

Unit 5 - RADIATION THERAPY AND RADIATION SAFETY

5.3 RADIATION PROTECTION IN MEDICINE

Radiation protection in medicine is crucial for both patients and healthcare workers to minimize the risks associated with exposure to ionizing radiation during diagnostic and therapeutic procedures.

1. Justification

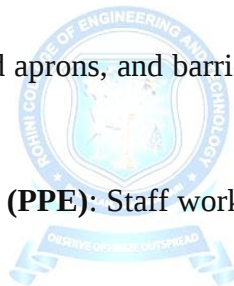
- Every medical use of radiation should be justified, meaning the benefits of the procedure should outweigh the potential risks. For instance, a medical imaging procedure like an X-ray should only be performed if it provides valuable diagnostic information that cannot be obtained by other means.

2. Optimization

- The radiation dose should be kept as low as reasonably achievable (ALARA principle). This involves adjusting the exposure settings, using appropriate shielding, and considering alternatives like non-radiation-based diagnostic methods (e.g., MRI or ultrasound) when possible.

3. Protection for Healthcare Workers

- **Radiation Shielding:** Walls, lead aprons, and barriers are used to protect healthcare workers in areas where radiation is used.
- **Personal Protective Equipment (PPE):** Staff working with radiation may wear lead aprons, thyroid shields, gloves, and goggles.
- **Distance and Time:** Increasing the distance between the radiation source and the worker, and reducing the time spent near radiation sources, helps minimize exposure.



4. Radiation Dose Limits

- Regulatory agencies (e.g., the International Commission on Radiological Protection, ICRP) set annual dose limits for both patients and healthcare workers. These limits help ensure safety standards are met.

5. Monitoring and Tracking

- **Dosimeters:** Personal dosimeters are worn by healthcare workers to monitor radiation exposure levels.
- **Environmental Monitoring:** Radiation levels in medical facilities are regularly checked to ensure they are within safe limits.

6. Patient Protection

- **Pregnancy Consideration:** Special precautions are taken for pregnant patients, as radiation can harm fetal development. If necessary, alternative imaging methods are considered.
- **Pediatric Considerations:** Children are more sensitive to radiation, so their radiation dose is minimized using techniques such as lower exposure settings and tailored equipment.
- **Radiation Therapy:** In therapeutic settings, radiation treatment is carefully calculated and directed to minimize exposure to healthy tissue surrounding the target area.

7. Education and Training

- Continuous education and training for healthcare workers on radiation safety practices and new technological advances in medical imaging and therapy are essential.

By following these principles and employing proper technology and protocols, the risks of radiation exposure can be minimized while still achieving the benefits of medical imaging and radiation therapy.

