

# Optimal pain relief for pediatric MSK injury

Christina Korownyk MD CCFP Jennifer Young MD CCFP(EM) G. Michael Allan MD CCFP

## Clinical question

In children with acute musculoskeletal (MSK) injuries, what is the optimal approach to pain management?

## Bottom line

Evidence suggests that ibuprofen provides better single-agent relief than acetaminophen or codeine, and is at least equivalent to both acetaminophen with codeine and morphine for acute injury pain, with fewer adverse events.

## Evidence

Single-agent comparisons:

- Ibuprofen versus acetaminophen versus codeine: RCT<sup>1</sup> of 336 children with MSK injuries (54% fractures).
  - At 60 minutes on a 100-mm pain scale, ibuprofen led to —greater mean reduction (-24 mm) versus acetaminophen (-12 mm) or codeine (-11 mm).
  - more patients achieving adequate analgesia (<30 mm) versus acetaminophen (number needed to treat [NNT]=7) or codeine (NNT=9).
- Morphine versus ibuprofen: RCT<sup>2</sup> of 134 children with uncomplicated extremity fractures given ibuprofen or morphine, followed for 24 hours.
  - No difference in pain score at any time point.
  - Less nausea with ibuprofen (NNT=5).

Combination comparisons: 2 RCTs with arm fracture or MSK limb trauma.

- Acetaminophen and codeine versus ibuprofen: 336 children followed for 3 days.<sup>3</sup>
  - No difference in mean pain scores.
  - Ibuprofen resulted in substantially less pain-related functional limitation.
  - Fewer adverse events with ibuprofen (NNT=5).
- Ibuprofen and codeine versus ibuprofen: 81 children followed for 120 minutes.<sup>4</sup>
  - No difference in pain score at any of 4 time points.

Four smaller (underpowered) RCTs<sup>5-8</sup> with 60 to 72 patients found no difference in any comparison of ibuprofen, acetaminophen, oxycodone, or acetaminophen-codeine.

Limitations include small sample sizes,<sup>2,4-8</sup> high dropout rates,<sup>2</sup> low pain scores at study entry (making it harder to show a difference),<sup>2</sup> and dosing of morphine (every 6 hours).<sup>4</sup>

## Context

- In 1 systematic review<sup>9</sup> of ibuprofen versus acetaminophen for any pediatric pain, ibuprofen provided mildly better pain control at 2 hours (standardized mean difference 0.28; 95% CI 0.10 to 0.46).
- Study doses<sup>1-4</sup> were 10 mg/kg of ibuprofen (maximum 400 to 600 mg), 15 mg/kg of acetaminophen (maximum

650 mg), 1 mg/kg of codeine (maximum 60 mg), and 0.5 mg/kg of morphine (maximum 10 mg).

- Nonsteroidal anti-inflammatory drugs do not appear to affect fracture healing.<sup>10</sup>

## Implementation

Pediatric pain has been poorly controlled in the emergency department.<sup>11</sup> This can be addressed by incorporating ibuprofen in medical directives. In primary care, ibuprofen should be the first-line treatment for management of acute MSK pain. Further, up to one-third of children do not metabolize codeine.<sup>12</sup> Irrespective of codeine's lack of comparative efficacy, Health Canada warned in 2013 that codeine can be associated with serious side effects in ultra-rapid metabolizers and thus should not be used in children younger than 12.<sup>13</sup> In practices and health facilities, electronic medical records could incorporate this warning as a prescribing alert.

**Dr Korownyk** is Associate Professor in the Department of Family Medicine at the University of Alberta in Edmonton. **Dr Young** is a family physician practising in Collingwood, Ont. **Dr Allan** is Professor and Director of Evidence-Based Medicine in the Department of Family Medicine at the University of Alberta.

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