National Variation in Pediatric Non-contrast Head CT Radiation Dose Indices

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Disclosures

Nothing to disclose.
Importance

- Head CT examinations are the most frequently imaged body part in children, especially infants.

- Adhering to ALARA practice is important in the pediatric population due to:
  - Higher sensitivity to radiation
  - Longer life span
Objective

- To assess national variation in the estimated radiation dose indices (CTDvol, DLP) for pediatric head CT.

- To compare reported national dose averages to “Best Practices” by pediatric hospitals.
Methods: Design

- Retrospective review of radiation dose indices for:
  - Single-phase non-contrast head CT
  - Pediatric patients ≤18
  - Between 07/2011 and 06/2016
Methods: DIR

- We used American College of Radiology Dose Index Registry (DIR)
  - Volume CT dose index ($\text{CTDI}_{\text{vol}}$)
  - Dose length product (DLP)
- Facility voluntary participation
- De-identified CT indices submitted
Results: Baseline Characteristics

268,120 single-phase pediatric non-contrast head CTs
Results: $\text{CTDI}_{\text{vol}}$

- Median $\text{CTDI}_{\text{vol}}$: 35.1 mGy
- Mean $\text{CTDI}_{\text{vol}}$: 36.1 mGy
- Interquartile range $\text{CTDI}_{\text{vol}}$: 24.6 to 48.2 mGy
- Approximately 200% difference between the 25th and 75th percentiles

- Children hospital ‘best practice’ mean $\text{CTDI}_{\text{vol}}$\(^1\): 22.3 (95% CI, 21.3-22.3) mGy

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Results: DLP

- Median DLP: 583.6 mGy-cm
- Mean DLP: 583.6
- Interquartile range: 406.5 to 791.5 mGy-cm
- Approximately 194% difference between the 25th and 75th percentiles

- Children hospital ‘best practice’ mean DLP\(^1\): 319.3 (95% CI, 304.2-334.4) mGy

Results - Median CTDI$_{vol}$ Trend by Age

0.0  5.0  10.0  15.0  20.0  25.0  30.0  35.0  40.0  45.0  50.0

0-2 yrs  3-6 yrs  7-10 yrs  11-14 yrs  15-18 yrs
Results- Median DLP Trend by Age

0-2 yrs
3-6 yrs
7-10 yrs
11-14 yrs
15-18 yrs
Conclusion

- Considerable variation in the radiation dose index for pediatric head CT examinations.
- Participating institutions use different doses per age, but pediatric radiologists are still doing better.
- Participation in DIR and ability to benchmark local performance can help discover areas for improving pediatric doses.
- ALARA respects confidence levels of individual radiologists- having pediatric radiologists on staff can help reduce dose levels.
Thank You!

Questions?
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