

- I. Skeletal survey is *necessary* in children 0–23 months old if any of the following features are present:**
- History of confessed abuse
 - History of injury occurring during domestic violence
 - History of impact from toy or other object causing fracture
 - Delay in seeking care >24 hours in a child with obvious signs of distress
 - Additional injuries on physical exam unrelated to fracture (ie, bruises, burns, whip marks)
 - No history of trauma to explain fracture
 - Except for the following fracture types in an ambulatory child >12 months old:
 - Distal buckle fracture of the radius/ulna
 - Distal spiral or buckle fracture of the tibia/fibula
- II. Skeletal survey is *necessary* in ALL children 0–11 months old with ANY type of fracture except in the following cases if there are no additional concerns:**
- Distal radial/ulna buckle fracture or toddler fracture of the tibia/fibula in a cruising child ≥ 9 months old with a history of a fall.
 - Linear, unilateral skull fracture in a child >6 months with a history of a significant fall (ie, height >3ft or fall with caregiver landing on child).
 - Clavicle fracture likely attributable to birth (acute fracture in infant <22 days old or healing fracture in infant <30 days old).
- III. Skeletal survey is *necessary* in children 12–23 months old with any of the following types of fractures:**
- Rib fracture
 - Classic metaphyseal lesion
 - Complex or ping-pong skull fracture
 - Humeral fracture with epiphyseal separation attributed to a short (≤ 3 feet) fall
 - Femur diaphyseal fracture attributed to a fall from any height
- IV. Skeletal survey may be *appropriate* and should be considered in other cases**
- V. Skeletal survey should not be routinely performed in the following cases in the absence of other findings that raise concern for abuse:**
- Distal spiral fracture of the tibia/fibula in a child 12–23 months old with a history of fall while walking/running
 - Distal radial/ulna buckle fracture in an ambulatory child 12–23 months old with a history of a fall onto an outstretched hand

FIGURE 2

Summary of Key Skeletal Survey Guidelines. The guidelines synthesize the panelists' responses from Tables 1, 2, 3, and 4. They apply to children who do not have a verifiable mechanism of accidental trauma (ie, MVC or fall in public place), do not have underlying bone fragility, such as osteogenesis imperfecta, and who do not have a clear history of birth trauma that accounts for the injury.

not only to additional injuries directly related to the abuse, but also could contribute to chronic medical conditions and overall mortality.^{36–39} Thus, guidelines that improve early detection and diagnosis of abuse may affect not only abuse-related injuries, but also a wide range of adverse health outcomes. The guidelines developed in this study are not part of and are not intended to conflict with the recommendation of the AAP Section on Child Abuse to perform SS in cases of suspected physical abuse in children <24 months old.¹⁴ Instead, they are purposed to provide additional guidance to clinicians on specific scenarios for which it is appropriate to suspect abuse and perform SS. The

guidelines developed in this study also could be applied retrospectively as performance measurement tools: the appropriateness criteria could be used to measure SS overuse, whereas the necessity criteria could be used to assess SS underuse. As the development of these guidelines relied on expert opinion and the limited evidence available, future studies evaluating the predictive validity of the guidelines to identify children with positive screens for occult fractures are warranted.

CONCLUSIONS

Applying the Rand/UCLA Appropriateness Method, a multispecialty panel reached agreement on clinical

scenarios for which initial SS is necessary in young children with fractures, permitting synthesis of guidelines for performing initial SS in this population. Postimplementation evaluation of these guidelines is needed to determine whether they achieve the goals of (1) decreasing variation and disparities in care, (2) increasing detection of cases of abuse, and (3) decreasing use of SS in children with low risk for occult fractures.

ACKNOWLEDGMENTS

We thank the panelists for the time, effort and expertise they dedicated to this project. See Supplemental Appendix 2 for a profile of the panelists.