ACR Dose Index Registry

Priscilla Butler, MS  
Senior Director, Quality and Safety  
American College of Radiology

thanks to Mythreyi Chatfield, PhD  
nrdr@acr.org
Guiding Principles Behind ACR National Radiology Data Registries

Cyclic Quality Improvement Process

Transmit data to NRDR

Develop and implement improvement plan

Receive semi-annual national benchmarking report

Analyze results

CT Head without IV Contrast
CT Head (mGy) per Exam
What is the ACR Dose Index Registry?

• A tool for quality improvement so facilities can review dose indices and optimize protocols
  – Collects and compares dose index information across facilities
  – Fully automated; uses standard methods of data collection and processing (DICOM SR, IHE REM Profile, RadLex)
  – Will help to develop size-specific reference levels
• CT DIR launched in May 2011
What the ACR Dose Index Registry is Not

• It does **not** collect individual patient doses; only dose indices
  – CTDIvol
  – DLP
  – SSDE (although getting closer with SSDE, still not there yet)
• It does **not** collect patient identifiable information
  – HIPAA (Health Insurance Portability and Accountability Act of 1996) privacy concerns
  – Participation agreement
• It is **not** a mechanism to track individual patient dose
How Does the Dose Index Registry Work?

Scanner → DICOM SR → TRIAD Site Server → Anonymized DICOM SR → NRDR → Feedback Report
Challenges and Solutions

• Comparability
  – Procedure name standardization
  – Patient size adjustment

• Ability to capture data from new and old scanners
  – DICOM structured report for new scanners
  – OCR on dose screen for old scanners
Mapping Exam Names

*Procedure Name Standardization*

- Exam names mapped to Radlex Playbook
  - [http://playbook.radlex.org](http://playbook.radlex.org)
- ACR used external vendor, RadMapps, to map all exam names currently in the registry
  - ~ 21,000 unique exam names
- New facilities may choose to use third party tool or may use mapping tool on website. Suggested tags are provided if an exam name is already in the database.
Size-Specific Dose Estimate (SSDE)

- DIR allows sites to submit localizer images along with Dose Report
- Algorithm developed by Duke physicists will measure patient thickness from localizer

![Image of a localizer with patient thickness measurement]
Size-Specific Dose Estimate (SSDE)

**Patient Size Adjustment**

- Measure patient thickness (from AP or lateral image or average of the two)
- Calculate effective diameter
- Determine normalized dose conversion factor using effective diameter and phantom size (AAPM TG204)
- Apply conversion factor to CTDIvol to get SSDE
July 2013
Over 750 facilities/458 fully active; 4.8 million exams/8.5 million scans
Participation from a Variety of Practice Types Across the US

At least 2 facilities are outside of the US
Data

• Sample Feedback Report
  – Uploaded to registry website every six months
  – Available to all facility users

• Facility’s own data available at all times
  – Web-based reports
  – Displays exam details and comparisons of scanners
## Executive Summary: Facility 999999

**CTDvol Per Scan (mGy)**

<table>
<thead>
<tr>
<th>RPID Shortname</th>
<th>1: Site 999999</th>
<th>2: All DIR sites</th>
<th>3: Sites in location Metropolitan</th>
<th>4: Sites in the South</th>
<th>5: Sites of type Community hospital</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT ABD</td>
<td>(14/18/21)</td>
<td>(13/17/24)</td>
<td>(12/16/21)</td>
<td>(12/17/22)</td>
<td>(13/17/22)</td>
</tr>
<tr>
<td>CT ABD PELVIS KIDNEY CALC</td>
<td>(10/14/18)</td>
<td>(9/13/19)</td>
<td>(10/14/18)</td>
<td>(11/15/19)</td>
<td>(10/14/20)</td>
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<tr>
<td>CT ABD PELVIS W IVCON</td>
<td>(10/15/21)</td>
<td>(11/16/22)</td>
<td>(11/16/22)</td>
<td>(11/16/22)</td>
<td>(11/16/22)</td>
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<tr>
<td>CT ABD PELVIS WO &amp; W IVCO</td>
<td>(11/17/28)</td>
<td>(13/19/25)</td>
<td>(14/19/26)</td>
<td>(14/20/27)</td>
<td>(13/20/26)</td>
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<td>CT ABD PELVIS WO IVCON</td>
<td>(10/15/23)</td>
<td>(10/16/22)</td>
<td>(10/15/21)</td>
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<td>(11/16/23)</td>
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<tr>
<td>CT C SPINE WO IVCON</td>
<td>(26/40/69)</td>
<td>(20/30/49)</td>
<td>(21/31/49)</td>
<td>(22/34/52)</td>
<td>(20/31/56)</td>
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<td>(8/12/16)</td>
<td>(8/11/15)</td>
<td>(9/12/16)</td>
<td>(9/12/17)</td>
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<tr>
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<td>(11/16/22)</td>
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<tr>
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<td>(13/17/23)</td>
<td>(13/16/24)</td>
<td>(13/17/26)</td>
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<tr>
<td>CT CHST PULM ARTS EMBO W</td>
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<td>(13/21/33)</td>
<td>(14/22/33)</td>
<td>(14/23/36)</td>
<td>(13/22/35)</td>
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<tr>
<td>CT CHST W IVCON</td>
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<td>(9/13/20)</td>
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<td>(10/14/20)</td>
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<td>CT HEAD SINUSES WO IVCON</td>
<td>(13/26/47)</td>
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<tr>
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<td>(13/22/48)</td>
<td>(14/19/33)</td>
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</table>
For Each Exam, Facility Data are Compared to that of Similar Facilities
# Results of Dose Information by Exam

## Dose Information by Exam

**06/01/2010 - 07/31/2010**

<table>
<thead>
<tr>
<th>Facility ID</th>
<th>Study</th>
<th>Institution</th>
<th>Total CTDIvol (mGy)</th>
<th>Total DLP (mGy.cm)</th>
<th>Study Date</th>
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<tbody>
<tr>
<td>100001</td>
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<tr>
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Additional Benefits of DIR for Radiologists, Medical Physicists and Facilities

• Free webinars led by ACR DIR committee to answer questions

• Participation in DIR supports US quality initiatives:
  – Certified as PQI (Practice Quality Improvement) project for ABR MOC (Maintenance of Certification)
  – Supports CMS’s PQRS (Practice Quality Reporting System) measure for 2014 on participation in national dose index registry
  – Endorsed by the National Quality Forum
Coming Soon to DIR

- CR/DR later this year
  - RDSRs
    - Pilot in summer, anticipated launch in Fall
- New report format for online reports
- Identifiable data available to facilities, with transmission of anonymized data to registry
Challenges with Patient Dose Tracking

- What is the most appropriate metric for assessing patient dose?
- How to automatically determine individual patient doses?
- Once you have a dose, what does it mean to the patient regarding his/her overall health diagnosis, management and future?
- How will this information impact healthcare decisions?
- How do dose mandates impact dwindling healthcare dollars?
- Rather than looking at this retrospectively, should we be focusing proactively on the “right” exam being done, at the “right” time and the “right” way?