

Tracking Radiation Exposure From Medical Diagnostic Procedures

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Standardization of Dose Reporting

- Manufacturers have been collaborating through MITA on a number of fronts:
 - Development of **Dose Check standard** (NEMA XR-25 2010)
 - Facilitating adoption of **DICOM Dose Structured Reporting**
 - Developing standard content for operator's **manuals**
 - Supporting AAPM WGCTNP
 - Standardization of **CT Nomenclature**
 - Sharing of **Reference Protocols**
 - Supporting initial Dose Check notification and alert levels
- Consensus is needed within the professional societies and industry for EDE, organ dose, or size-adjusted dose

Variation in Reported Dose for Similar Protocols

- Scanner design variations: geometry, tube-to-isocenter distance, CTDI/mAS variation among tube models, etc.
- Tube-current modulation implementation differences among manufacturers (reference mAs, noise index, etc.)
- Tube-current modulation variation based on patient size or shape
- Differences among clinical goals (e.g., 'head' protocol may be used for both low-contrast detectability/relatively higher dose or for follow-up of shunts/relatively lower dose, etc.)

Equipment Features that Reduce Exposure

- **Scanner design** — Improved detector sensitivity, reduced scatter / increased photon efficiency, dose modulation, beam filtration, etc.
- **Image reconstruction** — newest iterative reconstruction algorithms reduce noise and require less dose
- **Intelligent protocols** — use patient information to better tailor dose to body habitus
- **Intelligent scan ordering** — combine all the dose initiatives (ACR's appropriateness criteria, protocol optimization, dose modulation, etc)

Training and Education

- User training is imperative for safe and confident use of scanners
- Transparency and simplicity of access to information
 - Clinical education website (www.theonlinelearningcenter.com)
 - Different levels of training based on utility (protocol creation, etc)
 - www.philips.com/CTDoseManagement ← [Image Wisely](#) link
 - Consistency among manufacturers — [AAPM WGCTNP](#)

Which Dose or Index Needs to be Reported?

- ICRP 103 *“The Commission considers it appropriate for radiological protection purposes to use age- and sex-averaged tissue weighting factors and adequate protection is sufficiently robust to achieve adequate protection for both sexes”*.
- Phantoms based on tomographic images with organ masses pursuant to ICRP 89 calculating absorbed dose > effective dose using weighting factors
- ICRP 103 *“This averaging implies that the application of this approach is restricted to the determination of effective dose in radiological protection and cannot be used for the assessment of individual risk”*.
- ICRP Task Group 79 “Effective Dose”

Radiation Dose Automatically Becoming a Part of Radiology Reports and EMR

- Data valuable to have (epidemiological studies, equipment comparison)
- Cloud-based reporting?