Imaging Gently - Validation of Imaging Algorithms to Reduce Radiation Exposure for Pediatric Trauma Patients

Elaa Mahdi MD, Nicole Toscano MD, Robert Dorman MS, RN-BC, Julie Michels MS, RN-BC; Gina E Ryan MS, RN, Christopher Gitzelmann MD, Walter Pegoli MD, and Derek Wakeman MD

Department of Surgery, University of Rochester Medical Center, Rochester NY

Background

- Compared to adults, children are at higher risk of radiation complications.[1]
- It has been estimated that 1 in 1000 children undergoing CT of the abdomen/pelvis will die from radiation-induced cancers.[1]
- Standard imaging algorithms may decrease practice variability and unnecessary radiation exposure.[2,3]

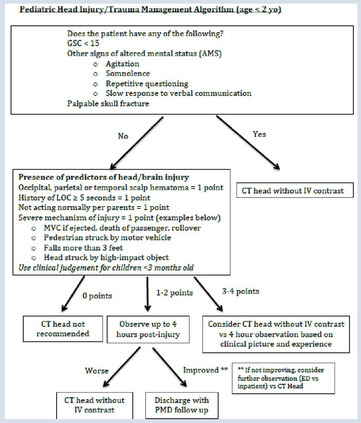
Hypothesis

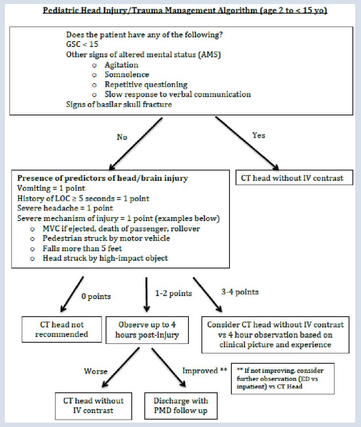
- Implementing imaging algorithms for pediatric blunt trauma patients will decrease the number of unnecessary computed tomography (CT) scans.

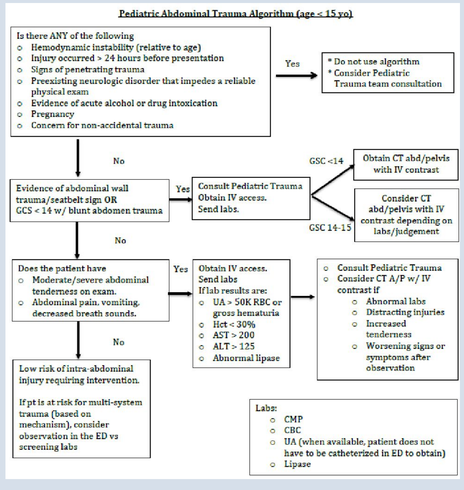
Methods

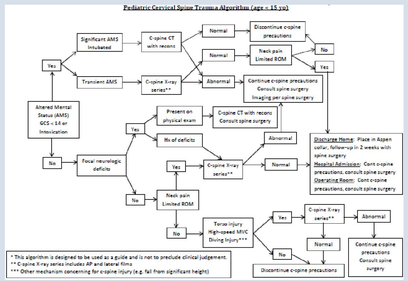
- After a literature review, imaging algorithms were developed for the head, cervical spine, chest, and abdomen/pelvis.
- Our institutional trauma database identified 58 patients in 2016 for whom the pediatric trauma team was activated.
- 13 children were excluded for penetrating mechanism (7), non-accidental trauma (4), death before advanced imaging (1), and proceeding directly to surgery (1).
- Our trauma imaging protocols were applied retrospectively after chart review to determine the necessity of imaging.

Results









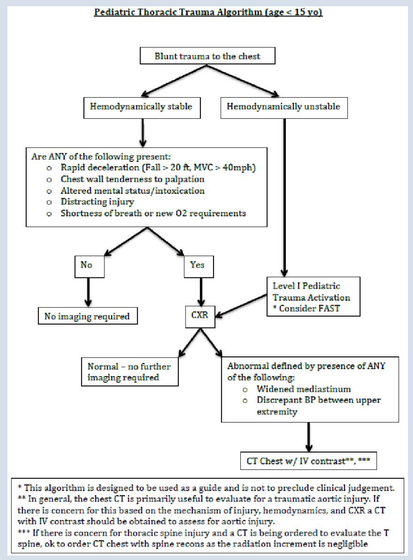


Figure 1. Percentage of children with unnecessary scans

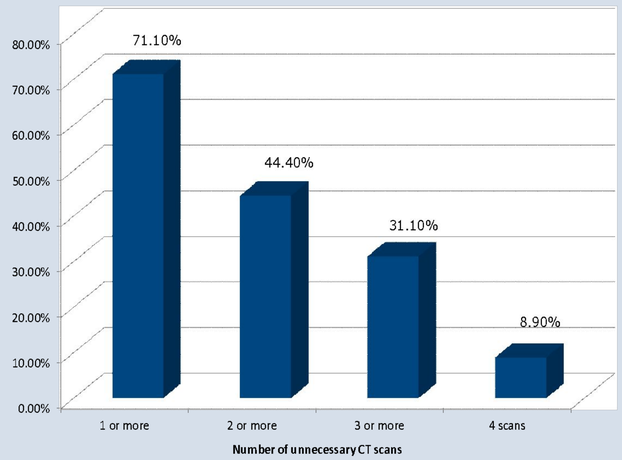
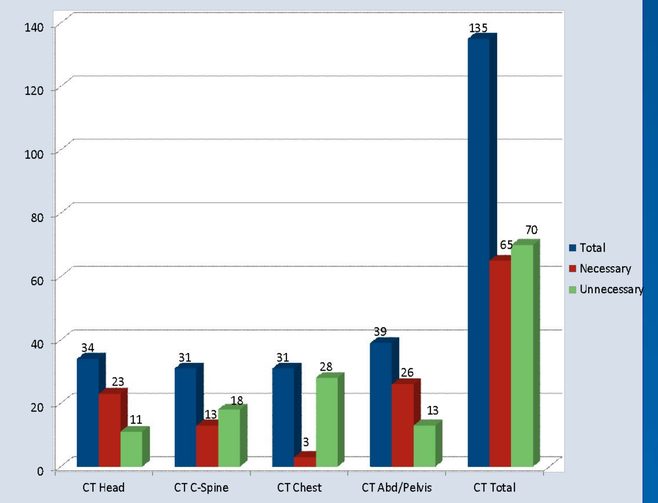


Figure 2. Breakdown of scans by necessity



- 135 CT scans were completed in the 45 children with an average of 3 scans per patient.
- 52% of CT scans were deemed to be unnecessary according to the established protocols.
- Unnecessary CT scans identified 12 pulmonary contusions, 3 tiny occult pneumothoraces, and 1 non-displaced orbital fracture that might not otherwise have been found. None of these injuries required injury-specific intervention.

Discussion/Conclusions

- By applying imaging protocols, we can significantly reduce radiation exposure to pediatric trauma patients while not compromising the detection of clinically significant injuries.
- We hope to implement these protocols prospectively to guide imaging and improve quality care in traumatically injured children.

References

1. Streck CJ, Jewett BM, et al. *J Trauma Acute Care Surg.* 2012; 73 (2): 371-6.
2. Holmes JF, Mao A, et al. *Annals of Emergency Medicine.* 2009; 54 (4): 528-533.
3. Scaife ER, Rollins MD. *Seminars in Pediatric Surgery.* 2010; 19: 252-256.

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