Introduction

The concept of multimodal, evidence-based interventions to improve post-operative outcome (enhanced recovery) was introduced more than 10 years ago and is now well documented in several recent reviews to hasten post-operative recovery and reduce the need for hospitalisation, morbidity and convalescence. Multimodal analgesia aims to improve patients’ comfort and to decrease side effects and opioid consumption. The goal is to target different mechanisms of pain pathways. This can be achieved through the use of multiple drug classes or administration techniques.

Pain management starts pre-operatively, the patient must be an active participate in the process. To enable the patient to become involved in their pain management they must be fully informed. This includes understanding the procedure, rehabilitation involved, procedures involved to improve their pain control and medications. The patient will be given a patient guide to hip or knee surgery. The Pain Service teaches within the education classes to inform patients about what to expect after surgery.

The Pain Service work collaboratively with the pre-operative assessment clinic to identify any patients that may need extra support from the Pain Service, for example, patients on long term strong opiates for chronic pain. This process should allow anaesthetic and analgesic strategy planning with the direct involvement of the patient.

This guideline should be adjusted to serve patients’ individual needs. However, it is important to note that all anaesthetics for the enhanced recovery pathway should involve a local anaesthetic based technique (spinal, local anaesthetic infiltration). Standardisation is critical to achieving the aim of enhanced recovery but variation may be required due to patient/surgical factors.

All drug doses mentioned in this guideline are for patients with a bodyweight >50 kg. Patients less than 50 kg bodyweight should be prescribed as per kg bodyweight.

Pre-operative analgesia

The use of gabapentin as an analgesic and opioid-sparing drug in acute post-operative pain management has been shown to provide significantly improved pain control after surgery and reduce side effects associated with opiate use. A recent meta-analysis has reviewed the effect of gabapentin as an adjunct to opioids for post-operative pain therapy. They report that the use of gabapentin decreased pain intensity ratings by 10 – 29 mm on a visual analogue scale (VAS) and morphine consumption by 2 – 59 mg or 20 - 60%. Gabapentin is usually well tolerated. If side effects occur, sedation and dizziness are the most commonly reported.

Intra-operative anaesthetic

<table>
<thead>
<tr>
<th>Spinal anaesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 0.5% heavy bupivacaine and intrathecal diamorphine 300 micrograms</td>
</tr>
<tr>
<td>+/- TCI propofol sedation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adjunctive analgesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Intravenous paracetamol 1 g (dose at 15 mg/kg if &lt;50 kg)</td>
</tr>
<tr>
<td>- Intravenous ketamine 0.5 mg/kg bolus dose</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Other interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Intravenous tranexamic acid 1 g (administered slowly over 3 - 5 minutes)</td>
</tr>
<tr>
<td>- Intravenous fluid 1 litre Hartmanns’ solution</td>
</tr>
</tbody>
</table>
Intrathecal diamorphine provides a minimum of 6 hours and a mean effect of 10 hours pain relief. This has an additional benefit of helping in the early mobilisation and physiotherapy, as the motor block from the bupivacaine would have worn off but patient has still analgesic effect provided by diamorphine. Two recent meta-analyses found a 10 - 50% reduction of morphine consumption when ketamine was used peri-operatively and up to 25% reduction of pain intensity ratings in the first 48 hours after surgery. The use of ketamine is encouraged not only because of its opioid-sparing effect, but also because there is evidence that its use helps to prevent opioid-induced hyperalgesia.

**Local anaesthetic periarticular infiltration (performed by surgeon)**

| Administration: The mixture consists of 30 ml of 0.5% levobupivacaine (150 mg) and 65 ml of 0.9% normal saline and 1 ml of 1:1000 adrenaline. The mixture needs to be prepared under strict aseptic conditions by the scrub nurse. The resultant 96 ml solution is distributed among three 50 ml syringes equally (32 ml of the local anesthetic mixture in each syringe). The periarticular and the subcutaneous injections are performed by the surgeon using each syringe with a 20 g spinal needle. |
| N.B. This regimen is only valid for patients weighing more than 70 kg. If patient weighs less than 70 kg, the dose would be reduced proportionately. The drugs should be administered with the weight adjustments and at the discretion of the individual clinician. |

The cornerstone of the enhanced recovery pathway for orthopaedics is the use of a local anaesthetic based technique. This guideline strongly recommends the use of spinal anaesthesia, local infiltration or the combination of both.

Current best evidence suggests the use of high volume local anaesthetic infiltration for pain relief knee arthroplasties. Here it forms an essential part of the treatment regimen and should as such be combined with either spinal or general anaesthesia. Further studies support the use of periarticular infiltration of levobupivacaine, as it reduced morphine consumption in the first twelve hours after total hip arthroplasty, concluding that periarticular injection of levobupivacaine can supplement available post-operative analgesic techniques and reduce post-operative morphine requirements after total hip arthroplasty.

**Post-operative analgesia**

This guideline promotes the use of oral analgesia to manage moderate to severe post-operative pain. As with all analgesia, strong opioids should be administered in time to provide sufficient analgesia in the early post-operative recovery period. Strong opioids are recommended in combination with non-opioid analgesia for managing high intensity pain following hip and knee replacement. Oxycodone M/R is used in this guideline. This is a controlled release formulation, which is a synthetic opioid, and is popular in enhanced recovery programmes because of its quick and reliable onset. Oxycodone gives a peak effect within 45 minutes and its effects last for up to 12 hours. The release of oxycodone M/R tablets is biphasic, with an initial relatively fast release providing an early onset of analgesia followed by a more controlled release, which determines the 12 hour duration of action.

Oral analgesia provides a more sustained analgesic effect due to the long acting nature of the controlled release strong opiate preparations. Overall, patients should use less opiates and therefore have fewer side effects from opiates. Controlled release formulations provide a reliable means of maintaining stable serum concentrations and avoid erratic fluctuations that may characterise immediate release formulations. The patient is less reliant on requesting oral analgesia every 3 - 4 hours. There are well documented problems associated with this approach; patients worry about addiction, they are reluctant to trouble nurses for analgesia and delays can occur in administering analgesia due to the time to check controlled drugs.

Some patients are reluctant to take analgesia if they are not in pain. It is important to educate patients regarding the use of regular analgesia. Therefore patients should never refuse regular oral analgesia unless there is a good reason to, for instance intolerable side effects. Patients should be taught to pre-empt pain, meaning it is better to take analgesia prior to mobilisation
or physiotherapy rather than wait until after when it may take more opioids to improve their pain control, resulting in more side effects. Patients use less analgesia when using it pre-emptively. This information is given to patients in the patient information booklet and forms part of the pre-operative education class. Patients need this information reinforced by all members of the multidisciplinary team.

**Patients on long standing opiate therapy for chronic pain**

Patients that take opiates for long standing pain, e.g. fentanyl patches, oxycodone M/R, Zomorph®, should continue these during the intra-operative and post-operative periods. This should be highlighted at pre-operative assessment and a plan should be documented. These patients should not be given the standard enhanced recovery analgesic guideline. They should continue on their normal opiate dose and have patient controlled analgesia (PCA). If they wish to reduce their opiates post-operatively then this would be considered by the patient’s GP and it would not be considered in the immediate post-operative period.

**Inadequate pain control**

If pain is severe at rest and oral analgesia has been titrated upwards without effect, consider conversion to intravenous opiates via PCA. It may be appropriate to give overrides via the PCA (see Guideline 332 Management of Patient Controlled Analgesia in Adults). Please contact the Pain Service or on-call anaesthetist out of hours.

**Post-operative oral analgesia for primary hip and knee arthroplasty flowchart (Appendix 1)**

The flow chart in Appendix 1 assists practice. Use this in conjunction with the enhanced recovery guidelines and use own clinical judgment. This guideline should be adjusted to meet individual patient needs.

**References**


**Related guidelines of other Trusts**

Dr Bantel 2011. Chelsea and Westminster Hospital. Enhanced recovery guidelines for orthopaedics. (Updated version in print.)

Norfolk and Norwich University Hospitals. Trust guideline for the enhanced recovery programme for total hip and knee replacement, 2010.


See also:

Guideline 49FM Post–Operative Analgesic Ladder for Adults
Guideline 138 Management of Intrathecal (Spinal) Opioids (In patients aged 16 years and older)*
Guideline 216 Prevention and Management of Post-operative Nausea and Vomiting in Adult Patients >16 Years*
Guideline 222 Injectables Policy and Guide (Adults)*
Guideline 299FM Prescribing Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) in Adults
Guideline 332 Management of Patient Controlled Analgesia in Adults (age 16 years and older)*

Medicines Policy Annex, SOP 032, Controlled Drugs in Patient Controlled Analgesia and Epidural Preparations – additional requirements*

*BHT users only

<table>
<thead>
<tr>
<th>Title of Guideline</th>
<th>Pain Management in Enhanced Recovery for Hip and Knee Arthroplasty Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Guideline Number</td>
<td>337FM</td>
</tr>
<tr>
<td>Version</td>
<td>1</td>
</tr>
<tr>
<td>Effective Date</td>
<td>March 2014</td>
</tr>
<tr>
<td>Review Date</td>
<td>March 2017</td>
</tr>
<tr>
<td>Approvals:</td>
<td></td>
</tr>
<tr>
<td>Clinical Guidelines Subgroup</td>
<td>13th February 2014</td>
</tr>
<tr>
<td>Author/s</td>
<td>Kelly Warfield, Senior Acute Pain Nurse</td>
</tr>
<tr>
<td></td>
<td>Dr R Nagpaul, Consultant Anaesthetan</td>
</tr>
<tr>
<td></td>
<td>Dr M Forbes, Consultant Anaesthetan</td>
</tr>
<tr>
<td>SDU(s)/Department(s) responsible for updating the guideline</td>
<td>Pain Service Anaesthetics</td>
</tr>
<tr>
<td>Uploaded to Intranet</td>
<td>11th March 2014</td>
</tr>
</tbody>
</table>

Buckinghamshire Healthcare NHS Trust
Appendix 1  Oral Analgesia Pain Management for Enhanced Recovery in Primary Hip and Knee Arthroplasty

Pre-operative:
Gabapentin 600 mg given 1 - 2 hours before surgery (check for contraindications)

Day 0
Paracetamol 1 g oral or intravenously (if NBM - dose at 15 mg/kg if <50 kg) every 6 hours.
Ibuprofen 400 mg every 6 hours (see NSAID guideline).
Oxycodone M/R tablets 10 or 20 mg 12 hourly given 6 hours post spinal diamorphine (consider patient co-morbidities, previous sensitivities, renal function - reduce dose if necessary).
Lanzoprazole 15 mg OD whilst taking NSAID (if any GI risk).

As required:
Oxycodone 5 – 10 mg 4 hourly (starting at lower dose and titrating upwards).
Contact anaesthetist if any problems.

Day 1
Assess pain scores/side effects.
Add gabapentin 200 – 300 mg 8 hourly.
Analgesia as above.
Contact Pain Service if any problems

Day 2
Assess pain scores/side effects.
If pain score <5 on movement:
In preparation for discharge - consider changing regular analgesic regimen to codeine 30 – 60 mg 6 hourly or tramadol 50 – 100 mg 6 hourly.
Continue oxycodone 5 – 10 mg prn 4 hourly.

Day 3
Assess pain scores/side effects.
If pain score <5 and nil side effects, prescribe current analgesia for TTOs – DO NOT prescribe gabapentin or strong opiates for discharge analgesia unless patient normally prescribed for long term pain control or discussed with Pain Service.

Note: If pain score is >5 on movement and patient unable to progress with physiotherapy:
Continue analgesia at current level and re-assess daily.
PCA analgesia can be used if pain severe and uncontrolled by oral analgesia.
Contact Pain Service or on-call anaesthetist.