



National Dose Guidelines Established for 10 Common Adult CT Examinations

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Using data from the [inShare](#) world's largest CT dose index registry, *Radiology* researchers have established U.S. national dose levels for the 10 most common adult CT examinations based on patient size. Healthcare facilities can optimize these exam protocols so that dose is commensurate with the size of the patient, avoiding unnecessary radiation exposure.

Results of the two-year study published online in *Radiology* established patient-size based diagnostic reference levels (DRLs) and achievable doses (ADs) for the 10 most common CT head, neck and body examinations, said lead researcher Kalpana M. Kanal, PhD, a medical physicist, professor and section chief in diagnostic physics in the department of Radiology at the University of Washington, Seattle.

While the impact of patient size on radiation dose is well established, national DRLs previously provided only one value for each examination based on a standard-size phantom representing an average patient, a single patient size or data averaged across all patient sizes.

In their research, Dr. Kanal and colleagues examined actual patient data from the American College of Radiology (ACR) CT Dose Index Registry to develop size-based DRLs that enable healthcare facilities to compare their patient doses with national benchmarks and more effectively optimize CT protocols for the wide range of patient sizes they examine.

"This extensive participation and totally automated complete capture of all patient examinations enabled the development of robust, clinically based national DRLs and ADs," Dr. Kanal said.

More than 1.3 Million Patient CT Exams Studied

Researchers accessed more than 1.3 million ACR CT Dose Index Registry examinations conducted in 2014 at 538 healthcare facilities throughout the U.S., located in primarily metropolitan and suburban areas as well as community hospitals.

For head examinations, researchers used lateral thickness as an indicator of patient size, while water-equivalent diameter was used for neck and body examinations.

Data from the 1.3 million CT exams provided median values, as well as means and 25th and 75th DRL percentiles for CT dose index (CTDIvol), dose-length product (DLP) and size-specific dose estimate (SSDE).

DRLs are typically set at the 75th percentile of the dose distribution from a survey conducted across a broad user base using a specified dose-measurement protocol. ADs are set at the 50th percentile of a dose distribution based on the fact that roughly 50 percent of facilities have already achieved doses at or below this value.

Results demonstrated that the new DRLs are not markedly different from those used in other countries. The publication on this research will be accessible to healthcare facilities worldwide through *Radiology* and on the ACR CT Dose Index Registry website that will publish highlights, Dr. Kanal said.

Accessing National Benchmarks

The use of DRLs has been shown to reduce the overall dose and the range of doses observed in clinical practice, Dr. Kanal said. In terms of using the benchmarks established in their research, she stresses that DRLs should be used to determine if a facility's dose indexes are unusually high, and are not to



Kanal

Web Extras

- Access the Radiology study "U.S. Diagnostic Reference Levels and Achievable Doses for 10 Adult CT Examinations" [here](#)

<http://pubs.rsna.org/doi/full/10.1148/radiol.2017161911>

- Access the American College of Radiology CT Dose Index Registry [here](https://www.acr.org/Quality-Safety/National-Radiology-Data-Registry/Dose-Index-Registry)

be used as target doses.

“Both ADs and DRLs are provided to encourage facilities to optimize dose to a lower level than that indicated by the DRL,” Dr. Kanal said. “Image quality must be taken into consideration when using DRLs and ADs to evaluate CT protocols on each scanner to determine if protocols are optimized.”

Ideally, facilities should analyze and compare their median and size-grouped dose indexes with the respective size-based ADs and DRLs. If size-grouped dose indexes are not available, they should compare their overall median indexes with the average DRLs and ADs across all patient sizes.

And if the CTDIvol or SSDE for a protocol is below its DRL but the DLP exceeds its DRL, the scan length should be reviewed.

“DRLs and ADs are not intended to be used for comparisons with dose indexes for individual patients,” Dr. Kanal said. “Implementation of DRLs and ADs is most effective if the facility has a system to automatically monitor patient dose indexes so that aggregate results may be evaluated.”

Going forward, the ACR Dose Index Registry will update its ADs and DRLs to capture future trends in CT scanners and radiation dose. Dr. Kanal and colleagues will expand their analysis to include high-dose studies and various scanner configurations and will develop DRLs and ADs for the pediatric population.

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