Radiation safety

Group 4

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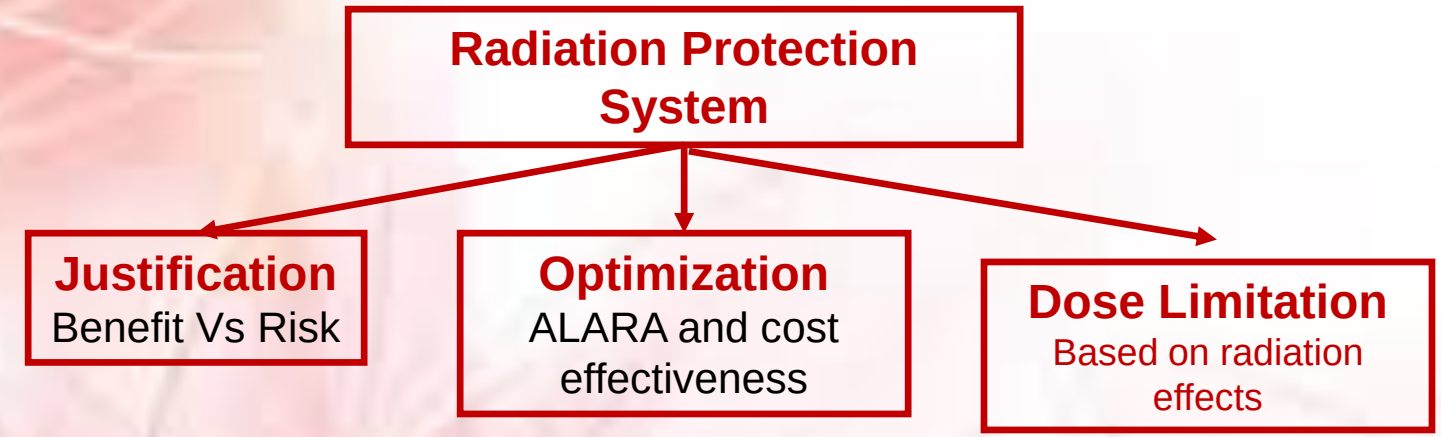
Why Radiation Safety is essential

Reasons

- Carcinogenic, Cataract, Hair Loss, Birth defects due to genetic mutation
- Patients undergoing following studies are exposed to ionizing radiation – radiographs, fluoroscopy, conventional angiogram, CT scan, nuclear medicine
- Exposure- Xray 10mrem, Mammogram 42mrem, HCT 200, Whole body CT 1000mrem.
- Goals Of Radiation Safety
  - To eliminate deterministic effects
  - To reduce the incidence of radiation complications

System of Radiation Protection

The system of radiation protection recommended by the ICRP(International Commission on Radiological Protection) in Publication 60 is based on three major principles *justification*, *optimization*, and *dose limitation*



An effective radiological protection system should use the three principles to ensure that all radiation doses are kept as low as possible

ALARA - As low as reasonably achievable

CARDINAL PRINCIPLE OF RADIATION PROTECTION

ALARA PRINCIPLE

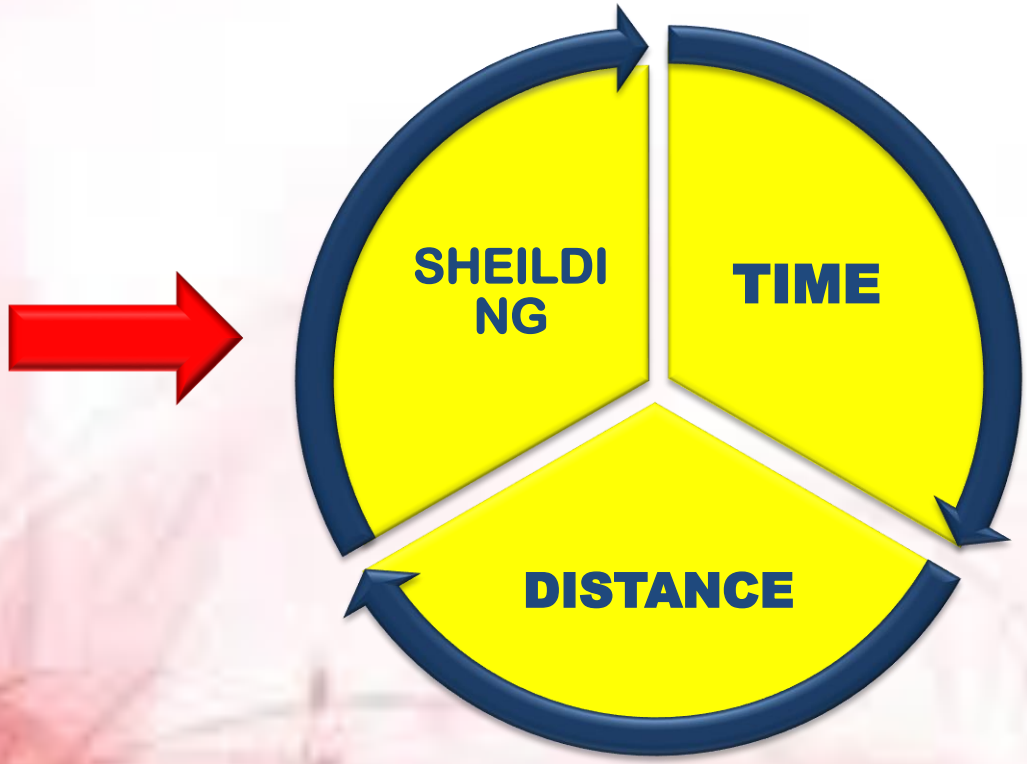
A – AS

L – LOW

A – AS

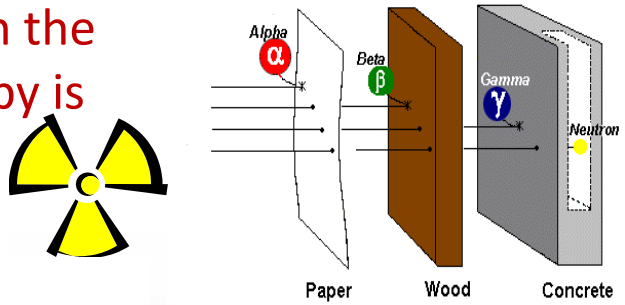
R – REASONABLY

A – ACHIEVABLE



Use Effective **SHIELDING**

- Placing radiation absorbing material between the source of radiation and people working nearby is considered as **SHIELDING**



LEAD APRON

- 0.25 mm lead equivalent thickness can stop 90% of the radiation
- ***0.5 mm lead equivalent thickness can stop almost 99% of the radiation***

Wear a lead apron

Work behind the lead barrier

SHEILDING – Use of Protective barrier

a) APRONS :

- Material used is a lead rubber covered with cloth or plastic impregnated with metallic lead.
- Should have minimum of 0.25mm lead covering.
- Aprons should not be folded as protective material tend to separate hence they should be kept flat.
- Organ shields are required for eyes, thyroid, breast, gonad.

b) GLOVES AND GOGGLES:

- The lead equivalent of gloves should not be less than 0.33mm.
- Gloves should be checked by radiography for cracks which can be easily missed on visual inspection.
- Lead goggles should be used during fluoroscopic examination.

C) X RAY ROOM AND EQUIPMENT

- Room should be away from public places.
- Equipments should be checked for possible leakages.
- Room should be well coated with lead free from any leakages.
- The wall of the room should be at least 22cms thick.
- Warning signs must be placed near X ray room regarding potential hazards.

THERMILUSCENT DOSIMETERS

- Looks like a film badge
- Contains a lithium fluoride crystal
- Crystal will luminescent if exposed to radiation.
- The amount of light emitted is proportional to radiation dose which is measured by a photomultiplier
- More accurate than a film badge.

ADVANTAGES AND DISADVANTAGES

ADVANTAGES

- Small in size
- Small change in sensitivity with radiation quality.
- Sensitivity independent of dose rate.
- Results can be read out simple and quick

DISADVANTAGES

- Cost is higher than the film badge.
- Record exposure only when worn.
- Can only be read once.
- Fading of stored signal can occur
- They do not give much info about energy of incident radiation as film bages

HR POLICY IN RADIATION SAFETY

- This policy is applicable to all faculty and staff. Radiologists, technicians and support staff should be trained on imaging safety practices at induction and periodically
- RSO recruited should be certified from AERB
- The training should include
  - All measures taken to protect the patient and staff from unwanted radiation
  - Safe use of radioactive isotopes
  - Safe disposal of radioactive and hazardous materials as per guidelines laid down by authorized bodies (any state local body licesensed by AERB)
  - Equipment safety

HR POLICY IN RADIATION SAFETY Cont.,

- Personal dosimeters (TLD badge, lead sheild, lead apron) should be given to all radiation workers (radiology dept., CATH lab, surgeons, anesthetist and nurses in the radiation field)
- TLD badge is monitored for radiation exposure in EVERY 3 MONTHS from a authority which is approved by AERB
- Protective devices like lead apron should be numbered and checked one IN 2 YEARS by exposing to X-Ray/ Fluoroscopy/CT for cracks and damages
- All these reports and screening records should be maintained
- RSO will schedule education session and training session to all its workers
- Overall exposure to the worker is monitored if it exceeds the normal limits, the worker is given leave.(for eg., dose limitation for the whole body is 20mSv/year averaged over 5 consecutive years)
- Crash cart must be available in the radiology services and staff must be trained in basic management of cardiac emergencies

RESPONSIBILITY OF RSO

- RSO is responsible for recommending or approving correction action, identifying radiation safety problems, initiating actions and ensuring compliance with regulation
- Responsible for assisting Radiation Safety Committee in performing of its duties and servicing as its secretary
- RSO along with the Radiation Committee to implement ALARA concept
- When the exposure exceeds to a worker he will initiate review or investigate into the over exposure of the worker

RADIOATIVE WASTE MANAGEMENT IN A HOSPITAL

- RSO playa a key role in radioactive waste disposal
- Record should be maintained to identified the quality and quantity of radioactive waste generated and the mode of its disposal
- It involved in 2 stages collection and disposal
- Foot operated waste collection bins with disposable polythene lining should be used for collecting solid waste and polythene carboy for liquid waste
- Disposal – dilute and disperse, delay and decay.

PREGNANT WORKERS

- Must declare pregnancy – 2 badges provided.
- 1 collar worn at collar (mother's exposure)
- 1 worn inside apron at waist level.
- Under 5 rad – negligible risk.
- Risk increases above 15 rads.
- Recommended abortion at 25 rads.

PUBLIC SAFETY

- The doors of the xray room should be lined with 2mm thick lead sheets.
- Unshielded openings for ventilation purposes, if any, shall be located above a height of 2meters from the finished floor level.
- To indicate the presence of ionising radiation, warning light, symbol and appropriate radiation safety instructions to be provided at the entrance of the room.

SAFETY IN MEDICAL DIAGNOSTIC X-RAY

- AERB Licence for medical diagnosis facility having X ray equipment (such as Radiography) Fluroscopy, CT, Cathlab, C-arm, Mammography, Dental ect
- AERB Licence ensures that
- 1. Equipment meets the quality requirements
- 2. Qualified / trained staff is available
- 3. Adequate shielding is provided to X-ray room

RADIATION ACCIDENTS

- Radiation leakage
- Radiation accident
- When there is leakage we should alert the staff and the public around the vicinity and inform the RSO(radiation safety officer) immediately

Advertisements & Safety Posters

ATTENTION
All owners of Medical Diagnostic X-ray Equipment

Have you obtained Licence for operation of your X-ray equipment for ensuring radiation safety...?

- Operation of Medical X-ray equipment without AERB (Atomic Energy Regulatory Board) Licence is an offence under Atomic Energy (Radiation Protection) Rules 2004, promulgated under Atomic Energy Act 1962.

Choose between

Operating Licence or Sealing of X-ray equipment

- DO NOT DELAY – Several X-ray equipment have been sealed by AERB for operating without AERB Licence.

Licence can be obtained online through AERB's web application eLORA (e-Licensing of Radiation Applications) System.
Visit AERB website www.aerb.gov.in for more information

Message from AERB

Act Now – Ensure Radiation Safety – Register in eLORA – Be assured

While undergoing prescribed medical X-ray examination, public is advised to ensure that X-ray equipment is Licensed by AERB

Issued by: **Atomic Energy Regulatory Board**
(Government of India)
Niyamak Bhavan, Anushaktinagar
Mumbai – 400094 (Maharashtra)

Do You Have Ionising Radiation Source?

(i.e. X-ray machines and radioactive sources used in medicine, industry, research and other beneficial applications)

If Yes, have you obtained Licence from AERB?

It is a statutory requirement to obtain Licence from Atomic Energy Regulatory Board (AERB) for possession and use of ionising radiation source(s).

Obtaining Licence from AERB is easy through AERB's web based system eLORA (e-Licensing of Radiation Applications). No Licence fee as of now !

To avoid undue risk arising from the use of ionising radiation, ensure the following:

- Install only AERB type-approved equipment emitting ionising radiation
- Must have a valid Licence issued by AERB from radiological safety view point
- Comply with the terms & conditions of AERB Licence
- Ensure safety and security of radiation sources at all times
- Ensure disposal of disused radiation sources with prior approval of AERB.

Ionising radiation sources found to be in possession/operation without a valid Licence from AERB can be SEIZED or SEALED without further notice and owner of source is liable for legal prosecution.

For detailed information, visit AERB website www.aerb.gov.in

Issued by: Directorate of Regulatory Affairs & Communications
Atomic Energy Regulatory Board
Niyamak Bhavan, Anushaktinagar
Mumbai – 400094

Radiation symbol

Radioactivity

X rays

Warning light

Thank You


Merry Christmas
Happy New Year
Nirmals Eye Hospital
Nirmals'
EYE HOSPITAL
BASIC PROGRAM
TO
TRAIN CPQIH
15 - 17th December 2018
Nirmals' Eye Hospital,
Tambaram, Chennai
Certified Professionals for Quality Implementation in Hospitals
(NABH Pre-Accreditation Entry Level Certification)
NIRMALS'
EYE HOSPITAL
Advanced
Affordable
Appropriate
Eye Care to all