Radiologic Safety in the IR Suite Related to Surveys by Regulatory/Accrediting Agencies

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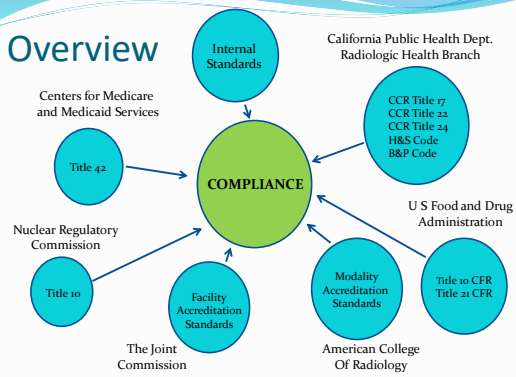
Overview



Traditional

TIME

DISTANCE

SHIELDING

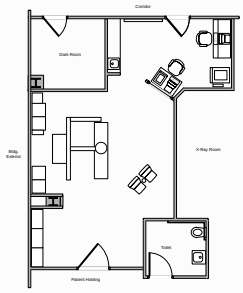
Room Considerations

Shielding Design

- Weekly Exposure Levels
- Occupancy Factors
- Use Factors
- Workload (mA-min/wk)
- Tube Potential

Construction

Evaluation



Room Considerations

Lighting

Sterility

- Airflow
- Routine cleaning
- Terminal cleaning

Patient Communication

Patient Visibility

Signage

Interlocks/Security

Emergency Power

Imaging Equipment

Equipment Selection

Installation/Testing

Safety Factors

Quality Assurance

Maintenance

- Preventive
- Regular

Operator Shielding

Weight Loading

Dose Monitoring

Patient Considerations

Instructions/Consent
Who
What
How
Risks (including radiation effects)
Time Out
Patient Shielding
Collimation
Pulsed Fluoroscopy
Auto Pre-processing
Post Processing
Dose Documentation

Patient Considerations

- Drain ascites before a TIPS procedure to reduce patient size
- Obtain a thorough medical history to determine previous radiation-related procedures involving potentially high skin doses; consider including the potential for skin injury in the patient consent, especially if: the patient is large and/or the procedure could be prolonged.
- If a previous radiation history exists, examine the patient for signs of skin changes and try to avoid added irradiation, if possible
- Pregnancy?

Patient Considerations

Review medical history for conditions that might increase radiation sensitivity, such as:

collagen vascular disease (particularly scleroderma, discoid lupus erythematosus or mixed connective tissue disease)

diabetes mellitus

hyperthyroidism

homozygosity for ataxia telangiectasia

sensitizing chemical/pharmaceutical agents

Personnel

- Aprons
- Thyroid shields
- Eye protection
- Time/Distance
- Dosimetry
  - Personal
  - Environment (e.g. Dose Aware)
- Certification/Training

Interview

Yul Brynner as Ramses in The Ten Commandments

TJC Standards That Affect Diagnostic Imaging Services

- Environment of Care
  - EC.02.01.01: The hospital manages safety and security risks.
  - EC.02.02.01: The hospital manages risks related to hazardous materials and waste.
  - EC.02.04.01: The hospital manages medical equipment risks.
  - EC.02.04.03: The hospital inspects, tests and maintains medical equipment.
  - EC.02.06.05: The hospital manages its environment during demolition, renovation or new construction to reduce risk to those in the organization.

TJC Standards That Affect Diagnostic Imaging Services

- Human Resources
  - HR.01.02.05: The hospital verifies staff qualifications.
  - HR.01.05.03: Staff participate in ongoing education and training.
- Medication Management
  - MM.06.01.01: The hospital safely administers medications.

TJC Standards That Affect Diagnostic Imaging Services

- Patient Care
  - PC.01.02.15: The hospital provides for diagnostic testing.
- Performance Improvement
  - PI.01.01.01: The hospital collects data to monitor its performance.
  - PI.02.01.01: The hospital compiles and analyzes data.

Specific Impacts: Fluoroscopy and Radiotherapy

- Joint Commission Perspectives, December 2005, Volume 25, Issue 12:
  - Announced the addition of specific radiation doses to list of reviewable sentinel events for 2006:
    - "Prolonged fluoroscopy with cumulative dose>1500 rads to a single field or any delivery of radiotherapy to the wrong region or >25% above the planned dose."

Specific Impacts: Diagnostic Imaging

- *Radiation risks of diagnostic radiology* was published in Sentinel Event Alert, Issue 47, August 24, 2011.
  - Addressed the TJC's concerns regarding radiation risks associated with diagnostic imaging.
  - Identified "contributing factors" to eliminate avoidable radiation dosing.
  - Suggested actions healthcare organizations can take to reduce risks from "avoidable" diagnostic radiation:
    - Right test
    - Right dose
    - Effective processes
    - Safe technology
    - Safety culture

Revised Requirements for Diagnostic Imaging Services

Revisions are effective as of July 1, 2014

Environment of Care (EC)

- **Standard EC.02.04.01: The hospital manages medical equipment risks.**
  - 7. The hospital identifies quality control and maintenance activities to maintain the quality of diagnostic images produced. The organization identifies how often these activities should be conducted.

Environment of Care (EC)

- **Standard EC.02.04.03: The hospital inspects, tests and maintains medical equipment.**
  - 15. The hospital maintains the quality of the diagnostic images produced.
  - 17. For hospitals that provide diagnostic computed tomography (CT) services: At least annually, a diagnostic medical physicist does the following:
    - Measures the radiation dose (in the form of volume computed tomography dose index (CTDIvol)) produced by each diagnostic CT imaging system for the following CT protocols: adult brain, adult abdomen, pediatric brain and pediatric abdomen. If one or more of these protocols is not used by the hospital, other commonly used CT protocols may be substituted.

Proposed Standards Revisions that Relate to Fluoroscopy Services

Proposed March 5, 2018; Request for Comments

Element(s) of Performance EC.02.04.03

The hospital inspects, tests, and maintains medical equipment.

34. For hospitals that provide fluoroscopic services: At least annually, a diagnostic medical physicist or health physicist conducts a performance evaluation of fluoroscopic imaging equipment. The evaluation result, along with recommendations for correcting any problems identified, are documented. The evaluation includes an assessment of the following:

Beam alignment and collimation

Tube potential/kilovolt peak (kVp) accuracy

Beam filtration (half-value layer)

High-contrast resolution

Low-contrast resolution

Exposure rate for typical exams

Maximum exposure rate

Patient dose display accuracy (where applicable)

Automatic dose rate and automatic exposure control performance

Element(s) of Performance HR.01.05.03

Staff participate in ongoing education and training.

14. The hospital verifies and documents that individuals who perform diagnostic computed tomography (CT) and/or fluoroscopic examinations participate in ongoing education that includes annual training onn the following:

- Radiation dose optimization techniques and tools for pediatric and adult patients addressed in the Image Gently®, Image Gently-Step Lightly®, and Image Wisely® campaigns
- Safe procedures for operation of the types of CT and fluoroscopy equipment they will use

Element(s) of Performance LD.04.01.05

The hospital effectively manages its programs, services, sites, or departments.

25. For hospitals that provide fluoroscopic services: The hospital designates an individual to serve as the radiation safety officer. This individual is responsible for making certain that radiologic services are provided in accordance with law, regulation, and organizational policy.

Element(s) of Performance PC.01.02.15

The hospital provides for diagnostic testing.

13. For hospitals that provide fluoroscopic services: The reference-air kerma, cumulative-air kerma, or kerma-area product are documented in a retrievable format. For fluoroscopy equipment that is not designed to display reference-air kerma, cumulative-air kerma, or kerma-area product, fluoroscopy time and number of images acquired are documented in a retrievable format, such as a picture archiving and communication system.

Element(s) of Performance PC.01.03.01

The hospital plans the patient's care.

25. The hospital establishes or adopts diagnostic computed tomography (CT) and fluoroscopy imaging protocols based on current standards of practice, which address key criteria including the following:

- Clinical indication
- Contrast administration
- Age (to indicate whether the patient is pediatric or an adult)
- Patient size and body habitus
- For diagnostic computed tomography: The expected radiation dose index range
- For fluoroscopy: Expected ranges for the reference-air kerma, cumulative-air kerma, kerma-area product and fluoroscopy time. For fluoroscopy equipement that is not designed to display reference-air kerma, cumulative-air kerma, or kerma-area product, expected ranges for fluoroscopy times are addressed in protocols.

Element(s) of Performance PC.01.03.01

The hospital plans the patient's care.

26. Diagnostic computed tomography (CT) and fluoroscopy imaging protocols are reviewed and kept current with input from an interpreting physician, medical physicist, and lead imaging technologist to make certain that they adhere to current standards of practice and account for changes in CT and fluoroscopy imaging equipment. These reviews are conducted at time frames identified by the hospital. (For hospitals that use Joint Commission accreditation for deemed status purpose, refer to MS.06.01.03, EP 9 for supervision of radiologic services)

Element(s) of Performance PC.02.01.01

The hospital provides care, treatment, and services for each patient.

30. For hospitals that provide fluoroscopic services: The hospital establishes criteria for patient follow-up to assess for adverse radiation effects when the reference-air kerma, cumulative-air kerma, kerma-area product or fluoroscopy time exceeded expected ranges identified in fluoroscopy imaging protocols.

Element(s) of Performance PI.02.01.01

The hospital compiles and analyzes data.

30. For hospitals that provide fluoroscopic services: The hospital reviews and analyzes incidents where the reference-air kerma, cumulative-air kerma, kerma-area product or fluoroscopy time exceeded expected ranges identified in fluoroscopy imaging protocols. For fluoroscopy equipment that is not designed to display reference-air kerma, cumulative-air kerma, kerma-area product, only fluoroscopy times that exceeded expected ranges are reviewed and analyzed by the hospital.

"Questions are the creative acts of intelligence"

Frank Kingdon