



60 Years

Atoms for Peace and Development

# Factsheet for Decision Makers

## Radiation Protection of Patients

## RADIATION PROTECTION IN RADIOTHERAPY

### Why is it important?

Radiotherapy is the treatment of disease using ionizing radiation. Mainly it is used to treat cancer but occasionally it is used in the treatment of some non-malignant diseases. More than 5 million courses of radiotherapy treatment are given each year around the world. Common procedures are external beam radiotherapy, where radiation is pointed at the patient's body from an external source, and brachytherapy, where small encapsulated radioactive sources are placed into or near the area to be treated.

Radiotherapy has tremendous benefits, but also carries some risks. Serious incidents have occurred that resulted in more or less radiation being given to the patient than intended. There may also be the risk of developing secondary cancer after radiotherapy even under normal use.

### What do I need to know?

Justification and optimization are the two cornerstones of radiation protection of patients. Dose limits do not apply in medical exposures as they may limit the benefits for the patient. Dose limits apply to occupational and public exposure only.

The process of justification allows determining whether the exposure will take place or not. Once justified, the procedure should be optimized and performed such that the exposure of the patient is managed in order to achieve the medical objective.



The International Basic Safety Standards (BSS) are the international benchmark for radiation safety. The BSS are used in many countries as the basis for national legislation to protect workers, patients, the public and the environment from the risks of ionizing radiation.

### IAEA Safety Standards

for protecting people and the environment

#### Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards

Jointly sponsored by  
EC, FAO, IAEA, ILO, OECD/NEA, PAHO, UNEP, WHO



General Safety Requirements Part 3  
No. GSR Part 3



IAEA  
International Atomic Energy Agency



The BSS are based on the most recent scientific evidence on the effects of ionizing radiation and take into account practices and experiences from around the world in the use of ionizing radiation and nuclear techniques. Eight international organizations sponsor the BSS.

### What actions are required?



The government is responsible for establishing and implementing a legal and regulatory framework for radiation protection in medicine.

The regulatory body is responsible for establishing requirements and guidelines, authorization and inspection, and for enforcing legislative and regulatory provisions.

The hospital management has a prime responsibility for safety and for establishing and implementing a radiation safety programme.

Medical staff is responsible for the overall protection, both for patients and for themselves, in the delivery of medical exposures.

### Pay particular attention in radiotherapy to:

- Optimization of protection and safety to include:
  - ▶ Equipment and software design (which should be used only if they conform to applicable standards);
  - ▶ Operational considerations to ensure that exposure of volumes other than the planning target volume are kept as low as reasonably achievable within the required tolerances for each patient;
  - ▶ Calibrations carried out at the commissioning of a unit, after maintenance procedures, and at regular intervals, which should be subject to independent verification prior to clinical use;
  - ▶ A comprehensive programme of quality assurance.
- All measures should be taken to minimize the likelihood of unintended or accidental medical exposures arising from design flaws and operational failures of medical radiological equipment, from software failures of and errors, or from human error.



### Resources

Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards, No. GSR Part 3

[http://www-pub.iaea.org/MTCD/publications/PDF/Pub1578\\_web-57265295.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/Pub1578_web-57265295.pdf)

Radiation Protection of Patients (RPoP) website

<https://rpop.iaea.org/RPoP/RPoP/Content/index.htm>