



Staff Training - Fire Safety and AERB (Radiological Safety)

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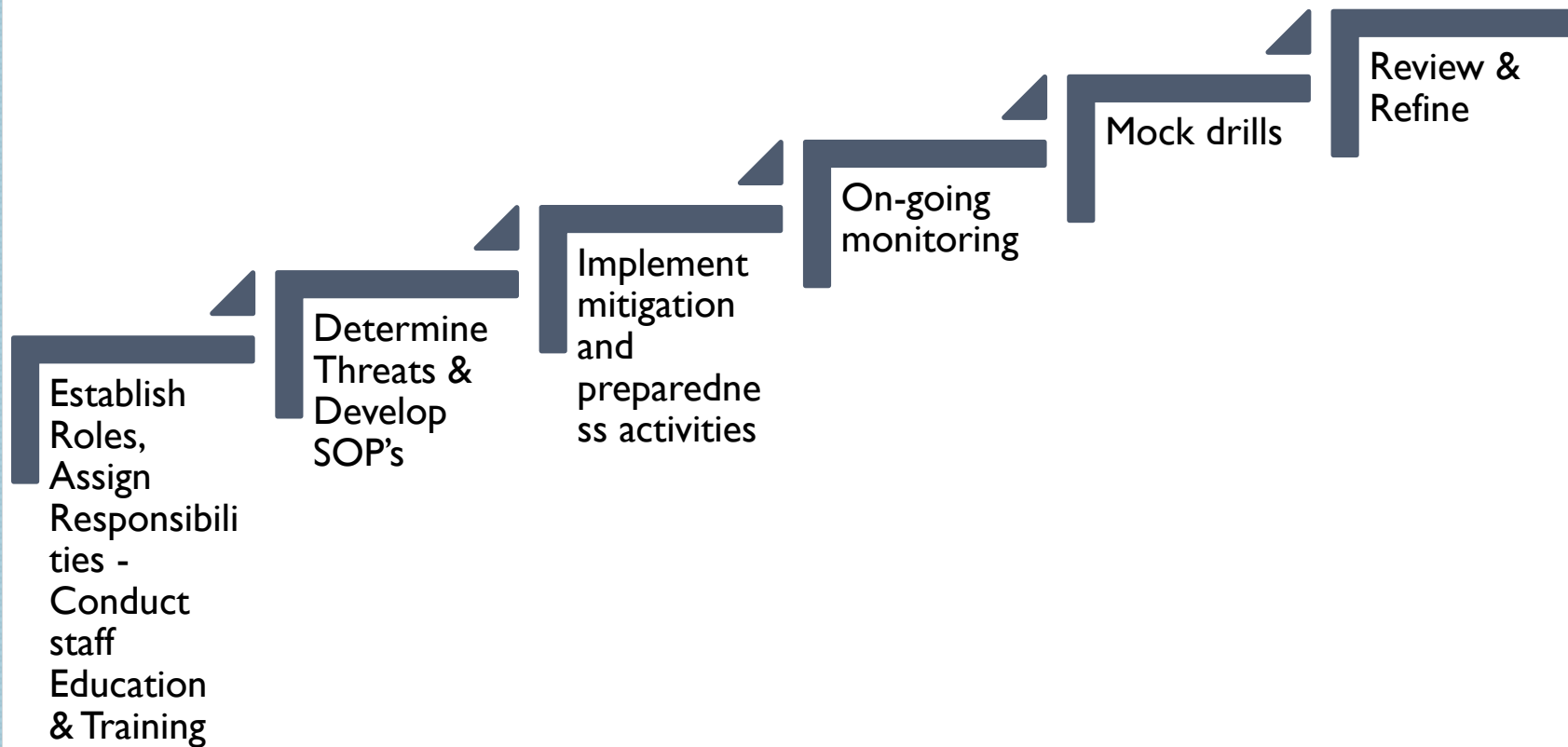
Why this session on Fire Safety?

Healthcare Organizations are vulnerable to Fire hazards

- Have many heat-dissipating heavy-duty Equipment and gadgets
- Combustible Gases, Chemicals that are used
- Electrical wiring, high voltage connections, 24 hr operability
- Generates a lot of waste that could become the fuel for fire
- Closed (Air-conditioning), Confined spaces



Steps for Fire Safety



Statutory Norms

Hospital Design (Architectural, Interior, Electrical, Space & Equipment location) is in accordance to the National Building Code of India

- All high-rise buildings need to get NOC as per the zoning regulations of their jurisdiction concerned
- A road adjoining to a high rise should be more than 12 metres wide, to facilitate free movement of Fire Services vehicles
- Entrance width and clearance should not be less than 6 metres
- At least 40% of the occupants should be trained in conducting proper evacuation, operation of systems and equipment and other fire safety provisions in the building, apart from having a designated fire officer at the helm
- The buildings should have open spaces, as per the Zonal Regulations
- Minimum of two staircases with one of them on the external walls of the building

Steps for Fire Hazard Aversion/ Management

Preparedness

- Hospital is a No Smoking zone, Security check at Entrance (to check on flammable articles), cloak rooms
- Team – under the Security, trained Fire Safety Officer and his team
 - Conducts staff training periodically
 - Mock drills
 - Fire safety rounds, including checking Extinguishers
- Hospital has invested in
 - Fire resistant doors
 - Evac Chairs & canvas stretchers
 - Fire safety gear



Keep
emergency
exits clear



Do not block
or obstruct
emergency exits



Steps for Fire Hazard Aversion/ Management

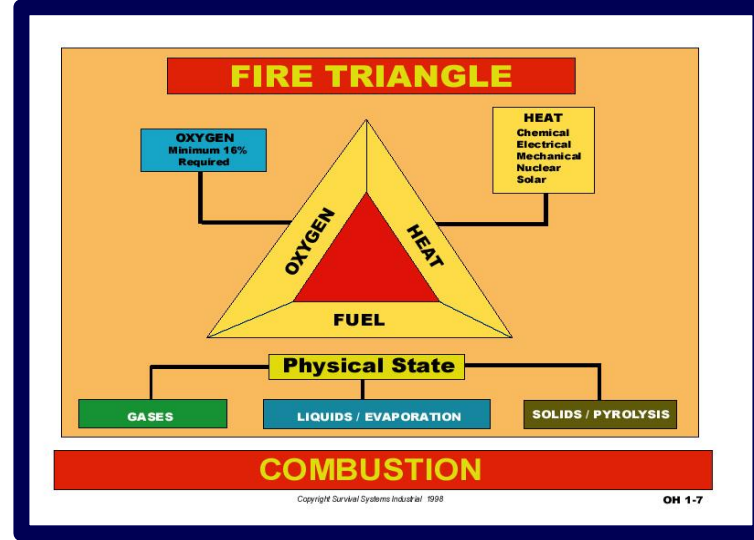
Preparedness

- Notification System - Contact details of Fire Stations in the vicinity
- Detection System –
 - Network of Smoke & Heat detectors linked to addressable fire panels in Security office,
 - Fire Alarms,
 - Automated water sprinklers
- Fire safety equipment
 - Fire extinguishers at Key Hospital locations, Fire hydrant (near staircase)
 - Signages - Fire Exit, Fire escape plan, glow in the dark signs guiding towards exits



What is Fire?

- Fire is an exothermic chain reaction which takes place presence of Fuel, Heat and Oxygen, represented by the 'FIRE TRIANGLE'



Types of Fire Extinguishers

DRY POWDER	FIRE HOSE REEL	FOAM SPRAY	WATER	CO ₂
A ✓ USE ON: Wood, Paper and Textiles	A ✓ USE ON: Wood, Paper and Textiles	A ✓ USE ON: Wood, Paper and Textiles	A ✓ USE ON: Wood, Paper and Textiles	B ✓ USE ON: Flammable Liquids
B ✓ USE ON: Flammable Liquids	B DO NOT USE ON: Live Electrical Equipment	B ✓ USE ON: Flammable Liquids	B DO NOT USE ON: Live Electrical Equipment	B ✓ USE ON: Live Electrical Equipment
C ✓ USE ON: Gaseous Fires	B DO NOT USE ON: Flammable Liquids	B DO NOT USE ON: Live Electrical Equipment	B DO NOT USE ON: Flammable Liquids	A DO NOT USE ON: Wood, Paper and Textiles
E ✓ USE ON: Live Electrical Equipment	E DO NOT USE ON: Flammable Metal Fires	E DO NOT USE ON: Flammable Metal Fires	E DO NOT USE ON: Flammable Metal Fires	DO NOT: Hold horn when operating



How to use Fire Extinguishers?



In case of Fire

- Don't panic
- Operate the alarm button of Manual Call point
- Call security officer on (dedicated Extension no.) give location, size and kind of fire
- Send colleague to call inform Floor Marshal stay at the scene until help arrives
- Rescue combustibles from immediate surroundings (if its not a risk)
- Isolate the area – see if patients are stuck help them. Try and switch off nearby gas and electrical appliances without taking risk
- Fight a fire, only if it is safe and if you are confident
- Assemble in the refuge area (for head count by the Floor Marshal and directions)
- Take stairs do not use elevators (stick to left hand side – near the railing) and gather at designated assembly point (designated area name)
- In case the room is full of fumes crawl on your knees and elbows to come out. Keep a wet towel/ handkerchief on your nose and mouth to prevent choking.
- Report to the fire marshal at the designated assembly point after evacuation (for a repeat head count)

Managers of Fire

Emergency Evacuation

- Inform all Employees by PA System, MCP, Fire Alarm or by Shouting
- Close all the lifts and open all fire exit door
- Guide people towards the nearest exit routes
- Check all areas (offices, rest-rooms, prayer rooms, etc.) to ensure everyone has left
- Help the Physically challenged / elderly / sick people dependent on you
- Ensure all doors / windows are closed (but not locked) to avoid spread of fires
- Cut OFF main power supply
- Conduct a head count & report missing people
- Inform all Emergency assistant like Fire-brigade, Ambulance, Police & Neighbors
- Make sure all personnel evacuate without wasting time, to collect their personal belongings
- Control traffic / parking, allow access to fire engines

Remember

- Always know about -
 - Nearest Exits Assembly area/ Refuge area in your work area
 - Locations of fire extinguishers, Fire emergency alarm switches and contact numbers
 - Know, how the Fire alarm in your building sounds like
 - How to operate fire extinguishers and which fire extinguisher to use & where
 - Have an understanding of the evacuation plan in your building
- Help anyone in need in the course of evacuation so long as there is no personal risk
- Participate positively in fire drill procedures
- Follow guidelines to maintain and keep clear all escape routes and fire exits
- Don't allow patients / relatives / visitors / staff to smoke inside the Hospital
- Don't allow combustible waste to accumulate on the place of work

In an Event -

- Do not panic, stay at scene of fire
- Do not crowd near the scene, click pictures
- Do not use the elevators unless instructed
- Don't leave the fire unattended

AERB

Norms & Regulations



Mission of AERB:

- To ensure that the use of ionizing radiation and nuclear energy in India does not cause undue risk to health and the environment.

Broad Regulatory Activities of AERB are:

- Develop and issue regulatory requirements and provide related guidance.
- Review whether the applicant meets the regulatory safety requirements for design, Siting, construction, commissioning, operation)
- Inspections &
- Enforcement

Regional Regulatory Centers (RRC) of AERB



Radiation Sources/Facilities under Regulatory Control as on June 30, 2018

- Gamma Radiation Processing Facilities: 19
- Industrial Accelerators for Radiation Processing: 15
- Gamma Irradiation Chambers: 126
- Radiotherapy Facilities: 454
- Industrial Radiography Devices: 2,690
- Nucleonic Gauge & Well Logging Devices: ~ 9,000
- Medical Cyclotron Facilities: 18
- Nuclear Medicine Facilities: 289
- Consumer Products Manufacturing Facilities: 17
- Research Facilities using Sealed Sources: 109
- Research Facilities using Unsealed Source: 157
- Research Accelerators: 8
- Interventional Radiology Equipment : 1537
- Computed Tomography Equipment: 3600
- Licensed Diagnostic X-ray equipment: 53631

Evolution of Regulatory Framework in Nuclear and Radiation Field

Prior to AERB Set up:

- For CIRUS, built with Canadian assistance in late fifties, formal design and safety report was prepared with Selected chapters by Indian experts
- For TAPS-I&2, the first Indian NPPs built by GE in late sixties, an independent committee carried out safety review
- In 1971, when RAPS-I was getting ready for commissioning the committee for TAPS was renamed as DAE Safety Review Committee (DAE-SRC)
- AERB was constituted on Nov 15, 1983.



- It is mandatory for all users of medical diagnostic x-ray equipments to obtain License for Operation from AERB as per Atomic Energy (Radiation Protection) Rules 2004
- To facilitate online submission of applications for regulatory consents and establish channel of communication with AERB for other regulatory requirements, AERB has launched Diagnostic Radiology module in its e-governance application e-LORA (e-Licensing of Radiation Applications) System. All diagnostic x-ray equipment user Institutes are required to use eLORA for obtaining operating Licence from AERB

Register Your Institute -

Visit the website www.aerb.gov.in. Click on the button eLORA, which is available on website home page. It will redirect you to the following screen of eLORA home page.



Government of India Atomic Energy Regulatory Board e-Licensing of Radiation Applications (eLORA) System



eLORA System

eLORA (e-Licensing for Radiation Applications), an eGovernance initiative by AERB, is a web-based application for automation of regulatory processes for various Radiation Facilities in India. The objective of the project is to enhance efficiency and transparency in the regulatory processes of AERB. The system is aimed at achieving paperless licensing of Radiation Facilities.

Institute Registration

Register Institute link is provided only for upcoming radiotherapy facilities. However, for existing Radiotherapy facilities AERB will be providing username & password to the respective facilities shortly.

Radiation Professional Registration

A person working with radiation, whose role is defined in AERB's safety codes, is termed as Radiation Professional (RP). All Radiation Professionals in India are required to register themselves in eLORA for their inclusion in Radiation Facility personnel. Upon successful

Login

Username

Password

[Forgot Password?](#)

Registration

[Register Radiation Professional \(For Existing\)](#)

[Register Institute \(For New Institute\)](#)

Feedback

[Feedback](#)

- Tab 1: Institute Details
- In Type of Facility section, for the field Practice select Diagnostic Radiology and for the field Role of Institute click on Medical Diagnostic X-ray Facility
- Tab 2: Employer Details
- Tab 3: Attachments

- Proof of Identity and Date of Birth (of employer): Acceptable documents are as follows:
 - Passport
 - PAN card issued by Income Tax Department
 - Driving Licence issued by RTO
 - Photo identity document/card having serial number and date of birth issued by Central/State Government or PSU
- Proof of Employership: Example: (i) Appointment Letter of Employer, (ii) Board Resolution, (iii) Any Govt./PUC document substantiating proprietorship (iv) Partnership deed (notorised) or (iv) Proprietor's self declaration on institute letter head affixed with institute seal
- Upload scan copy of any one of the document (in the relevant position) for the proof of existence of institute:
 - PAN of Institute
 - TAN of Institute
 - Registration with State/Central/Local Government Authority
- Enter the Captch and submit the application form

List of Instruments Required Type of Equipment/ Instruments to be added

Type of Instrument - Instrument Sub Type

- **Interventional Radiology**
 - Protective Apron (minimum 3)
 - Protective Rubber Flaps
 - Ceiling suspended protective glass
- **Computed Tomography**
 - Protective Apron
- **Radiography & Fluoroscopy**
 - Mobile Protective Barrier with lead equivalent Viewing Window
 - Protective Apron
 - Protective Rubber Flaps
 - Radiography(fixed)
- **Mammography OPG CBCT**
 - Mobile Protective Barrier with lead equivalent Viewing Window
- **Radiography (Mobile) Radiography (Portable) C-arm/O-Arm Dental (Intra-oral) Dental (Hand –held)**
 - Protective Apron

Radiation Safety

What can radiation do? General Effects

- Cancer
- Genetic effects
- Skin injuries
- Cataracts
- Infertility
- Death

Why Radiation Safety

- Patients
- Safety of the operators
- Safety other members/employees working in the Department
- All others who could be possibly exposed to harmful & hazardous radiation.
- This is possible by adhering to the policies & protocols. Following statutory norms and also by monitoring the same.

Radiation safety awareness for diagnostic radiology

- Display radiation warning sign at entrance
- Caution sign
- AERB license sign
- Do not enter when red light is on
- Always work behind a protective barrier (min 1.5 mm lead)
- Wear TLD badge below lead apron at chest level
- Never leave TLD badge near XRAY equipment inside the X-ray room
- TDS principle
 - Less time spent
 - Greater distance
 - Behind shielding from source

Training Overview

- Overview of Radiation Hazards, Regulations, Protection Standards, Radiation Safety
- Basic Radiation Protection Principles:
 - Radiation Protection Standards,
 - Dose Limits
 - External Protection
 - General Precautions and Safety Protocols
- Radiation Detection and Monitoring
- Radiation Safety Policies and Protocols
- For Radioactive Materials: Security, Transportation, Receipt, Package Opening, Usage, Storage, Disposal etc.

Training & Awareness

- Doctors, Technicians, Nurses, other staff:
- Safety Protocols for Radiation Safety
- Using Protective Shields & Monitoring Devices during procedures
- Safe Practices like Time Distance Shielding, Dosimeter Testing & Apron Testing Calibration
- Administrators, & Policy Makers
- Defining necessary Protocols,
- Safety Monitoring, & Surveillance
- Radiation Protection
- DOs and DONTs before procedures: this is done through signage, brochures, education & counseling etc.

Protective Devices



Lead Aprons



Thyroid Shields



Gonadal Shields

Monitoring Devices



TLD Badges

Role of the RSO

Liasioning Officer

- To ensure compliance with all standards and regulations.
- To assess new safety and health hazards.
- To make sure that staff is aware of any environmental health and safety issues.

Awareness of the Regulations

- Be aware of relevant regulations and policies.
- RSO shall provide advice and assistance on radiation safety as applicable

Training

- To conduct training sessions
- Make sure staff are aware of all required safety training.
- Instructing the staff about hazards of radiation and safety and good work practices, safe disposal of radioactive waste.

Record Keeping

- To maintain all the relevant documents, licenses etc in the department.
- To carry out measurements and analysis on radiation and radioactivity levels in the controlled area, supervised area and maintain records of the same report them to the authorities

Guidelines

- AERB has prescribed an annual dose limit of 30 mSv for radiation workers and a limit of 100 mSv over a period of five consecutive years. A Standing Committee reviews radiation exposures above the prescribed limits. The Committee also reviews the circumstances under which any radiation worker in the country has been exposed to more than 20 mSv in any particular year.
- Mandatory Health Surveillance of Workers
- Safety Committee.....Review radiation safety incidents, issues, and violations, and recommend corrective actions. Review a summary of the occupational radiation dose records and recommendations on ways to maintain doses as low as reasonably achievable (ALARA)

Guidelines

Room size-

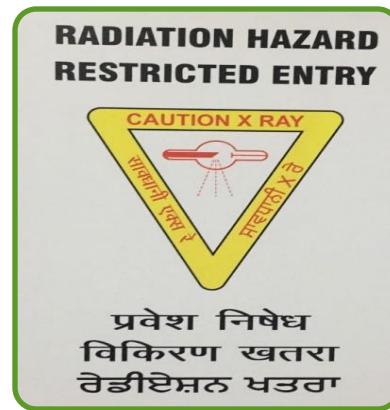
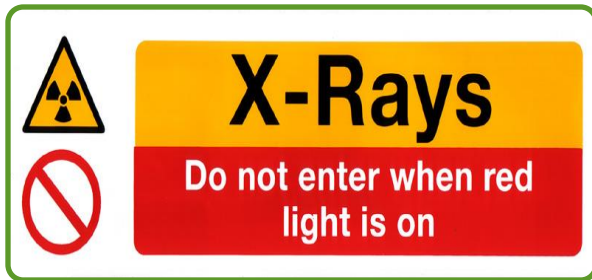
- For x ray= $> 18\text{m}^2$ for general purpose radiography and fluoroscopy.
- For CT Unit= $>25\text{m}^2$
- For mammo= $> 10 \text{ m}^2$.

Not more than one unit of any type shall be installed in the same room.

Wall size and shielding should be followed.(9 inches thick brick).

Control room-

- For equipments operating at 125 KV or above, should have a separate control room
- Not required in equipments of less than 125 kv



Proper way of using TLDS in diagnostic radiology

- Full form of TLD is Thermoluminescent dosimeter
- Dose limit-20 msv over a year
- TLD with cassette, Below apron at chest level

Equipment should be

- Licensed by AERB and periodic quality assurance carried out

ALARA

As Low As Reasonably Achievable

Using good safety practices each day, for every study, you can keep your own and your patient's radiation dose as low as possible

Initiatives by AERB

- Efforts in bringing more effectiveness in regulatory requirements for ensuring patient protection against ionising radiation.
- Accredited several QA agencies for providing QA services to x-ray facilities.
- Formulated guidelines for necessary periodic QA as per NEMA protocol to be performed for NM imaging devices.
- Standard QA protocol has been established for all equipment in radiotherapy.
- Recognized the National Audit Programme conducted by BARC for dose measuring instruments for dose measuring instruments.

Initiatives by AERB

- Accredited calibration laboratories for radiation survey instruments and contamination monitors.
- Recognized several medical physics and NM/RT professional courses conducted by various Institution / Universities.
- Initiatives for establishment of State DRS/RSA for X-ray facilities
- Awareness campaign by -Advertisement on print media, public information brochure, press releases, interviews, awareness programs, discussions with stakeholders, participation in CMEs and Conferences of medical professions associations/societies.
- Broadcasting of radio jingle....

Thank You From All of Us

Dr. Shobhana Nair (Head of Medical Services – Wockhardt Hospitals)

Ms. Rajvee Patel (Executive – P.D. Hinduja Hospital & MRC)

Ms. Phyllida Francis (Management Trainee – Apex Group of Hospitals)

Ms. Priyanka Shinde (Quality Consultant)