NUCLEAR MEDICINE INSPECTIONS-WHAT PROBLEMS DO WE FIND AND WHY

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Nuclear Medicine-then and now

- Many procedures and techniques are the same
- Recordkeeping has evolved and become more electronic
- Personnel comes and goes
- Training: DOTD, in house, annual

Posting Requirements

- Louisiana Radioactive Material(s) License
  - Radiation Safety Officer (RSO)
  - Authorized Users & Types of RAM
- Louisiana Regulations
  - Chap. 1, 3, 4, 7, &10 (available online at LDEQ.la.gov)
- Operating and Emergency Procedures
  - Approved procedures from RAM Application
- DSC-3 "Notice to Employees"
  - DEQ Emergency Telephone Numbers
ALARA
As Low As Reasonably Achievable

- Must have written ALARA program
  - How is the licensee going to maintain doses and releases of RAM to unrestricted areas ALARA?
  - Commitment by management to keep occupational doses ALARA.

Radiation Officer & Radiation Safety Committee

- Radiation Safety Officer (RSC) - is the individual responsible for the day-to-day radiation program.
- Write and implement a RAM program.
- Is usually a Doctor or a Physicist.
- The RSO must be listed on the Louisiana RAM license.

- Radiation Safety Committee (RSC) is only required to form a membership if the facility is a medical institution. (In-patient)
- Must meet quarterly and consist of at least an authorized user, the RSO, and a representative of management.

Authorized Users

- Must be listed on the RAM License
- Must be immediately available to communicate with the supervised individual.
- Must be able to be physically present and available to the supervised individual on one hours notice.
Personnel Monitoring

- CNMT must wear dosimeters to determine his/her monthly exposure.
  - Whole body badge is worn on the outside of the shirt collar.
    - Sometimes called Film, TLD or Luxel Badges.
  - Extremity badge is worn on the finger most likely to receive the highest exposure.

Radiation Safety

- Annual training must be provided for all technologists
- DOTD training must be done every three years for anyone packaging material for shipment
- An annual review of the program including the types of RAM used is required for all nuclear medicine licensees
- Number and types of procedures performed at the facility

Initial inspection issues

- Important to update the license to add and DELETE authorized users
- Must have an RSO listed who can be available
- Annual Radiation Safety Training and program review required for ALL licensees
- Department procedures should be accurate
  - Update with new equipment
  - Update with new personnel (including monitoring)
  - Update with new testing procedures
  - Update with facility changes (including additional sites of use)
Receiving and Opening Packages

- The technologist must monitor the external surface of the package before opening.
  - visually inspect it for damage
  - measure radiation levels $< 10$ mR/hr @ 1 Meter
  - $< 200$ mR/hr @ surface
  - wipe test for removable contamination $< 0.01$ μCi

- If a package is delivered after hours the tech has no later than three hours from the beginning of the next work day to check it.

Dose Calibrators

- Dose calibrators are used to check activity of prescribed dose.
- The calibrator must be checked for constancy with a dedicated check source before it is used for the day.
- Quarterly linearity checks.
- Annual accuracy checks.
- Geometry- must be checked and installation and after any move or repair.

Assay of Radiopharmaceutical Doses

- The activity of each dose must be measured, using the dose calibrator, 30 minutes before medical use. - for doses above 10 μCi
- Records must include:
  + Name or Abbreviation of RAM
  + Lot #
  + Exploration Date
  + Activity at Time of Assay
  + Radiospecies
  + Time of Assay
  + Patients Name and ID
  + Initials of person performing it
  + Time and date of administration
Daily Surveys

- A survey shall be made of all areas where RAM is prepared and used by the end of each day.
- Must be done with a calibrated survey meter. (annual calibration sticker can be found on the side the meter)
- Sketch of areas surveyed.
- Survey storage areas weekly.
- Records should contain:
  - Date
  - Area Surveyed
  - Sketch of the area
  - Background
  - Meter Used
  - Results in mR/hr
  - Action Levels (usually 2X Background)
  - Initials of Surveyor

Weekly Wipes

- A wipe, for removable contamination, shall be done once a week.
- Instrument used to count the wipe is usually a well-counter.
- Some pharmacies provide this service for the hospital/clinic.
- Records should include:
  - Date
  - Sketch of Areas wiped
  - Action levels
  - Instrument used to count
  - Wipes
  - Wipe results in dpm/100 cm²
  - Initial of Person

Camera Quality Control

- Quality control of image equipment (gamma camera) must be performed at the recommendation of the manufacturer or by approved procedures.
- Usually floods are performed daily and bars are performed weekly.
  - Floods (Daily)- checks uniformity of image
  - Bars (Weekly)- checks the resolution of image
Disposal of Radioactive Waste

- Most waste is sent back to the nuclear pharmacy.
- The left over waste is usually decayed in storage, then thrown in ordinary trash or bio-hazard trash cans.
  - Hold RAM test for 10½ lives.
  - Can't be distinguished from background.
  - All labels have to be removed.
  - Must keep records of disposal.
  - Background usually varies from 0.001-0.01 mR/hr. Could be much different depending where you are.

Recordkeeping Issues

- Frequency of testing not met
- Use of part time and contract technologists
  - Electronic QC programs—do the full time techs have a password and know how to use/access the system
- Computer programs/back up and failures
  - Must be able to demonstrate compliance to the inspector at the inspection (pull up old records)
  - What happens when the system fails

Recordkeeping Issues

- Testing procedures not the same as those outlined in the O & E's (not updated to reflect new equipment)
- What about tests not kept in the online system
  - Disposal records
    - What is returned to the pharmacy
    - What is held at the facility
Caution Signs

- Posting of areas or rooms where licensed sources are stored or used. "Caution Radioactive Material(s)"
  - Post it if amount is 10X the amount in Appendix C
  - Tc-99m 1000μCi = 1μCi
    - Caution Sign required if amount is over 10μCi of Tc-99m
  - Do not need signage if RAM is used or stored for less than eight hours provided.
    - Source is constantly attended to
  - Is not a radiation area >5mr/hr @30cm
  - In a radiation area the posting should read "Caution, Radiation Area" and "Caution, Radioactive Material(s)"

Labels

- All sources must be labeled with the:
  - Caution Symbol
  - Kind of RAM
  - Amount of RAM

(This includes syringes from the pharmacy.)
Security of Stored Sources of Radiation

- Licensee shall secure licensed radioactive material (RAM) from unauthorized removal or access.

Sealed Sources

- Hospitals use sealed sources, not liquids, for calibrating equipment such as the gamma camera and the dose calibrator. Sealed sources are also used for patient therapy.
- Leak tests must be performed every six months if required
- There must be an annual inventory on all sealed sources.
  - Even if the facility only has one or two sources

Administering the Dose

- The Certified Nuclear Medicine Technologist should be wearing protective clothing and personnel monitoring badges while administering a dose to a patient. This includes:
  - Gloves
  - Lab Coat
  - Film, TLD or Luxel Dosimeter Badge
  - Use of syringe Shield
Release of Patients

- Most patients who receive doses for diagnostic purposes can be released with little instructions.
  - Exposure levels to other people would not exceed regulated exposure levels.

- General rule for releasing patients:
  - If patient dose is less than 30 mCi
  - If patient dose rate is less than 5 mR/hr

Xenon 133

- If a facility uses Xe-133 for lung ventilation studies then room ventilation rates must be measures semi-annually.

- Records shall include:
  - the measured evacuation time.
  - must be posted in area of use.

- Some hospitals/clinics use DTPA-Tc99m for this study. DTPA is an aerosol, so there is no need for ventilation rates. Aerosols, which is more of a liquid than a gas, doesn’t disperse like Xe-133 gas.

Mobile Nuclear Medicine

- Shall transport to each address only prepared syringes and vials.
- Bring RAM to be used and take all unused and RAM waste before leaving.
- Keep under constant surveillance of RAM when in transit or at location of use.
- Must have RAM license and follow all regulations in chapters 1, 3, 4, 7, 10 and 15.
- Exceptions can be made by the Department, but must be in writing.
Therapy Doses

- The patient is usually hospitalized if the patient receives a therapy dose.
- Must have private room
- Instructions for nurses
- Lots of surveys
- Inventory and utilization logs kept on all sealed sources.
- Before patient release the patient’s dose rate must be below regulated rates. ~5mR/hr

Food and Drinks

- There is no Eating or Drinking where RAM is prepared or used.

Facility Problems

- Wrong signage used
- Door to hot lab open and not secure with sealed sources inside
- Locks/codes not changed after employee changes
- Technologist does not follow protocol (wear lab coat, use syringe shield, etc)
- Evacuation times not posted for Xe
- Food/Drink in the hot lab (Refrigerator)