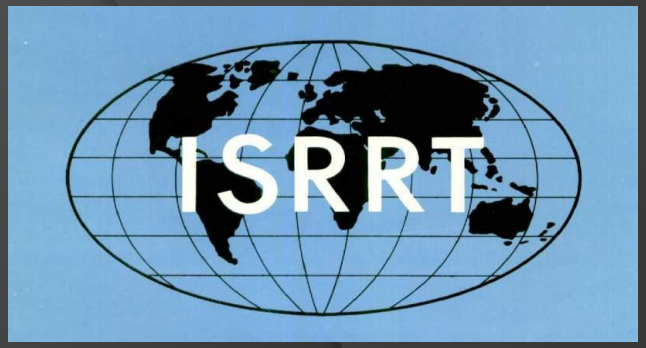


Donna Newman B.A. RT (R) CNMT
Director of Professional Practice ISRRT

OCCUPATIONAL RADIATION PROTECTION IN MEDICINE - THE WAY FORWARD: A TECHNOLOGIST PERSPECTIVE

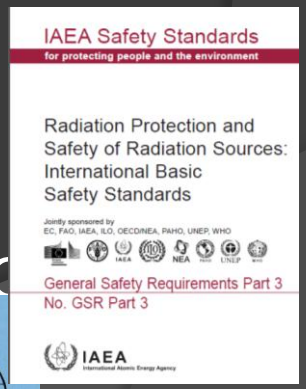
Responsibilities Worker (BSS 3.83)

Workers shall:

- follow any applicable rules for protection
- use properly the monitoring devices and the protective equipment and clothing provided
- co-operate with the licensee with respect to protection

Factors affecting technologist exposure(Occupational Dose Exposure)

- How use x-ray system
- Whether protective measures used
- Optimization of patient dose
- Number of procedure performed
- Height of technologist
- New Multi Modality(Hybrid Imaging) PET/CT, SPEC PET/MRI



Occupational Radiation protection is a shared responsibility: Imaging Team(Radiologist, Medical Physicist, Radiologic Technologist)

What is the Technologist Role?

- ICRP 2008 Recommendations
  - Justification, Dose Limitations ,Optimization of protection
- **Optimize Operating parameter of you Imaging System – Quality Assurance Program and Quality Control Program**
- Use recommended **International guidelines** that are available to assist in optimization of image quality and radiation dose
- Become familiar with Professional Organization's and website's that are internationally accepted for **best practice** for dose reduction
- Ensure **Qualifications of Staff** Initial and yearly Competency check list
- Radiation Protection guidelines in line with new scientific knowledge (**Hybrid Imaging-** PET/CT, PET/MRI, SPECT/CT)
- **ALARA=Time ,Distance and Shield**

Technologist Protection: By Modality

- Diagnostic Radiology
  - Control Booth ,Exposure button /connected to a cord, Lead glass, X-ray tube always pointing to the receptor/ SFOV for beam collimation
  - Portable machine- 6 ft cord, lead apron (6 Ft and at 90 degree angle)
  - Properly position patient reduce non targeted tissue and use tight collimation
  - Effective Immobilization strategies young patients(age 5 under) more effective then manual physical restraints by staff, to avoid motion
  - Shielding- Eye protection, Face protection, Thyroid protection, Hand protection

Technologist Protection: By Modality

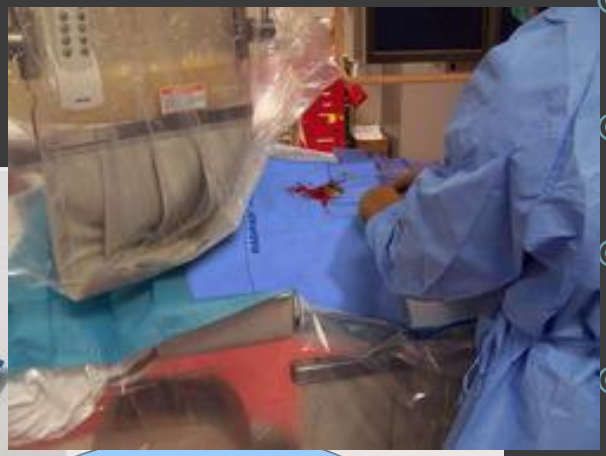
- Nuclear Medicine/PET
  - Protective clothing/Use Syringe Shields, lab coat and gloves, absorbent pad
    - Contamination monitor
  - Shields-Bench top shield,Vial shields,Syringe shield
    - forceps, tongs

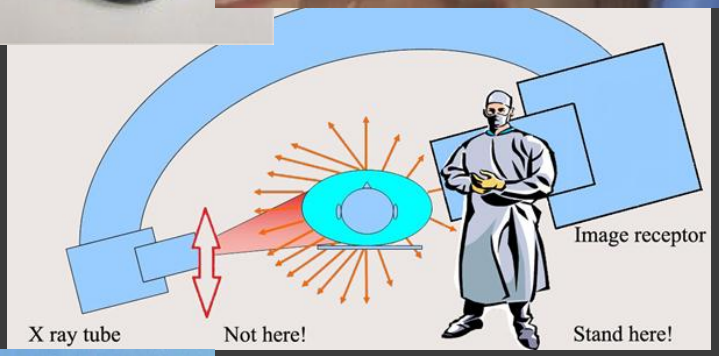
- CT
  - Adjust CT doses to patient size, Beam Ma Modulation
  - Automatic dose reduction methods in CT scanners with optimal x-ray tube voltage
  - Standardize CT protocols; periodic review
  - Ct Collimation to reduce scatter
  - Pitch
  - Develop CT QC programs

Special consideration for I-131 Therapy

Post processing and real time noise reduction algorithms for DR, CT and Fluoro

3 Principles of Radiation Protection: Time, Distance and Shielding Applications Fluoro and C-arm (Diagnostic, Interventional , OR





- Minimize Fluoro Time: last hold, tap instead of continuous
- Position patient /as far from x-ray tube tight collimation
- Protocol's with x-ray tube opposite the operator
- Personal protective gear/ lead apron, Thyroid shield, lead eye wear
- Equipment shielding/ Ceiling shields, table shield, patient shielded tarps,

Wear personal Dosimeter/
Use lowest Dose possible

Lessons Learned : Radiation – associated Cataracts

Two separate studies in 2010 Studied Cataracts in Interventional procedure and concluded:

"Without proper eye protection health care professionals were at higher risk of developing cataract"

2011(ICRP)

Based this data 2011 the international commission on Radiological protection (ICRP) reduced the lens threshold value of absorbed dose for cataract form" 3.0 Gy to .50 Gy"

Radiation cataract risk in interventional cardiology personnel, radiation Res.,Vano e. 2010:174(4):490-495

Risk for radiation –induced cataract for staff in interventional cardiology: Is there a reason for concern?, Ciraj-Bjelac O, Catheter Cardiovasc Interv. 2010:76(6):826-834

Conclusion: Team approach(Radiologist, Physicist and Technologist)

- Better QA and QC standardization needed in all countries
- Close the gap the exist in radiation protection programs world wide
- Ensure that all workers have access to radiation protection devices (aprons, thyroid shield, lead eye wear)
- Non- traditional educational material available on the newest hybrid equipment (PET/CT, PET/MRI, SPECT/CT ect.) best practice information