Professional Symposium
Voluntary Dose Reporting Standards

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Columbia University
Presented at AAPM
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Application to all imaging modalities

• Today’s focus is on interventional fluoroscopy
  – Some procedures require significant radiation dose.
  – Reasonable standards are available.
  – Equipment is relatively new.
• Standards based CT dose reporting is available
  – Not discussed in detail today.
• Straightforward extension to other modalities
  – General radiography and fluoroscopy
  – Mammography

Stakeholders

• Patients
• Patient surrogates
  – Health care professionals
  – Facilities
  – Professional organizations
  – Health and regulatory authorities
• Imaging equipment suppliers

Is dose tracking and reporting new?
Why bother?
Cancer risk to population
Operators did not know that they inflicted these injuries

Why should I do anything?
• It is the right thing to do
  – Funding?
• Need to do it to stay out of court
  – Malpractice insurance
• Need to do it to get paid
  – CMS or other payer mandate
• Need to do it to stay out of jail
  – Regulatory requirement

Deming Cycle

How to voluntarily monitor dose
• Local Dose Tracking Process
• Proprietary Support Processes
• Standards Based Process
Proprietary Reports

- Most manufacturers can supply some form of proprietary radiation report to a facility.
  - Individual procedure reports
  - Summary reports.
- Difficult to compare data from systems supplied by different manufacturers.
Standards

- Why standards
  - Multi-vendor interoperability
  - Market demand
  - Regulatory mandate
- Standards writers
  - Industry
  - Customers and users
  - Regulatory community
  - Patients

Standards Based Reporting

- Needed for multi-vendor environments
- Expected to meet the needs of all stakeholders.
- Simplifies implementation of local data management
- Enables “regional” data management
Limitations of Headers and MPPS

- DICOM image headers usually only report data on their own images.
- No images ... No data
- MPPS has limited compatibility with facility data systems
- Proprietary fields may contain key data.

OPEN STANDARDS
Radiation Dose Structured Report

- DICOM object that is designed to be handled independently from any images.
- All irradiations are reported
- Organization Attribute: Value pairs as defined in DICOM
- Expandable format with all public fields.
- Object to be managed & transported like other DICOM objects
- Near real-time streaming is included in the specification.

IEC PAS 61910-1

- Focus on fluoro guided interventions.
- Includes most of projection radiography
- Two compliance levels available based on expected doses for normal use.
- X-ray generator is the data source.
- Specification includes both network and “sneaker-net” data transfer.
- Evolution to IEC Standard in progress

Extract of processed RDSR I

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Irradiation Events

- µGym²
- Gy

- Time: 08:50:14
- Event Type: Fluoroscopy
- Acq. Protocol: FL Norm Card  Sharp 16
- DAP Total [Gym²]: 0.006972
- Fluoro DAP Total [Gym²]: 1.03154
- Total Acquisition Time [s]: 54
- RP Definition: 15 cm from isocenter toward Source

Extract of processed RDSR II

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ACTOR expectations

- Skin dose maps
  - Retrospective and real-time
- Tracking patients over multiple procedures and facilities
- Interfaces with external databases
- Automated process control
  - Statistical quality management
  - Automated alerts

Purposes of dose monitoring

- Any procedure
  - Detect facility variance with expected performance.
  - Detect system or operator variance with facility norms.
- Intervventional procedures
  - Detect individual patients at risk for tissue reactions.
- Collect data to obtain state of practice.

Dose data should be used clinically!

- Any procedure
  - Detect facility variance with expected performance.
  - Detect system or operator variance with facility norms.
- Intervventional procedures
  - Detect individual patients at risk for tissue reactions.
  - Collect data to obtain state of practice.
Location of reference data centers

- Professional associations
  - Specialized requirements could impede intra-specialty cooperation
- Payers
  - Data may be affected by patient pool
- Public health agencies
  - Minimal HIPAA issues
- IAEA – SAFRAD
- Regulatory
  - UK “misadministration” centre

Using dose measurements

When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind.

Lord Kelvin (1824 - 1907)