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 3-4yrs

General approach

- Prioritize the child's self-report of pain (can generally be done by age 3-4yrs) 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 behaviours, 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	• 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**) See online extra. — Age ≥4-7 yrs (some suggest ≥ 3 yrs); ask about "how they feel inside" (not how they look). Numerical Rating Scale (**NRS-11**) — Age ≥ 6 yrs; ensure numeric competency. Color Analogue Scale (**CAS**) — Age ≥ 8 yrs; 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, 0-4 mo (also chronic pain). Face/Legs/Activity/Cry/Consolability (**FLACC**) — Age 2 mo – 7 yr. See online extra. Revised version (r-FLACC) for 4-19yrs with neurological impairment/non-verbal. Evaluation Enfant, DOuLeur (**EVENDOL**) — Age 0-7 yr. - 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 10-19 yr, parent version also an option Pediatric Pain Interference Scale (PPIS) — Age 8-17 yr, available as short form Pediatric Pain Questionnaire (PPQ) — Age 4-16 yr, 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. Using 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 >12yrs (✓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 behaviors. 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-procedure, if BF not feasible (e.g. NPO, CI, parent unavailable), 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 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, bubbles, TV, music, 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]

Older child (≥4yr): add 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*". Cough Trick,[21] 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 Anesthesthetics* (for open wounds, infiltration)

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

✓ Skin anesthetic prior to venipuncture or cannulation. Use of AMETOP for vaccination is off-label.

	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 compared to lidocaine/prilocaine for IV insertion: 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 if 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 •Toxic single dose <6yr: ≥200mg/kg •Rectal admin has erratic absorption & slower time to peak effect vs po (pr 2-5hr vs po <1hr)[31] •Max ≤10day/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 ≤10day/mo for migraine (prevent medication overuse HA) •Celecoxib [FDA approval]: **JIA** >2yr 10-25kg: 50mg po BID (100mg cap smallest form available on CDN market liquid may be compounded, yet off-label for JIA in Canada)	**$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&As** 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)	•Open capsules and sprinkle; gabapentin suspension may also be compounded by some pharmacies •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).	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**	•May crush amitriptyline tabs (admin immediately) but film coated (does not disperse well) & bitter taste; nortriptyline caps may be opened & sprinkled •Off-label; may trial for migraine proph (not effective?)[48], neuropathic pain, as used in adults (but not well studied)[47] •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, advise 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 <18yrs [HC 2017]
- Avoid **codeine**: CI in <12yrs [HC 2013] & in <18yrs post-op tonsil/adenoid removal [HC 2016]; also avoid if 12-18yrs 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

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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.

0 2 4 6 8 10

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 x48hrs {add low dose midazolam if ≥10 yrs 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 anaesthesia.

Other Local Anesthetics*

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

LET lidocaine 4% */ epinephrine 0.1% / tetracaine 0.5% (compound)

Epinephrine (E): ↑ hemostasis, ↑ anaesthetic duration; AVOID: digits, nose tip, ear, penis (2° necrosis end artery).

- Topical anaesthetic 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 anaesthetic 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 anaesthetic, 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 12yrs+ ✓ **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).
- 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
  - 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 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 ≥6yrs. 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 ≤10days/mo, triptans to ≤9days/mo, & combo of triptan + other analgesic to ≤9days/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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