PEDIATRIC PAIN: Overview of Acute and Chronic Pain[1,2,3]

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Also see RxFiles: CHRONIC PAIN - Pain Overview and An Approach to Pain Assessment & Management Planning.

Overview

- Similarities exist for pain management across the lifespan; however, the pediatric population requires special consideration to ensure:
  - **Full pain assessment** occurs – even when challenges with a child's ability to verbally communicate are present.
  - Management strategies are **individualized** – to be realistic and support daily function.
  - **Active participation** of the child, to the extent possible, in their own **multimodal** pain management strategies.
- Use **age-appropriate language**: might say "hurt" instead of "pain", especially in younger children; ask yes/no questions for child 3-4yr

General approach

- Prioritize the child's self-report of pain (can generally be done by age 3-4yr) as the primary source for gathering info about pain experience
  - Other useful sources of information include observation, family/caregiver reports, and clinical context
  - Ask caregivers how to best communicate with the child (e.g. assistive technology, pictures) & what their behaviour is like when not in pain
- Anticipate painful procedures (e.g. lab work, IV insertion, vaccination) & proactively establish a pain coping & management plan
- Pain management plans should be individualized and family-centred (consider what strategies might be useful/feasible in current circumstance)
  - Invite the child's participation in pain management strategies (encourages active self-management, helps build trust in healthcare encounters)
  - Promote active engagement - empower family members to assess & help manage pain at home

Common challenges

- Pain is commonly under-recognized & under-treated in pediatrics (Myth: children do not feel pain as their nervous system is not developed.[4])
  - More difficult to assess pain in very young (pre-verbal) & children with an impairment that impacts verbal communication (e.g. non-verbal)
  - Children may restrain their pain behaviour or struggle to know how to communicate their experience (e.g. adverse childhood experiences might influence pain perception & expression)
  - Caregivers are often very skilled at interpreting behaviour, however they may also under- and over-report pain for a variety of reasons (e.g. minimizing the pain or reflecting their own distress)
- Limited evidence to direct medication management (e.g. high placebo effect, questions about cannabinoids without evidence-based answers)
- Tendency to underdose medication (e.g. due to lack of parent/caregiver understanding of toxicity, dosing without weight-based calculation)[5]

	ACUTE PAIN (e.g. acute otitis media, MSK injury, fracture, appendicitis, burns)	CHRONIC PAIN (i.e. lasting > 3 months) (e.g. chronic headache, abdominal pain, low back pain, spasticity)
Introduction / Prevalence	• All will experience acute pain at one time or another. • Addressing early can improve a provider's ability to evaluate & diagnose the cause, support faster recovery, and possibly prevent sensitivity to future pain. • 1/5 children who undergo major surgery will develop chronic pain in adulthood.[2]	• Estimates suggest 11-38% of children will experience chronic pain, with prevalence generally being higher in girls than boys, and increasing with age.[1] • Evidence suggests chronic pain associated with adverse childhood experiences.[6] • Anxiety & depression in youth with chronic pain are >3x greater than in those without pain.[7]
Assessment *For comparison, use the same tool to reassess / follow-up *Explain the results of assessment	• Assess location, quality (what makes it worse/better, words to describe), duration, context (recent relevant events/changes), functional consequences, pain intensity, + physical exam. ***Self-report scales*** to assess pain intensity:[3,9] Faces Pain Scale-Revised (**FPS-R**) — Age ≥4-7yr (some suggest ≥ 3yr); ask about "how they feel inside" (not how they look). See online extra. Numerical Rating Scale (**NRS-11**) — Age ≥6yr; ensure numeric competency. Color Analogue Scale (**CAS**) — Age ≥8yr; uses colour, size, and number gradients. - Limitations if pre-verbal, non-verbal, different language, & hearing/seeing challenges ***Observational/Behavioural tools*** (if self-report not possible) with caregiver's assessment:[1,3,42] Neonatal Facial Coding System (**NFCS**) — For neonates, 0-4mo (also chronic pain). Face/Legs/Activity/Cry/Consolability (**FLACC**) — Age 2mo – 7yr. See online extra. Revised version (r-FLACC) for 4-19yr with neurological impairment/non-verbal. Evaluation Enfant, DOuLeur (**EVENDOL**) — Age 0-7yr. - Note medication toxicity & withdrawal can be associated with pain behaviors – rule out. • Assessment tools generally studied for hospital use, less studied in outpatient settings.[3] • Documenting pain score associated with ↑analgesic use & ↓acute pain.[8]	• Complete a biopsychosocial assessment (in addition to location, quality, duration, etc) … Also consider social determinants of health, emotional components of pain (e.g. mental health, "catastrophizing", beliefs about pain), sensitivity to sounds/smells/touch, impact on daily life (e.g. play, school, socialization, sleep, family life), prior & current strategies trialed (e.g. movement, mind, medications), language & cognitive abilities, values & preferences. • Little evidence for use of NRS-11, yet may be used at initial assessment (FPS-R not recommended) ***Self-report scales*** generally to assess pain interference with function in life:[1,10] Bath Adolescent Pain Questionnaire (BAPQ) — Age 10-19yr, parent version also an option Pediatric Pain Interference Scale (PPIS) — Age 8-17yr, available as short form Pediatric Pain Questionnaire (PPQ) — Age 4-16yr, parent & child screening tool Pediatric Pain Profile (PPP) — Age 1-18yr with severe neurological impairment • No validated behavioural tools for use in chronic pain (might use NFCS, EVENDOL). • Additional tools may be found at: Holland Bloorview Kids Rehab Hospital – Tools for Assessing Chronic Pain. • Assess other related comorbid conditions, and treat concurrently (e.g. mental health, constipation). • Assess values, preferences, & goals (strive to relieve symptoms & ↑ function).

General Approach to Management
* Identify & treat the underlying cause whenever possible
* Consider the perceived underlying pain mechanism (e.g. neuropathic, nociplastic)
	Multimodal Management is Key! [1,3,5,32,38,42,44] Include a combination of analgesic strategies: 1) **P**hysical, 2) **P**sychological, & 3) **P**harmacological. Emphasize active self-directed techniques. Use of a "**3P Approach**" can ↑coping & pain threshold - educate patients & caregivers on the role for combinations of strategies.
	Physical: As appropriate, consider heat, ice/cold compress, splinting, elevation, massage, bandage +/- dressing (immobilizing area can ↓pain), caregiver holding/cuddling/rocking.
	Psychological: Consider use of distraction, breathing exercises, providing information & reassurance, virtual reality, counsel regarding anticipated pain severity & duration (when able).
	Pharmacological (see **Tables 1 & 2**): 1st line - **NSAID** or **acetaminophen** as monotherapy (if not CI), for most mild-moderate acute pain. NSAID may be preferred for acute dental[41] & MSK[65] pain.
	• If monotherapy not effective (e.g. for mod-severe pain), may *switch to* or *add* the other. May give one around the clock, with other PRN for breakthrough, or give both on scheduled basis.
	• For mod-severe pain, may *add* **immediate-release opioid** to other optimized analgesics for short period (i.e. ≤5 days, longer period after surgery/trauma may be required); Not used as monotherapy.[39]
	  ○ Screen youth for substance use (e.g. CRAFFT); risk factors for OUD in peds not well established.[56]
	• **Triptan** for acute migraine: Almotriptan 6.25-12.5mg po, may rpt x1 >12yr (✓HC indication; See online extra)
	• **Topical agents** may be considered (e.g. lidocaine, capsaicin) for some types of pain.
	• In acute care, consider other approaches (e.g. adjuvants ketamine/dexmedetomidine/nitrous oxide, nerve blocks, other administration routes such as IV or intranasal, epidural +/- patient-controlled analgesia), as appropriate.
		Physical: Physical therapy, physical activity, repositioning, yoga, passive stretching, warm baths, massage, mobility aids, square breathing, weighted blankets, vibratory stimulation, acupuncture, transcutaneous electrical nerve stimulation, occupational therapy (sensory rehabilitation, ↑ ability to engage in ADLs and self-care).
		Psychological: Reassure & validate that pain is real, educate regarding pain science & realistic goals for management strategies (focus on function before pain intensity), address "catastrophizing" & fear-avoidance behaviours. Normalize life through the "**4 S**'s": **s**ports, **s**ocial, **s**leep, & **s**chool (see online extra).[45] Add CBT, Acceptance & Commitment Therapy, music therapy, guided imagery, mindfulness. **Consider **multidisciplinary program** referral, if available, when high impact on function without improvement from multimodal strategies.**
		Pharmacological (see **Table 2**): Trials for use in peds are low/very low QE, benefits often extrapolated from adult use.[44,50,51]
		• **Acetaminophen / NSAID**: Consider PRN → primary HA (caution: medication overuse HA) or acute-on-chronic pain.
		• **Gabapentinoid, TCA** ?for neuropathic-type or chronic widespread MSK (e.g. juvenile fibromyalgia) pain.
		• **Opioids** rarely indicated (exception: may use OAT in OUD): may use for acute flares/acute-on-chronic pain.
		  ○ Avoid use for primary HA, centrally mediated abdominal pain syndrome, chronic MSK pain.[39,45]
		  ○ Avoid abrupt/rapid discontinuation if on stable, long-term dose.
		• **Traditional medicines** & other culturally relevant healing practices may be utilized, as requested.
		• Consider **dietary supplements** (e.g. magnesium 9mg/kg/day po divided TID; Max: 600mg/day for migraine prevention).[55]

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Needle Pain & Other Common Minor Procedures

(e.g. vaccination, IV insertion, NG tube insertion)[11,22]

Parent: be present, engage child in non-procedure talk, assist with child's position for comfort (sitting upright on or beside parent), apply numbing cream for child (Topical anaesthetic: OTC; apply prior to appointment; may ↓ pain 40%; see **Table 1**), avoid saying "*it's ok*" or "*it will be over soon*". Avoid giving oral analgesics/antipyretics to infant / child pre-emptively (ineffective & may ↓ vaccine immune response).[52] Video for parents here.

Neonate/infant:[12-17] swaddle, feed at the breast 2-3min pre- & during procedure, if BF not feasible, may bottle feed or give oral sucrose 24% soln (e.g. TootSweet; home made=1 sugar pack/cube in 10mL H_2O) 1-2min pre-procedure & repeat PRN + sucking. Topical anesthetic.

Topical anesthetics: Not well studied in term/pre-term neonates, however used.[24] Tetracaine & liposomal lidocaine have fast onset & not associated with methemoglobinemia, but in very young (including preterm) lidocaine/prilocaine has the most evidence. Systemic toxicity (cardiac & CNS-seizures) possible[29] but rare with appropriate use. If used, apply small amount of cream for shortest period necessary for onset (& avoid patch).

Age ≥1yr:[18,19] Upright position, age-appropriate distraction / psychological techniques[20] - **very useful**: toys, books, music, TV, humour, imagery, deep breathing, blowing a pinwheel. Topical anesthetic (See **Table 1**); ?**Vapocoolant Spray PAIN EASE** OTC; onset ≤60 seconds, risk of over-cooling & may startle young child.[23] Include support person.

Older child (≥4yr): Calmly offer preparation/information: brief description, what to expect - feels cold/warm, little pinch, will help you! Choose words such as "*pressure/immunization/poke*", instead of "*pain/shot/needle*". Cool-vibrating device (e.g. *Buzzy*).[30]

Resources: 1) BC Centre for Disease Control – Reducing Immunization Injection Pain; 2) Immunize Canada – Pain Management During Immunizations for Children; 3) Toronto SickKids – CARD System, Learning hub. **See online extras**: for information about *Drugs for Procedural Sedation & Other Local Anesthetics* (for open wounds, infiltration)

Table 1: Topical Anesthetics ("numbing cream/patch")[22] OTC

Skin anesthetic prior to venipuncture, cannulation, or vaccination to reduce needle pain.

	Generic/TRADE (Strengths & formulations)	Onset (O) Duration (D) Max time (M)*	Adverse Events AE / Contraindications CI	Additional Comments	Cost/Pack
AMIDE	**liposomal lidocaine** MAXILENE 4 4% crm (5, 30g tube)✗ ⊗; MAXILENE 5 5% crm (5, 30g tube)✗ ⊗; LMX4 4% crm, LMX5 5% crm	O: 30 min (15-45min) D: 1-2 hr+ M: 2 hr	AE: possibly lower incidence of skin blanching than lidocaine/ prilocaine. No safety data for child <2yr however used. Caution if heart block / severe hepatic impairment.	• Occlusion not required (but may use to protect area from rubbing) • Minimally vasoactive • Methylparaben free	**$60**, 30g 4% crm **$70**, 30g 5% crm
AMIDE	**lidocaine + prilocaine** EMLA 2.5/2.5% crm (5 & 30g tube)✗ ▼; 2.5%/2.5% patch✗ ▼	O: 60+ min D: 1-2 hr M: 1-4 hr (depends on age/wt)	AE: vasoconstriction, local reaction (e.g. mild transient skin blanching / erythema). Caution if heart block/severe hepatic impairment. Rare risk of methemoglobinemia (↑ risk if: <3mo; <1yr if DI e.g. sulfonamides; G6PD deficiency)	• Occlusive dressing required • Do not cut patch • Preservative free	**$65**, 30g **$15**, 2 patch
ESTER	**tetracaine** (also called amethocaine) AMETOP 4% gel (1.5g single use tube, 12g)✗ ⊗ ❄	O: 30-45 min D: 4-6 hr M: 2 hr	AE: vasodilation (may cause more erythema, edema than lidocaine products; skin blistering (rare) CI: Neonates <1mo (including preterm corrected to 1mo, see note at left)	• Occlusive dressing required • Store refrigerated • Methylparaben preservative (caution: hypersensitivity)	**$15**, 1.5g

General Comments: **Effectiveness**: Few head-to-head studies, however for IV insertion, lidocaine + prilocaine compared to: liposomal lidocaine → as effective[25,26] & tetracaine → as effective, possibly more effective (Cochrane review withdrawn by authors).[27] Not likely effective for heel poke.[24]
Cream Application: Use on intact skin only, avoid contact with mucous membranes, child's fingers, & ingestion. Amount applied on planned site(s) - for 0-3mo: 0.5g (size of a 5-cent coin); for ≥4mo: 1-2g (up to size of a 2-dollar coin). Cover with occlusive dressing (e.g. *Tegaderm*) or plastic wrap secured with tape, as required, up to the maximum application time (see above*). Wipe off prior to procedure. *Resource*: How to apply.
Allergy:[28] True allergy to local anesthetic is rare (ester more common than amide); often due to preservative. Avoid tetracaine if ester or PABA allergy. Cross-reactivity between amide and ester anesthetics unlikely. If reaction, may trial different class (i.e. if allergy to tetracaine, reasonable to trial lidocaine instead) & use formulation without preservative when available/suitable.

Table 2: Oral / Enteral Medication for Pain Management in Pediatric Patients[1,38,45]

	Generic/TRADE (Strengths & formulations)	Initial Dose & Maximum[31,42,43] (po unless otherwise indicated)	Adverse Events AE / Contraindications CI / Monitoring M	Comments	Cost/30d
	acetaminophen TYLENOL ✗ ▼OTC Susp 160mg/5mL; Drops infant 80mg/mL; Chew-tab 80, 160mg; Tab 325mg; Supp 120, 325mg Caution: Ingredient of many products! Unintentional duplication may occur.	**Initial**: 10-15mg/kg q4-6hr (up to 1000mg/**dose**). **Max**: 75mg/kg/**day**term ≥10days 4000mg/**day**, or 5 doses per 24hr. Supp **pr**: 15-20mg/kg	AE: Well tolerated. Caution: ?↑hepatotoxicity risk if malnourished or dehydrated M: liver enzymes (with chronic use)	• Lower max (e.g. 60mg/kg/**day** or less) for premature/ newborns[31]; may give drops pr for doses ≤80mg • Rectal admin has erratic absorption & slower time to peak effect vs po (pr 2-5hr vs po <1hr)[31] • Toxic single dose <6yr: ≥200mg/kg • Max ≤15day/mo for migraine (prevent medication overuse HA)	**$12/120** x 325mg tabs **$12/100mL** x 160mg/5mL
NSAID	**ibuprofen** ADVIL, MOTRIN ✗ ▼OTC Susp 20mg/mL; Drops infant 40mg/mL; Chew-tab 100mg; Tab 200, 300, 400mg	**Initial**: 5-10mg/kg q6-8hr>6mo (up to 600mg/**dose**). **Max**: 40mg/kg/**day**	AE: Dyspepsia, renal risk. Caution: renal risk with dehydration, NSAID-induced asthma, & ? bleeding disorder • Some concern: long-term use may restrict healing fractures	• Generally, 1st line for mild-moderate acute pain, used with other agents for mod-severe pain. • Max ≤15day/mo for migraine (prevent medication overuse HA) • Celecoxib FDA approved: **JIA** >2yr 10-25kg: 50mg po BID (off-label for JIA in Canada; 100mg cap smallest form available on CDN market liquid may be compounded)	**$15/100** x 200mg tabs **$12/100mL** x 100mg/5mL
NSAID	**naproxen** g Susp 25mg/mL (ALEVE OTC ≥12yrs, Tab 220mg✗ ▼) (Stronger prescription strengths avail. for both)	**Initial**: 5-7mg/kg q8-12hr>2yr (up to 500mg/**dose**). **Max**: 20mg/kg/**day**			**$17/100** x 220mg tabs **$60/474mL** x 125mg/5mL
OPIOID	**morphine** DOLORAL, MS-IR, STATEX Liquid 1, 5mg/mL; Tab 5, 10mg (Stronger prescription strengths available)	**Initial**: **0.2**-0.5mg/kg q4hr>6mo (up to **5**-10mg/**dose**). **Max**: Generally, limit to 50mg/**day**	AE: Sedation, nausea, constipation, misuse risk. Caution: Hx of substance use disorder, concurrent CNS depressants,[39] OSA M: respirations	• **Morphine** initial dose for infant ≤ 6mo in monitored setting: 0.08-0.1mg/kg po q4hr • May use for acute mod-severe pain in addition to other analgesics (not for monotherapy). • See **Q&A**s for prescribing considerations • Do not stop abruptly after regular use (taper).	5-10mg po q4h prn x 30 tabs **$14-17**
OPIOID	**HYDROmorphone** DILAUDID, g Liquid 1mg/mL; Tab 1, 2mg (Stronger prescription strengths available)	**Initial**: >10-50kg: **0.03**-0.06mg/kg>6mo or ≥50kg: **1**-2mg/**dose** q4hr. **Max**: Generally, limit to 10mg/**day**			1-2mg po q4h prn x 30 tabs **$14-16**
GABAPENTINOID	**gabapentin** NEURONTN, g Cap 100, 300, 400mg ♀; Tab 600, 800mg	**Initial**: 5mg/kg daily (up to 300mg/**dose**), titrated to TID. **Max**: **35**-50mg/kg/**day**	AE: Sedation, dizziness, wt gain, misuse risk. Caution: Concurrent CNS depressants (e.g. opioids)	• Off-label; may trial for neuropathic pain, fibromyalgia, spasticity, as used in adults (but not well studied)[46,47,49] • Do not stop abruptly after regular use (taper). • Open capsules and sprinkle; gabapentin suspension may also be compounded by some pharmacies	100-300mg po HS **$11-13** 300mg po bid-tid **$16-19**
GABAPENTINOID	**pregabalin** LYRICA, g Cap 25, 50, 75, 150, 300mg ♀	**Initial**: 1-1.75mg/kg daily (up to 50mg/**dose**), titrated to **BID**-TID. **Max**: 14mg/kg/**day** or 600mg/**day**	**Pregabalin** dose for juvenile fibromyalgia≥ 12yrs **initial**: 25-75mg daily to BID; **Max**: 450mg/**day** div BID.[54]		25-75mg po HS **$14-19** 75-150mg po bid **$28-35**
TCA	**amitriptyline** ELAVIL, g Tab 10,25,50mg; 75mg✗ ▼	**Initial**: **0.1**-0.25mg/kg HS (up to 10mg/**dose**), titrated. **Max**: 0.5-2mg/kg HS or 50-100mg/**day**	AE: Sedation, wt gain, constipation. Caution: ↓sz threshold, cardiac conduction abnormality /prolonged QTc, suicidality, with other anticholinergic agents (e.g. baclofen) M: Baseline ECG & dose >50mg/**day**	• Off-label; may trial for migraine proph (not effective?),[48] neuropathic pain, as used in adults (but not well studied)[47] • May crush amitriptyline tabs (admin immediately) but film coated (does not disperse well) & bitter taste; nortriptyline caps may be opened & sprinkled • Do not stop abruptly after regular use (taper).	10-25mg po HS **$11-12** 50-100mg po HS **$14-17**
TCA	**nortriptyline** AVENTYL Cap 10, 25mg ♀	**Initial**: **0.2**-0.25mg/kg HS (up to 10mg/**dose**), titrated. **Max**: 1mg/kg HS or 50mg/**day**			10-25mg po HS **$21-31** 50mg po HS **$52**

SNRI – duloxetine CYMBALTA, g 30-60mg/day studied in one small 13wk RCT vs Pl for juvenile fibromyalgia – benefit not established, however AE likely mild (N/V, HA)[53] **$27-42**/30days.
Cannabis for chronic pain – see Online Extras. Limited evidence for chronic pain, esp in pediatrics – might consider if other multimodal strategies insufficient to achieve function & potential benefits > harms.

Q&As

Is alternating acetaminophen with ibuprofen appropriate?
It can be. Since the mechanisms of action differ, they may be used concurrently, however monotherapy sufficient & preferred when possible. Combination may ↑ risk of administration errors & AE (e.g. renal). If used, instruct caregiver to verify each dose & write down time of each administration to keep track.

Are opioids the most effective option for acute pain?
The evidence suggests they are not. Ibuprofen may be more effective than acetaminophen & opioids for MSK injury.[33,65] Oral ibuprofen 10mg/kg = to oral morphine 0.5mg/kg for post-op ortho pain[34] & extremity fracture pain[35] plus morphine is associated with more AE.

What are some considerations when prescribing opioids for pediatric patients?[39]
• Generally, acute pain limit <5days.
• Start with lowest immediate release dose (syrup, tab) & reassess/titrate/taper as appropriate.
• Counsel re: potential AE & management. Be prepared to prevent opioid AE & treat as soon as they happen (e.g. nausea, constipation, itch).
• Advise re: locked storage & proper disposal. Consider caregiver-observed administration. Educate about non-medical substance use (& risks of sharing / selling meds), & monitor for self-led dose escalations.[39,64]
• Discuss overdose response & provide naloxone (See: JAMA Parent Naloxone resource).
• Avoid **tramadol**: CI in <18yr HC 2017
• Avoid **codeine**: CI in <12yr HC 2013 & in <18yr post-op tonsil/adenoid removal HC 2016; also avoid if 12-18yr with OSA, ↑BMI, severe lung dz[39]; morphine toxicity risk in ultrarapid CYP2D6 metabolizers

Additional Resources:
• https://kidsinpain.ca/
• BC Children's Hospital: Pediatric Pain Guide for Caregivers
• Zoe & Zak's Pain Hacks Book Series - More at online extras

Abbreviations: ☎=Exception Drug Status in SK ✗ =Non-formulary in SK ✆=prior approval for NIHB ⊗=not covered by NIHB ▼=covered by NIHB **5HT**=serotonin **ADLs**=activities of daily living **AE**=adverse events **BF**=breastfeeding **BID**=twice daily **BMI**=body mass index **cap**=capsule **CBD**=cannabidiol **CBT**=cognitive behavioural therapy **CI**=contraindicated **crm**=cream **CV**=cardiovascular **CYP**=cytochrome **d**=day(s) **DI**=drug interaction **dz**=disease **FDA**=approved Food & Drug Admin. **fx**=function g=generic available **G6PD**=glucose-6-phosphate dehydrogenase **HA**=headache **HC**=Health Canada **hr**=hour(s) **HS**=bedtime **HTN**=hypertension **hx**=history **IV**=intravenous **JAMA**=Journal of the American Medical Association **JIA**=juvenile idiopathic arthritis **max**=maximum **min**=minute(s) **MOA**=mechanism of action **mod**=moderate **mo**=month(s) **MSK**=musculoskeletal **N/V**=nausea/vomiting **NSAID**=non-steroidal anti-inflammatory drug(s) **OAT**=opioid agonist therapy **ODT**=orally disintegrating tablet **oint**=ointment **OSA**=obstructive sleep apnea **OUD**=opioid use disorder **PABA**=para-aminobenzoic acid **peds**=pediatrics **Pl**=placebo **po**=oral **pr**=per rectum **PRN**=as needed **QE**=quality of evidence **QTc**=corrected QT interval **RCT**=randomized controlled trial **rpt**=repeat **s**=second **soln**=solution **SR**=sustained release **supp**=suppository **susp**=suspension **sx**=symptoms **sz**=seizure **tab**=tablet **TCA**=tricyclic antidepressant(s) **THC**=delta-9-tetrahydrocannabinol **TID**=three times daily **tx**=treatment **wks**=weeks **wt**=weight **yrs**=years/years old

RxFiles On-Line Extras: PEDIATRIC PAIN

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Faces Pain Scale – Revised (FPS-R) – age 4+

This is a thumbnail image. The full-size FPS-R with instructions is available at https://www.iasp-pain.org/resources/faces-pain-scale-revised/. Numbers are not shown to children.

From: Hicks CL, von Baeyer CL, Spafford PA, Van Korlaar I, Goodenough B. The *Faces Pain Scale – Revised*. Toward a common metric in pediatric pain measurement. *Pain* 2001;93:173-183. ©2001 International Association for the Study of Pain. Reprinted with permission.

FLACC SCALE – for assessing pain in very young children non-verbal; suitable for cognitively impaired

Face	No particular expression or smile	Occasional grimace or frown, withdrawn, disinterested	Frequent to constant quivering chin, clenched jaw
Legs	Normal position or relaxed	Uneasy, restless, tense	Kicking, or legs drawn up
Activity	Lying quietly, normal position, moves easily	Squirming, shifting back and forth, tense	Arched, rigid or jerking
Cry	No cry (awake or asleep)	Moans or whimpers; occasional complaint	Crying steadily, screams or sobs, frequent complaints
Consolability	Content, relaxed	Reassured by occasional touching, hugging or being talked to, distractible	Difficult to console or comfort

- Each of the five categories (F) Face; (L) Legs; (A) Activity; (C) Cry; (C) Consolability is scored from 0-2, which results in a total score between zero and ten.
- From ***The FLACC***: *A behavioral scale for scoring postoperative pain in young children*, by S Merkel and others, 1997, Pediatr Nurse 23(3), p. 293-297. Copyright 1997 by Jannetti Co. University of Michigan Medical Center.

Drugs for Procedural Sedation (sedative/hypnotic adjuncts)

Monitor for procedural sedation & vital signs. Check protocols & be aware of guidelines/liability implications (institutional/departmental/professional). Should not be providing sedation & doing procedure.

- **N_2O**:(50/50mix O2, demand valve) age ≥ 3: quick 3 min, short acting good for IV starts; **CI**: pneumothorax, bowel obstruction
- **Midazolam**: as adjunct prior to minor procedures; po onset 10-20min, duration 30-45min;
  po: <20kg: 0.5-0.75mg/kg/dose; ≥20kg: 0.3-0.5mg/kg/dose; Max 10-20mg po;
  no oral formulation commercially available in Canada – use injectable product given orally, or some pharmacies may compound oral suspension using injectable formulation
  Note IV midazolam dose is MUCH lower than po dose!!! (1/10th the dose)
  {IV: 0.05mg/kg/dose IV x1; repeat x1 PRN; onset 2-5min, duration 10-20min}; **AE**: disinhibition, apnea, paradoxical agitation;
  Caution: ↓ hepatic / renal fx; **DI**: CNS depressants: ↓ dose of both.
  {Nasal limited study: use injectable product through Mucosal Atomization Device; faster onset but ↓sedation & duration than po; can be irritating to nasal mucosa; less effective than intranasal ketamine.[36]}
- **Ketamine**: 0.5-2mg/kg IV (1mg/kg intranasal); onset 1-5min; duration 15-60min; follow protocol.
  AE: nystagmus, dissociative (looks awake but is asleep; inform parents); vivid dreams x48hr {add low dose midazolam if ≥10yr to prevent nightmares}; ↑BP, HR, salivation (co-administer atropine with 1st dose); rash common but transient.
  Rare-Severe **AE**: laryngospasm, apnea, resp depression, recovery agitation,
  Preserves pharyngeal & resp fx. **CI**: airway instability, URTI, ?↑ICP, ↑BP, acute globe injury, glaucoma, thyrotoxicosis, psych disorder. Age >1yr preferred; **DI**: CYP 2B6.
- Fentanyl: chest wall rigidity possible with midazolam
- Propofol: Caution - significant toxicity! →metabolic acidosis; ↑BP, ↑death in ICU
  Reserve for anesthesia.

Other Local Anesthetics*

Comments: 45 minutes for good effect; Avoid mucous membranes[37]

LET lidocaine 4% */ epinephrine 0.1% / tetracaine 0.5%
Epinephrine (E): ↑ hemostasis, ↑anaesthetic duration; (compound)
AVOID: digits, nose tip, ear, penis (2° necrosis end artery).

- Topical anesthetic for **open wounds** esp facial/scalp if <5cm in length; max 3mL
  1) mix with cellulose form gel, apply to wound, cover - occlusive dressing
  2) place LET soaked cotton ball into wound; apply pressure x20min

Methylcellulose / epinephrine 0.05% / cocaine 11.8%

- Mixed solution with methylcellulose forms gel, preventing running; **LET preferred!**

Local Infiltration: 1) warm anesthetic 37°C, 2) use smaller gauge needle (e.g. 27 or 30-gauge), 3) inject at slow rate, proximal borders 1st, from inside wound edge, 4) pre-treat with topical anesthetic, 5) consider buffering (sodium bicarb 9mL mix with 1mL 1mEq/mL bicarb) for less pain, 6) pressure

Lidocaine (L): **local** onset rapid; duration 30min {duration 1-2hr if regional block}; Age 3yrs+ ✓ [**L**: 0.5%, 1%, 2%; **L+E**: 1%, 2%; (L+E no preservative:1.5%)]	**Mepivacaine**: **local** onset 6-10min; duration 1-3hrs; - if Age <3yrs or weight <13.6kg, use [0.5-1.5%]; - little vasodilation & epinephrine seldom needed	**Bupivacaine (B)**: **local** onset 8-12min; duration 4- 6hr; Age 12yr+ ✓ **CI**: sulfite allergy [**B**: 0.25%, 0.5%; **B+E**: 1%, 2%]

* Systemic toxicity (cardiac & CNS-seizures) possible but rare with appropriate use: (careful with dose & site)

Normalizing the 4 S's for Chronic Pain Management: Sports, Social, Sleep, & School[45]

"*First your life gets back to normal, then your pain decreases – unfortunately it's not the other way around… sometimes pain may even increase, before it gets better.*" – the 4 S's need to return to normal parameters before pain resolution could or should be expected.

– Friedrichsdorf, et al.

1) **Sports** – address physical therapy, emphasize restoration of activity (e.g. exercise, participation in sports)
2) **Social** – validate & acknowledge feelings of being misunderstood, work with psychologist/family therapist to build coping strategies and develop strategies for integration with others in social settings
3) **Sleep** – address insomnia through education and establishment of healthy routines (e.g. waking at consistent time in the morning, eating breakfast, personal hygiene, attendance at school, avoidance of napping, avoidance of screen time at least 1 hour prior to bedtime, maximum weekend "sleep in" of 1-2 hours on weekend).
4) **School** – Ensure daily attendance, work with school to establish support (e.g. time-limited breaks), address teasing/bullying, potential learning concerns

Cannabis for Chronic Pain in Child & Adolescent Populations[60,62,63]

- Cannabis products in Canada available for pediatric access include prescribed cannabinoids (e.g. nabilone CESAMET☎▼, cannabidiol oral solution EPIDIOLEX✗ ⊗, nabiximols SATIVEX✗ ⊗) and cannabis for medical purposes authorized by a prescriber (many products, including whole dried flower, oils, capsules).
  - The two most well-known (& studied) cannabinoids are delta-9-tetrahydrocannabinol (THC) and cannabidiol (CBD).
- **Efficacy:** While the evidence base is growing for use of cannabinoid products in a variety of pediatric indications (e.g. CBD for drug-resistant epilepsy, namely Dravet & Lennox-Gastaut syndromes), there is insufficient evidence to support its efficacy (& no dosing information) for chronic pain.[60]
  - Cannabis use in pediatrics is off-label for all indications (exception: EPIDIOLEX indicated for drug resistant epilepsy≥2yrs)
  - Chronic headache in adolescents study underway: CBD (using THC:CBD 1:25 extract) po 0.2mg/kg/day titrated to max 1mg/kg/day.[61]
- **Safety** considerations include:
  - Longer-term safety data in pediatrics is limited to purified CBD
  - Most common short-term AE associated with CBD: drowsiness, fatigue, ↓appetite, diarrhea, vomiting, ↑liver transaminases, ?thrombocytopenia, irritability/agitation
    - **DI**: CBD inhibits CYP2C19 enzyme – may ↑ levels of clobazam, citalopram, etc
  - Potential AE associated with THC: ↓memory, hypotension, euphoria, nausea/cannabis-hyperemesis syndrome, dizziness, fatigue, ↑appetite, ?negative impact on brain development (noted of concern with non-medical use of high concentrations of THC).
  - Advise against: smoking (respiratory risks, difficult to standardize dose), edibles (difficult to standardize dose, products tend to have high THC:CBD content)
- Cost can be a barrier to access (generally, not covered)
- **Place in therapy**: Generally, possibly consider trial of cannabis for chronic pain after multiple other management strategies (pharm & non-pharm) have been trialed and insufficiently effective, the risks vs benefits have been examined and shared decision-making utilized, in consultation with a specialist in pediatric chronic pain management. Ensure goals of therapy are clearly defined & monitor for AE.
- **Resource**: Counselling Adolescents & Parents about Cannabis (Canadian Pediatric Society, 2020)
- See **RxFiles chart**: Cannabinoids: Overview for more information.

Migraine Management with Triptans – MOA: Selective 5HT-1 receptor agonists.

Agents with HC/FDA indication for pediatrics/adolescents listed below. See RxFiles chart: MIGRAINE: Acute Therapy for more, including information about other triptans.

Place in therapy: Generally, first trial lifestyle modification (e.g sleep, physical activity, regular meals, hydration), headache diary (e.g. triggers, symptoms, duration, severity, medication effect) +/- CBT.

- Next, treat early (within <1hr of onset) with NSAID (e.g. ibuprofen studied QE=low, pain-free within 2hr **NNT≈4**[57]). May add acetaminophen if needed +/- an antiemetic.[59]
- If ineffective, reasonable to trial triptan for mod-severe migraine in pediatrics ≥6yr. Consider trial of alternate triptan or add NSAID (e.g. ibuprofen, naproxen) to triptan if not helpful after 2-3 times.[58]
- Counsel about medication overuse headache (Limit NSAID/acetaminophen to ≤15days/mo, triptans to ≤10days/mo, & combo of triptan + other analgesic to ≤10days/mo).
- Consider prophylactic agent if ≥3-6 migraines/month.

Generic/TRADE (Strengths & formulations)	HC/FDA Indication for Age	Initial Dose & Maximum[31,42,43] (po unless otherwise indicated)	Adverse Events AE / Contraindications CI	Comments	$/6 doses
almotriptan AXERT, g Tab 6.25, 12.5mg☎≥12yrs▼	✓adolescent≥12yr	6.25-12.5mg po; may repeat in 2hr; MAX: 25mg/24hr.	AE: nausea, dizziness, facial flushing, chest discomfort, paresthesia CI: hx of stroke, peripheral vascular disease, uncontrolled HTN, Wolff-Parkinson-White syndrome, ischemic CV disease, hemiplegic migraine/migraine with brainstem aura	Only product with HC indication; for adolescents only	$57-25
rizatriptan MAXALT, g Tab 5, 10mg☎≥18yr▼; RPD Tab (ODT) 5, 10mg☎≥18yr▼	USA: ODT child≥6yr	<40kg: 5mg po; ≥40kg: 10mg po x1 dose; no safety data for repeat dose, but some use.[59]		Time to peak effect of tablet faster than ODT (60-90min 90-150min) DI: avoid with propranolol if weight <40kg & ↓ rizatriptan dose for ≥40kg	$34
sumatriptan/naproxen sodium SUVEXX Tab 85/500mg✗ ⊗ USA: TREXIMET	USA: Tab adolescent≥12yr	85/500mg po x1 dose; do not repeat dose.		Caution: do not exceed max naproxen 7-10mg/kg/**dose**. High cost: could consider combination of sumatriptan + naproxen as sole ingredient products, though off-label for use in pediatrics.	$80
zolmitriptan ZOMIG Tab 2.5mg, g ☎≥18yrs▼; RAPIMELT Tab 2.5mg, g ☎≥18yr▼; Nasal spray 2.5mg✗ ⊗, 5mg☎≥18yr▼	USA: Nasal spray adolescent≥12yr	2.5-5mg spray in one nostril; may repeat in 2hr; MAX: 10mg/24hr. Tabs off-label: <40kg: 2.5mg po; ≥40kg: 5mg ; may repeat in 2hr[59]		Fast relief: Nasal onset = 10-15min. Nasal route useful if nausea/vomiting.	$120 $22-33 if tabs

Other Pediatric Pain Resources:

- SaskPain.ca
- Opioids and Pain in Youth: A toolkit for health professionals – 1) acute pain 2) chronic pain
- Therapeutic Management of an Acute Migraine Attack in Pediatrics
- Power over Pain Portal for Youth

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References - Pediatric Pain:

1. Trottier ED, Ali S, Dore-Bergeron MJ, et al. Best practices in pain assessment and management for children – Position Statement. Canadian Paediatric Society. *Paediatrics & Child Health.* 2022;27:429–437.
2. Health Standards Organization. Pediatric Pain Management. National Standard of Canada. 2023. Accessed Oct 4, 2024 from: https://healthstandards.org/standard/pediatric-pain-management-can-hso-13200-2023-e/.
3. Villacres S, Chumpitazi CE. Acute Pediatric Pain Management in the Primary Care Office. Pediatr Ann. 2018;47(3):e124-e129. doi: 10.3928/19382359-20180222-01.
4. Anand KJ, Hickey PR. Pain and its effects in the human neonate and fetus. N Engl J Med. 1987 Nov 19;317(21):1321-9. {Also: Finley, G.A., Franck, L.S., Grunau, R.E., & von Baeyer, C.L. (2005). Why children's pain matters. International Association for the Study of Pain. *Pain: Clinical Updates,* XIII(4), 1-6.
5. Dlugosz CK, Chater RW, Engle JP. Appropriate use of nonprescription analgesics in pediatric patients. J Pediatr Health Care. 2006;20(5):316-25; quiz 326-8.
6. Tidmarsh LV, Harrison R, Ravindran D, et al. The Influence of Adverse Childhood Experiences in Pain Management: Mechanisms, Processes, and Trauma-Informed Care. Front Pain Res (Lausanne). 2022 Jun 10;3:923866. doi: 10.3389/fpain.2022.923866.
7. Dudeney J, Aaron RV, Hathway T, et al. Anxiety and Depression in Youth with Chronic Pain: A Systematic Review and Meta-Analysis. JAMA Pediatr. Published online September 09, 2024. doi:10.1001/jamapediatrics.2024.3039.
8. Drendel AL, Brousseau DC, Gorelick MH. Pain assessment for pediatric patients in the emergency department. Pediatrics. 2006 May;117(5):1511-8.
9. Birnie KA, Hundert AS, Lalloo C, Nguyen C, Stinson JN. Recommendations for selection of self-report pain intensity measures in children and adolescents: a systematic review and quality assessment of measurement properties. Pain. 2019 Jan;160(1):5-18. doi: 10.1097/j.pain.0000000000001377.
10. Kingsnorth S, Townley A, Provvidenza C, et al. Pediatric Chronic Pain Assessment Tools – Chronic pain assessment toolbox for children with disabilities. Ontario, CA. Section 3.0, Version 2. 2018. Accessed Oct 4, 2024, from: https://hollandbloorview.ca/sites/default/files/2019-06/Chronic%20Pain%20Assessment%20Tools%202018-04.pdf.
11. Taddio A, Shah V, McMurtry CM, et al. Reducing distress during vaccine injections: 2026 clinical practice guideline update. CMAJ. 2026;198(32):E1243-E1263. Published 2026 Sep 20. doi:10.1503/cmaj.260123.
12. Shah PS, Aliwalas L, Shah V. Breastfeeding or breastmilk to alleviate procedural pain in neonates: a systematic review. Breastfeed Med. 2007 Jun;2(2):74-82.
13. Efe E, Ozer ZC. The use of breast-feeding for pain relief during neonatal immunization injections. Appl Nurs Res. 2007 Feb;20(1):10-6.
14. Stevens B, Yamada J, Ohlsson A. Sucrose for analgesia in newborn infants undergoing painful procedures. Cochrane Database Syst Rev. 2004;(3):CD001069.
15. Acad Emerg Med. 2006 Jun;13(6):617-22. Epub 2006 Apr 24. A randomized, controlled trial of sucrose analgesia in infants younger than 90 days of age who require bladder catheterization in the pediatric emergency department.Rogers AJ, Greenwald MH, Deguzman MA, Kelley ME, Simon HK.
16. Harrison D, et al. Efficacy of sweet solutions for analgesia in infants between 1 and 12 months of age: a systematic review. Arch Dis Child. 2010 Jun;95(6):406-13.
17. Pillai Riddell RR, Bucsea O, Shiff I, et al. Non-pharmacological management of infant and young child procedural pain. Cochrane Database of Systematic Reviews 2023, Issue 6. Art. No.: CD006275. DOI: 10.1002/14651858.CD006275.pub4.
18. Schechter NL, Zempsky WT, Cohen LL, McGrath PJ, McMurtry CM, Bright NS. Pain reduction during pediatric immunizations: evidence-based review and recommendations. Pediatrics. 2007 May;119(5):e1184-98.
19. Taddio A, Manley J, Potash L, Ipp M, Sgro M, Shah V. Routine immunization practices: use of topical anesthetics & oral analgesics. Pediatrics 2007;120(3):e637-43.
20. Uman LS, Chambers CT, McGrath PJ, Kisely S. Psychological interventions for needle-related procedural pain and distress in children and adolescents. Cochrane Database of Systematic Reviews. 2006 Oct 18;(4):CD005179.0.
21. Wallace DP, Allen KD, Lacroix AE, et al. The "**Cough Trick**," a Brief Strategy to Manage Pediatric Pain From Immunization Injections. Pediatrics. 2010 Jan 11.
22. Trottier ED, Dore-Bergeron MJ, Chauvin-Kimoff L, et al. Managing pain and distress in children undergoing brief diagnostic and therapeutic procedures – Position Statement. Canadian Paediatric Society. *Paediatrics & Child Health.* 2019;24(8):509-521.
23. Farion KJ, Splinter KL, Newhook K, Gaboury I, Splinter WM. The effect of vapocoolant spray on pain due to intravenous cannulation in children: a RCT. CMAJ. 2008;179:31-6.
24. Foster JP, Taylor C, Spence K. Topical anaesthesia for needle-related pain in newborn infants. Cochrane Database Syst Rev. 2017 Feb 4;2(2):CD010331. doi: 10.1002/14651858.CD010331.pub2.
25. Koh JL, Harrison D, Myers R, et al. A randomized, double-blind comparison study of EMLA and ELA-Max for topical anesthesia in children undergoing intravenous insertion. Paediatr Anaesth. 2004 Dec;14(12):977-82. doi: 10.1111/j.1460-9592.2004.01381.x.
26. Eichenfield LF, Funk A, Fallon-Friedlander S, et al. A clinical study to evaluate the efficacy of ELA-Max (4% liposomal lidocaine) as compared with eutectic mixture of local anesthetics cream for pain reduction of venipuncture in children. Pediatrics. 2002 Jun;109(6):1093-9. doi: 10.1542/peds.109.6.1093.
27. Lander JA, Weltman BJ, So SS. EMLA and amethocaine for reduction of children's pain associated with needle insertion. Cochrane Database Syst Rev. 2006 Jul 19;(3):CD004236. doi: 10.1002/14651858.CD004236.pub2. Update in: Cochrane Database Syst Rev. 2014 Mar 13;(3):CD004236. doi: 10.1002/14651858.CD004236.pub3.
28. Eggleston ST, Lush LW. Understanding allergic reactions to local anesthetics. Ann Pharmacother. 1996 Jul-Aug;30(7-8):851-7.
29. Maulidi H, McNair C, Seller N et al. Arrhythmia associated with tetracaine in an extremely low birth weight premature infant. Pediatrics. 2012 Dec;130(6):e1704-7. doi: 10.1542/peds.2011-1743.
30. Su HC, Hsieh CW, Lai NM, et al. Using Vibrating and Cold Device for Pain Relieves in Children: A Systematic Review and Meta-analysis of Randomized Controlled Trials. J Pediatr Nurs. 2021 Nov-Dec;61:23-33. doi: 10.1016/j.pedn.2021.02.027.
31. Uptodate Lexidrug. Drug Product Monographs. Accessed Oct 16, 2024 from: https://www.wolterskluwer.com/en/solutions/uptodate/pro/lexidrug.
32. Children's Healthcare Canada (CHS). Acute Pain – A Toolkit for health professionals. Accessed Oct 16, 2024 from: https://www.childrenshealthcarecanada.ca/en/networks-and-hubs/suap-acute-pain.aspx.
33. Clark E, Plint AC, Correll R, et al. A randomized, controlled trial of acetaminophen, ibuprofen, and codeine for acute pain relief in children with musculoskeletal trauma. Pediatrics. 2007 Mar;119(3):460-7. Comment in: Evid Based Med. 2007;12(5):144. Pediatrics. 2007;120(1):237; author reply 237-8.
34. Poonai N, et al. Oral morphine versus ibuprofen administered at home for postoperative orthopedic pain in children: a randomized controlled trial. CMAJ.2017 Oct 10;189(40):E1252-E1258.
35. Poonai N, Bhullar G, Lin K, et al. Oral administration of morphine versus ibuprofen to manage postfracture pain in children: a randomized trial. CMAJ. 2014;186(180:1358-1363.
36. Nasal Midazolam for Sedation in Pediatric Patients Prior to Invasive Procedures. CADTH HTIS. March 2008. Available from: https://www.cda-amc.ca/sites/default/files/pdf/htis/Nasal%20Midazolam%20for%20Sedation%20in%20Pediatric%20Patients%20Prior%20Invasive%20Procedures%20Clinical%20Safety%20and%20Ef.pdf.
37. Emslander HC. Local and topical anesthesia for pediatric wound repair: a review of selected aspects. Pediatr Emerg Care. 1998 Apr;14(2):123-9.
38. Chumpitazi CE, Chang C, Atanelov Z, et al. Managing acute pain in children presenting to the emergency department without opioids. J Am Coll Emerg Physicians Open. 2022 Mar 12;3(2):e12664. doi: 10.1002/emp2.12664.
39. Hadland SE, Agarwal R, Raman SR, et al. American Academy of Pediatrics. Opioid Prescribing for Acute Pain Management in Children and Adolescents in Outpatient Settings: Clinical Practice Guideline. *Pediatrics* 2024; e2024068752. 10.1542/peds.2024-068752.
40. Kelley-Quon LI, Kirkpatrick MG, Ricca RL, et al. Guidelines for Opioid Prescribing in Children and Adolescents After Surgery: An Expert Panel Opinion. JAMA Surg. 2021;156(1):76–90. doi:10.1001/jamasurg.2020.5045.
41. Carrasco-Labra A, Polk DE, Urquhart O, et al. Evidence-based clinical practice guideline for the pharmacologic management of acute dental pain in children. The Journal of the American Dental Association, 2023;154(9):814 - 825.e2.
42. Hauer J, Houtrow AJ, Pain Assessment and Treatment in Children With Significant Impairment of the Central Nervous System. Pediatrics. June 2017;139(6): e20171002. 10.1542/peds.2017-1002.
43. PedMed App, taken from "Pediatric Drug Dosage Guidelines", 8th Edition, Editors: Dr. Jennifer Kendrick and Dr. Jason Tan. Accessed Oct 24, 2024 from: https://www.pedmed.org/DrugApp/index.html.
44. Guidelines on the management of chronic pain in children. Geneva: World Health Organization;2020. Available from: https://www.who.int/publications/i/item/9789240017870.
45. Friedrichsdorf SJ, Giordano J, Dakoji KD, et al. Chronic Pain in Children and Adolescents: Diagnosis and Treatment of Primary Pain Disorders in Head, Abdomen, Muscles and Joints. *Children.* 2016;3(4):42. doi: 10.3390/children3040042.
46. Egunsola O, Wylie CE, Chitty KM, et al. Systematic review of the efficacy and safety of gabapentin and pregabalin for pain in children and adolescents. Anesth Analg. 2019;128(4):811–819.
47. Cooper TE, Heathcote LC, Clinch J, et al. Antidepressants for chronic non-cancer pain in children and adolescents. Cochrane Database Syst Rev. 2017 Aug 5;8(8):CD012535. doi: 10.1002/14651858.CD012535.pub2.
48. Powers SW, Coffey CS, Chamberlin LA, et al. Trial of amitriptyline, topiramate, and placebo for pediatric migraine. New England Journal of Medicine. 2017 Jan 12;376(2):115-24.
49. Branstetter JW, Mantione J, Deangelo A, et al. Safety and Efficacy of Gabapentin for Pain in Pediatric Patients: A Systematic Review. Hosp Pediatr. 2024;14(1):e57-65.
50. Pharmacological Interventions for Chronic Pain in Pediatric Patients: A Review of Guidelines. Ottawa: CADTH; 2020 May. (CADTH rapid response report: summary with critical appraisal).
51. Eccleston C, Fisher E, Cooper TE, et al. Pharmacological interventions for chronic pain in children: An overview of systematic reviews. Pain 2019;160(8):1698–707.
52. Wysocki J, Center KJ, Brzostek J, et al. A randomized study of fever prophylaxis and the immunogenicity of routine pediatric vaccinations. Vaccine. 2017 Apr 4;35(15):1926-1935.
53. Upadhyaya HP, Arnold LM, Alaka K, et al. Efficacy and safety of duloxetine versus placebo in adolescents with juvenile fibromyalgia: results from a randomized controlled trial. Pediatr Rheumatol. 2019;17(1):1–10.
54. Arnold LM, Schikler KN, Bateman L, et al. Safety and efficacy of pregabalin in adolescents with fibromyalgia: a randomized, double-blind, placebo-controlled trial and a 6-month open-label extension study. Pediatr Rheumatol. 2016;14(1):46 Available from: http://ped-rheum.biomedcentral.com/articles/10.1186/s12969-016-0106-4.
55. Wang F, Van Den Eeden SK, Ackerson LM, et al. Oral magnesium oxide prophylaxis of frequent migrainous headache in children: A randomized, double-blind, placebo-controlled trial. Headache. 2003;43:601–610. doi: 10.1046/j.1526-4610.2003.03102.x.
56. Ahrari M, Ali S, Hartling L, et al. "Nonmedical Opioid Use After Short-Term Therapeutic Exposure in Children: A Systematic Review." Pediatrics. 2021;148(6):1.
57. Richer L, Billinghurst L, Linsdell MA, et al. Drugs for the acute treatment of migraine in children and adolescents. Cochrane Database Syst Rev. 2016 Apr 19;4(4):CD005220. doi: 10.1002/14651858.CD005220.pub2.
58. Oskoui M, Pringsheim T, Holler-Managan Y, et al. Practice guideline update summary: Acute treatment of migraine in children and adolescents. Report of the Guideline Development, Dissemination, and Implementation Subcommittee of the American Academy of Neurology and the American Headache Society. *Neurology.* 2019;93:487-499. doi:10.1212/WNL.0000000000008095.
59. Migraine Canada. Pediatric Medication Dosing Advice. Therapeutic Management of an Acute Migraine Attack in Pediatrics (6-17 years). Accessed Nov 6, 2024, available from: https://migrainecanada.org/medication-dosing-advice/.
60. Kelly LE, Rieder MJ, Finkelstein Y. Medical cannabis for children: Evidence and recommendations. Paediatrics & Child Health May 2024;29(2):104–112. https://doi.org/10.1093/pch/pxad078.
61. Chhabra M, Lewis EC, Balshaw R, et al. A multi-centre, tolerability study of a cannabidiol-enriched Cannabis Herbal Extract for chronic headaches in adolescents: The CAN-CHA protocol. PLoS One. 2024 Sep 20;19(9):e0290185. doi: 10.1371/journal.pone.0290185.
62. Hagg L, Leung S, Carr R. Characterizing the Use of Nabiximols (Δ9-Tetrahydrocannabinol–Cannabidiol) Buccal Spray in Pediatric Patients. Can J Hosp Pharm. 2023;76(3):216-20. https://doi.org/10.4212/cjhp.3349.
63. Chhabra M, Ben-Eltriki M, Mansell H, et al. Cannabinoids Used for Medical Purposes in Children and Adolescents: A Systematic Review and Meta-Analysis. JAMA Pediatr. 2024;178(11):1124–1135. doi:10.1001/jamapediatrics.2024.3045.
64. Chadi N, Walker-Harding L. COMMITTEE ON SUBSTANCE USE AND PREVENTION; Nonmedical Use of Controlled Medications by Adolescents and Young Adults: Clinical Report. Pediatrics December 2024; 154 (6): e2024069298. 10.1542/peds.2024-069298.
65. Ali S, Klassen TP, Candelaria P, et al; KidsCAN PERC Innovative Pediatric Clinical Trials No OUCH Study Team. Acetaminophen (Paracetamol) or Opioid Analgesia Added to Ibuprofen for Children's Musculoskeletal Injury: Two Randomized Clinical Trials. JAMA. 2026 Jan 8. doi:10.1001/jama.2025.25033.

Other Articles of Interest

Buel KL, Wilcox J, Mingo PT. Acute Abdominal Pain in Children: Evaluation and Management. Am Fam Physician. 2024 Dec;110(6):621-631.
Chhabra M, Ben-Eltriki M, Mansell H, et al. Cannabinoids Used for Medical Purposes in Children and Adolescents: A Systematic Review and Meta-Analysis. JAMA Pediatr. 2024 Sep 16:e243045.
Hadland SE, Agarwal R, Raman SR, et al. Opioid Prescribing for Acute Pain Management in Children and Adolescents in Outpatient Settings: Clinical Practice Guideline. Pediatrics. 2024 Sep 30:e2024068752.
Healy P, Allegaert K, Della Pasqua O. Evaluation of the effect of CYP2D6 and OCT1 polymorphisms on the pharmacokinetics of tramadol: Implications for clinical safety and dose rationale in paediatric chronic pain. Br J Clin Pharmacol. 2024 Oct 9. doi: 10.1111/bcp.16201.
Kohandel Gargari O, Aghajanian S, Togha M, et al. Preventive Medications in Pediatric Migraine: A Network Meta-Analysis. JAMA Netw Open. 2024 Oct 1;7(10):e2438666.

Olejnik L, Lima JP, Sadeghirad B, et al. Pharmacologic Management of Acute Pain in Children: A Systematic Review and Network Meta-Analysis. JAMA Pediatr. 2025 Feb 3:e245920.
Raman SR, Smith MJ. Evidence for the Use of Opioid Medication for Pediatric Acute Pain in the Outpatient Setting: Technical Report. Pediatrics. 2024 Sep 30:e2024068753.
Wang JY, Speechley K, Anderson KK, et al. Intranasal midazolam for procedural distress in children in the emergency department: a systematic review and meta-analysis. CJEM. 2024 Sep;26(9):658-670.
Angulo MI, Collazo GR, Thompson LA. What Parents Need to Know About Knee Pain in Active Children. JAMA Pediatr. 2025 Feb 24. doi: 10.1001/jamapediatrics.2024.6164.
Campbell-Yeo M, Disher T, Mitra S; Canadian Paediatric Society. Managing pain in newborns:A multidimensional approach. Position Statement. Dec 2024. Available from: https://cps.ca/en/documents/position/managing-pain-in-newborns.
Tsze DS, Woodward HA, McLaren SH, et al. Optimal Dose of **Intranasal Midazolam for Procedural Sedation** in Children: A Randomized Clinical Trial. JAMA Pediatr. 2025 Jul 28:e252181.