

Pain in Children: Management



International Association for the Study of Pain

Given the dependency of children upon adults with regard to pain assessment, prevention, and treatment, children 0-17 years are a vulnerable population and in need of special attention with regard to pain management.

Pain experiences, including acute and chronic, are common in infants, children, and adolescents. Data from children's hospitals reveal that pain in pediatric patients is common, under-recognized and under-treated [3,15,35,38,47,50,54]. A recent systematic review showed that neonates admitted to intensive care units frequently suffer through an average of 7 to 17 painful procedures per day, with the most frequent procedures being venipuncture, heel lance, and insertion of a peripheral venous catheter [3]. In the vast majority of infants, no analgesic strategies are employed [33]. In addition, children with serious medical conditions are exposed to frequent painful diagnostic and painful procedures (e.g., bone marrow aspirations, lumbar punctures). Furthermore, even healthy children have to undergo significant amounts of painful medical procedures throughout childhood. Vaccinations are the most commonly performed needle procedure in childhood, and pain is a common reason for vaccine hesitancy [9,25,41].

Exposure to severe pain without adequate pain management has negative long-term consequences, including increased morbidity (e.g., intra-ventricular hemorrhage) and mortality [2,42]. Exposure to pain in premature infants is associated with higher pain self-ratings during venipuncture by school age [52], poorer cognition, and motor function [19]. Research has shown that exposure to pain early in life has long-lasting consequences in terms of increases in the risk for developing problems in adulthood (chronic pain, anxiety and depressive disorders). Adequate management of infant and child pain is imperative [5,21,53].

Management of needle pain in children

Untreated needle pain, caused by procedures such as vaccinations, blood draws, injections, venous cannulation etc., can have long-term consequences including needle phobia, pre-procedural anxiety, hyperalgesia, and avoidance of healthcare, resulting in increased morbidity and mortality [39,40]. Current evidence [39,44,46], supported by guidelines from the Canadian Pediatric Society [6,23], HELPinKids [1,29,30,43], and recently brought forward by science-to-social media campaigns ("Be Sweet to Baby" [8] and especially "It Doesn't Have to Hurt" by Chambers et.al [7]), strongly suggests that four bundled modalities should be offered for elective needle procedures in order to reduce or eliminate pain experienced by children [13].



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In general, it is recommended that healthcare professionals and parents use neutral words and avoid language that can increase fear and may be falsely reassuring (e.g., “it will be over soon”; “you will be ok”). A recent Cochrane review identified sufficient evidence for the effectiveness of Cognitive-Behavioral Therapy, breathing interventions, distraction, and hypnosis for reducing children’s pain and/or fear due to needles [4]. Offering four simple steps (and not just some of them) for all needle procedures for all children has now been implemented system-wide in children’s hospitals and pediatricians’ offices on several continents [13,31].

Box 1: Prevention and treatment of needle pain

Offer a bundle of 4 evidence-based modalities to all children:

- (1) **Topical Anesthesia, “Numb the skin,”** (for children 36 weeks corrected gestational age and older). Topical anesthetics include 4% lidocaine cream [45], EMLA-cream or needle-less lidocaine application via a J-tip® (sterile, single-use, disposable injector that uses pressurized gas to propel medication through the skin) [27,28].
- (2) **Sucrose** [16,37] **or breastfeeding** [34] for infants 0-12 months [8].
- (3) **Comfort positioning, “Do not hold children down.”** Restraining children for procedures is never supportive, creates a negative experience, and increases anxiety and pain [24]. For infants, consider swaddling, warmth, skin-to-skin contact, or facilitated tucking. For children six months and older, offer sitting upright, with parents holding them on their laps or sitting nearby.
- (4) **Age-appropriate distraction**, [51] such as toys, books, blowing bubbles or pinwheels, stress balls, and using apps, videos, or games on electronic devices.

Management of acute pain in children

Nociceptive pain might be due to tissue injury caused by disease, trauma, surgery, interventions and/or disease directed therapy. Untreated acute pain may lead to fear and even avoidance of future medical procedures.

Multimodal analgesia (see Box 2) is the current approach to address complex acute pain. Pharmacology alone (including basic analgesia, opioids, adjuvant analgesia) might not be sufficient to treat children with acute pain. The addition and integration of modalities, such as regional anesthesia, rehabilitation, effective psychosocial interventions [43], psychology, spirituality, as well as integrative (“non-pharmacological”) modalities, acts synergistically for more effective (opioid-sparing) pediatric pain control with fewer side effects than single analgesic or modality [12,34].



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Box 2: Prevention and treatment of acute pain: Multimodal analgesia

Multimodal analgesia acts synergistically for more effective pediatric pain control with fewer side effects than single analgesic or modality

(1) **Medications** (depending on clinical scenario) might include:

- Basic analgesia (e.g. paracetamol/acetaminophen, NSAIDs, COX-2 inhibitors)
- Opioids (e.g. tramadol, morphine, methadone)
- Adjuvant analgesics (e.g. gabapentin, clonidine, amitriptyline)

(2) **Regional anesthesia** (e.g. neuroaxial infusion [epidural], peripheral/plexus nerve block, neurolytic block, intrathecal port/pump)

(3) **Rehabilitation** (e.g. physical therapy, graded motor imagery [32], occupational therapy)

(4) **Psychology** (e.g. cognitive behavioral therapy)

(5) **Spirituality** (e.g. chaplain)

(6) **Integrative (“non-pharmacological”) modalities** (e.g. mind-body techniques such as diaphragmatic breathing, bubble blowing, self-hypnosis, progressive muscle relaxation, biofeedback plus massage, aromatherapy, acupressure, acupuncture)

Management of chronic pediatric pain

Pediatric chronic pain is a significant problem with conservative estimates that posit 20% to 35% of children and adolescents are affected by it worldwide [17,26,36]. Pain experienced in children's hospitals is known to be common, under-recognized, and under-treated, with more than 10% of hospitalized children showing features of chronic pain [15,38,47,55]. Although the majority of children reporting chronic pain are not greatly disabled by it [22], about 3% of pediatric chronic pain patients require intensive rehabilitation [20].

The 2012 American Pain Society Position Statement, “Assessment and Management of Children with Chronic Pain”, indicates that chronic pain in children is the result of a dynamic integration of biological processes, psychological factors, and sociocultural variables, considered within a developmental trajectory [11]. Unlike in adult medicine, chronic pain in children is not necessarily defined by using arbitrary temporal parameters (e.g. 3 months), but rather employ a more functional definition such as “pain that extends beyond the expected period of healing” and “hence lacks the acute warning function of physiological nociception” [48,49].



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An interdisciplinary approach combining (1) rehabilitation; (2) integrative medicine/active mind-body techniques; (3) psychology; and (4) normalizing daily school attendance, sports, social life, and sleep appear to be effective. As a result of restored function, pain improves and commonly resolves. Opioids are not indicated for primary pain disorders (including centrally mediated abdominal pain syndrome, primary headaches [tension headaches/migraines], and widespread musculoskeletal pain) and other medications, with few exceptions, are usually not first-line therapy.

A recent Cochrane review concluded that face-to-face psychological treatments might be effective in reducing pain outcomes for children and adolescents with headache and other types of chronic pain [10]. Psychological treatments have also been found to be effective for reducing pain-related disability in children and adolescents with mixed chronic pain conditions at post-treatment and follow-up, and for children with headache at follow-up. Types of psychological treatments that received the most research attention are Cognitive-Behavioral Therapy and Acceptance and Commitment Therapy.

Increasing evidence suggests that it is important to target parental catastrophizing thoughts, parental distress, and parental behaviors with regard to child pain (e.g., protective behaviors), which has led to recommendations to incorporate parents within the multidisciplinary treatment [18].

Box 3: Treatment of chronic pain and primary pain disorders [14]

- (1) Rehabilitation** (e.g. physical therapy, graded motor imagery [32], Occupational therapy)
- (2) Integrative (“non-pharmacological”) modalities** (e.g. mind-body techniques such as diaphragmatic breathing, bubble blowing, self-hypnosis, progressive muscle relaxation, biofeedback plus modalities such as massage, aromatherapy, acupressure, acupuncture)
- (3) Psychology** (e.g. cognitive behavioral therapy, acceptance and commitment therapy)
- (4) Normalizing Life** (usually life gets back to normal first, then pain goes down – not the other way around)
 - Sports / exercise
 - Sleep-hygiene
 - Social life
 - School attendance
- (5) Medications** (may or may not be required)
 - Basic analgesia (e.g. paracetamol/acetaminophen, NSAIDs, COX-2 inhibitor)
 - Adjuvant analgesics (e.g. gabapentin, clonidine, amitriptyline)
 - Of note: Opioids in the absence of new tissue injury, e.g. epidermolysis bullosa, osteogenesis imperfecta, are usually NOT indicated

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