Pediatric CT scan radiation effective dosages for trauma

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Women & Children's Hospital of Buffalo
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Abstract

Introduction: An inverse relationship between tissue radiosensitivity and body size has been implicated during Computed tomography (CT). This is the first study is to report the CT scan effective dosage on different body sizes of the most common diagnostic imaging for pediatric trauma.

Methods: Diagnostic images for trauma evaluation from 2008 to 2011 were retrospectively reviewed for patients presenting to a pediatric trauma center. CT effective dosages were calculated using the dose length product method and phantom model cofactors for five different body sizes.

Results: The figure demonstrates the CT effective dosage per scan for different body sizes of 1159 patients. Of 1407 CT scans, CT head was the most common in all body size groups followed by CT abdomen and pelvis and CT cervical spine.

Conclusion: Evaluating physicians should be familiar with radiation exposure in pediatric trauma. As CT scans of the abdomen and pelvis account for more radiation than all other imaging studies combined (in all groups), strategies should include thoughtful utilization of this resource especially in the smallest of children.

Background

Balance radiation risks versus the benefit of diagnosis of life-threatening injury

Purpose

Determine radiation dosages for the most commonly ordered CT scans for pediatric trauma at the Women and Children's Hospital of Buffalo

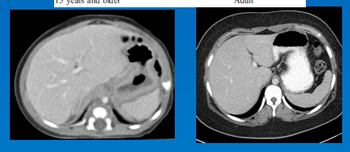
Guide future efforts at radiation reduction in trauma for performance improvement and enhanced quality of care

Methods

IRB approved retrospective review
Jan 2008 to Dec 2011 evaluated for trauma
Demographics and radiation data recorded
Exclusion criteria – Partial evaluation at another facility
Calculations based on 5 DLP phantom models

Body size matters: DLP method effective dose (mSv)

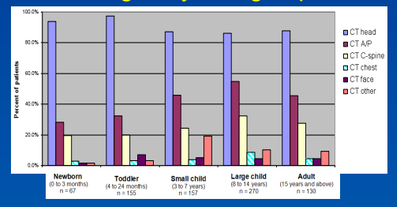
Age group	Conversion coefficient applied
Newborn to 3 months	0 years
4 months to 2 years 11 months	1 year
3 years to 7 years 11 months	5 years
8 years to 14 years 11 months	10 years
15 years and older	Adult



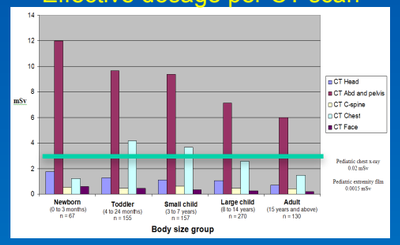
Results

1810 patients evaluated during 4 years
651 patients excluded with CT scans from referring hospitals
779 of 1159 patients in our hospital had CT scans
1407 total CT scans reviewed
1570 radiographs
- 458 lateral c-spines
- 412 CXR
- 348 pelvic
- 352 extremity films

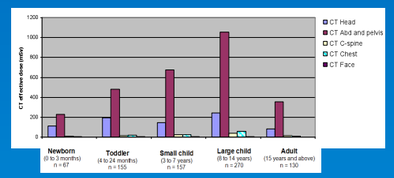
Distribution of CT scans among body size groups



Effective dosage per CT scan



Total study period radiation



Limitations

Reductions may not reduce future malignancy

Less imaging could result in delay in diagnosis

"Effective dosage" concept new and unproven

"Non-imaging" algorithms could be confusing to providers

Conclusions

CT abdomen and pelvis:

* 2nd most frequent trauma CT

* Results in more radiation than all other studies combined

* Results in significant more radiation in smaller children

Strategies should include thoughtful utilization of this resource

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