Elaa Mahdi MD; Nicole Toscano MD; Robert Dorman MS, RN-BC; Angela Holland RT; Christopher Gitzelmann MD, Walter Pegoli MD, and Derek Wakeman MD

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

Purpose: Compared to adults, children are at higher risk of radiation related complications including fatal malignancies. Imaging algorithms may decrease practice variability and unnecessary radiation exposure. We sought to identify and validate imaging algorithms for pediatric blunt trauma patients to decrease the number of unnecessary computed tomography (CT) scans.

Methods: 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 by blinded chart review to determine the necessity of imaging.

Results: 135 CT scans were performed in 45 children, averaging 3 scans per patient. 52% of CT scans were not indicated per protocol (Figure 1). Protocol utilization would have saved an average of $2990 and 648 mGy*cm radiation exposure per child. Not indicated CT scans identified 12 pulmonary contusions, 3 occult pneumothoraces, and 1 non-displaced orbital fracture; none required injury-specific therapy.

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

Figure 1: Breakdown of CT scans by indication