Picture Perfect: Pediatric CT Utilization in Trauma

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**Recommended Citation**
Strickland L, Zino C. Picture Perfect: Pediatric CT Utilization in Trauma. Poster presented at: South Carolina Trauma Symposium; October 24-25, 2019; Columbia, SC.

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Picture Perfect

Pediatric CT Utilization in Trauma

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Introduction

- Radiation exposure poses a greater risk to children compared to adults. Children have a greater life expectancy than adult or geriatric patients, extending the amount of time potential cancer has to develop. Further, the body and organ size is much smaller, yet receives a similar dose of radiation when used as a diagnostic tool. The risk for developing radiation-related cancer can be higher for children exposed to diagnostic radiation than the risk for adults. Radiation exposure is quite common in trauma.

Background

- Following an ACS consultative site visit for Level II Pediatric standards, a weakness was identified regarding over-utilization of computed tomography (CT) scans on pediatric trauma patients (defined as age <15). A multidisciplinary radiation reduction plan was devised. Cervical spine and thorax CT scans were named primary targets.

Methods

Quality change:

- The radiology medical director and trauma liaison presented evidence in support of decreased CT utilization in the pediatric trauma population at the monthly trauma quality meeting, in conjunction with three pediatric case reviews of possible overutilization. The radiologist critiqued all three cases. Intense discussion sparked and the decision was made to perform this review at every pediatric trauma quality meeting (Radiation Roundup).

Operational change:

- CT c-spine and thorax were removed from the initial resuscitation order form so that these scans must be intentionally written-in
- Pediatric emergency medicine physicians were incorporated into response to pediatric trauma alerts to allow for board certified, pediatric specific input while deciding on CT scans

Education change:

- Trauma and radiology created an educational flyer, posted in the trauma resuscitation bays, pediatric ED area, triage, CT scan control rooms, physician lounge, resident lounge and PICU.
- Pediatric trauma imaging algorithms, including PECARN for mild TBI and the Trauma Association of Canada pediatric c-spine clearance and imaging recommendations were hanged in every trauma bay.
- The *departure to CT* checklist was modified, and a pediatric version was created to include consideration of risk vs. benefits for diagnostic radiation in pediatric patients.

Results

- In calendar year 2015, 53% of pediatric trauma patients received a CT of the cervical spine, dropping to 37% in 2017, and in 2018 only 32% of pediatric trauma patients received a CT of the cervical spine. CT thorax utilization in 2015 was 26%, dropping to 21% in 2017 and further to 17% in 2018.

- Further measurement involves comparison of injury severity score (ISS) before the initiative, and after. In 2017, prior to the initiative, the average ISS of a pediatric trauma patient receiving a CT c-spine was 4.8. 72% of those cases had an ISS < 9. Calendar year 2018, the average ISS is 7.6, with 57% cases with an ISS <9 receiving a CT c-spine. In 2017, of patients who received a CT thorax, 45% sustained an ISS <9. In 2018, only 30% of patients who sustained an ISS <9 underwent CT thorax. Also importantly, zero missed injuries have been identified.

Conclusion

- Pediatric radiation exposure is a critical element for trauma programs that treat children, regardless of verification level, to routinely evaluate and can be significantly impacted in a short period of time.