



Pediatric Imaging Statement
TASC Pediatric Subcommittee

The following statement, drafted in 2018, reflects the consensus of the Trauma Association of South Carolina

- The Trauma Association of South Carolina considers this issue important because of the risks that are unique to pediatric patients regarding ionizing radiation. Pediatric patients typically have a longer lifespan than adult or geriatric patients, which allows cancer a longer time frame in which to grow and develop¹. (i.e., risks are cumulative over time). Further, pediatric tumor cells proliferate at more a rapid rate than in adults, which is conducive to development of tumors and cancers. Pediatric patients receive a higher dose per unit area of radiation despite exposure to the same “dosing” as an adult due to the increased surface area of the pediatric patient. For all the above reasons, diagnostic imaging that utilizes higher doses of ionizing radiation should be limited in the pediatric patient population². We support “Image Gently” guidelines and ALARA guidelines.

There is no mechanism of injury that requires routine, full-body CT (computerized tomography scan) or “pan-scan” of the hemodynamically stable pediatric trauma patient. Clinically significant injuries in pediatric patients are typically identifiable through clinical evaluation. CT scanning should generally be limited to follow up for suspicion of significant injury, and not utilized as a routine evaluation. Facilities that may encounter pediatric trauma patients should have clinical guidelines, pathways and protocols that limit ionizing radiation through CT scans, using validated references, such as the following:

- CT scanning of the head or brain³: PECARN head trauma algorithm
- CT scanning of the c-spine⁴: Plain film A/P (anterior/posterior) and lateral are effective for screening for injury. Please see the Trauma Association of Canada c-spine algorithm for additional recommendations.
- CT scanning of the thorax⁴: chest xray should be used as a screening device in conjunction with clinical assessment and physiologic state to identify injuries with potential for significant mortality and morbidity. CT scanning should be considered if significant suspicion of major

¹ Pediatric Exposures to Ionizing Radiation: Carcinogenic Considerations. 2016. Int J Environ Res Public Health.

² Management of Pediatric Trauma – Policy Statement, American Academy of Pediatrics. 2016.

³ Pediatric Trauma: Pathophysiology, Diagnosis, and Treatment, 2nd edition 2017.

⁴ Royal college of Radiology Paediatric Trauma Protocols. 2014.

⁵ Identifying Children at Risk for Blunt Intra-abdominal Injury in Whom CT of the abdomen can be Avoided Safely. Streck CJ, Vogel AM, Zhang J, et al. J Am Coll Surg. 2017 Apr;224(4):449-458. PMID:28130170

⁵ External Validation of a five-variable clinical prediction rule for identifying children at very low risk for intra-abdominal injury after blunt abdominal trauma. Arbra CA, Vogel AM, Plumblee L, et al. J Trauma Acute Care Surg. 2018 Jul;85(1):71-77. PMID: 29649473



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intrathoracic injury such as great vessel injury is present (e.g. scapula fx & first rib may be associated with high risk of cardiovascular injury). The CXR (chest xray) should identify injuries that require intervention such as significant hemo or pneumothorax or may identify a widened mediastinum that may merit further imaging at clinician discretion.

- CT scanning of the abdomen (usually with pelvis)⁵: There is no mechanism of injury that mandates abdominal CT scanning. Certain clinical variables may be suggestive of intra-abdominal injury and if present, should result in transfer to a pediatric trauma center for evaluation. These include but are not limited to: seatbelt sign, handle bar injuries, abdominal wall ecchymosis, abdominal tenderness in the conscious patient, abdominal distention, clinical evidence of persistent hypovolemia (such as unexplained age-appropriate tachycardia) and blood from rectum or nasogastric tube) (RCR UK)
- CT scanning of the pelvis: Consider if concerns after clinical assessment and/or abnormal pelvis xray.
- CT scanning of limbs: Plain film radiograph⁵ should be utilized first, with the decision to CT scan a limb left up to a pediatric specialist or pediatric trauma center.

Centers that receive a significant pediatric trauma population should strongly consider utilizing pediatric dose limiting software for computed tomography scanners that can dramatically decrease exposure for children who meet criteria for CT scans to evaluate for injury. Because pediatric patients are typically smaller, a lower ionizing radiation dose can still provide an acceptable image for diagnostic reading.

Centers that treat children should be aware that many CT studies 'overlap' causing multiple exposures to the same body region and susceptible organs when performing multiple scans. For example, obtaining a CT head and CT spine will overlap areas of the head and neck resulting in a higher radiation dose than choosing individual scans based on clinical presentation, assessment and judgement.

Within the pediatric trauma system for the region, robust image transfer procedures should be in place. The written diagnostic reading of the imaging should not be sent alone, images themselves **must** accompany the patient transfer process in order to allow for pediatric specialists to view the actual images and corroborate diagnoses. Images that are not transferred often result in repeat CT scans being performed after transfer and can add significant radiation doses to this already vulnerable population.

Centers that are not equipped to manage pediatric trauma patients beyond initial ATLS primary and secondary surveys should strongly consider transfer to a pediatric trauma center prior to obtaining CT imaging in order to avoid: unnecessary scans, delay in care, multiple scans, lost images, and to allow pediatric providers to use judgement on what scans are necessary.