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\(^1\) 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\(^2\) 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.\(^3\)
  - 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.\(^4\)
  - No difference in pain score at any 4 time points.
  - Four smaller (underpowered) RCTs\(^5-8\) with 60 to 72 patients found no difference in any comparison of ibuprofen, acetaminophen, oxycodone, or acetaminophen-codeine.

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

Context
- In 1 systematic review\(^9\) 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\(^1,4\) 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.\(^10\)

Implementation
Pediatric pain has been poorly controlled in the emergency department.\(^11\) 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.\(^12\) 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.\(^13\)

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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References