

Control of acute pain in postoperative and post-traumatic situations and the role of the acute pain service

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Abstract

Since the early 1980s the vast majority of hospitals in the UK have developed their own acute pain services (APS) to better manage acute pain. A well-run and locally tailored APS will lead to improved quality of patient care and satisfaction along with a reduced length of stay and complications. Historically the main analgesic interventions are oral medication, intravenous patient-controlled analgesic devices and epidural infusions. Increasingly newer analgesic techniques are being utilized to improve care, including wound catheter infusions, peripheral nerve blocks and subcutaneous infusions of ketamine.

Keywords Acute pain service; epidural; ketamine; local anaesthetics; non-steroidal anti-inflammatory drugs; opiates; paracetamol; patient-controlled analgesia; patient-controlled epidural; transverse abdominal plane blocks

Why treat postoperative pain?

Patients have a humanitarian right to be as comfortable as possible, but there are additional physiological and psychological reasons for treating acute pain. Pain results in nociceptive impulses that lead to autonomic as well as somatic reflexes. Various mediators are released systemically in response to these reflexes including bradykinin and the stress hormones, for example cortisol and catecholamines. Together with cytokines, adhesion molecules and some coagulation factors this chemical mix constitutes the peripheral inflammatory response and results in tissue oedema, hyperaemia, immunosuppression, catabolism and hypercoagulability.

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Learning objectives

After reading this article you should be able to:

- describe the role of the acute pain service
- list the physiological benefits of good acute pain management
- compare the different routes of analgesia provision.

Post-surgical and post-traumatic pain states are often considered in the same context as they both induce substantial alteration in physiological homeostasis – initiating a stress response and inflammatory cascade. If poorly managed they cause suffering and functional impairment, delay recovery and can lead to chronic pain states.

Achieving good analgesia lowers the stress response and results in reduced catabolism, less immunosuppression (leading to better wound healing), less respiratory work and therefore less imbalance in oxygen supply/demand, less cardiac work and dysrhythmias and less coagulation disorders (less blood loss). All of these factors have led to a reduction in length of stay for patients and a reduction in postoperative complications.

The acute pain service

In the last few decades significant advances have been made in the management of acute pain. The introduction of acute pain services and the development of organized, multidisciplinary acute pain care have reduced patient suffering perioperatively and raised awareness of the importance of acute pain management in holistic care. The concept has been adopted worldwide and has been reinforced by guidelines developed in the UK, Australia and the USA.

In some hospitals the acute pain service (APS) continues to be primarily for managing postoperative pain and supervising electronic equipment that delivers pain relief. For others the role of the APS has been extended to provide a more comprehensive service dealing with complex patients (opioid-tolerant patients), older patients, acute cancer pain and pain resulting from acute medical conditions such as pancreatitis and sickle cell disease.

The structure of the acute pain team can vary from a ‘low-cost’ service that is nurse-based and anaesthetist-led (but without daily participation by an anaesthetist), to an anaesthesia-centred one, with daily input by an anaesthetist and APS nurse and 24-hour cover by anaesthetists. Additionally, clinical input from pharmacists is occurring increasingly. There is no consensus as to the best model for an APS and it has been suggested that tailoring the service to the local environment/needs may be as important as choice of analgesic modalities.¹ Table 1 outlines the key components of an acute pain service.²

The heterogeneous nature of studies in this field makes it impossible to perform meta-analysis and very few large, high-quality assessments exist, but the proposed benefits of an acute pain service include:

- better pain relief
- lower incidence of side effects
- lower postoperative morbidity/mortality
- a reduction in the incidence of persistent pain after surgery.

Royal College of Anaesthetists guidance for components of an acute pain service²

- Provide acute pain management at all times and named consultant(s) with responsibility for the acute pain service
- Promote a multidisciplinary approach involving medical, nursing and pharmacy staff
- In-service training programme for medical, paramedical and nursing staff in the management of patients with acute pain
- Promote and implement formal pain assessment
- Set standards and establish protocols for good clinical practice in acute pain management consistent with evidence-based recommendations
- Facilitate communication across specialities
- Support specialized methods of pain relief such as epidural analgesia
- Audit the efficacy of existing methods of treatment and evaluation of new techniques

Table 1

Pain assessment and measurement

Pain has been identified as the ‘fifth vital sign’ and should be routinely assessed (alongside blood pressure, heart rate, temperature and respiratory rate/SpO₂) to facilitate accountability for pain assessment and management.

Pain is a complex, subjective phenomenon involving sensory, emotional, cognitive, behavioural and cultural components that influence the way in which patients perceive and express pain. Assessment of a patient’s experience of pain is a crucial first step in providing effective pain management. Self-reporting of pain is regarded as the gold standard measurement, providing a valid recording of pain that responds to treatment and intervention. This is conventionally done using a numerical rating score (NRS). There is a wide range of additional pain measurement tools including disease and patient-specific functional scales, such as the Western Ontario and McMaster Universities for osteoarthritis (WOMAC), and neuropathic pain screening tools such as the Neuropathic Pain Scale (NPS), Leeds Assessment of Neuropathic Symptoms and Signs (LANSS). The choice of pain-rating method should be based on patient characteristics, adjusting for the patient’s age, language, educational and cognitive status as well as the type of pain being assessed. Pain assessment in children, the elderly and those patients in whom English is not their first language requires additional consideration and guidance on assessing pain in these patients can be found in the recommending reading resources. Acute pain should be assessed both at rest and during movement, for example whilst coughing, to ensure adequate pain relief exists to maintain deep breathing/comply with postoperative physiotherapy.

Teamwork, training and education

One of the most important roles undertaken by the APS is the provision of educational support for patients, relatives/carers and staff. All patients undergoing elective surgery should have

written and verbal information regarding their pain management, this includes PCA and epidural analgesia.³

The APS provides competency-based training for staff in the use of PCA and epidural devices and has responsibility for the education of all staff members involved in the management of patients who experience acute pain whilst in hospital. This teaching can be provided formally, through study-days and tutorials, but most often occurs informally on ward rounds. A daily presence on the ward facilitates interdisciplinary communication and addresses potential communication barriers with pain management.

Healthcare professionals vary considerably in their knowledge and attitudes towards pain management and this is in part due to poor undergraduate teaching on the subject. A recent survey by the British Pain Society highlighted that on average only 12 hours was allocated to pain education in undergraduate curricula for healthcare professionals. As it is essential to pitch educational resources at appropriate levels, it can be challenging and time-consuming for the APS to correct this knowledge shortfall across specialities. A suggested framework to help the APS educate the multidisciplinary team is the RADAR approach – Responsibility, Anticipation, Discussion, Assessment and Response.⁴ This approach encourages the patient and their carers to engage in open and frequent discussion about pain control efficacy and analgesic options.

The development of clinical guidelines can help to raise awareness of pain management strategies and these have been used to reduce practice variations and promote quality evidence-based healthcare. However, acute pain continues to be prevalent in hospital patients.⁵

Regular audits are necessary to monitor the quality of the service and to evaluate pharmacological and interventional analgesic techniques. The Royal College of Anaesthetists’ audit recipe book provides indicators that can be used to assess and improve clinical practice.⁶

Analgesic techniques

Postoperative pain is best managed using a multimodal approach both in terms of drugs and analgesic techniques. [Table 2](#) compares the routes and types of commonly used analgesic interventions.

Oral administration is the preferred route, except when gastrointestinal function is compromised. Intramuscular administration should be avoided; it is painful and increases the risk to staff of accidental needlestick injury. The subcutaneous route is an acceptable alternative and can be accessed on demand using an indwelling dedicated catheter.

Intravenous PCA

One of the cornerstones of the APS is the development and maintenance of PCA devices. Historically these deliver opioids, for example morphine or fentanyl intravenously, and are controlled by an electronic programme. It is the responsibility of the APS to ensure that all staff are trained and certified competent to use PCA devices. For added safety there should be hospital-specific guidelines and designated pumps used under the supervision of the APS. Any patient with a PCA device should be reviewed by the APS on, at least, a daily basis – this ensures

Routes of drug administration and analgesic interventions

	Patient acceptability	Technical ease	Rapid of onset	Adverse risks
Oral	++++	++++	+	+++
Rectal	--	++	+	+++
Transdermal	++++	+++	---	-
Intramuscular	-	-	++	+
Intravenous	-	--	+++	-
Subcutaneous	+	-	++	-
Epidural (LA)	-	---	++	---
Nerve/plexus block (LA)	-	---	++	---
Wound infiltration (LA)	+	-	++	-
Intrathecal (LA)	--	---	++++	---

+, beneficial for patient; -, detrimental for patient; LA, local anaesthetic.

Table 2

continuity, adequate supervision of ward staff and the early introduction of a step down plan appropriate to each patient. Rarely a background infusion may be necessary to improve analgesia in certain patient groups, since opioid toxicity is greater in this situation the APS will more closely monitor the patient and ward area.

Neuroaxial blocks

The ultimate reduction in surgical stress response is achieved with an epidural or spinal (intrathecal). The resultant temporary sympathectomy can minimize the systemic stress response to a negligible level. The use of epidurals is seen as a gold standard for pain relief post-thoracoabdominal surgery and for some orthopaedic procedures.

Many hospitals insist on nursing patients with epidurals in a critical care environment (high dependency unit (HDU)) leading to an extra pressure on this expensive resource, but they can be managed safely in a ward environment if there is sufficient appropriately trained staff who are supported by a well run APS. The use of patient-controlled epidurals (PCEA) helps some units to avoid the use of critical care facilities as the patient receives a low rate of continuous infusion of LA but can top themselves up with a bolus from the dedicated pump analogous to a PCA with background infusion. It is essential to have robust monitoring, daily APS review and local troubleshooting guidelines for safety and efficiency.

As well as ensuring that epidurals work well and provide analgesia, the APS is tasked with monitoring, identifying and managing complications that result from drugs or techniques used in acute pain management. The 2009 National Anaesthesia Project (NAP3) reported rates (for permanent harm or death) between 1 in 23,500 and 1 in 50,500 for all forms of neuroaxial block. Combined spinal/epidurals in non-obstetric patients confer the largest risk with a rate of 1 in 5500.

Nerve/plexus blocks can be used as single shot or via prolonged infusions. When used as a prolonged infusion care has to be given to try and minimize the density of motor block while still ensuring good analgesic levels. Elastometric delivery devices are commonly used to drive these infusions and can now infuse local anaesthetic for more than 24 hours.

Wound infiltration has been used to good effect in hernia surgery but leaving a catheter in with local anaesthetics running over several hours is gaining acceptance, especially in orthopaedics where infiltrations and repeated boluses have been shown to improve analgesia and time to mobilization after major lower limb joint replacements.

The use of *transverse abdominal plane blocks (TAP)* or *rectal sheath blocks* with local anaesthesia following laparotomy and caesarean section can provide good analgesia without the cardiovascular instability seen with neuroaxial equivalents and permit patients to return to a normal ward environment postoperatively.

Pharmacology

The World Health Organization's 'analgesic ladder', originally developed for cancer pain management, is used to manage post-surgical and trauma pain. The acute pain service has a role in administering these drugs and developing local protocols to educate and promote safe prescribing.

Paracetamol

In almost all patients regular paracetamol should be given in adequate doses (1 g or 15 mg/kg four times daily). It is an effective analgesic for mild pain and works synergistically to reduce the required doses of other drugs from higher up the 'analgesic ladder'. Intravenous paracetamol has a significantly shorter time to meaningful analgesia (8 minutes versus 37 minutes for oral preparations).

Non-steroidal anti-inflammatory drugs (NSAIDs)

These drugs block the cyclooxygenase enzyme, limiting the production of prostaglandins in many tissues, reducing inflammation and pain. They are effective alone for mild to moderate pain and are used in combination with paracetamol at step 1 of the WHO ladder. Their side effect profile of bronchospasm (only ~15% of asthmatics react), gastrointestinal ulceration, increased perioperative bleeding and impaired renal function restricts their utility. Recent research has pointed to an increase in cardiovascular events in all patients taking long-term NSAIDs, it is not just

a COX-2 phenomenon. NSAID used post-surgically can still be justified if the analgesic benefits outweigh the patient's risk factors.

Opioids

Opioids are the mainstay of treatment in moderate to severe pain. There is little difference in the analgesic properties between the differing opioids if given in equipotent doses. Intravenous PCA morphine is often replaced with oral slow-release equivalents when tapering IV analgesia. The APS has a role in ensuring any opioid prescriptions are appropriate and either reduced or ceased prior to hospital discharge.

Neuropathic agents

There is increasing awareness of acute neuropathic pain and it is estimated to occur in around 3–8% of post-surgical patients. Early identification is important and the use of anti-neuropathic medication, such as tricyclics and anti-convulsants may be warranted perioperatively. Early liaison with chronic pain services should occur to aid prescribing and patient handover in refractory cases.

NMDA agonists

Ketamine is used in many units as a low-dose subcutaneous infusion for up to 4 days. It is useful adjuvant in opioid-tolerant patients and also in managing neuropathic pain. Up to one-third of patients suffer significant hallucinations or delirium and it should be administered to local protocol and monitored by the APS.

Summary

Pain following postoperative and post-traumatic situations can be adequately managed by following the WHO analgesic ladder and by employing interventional analgesic techniques. However, to optimize care and provide robust monitoring an acute pain service is necessary. Ideally this should be developed with reference to the hospital services and setting. While the APS has evolved to supervise the appropriate and safe provision of

analgesia for all patients, its roles and responsibilities also include the development of education and training resources in pain management and the continuous audit of efficacy and safety of analgesics and techniques. Through the development of local guidelines and protocols the APS can help standardize care and bridge knowledge gaps between specialities. A good working relationship with all hospital specialists, primary care colleagues and outpatient chronic pain services is vital to the successful functioning of the APS and to the delivery of safe acute pain management. ◆

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FURTHER READING

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