Radiation Safety Program
Management

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Disclosures

- Nothing to disclose.
Objectives

- Essential Components of a Radiation Safety Program
- RSO Responsibilities
- Fundamental Regulatory Requirements
- Commonly Encountered Issues
- Special Program Considerations
Program Components

- Radioactive Materials License
- Machine Registrations/Licenses
- Radiation Safety Committee
- Radiation Safety Officer
- Radiation Safety Manual
- ALARA Program
- Training Program
- Monitoring Program
Scope of Program

• Radioactive Materials License
  • Isotopes, Form, Use, Quantity
  • Conditions (specific and general)
  • RSO
  • Personnel Authorizations: AU, AMP

• Machine Registrations/Licenses
  • Radiological Imaging and Therapeutic Equipment
  • Mammography License
  • Registrations of Service
# Regulations

<table>
<thead>
<tr>
<th>Description</th>
<th>US NRC</th>
<th>MA DPH RCP</th>
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</thead>
<tbody>
<tr>
<td>General Provisions, Standards for Protection Licensing, Enforcement, Records, Reports, Registration of Machines and Services*</td>
<td>10 CFR Multiple Parts</td>
<td>105 CMR 120.001 through 105 CMR 120.299</td>
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<tr>
<td>Machine-Produced Radiation for Medical Use</td>
<td>-</td>
<td>105 CMR 120.400</td>
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<tr>
<td>Medical Use of Radioactive Material</td>
<td>10 CFR 35</td>
<td>105 CMR 120.500</td>
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<tr>
<td>Notices, Instructions and Reports to Workers, Inspections, Transportation</td>
<td>10 CFR 19, 71</td>
<td>105 CMR 120.750</td>
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</tbody>
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Regulatory Guidance

- Regulations
  - State Regulations: Unofficial Web Version?
- NRC / Agreement State
  - Licensing Guides (NUREG-1556)
  - Guidance Documents, Publications, Reports
- NCRP Reports
- AAPM Task Group Reports
Personnel Authorizations

• Authorized User
  • Unsealed:
    • Imaging, Localization, Uptake, Dilution, Excretion Studies
    • Therapeutics
  • Sealed Sources:
    • Manual Brachytherapy
    • Afterloader Brachytherapy, Teletherapy, Gamma SRS
    • Ophthalmic Use of Sr-90
    • Diagnostic Use
  • Machine-based Radiation Therapy*

• AMP, QMP, QMP(RT)
• RSO
• Nuclear Pharmacists
Exposure Limitations

- Member of the Public: 1 mSv / year (5 mSv for patient release purposes)
- Radiation Worker: 50 / 150 / 50 mSv / year (Minors 10%)
- Pregnant Radiation Worker: 5 mSv (Recommended 0.5 mSv / month)
- Radiation Worker Vs. Everyone Else:
  - Training
  - Exposure supervised by Radiation Safety Program

\[ \text{TEDE} = \text{EDE} + \text{CEDE} \]

Whole Body Limit…………..5 mSv

\[ \text{TDE} = \text{DDE} + \text{CDE} \]

For a given Organ/Tissue…..50 mSv

LDE often Limiting in Fluoroscopy
Authorized Users

- Approved by Regulator or RSC for Broad-Scope Licensee
- Training Requirements
- Directs / Supervises Administration of Radioactive Material
- Responsibilities must be clearly defined
- AU must understand scope of supervision and authorized uses
- All staff involved must understand this chain-of-command and control
- Radiation Safety Vs. Practice of Medicine
- Written Directive: AU Intent and actual delivery
- Medical Event: Deviation from AU Intent as defined in Written Directive
Nuclear Medicine

- Contamination Control: Packages, Areas, Patients
- Dose Calibrator QA
- Spill Procedures / Preparedness
- Therapeutics: I-131, Y-90 Microspheres, Ra-223
- Patient Release Decisions
- Record Keeping
- Surveys: Daily, Weekly, Procedure-Specific, AS NEEDED
- Medical Event / AU Awareness
- RSO Audits
- Signage, Labeling
Imaging

- Fluoroscopically Guided Procedures, Portable Systems
- Lead Apparel:
  - 0.5mm Pb Eq. Apparel  Transmission ~ 5 -10%
  - X-ray Protective Eyewear  Reduction by at least a factor of 2 or 3
- Training
  - Staff and Non-Radiology Operators (Credentialing)
- Patient Dose Evaluations (2 Gy)
- Pregnant Staff
Radiation Oncology

- HDR Emergency Procedures
- Security of Sources
- Inventory Tracking
- Quarterly Surveys of Brachytherapy Storage Areas
- Medical Event Awareness and Understanding
  - AU Intent = Written Directive
  - Permanent Brachytherapy
Disposal / Waste

- Decay-in-Storage
- Vendor Exchange / Return
- Patient Excreta
- Sanitary Sewer
- Waste Brokers / Permanent Disposal
  - CRCPD
  - NNSA ORS
Routine Tasks

• Source Inventory
• Leak Testing
• Surveys
• Calibration/Testing of Instruments
• Compliance Audits
• Review of Personnel Monitoring
• Inspections
Training Programs

• Radiation Workers: Annual Training
• Electronic Media
• Imaging, Nuclear Medicine, Radiation Oncology
• Content:
  • Fundamentals
  • RadBio, risks
• Non-Radiation Workers: Security, ES, Code Team
• Fluoroscopy Credentialing
• Ad Hoc Training / Meeting with Staff
• DOT Training
Monitoring

- Required:
  - Adults: 10% Limit  Minor and Pregnant Personnel: 1mSv
  - Personnel entering High and Very High Radiation Area (1mSv/h 30cm, 5 Gy/h 1m)
  - Fluoroscopy Operators

- Double vs. Single Monitor Schemes

- Extremity monitors

- Area Monitors

- Electronic Monitors: NAVLAP or non-accredited

- ALARA Investigation Levels (10% / 30% Quarterly)

- Managing the Scope of a Monitoring Program
Security

• General Requirements
• Quantities of Concern
  • 10 CFR Part 37 & Agreement Statement Implementation
  • NRC National Source Tracking
  • Dedicated Security Inspections
  • NNSA Office of Radiological Security
Questions?