



# Good, Clinical Pain Practice for Pediatric Procedure Pain: Iatrogenic Considerations

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**ABSTRACT** The primary objective of this review is to integrate current knowledge on pediatric procedure pain to develop a conceptual framework of good, clinical pediatric pain practice that can be used to improve the processes and outcomes of the clinical management of pediatric procedure pain in dentistry. This paper will review the manner in which iatrogenic factors influence the management of pediatric procedure pain.

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## ACKNOWLEDGMENT

The author thanks NorthBay Medical Center, Fairfield, Calif., and librarian Linda Grix for their assistance in the acquisition of many of the relevant journal articles for this paper.

**H**ow should we define good, clinical pain practice for pediatric procedure pain? Neurobiologic evidence supports the establishment of three principles of good, clinical pain practice.<sup>1</sup> The subjective nature of pain prevents clinicians from reliably predicting a child's pain experience and suggests that only the child can know how much pain they are experiencing. The phenomenon of central sensitization injury secondary to procedure pain demonstrates it is better to prevent pain than to treat it after its occurrence. Finally, the multidimensional nature of pain compels clinicians to use a multidimensional

pain technique that attends to the nociceptive, subjective, developmental, and stimulus dimensions of pain.

Other principles of good, clinical pain practice may be derived from evidence that psychological and knowledge "deficits" unique to the clinician influence the dynamics of pediatric pain management. These clinician deficits can skew the pain assessment-intervention dynamic in a way that leads clinicians to permit more pain than necessary during the course of a procedure. The question of how much pain to permit is an analytic process known as "pain justification" and is undertaken by all clinicians each time invasive treatment is performed.

In this imperfect analgesic world, the method by which one derives the answer to this question lies at the heart of any concept of good, clinical pain practice.

### Pain Justification: Comparative and Pragmatic Methods

The limits of contemporary analgesic modalities compel clinicians to use an ethical method of pain justification as responsible administration of good, clinical pain practice. Despite advances in modern pain control techniques, it is not reasonable to expect safe or pragmatic elimination of all pain. Walco, Burns, and Cassidy astutely pointed out that “pain is not always an unqualified evil, and pain relief interventions are not always of unqualified benefit.”<sup>2</sup>

Local anesthetic failures are an acknowledged facet of clinical pediatric dental practice, and needle procedures in dentistry have garnered an infamous reputation for acute pain, despite Malamed’s qualified assertion that injections can be performed entirely “atraumatically.”<sup>3-7</sup> For pediatric patients, Malamed’s claim only holds true if they are preprocedurally screened by an imperfect, human process for those very young or highly sensitized, emotionally or cognitively impaired children whose pain perceptions are so acute they cannot tolerate even the best needle procedure technique.

For those remaining patients, their ability to tolerate a pain-free, good injection technique is merely a clinical hypothesis. It is through the operation of the pain assessment-intervention dynamic that clinicians ethically allow the potential for procedure pain while testing their clinical hypotheses during treatment. The pain assessment-intervention dynamic may be defined as the sum of all mental assignments of risk, calculations, and judgments that lead to

clinical strategies of pain intervention or pain justification (nonintervention). Walco, Burns, and Cassidy described three rationales by which a clinician may justify permitting procedure pain.<sup>2</sup>

In the comparative justification for permitting pain, the clinician must resort to an estimation of the relative risk of procedure pain versus the risk of pain relief intervention and “choose the lesser evil.”<sup>2</sup> Once the choice has been made, good, clinical pain practice

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will have been achieved if the child experiences no more pain than is necessary to remedy the pathology.

Dentists exercise the comparative justification for pain when they permit the possibility, though not necessarily the expectation, of exceeding a patient’s pain threshold. This is the minimum level of noxious stimulation needed to elicit pain sensation.<sup>8</sup> Pain is more ethically justified when it is not allowed to exceed the patient’s pain tolerance threshold, which is the maximum level of noxious stimuli that a patient is willing to tolerate.<sup>8</sup>

The placement of “transitional” restorations is one example of invoking the comparative form of pain justification. Transitional restorations are a type of remedy that results from the performance of an accommodating procedural technique, APT, a procedure wherein the traditional level of invasiveness

has been reduced to accommodate the unique pain response of the patient. Its goal is to stabilize the patient’s pathology for a period of time that will allow the child to transition from a state of low pain inhibitory controls to a state of more elevated pain inhibitory controls.

With primary teeth, a transitional restoration can last until exfoliation and may thereby serve as the final restoration. More often, a more invasive procedure will need to be performed at a later date in order to provide a more durable remedy. An APT remedy is performed because it is better to prevent pain than to treat it after it occurs. This means that clinicians need to err on the side of caution when noxiously simulating pediatric patients.

When a dentist treating a 3-year-old elects to avoid a needle procedure by performing an APT remedy on a lower primary molar, the operation of the clinician’s assessment-intervention dynamic has led to the hypothesis that the risk of exceeding the patient’s pain tolerance threshold with a reduced invasive procedure (often decay excavation alone) is less than the risk of exceeding their pain tolerance threshold by adding a needle procedure as a part of the pain intervention technique.<sup>9,10</sup>

The typical factors that would lead the clinician to this hypothesis are: 1) accessible carious lesions (even in permanent teeth) do not always require an anesthetic.<sup>11</sup> Active decay is necrotic debris that is devoid of viable nerves and the stained but durable cavity floor that makes up the caries inhibition zone (sclerotic dentin) insulates the pain sensitive dentinal tubules from mechanical nociceptive stimulation.<sup>12,13</sup> Second, the assessment features inherent in an innocuous exposure trial (desensitization) process has demonstrated the patient’s affective dimension of pain (anxiety, general

discomfort) to be low for slow-speed handpiece manipulation.<sup>14</sup> Third, psychological (desensitization, distraction) techniques have substantially lowered the patient's pain perception threshold. Fourth, the well-documented potential for sensitization injury by needle procedures makes avoiding them, in very young children, a prudent goal of good, clinical pain practice.<sup>4,5,15-17</sup> Procedure pain, should it occur in this case, is justifiable if this APT remedy results in the least amount of pain (or risk) experienced by the child relative to a more invasive form of pain intervention requiring a needle procedure.

Placement of an APT transitional restoration with reduced invasiveness will stabilize the child's pathology, giving them time to develop endogenous pain control mechanisms that will assist the child in tolerating a more invasive remedy later.<sup>18-20</sup>

A second rationale for permitting procedure pain is the pragmatic justification. It permits procedure pain in order to achieve a greater benefit. When a dentist taps on teeth with the end of a mouth mirror to elicit pain to identify and optimally diagnose an occult, mild, occasional pain complaint, the justification for allowing that pain is a pragmatic one. Likewise, when a dentist cautiously uses the sharp end of an explorer to "noxiously" stimulate soft tissue to assess the effectiveness of an analgesic nerve block, the pain elicited is pragmatically justified.

Pain may also be justified by appeal to revision of the pain report of the child. However, the ethical solution that this method of pain justification offers is critically limited by factors inherent to the clinician and not the patient.

### Clinician Deficits

Clinicians have been shown to have deficits, both psychological and educational, that adversely affect their pediatric

pain assessment-intervention dynamic. The current definition of pain is not helpful in protecting the dynamic from these deficits. The International Association for the Study of Pain has defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage."<sup>21</sup> Price pointed out that a weakness in this definition is that it does not present a clear solution to the problem that arises when a

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clinician's assessment of a child's pain disagrees with the child's pain report.<sup>22</sup> To always acquiesce to a young patient's behavioral report of pain seems wrong since they will give behavioral reports of pain when there is clearly no nociceptive stimulation. So, who should decide how much pain the patient is really experiencing — the clinician or the patient?

Under conditions of tissue trauma, a patient's pain report is superior to any clinician assessment of pain.

As discussed elsewhere in this issue, a child's sensitivity to pain varies from individual to individual.<sup>1,20,23,24</sup> There is no uniform pain experience for a given stimulus intensity. Previous pain experience will lower pain threshold levels and create unique phenotypic responses to pain that magnifies genetic differences. It is not possible for a clinician to reliably predict the intensity of pain that

is experienced by a child based on the clinician's calculation of the extent of tissue damage or the clinician's previous experience with the reactions of other children in similar conditions.

Second, there does not yet exist a reliable, objective, measure of pediatric pain.<sup>25</sup> No physiological measurement of pain, such as heart rate or galvanic skin reaction, is more reliable than the child's subjective pain report. Clinicians must rely on the subjective reports (behavioral or self-report) of a patient's pain experience for the quantification of their pain intensity.

Third, psychological and knowledge deficits peculiar to caregivers can render clinicians biased in the operation of their pain assessment-intervention dynamics. This psychological deficit primarily affects the assessment side of the dynamic while knowledge deficits can affect both sides. Both deficit types can lead a clinician to justify more pain than is necessary.

If clinicians were not biased in their pain assessments and were simply inaccurate they would tend to overestimate pain as often as they underestimate pain but, consistent with physicians and nurses, dentists have shown a tendency to underestimate pediatric pain.<sup>26-34</sup> Versloot, Veerkamp et al., Nakai, Milgrom et al., and Bagheri, Perciaccante et al. have each confirmed that dentists are biased to underestimate a patient's pain.<sup>35-37</sup>

Versloot et al. found that the child's mother was more accurate at discerning the child's pain experience relative to the pediatric patient's self-report than the treating dentist who generally underestimated the patient's pain.<sup>35</sup> Walco, Burns, and Cassidy have hypothesized that one reason for this clinician tendency to downwardly revise a patient's behavioral pain report is a caregiver's intrinsic need to rationalize their failure at not ad-

equately preventing a child's suffering.<sup>2</sup>

Wanting to avoid hurting children is not a psychological deficit, needing to rationalize away their overt pain behavior is. Since the dentists in the Versloot et al. study had been given the same training in observational pain assessment to minimize knowledge deficits relative to pain assessment, it is likely that the bias uncovered was psychological, not knowledge in origin.

Supporting this conclusion is the finding that an independent observer was more accurate at assessing the pain of the pediatric patient than either the dentist or the patient's mother. This was a person who had been given the same preparatory training in behavioral pain assessment as the dentist but was not involved in causing the patient's pain.

Knowledge deficits can adversely affect a clinician's pain assessment-intervention dynamic and cause them to justify more pain than is necessary. Nurses have been found to have educational deficits with regard to their pharmacological management of pain.<sup>32,34</sup> Their ignorance of the low opiate addiction rate during pain treatment allows their fear of addiction to skew their assessment of intervention risk and withhold opiate pain dosing.

In dentistry, Houpt found that "82 percent of pediatric dentists use sedation for less than 11 percent of their patients."<sup>38</sup> Furthermore, "82 percent of the sedations reported in the survey were performed by only 27 percent of the dentists." While Houpt could find no specific reason to substantiate the wide variation in the use of sedation, one may speculate that an educational deficit may be a factor accounting for the discrepancy. Do a majority of pediatric dentists lack the proper training in this modality to feel comfortable in its use? Do they overesti-

mate the risks of sedation, or do dentists not believe that children experience pain commensurate to their pain report?

The reason for the apparent aversion most pediatric dentists have for sedation may be a combination of all three possibilities. The presence of an educational deficit regarding sedation is one possible interpretation of the data reported by Vargas and Nathan who found that 36 percent of pediatric dentists "preferred

### KNOWLEDGE DEFICITS can adversely affect a clinician's pain assessment-intervention dynamic

to restrain a 3- or 4-year-old patient for limited treatment needs rather than use a sedative technique."<sup>39</sup> In 1994, Milgrom and Weinstein et al. reported evidence that dentists do not believe children's pain reports credible.<sup>40</sup> They found that 11 percent of the practicing Seattle-area dentists strongly agreed with denying the pain reports of children, and a large majority of the dentists in the study doubted the authenticity of children's behavioral pain reports issuing during invasive procedures.

While a dentist may mentally doubt the authenticity of a child's pain report yet still choose to act as if it is credible, there exists the possibility that this report has uncovered a type of knowledge deficit created by clinician ignorance or nonacceptance of the subjective nature of pain, the inability of clinicians to objectively measure it, and the tendency for clinicians to underestimate pain. Such an attitude is a barrier to good, clinical pain practice.

Given the subjective nature of pain, its resistance to objective measurement and the problems of clinician bias, one may conclude that only the child can know how much pain they are experiencing. A child's behavioral and/or self-report of pain is to be accepted as credible unless there is good evidence that procedural tissue trauma has not occurred. Otherwise, clinicians may commit errors in pain justification and allow more pain than necessary.

### Pain Justification: Revisionist Method

The tendency in clinicians to underestimate pediatric pain combines with other neurobiologic factors of pain experience to limit the ethical solutions available to the revisionist method of pain justification. This method permits a revision of the pain reports of the patient to a lower value when knowledge of the physiologic conditions for nociception makes it reasonable to do so.<sup>2</sup> There are two differing pain report contexts to consider here. In one context, revision of a patient's pain report is ethical, and, in the other context, revision is of questionable ethical practice.

A pain report that occurs without any context of procedural tissue trauma may be revised downward because the conditions for nociception are not present. When a dentist runs a slow-rotating round bur on sound enamel prior to commencing incipient cavity excavation and the child raises their hand in an anticipatory behavioral report of pain, that pain report is justifiably revised downward because a slow-rotating round bur will not penetrate intact enamel and because the enamel surface is devoid of nociceptors.

Under these conditions, the patient's anticipatory report of pain can be seen as a symptom of procedural anxiety. In this case, it would be acceptable to

cautiously revise downward a patient's pain report since the clinician has good evidence for believing the conditions for nociception were not present. However, that revision should result in a pain score that adequately encumbers the clinician's pain assessment-intervention dynamic to accommodate the nociceptive amplification that occurs with procedural anxiety.

In the instance of a pain report occurring coincident with procedural tissue trauma, downwardly revising the pain reports of a child is a questionable ethical practice. The problem arises because clinicians have long understood that much of the pain response they see is dominated by emotion. This observation can lead clinicians to mistakenly conclude that the emotional dimension of pain is a false contribution that can be dissected from the nociceptive pain experience as if it were a separate component. It gives clinicians the appearance of an assessment opportunity to discount a child's pain report that is not there when physiologic conditions make nociception possible. This is because 1) clinicians have an inherent tendency to underestimate pediatric pain; 2) clinicians cannot know that the physiological conditions for adequate hard tissue anesthesia actually exist; 3) pain is an emotional experience with nociceptive and subjective dimensions that cannot be separated; 4) in the event that the clinician's revision judgment errs, adding to the child's pain inventory may harm the child by increasing the possibility of a central sensitization injury.

Pediatric pain coincident with procedural nociceptive stimulation (e.g., restorative treatment) should not be justified by appeal to a method of revision. Rather, any pain justification in this instance should occur through appeal to a comparative or pragmatic method. Downwardly revising

the pain reports of a child when coincident with invasive procedures teeters on the brink of unethical pain practice and should be avoided. Therefore, an integral aspect of good, clinical pediatric pain practice is to use an ethical method of pain justification. This principle is generally assumed to be in place during clinical pain practice but its importance, complexity, and ubiquitous application warrants being identified as a general principle itself.

### AN INTEGRAL ASPECT of good, clinical pediatric pain practice is to use an ethical method of pain justification.

Bear in mind that children do not mangle with respect to procedure pain. Children who mangle have "bland, indifferent, or flat affective responses to unpleasant procedures" that are in contradistinction to the emotionally charged responses typical of procedure pain.<sup>41</sup> Malingering is a false pain report given for the purpose of obtaining an external gain such as money, avoiding school, or obtaining parental attention.<sup>21</sup>

Pediatric procedure pain is more conducive to symptom magnification. Symptom magnification is an "exaggeration of symptom severity to convince an observer (parent or clinician) that one is truly experiencing some level of pain."<sup>21</sup> The exaggerated responses of symptom magnification are more conducive to the affirmation of the child's pain report and altering one's multidimensional pain strategy to attend to the subjective, nociceptive developmental, and stimulus dimensions of pain.

### Summary

Three ethical methods of pain justification, the comparative, pragmatic, and revisionist, have been presented. The importance, complexity, and ubiquitous application of pain justification warrants that use of an ethical method of pain justification is identified as a general principle of good, clinical pain practice. The APT was introduced as a strategy to accommodate the unique pain responses of pediatric patients. The technique stabilizes a patient's pathology with a reduced invasive remedy (transitional restoration) while allowing the patient's pain inhibitory controls to mature.

Evidence for psychological and educational deficits peculiar to clinicians was discussed in the context of how these deficits or attitudes adversely affect the pain assessment-intervention dynamic. This frailty of the assessment-intervention dynamic to clinician bias further supports the idea that only the child can know how much pain they are experiencing be the first principle of good, clinical pediatric pain practice. ■■■■■

### REFERENCES

1. Nutter DP, Good, clinical pain practice for pediatric procedure pain: target considerations. *J Calif Dent Assoc* 37(10):719-22, October 2009.
2. Walco GA, Burns JP, Cassidy RC, The ethics of pain control in infants and children. In: Pain in infants, children and adolescents, second ed., Schechter NL, Berde CB, Yaster M, eds. Philadelphia, Lippincott, Williams and Wilkins, pages 157-68, 2003.
3. Wilson GT, Primosch R, et al, Clinical effectiveness of 1 and 2 percent lidocaine in young pediatric dental patients. *Pediatr Dent* 12:353-9, 1990.
4. Milgrom P, Coldwell SE, et al, Four dimensions of fear of dental injections. *J Am Dent Assoc* 128:756-62, 1997.
5. Caprara HJ, Eleazer PD, et al, Objective measurement of patient's dental anxiety by galvanic skin reaction. *J Endod* 29(8):493-6, 2003.
6. Vika M, Raadal M, et al, Dental and medical injections: prevalence of self-reported problems among 18-year-old subjects in Norway. *Eur J Oral Sci* 114(2):122-7, 2006.
7. Malamed SF, Basic injection technique. *Handbook of Local Anesthesia*, fifth ed. St. Louis, Mosby Inc., pages 159-69, 2004.
8. Wilson S, Dilley DC, Vann Jr. WF, Pain perception control. In: *Pediatric dentistry infancy through adolescence*, fourth ed.

- Pinkham JR, Casamassimo PS, et al, eds. St. Louis, Elsevier Saunders, pages 108-15, 2005.
9. American Academy of Pediatric Dentistry, Policy on alternate restorative treatment. *Pediatr Dent* 26(7):30 (supplemental issue), 2004-2005.
  10. Yip KHK, Smales RJ, Peng D, The effects of two cavity preparation methods on the longevity of glass ionomer cement restorations. *J Am Dent Assoc* 133(6):744-51, 2002.
  11. Anusavice KJ, Kincheloe JE, Comparison of pain associated with mechanical and biomechanical removal of caries. *J Dent Res* 66(11):1680-3, 1987.
  12. Pashley DH, Pashley EL, et al, The effects of dentin permeability on restorative dentistry. *Dent Clin North Am* 46(2):211-45, v-vi, 2002.
  13. Pashley EL, Talman R, et al, Permeability of normal versus carious dentin. *Endod Dent Traumatol* 7(5):207-11, 1991.
  14. Champion GD, Goodenough B, et al, Measurement of pain by self-report. In: Finley GA, McGrath PJ, eds. Measurement of pain in infants and children. Seattle, IASP Press, pages 123-60, 1998.
  15. Baier K, Milgrom P, et al, Children's fear and behavior in private pediatric dentistry practices. *Pediatr Dent* 26(4):316-21, 2004.
  16. Majstorovic M, Veerkamp JSJ, Relationship between needle phobia and dental anxiety. *J Dent Child* 71:201-5, 2004.
  17. Fassler D, The fear of needles in children. *Am J Orthopsychiatry* 55:371-7, 1985.
  18. Boucher T, Jennings E, Fitzgerald M, The onset of diffuse noxious inhibitory controls in postnatal rat pups: a c-fos study. *Neurosci Lett* 257:9-12, 1998.
  19. Ren K, Dubner R, Enhanced descending modulation of nociception in rats with persistent hindpaw inflammation. *J Neurophysiol* 76:3025-37, 1996.
  20. Jay SM, Ozolins M, et al, Assessment of children's distress during painful medical procedures. *Health Psychol* 2:133-47, 1983.
  21. Turk DC, Okifuji A, Pain terms and taxonomies of pain. In: Bonica's management of pain, Loeser JD, Butler SH, et al, eds. Philadelphia, Lippincott Williams and Wilkins, pages 17-25, 2001.
  22. Price DD, The dimensions of pain experience. In: Psychological mechanisms of pain and analgesia, progress in pain research and management, Seattle, IASP Press, 15:1-14, 1999.
  23. Diatchenko L, Slade GD, et al. Genetic basis for individual variations in pain perception and the development of a chronic pain condition. *Human Molecular Genetics* 14(1):135-43, 2005.
  24. Walco GA, Dampier CD, et al, The relationship between recurrent clinical pain and pain threshold in children. In: Advances in pain research therapy, Tyler DC, Krane EJ, eds. New York, Raven Press, Ltd., 15:333-40, 1990.
  25. Sweet SD, McGrath PJ, Physiological measures of pain. In: Measurement of pain in infants and children. Finley GA, McGrath PJ, eds. Seattle, IASP Press, pages 59-81, 1998.
  26. Singer AJ, Gulla J, Thode HC Jr., Parents and practitioners are poor judges of young children's pain severity. *Acad Emerg Med* 9:609-12, 2002.
  27. Von Roenn JH, Cleeland CS, et al, Physician attitudes and practice in cancer pain management. *Ann Intern Med* 119:121-6, 1993.
  28. Singer AJ, Richman PB, et al, Comparison of patient and practitioner assessments of pain from commonly performed emergency department procedures. *Ann Emerg Med* 33:652, 1999.
  29. Lieberman JR, Dorey F, et al, Differences between patients and physicians evaluations of outcome after total hip arthroplasty. *J Bone Joint Surg Am* 78(6):835-8, 1996.
  30. Lewis LM, Lassiter LC, et al, Are emergency physicians too stingy with analgesics? *South Med J* 87(1):7-9, 1994.
  31. Schecter N, The undertreatment of pain in children: an overview. *Pediatr Clin North Am* 36:781-94, 1989.
  32. Clarke EB, French B, et al, Pain management knowledge, attitudes, and clinical practice: the impact of nurses characteristics and education. *J Pain Symptom Manage* 11:18-31, 1996.
  33. Hamilton J, Edgar L, A survey examining nurses' knowledge of pain control. *J Pain Symptom Manage* 7:18-26, 1992.
  34. Morita T, Jujimoto K, et al, Self-reported practice, confidence and knowledge about palliative care of nurses in a Japanese regional cancer center: Longitudinal study after one-year activity of palliative care team. *Am J Hosp Palliat Med* 23:385-91, 2006.
  35. Versloot J, Veerkamp JSJ, Hoogstraten J, Assessment of pain by the child, dentist, and independent observers. *Pediatr Dent* 26(5):445-9, 2004.
  36. Nakai Y, Milgrom P, et al, Effectiveness of local anesthesia in pediatric dental practice. *J Am Dent Assoc* 131:1699-705, 2000.
  37. Bagheri SC, Perciaccante VJ, Bays RA, Comparison of patient and surgeon assessments of pain in oral and maxillofacial surgery. *J Calif Dent Assoc* 36(1):43-50, 2008.
  38. Houpt M, Project USAP 2000 - Use of sedative agents by pediatric dentists: a 15-year follow-up survey. *Pediatr Dent* 24(4):289-94, 2002.
  39. Vargas KF, Nathan JE, et al, Use of restraint and management style as parameters for defining sedation success: a survey of pediatric dentists. *Pediatr Dent* 29(3):220-7, 2007.
  40. Milgrom P, Weinstein P, et al, Pain management in school-aged children by private and public clinic practice dentists. *Pediatr Dent* 16(4):294-300, 1994.
  41. Libow JA, Child and adolescent illness falsification. *Pediatr* 105(2):336-42, 2000.

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