

Pediatric trauma team helps reduce radiation exposure in children

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Every time a child gets a computed tomography (CT) scan from a hospital they are exposed to radiation that—[according to research](#)—creates a 1-in-1,000 risk of developing a fatal tumor later in life.

These CT scans—which utilize several X-ray images and computer processing to create cross sectional images—are important to get a precise diagnosis in specific situations, but carry extra risks and [additional costs](#) that are best avoided if other methods are possible.

To prevent these risks, clinicians at the Pediatric Trauma Center at UR Medicine Golisano Children's Hospital (GCH) initiated one of the first large-scale hospital efforts that significantly reduced the number of unnecessary CT scans conducted on injured children, limiting exposure to harmful radiation and reducing health care costs with no negative effect on outcomes.

"Clinicians often feel compelled to do a CT scan and not risk missing something really important," said Derek Wakeman, MD, associate professor in the departments of Surgery and Pediatrics. "But, there are alternative ways to rule out conditions without a CT scan. If a child is awake and alert, we don't necessarily need a CT scan to determine concussion risk. If blood work looks normal and the child does not have significant abdominal pain, we can often omit an abdominal CT. For possible cervical spine injuries, X-rays can help pick up significant injuries."

The results of the initiative were reported in a recent study in the *Journal of Pediatric Surgery*, which was co-authored by GCH faculty in the divisions of Emergency Medicine, Surgery, and Radiology. The team adapted existing CT scan guidelines and developed new ones around four areas of the body: head, neck, chest, and abdomen/pelvis.

"Guidelines have always been available for these areas, but the methods in which our department rigorously applied them, tracked the results, and looked to continuously improve are unique," said Wakeman.

After adapting guidelines for these four body regions, GCH clinicians

examined the CT scanning rates prior to the initiative (01/2016–06/2017) and after implementation (07/2017–08/2021) to determine how many scans were not indicated by the guidelines. Before the program launched, 61 patients underwent 171 CT scans, of which 87 scans (51%) were not indicated by guidelines. Post-implementation, 363 patients had 531 scans and only 134 CTs (25%) were not indicated.

This significant reduction of CT scans has multiple benefits for [patient safety](#) and operational efficiency, according to Wakeman.

"It reduces a lot of waste in the system and more importantly minimizes exposure to radiation, as [young children](#) are at a much greater risk of injury from this exposure than adults," said Wakeman.

The study estimated that a total of 146 children were spared excessive radiation with no clinically significant missed injuries since the guidelines were implemented. The GCH clinical teams achieved this by utilizing alternative means of diagnosis, while still applying best-practices, for the different areas of the body. Existing guidelines were more widely adapted for head, neck, and abdomen/pelvis, while new guidelines were developed at GCH for the chest area.

In addition to preventing unnecessary exposure to radiation, charges related to scans in the GCH emergency department decreased from \$1,490.31 per patient to \$408.21 per patient, saving an estimated \$218,000 in total medical costs for this group of children.

Implementing these changes required a collective education effort among all the teams to review and revise guidelines, and then the guidelines were integrated into the technological process to diagnose patients.

"It's built into the culture now. People know it's safe to utilize this

approach and they're not going to miss clinical injuries," said Wakeman.

More information: Elaa Mahdi et al, Sustaining the gains: Reducing unnecessary computed tomography scans in pediatric trauma patients, *Journal of Pediatric Surgery* (2022). [DOI: 10.1016/j.jpedsurg.2022.09.027](https://doi.org/10.1016/j.jpedsurg.2022.09.027)

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