BOTTOM LINE RECOMMENDATIONS:

Pediatric Fractures

DIAGNOSIS AND INITIAL MANAGEMENT

MANAGE THE CHILD'S PAIN

» Rate the pain using an age validated pain scale
» Splint the injured limb
» Analgesia:

- » **MILD PAIN** - treat with **oral** ibuprofen (10 mg/kg), acetaminophen (15 mg/kg) and/or morphine (0.2-0.5 mg/kg).
- » **MODERATE TO SEVERE PAIN** - treat with **intranasal** fentanyl (1.5 mcg/kg) or **intravenous** morphine (0.1 mg/kg).

ESTABLISH TIMING AND MECHANISM OF INJURY

EXAMINE THE INJURED AREA

For extremity injuries, examination should also include:

- » Examination above and below the injury on the same limb
- » Comparison with the uninjured opposite limb
- » Examination of neurovascular status
  - » Assessment for an open fracture

For fractures that will need sedation for reduction or further operative management:

- » Keep the child nil per os.

DIAGNOSTIC IMAGING

» At a minimum, all children's injuries that demonstrate focal swelling, focal pain, deformity, or change in status of using a limb should receive x-ray imaging to rule out a fracture.
  » The exception is ankle or knee injuries where you can apply clinical decision rules to aid in imaging decisions. Three validated musculoskeletal imaging rules in children include:
    i. Ottawa Ankle Rules ii. Low Risk Ankle Rules iii. Ottawa Knee Rules
» Ensure imaging includes all recommended views for the specific body part and that you review x-ray imaging **after** you have examined the patient.
» If there is a fracture, identify the specific bone(s) injured, location of fracture (proximal, middle, distal), type of fracture (spiral/oblique, transverse, comminuted, buckle, greenstick, growth plate, avulsion), and degree of displacement and/or angulation.
  » Salter-Harris classification of growth plate fractures

PERFORM ASSESSMENT FOR POTENTIAL EVIDENCE OF NON-ACCIDENTAL INJURY

Triggers for non-accidental injury could include (but are not limited to) fractures with the following features:

» Non-ambulatory child with any fracture but particular suspicion in those with femur, humerus, metaphyseal, and axial fractures
» Non-mobile infant with bruising
» Developmental history not consistent with proposed mechanism of injury
» Injury not consistent with mechanism
» Significant delay in care

» Other evidence of trauma (e.g., multiple fractures)
» Features of failure to thrive or neglect

MANAGEMENT OF SPECIFIC FRACTURE TYPES

» Please refer to your site's specific protocols.
» Distal forearm buckle fractures and minor distal fibular fractures (avulsion, non-displaced Salter-Harris I/II) can be treated with a removable device (wrist splint/ankle brace) and self-regulated return to activities.
» A user-friendly pediatric fracture management guideline can be found at http://www.rch.org.au/clinicalguide/fractures/

EMERGENT (<1 HOUR) ORTHOPEDIC CONSULTATION

» Fractures associated with vascular compromise (pulseless/white hand)
» Fractures with signs or symptoms of compartment syndrome

URGENT (<4 HOURS) ORTHOPEDIC CONSULTATION

» Open fracture or impending open fracture (skin tenting)
» Fractures with associated nerve injury
» Fractures associated with vascular compromise (reduced pulse with good perfusion to extremity)
» Fractures associated with deformity
» Growth plate fractures classified as Salter-Harris III, IV, V

NON-URGENT OUTPATIENT ORTHOPEDIC CONSULTATION

» Closed, stable, uncomplicated fractures without deformity (except those detailed below which are appropriate for primary care physician follow up).

MINOR FRACTURES THAT CAN BE FOLLOWED BY THE PRIMARY CARE PHYSICIAN

» Distal radius buckle (with or without associated ulnar buckle/styloid) fractures
» Minor non-displaced distal fibular fractures: Salter-Harris I, Salter-Harris II, avulsion fractures
» Uncomplicated mid-shaft clavicle fractures

DISCHARGE INSTRUCTIONS

» Ibuprofen (10 mg/kg, max. 600 mg) every 6-8 hours as needed is as effective as morphine in children with non-operative upper extremity fractures. Ibuprofen is also more effective than acetaminophen with codeine in children with extremity fractures.
» Provide information on management of injury that includes home care of immobilization device, anticipatory guidance on recovery and participation in sports, scheduled follow up with a physician.
» Provide information on reasons to return to the emergency department prior to scheduled physician visit - e.g. increased pain, swelling, fever, cold fingers/toes, cast too tight or other concerns.

This summary is based on:

1) Fractures in Children. John M. Flynn, David L. Skaggs & Peter M. Waters, eds. Philadelphia: Lippincott Williams & Wilkins.
2) Dowling S, et al. Accuracy of Ottawa Ankle Rules to Exclude Fractures of the Ankle and Mid-foot in Children: A Meta-Analysis. Academic Emergency Medicine. 2009; 16(1): 1-11.
3) Boutis K, et al. Effect of the Low Risk Ankle Rule on the frequency of radiography in children with ankle injuries. CMAJ. 2013; 185(15):731-8.
4) Bulloch B, et al. Validation of the Ottawa Knee Rule in children: a multicenter study. Ann Emerg Med2003;42(1):48-55
5) Boutis K. Pediatric Fractures Managed with Minimal Intervention. Ped Emerg Care. 2010; 26(2): 152-7.
6) Poonai N, et al. Oral administration of morphine versus ibuprofen to manage post fracture pain in children: a randomized trial. CMAJ. 2014; 186(17): 1358-63. 2)
7) Clark E, Plint AC, Correll R, Gaboury I, Passi B. 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.

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