Acute Pain Management for Pediatric Dental Patients

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Abbreviations
AAPD: American Academy of Pediatric Dentistry.
CDC: Centers for Disease Control and Prevention.
FDA: US Food and Drug Administration.
IV: Intravenous.
Majr: Medical subject headings major topic.
NSAIDs: Nonsteroidal anti-inflammatory drugs.
Tiab: Title and abstract.

** Used in the PubMed search to identify all terms that begin with this truncated base.*

Abstract
This statement summarizes current best practices in pediatric pain management for dentists and other stakeholders. Infants, children, adolescents, and individuals with special health care needs may experience pain resulting from dental/orofacial injury, infection, and dental procedures. Dental pain, an inflammatory condition, can be categorized as somatic (ie, periodontal, alveolar, mucosal) or visceral (ie, pulpal). Effective pain management begins with careful assessment for every patient, as inadequate treatment can result in significant physical and psychological consequences. Perioperative pain management approaches include preemptive pain management (eg, anesthetics), use of local anesthesia during general anesthesia for postoperative pain control, nonpharmacological anxiolytic interventions (eg, providing a calm environment, emotional support), distraction and imagery (eg, counting, video games), and pharmacological agents including non-opioid analgesics (eg, nonsteroidal anti-inflammatory drugs, acetaminophen) and opioid analgesics. Acetaminophen and nonsteroidal anti-inflammatory medications are first line pharmacologic therapies for pain management. Opioids should rarely be used in this population, and, when necessary, should be prescribed with measures to minimize misuse.

This document was developed through a collaborative effort of the American Academy of Pediatric Dentistry Councils on Clinical Affairs and Scientific Affairs to offer updated information and guidance on pain management in infants, children, adolescents, and individuals with special health care needs.

KEYWORDS: PAIN MANAGEMENT; ACUTE PAIN; PAIN, POSTOPERATIVE; FACIAL PAIN; TOOTHACHE; ANALGESIA

Purpose

The American Academy of Pediatric Dentistry (**AAPD**) recognizes that infants, children, adolescents, and individuals with special health care needs can experience pain due to dental/orofacial injury, infection, and dental procedures. Inadequate pain management may have significant physical and psychological consequences for the patient. Appreciation of pediatric pain can help practitioners develop clinical approaches to prevent or substantially relieve dental pain. When pharmacological intervention is necessary to manage pain, the practitioner must understand the consequences, morbidities, and toxicities associated with the use of specific therapeutic agents. These recommendations are intended to provide oral health

professionals and other stakeholders with current best practices for acute pain management in pediatric dentistry.

Methods

This document was developed by the Council on Clinical Affairs, adopted in 2018,[1] and last revised in 2022.[2] It is based on a review of current dental and medical literature pertaining to pain management in pediatric dental patients. Review of existing federal and professional pain management guidelines and consensus statements was used to assist with this document. An electronic search was conducted in the PubMed/MEDLINE database using the terms: (*evidence based dentistry* [**Majr**] OR *pediatric dentistry* [Majr] OR *dental care for children* [Majr] OR *paediatric dentistry* [**Tiab**] OR *dental health services* [Majr] OR *dentistry* [Majr] OR *public health dentistry* [Majr] OR *community dentistry* [Majr] OR *oral health* [Majr]) AND (*dental pain management* [Tiab] OR *postoperative pain management* [Tiab] OR *pediatric pain management* [Tiab] OR *analgesic overdose** OR *NSAIDs* [Tiab] OR *nonsteroidal anti-inflammatory drug**); fields: all; limits: within the last 10 years, humans, English, systematic review, and clinical trials. There were 327 articles that met these criteria. Papers for review were chosen from this list and from references within selected articles. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background

Pain is defined by the International Association of the Study of Pain as "an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage."[3] Their expanded definition includes 6 items that provide further context to the complex topic of pain: (1) pain is always a personal experience; (2) pain is a lived experience that is distinct from the neural process known as nociception; (3) pain is learned through life experiences; (4) a person's report of pain should be respected and accepted; (5) pain can have adverse effects on function and well-being; and (6) pain can be expressed in many ways; verbal description is just one of several possible behaviors.[3]

Pain experienced during dental procedures can be distressing for the patient and caregivers as well as for the provider and staff and can also lead to difficult behavior, dental fear, and avoidance behavior in the child.[4] Moreover, pain experience in childhood may shape future pain experiences in adulthood.[5p151,6]

Pain may be divided into diagnostic categories such as somatic, visceral, and neuropathic.[7p4] Pain encountered in dentistry is typically inflammatory and categorized as somatic (ie, periodontal, alveolar, mucosal) or visceral (ie, pulpal) pain.[7p4]

Three principal types of stimuli can activate dental sensory nerves: mechanical (such as trauma), chemical (including bacterial products and other irritants), and thermal (heat and cold).[7p6] Toothache is a frequent intraoral source of orofacial pain in children.[8] Dental pulp pain arises when Aδ (A-delta) fibers, which mediate sharp, transient pain, and C fibers, which mediate dull, lingering pain, are activated by inflammatory mediators in response to bacterial invasion, chemical irritation, thermal stimulation, or mechanical trauma.[7p7] Periodontal pain occurs when infectious or traumatic insults to the gingiva, periodontal ligament, and alveolar bone stimulate free nerve endings.[7p4] Other sources of orofacial pain include temporomandibular disorders (eg, joint pain, masticatory muscle pain), headaches (eg, migraine, tension type), or other non-odontogenic causes (eg, pathologic jaw lesions, oral ulcers, neuralgia).

Understanding nociception (ie, pain processing) is essential for the management of pain. Following tissue injury, infection, or invasive treatment, thermal, mechanical, and chemical stimuli activate receptors on free nerve endings in vital structures in the orofacial region.[9p48,10] In turn, sensory signals travel along afferent trigeminal nerve fibers and relay information to the brainstem and higher structures involved with the perception of pain.[11] Under normal conditions the perception of pain persists until the stimulus is removed.

Sensitization of central and peripheral nervous system circuits occurs following significant tissue damage or prolonged neuronal stimulation[10] and can lead to an exaggerated pain response to noxious stimuli

termed primary hyperalgesia (at the site of injury)[10] or secondary hyperalgesia (at other sites). Allodynia refers to pain perception following innocuous stimuli (eg, light touch) and is characteristic of central sensitization.[12] Both pharmacologic and nonpharmacologic methods target central nervous system (CNS) inhibitory processes to alter pain processing.[13p633,14]

Pain also may be categorized as acute or chronic. Acute pain typically is of sudden onset, closely linked to tissue injury, inflammation, or surgical procedures, and usually resolves as healing occurs.[15] If acute pain fails to respond to treatment, it may persist and transition into chronic pain.[15] Chronic pain refers to pain that is dysfunctional and persists beyond the time for typical tissue healing.[3,16] Chronic pain is a costly public health problem that is difficult to treat.[17,18] Temporomandibular disorder (TMD) is an example of a chronic pain condition encountered in dentistry.[19]

Pain assessment is an integral component of the dental history and comprehensive evaluation. When symptoms or signs of orofacial/dental pain are evident, a detailed pain assessment helps the dentist to derive a clinical diagnosis, develop a prioritized treatment plan, and better estimate analgesic requirements for the patient. Direct questioning or a structured, comprehensive pain assessment can be clinically beneficial for pediatric and adolescent patients.[20,21p322] Conducting a structured interview begins with asking specific questions regarding pain onset, provoking factors, palliative factors, quality or character, region or location, severity or intensity, timing or duration, and impact on daily activities.[22] Extending the assessment beyond intensity scoring to include functional impact, temporal trajectory, sleep disturbance, emotional and behavioral effects, response to prior therapies, and patient and family goals facilitates clinical decision making.[3,23] Obtaining information through self-report can be aided by asking the child to make comparisons, using temporal anchors and facilitating communication through objects or gestures.[21p322] Behavioral reactions[21p324-325] (eg, vocalizations, facial expressions, body movements) and physiological responses[12p325-326] (ie, heart rate, oxygen saturation, stress response) are informative when assessing pain in nonverbal patients, young patients, and patients with special health care needs.[24] Additionally, ethnic, cultural, and language factors may influence the expression and assessment of pain.[25]

Validated instruments for assessing pain in verbal or nonverbal patients, depending on age and developmental status, include: Wong-Baker FACES; Faces Pain Scale (Revised); visual analogue scale (VAS); numeric rating scale (NRS); Faces, Legs, Activity, Cry, and Consolability score (FLACC); Revised Faces, Legs, Activity, Cry and Consolability (r-FLACC); and the McGill Pain Questionnaire.[21p323-325,24,26,27] Because no single tool is appropriate for all children, selection of pain assessment instruments may be based on the patient's developmental stage and the clinical setting. Validated pediatric pain assessment tools and their main strengths[26] are included in the table below.

Table. Pain Assessment Tools for Use in the Pediatric Dental Setting

Tool	Type	Age Group	Strengths/Notes
Wong-Baker FACES®	Self-report (faces)	3+ years	Simple, widely used; culturally adaptable
Faces Pain Scale – Revised (FPS-R)	Self-report (faces)	4+ years	Validated internationally; avoids smiling faces issue
Visual Analogue Scale (VAS)	Self-report (line scale)	7+ years (with abstract thinking)	Sensitive but requires abstract thinking
Numeric Rating Scale (NRS)	Self-report (0–10 numeric)	8+ years	Quick and easy; widely validated
FLACC	Behavioral/observational	2 months–7 years	Reliable for acute/postoperative pain; simple scoring
r-FLACC	Behavioral/observational (cognitive impairment)	Children with cognitive impairment	Validated for children with developmental disabilities
McGill Pain Questionnaire	Multidimensional questionnaire	Adolescents and adults (adapted for pediatrics)	Comprehensive but time-consuming

Pain management

Pre-emptive pain management

Preemptive pain management is the use of an anesthetic agent, medication, or technique administered prior to a surgical procedure to minimize or prevent pain. Goals of preemptive pain management include attenuating central sensitization, decreasing postoperative pain, improving recovery, and reducing postoperative analgesic consumption.[11,13p633,28,29] Data supports preemptive measures to optimize pain control for a variety of dental and surgical procedures.[22,29-31]

Achieving profound anesthesia prior to initiating invasive treatment decreases central sensitization.[22] Topical anesthetics are used in dentistry to minimize pain; yet, these medicaments alone may not be sufficient for dental procedures.[32,33] Compounded topical anesthetic formulations combining multiple local anesthetics have been developed to enhance efficacy and reduce discomfort during procedures such as local anesthetic injection, scaling, and minor soft tissue surgery. Professional application is required; in pediatric populations, dosing and contraindications are key safety concerns when considering commercially available or compounded agents.[34,35] Adjunctive nonpharmacologic approaches, such as cryotherapy, and cooled topical anesthesia also have demonstrated benefit, with recent systematic review and meta-analysis evidence showing reduced intraoral injection pain compared with conventional topical anesthetics alone.[36]

Local anesthetic administration techniques, the anesthetic's properties, and the needle used during injection may contribute to a patient's pain experience.[37] Distraction techniques made at the time of the injection (eg, jiggling the patient's cheek, applying pressure to the palate with a mirror handle) take advantage of Aß (A-beta) fiber signal dominance and can significantly reduce the intensity of pain-related C-fiber signaling.[37-39]

Decreasing acidity of local anesthetics containing vasoconstrictors by using sodium bicarbonate as a buffer can reduce injection site pain and postoperative discomfort and facilitate faster onset.[40] A recent systematic review demonstrated lower pain scores following inferior alveolar block injections in children when buffered versus nonbuffered local anesthesia was used; however, there was no difference in observer-reported pain behavior.[40] Finally, decreasing anesthetic delivery rate also has demonstrated pain reduction during injection.[41] Alternative delivery systems, including intraosseous and computer-controlled injection technologies, have been introduced and are sometimes marketed as improving comfort or onset characteristics. However, high-quality evidence demonstrating superiority over traditional techniques remains limited, and practical considerations such as equipment availability, training, and cost may influence their use.[42]

The use of preemptive analgesics in conjunction with local anesthetics has been shown to increase the ability to achieve pulpal anesthesia in patients with irreversible pulpitis,[43] suppress the intensity of injection pain, and reduce pain following extractions.[29,31] In dentistry, the most commonly used preemptive analgesics are NSAIDs (eg, ibuprofen), which are considered first-line therapy, and acetaminophen, which may be used alone or in combination with NSAIDs for enhanced pain control.[29,30] NSAIDs are preferred because they address both pain and the inflammatory component associated with dental procedures, and they have consistently demonstrated superior efficacy compared to opioids for acute dental pain.[30] When used together, NSAIDs and acetaminophen provide additive or synergistic effects, offering greater analgesia than either drug alone while maintaining a favorable safety profile.[30] Analgesics with sedative properties may be administered in the pre-, peri-, or postoperative period when moderate to severe pain is anticipated. Their use can be incorporated into minimal, moderate, or deep sedation, as well as general anesthesia.[44-47]

Use of local anesthesia during general anesthesia

Although pain is not consciously experienced during general anesthesia, nociceptive stimuli activate peripheral or central nerves and can lead to increased future pain sensitivity.[22,48] Central sensitization is minimized with preemptive analgesia or local anesthesia. For this reason, regional block or infiltration anesthesia is commonly performed prior to surgical procedures to attenuate intraoperative nociceptive input and reduce peripheral and central sensitization, with decreased postoperative pain representing an additional

benefit.[11,49] The decision to withhold local anesthesia containing vasoconstrictors during general anesthesia may reflect concerns about synergistic physiologic or cardiovascular effects when combined with systemic anesthetics or sedatives, as well as the desire to avoid postoperative numbness and the risk of self-inflicted oral trauma.[49,50]

Nonpharmacologic approaches to pain management

Nonpharmacologic interventions can be effective both alone and as adjuncts to pharmacological interventions in managing procedure-related pain, anxiety, and distress with minimal risk of adverse effects.[51-53] These interventions, which include distraction, relaxation techniques, guided imagery, cognitive-behavioral therapy, and newer modalities such as virtual reality, help redirect attention, reduce anticipatory anxiety, and improve cooperation during procedures.[53] Evidence suggests that the greatest benefit is achieved when nonpharmacologic strategies are combined with pharmacologic measures, yielding superior reductions in pain and anxiety.[38,54] Nonetheless, studies also acknowledge that in cases of mild pain or anxiety, such approaches may be sufficient on their own and contribute to fostering positive treatment experiences.[52,53,55]

Fear and anxiety activate circuits within the central nervous system that facilitate pain.[16] Establishing a safe, supportive, and child-friendly environment can help reduce perioperative anxiety and stress and contribute to improved postoperative comfort and pain coping in pediatric patients.[38,51,56,57] Individual studies have shown the efficacy of psychologic techniques, including preparation and information, parent coaching or training, suggestion, memory alteration or change, and coping self-statements. [38,58,59]

Distraction and imagery

Distraction is a well-supported and effective nonpharmacologic method for managing pain anxiety, and distress in the pediatric population.[25,38,60] It can be cognitive (eg, counting, nonprocedural talk) or behavioral (eg, videos, games), both of which aim to shift attention away from pain. Distraction techniques may be used by health care providers or the child's caregiver.[51,57] Distraction techniques may be of great use with patients with special needs who have shortened attention spans and cannot understand verbal reasoning or reassurance.[59]

Imagery guides the child's attention away from the procedure by harnessing imagination and storytelling. Imagery in combination with distraction has been shown to decrease postoperative pain significantly in children.[60,61]

Hypnotherapy

Hypnotherapy, a therapeutic technique that uses guided relaxation, focused attention, and suggestion, aims to alter sensory experiences and dissociate from pain experiences. Hypnosis is best for children of school age or older.[38,62] Systematic reviews have recommended more well-designed research on hypnosis as a tool for reduction of anxiety and pain in the dental setting.[63,64]

Virtual reality and smart phone applications

Using digital technology can provide distraction and reduction in pain and distress for children undergoing painful procedures.[65,66] The use of virtual reality, video games, and smartphone applications has shown a reduction in self-reported and observer-reported pain and distress during common procedures such as venipuncture and dental and burn treatments.[65] Some studies suggest that more immersive or interactive distraction modalities (eg, audiovisual media, virtual reality) may improve pain outcomes compared with less immersive approaches.[38,67-69] However, evidence is still limited, and further trials directly comparing a tablet to virtual reality glasses distraction in pediatric dental settings are warranted.[66,70]

Other techniques

Other effective techniques for pediatric pain management include relaxation and breathing exercises, transcutaneous electrical nerve stimulation, acupuncture, counter-stimulation, video modelling, and music

therapies.[59,60,71-76] Recently, auditory interventions such as binaural beats, which use sound frequency differentials to influence brainwave activity, have been explored as potential tools for reducing anxiety and modulating pain perception.[77] Use of these technologies may have synergistic analgesic effects. Additional research on different modalities is warranted.[75,78]

Pharmacologic/therapeutic agents

Management of pain in children has shifted significantly in recent years as understanding of pediatric pain and pharmacology has advanced.[25,79-81] NSAIDs (eg, ibuprofen, naproxen) alone or in combination with acetaminophen have been recommended as first-line therapy for acute dental pain in children; when used together, this combination provides superior analgesia compared to either agent alone.[30] Importantly, these medications have the strongest evidence base and the most favorable safety profile when dosed appropriately.[30] Still, many other pharmacologic agents continue to be prescribed off label due to the limited number of randomized controlled trials in children.[79,82]

Non-opioid analgesics

Nonsteroidal anti-inflammatory drugs. A recent network meta-analysis reported that NSAIDs as a class provide the greatest benefit and least harm for acute pediatric pain, with the added advantage of reducing the need for rescue mediations.[83] NSAIDs are among the most commonly used class of drugs and have anti-inflammatory, analgesic, antipyretic, and antiplatelet properties.[84] They inhibit prostaglandin synthesis, with specific action on cyclooxygenase (COX), the enzyme responsible for converting arachidonic acid into pro-inflammatory mediators that drive postoperative pain, swelling, and hyperalgesia.[46,85] Representatives of the major categories of NSAIDs are salicylic acids (aspirin), acetic acids (ketorolac), propionic acids (ibuprofen, naproxen), and selective cyclooxygenase-2 inhibitor (celecoxib). Ibuprofen in oral or intravenous (**IV**) form is a safe and commonly used analgesic and antipyretic agent in pediatrics.[81,84] Ketorolac, an IV or intranasal NSAID, is useful in treating moderate to severe acute pain in patients unable or unwilling to swallow oral NSAIDs.[46,86,87p682] Ketorolac has demonstrated effectiveness for short-term management of acute pain in pediatric patients, including in emergency department settings, but current evidence does not show superiority over other NSAIDs.[83,88] Systematic reviews emphasize its role as a useful non-opioid option while underscoring the need for further research to establish optimal dosing, administration routes, and comparative effectiveness across clinical scenarios.[83,88]

Adverse effects associated with NSAIDs include: rash, inhibition of bone growth and healing, gastritis with pain and bleeding, decreased renal blood flow and kidney dysfunction, reversible inhibition of platelet function, hepatic dysfunction, and increased incidence of cardiovascular events.,[87p682,89p103] A specific concern with NSAIDs is the potential to exacerbate asthma due to a shift in leukotrienes.[79] Because NSAIDs and corticosteroids both act on the arachidonic acid pathway, their combined use does not provide additive analgesic benefit and instead increases the risk of adverse effects such as gastrointestinal irritation, bleeding, and impaired wound healing.[90] Ketorolac carries important safety concerns, including risks of gastrointestinal bleeding, platelet inhibition, and renal impairment, which limit its use to brief courses and make it less suitable for routine dental care.[83,88]

NSAIDs, including ibuprofen and naproxen, are recommended as first-line therapy for acute dental pain such as toothache.[30,91,92] Current evidence-based guidelines support NSAIDs as the initial pharmacologic approach because they target the inflammatory component of dental pain and provide effective analgesia when used appropriately.[30] Although naproxen is not labeled for all pediatric age groups, clinical guidelines note that it may be considered for older children and adolescents when clinically appropriate, with attention to age, weight, dosing, and contraindications.[30] NSAIDs should be used unless contraindicated and in conjunction with definitive dental treatment when indicated.[30]

Acetaminophen. Acetaminophen (acetyl-para-aminophenol [APAP], paracetamol) is an analgesic with efficacy for mild to moderate pain and is an antipyretic.[93] Unlike NSAIDs, acetaminophen is centrally acting and does not have anti-inflammatory effects or an effect on gastric mucosal lining or platelets.[93] Its

mechanism of action is the blockade of prostaglandin and substance P production. Allergic reactions are rare,[89p103] but toxicity from overdose may result in acute liver failure.[94] Acetaminophen can be administered in tablets, capsules, and liquid but also is available as oral disintegrating tablets, oral disintegrating films, and rectal and IV forms.[46] Oral acetaminophen remains the preferred route for most pediatric patients due to its safety, ease of use, well-established efficacy and cost. Rectal administration can be considered when oral dosing is not feasible, although variability in absorption limits its reliability.[95] If rectal is required, consider a loading dose to achieve therapeutic levels.[96,97] Intravenous acetaminophen typically is reserved for inpatient or critical care settings, where oral or rectal absorption may be compromised.[97] Therefore, its use should be restricted to cases of moderate to severe pain or when strict temperature control is required.[96,97]

Combination analgesia: NSAIDs and acetaminophen. Combination therapy using an NSAID and acetaminophen may be considered when a single agent fails to provide adequate pain relief or when moderate/severe postoperative pain is anticipated.[30,92] Concurrent use of these agents can provide greater relief for acute dental pain than either medication alone.[30,92] Scheduling alternating or staggered administration—rather than as-needed dosing—can help maintain consistent analgesia while minimizing peak dosing.[30,92] When used in combination, dosing of each medication should be based on age and weight, with attention to contraindications and maximum daily dose limits.[30]

Opioid analgesics

Opioid analgesics have long been used to provide profound pain relief in all age groups and may be considered for acute severe pain refractory to first-line therapies.[98] However, their role in dentistry is limited as opioids primarily interrupt nociceptive signaling via the μ receptor to inhibit pain perception but do not address the underlying inflammatory processes that drive most dental pain.[85] Opioids are not recommended for routine management of acute dental pain in children due to 1) limited efficacy[99,100]; 2) significant safety risks; 3) potential for misuse, diversion and accidental ingestion leading to overdose; and 4) lack of evidence demonstrating superiority over nonopioid regimens.[30,82,101,102] For these reasons, only short-acting, immediate-release opioids—prescribed at the lowest effective dose for the shortest duration possible—are appropriate.

Opioids increase risk of respiratory depression, sedation, physical dependence, and endocrine disruption.[87p694,103] Use of opioids warrants additional caution for patients with hepatic or renal impairment.[87p685] In the setting of liver dysfunction, impaired metabolism can increase circulating drug concentrations and prolong effects, while renal impairment may delay clearance of active metabolites, elevating the risk of toxicity.[87p685,104] These concerns are particularly relevant in pediatrics, where unpredictable pharmacokinetics already complicate safe prescribing.[87p682] Naloxone is a μ-receptor competitive antagonist usually administered parenterally to counter opioid overdose.[46]

Opioids vary in efficacy and safety among patients.[87p684] Morphine provides rapid relief of severe pain for 2 to 3 hours,[87p685,105] and the potency of all opioids, including codeine, oxycodone, hydrocodone, fentanyl, methadone, and tramadol, is compared to morphine using a morphine milligram equivalent dose.[87p685] Considering the variability of drug metabolism, safety concerns, and the experience of pain, the 'right' dose for everyone does not exist.[87p684]

Codeine has more adverse effects and limited efficacy for dental pain when compared to over-the-counter analgesics.[85] Codeine, tramadol, and other opioids are broken down in the liver to active metabolites by the highly variable cytochrome enzyme, CYP2D6,[106-108] and in rapid metabolizers can increase risk of overdose.[107,108] In response, the FDA issued a strong warning against the use of codeine and tramadol in children less than 12 years of age.[107,108] The FDA warns that in the 12- through 17-year age group, these medications should not be used in high-risk patients (eg, those with obesity, obstructive sleep apnea, lung tissue disease).[108]

Trends in opioid overdose, opioid misuse, and concerns for opioid addiction prompted the Centers for Disease Control and Prevention (**CDC**) and the World Health Organization to issue guidelines for prescribing opioids for chronic pain.[103] The CDC guideline focuses on adults while the World Health

Organization guideline relates specifically to children.[103] Although chronic pain is the focus of the guidelines, both aim to improve prescribing practices and to ultimately benefit patient safety, emotional well-being, and quality of life.[18,103,109] The topics covered in the guidelines include limiting opioids for moderate to severe pain, restricting opioid prescriptions to 3 days, providing concurrent pharmacologic and nonpharmacologic therapy, and following accepted protocols for procurement, storage, and disposal of unused opioids.[18,103] The CDC guideline also advises against overlapping benzodiazepines and opioids prescriptions because of the increased potential for respiratory depression.[103]

Deaths due to opioid overdoses reached record highs and prompted the CDC to declare an opioid epidemic in 2011.[101,110] The pediatric mortality rate for opioid poisoning increased nearly threefold from 1999 to 2016, with nearly 9,000 children and adolescents in the US dying as a result of opioids.[110] A trend towards increased pediatric emergency department visits due to opioid ingestion and a greater than 5-fold increase in overdose death rates in the 15- through 24-year age group also have been demonstrated.[110] Risky use of opioids among children and adolescents is a growing trend, and the concern for opioid use disorder in adolescents is significant.[111,112] Since commercial opioids often are combined with acetaminophen, the potential for hepatotoxicity is an accompanying concern.[113,114] In 2016, the American Academy of Pediatrics released a policy statement that recommended timely intervention to curb opioid use disorder with the goal of eliminating long-term medical, psychiatric, and social consequences of ongoing substance abuse.[107]

Opioid risk mitigation involves recognizing drug-seeking behavior.[115] To address the potential risk of opioid misuse, screening patients prior to prescribing opioids has been advocated as standard practice.[103] However, a standardized assessment for adolescents has not been identified.[82,116] Therefore, at a minimum, a thorough review of medical history including analgesics used in the past is indicated before prescribing.[82] Despite the fact that screening of parents is recommended by the American Academy of Pediatrics, this is not a common practice.[117,118] Nonetheless, screening is essential for identifying children at risk of opioid exposure in the home. Children of parents who abuse opioids are at an increased risk for neglect and often suffer from parental instability and lack of structure in the home.[118]

For professionals who suspect patients have misuse issues, the FDA, National Institutes of Health, National Institute on Drug Abuse, the American Dental Association, and state prescription drug monitoring programs have resources available to review the history of prescriptions for controlled substances which may decrease their diversion.[103,119] Transparent discussion about the potential for physical and/or psychological dependence is a critical component of safe opioid practices in the adolescent population.[80,120] Furthermore, discussion regarding the proper disposal of unused controlled medications is key to reducing availability/diversion of opioids.[80,120] Safeguarding of opioids stored in offices for sedation can be accomplished by following security requirements for dispensers of controlled substances.[121]

Recommendations

Infants, children, and adolescents can and do experience pain due to dental/orofacial injury, infection, and dental procedures. Inadequate pain management may have significant physical and psychological consequences for the patient. Adherence to the following recommendations can help practitioners prevent or substantially relieve pediatric dental pain and minimize risk of associated morbidities. Practitioners should

- assess pain for all patients as part of the dental history.
- avoid sensitization by using techniques to minimize stimulation and tissue damage when providing dental treatment.
- achieve profound anesthesia prior to invasive treatment.
- use preemptive analgesia when moderate to severe postoperative pain is anticipated.
- manage odontogenic and non-odontogenic pain with combined nonpharmacologic (eg, distraction) and pharmacologic pain management.
- use NSAIDs as first-line pharmacologic therapy for pain management.
- use acetaminophen as an appropriate first-line pharmacologic option for pain management when NSAIDs are contraindicated or not tolerated.

- use combination analgesia with NSAIDs and acetaminophen to enhance pain control when monotherapy is insufficient.
- limit or avoid altogether opioid prescriptions in children and adolescents. In rare cases (eg, patient allergy to NSAIDs), use caution and carefully assess benefits and risks of adverse events when considering prescribing opioids for pain management in children and adolescents.
- minimize the risk of opioid misuse by screening patients and parents regarding previous/current opioid use before prescribing opioid analgesics.
- utilize prescription monitoring databases and inform parents to properly discard unused medications to avoid diversion of controlled substances.
- educate parents on the importance of adhering to recommended dosage and timing of prescribed and over-the-counter analgesic medications, associated risks, and anticipation and management of adverse effects (eg, asthma and NSAIDs, sedation and opioids.)
- seek expert consultation for patients with chronic pain or other complicated pain condition.
- be familiar with analgesic properties of agents when used in conjunction with sedation or general anesthesia.
- strongly advise against opioids in high-risk patients (eg, obesity, obstructive sleep apnea, lung tissue disease, benzodiazepines use).
- use an alternating schedule of acetaminophen and NSAIDs for multimodal pain management if single-agent therapy is ineffective.

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