RADP 215: Radiation Protection

Best Practices for Minimizing Dose to Imaging and Support Personnel

MRT Program

Radiation Safety Roles in Medical Imaging

- All Medical Imaging staff are responsible for radiation safety
- Governing Bodies
  - Health Canada
    - Safety Code 35
  - The College of Physicians and Surgeons
  - Canadian Association of Medical Radiation Technologists (CAMRT) and provincial colleges

Fundamental Rules of Protection

- Rules for staff protection:
  - TIME: Decrease time in room
  - DISTANCE: Increase distance from tube and patient
  - SHIELDING: Always use protective shielding

ALARA also applies to our exposure

Protection from Radiation

- Three types of radiation that may be in an X-ray room:
  - Primary
  - Scatter
  - Leakage
- Protection of staff from radiation must be considered if patients need to be restrained or assisted during a procedure
- Where you stand is very important!
- As beam energy increases, forward scatter also increases

Scatter and Leakage

- Patients are the greatest radiation hazard to the technologist!
- Scatter radiation from the patient
- Important to reduce exposure to that scatter
- During an exposure, individuals in the room should be:
  - Positioned at 90° to primary beam

Scatter and Leakage

- Occupational exposure is greatest in fluoroscopy and interventional procedures for all staff
- Table head and foot have the most scatter in fluoroscopy and CT
- Several means to protect staff from scatter radiation:
  - Protective equipment
    - Image intensifier curtain
    - Bucky slot shielding device
    - Operator shield
      - Mobile walls

Tech Protection and Patient Safety

- When restraining or supporting a patient during an exposure:
  - No one other than the patient should be exposed to the primary beam
  - Technologists should never stand in the primary beam
  - Other support personnel should always be positioned with awareness of location of hands and arms in regard to the primary beam

Protection and Safety

- If the patient cannot follow instructions:
  - Immobilization of a patient is preferred over exposing staff
  - Mechanical restraints explained well and correctly used may be successful
- Human restraints are a **last resort**
- When human restraints are required:
  - Non-occupationally exposed individuals can be asked to hold
  - Some individuals are a better choice than others for radiation safety

Protection and Safety

- Technologist is responsible for positioning the individual holding the patient.
- Ensure the individual is not in the primary beam and is protected from scatter and leakage.
- Individual must wear all the appropriate lead protection.
- No individual should routinely hold patients (including male RNs, radiation aides, security staff or caregivers).

Protection and Safety

- Pregnant women are never permitted to hold a patient!
- Best options for asking an individual to help restrain a patient:
  - Male or female past reproductive age
    - 1st choice: family member, friend or personal caregiver
    - 2nd choice: non-radiology hospital staff
- Any one of these individuals has the right to refuse the request.

Protection and Safety

- Best practice suggests radiology staff is the last resort, but sometimes:
  - There are time constraints
  - Non-occupational individuals not available
  - More efficient for a tech to hold
- Techs must wear all the lead protection available, including gloves and collar monitor
- Holding of the patient by a tech should always be reported and documented (as per best practices)

Protective Equipment

- Protection from **secondary** radiation

- Lead (Pb) aprons (full and ½)
  - Minimum is 0.35 mm Pb where peak kVp is between 100-150kVp

- Shielded barriers
  - Wall: 0.3–2.0 mm Pb
  - Hanging: 0.5 mm Pb (ceiling mounted)

Protective Equipment (cont'd)

- Gloves
  - 0.25 mm Pb equivalency (minimum)
- Glasses
  - Lead equivalent/leaded glasses is recommended where scatter radiation to the lenses of the eye could approach the annual equivalent dose limit – interventional procedures
- Thyroid Collars
  - 0.50 mm Pb recommended

Conclusion

- Basic rules prevail:
  - Never be in the primary beam
  - If you don't need to be there, don't be there
  - Stay as far away as you can

- Use all the protective lead provided:
  - Aprons, thyroid collars, gloves and glasses
  - Protective curtains and mobile walls