

Managing Pain in Children

A Clinical Guide for Nurses
and Healthcare Professionals



Second Edition

Edited by

Alison Twycross

Stephanie Dowden

Jennifer Stinson

WILEY Blackwell

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Foreword

I am delighted to introduce you to *Managing Pain in Children: A Clinical Guide for Nurses and Healthcare Professionals* (2nd edition). The editors, Twycross, Dowden and Stinson, are each internationally known as clinicians and scientists in pain in children. I know their work well. Together they bring a profound commitment to excellence in nursing care and their extensive experience from three continents in helping children, their nurses and their parents overcome pain.

The first edition of this book was an overwhelming success as it ensured that the best evidence was combined with a practical approach that is lacking in most textbooks. The coverage is broad and detailed and includes helpful approaches to acute, chronic and procedure pain as well as the special problems of pain in palliative care.

The integration of theory, evidence and practice is evident in the very helpful case studies that enliven the text.

Managing Pain in Children will be used by nurses, psychologists, physicians and other healthcare professionals who are committed to helping children. It is more than a book; it encompasses the distilled wisdom of the best clinicians and scientists in the field. This text will serve as a trusted colleague in guiding your clinical practice. Keep it close; you will consult it often.

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CHAPTER 1

Why Managing Pain in Children Matters

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Introduction

Despite the evidence to guide clinical practice being readily available, the management of pain in children is often suboptimal. This chapter will start by providing a definition of pain and pain management and will highlight the consequences of unrelieved pain. Children's views about the effectiveness of their pain management will be discussed, and commonly held misconceptions about pain in children detailed. The factors thought to influence pain management practices will be outlined. Information about pain management standards published in several countries will be discussed. How well children's pain is currently managed will be considered alongside the issue of professional accountability. Finally, the ethical imperative for managing children's pain effectively will be examined.

What is Pain?

'Pain is whatever the experiencing person says it is, existing wherever they say it does' (McCaffery 1972).

'Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage. Pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life' (International Association for the Study of Pain [IASP] 1979, p. 249).

These two definitions of pain illustrate that the experience of pain is both a subjective and an individual phenomenon. This is particularly clear in the IASP definition, which explains how the many facets of pain interrelate and affect pain perception. Although supporting the concept of pain as a subjective phenomenon, the original IASP definition fell short in relation to those unable to communicate verbally, including neonates and young children and cognitively impaired children. This was addressed in 2001 when the following amendment was made:

‘The inability to communicate in no way negates the possibility that an individual is experiencing pain and is in need of appropriate pain-relieving treatment’ (IASP 2001, p. 2).

Pain management means applying the stages of the nursing process – assessment, planning, implementation and evaluation – to the treatment of pain.

The cyclical basis of these stages is illustrated in Figure 1.1.

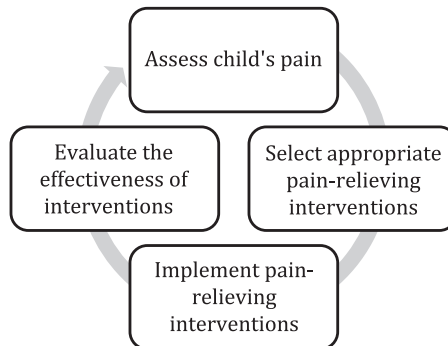


Figure 1.1 The stages of pain management.

Consequences of Unrelieved Pain

Pain has an important purpose, serving as a warning or protective mechanism, and people with congenital analgesia, who are unable to feel pain, often suffer extensive tissue damage (Melzack and Wall 1996). However, unrelieved pain has a number of undesirable physical and psychological consequences (Box 1.1). When these are considered, the need to manage children's pain effectively is clear. The results of studies demonstrating this are outlined in Box 1.2.

Children's memories of pain also influence subsequent pain experiences (Noel et al. 2012). Other consequences of unrelieved pain include:

- In a retrospective study with adults ($n = 147$), aged 17–21 years, childhood experiences of medical and dental pain were significant predictors of adults' medical pain (Pate et al. 1996).

BOX 1.1

Consequences of unrelieved pain

Physical effects

- Rapid, shallow, splinted breathing, which can lead to hypoxaemia and alkalosis
- Inadequate expansion of lungs and poor cough, which can lead to secretion retention and atelectasis
- Increased heart rate, blood pressure and myocardial oxygen requirements, which can lead to cardiac morbidity and ischaemia
- Increased stress hormones (e.g. cortisol, adrenaline, catecholamines), which in turn increase the metabolic rate, impede healing and decrease immune function
- Slowing or stasis of gut and urinary systems, which leads to nausea, vomiting, ileus and urinary retention
- Muscle tension, spasm and fatigue, which leads to reluctance to move spontaneously and refusal to ambulate, further delaying recovery

Psychological effects

- Anxiety, fear, distress, feelings of helplessness or hopelessness
- Avoidance of activity, avoidance of future medical procedures
- Sleep disturbances
- Loss of appetite

Other effects

- Prolonged hospital stays
- Increased rates of re-admission to hospital
- Increased outpatient visits

Source: WHO (1997)

BOX 1.2

Examples of research demonstrating the effects of poor management of acute pain

Taddio et al. (1997)

- Data from a clinical trial studying the use of EMLA® during routine vaccinations at 4 or 6 months was used to ascertain whether having had a circumcision impacted on boys' ($n = 87$) pain response.
- Boys who had been circumcised without anaesthesia as neonates were observed to react significantly more intensely to vaccinations than uncircumcised boys ($p < 0.001$).
- Supported findings from a previous study (Taddio et al. 1995).

Grunau et al. (1998)

- Examined the pain-related attitudes in two groups of children, aged 8–10 years: extremely low birthweight children ($n = 47$); full birthweight children ($n = 37$).
- The very low birthweight group of children had been exposed to painful procedures as neonates, the other group had not.
- Children were shown the *Pediatric Pain Inventory*, which comprises 24 line drawings, each depicting a potentially painful event (Lollar et al. 1982).

BOX 1.2 Continued

- The two groups of children did not differ in their overall perceptions of pain intensity. However, the very low birthweight children rated medical pain intensity significantly higher ($p < 0.004$) than psychosocial pain, suggesting that their early experiences affected their later perceptions of pain.

Saxe et al. (2001)

- Investigated the relationship between the dose of morphine administered during a child's hospitalisation for an acute burn and the course of post-traumatic stress disorder (PTSD) symptoms over the 6-month period following discharge.
- Children ($n = 24$) admitted to the hospital for an acute burn were assessed twice with the Child PTSD Reaction Index: while in the hospital and 6 months after discharge.
- The Colored Analogue Pain Scale was also administered during the hospitalisation. All patients received morphine while in the hospital. The mean dose of morphine (mg/kg/day) was calculated for each subject.
- There was a significant association between the dose of morphine received while in the hospital and a 6-month reduction in PTSD symptoms.
- Children receiving higher doses of morphine had a greater reduction in PTSD symptoms.

Rennick et al. (2002)

- A prospective cohort study of patients ($n = 120$) in paediatric intensive care units and medical-surgical wards.
- There were no differences between wards in terms of negative outcomes; however, children in the intensive care units received more analgesics and sedation.
- 17.5% of patients expressed significant medical fears 6 weeks after discharge.
- 14% continue to express these fears 6 months later.
- Children who underwent more invasive procedures had more medical fears, felt less in control of their own health, and exhibited more signs of post-traumatic stress for 6 months after discharge.

Taddio et al. (2002)

- A prospective cohort study of babies ($n = 21$) born to mothers with diabetes and babies ($n = 21$) born to mothers with an uneventful pregnancy.
- Infants of diabetic mothers had repeated heel-sticks in the first 24–36 hours of life.
- Babies of diabetic mothers demonstrated significantly greater pain behaviours at venepuncture for newborn blood screening ($p = 0.04$).

Grunau et al. (2009)

- Infants ($n = 137$ born preterm at 32 weeks gestation; $n = 74$ full-term controls) were followed prospectively.
- Infants with significant brain injury or major sensorineural impairments were excluded.
- At 8 and 18 months, poorer cognition and motor function were associated with a higher number of painful (skin-breaking) procedures.

- Distress associated with needle-stick procedures can develop into phobic reactions (Hamilton 1995), making completion of later procedures more difficult.
- Pain affects children's anxiety, mood and general quality of life (Schanberg et al. 2003; Martin et al. 2007).
- Pain and pain-related fear and anxiety affect children's functioning and can lead to deconditioning or avoidance of activity (Martin et al. 2007; Asmundson et al. 2012).

There is increasing evidence that acute (postoperative) pain can result in chronic pain:

- The incidence of chronic postsurgical pain is between 15% and 30% of (adult) patients (Gupta et al. 2011).
- 13% of children undergoing orthopaedic surgery developed chronic postoperative pain (Fortier et al. 2011).

Unrelieved pain has short- and long-term effects on children. It is important, therefore, to ensure that pain is managed effectively.

Children's Views about the Effectiveness of Pain Management

Pain is a biopsychosocial experience (Chapter 3) and this is why two people undergoing the same surgery or experiencing the same illness may report different pain experiences. When considering children's painful experiences it is, therefore, essential to explore children's views. Indeed the United Nations Convention on the Rights of the Child (1989) states that:

‘Children's views must be taken into account in all matters affecting them, subject to children's age and maturity.’

Children's views about how well their pain has been managed have been explored in four studies in the past decade (Box 1.3). It is evident that from the child's perspective there is a need to evaluate practices. (Further discussion about undertaking research with children can be found in Chapter 11).

Although these studies highlight the fact that children continue to experience moderate to severe pain, it is worth noting that this does not necessarily impact on satisfaction with care (Twycross and Collis 2012; Vincent et al. 2012; Twycross and Finley 2013). A study by Habich et al. (2012) found no changes in patient or family satisfaction with care despite improvements in pain assessment when evaluating the effectiveness of implementing evidence-based paediatric pain guidelines. These findings suggest that children, and their families, may expect to experience pain when in hospital and may see this pain as unavoidable. Children's perceptions of good pain management emphasise a holistic approach; valuing professional competence, communication, openness, and the invitation to participate in decision-making about pain management interventions (Nilsson et al. 2011).

Additional information

Further insight into children's experiences of pain in hospital can be found in: Kortessluoma, R.L. and Nikkonen, M. (2004) ‘I had this horrible pain’: The sources and causes of pain experiences in 4- to 11-year-old hospitalized children. *Journal of Child Health Care* **8**(3), 210–231.

BOX 1.3**Studies exploring children's views about pain management*****Polkki et al. (2003)***

- Children ($n = 52$), aged 8–12 years, were asked about their postoperative pain experiences and to suggest what nurses could do to improve postoperative pain management.
- Children indicated that they wished the nurses had given them more or stronger analgesic drugs, as soon as they asked for them, and that they would like nurses to ask them about their pain on an hourly basis. Children would also like nurses to provide them with *meaningful things to do* to distract them from their pain.

Kortessluoma et al. (2008)

- Children ($n = 44$), aged 4–11 years, were interviewed about their experiences of pain management in hospital. Children's descriptions of what helped when they were in pain included self-help strategies, the assistance of healthcare professionals and significant others, medicine, emotional support and modifying the environment.
- Children felt that healthcare professionals were not always gentle enough or did not have enough time to manage their pain adequately. They expected professionals to be competent and empathic, and to give time to help them when in pain.

Twycross and Collis (2012)

- As part of a larger study, young people ($n = 17$) completed a questionnaire about their pain management experience.
- Young people felt their pain management was of an acceptable level or very good. This was despite the fact that 58% of children experienced severe pain and 24% moderate pain.

Twycross and Finley (2013)

- Children ($n = 8$), in one Canadian tertiary hospital, were interviewed about their perceptions of pain care, and asked to rate the worst pain experienced postoperatively on a numerical scale.
- Most children ($n = 10$) experienced moderate to severe pain postoperatively.
- Children were, on the whole, satisfied with the care provided.
- Children reported being asked about their pain, receiving pain medication and using physical and psychological methods of pain relief.
- A lack of preoperative preparation was evident for one child.

Misconceptions about Pain

Children are still experiencing moderate to severe pain in hospital (Kozlowski et al. 2012; Stevens et al. 2012; Twycross et al. 2013). One reason for this could be the perceptions of the healthcare professionals caring for the child. A number of misconceptions about children's pain have been identified, with a comprehensive summary of these provided by Twycross (1998). The key misconceptions and a summary of the evidence demonstrating their mythological status can be seen in Table 1.1. (Other misconceptions are discussed in Chapters 2, 4 and 9.) These misconceptions have all been shown to have no scientific basis. Other reasons that may explain why pain continues to be mismanaged are discussed in Chapter 11.

Table 1.1 Key misconceptions about pain in children

Misconception	Evidence
Infants do not feel as much pain as adults	Pain pathways (although immature) are present at birth and pain impulses are able to travel to and from the pain centres in the brain (Wolf 1999; Coskun and Anand 2000; Fitzgerald 2000) Neonates exhibit behavioural, physiological and hormonal responses to pain (Franck 1986; Hogan and Choonara 1996; Carter 1997; Abu-Saad et al. 1998)
Infants cannot feel pain because of an immature nervous system	Complete myelination is not necessary for pain to be felt (Volpe 1981) Painful stimuli are transmitted by both myelinated and unmyelinated fibres (Volpe 1981; Craig and Grunau 1993) Incomplete myelination implies only a slower conduction speed in the nerves, which is offset by the shorter distances the impulse has to travel (Volpe 1981; Anand and Hickey 1987) Noxious stimuli have been shown to produce a cortical pain response in preterm babies (Bartocci et al. 2006; Slater et al. 2006)
Young children cannot indicate where pain is located	Children as young as 4 years old can demonstrate on a body chart where they hurt without knowing the names of body parts (Van Cleve and Savedra 1993) Children are able to report the intensity of pain by the age of 3–4 years (Harbeck and Peterson 1992)
Sleeping children cannot be in pain	Sleep may be the result of exhaustion because of persistent pain (Hawley 1984)

Factors Affecting Healthcare Professionals' Perceptions of Pain

Several factors have been postulated as contributing to suboptimal practices relating to healthcare professionals, patients (children and parents) and the organisation (International Association for the Study of Pain [IASP] 2010). These factors are illustrated in Figure 1.2. Research conducted in the past 10 years provides an indicator of the factors relating to children and healthcare professionals, which may affect pain management practices (Table 1.2). These factors are discussed in more detail in Chapter 11. Research relating to the factors impacting on pain management practices of other healthcare professionals has not been carried out.

Suboptimal practices can be attributed to a number of factors. A multifactorial approach is needed to improve practice.

Pain Management Standards

Some of the pain management standards published in the last 10 years are listed in Box 1.4. These guidelines and standards provide knowledge and guidance about how pain should be managed. In the United States, the Joint Commission for the Accreditation of Healthcare Organisations (JCAHO) first published standards for pain

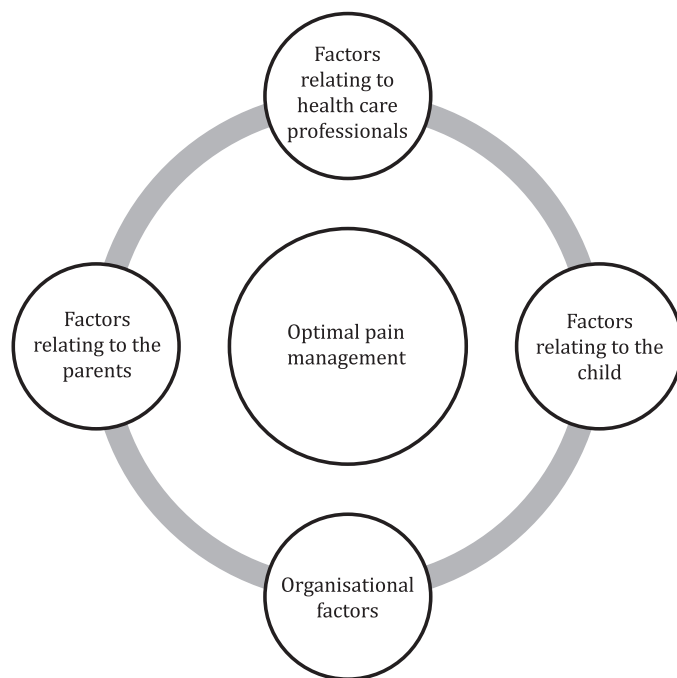


Figure 1.2 Barriers to optimal pain management practices.

management in 2001. These were updated in 2010 (Box 1.5). These standards are not specific to children, but they ensure that accreditation is dependent on each hospital being able to demonstrate that they are meeting these standards. Whether the implementation of these standards improves pain management requires evaluating.

How Effective are Current Pain Management Practices?

An increasing number of studies have focused on exactly how healthcare professionals manage children's pain. The results of key studies examining practices over the past 10 years are summarised in Box 1.6. These studies indicate that practices do not always conform to current best practice guidelines. Most of these relate to nursing practice. There is very little information regarding other healthcare professionals. It is likely that suboptimal practices would also be evident among other professional groups.

Professional Accountability and Evidence-Based Practice

Registered nurses are accountable for their actions and should practise in an evidence-based manner. In the UK, nurses' professional conduct must conform to the Nursing and Midwifery Council's (NMC) Code of Professional Conduct (2008). The clauses that relate to accountability and evidence-based practice can be seen in Box 1.7. (The Code is available from: www.nmc-uk.org/Nurses-and-midwives/The-code/.) Similar codes of conduct are in place in other countries.

Table 1.2 Factors that contribute to suboptimal pain management

Factors relating to staff	Factors relating to children	Factors relating to parents	Organisational factors
- Healthcare professionals' personal judgements, preconceived views and assumptions - Priority healthcare professionals give to pain management - Lack of knowledge about pain management (nurses and medical staff) - Nurses' belief that children exaggerate their pain scores - Nurses' belief that parents encourage their child to have pain medication when they had not asked for it - Nurses having to remind doctors to ensure analgesics are prescribed - Healthcare professionals being desensitised to pain or emotional distancing to cope with patients in pain	- Child's age - Child's culture - Child's behaviour - Child's diagnosis - Time since surgery - Non-compliance with nurses' suggestions for pain care - Child's reluctance to report their pain - Child refusing pain medications	- Reliance on behavioural cues to assess pain - Reluctance for their children to receive pain medications - Fears about the side effects of analgesic drugs - Fears about addiction - Belief that pain medications should be given as little as possible	- Ward/unit norms in relation to managing pain (patterns of pain care) - Inadequate or insufficient medication orders - Lack of time to implement physical and psychological strategies - Low staff numbers and a heavy workload - Insufficient supply of some medication - A lack of cooperation between nursing and medical staff

Source: Data from Nagy (1999); Byrne et al. (2001); Kankkunen et al. (2003); Vincent (2005); Gimbler-Berglund et al. (2008); Vincent and Gaddy (2009); Zisk-Rony et al. (2010); Czarnecki et al. (2011); Lim et al. (2012); Ljusegren et al. (2012); Sutters et al. (2012); Twycross and Collis (2012); Williams (2012); Twycross et al. (2013)

Evidence-based practice is:

'An approach to providing care to patients that involves the use of clinical research combined with clinical experience, patient characteristics, and patient preferences to make clinical decisions regarding pain treatment and management' (Joint Commission International 2010, p. 9).

BOX 1.4

Pain standards and guidelines

Australia and New Zealand

Macintyre, P.E., Schug, S.A., Scott, D.A., Visser, E.J., Walker, S.M.; APM:SE Working Group of the Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine (2010) *Acute Pain Management: Scientific Evidence*, 3rd edition. ANZCA & FPM, Melbourne. Available from: www.anzca.edu.au/resources/books-and-publications/Acute%20pain%20management%20-%20scientific%20evidence%20-%20third%20edition.pdf

Canada

Reducing the pain of childhood vaccination: An evidence-based clinical practice guideline (2010). Available from: www.cmaj.ca/content/182/18/E843.full.pdf+html

International Consensus Document

Assessment and Management of Pain in Neonates (2006). Available from: <http://pediatrics.aapublications.org/content/118/5/2231.full.pdf+html>.

United Kingdom

Royal College of Nursing (2009) *The Recognition and Assessment of Acute Pain in Children*, 2nd edition, RCN Publishing, London. Available from: www.rcn.org.uk/development/practice/clinicalguidelines/pain

Association of Paediatric Anaesthetists of Great Britain and Ireland (2012) *Good Practice in Postoperative and Procedural Pain*, 2nd edition. Available from: <http://onlinelibrary.wiley.com/doi/10.1111/j.1460-9592.2012.03838.x/pdf>

USA

American Society of Anesthesiologists Task Force on Acute Pain Management (2012) *Practice Guidelines for Acute Pain Management in the Perioperative Setting*. Available from: http://journals.lww.com/anesthesiology/Fulltext/2012/02000/Practice_Guidelines_for_Acute_Pain_Management_in.11.aspx

American Society for Pain Management Nursing (2011) *American Society for Pain Management Nursing Guidelines*. Available from: www.aspmn.org/Organization/documents/ProceduralPainMgt.PositionStatement.pdf

World Health Organization

Guidelines on the pharmacological treatment of persisting pain in children with medical illnesses. Available from: www.icpcn.org.uk/page.asp?section=0001000100330009§ionTitle=WHO+guidelines+on+the+pharmacological+treatment+of+persisting+pain+in+children+with+medical+illnesses

Everyone is responsible for pain management. The bedside nurse is as responsible as the analgesia prescriber, the physiotherapist or a member of the specialist pain management team; if any of these clinicians do not fulfil their role, the patient suffers. Thus all healthcare professionals have a responsibility to:

- learn and be educated about pain;
- know about pain management (pharmacological, physical and psychological strategies);
- assess and respond to patients in pain.

BOX 1.5

Topics addressed by the JCAHO Pain Management Standards

- Patients' rights regarding pain management
- Assessment and reassessment
- Managing patients' pain according to the treatment plan
- Ensuring comprehensive pain management after surgery
- Addressing pain in the hospice setting
- Educating patients about pain
- Staff and licensed independent practitioner training and competency
- Discharge communication regarding pain management

Source: Joint Commission International 2010

BOX 1.6

Studies examining pain management practices

Twycross (2007)

- Observed registered nurses ($n = 13$) on a children's surgical ward in England for a period of 5 hours per shift for two to four shifts.
- The role of the *observer as participant* was adopted, whereby the researcher could shadow the nurse and act primarily as an observer.
- Although nurses administered analgesic drugs when a child complained of pain, other practices did not conform to current recommendations and were in need of improvement.
- Nurses did not, for example, routinely assess a child's pain, nor use physical or psychological methods of pain relief on a regular basis.

Taylor et al. (2008)

- Undertook an audit of pain management practices during one 24-hour period at a Canadian children's hospital.
- A structured interview was used to collect data from 83% of the inpatients on the day of the study ($n = 241$) and a chart review was carried out.
- They found that 23% of children had moderate to severe pain at the time of the interview, and 64% had had moderate to severe pain at some point during the 24-hour period.
- Of the children in pain, 58% had received analgesic drugs but only 25% had received these on a regular basis.
- Only 27% of patients had a pain score documented.

Shrestha-Ranjit and Manias (2010)

- Carried out a retrospective audit of children ($n = 106$), aged 5–15 years, who were admitted for a surgical procedure for a fractured lower limb over a two-year period in one Australian children's hospital.
- Data were collected pertaining to the first 72 hours postoperatively.
- They found that 50% of children experienced moderate to severe pain during this period.
- Nurses were found to document pain assessments less frequently than would have been expected in the postoperative period.
- Most analgesics were prescribed on an *as-needed* basis with children receiving a lower dose than the amount prescribed.

Smyth et al. (2011)

- Explored nursing practices associated with administration of postoperative pro re nata (PRN) analgesia to children.

BOX 1.6 Continued

- A mixed methods explanatory study was carried out in one Australian hospital.
- Nurses used multiple strategies to ascertain children's need for postoperative PRN analgesia, including reference to pain assessment tools, focusing on the behavioural cues of children, involving parents and children, and drawing upon personal and professional backgrounds and experience.
- Evaluation of the effectiveness of PRN postoperative analgesia was poorly communicated.

Zhu et al. (2012)

- Reviewed medical records at one Canadian Children's Hospital on a single day in September 2007.
- Inpatient records ($n = 265$) were audited and data recorded on a standardised form.
- 63% of children had a documented pain assessment.
- 83% of children with documented pain received had at least one recorded pain management intervention.
- 51% of children received pharmacological therapy, and 15% received either a psychological or physical pain-relieving intervention.
- Of those assessed, 44% experienced pain in the previous 24 hours with 31.5% indicating they had experienced moderate to severe pain.
- One-third of children received opioids: 19% of these had no recorded pain assessment.
- Children ($n = 131$) underwent a painful procedure, 21% had a concurrent pain assessment.
- Painful procedures were accompanied by a pain-relieving intervention in 12.5% of cases; 87.5% of children had no pain-relieving interventions documented.

Twycross et al. (2013)

- Observed the postoperative pain care of children ($n = 10$), aged 5 years and over in one Canadian children's hospital.
- A philosophy of care on the unit was identified where pain medications were given regularly even if they were prescribed prn.
- Pain management was considered synonymous with administering analgesic drugs; physical and psychological methods seen as parents' role.
- Communication tended to focus on pain medications and there was limited documentation about pain. Pain scores were not recorded consistently.
- Actions when a pain score ≥ 5 was recorded varied: 30% of the time no action was taken but in 37% of cases additional action was noted.
- Recorded pain scores did not appear to guide decision-making about pain medications given.

BOX 1.7

Clauses of the NMC Code (2008) relating to accountability and evidence-based practice

- You must deliver care based on the best available evidence or best practice.
- You must ensure that any advice you give is evidence-based if you are suggesting healthcare products or services.
- You must have the knowledge and skills for safe and effective practice when working without direct supervision.
- You must recognise and work within the limits of your competence.
- You must keep your knowledge and skills up to date throughout your working life.
- You must take part in appropriate learning and practice activities that maintain and develop your competence and performance.

Pain management practices should be based on **scientific facts** or agreed best practice, not personal beliefs or opinions. The burden of proof lies with the healthcare professional, **NOT** the patient.

The aim of this book is to provide healthcare professionals with knowledge about current research and best practice guidelines in relation to managing children's pain. Each practitioner is accountable and responsible for evaluating their practices to ensure they conform to current best practice guidelines.

Managing Pain in Children is an Ethical Imperative

The United Nations, in its Declaration on the Rights of the Child, states that:

'Children should in all circumstances be among the first to receive protection and relief, and should be protected from all forms of neglect, cruelty and exploitation' (United Nations 1989).

This principle can be applied to the management of pain, particularly as evidence-based practice guidelines are available (Box 1.2). Yet there is evidence that children still experience moderate to severe unrelieved pain (Kozłowski et al. 2012; Stevens et al. 2012; Twycross et al. 2013). Failing to provide children with satisfactory pain relief can be considered a violation of their human rights. Indeed, when the consequences of unrelieved pain are taken into account, managing children's postoperative pain effectively could be considered an ethical imperative. The *Human Rights Watch report* (2009) and the *Declaration of Montreal* (2010) make it clear that failure to provide access to effective pain-relief constitutes a breach of human rights.

The Declaration of Montreal is an international initiative highlighting the ethical imperative of managing pain worldwide. It outlines three key human rights in relation to pain and its treatment, including the rights:

- of access to pain management without discrimination;
- to having one's pain acknowledged and the provision of information about pain and pain management;
- of access to pain assessment and treatment, delivered by appropriately trained healthcare professionals.

These rights imply a number of obligations for both healthcare organisations and professionals in establishing appropriate laws, policies and systems for pain management, and delivering effective pain management as part of the therapeutic relationship.

Summary

- Pain is an individual and subjective phenomenon.
- Unrelieved pain has a number of undesirable social, physical and psychological consequences.
- Children are still experiencing moderate to severe pain while in hospital. This is not necessarily reflected in the overall satisfaction with pain care.

- Children's reports of how well their pain is managed indicate areas where pain practices could be improved.
- The continuing belief in misconceptions about children's pain by some healthcare professionals may account, at least in part, for suboptimal practices.
- Other reasons for suboptimal practices include nurses emotionally distancing themselves from patients in pain; nurses managing patients' pain behaviours rather than their pain; and nurses becoming desensitised to patients' pain.
- Clinical guidelines and best practice standards have been produced in several countries to promote good pain management practices.
- Healthcare professionals' practices in some areas need evaluating to ensure that they conform to current best practice guidelines.
- Every healthcare professional is responsible for managing pain and accountable for their own practices.
- Pain management practices should be based on scientific facts not personal beliefs or opinions.
- Managing children's pain effectively is an ethical imperative. Access to adequate pain management is a human right.

Additional information

Declaration of Montreal: www.iasp-pain.org/Content/NavigationMenu/Advocacy/DeclarationofMontr233al/default.htm

Human Rights Watch: www.hrw.org/reports/2009/03/02/please-do-not-make-us-suffer-any-more-0

The IASP Special Interest Group on Pain in Childhood: <http://childpain.org/>

International Association for the Study of Pain (IASP): www.iasp-pain.org

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CHAPTER 2

Anatomy and Physiology of Pain

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Introduction

The capacity to feel pain helps to protect us from harm. Knowledge of nervous system anatomy and physiology is crucial to understanding pain, its presentation and management. This chapter explores the mechanisms involved in pain perception and how this relates to the management of pain.

The Nervous System

Terminology relating to pain is defined in Table 2.1 and key nervous system structures and terms are presented in Table 2.2. The nervous system is made up of neurons (nerve cells) and can be subdivided into the *peripheral nervous system* (PNS) and *central nervous system* (CNS).

- The PNS is made up of all nervous tissues (*nerves, ganglia, enteric plexuses* and *sensory receptors*) outside the CNS. It transmits information to the CNS (via *sensory* or *afferent* neurones) and from the CNS (via motor or *efferent* neurones).
- The CNS is comprised of the brain and spinal cord. The brain integrates and interprets information from sensory neurones and determines a response.
- The dorsal area of the spinal cord acts as an information hub and is able to simultaneously direct information to the brain and down the spinal cord to the area of injury.

Misconceptions about the Physiology of Pain in Children

In the past, healthcare professionals have doubted the capacity of children and infants to feel pain and be affected by it to the same extent as adults. These assumptions were

Table 2.1 Key pain terminology

Term	Definition
Acute pain	Pain of short duration that can be attributed to injury or disease and is generally considered to be protective as it triggers behaviours that remove us from harm and promote recovery
Allodynia	Pain due to a stimulus that does not normally provoke pain
Causalgia	A syndrome of sustained burning pain, allodynia and hyperpathia after a traumatic nerve lesion, often combined with vasomotor and sudomotor dysfunction and later trophic changes
Central pain	Pain initiated or caused by a primary lesion or dysfunction in the central nervous system
Central sensitisation	Increased responsiveness of nociceptive neurones in the central nervous system to their normal or subthreshold afferent input
Chronic pain	Pain that persists after the initial injury and may (as in some types of neuropathic pain) occur in the absence of tissue damage. As a result it serves no protective function and becomes a health problem in itself
Dysaesthesia	An unpleasant abnormal sensation, whether spontaneous or evoked
Hyperaesthesia	Increased sensitivity to stimulation, includes both allodynia and hyperalgesia
Hyperalgesia	Increased pain from a stimulus that normally provokes pain
Hyperpathia	A painful syndrome characterised by an abnormally painful reaction to a stimulus, especially a repetitive stimulus, as well as an increased threshold
Hypoalgesia	Diminished pain in response to a normally painful stimulus
Neuralgia	Pain in the distribution of a nerve or nerves
Neuropathic pain	Pain caused by a lesion or disease of the somatosensory nervous system
Neuropathy	A disturbance of function or pathological change in a nerve: in one nerve, mononeuropathy; in several nerves, mononeuropathy multiplex; if diffuse and bilateral, polyneuropathy
Nociception	The neural process of encoding noxious stimuli
Nociceptive pain	Pain that arises from actual or threatened damage to non-neural tissue and is due to the activation of nociceptors
Nociceptor	A high-threshold sensory receptor of the peripheral somatosensory nervous system that is capable of transducing and encoding noxious stimuli
Pain	An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage
Pain threshold	The least intensity of a stimulus that is perceived as painful
Pain tolerance level	The maximum intensity of a pain-producing stimulus that a subject is willing to accept in a given situation
Paraesthesia	An abnormal sensation, whether spontaneous or evoked
Placebo analgesics	'Medications' that are presented to the patient as providing pain relief, which contain no pharmacologically active ingredient
Wind-up	An increase in the excitability of spinal cord neurones provoked by repetitive stimulation of C-fibres

Source: Melzack and Wall (2008); International Association for the Study of Pain (IASP) (2011)

Table 2.2 Key nervous system terminology

Term	Definition
Action potential (nerve impulse)	Electrical signal created by changes in electrochemical energy across the membrane of the neurone
Afferent (<i>sensory</i>) neurones	Neurones that carry sensory information <i>to</i> the central nervous system
Axon	Single long process of a neurone that conducts nerve impulses towards another neurone
Cranial nerves	12 pairs of nerves emerging from the brain
Dendrite	Receiving, input portion of neurone
Descending modulation	Mechanisms that modulate nociception (may be facilitatory or inhibitory) via nerve impulses transmitted from the brain to the spinal cord. The process modulates transmission of pain signalling in the spinal cord
Dorsal horn	Found in all spinal cord levels and is comprised of sensory nuclei that receive and process somatic information. From there ascending projection emerges to transmit the sensory information to the midbrain and diencephalon
Efferent (<i>motor</i>) neurones	Neurones that carry motor information <i>from</i> the central nervous system
Excitation	Triggering of a nerve impulse. Excitation of an A-delta or C fibre will lead to transmission of pain stimuli
Ganglion	Cluster of neuronal cell bodies in the peripheral nervous system
Grey matter	Comprised of neuronal cell bodies, dendrites, unmyelinated axons, axon terminals and neuroglia
Enteric plexuses	Networks of neurones in organs and gastrointestinal tract
Inhibition	Inhibition refers to processes that impair onward transmission of nerve impulses, e.g. prevention or reduction of pain impulse transmission from primary to secondary afferent neurones in the dorsal horn of the spinal cord
Interneurones	Form connections between sensory and motor neurones in the central nervous system
Myelin sheath	Lipid and protein covering that insulates the axon enabling faster electrical transmission
Myelination	Process of forming the myelin sheath
Nerve	Bundle of axons in the peripheral nervous system
Neuroglia (glial cells)	Nerve cells that support neurone functioning (includes astrocytes, microglia, ependymal cells and oligodendrocytes)
Neurone	Excitable nerve cells (capable of transmitting an impulse and processing information) made up of cell body, dendrites and an axon
Neurotransmitters	Chemicals that influence the transmission of the impulse across the synapse by inhibition or excitation
Nociceptor	A sensory nerve ending capable of responding to noxious (painful) stimulation
Spinal nerves	31 pairs of nerves emerging from the spinal cord
Spinoreticular tract	An ascending nociceptive pathway that carries information on the emotional/affective components of pain