Picture Perfect - Pediatric CT Utilization in Trauma

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Introduction

- Radiation exposure poses a greater risk to children.
  - Children have a greater life expectancy, extending the amount of time potential cancer has to develop.
  - The body and organ size is much smaller, yet receives a similar dose of radiation from diagnostics.
  - The risk for developing radiation-related cancer may be higher for children vs adults.
  - Radiation exposure is quite common in trauma.
Background

- Following an ACS consultative 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 began.
- Cervical spine and thorax CT scans were primary targets.
Methods

Quality Meeting
• 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).

<table>
<thead>
<tr>
<th>DOS</th>
<th>Age</th>
<th>Trans In</th>
<th>ISS</th>
<th>Mechanism</th>
<th>Injuries/Add’l Notes</th>
<th>CT Scans Performed</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>34</td>
<td>Pedestrian vs Auto</td>
<td>34</td>
<td>Severe multitrauma/ Peer reviewed</td>
<td>CT head x6, cspine, chest, abdpel, face, repeat CAP</td>
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<tr>
<td>N</td>
<td>5</td>
<td>Jetski vs Boat</td>
<td>5</td>
<td>Abrasion, contusions, concussion/ Suspect high speed</td>
<td>CT head, cspine</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>2</td>
<td>Jetski vs Boat</td>
<td>2</td>
<td>Abrasion, contusions, concussion/ Suspect high speed</td>
<td>CT head, cspine</td>
<td></td>
</tr>
</tbody>
</table>
Methods

Operational changes
• CT c-spine and thorax were removed from the initial resus order form
• Pediatric emergency medicine physicians were incorporated into response to pediatric trauma alerts

Education changes
• Trauma and radiology created an educational flyer (right).
• Pediatric trauma imaging algorithms were hanged in every trauma bay which included radiation dose for each study
• A pediatric “departure to CT” checklist was created to include a pause for consideration of risk vs. benefits for diagnostic radiation
Results

- Prior to implementation, the CT utilization rate ranged 49-53% for c-spine and 20-26% for thorax.
- After two years, the CT utilization rate dropped 75% for c-spine and 73% for thorax.
Results

• Further measurement involves comparison of injury severity score (ISS) before the initiative, and after.
• In 2017
  • The average ISS of a patient receiving a CT c-spine was 4.8.
• In 2019
  • The average ISS of a patient receiving a CT c-spine was 8.9
  • Patients scanned now are more likely to be injured.

• Zero missed injuries have been identified.
Conclusion

- Pediatric radiation exposure is a critical element for trauma programs that treat children to routinely evaluate.
- A significant impact can be made in unnecessary CT scans with some education, operational changes and consistency in quality review.
- Programs should strongly consider reviewing this on a Regional Trauma Advisory Council level as well to decrease utilization within the whole trauma system.