receptors in both the peripheral and central nervous systems, including opioid receptors, and most notably as an antagonist to the NMDA receptors (N-methyl D-aspartate) in the dorsal horn of the spinal cord. It may be beneficial in reducing 'wind up' (hyperalgesia) in the pain pathway in response to ongoing pain as well as allodynia.

Administration: Ketamine is most commonly given via the intravenous route, but can be given SC or orally (uncommon).

Bioavailability is variable:

- Oral 20% – peak level 30 minutes and half-life approximately 5 hours
- Sublingual 30%
- Intranasal 45%.

It is likely that the metabolite – norketamine – has the major analgesia role compared to the parent compound ketamine.

Usual dosage

1) Intravenous 10–20mg/hr is usual range but can increase higher if tolerant of side effects (0.1–0.5mg/kg/hr)
2) Bolus dosing should be avoided for pain unless for the rapid resolution of acute pain. There is no place for bolus ketamine in persistent pain.

Indications

- Patients with acute pain, in whom multimodal therapy with local anaesthetics (including epidurals), opioid, paracetamol, and NSAID/COX-2 as appropriate are not providing adequate pain relief, or are producing intolerable side effects. This can be achieved using infusion or bolus 'rescue doses' (e.g. 0.25mg/kg).
- Patients with acute pain who are developing neuropathic pain.
- Ketamine has anti-hyperalgesia, anti-allodynia and anti-tolerance properties at low doses. There is a place to reduce opioid tolerance and minimise potential for opioid induced hyperalgesia.
- May have an effect to reduce incidence of chronic post-surgical pain (less wound hyperalgesia and allodynia).

In some situations, ketamine infusions may be used in chronic pain management and palliative care—this will be done under the direction of specialists in these areas.

Contraindications

- Uncontrolled hypertension
- Raised ICP
- Glaucoma
- Acute psychiatric illnesses
- Pregnancy/lactation
- Significant ischaemic heart disease
- Patients prone to severe hallucinations
- Allergy/sensitivity to ketamine.

Commencing and running the treatment

- Consider prophylactic ondansetron 4mg PO PRN up to 6hrly (4 doses in 24hrs).
- In some cases pre-medicating with midazolam 7.5mg PO may be useful to avoid dysphoric effects. This must only be prescribed by the Pain Service or palliative care teams.
- Commence the infusion at 5 ml/hr (5mg/hr) via volumetric pump.
- Assess the patient after commencing the infusion in 5 minutes, 15 minutes, 30 minutes then hourly (see Patient observations below)
- If no side effects occur after one hour, the infusion rate can be increased to 10 ml/hr (10mg/hr). If the patient is comfortable, no change in rate is required at this time.
- After the second hour, if pain still problematic and no side effects occur, increase the rate of infusion to 15ml/hr (15mg/hr).
- If side effects occur after increasing the rate of infusion – **STOP** the infusion until side effects subside. The infusion can be recommenced at the previous rate that was tolerated by the patient if the patient agrees to this.
- Subcutaneous ketamine may cause irritation at the site of infusion – 21 gauge butterfly should be changed every 24 hours.

Side effects

- Excessive sedation
- Nausea
- Cardiovascular stimulation resulting in hypertension and tachycardia
- Hallucinations and dysphoria
- Central nervous stimulation—rise in ICP, cerebral blood flow and metabolism.

All of these should be minimal at the low doses used, but may limit patient's ability to tolerate higher infusion rates. Dose is titrated to balance the analgesia effect versus side effects.

Patient observations

- Vital signs as per NEWS chart – heart rate, blood pressure, pain, sedation every
- 15 minutes on commencing infusion for first hour and after every rate change. Once rate of infusion is stable, routine vital signs are appropriate.
- Regularly enquire about presence of hallucinations, dysphoria and tolerance of the infusion.
- Patient assessment and pump infusion rate must be checked on initiation of the infusion then after 30 minutes, then **2 hourly** for the duration of the infusion.

This is to ensure the patient is tolerating ketamine and reduces the incidence of over and under infusion through pump programmer error or equipment fault.

Treatment of side effects: Stop the infusion. Side effects should subside in 15–30 minutes. Contact the Pain Service or on-call anaesthetist for further advice.

Nausea: Ondansetron 4mg orally or IV as prescribed.

Dysphoria: Midazolam 1–2mg IV or midazolam 7.5mg PO. The patient must be reviewed by member of Pain Service and sedatives should not be charted by ward team.

Duration of infusion: This will be dictated by clinical effect and ongoing symptoms but will range from 1–5 days.

Section 4.3: Management of neuropathic pain

Neuropathic pain is pain caused by a lesion or disease of the (peripheral or central) somatosensory nervous system.

Diagnosis

- Common pain descriptors: Burning, tingling, shooting or excessive sensitivity.
- Sensory examination: Allodynia (pain from an innocuous stimulus e.g. cotton wool), hyperalgesia (some more than expected from a stimulus such as pin prick).
- Note: Many patients will have a mixed pain syndromes, with nociceptive and neuropathic features, use the analgesics outlined below, along with standard analgesics.
- The presence of new neuropathic pain in the context of cancer generally represents new disease. Hence an underlying understanding of the cause of neuropathic pain in this situation is most important.
- Neuropathic pain does not respond well to NSAIDs but opioids may be useful.
- Data is supportive for the role of tricyclic antidepressants for neuropathic pain, but limited for SSRIs. This may partly reflect limited study numbers. SNRIs such as duloxetine have good evidence but the only available SNRI in NZ, venlafaxine, has limited support for use with neuropathic pain.
- Gabapentinoids are equally useful for neuropathic pain but are associated with fewer side effects. They are however more expensive. Gabapentin is fully funded through special authority from Pharmac but pregabalin is not on the HML and is not funded in the community.
- The general principle is to start on low dose of one agent, increase slowly till either a therapeutic end point or dose limiting side effect. Then trial other agent.
- Most studies on NNTs are disease and agent specific.

Holistic assessment

Consider the following when selecting antidepressant or anticonvulsant first line therapy for neuropathic pain:

- Work / shift patterns
- Poor sleep
- Previous failed treatments
- Responsibilities e.g. main carer/dependants/return to work issues.

Table 11: Common neuropathic pain treatments and their effectiveness

	Gabapentin	Pregabalin	Tricyclic antidepressants	Carbamazepine
Diabetic neuropathy	NNT 3.8 NNH 2.6	NNT 4.2	NNT 2.4 NNH 3.2–17	
Post herpetic neuralgia	NNT 3.2		NNT 2.3	NNT 2.5
Polyneuropathy	NNT 3.7		NNT 2.4	NNT 3.3
Trigeminal neuralgia				NNT 2.6
Peripheral nerve injury	NNT 2.5			

Adjuvant therapies

Tricyclic antidepressants

- Tricyclic antidepressants (TCAs) act by increasing the descending control pain pathways modulated by noradrenaline and serotonin.
- TCAs act to increase the descending control, improve sleep pattern and in some cases improve mood.
- The NNT overall for TCAs is 3.6, SSRIs (limited evidence) and SNRIs (duloxetine only) 5.8.
- Amitriptyline may reduce the incidence of post herpetic neuralgia after herpes zoster.
- The drugs of choice are amitriptyline or nortriptyline, starting at 10mg at night and gradually increased according to the patient's needs. Doses above 75mg are seldom required. It may take weeks to get to the correct dose. Most often patients stop taking these agents due to side effects. It is better to go slow (even starting at 5mg and increasing by 5mg weekly) than to stop prematurely. Patients frequently get tolerant to side effects if titration occurs slowly

  A typical dosage regimen:

  Step 1 Amitriptyline 10mg at night*
  Step 2 Amitriptyline 20mg at night*
  Step 3 Amitriptyline 30mg at night*
  Step 4 Amitriptyline 40mg at night*
  Step 5 Amitriptyline 50mg at night*
  * Ensure patient tolerates dose at each step before increasing dose. This may mandate being on this dose for 1–2 weeks before increasing.

- Consider first line choice if:
  - Poor sleep
  - Poor compliance with medication (once daily dosage)
  - Polypharmacy specifically large numbers of tablets/day.

Gabapentinoids

These agents bind to voltage gated calcium channels in the dorsal horn of the spinal cord, leading to a decrease in excitatory neurotransmitters (glutamate and substance P). The pharmacokinetics of gabapentin suggest absorption limitation and hence higher blood levels are difficult to achieve. Pregabalin is an analogue of gabapentin. It has liner pharmacokinetic so doses can be reliably increased. The NNT for neuropathic pain for gabapentin = 4; pregabalin = 4.2. Gabapentinoids have been shown to be useful in both the acute and persistent pain states. In acute pain, they reduce opioid requirements but are associated with sedation. The two main agents are gabapentin and pregabalin.

Doses range from 75–600mg/day for pregabalin, and 100–3600mg/day for gabapentin in divided doses.

- The drug of choice is gabapentin which is effective and safer than alternatives.
- Capsules are the most cost-effective formulation.
- In renal impairment, the elderly or drug sensitive patients, this titration may need to be done in 100mg

increments. Refer to the New Zealand Formulary for more details.

- Gabapentin should be started slowly according to the following regimen:

  Step 1 Gabapentin 300mg once daily until tolerated* – usually at night
  Step 2 Gabapentin 300mg twice daily until tolerated* – usually morning and night
  Step 3 Gabapentin 300mg three times daily until tolerated* – morning, lunch and night
  *This may take up to a week per step.

  The patient should stay on this dose for about a week and then can gradually increase the dose by 300mg increments to the recommended maximum dose of 3600mg or the maximum tolerated dose. If no improvement after 6 weeks consider alternative treatment.

- Gabapentin can make patients drowsy or dizzy and occasionally causes severe headaches.
- The headache does not tend to resolve. Serious adverse effects are rare.
- Weight gain is also an important side effect to discuss.
- Mood deterioration, depression and suicidal ideation may worsen with the initiation of gabapentin.
- The DHB will fund up to 8 days of perioperative gabapentin for surgical patients. If gabapentin is to be continued for >8 days, it is funded under Special Authority.

If symptoms persist, add in amitriptyline (if gabapentin is used before amitriptyline).

Additional notes

- Other adjuvant therapies that can be tried, if the above have failed, include sodium valproate and carbamazepine but often side effects limit their usefulness.
- Pregabalin as third line starting at 75mgs bd. This however is not on the HML and in the community is not funded and may be costly for many patients.
- If switching from gabapentin to pregabalin, phase in over 3 days.
  - Pregabalin should be **stopped** if a patient has not shown sufficient benefit within 8 weeks of reaching the maximum tolerated therapeutic dose of pregabalin and referred to the Waitemata Pain Services (Outpatient) by the patient's GP.
  - Topiramate can be used for problematic headaches, neuropathic pain or migraines. It can suppress appetite, lead to weight loss and predispose to renal tract stones.
  - The dose is started at 25mg/day and increased weekly to a maximum of 200mg/day.
- Patients with neuropathic pain caused by cancer, if the above measures are not effective, should seek specialist advice.

Section 4.4: Systemic lignocaine infusion for management of neuropathic pain

- **Refer to** lignocaine protocol in the first instance.

Introduction

Lignocaine is a local anaesthetic that suppresses neuronal activity by sodium channel blockade. Systemic lignocaine can reduce ectopic activity without blocking nerve conduction. A systematic review of local anaesthetic-type drugs has shown them to be effective in the treatment of chronic pain, including neuropathic pain. In addition there is evidence that lignocaine may also be a useful adjunct in providing additional post-operative analgesia in patients undergoing abdominal surgery and may be as effective as epidural analgesia.

Indications

- Neuropathic pain
- Complex regional pain syndrome
- Post-operative analgesia.

Contraindications

- Previous seizures/pseudoseizures
- Severe liver disease
- Severe respiratory disease
- Significant communication difficulties
- On drugs known to lower the seizure threshold
- Severe renal disease (see below for infusion alterations in renal disease).

Please contact the Pain Service/Consultant in Pain Medicine if suitability of a patient for this treatment needs to be verified.

Notes

- Pain relief may take up to a week to take full effect.
- If there is no pain relief after a second infusion (with a maximum tolerated infusion rate), the patient is unlikely to respond to any further infusions.

Local anaesthetic toxicity

Early signs and symptoms

- Metallic taste
- Numbness or tingling around the lips and mouth, ringing in ears
- Dizziness, sedation, word-finding difficulties, confusion
- Development of muscle twitching
- Visual disturbances.

Treatment

1) Immediately stop infusion.
2) Place patient in supine position, (administer oxygen if sedated and monitor vital signs), and call Pain Service/on-call anaesthetist for assistance.
3) Do not leave patient unattended and observe closely for signs of worsening toxicity; symptoms normally subside within 15 to 30 min of stopping the infusion.
4) Once the symptoms have completely resolved, restart the infusion at a slower rate.

N.B. Mild dizziness and nausea are side effects and not indicative of imminent toxicity. They do not require the infusion to be stopped but may improve if the infusion rate is slowed down.

Anti-emetics should be routinely prescribed PRN for nausea (e.g. Ondansetron 4mg po/ IV q 6 hourly).

Late signs and symptoms

1) Unconsciousness
2) Seizures
3) Arrhythmias
4) Cardiorespiratory arrest.

Treatment

1) Call **777**
2) Refer to Treatment algorithm for local anaesthetic toxicity in the epidural section above.
3) Medical and ICU teams to attend. Contact on-call anaesthetist or Pain Service (Inpatient).

Section 4.5: Calcitonin for pain management

- **Refer to** the Calcitonin-Salmon guideline in the first instance; this is anticipated to be available from July 2015.

Background: Calcitonin is involved with the regulation of the body's calcium and phosphate levels. It can also have a role in modulating pain from a variety of conditions and is thought to act via serotinergic pathways in the central nervous system. Calcitonin-Salmon's side effects such as nausea, flushing, abdominal pain, diarrhoea and sedation are probably also mediated by serotonin and hence the role of 5-HT# antagonists (ondansetron) may be useful as a co-medication. It has been shown to have benefit in cases of:

- Phantom limb pain (better for acute vs. chronic)
- Bony metastatic pain (limited support)
- Pain secondary to osteoporotic vertebral fractures (both rest and movement pain)
- Complex regional pain syndrome
- Hypercalcaemia.

Dosage: 100 units Calcitonin-Salmon diluted in 100 ml saline and given over 60 minutes.

Nasal administration is also effective. The dose via the nasal route is 200 IU daily and if prolonged administration is considered, supplemental calcium and Vitamin D are needed.

Prescribing: Medication is written on a continuous IV Medication Record/chart and cross- referenced on the medication chart. To be prescribed in the patient's medication chart plus an infusion chart.

e.g. Calcitonin 100 units IV in 100ml 0.9% sodium chloride over 60mins

PLUS ondansetron 4mg PO 20 mins before infusion commences.

Adverse effects and caution: Before administration consult warnings and precautions in manufacturer's data sheet. Nausea, vomiting, dizziness and slight facial flushing accompanied by a sensation of heat may occur, usually within 30 to 60 minutes after injection and lasting about an hour. These effects are dose dependent and more frequent after IV than after SC or IM injections and usually subside after a few days of therapy, although occasionally dosage reduction or stopping therapy may be needed. Other adverse reactions include diarrhoea, unpleasant taste, arthralgia, oedema at injection site and polyuria. Isolated anaphylactic-type reactions with tachycardia, hypotension and collapse have occurred.

The infusion can be repeated on a daily basis but electrolytes need to be taken, including calcium and phosphate, during treatment.

Section 4.6: Biphosphonates for pain management

Background: Biphosphonates such as pamidronate are second line adjuvant medications in the management of problematic pain. As biphosphonates inhibit bone resorption, this mechanism may explain their efficacy in cases of bony lesions related to tumour or complex region pain syndrome (CRPS).

Potential indications

- Acute osteoporotic vertebral fractures
- Bone pain from bony metastasis and multiple myeloma
- Complex regional pain syndrome (CRPS).

Prescribing: Refer to pamidronate policy.

The most common schedule is: Pamidronate 60–90mg diluted in 250mls normal saline administered over 2 hours once daily for 3 days only. In patients with renal impairment, the rate is reduced to 20mg/hr (i.e. give over 4 hours).

Observations and monitoring

- Baseline temperature, pulse, respiration and blood pressure (prior to infusion).
- Repeat observations 15 minutes after infusion has started, and again at completion.

Possible adverse effects: Adverse effects are usually mild and transient, but the following have been observed:

- Asymptomatic hypocalcaemia and fever are the most common adverse reactions, occurring within the first 48 hours of infusion. Fever usually resolves spontaneously and does not require treatment.
- Occasional transient bone pain, arthralgia, generalised pain
- Occasional headache, nausea, vomiting and lymphocytopenia
- Occasional reactions at the infusion site, pain, redness, swelling, induration, phlebitis, thrombophlebitis.

Section 4.7: Management of acute pain in opioid substance misusers

Introduction

Patients that misuse drugs are often admitted to hospital. Dealing with the treatment of pain in this group of patients is often difficult. Inappropriate behaviour can be prevented to a significant extent by developing a respectful, honest approach to communication, which includes an understanding that complete pain relief may not be a realistic goal. It is not easy to identify those patients who misuse drugs, as there are often no obvious signs and the patient may deny use for various reasons.

Effective management of acute pain in patients misusing drugs is complex due to:

- The presence of the drug(s) of abuse (remember poly-drug misuse is common)
- The presence of tolerance, opioid-induced hyperalgesia, physical dependence and the risk of withdrawal
- Psychological and behaviour characteristics associated with a substance misuse disorder
- Complications related to the abuse including organ impairment and infectious disease.

People who misuse drugs in the absence of pain develop tolerance and may need larger doses of the drug to obtain the same analgesic effect as a non-abuser. Conversely, patients who are taking opioids may develop an increased sensitivity to pain. This can occur acutely with highly potent analgesics (e.g. remifentanil) or over time with other opioids (e.g. morphine, methadone). Non-opioid drug therapies should be used as an adjunct to opioids. A full drug screen may be useful to guide safe prescribing. In most cases this will require the consent of the patient. If this is not forthcoming, the reasons for the request (the need to treat safely) should be reiterated. Safe prescribing relies on identification of any substances that may have been taken previously.

Aim of management: It is important to establish rapport with the patient and agree joint treatment aims. The main aims are:

- Good analgesia
- Avoidance of opiate withdrawal symptoms (see Opiate withdrawal scale below) and also monitor for withdrawal from benzodiazepines (e.g. diazepam) which can cause seizures
- Good compliance
- Prevention of substance misuse in hospital
- Prevention of disturbance to staff and other patients.

Assessment of opiate withdrawal in patients with pain

Opiate withdrawal can be assessed using the Opiate withdrawal scale.

Observe the patient and score accordingly. A score of **more than 5** is strongly suggestive of opiate withdrawal in a dependent patient. Titrate morphine to treat pain and opiate withdrawal. The signs are all consistent with sympathetic over activity.

Table 12: Opiate withdrawal scale

	2	1	0
Pupil size	Wide	Normal	Pin point
Palms	Wet	Moist	Dry
Skin	Goosed	Cold	Warm
Nasal	Running	Sniffing	Dry
Agitation	Can't sit	Agitated	Calm
GIT	Vomiting	Nausea	Normal
Pulse	>100	80–100	<80
Total			

Benzodiazepine withdrawal: Signs include anxiety, agitation, irritability, and sensitivity to noise and light, tremor nausea, muscle cramps, myoclonic jerks and sleep disturbance. The time interval between cessation of the drug and withdrawal will vary depending on the duration of action.

Amphetamine/cocaine withdrawal: Patients may seem overly sleepy but easy to rouse with no associated respiratory depression.

See CADS methadone maintenance programme link

Section 4.8: Analgesic approach for patients with substance misuse

Step 1: **Take full patient history and examination.** Always keep in mind patients with substance abuse disorders do feel pain and often are more sensitive to this and more resistant to standard approaches to pain relief.

- Reason for admission.
- Drug use history (e.g. taking prescription or non-prescription drugs, on a methadone programme, attending Community Alcohol and Drug Services (CADS), TRANX community based alcohol and drug treatment service, any previous admissions for detox and involvement with mental health service).
- Which drugs taken including route taken (smoking, IV etc), amount taken, frequency (daily, once a week etc), duration of habit, when drugs were last used (heroin purity varies considerably and regularly injecting significantly increases the degree of dependence).
- Examination – verify presenting findings, vascular access (may need CVL or PICC line in chronic IV users), evidence of drug end organ disease (e.g. neuro, psychiatric, CVS, respiratory, ENT).
- Consider blood and urine toxicology screen.

Step 2: **Verify drug prescription**. GP, community clinical pharmacist, or CADS. Frequently prescribed opioids are available in Concerto; however, patients may have multiple NHIs so fraudulent access is still feasible. Again, the presence or absence of drugs in urine screening may indicate ongoing use or diversion if absent.

CADS contact numbers

- All CADS services ph. 845 1818
- CADS North ph. 488 2701
- CADS Central ph. 845 1800
- CADS West ph. 837 9400
- CADS South ph. 263 2000
- Can ask to speak with patient's case worker or leave a message to notify them of patient's admission and likely length of stay.

Office hours: Monday–Friday 08:30am–5pm unless stated otherwise.

After hours: Inpatient Detox unit ph. 815 5830 ext. 5039 or pharmacy ext. 5006.

Step 3: **Goals**

(a) Provide analgesia
(b) Reduce withdrawal potential
(c) Prevent new prescribing problem.

(A) **Provide analgesia**

(a) Non opioids should be prescribed to bypass some of the problematic issues with co-prescribing opioids for pain relief. These include paracetamol, NSAIDs, and regional analgesic techniques. It is becoming increasingly recognised however that tramadol may also be subject to abuse and this should be limited as a first line agent.
(b) Opioid tolerant patients will need higher doses of conventional opioids to achieve analgesic effect (tolerance). Initially best to titrate either IV or oral opioids and identify dose range then convert to either long acting oral opioids or IV infusion with bolus dose for PCA. PCA is not contraindicated; however, the PCA should not be allowed to leave the ward and patients are ideally nursed in 4 bedded room.
(c) First line morphine – IV and oral. Pethidine is never prescribed. Opioid switching may be useful to:
    i. Minimise side effects
    ii. Improve analgesic efficacy at lower equianalgesic doses.

(B) **Reduce withdrawal potential**

(a) Convert existing oral opioid to long acting oral and prescribe as 'background'. If patient is on methadone, this should be maintained via oral route. If patients cannot tolerate oral intake, it can be given SC or IM at 80% of oral dose (contact Pain Service or ward pharmacist for advice).
(b) Beware of ongoing self-administration of drugs in ward setting.

(C) **Prevent new prescribing problem**

(a) Provide a clear step wise approach to discharge analgesia. Utilise the pain ladder and allow non-opioid analgesics to be baseline.
(b) Document discharge plan and communicate with GP and/or CADS.
(c) Do not provide open ended controlled drug scripts.
(d) Avoid changing long-term methadone unless discussion with CADS team or Pain Service.
(e) Beware of patients diverting medications or not swallowing drugs on ward. Close supervision is required.
(f) If possible, avoid discharging patients on weekend, as there may be issues with prescriptions, GP follow-up or access to support services (e.g. CADS).

Case studies

1. **Patient normally on 60mgs/day of methadone. Patient sustains a fractured humerus-requiring an open reduction and internal fixation.**

- Continue with 60mgs/day of oral methadone.
- Prescribe regular paracetamol +/- NSAID.
- Consider brachial plexus catheter and maintain for 3–4 days.
- Prescribe regular analgesia – e.g. tramadol 100mgs q6h – plus Sevredol® for breakthrough e.g. 20mg prn (1 hourly). Review daily and change to regular analgesia only (no PRN) as soon as possible.

2. **Patient normally on 60mgs/day of methadone – needs a laparotomy – nil by mouth post op, epidural running.**

- Remember there is no need to replace methadone until 24 hours have elapsed since last dose. It can be given at 80% of oral dose SC or IV or converted to morphine (discuss with the Pain Service). The equivalency of methadone to morphine is frequently difficult to identify. It can range from 1mg

methadone to 5mg IV morphine to 1mg methadone PO to 20mg IV morphine. If converting baseline in this case it therefore may range from 300mg to 1200mg/day!

- Use of regional anaesthetic technique and maintained for longer post-operatively than standard.
- Prescribe regular intravenous paracetamol.
- If morphine PCA used, a suggested 'starting point' would be continuous infusion 2–5mg/hr and bolus 3–5mg.

3. **Patient on opioids (not methadone) – laparotomy, nil by mouth, no epidural, refuses CADS treatment**

- Utilise rectus sheath catheters and provide regional anaesthesia.
- Prescribe regular intravenous paracetamol.
- Commence morphine PCA, a starting dose would be continuous infusion 2mg/hr with 2mg bolus and review frequently in first 24 hours.
- Once able to take oral medication convert PCA to slow-release oral morphine—contact GP prior to discharge to discuss reduction and daily dispensing.

CHAPTER 5: PAIN MANAGEMENT OF SPECIFIC POPULATION GROUPS

Section 5.1: Analgesia in renal impairment

In order to ensure that patients with renal dysfunction receive optimum pain management, while limiting serious and preventable adverse effects of analgesics, it is necessary to prescribe the right analgesia at the right dose. In renal impairment the clearance of drugs is reduced, therefore the following guidance should be used.

In severe renal impairment:

- Start with low doses and titrate slowly
- Use immediate release opioids and increase the dosing interval
- Avoid sustained release opiates where possible.

(The above principles are relevant in the elderly, people with liver impairment or in patients prone to side effects with analgesics).

In renal impairment, fentanyl is safer than morphine for acute pain management as it has no active metabolites, and does not appear to accumulate in renal impairment. This is our recommended choice for PCA in this group of patients.

Table 13: Analgesia dosages for renally impaired patients

Drug	Renal impairment			
	Mild: GFR 60–89	Moderate: GFR 30–59 ml/min	Severe: GFR 15-29ml/min	Less than 15ml/min
Paracetamol (oral)	Normal starting dose	Dose as per normal	Dose as per normal	
NSAIDs	50–75% normal starting dose	AVOID	AVOID	
Codeine / Dihydrocodeine	Normal starting dose	AVOID or use small dose, slowly titrated	AVOID	
Tramadol	Normal starting dose	Renal handbook- dose as per normal	CAUTION Renal handbook- dose as per normal BUT Max dose 200mg/24h total	Renal handbook- 50mg 8–12 hourly
Morphine	75% normal dose	50% normal dose, 6 hourly	Renal handbook- use small PRN doses (2.5–5mg) and monitor	Renal handbook- use small PRN doses (1.25–2.5mg) extend dosing interval and monitor
Oxycodone	Normal starting dose	Renal handbook – dose as per normal	Renal handbook- dose as per normal -monitor for sedation	Renal handbook – start with small doses, monitor for sedation
Fentanyl	Normal starting dose	Renal handbook – dose as per normal	Renal handbook – 75% of normal dose	Renal handbook – 50% of normal dose
Gabapentin	600–1800mg/24h in 3 divided doses	Start at low dose and increase according to response	Start at low dose and increase according to response. Max 900mg/day total	300mg on alternate days or 100mg at night initially, increase according to tolerability and response
Pregabalin	75mg initially and titrate according to tolerability and response	25–50mg initially and titrate according to tolerability and response	25mg initially and titrate according to tolerability and response	
Amitriptyline	Oral starting dose 10mg nocte	Normal starting dose	Normal starting dose	Dose as per normal

Source: Palliative care guidelines: Renal palliative care (2011); BNF 61 (2011); The renal drug handbook (3rd Edition) 2009; Arnold et al. (2006).

Section 5.2: Pain relief in the elderly population (in development)

Section 5.3: Pain relief in the paediatric population (in development)

CHAPTER 6: PHARMACOLOGICAL FOCUS ON COMMONLY USED ANALGESIA

Regular, accurate and effective pain assessment will provide information regarding patient requirements and allow the development of an individualised analgesic plan.

Analgesia should be:

- **Continuous**: Prevent 'breakthrough pain' by continuous infusions of drug or regular administration of drug at pre-determined ("ticked") times. Do not wait for pain to occur before analgesia is given. When prescribing regularly tick the specific times that medications should be given. Pay attention to timing and avoid giving several analgesics together- it is preferable to stagger timings to minimise 'pill load'
- **Pre-emptive**: Try to anticipate pain whenever possible. Give analgesia before painful procedures begin. Entonox® may be used for dressing changes or IV or oral analgesics. Most oral medications will take 30-60mins to achieve therapeutic levels.
- **Balanced**: A combination of a) paracetamol and non-steroidal anti-inflammatory drug, b) opioid, and c) local anaesthetic drug should be considered. The different drugs will act at three different parts of the acute pain pathway. This will help to prevent the side-effects that are associated with large doses of a single drug.
- **Sequential**: Pain after major surgery will still be present on the second or third day after the operation. The patient may not require an epidural or a patient-controlled analgesia device at this stage. It is important to step down to a less potent but effective method of analgesia. However remember that patients are individuals and that there is no standard pathway

REMEMBER: Pain assessment must be carried out at regular intervals to evaluate the effectiveness of the analgesic plan and guide any changes.

Section 6.1: Paracetamol (Panadol®)

Paracetamol has been shown to be an effective analgesic and anti-pyretic. It is very useful in mild to moderate pain and should be utilised at each rung of the analgesic ladder. In addition, paracetamol has an opioid sparing effect.

Mechanism of action: Remains slightly unclear. It may inhibit central nervous system prostaglandin synthesis or have a central or spinal effect on 5HT3 or even via endogenous cannabinoid receptors. The most popular theory is that paracetamol has a central COX3 inhibitory effect.

Administration: May be via oral, intravenous or rectal route. It is suggested that paracetamol be given four times daily at regular intervals (to a max of 4g). Caution should be exercised when using the parenteral route in patients weighing less than 50kg as IV paracetamol has 100% bioavailability—in these patients use a maximum daily dose of 60mg/kg/daily. The **rectal** preparation has very variable absorption **so should be avoided** if other routes are available. When possible, paracetamol should be given orally as it is easily absorbed and low cost.

The main limitation of paracetamol is a reluctance to administer by ward nursing staff. It is often perceived by patients as being a 'weak' analgesic and not considered important.

Doses: The standard dose is 1g PO 6 hourly regularly. In chronic long-term dosing this should be reduced to 750mg PO 6 hourly. This reduced dose should also be used in patients weighing less than 60kg, chronic alcoholics, and patients with malnutrition or sepsis.

The dose should be timed and not PRN if it is intended to be given regularly.

Paediatric dosing – an initial 30mg/kg and regular 15mg/kg 6 hourly. Daily maximum dose 60mg/kg.

Side effects: Paracetamol has very few side effects or interactions but is very hepatotoxic in overdose.

Cautions/interactions: Should be avoided or used with caution in patients with severe liver disease, chronic alcoholism, malnutrition and dehydration.

KEY POINTS

- Paracetamol is an effective analgesia for acute pain and should be used at all steps of the analgesic ladder
- Reduces dose of opioid required
- Few side effects
- Can be given PO and IV
- Should be given 'by the clock'

Section 6.2: NSAIDs such as diclofenac, ibuprofen, naproxen, parecoxib, etoricoxib and celecoxib

Non-steroidal anti-inflammatory drugs (NSAIDs) are extremely valuable in acute pain, especially when used in conjunction with paracetamol. Unfortunately, they have potentially significant contraindications and adverse side effects and these must be considered before administration.

Mechanism of action: NSAIDs work as anti-inflammatory analgesics by blocking production of prostaglandins and the prostaglandin-mediated sensitisation of peripheral tissues to noxious stimuli. Prostaglandins are involved in other physiological functions such as gastric mucosal protection, renal function, bronchodilation and platelet adhesiveness. These functions are non-specifically blocked by traditional NSAIDs (e.g. diclofenac, ibuprofen) and may lead to serious side effects. Some adverse effects are reduced by using more selective COX-2 inhibitors. These may have less effect on platelet function, bronchoconstriction, and GI bleeding. However, they still modify protective effects on renal function and may be a risk factor in higher risk patients for thromboembolic complications.

Administration: May be via oral (diclofenac, naproxen, celecoxib), rectal (diclofenac), topical (diclofenac gel) or IV (parecoxib). It is worth noting that the same systemic side effects will occur irrespective of route of administration.

All NSAIDs should be prescribed for a maximum of 5/7 then actively reviewed by primary team. If patients are discharged on NSAIDs this should be for a limited period with specific follow-up and review by GP.

NSAIDs should be used with caution if the patient has an epidural in situ and is also taking anticoagulant drugs (e.g. enoxaparin, rivaroxaban or heparin).

Dose

- Diclofenac 75mg PO 12 hourly with food (low risk, young fit and well patients – no renal, cardiac or GI problems)
- Naproxen SR 500mg PO 12 hourly with food (older patients, stable cardiac or pulmonary disease – no renal disease)
- Naproxen SR 500mg PO 12 hourly with food PLUS omeprazole 20mg PO nocte (older patient +/- cardiorespiratory disease that is stable and possible GI bleeding risk)
- Celecoxib 100–200mg PO 12 hourly (surgical patients only with low cardiac and thrombotic risk, but with possible GI bleeding risk)
- Parecoxib 40mg IV daily in post-operative patients who cannot tolerate oral intake, who have minimal cardio-thrombotic risk and who would benefit from opioid sparing effect of IV NSAID).

Side effects: Are linked to the non-specific inhibition of prostaglandins and include gastrointestinal bleeds, gastric ulcers, renal dysfunction, and bronchospasm. The data are limited on the effects of NSAIDs on bone healing and GI anastomosis breakdown.

Cautions/interactions: NSAIDs may be contraindicated in patients with asthma, coagulopathies, and peptic

ulcer disease and should be used with caution in elderly, frail and in post-operative anticoagulated patients.

KEY POINTS

- NSAIDs and COX-2 inhibitors are effective analgesics of similar efficacy for acute pain
- Should be used at all steps of the analgesic ladder if not contraindicated
- Reduces the dose of opioid required
- Careful patient selection and monitoring is required due to potential of significant side effects
- Can be given PO/IV/PR/TOP
- Use with caution
- **Review use every 3–5 days**

Section 6.3: Opioid analgesia

Opioids remain the first line treatment for moderate to severe pain. The term 'opioid' refers to any substance that binds specifically to endogenous opioid receptors and produces some agonist activity. Endogenous opioids exist within the body (e.g. endorphins, enkephalins, dynorphins) whilst exogenous opioids refer to drugs which may be administered to elicit a similar effect (e.g. morphine).

Opioid receptors are found in the CNS, pituitary and GI system and are especially abundant in the PAG (periacqueductal grey) and the dorsal horn of the spinal cord. Nociceptors carry information about noxious stimuli from the periphery to the dorsal horn where they release neurotransmitters such as adenosine triphosphate, glutamate and substance P. Opioid drugs bind to their receptors and block the release of these transmitters and thus the transmission of the pain impulse.

There are three main classes of opioid receptor: μ, κ, δ (mu, kappa and delta). Different opioid drugs have a different affinity for each of the receptor types and there is also a genetic variability (i.e. the density of each type of receptor varies from person-to-person). This may suggest why some opioids work for one patient but not another.

Opioids vary greatly in efficacy and strength. If pain is predicted to be severe or escalating and the middle step opiates at maximum doses are ineffective, then it is appropriate to move to the next step of the analgesic ladder. Opioid conversion tables are common and should be used to identify and convert equianalgesic doses. See the New Zealand formulary for opioid dose equivalences.

When the patient is able to tolerate medication by the oral route and absorption is not impaired, it is preferable to administer opioids by the oral route.

Section 6.3.1: Tramadol

Tramadol can be termed a 'middle step' opioid as it is suitable for the treatment of mild to moderate pain in patients who receive no relief from paracetamol alone. It is unsuitable for the treatment of severe or escalating pain due to its daily dose ceiling (use morphine here instead).

Due to its dual mechanism of action, tramadol has also been shown to be useful in the treatment of neuropathic pain (e.g. post herpetic neuralgia, radicular pain from a prolapsed intervertebral disk).

Mechanism of action: Tramadol is often termed an atypical opioid because it has opioid and non opioid mechanisms of action to provide analgesic response. It binds weakly to the μ opioid receptors in the central nervous system and also inhibits noradrenaline reuptake as well as releasing serotonin. As it is a pro-drug, the main metabolite (M1) is a more potent ligand at the mu opioid receptor than the parent compound, as well as having a higher noradrenaline reuptake inhibiting effect. As this is mediated by the cytochrome system, the same variability seen with codeine metabolism is also demonstrated with tramadol (e.g. there are slow and ultra-fast metabolisers).

Administration: May be via oral or IV route with a recommended maximum daily dose of 400mg. For post-

operative pain of short duration, 600mg/day may be given. A limited dose of 300mg per day is suggested in those with chronic renal insufficiency, a creatinine clearance of <30ml/min or cirrhosis of the liver.

Dose: Tramadol 50–100mg PO 6hrly PRN is the standard dose. Note it can be increased to over 1000mg/day but this should only be actioned after review by the Pain Service.

In some cases a combination of regular sustained release and immediate release is useful. This preparation may be associated with less dysphoria or nausea than immediate release (e.g. Tramadol SR 100–200mg PO 12 hourly. Regular for 3/7 then as needed).

Side effects: Tramadol is often regarded as having a better side effect profile than other opioids. The most common side effects include dizziness, nausea, constipation and sedation; these are common to all opioid analgesics but are often seen to a lesser degree with tramadol. When giving IV tramadol, a slow titration will minimise these effects (20mg every 5 mins). Fast IV titration has been reported by patients to be very unpleasant and can induce severe nausea and vomiting.

The analgesia-side effect profile: This can be highly variable and probably reflects wide variability in metabolism and active metabolites. For some patients it works extremely well whilst others have severe side effects with minimal analgesia.

Cautions/interactions: Tramadol should be used with caution in patients with epilepsy as it has been shown to lower seizure potential. Psychiatric reactions have also been reported. Potentially interacts with antidepressants causing serotonin syndrome (e.g. fluoxetine, citalopram, paroxetine, sertraline, mirtazepine or venlafaxine).

KEY POINTS

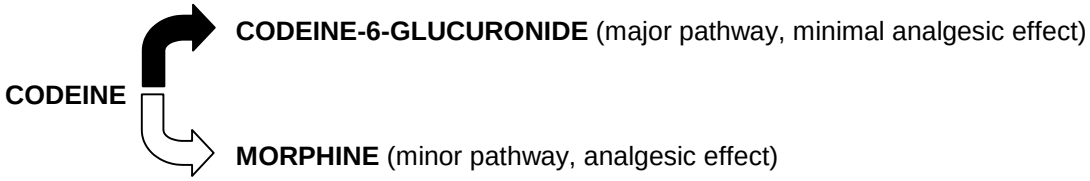
- Dual mechanism of action
- Can have effect on nociceptive and neuropathic pain
- Seen to have less side effects but can be very nauseating
- **Slow IV titration ESSENTIAL**

Section 6.3.2: Codeine & Panadeine®

Codeine is classed as a weak opioid which may provide analgesia for mild to moderate pain. However, it is simply a low dose opioid as its main analgesic effect is mediated by its conversion to morphine as well as codeine-6 glucuronide. It is not prescribed commonly by the Pain Service as it is thought that if opioids are needed it is more efficient and effective to use a standard opioid. It can be given as a combination agent (e.g. Panadeine® 8mg codeine/500mg Paracetamol or Panadeine Extra® 15mg Codeine /500mg Paracetamol) but this limits the codeine to a maximum of 120mg/day, otherwise hepatotoxcity may occur from excessive paracetamol.

Its main popularity is that it doesn't require a controlled drug script and can even be purchased over the counter at low doses in combination with paracetamol.

Mechanism of action: Codeine itself is devoid of any analgesic action and must be metabolised to morphine for its analgesic effect (see pathway). The enzyme responsible for this metabolism is absent in 10% of Caucasians (and 30% Hong Kong Chinese), hence the drug may be ineffective. Conversely, in some ethnic groups (e.g. North Africans), it may be metabolised extra rapidly and hence the effect may be magnified!



Administration: Codeine is usually given orally. It has all the same properties as any other opioid.

Dosage: It can be prescribed 30–60mg every four hours to a maximum daily dose of 240mg. It is approximately 1/6 the potency of morphine.

Panadeine® or Panadeine Extra® 1–2 tablets 6 hourly as needed. Note total maximum of 3–4g paracetamol/day (see paracetamol on p. 67).

Side effects: As with all opioids, codeine may cause dizziness, nausea, **constipation**, sedation and respiratory depression.

Cautions/interactions: As stated above, as it is a pro-drug, its effects might be minimal or extremely potent.

Lactation: Should not be prescribed to breastfeeding mothers.

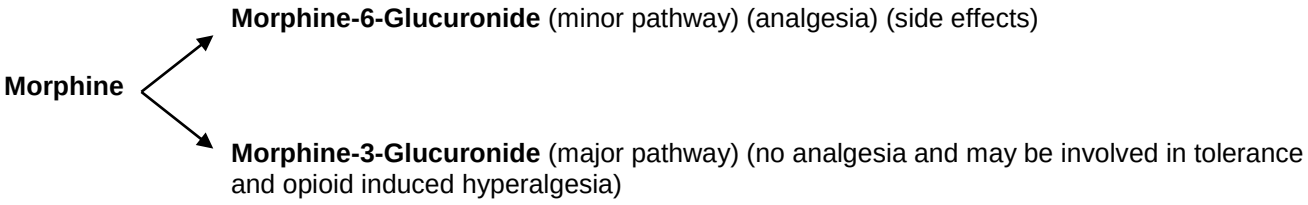
KEY POINTS

- Middle step opioid for mild to moderate pain
- Has a ceiling dose of 240mg/day
- If opioid needed, use morphine which is more reliable and predictable in effect
- No advantage over other opioids

Section 6.3.3: Morphine

Morphine remains the most widely used opioid in acute pain management and is seen as the 'gold standard' to which other opioids are compared.

Mechanism of action: Morphine is a potent μ agonist. It is metabolised in the liver by a process called glucuronidation (see below).



The kidneys excrete both M-6-G and M-3-G so a build-up of metabolites leading to unexpected side effects may occur in renal impairment. Some side effects of morphine such as tolerance and hyperalgesia have been attributed to the build-up of M-3-G but evidence is a little conflicting.

Administration: May be via oral, IV, IM or SC route. It is **essential not to mix routes** of opioid administration (i.e. if a patient can tolerate oral preparations stick with the oral route, don't mix oral, IV, IM etc).

There is no ceiling dose for morphine. Some patients may require larger doses than others—accurate pain assessment and observation of vital signs (e.g. respiratory rate, sedation level) will allow appropriate titration.

Oral morphine (Immediate release e.g. Sevredol®, Slow-release e.g. M-Eslon®)

Patients who require morphine and can absorb an oral preparation should be prescribed immediate release oral morphine e.g. Sevredol® and controlled release morphine e.g. M-Eslon® which should be titrated using the

appropriate algorithm (see section 2.4 on p. 22)

Patients who require large doses of oral morphine will receive better pain relief from a sustained release preparation which will provide a constant serum level of drug (e.g. M-Eslon, LA-morph). A rescue dose of an immediate release opioid (e.g. Sevredol® or oral morphine elixir) should be concurrently prescribed at a tenth of the total daily dose of morphine and prescribed 1–2 hourly.

For example, patient is prescribed M-Eslon® 50mg, twelve hourly then they should be prescribed Sevredol® 10mg 1hrly PRN for breakthrough analgesia (30+30/6).

If four or more breakthrough doses are regularly required in each 24hr period it may be appropriate to increase the sustained release daily dose by 50%.

Sustained relief morphine is somewhat limited for use in acute pain as it may take up to three doses to obtain a steady serum concentration. It is a suitable analgesia if pain is predicted to be long and ongoing. However, on the initial stabilisation only, Sevredol® may be administered along with M-Eslon® to achieve more rapid therapeutic levels.

NB: It is vital that sustained release morphine not be chewed as this may release total daily dose almost immediately. However, if necessary, capsules may be opened and the granules sprinkled into water or onto soft food, *provided the granules remain intact*.

IV Morphine

Patients who do not have an established oral route may require IV titration of morphine (0.5–2mgs every 3–5 minutes to effect). Patients who require large doses of IV morphine may receive more effective analgesia from morphine PCA. It is, however, important to give IV bolus until the patient is pain free before providing the PCA for maintenance of this pain free state (N.B. a patient in acute pain will find it almost impossible to achieve analgesia with PCA alone).

Side effects: As with all opioids, morphine may cause dizziness, nausea, constipation, itching, sedation and respiratory depression. Morphine causes histamine release which may lead to a transient drop in blood pressure, particularly when given as a bolus.

Cautions/interactions: The metabolites of morphine are excreted by the kidneys. They may build up in patients with renal impairment. Lower doses should be used and, if possible, a more appropriate opioid chosen (see Table 13 on p. 65). Doses may also need to be reduced in the elderly.

KEY POINTS

- Excreted by the kidneys so caution in renal impairment and the elderly
- Can be given PO/ IV/ IM/ SC using an appropriate algorithm
- May take several doses to reach a constant serum level
- Oral route must be established prior to administration of sustained release opioids (**at least** free fluids for 24hrs without complications)

Section 6.3.4: Oxycodone

Oxycodone is an effective opioid analgesic for moderate to severe pain and, in common with morphine, has no ceiling dose. A combination of controlled release (Oxycontin® OR Oxydone®) and immediate release (OxyNorm®) oxycodone is often used as a ‘step-down’ regimen following epidural infusion or PCA. It may have some theoretical benefit in patients with visceral pain and potentially in those with impaired renal function. Some studies have suggested that it may have a more ‘addictive potential’ than other opioids but this is not clear.

Administration may be PO or IV / PCA route; the oral preparation is the most commonly used.

Oxycodone CR can be utilised in a similar manner to sustained release morphine but has the benefit of quick titration to steady plasma state due to a biphasic absorption pattern. This means that there is an initial release of oxycodone from the tablet after about 40 minutes followed by a prolonged release over the 12 hour period.

As previously detailed, there is no ceiling dose for oxycodone but, in common with sustained release morphine, Oxycodone CR must be given at intervals of 12 hours. Titration of Oxycodone CR dose and calculation of rescue OxyNorm® dose is identical to that of sustained release morphine. Please also see the appropriate oxycodone algorithm.

Oxycodone has been shown to have a higher oral bioavailability than morphine, resulting in equianalgesic ratio of approximately 1 : 2, for example:

Oxycodone CR 10mg = M-Eslon® 20mg
Oxycodone immediate release 5mg = Sevredol® 10mg

Side effects: Oxycodone may lead to the usual opioid adverse effects but some comparative studies have shown the incidence of nausea and vomiting, pruritis and hallucinations to be less than with morphine.

Cautions/interactions: Oxycontin® and Oxydone® are sustained release preparations and should not be used in patients who could develop paralytic ileus. Oral intake should be established for 24 hours prior to commencing.

Oxycodone can be used more safely in patients with renal impairment as oxymorphone, one of its main metabolites, is only weakly active and contributes minimally to any clinical effect

As with any opiates, side effects are dose related. In renal impairment and the elderly, OxyNorm® liquid will allow starting doses from as little as 2.5mg (or less).

KEY POINTS

- Quicker titration in acute pain if oxycontin compared to M-Eslon®
- Useful when patients are getting side effects with morphine
- Biphasic absorption
- Potentially better tolerated by renal patients

Section 6.3.5: Fentanyl

Fentanyl is a synthetic opioid which has a faster analgesic onset and shorter duration of action than other opioids such as morphine. It is often used in anaesthesia (particularly in day surgery) and in post-operative epidural analgesia. It can be useful in patients with renal impairment as it has no active metabolites and the action is not prolonged in renal failure.

Note the transdermal patch is never used for the management of acute pain.

It should never be prescribed to opioid naïve patients and is unsuitable for initiating treatment in an acute setting.

Mechanism of action: Fentanyl is a mu agonist and highly potent. 100mcg fentanyl is equivalent to 10000mcg (10mg) of morphine.

Dose

(a) IV – fentanyl can be used as an IV protocol similar to morphine, oxycodone and tramadol. The initial bolus dose will range from 5-20 mcg
(b) Transdermal – It can be administered via 12.5, 25, 50, 75 or 100 mcg/hour transdermal patches (applied every 72h).

Side effects: As with any opioid.

Cautions: Suitable for patients already stabilised on opioids.

Transdermal patches: Care needs to be taken to avoid adding multiple patches and direct heating of patches which can promote higher drug delivery.

The patches should never be cut.

Importantly, there are differences between different patch manufacturers. Changing should be avoided to minimise under or over dosing patients already stabilised.

Fentanyl may also be used in a PCA for those who suffer intolerable side effects with morphine or oxycodone or patients with renal insufficiency (the major metabolite of fentanyl – norfentanyl – is pharmacologically inactive).

Starting PCA bolus dose (equivalent to 1mg of morphine) is 10mcg with 5 minute lock out period.

Section 6.3.6: Methadone

Background: Methadone is highly lipophilic, with a long half life (up to 80h in some individuals). It is a NMDA antagonist and mu agonist.

Indications: Patients often have negative feelings about starting methadone for pain as they associate it with drug addiction. Patients should be reassured that methadone is used to manage drug addiction, but this is only due to its long half life allowing once-daily dosing. It is an effective analgesic and can be particularly beneficial for patients with neuropathic pain and/or as part of an 'opioid switch' where the patient has failed to respond adequately to high dose morphine/oxycodone.

Administration: Available as tablets and liquid (WDHB use 5mg/ml).

Dose

Start low, go slow.

If a patient has been taking another opioid for some time and is changing to methadone, the dose should start at about 10% of the calculated equianalgesic dose for single administration and then be titrated to effect.

Should only be initiated for pain under the direction of the Pain Service or palliative teams.

Side effects and cautions: As per other opioids.

Interacts with carbamazepine (reduced methadone concentrations), diazepam (may enhance effects of methadone).

Metabolised by CYP3A4 – may be affected by other drugs that inhibit or induce this enzyme.

May prolong QT – caution with other medications that prolong QT.

Section 6.4: Gabapentinoids

This is a useful group of agents that act on voltage gated calcium channels and modulate nerve transmission. They are useful analgesics, working at spinal cord level, reduce opioid use and can be effective in neuropathic and nociceptive pain states. They are widely used in the setting of persistent pain management but also have a place in difficult to manage acute pain issues.

Mode of action: These agents act on the delta subunit of the calcium channel reducing calcium influx and subsequent nerve transmission. They may also reduce synapse formation.

Gabapentin may be used for the treatment of chronic neuropathic pain states and has been shown to be effective for the treatment of phantom limb pain following amputation. Perioperative use of gabapentin may also result in lower post-operative pain scores, a reduction in post-operative opioid consumption (with possible synergistic opioid effect), and the prevention of progression to chronic post-surgical pain.

Pregabalin acts in a similar way to gabapentin, reducing neuropathic pain severity through binding to voltage dependent calcium channels in the central nervous system. Research has shown it to be effective in the treatment of diabetic peripheral neuropathy but this efficacy has not been demonstrated in all neuropathic pain states. Clinically, pregabalin is seen to work more quickly and have fewer side effects than gabapentin.

As with opioids, a gabapentinoid 'switch' may be useful to improve efficacy and reduce side effects.

Gabapentin has dose limited absorption so doses above 3600mg/day do not reliably increase plasma levels.

Both pregabalin and gabapentin should be reduced in renal impairment.

Dosage

(a) Gabapentin: Start slowly in elderly, titrate dose up every few days and avoid excessive rapidity of dose escalation. It should be administered first at night to improve sleep and then increase day doses to minimise daytime sleepiness and cognitive dysfunction.

Gabapentin may be used for up to a total of 8 days perioperatively. If gabapentin is to be continued beyond this, a Special Authority for Pharmac needs to be completed and submitted either via fax or online.

(a) A typical dose for a 70-year-old with radicular pain
   i. 100mg 2200h for 3/7 then 100mg 0900h and 2200h for 3/7 then 100mg 0900h, 1300h and 2200h.
   ii. Doses can be increased slowly. This may only get to 300mg TDS.
   iii. If excess sedation hold dose for 1 day.
   iv. If side effects continue reduce by one dose.
   v. Goal is highest dose tolerated associated with best function and fewest side effects.

(b) A 40-year-old builder with groin pain post-surgery
   i. 300mg 2200h for 3/7 then 300mg 0900h and 2200h for 3/7 then 300mg 0900h, 1300h and 2200h.
   ii. Doses can be increased slowly. The plateau is 1200mg TDS.
   iii. If excess sedation hold dose for 1/52.
   iv. If side effects continue reduce by one dose.
   v. Goal is highest dose tolerated associated with best function and fewest side effects.

Pregabalin: This is a second line gabapentinoid, which can achieve more consistent plasma levels. Note: At the time of writing, pregabalin is not on the Hospital Medicines Formulary (HML). In the community, pregabalin is not funded and hence may cost the patient a significant amount if they are discharged on this agent.

(a) Start at 75mg PO at 2200h for 5/7 then 75mg PO 0900h and 2200h.

(b) Stabilise for 2/52 at this dose
   i. If pain score and function improved by 30% or more hold dose
   ii. If pain score and function improved by less than 30% increase to 150mg 12 hourly
   iii. The maximum dose is 300mg 12 hourly.

Side effects and cautions: Important clinical effects include sedation, unsteadiness, weight gain, mood disturbance and suicidal ideation.

Section 6.5: Tricyclic antidepressants

There is currently no evidence to support the use of tricyclic antidepressants, such as amitriptyline and nortriptyline, in acute pain. They have, however, been shown to be effective in the treatment of chronic neuropathic pain.

Duloxetine

As previously stated, there is a limited role for antidepressants in the management of acute pain. Duloxetine, a serotonin-norepinephrine reuptake inhibitor, has been shown to be effective in the management of diabetic peripheral neuropathy and fibromyalgia (MacIntyre et al., 2010). Note: At the time of writing, Duloxetine is not on the Hospital Medicines Formulary (HML).