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IAEA Perspective on the role and responsibilities of medical physicists in radiation protection of patients

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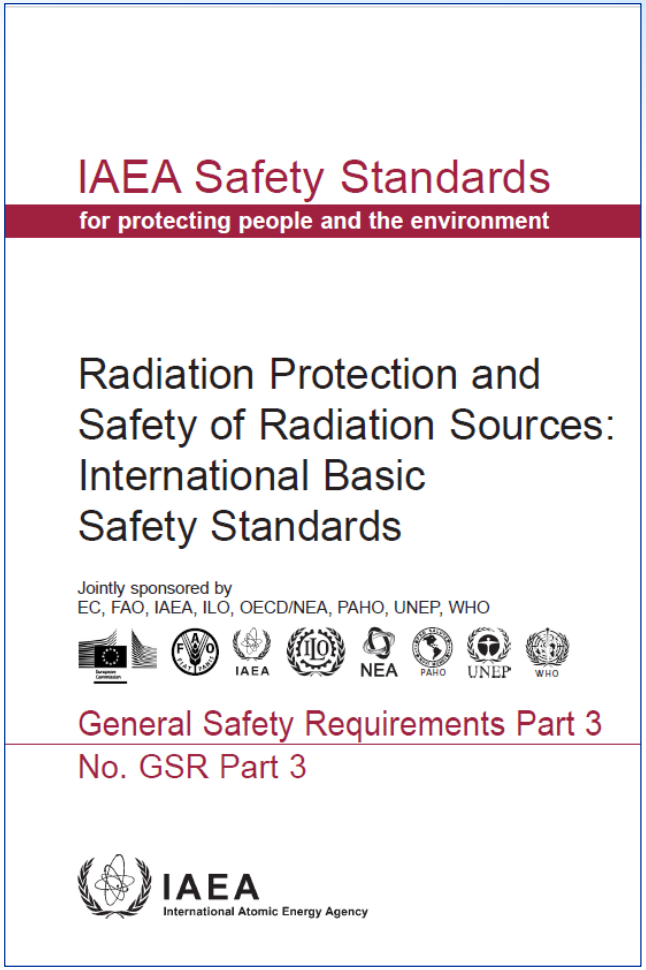
July 15, 2020

Objectives

- Provide information on the importance of medical physicists in radiation protection of patients.
- Identify some of the roles and responsibilities of medical physicists in radiation protection of patients.
- Provide some examples of activities provided to medical physicists to support the development of competencies in radiation protection of patients.

IAEA support for medical uses of radiation

- International BSS requires member states who receive support for advanced radiation medical applications to have regulations requiring the adequate **medical physicists** to offer safe services



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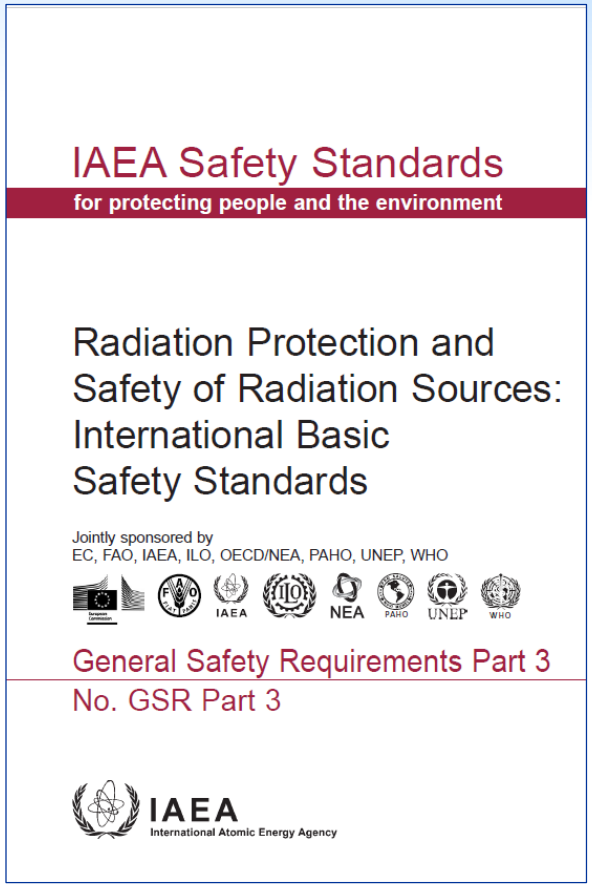
Requirements in the BSS

- Enhancing radiation medicine service provider **shall have at least one medical physics expert to act or give specialist advice**, as appropriate, on matters relating to radiation physics, dose optimization, quality assurance and radiation safety.



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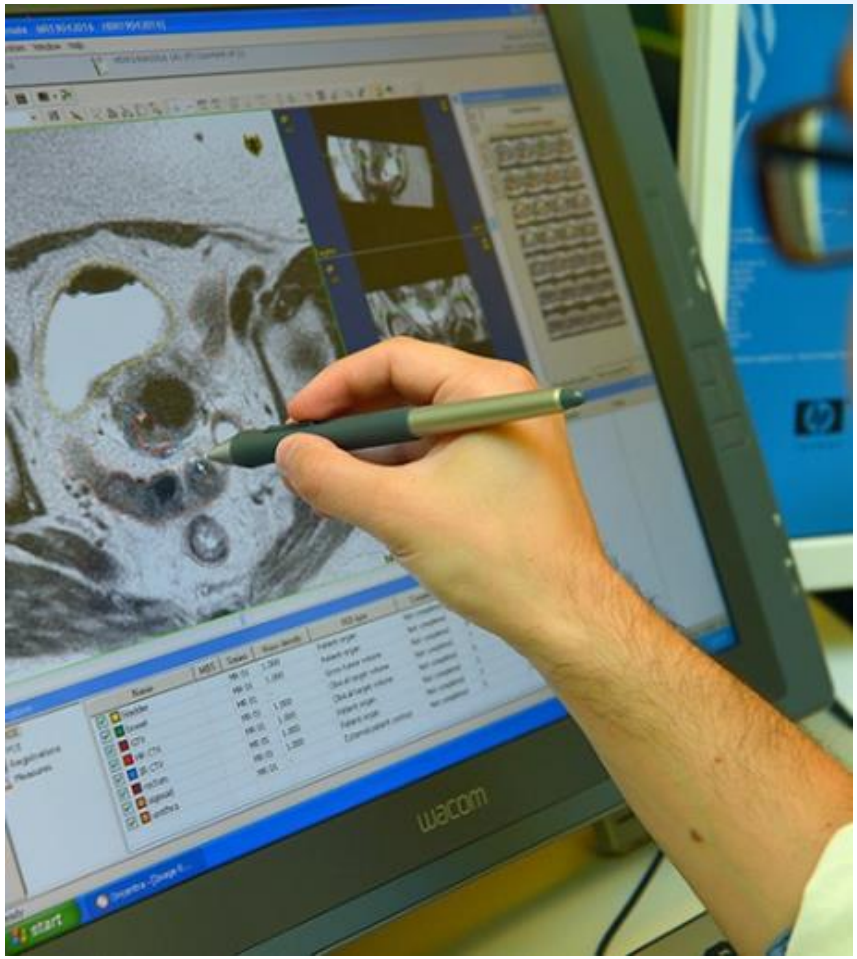
Requirements in the BSS

There are requirements in place for formal assessment of the competence (e.g. registration, accreditation, certification), of **medical physicists** to practice independently in one or more of the subfields (specialties) of medical physics



Medical physicist definition

A health professional with specialist education and training in the concepts and techniques of applying physics in medicine and competent to practice independently in one or more of the subfields (specialties) of medical physics.

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Quality assurance for medical exposures

Registrants and licensees shall establish a comprehensive program me of quality assurance for medical exposures with the **active participation of medical physicists**, radiological medical practitioners, medical radiation technologists and, for complex nuclear medicine facilities, radiopharmacists and radiochemists, and in conjunction with other health professionals as appropriate.

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Independent verification of calibration in radiotherapy

- 5.211. GSR Part 3 [3], para. 3.167(c), requires independent verification of the calibration of radiation therapy equipment, prior to clinical use, because miscalibration of a radiation therapy source can result in inappropriate treatment involving many patients and can lead to very serious consequences. Independent verification ideally means verification by a different, **independent medical physicist** using different dosimetry equipment

Radiological reviews

Registrants and licensees shall ensure that radiological reviews are performed periodically by the radiological medical practitioners at the medical radiation facility, in cooperation with the medical radiation technologists and the **medical physicists.** The radiological review shall include an investigation and critical review of the current practical application of the radiation protection

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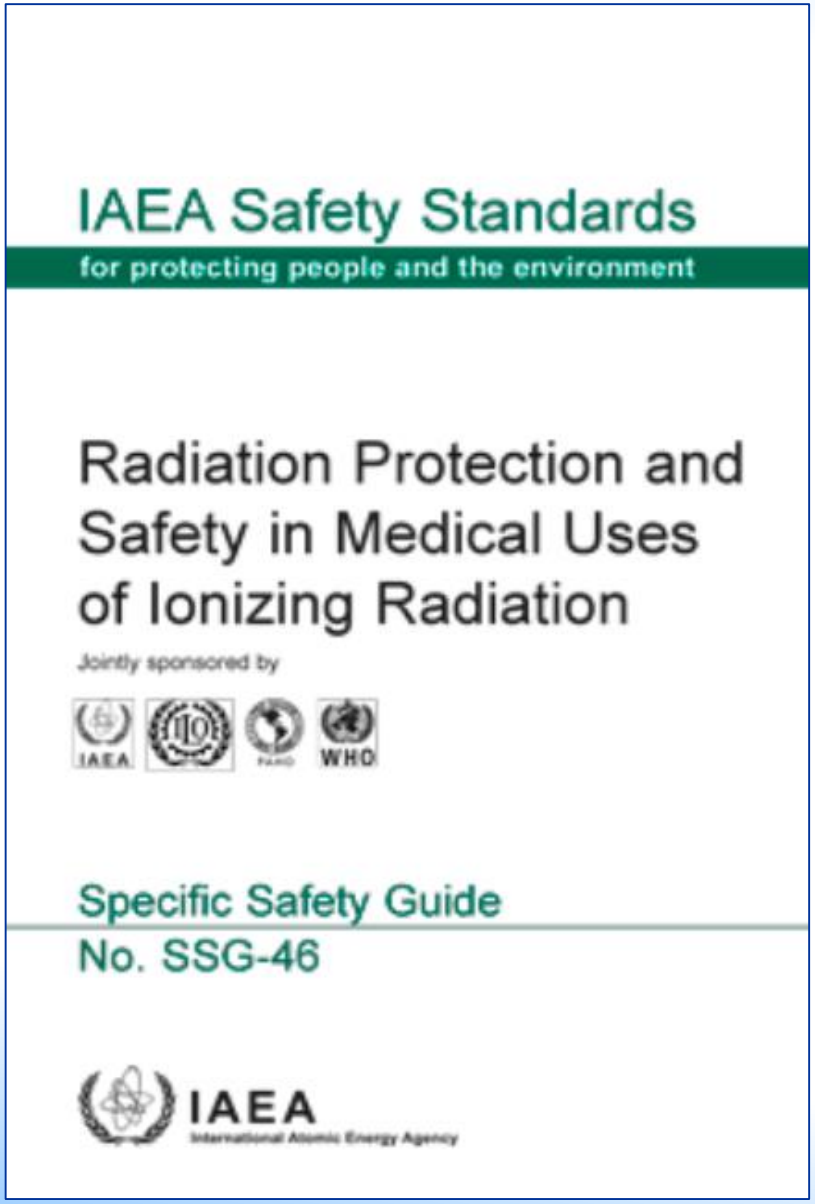
Safety Guide



Safety Guide is the handbook for implementation of the safety requirements.

It is designed to provide information to the regulatory authority as well as the users of radiation sources in medicine. Provides more information on roles and responsibilities of medical physicist.

https://www.iaea.org/publications/11102/radiation-protection-and-safety-in-medical-uses-of-ionizing-radiation

Medical Physicist in the role of equipment used in medical imaging and therapy

- The medical physicist should understand how the equipment and software function, including the available options and how to customize these, and their implications for patient radiation protection.

Modifications or maintenance on radiation source equipment

- After any modifications or maintenance, the person responsible for maintenance should immediately inform the licensee of the medical radiation facility before the equipment is returned to clinical use. The person responsible for the use of the equipment, in conjunction with the **medical physicist**, the medical radiation technologist and other appropriate professionals, should decide whether quality control tests are needed with regard to radiation protection, including image quality, and whether changes to protocols are needed.

Adequacy of shielding

Specification of shielding, including calculations, should be carried out by a **medical physicist or a qualified expert** in radiation protection. In some States there may be a requirement for
shielding plans to be submitted to the regulatory body for review or approval prior to any construction.

Responsibility for calibration

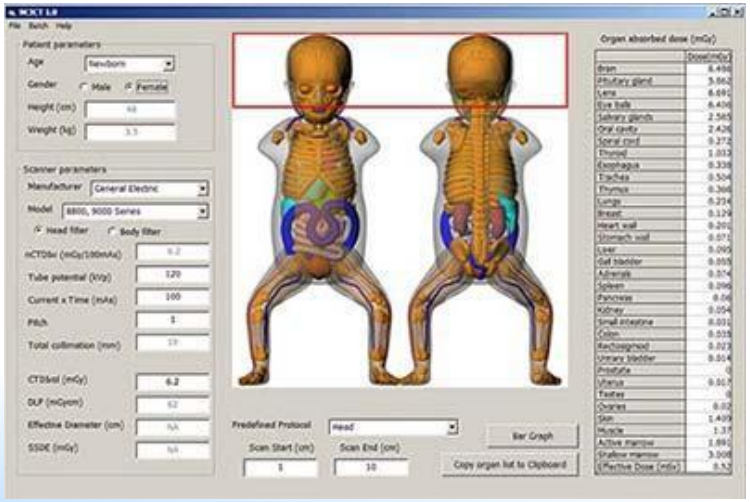
- 5.209. GSR Part 3 [3], paras 3.154(d) and 3.167, places the responsibility for calibration in radiation therapy on the **medical physicist**, with either direct fulfilment or by supervision. Correct calibration in radiation therapy is fundamental and, with increasing complexity in technology and software, the direct presence and involvement of the medical physicist is essential.

Mitigation of the consequences of accidents

- The **medical physicist or the RPO** should be notified and should take control of the situation, including deciding when it is safe to re-enter the room. Before resuming the treatment of patients, the medical physicist should check the calibration of the radiation therapy and should verify that it has not changed, particularly the timer error in cobalt-60 teletherapy units.
- The **medical physicist** should assess the patient doses and should check the machine for re-use after the ensuing maintenance;

Calculation or estimation of patient doses during an investigation

- What is required to be done in the course of the investigation. This includes calculation or estimation of patient doses, which should be performed by a **medical physicist**, and notification of the event to the patient's referring medical practitioner.



Release of patients receiving radiopharmaceuticals and brachytherapy

- The **medical physicist or RPO** at the nuclear medicine or therapy facility should establish prior to the release of a patient that the retained radioactivity or radioactive source(s) in the patient is such that the doses that could be received by members of the public would not exceed public dose limits, and would be unlikely to exceed the relevant dose constraints for both members of the public and carers and comforters.

Unfortunate circumstances

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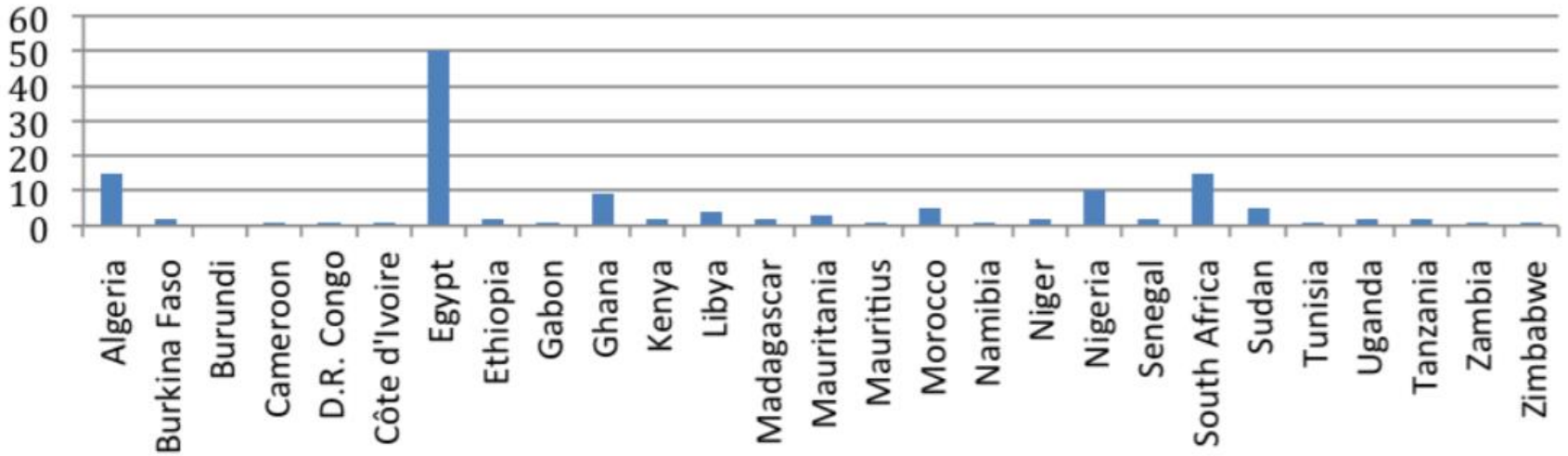


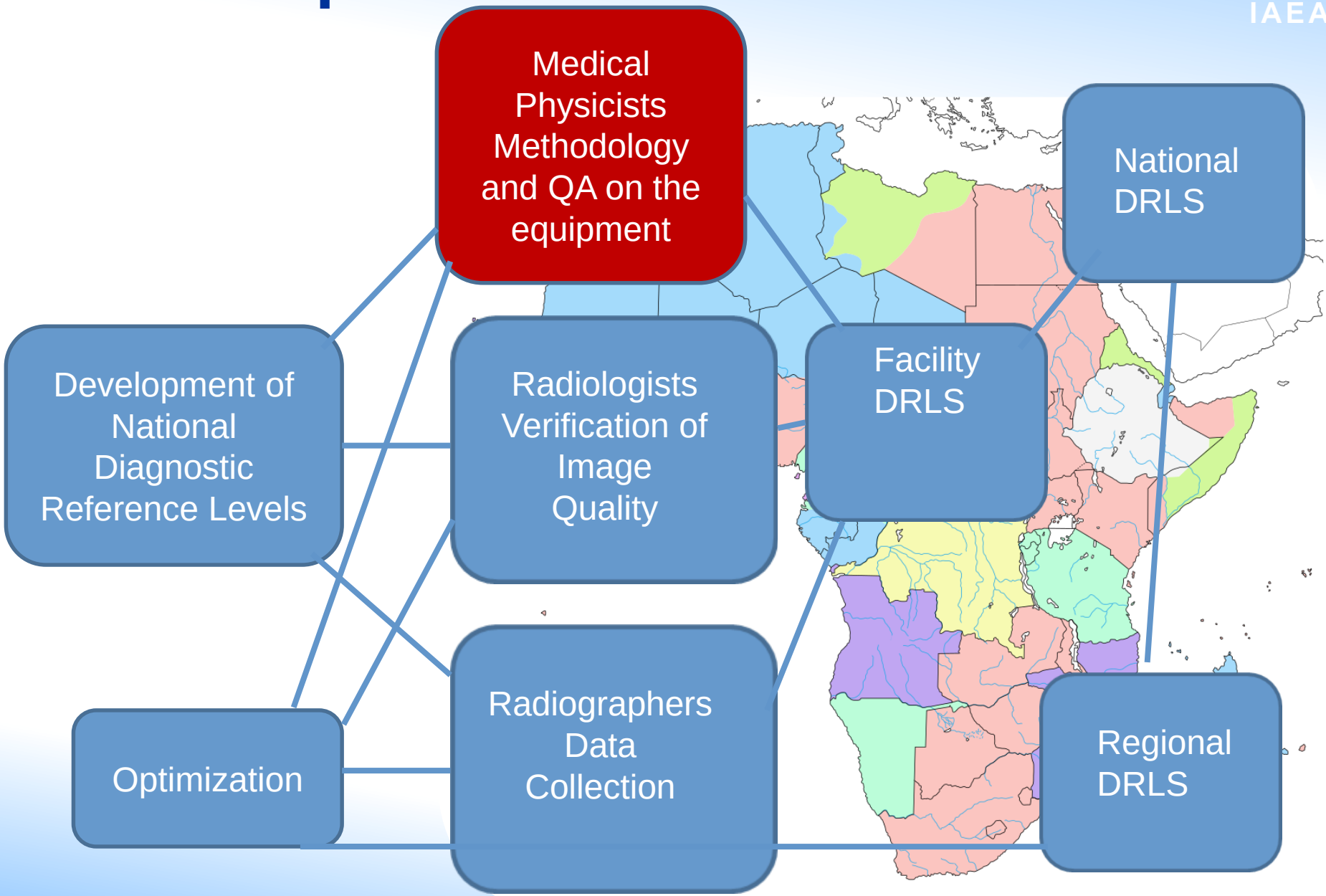
Fig. 1: Number of medical physicists employed in medical imaging in Africa.
(The countries missing in this graph do not have any medical physicists in imaging.)

https://www.iaea.org/sites/default/files/16/11/enhancing-patiient-care-in-africa-through-safe-medical-imaging.pdf

IAEA Radiation Protection of Patients Activities

- Development of Diagnostic Reference Levels of Imaging
- Ensuring quality and safety through guidance
- Prevention of unintended and accidental radiation exposure in Nuclear Medicine and Radiotherapy (SAFRON)
- Workshop on risk assessment in advanced radiotherapy techniques (dedicated to medical physics)

Roadmap to success

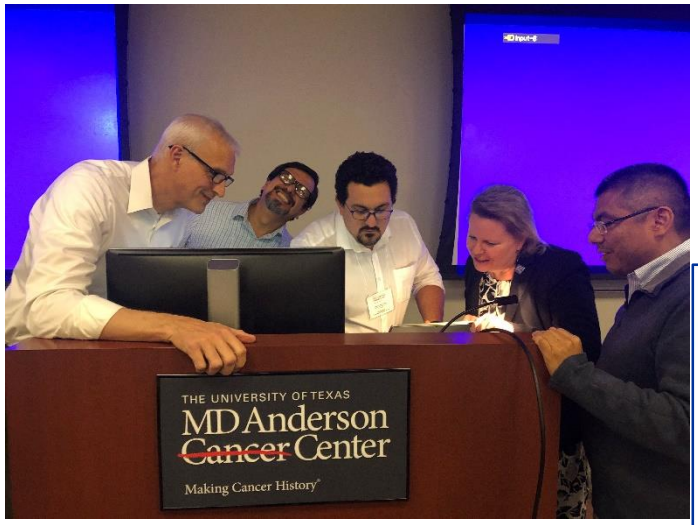


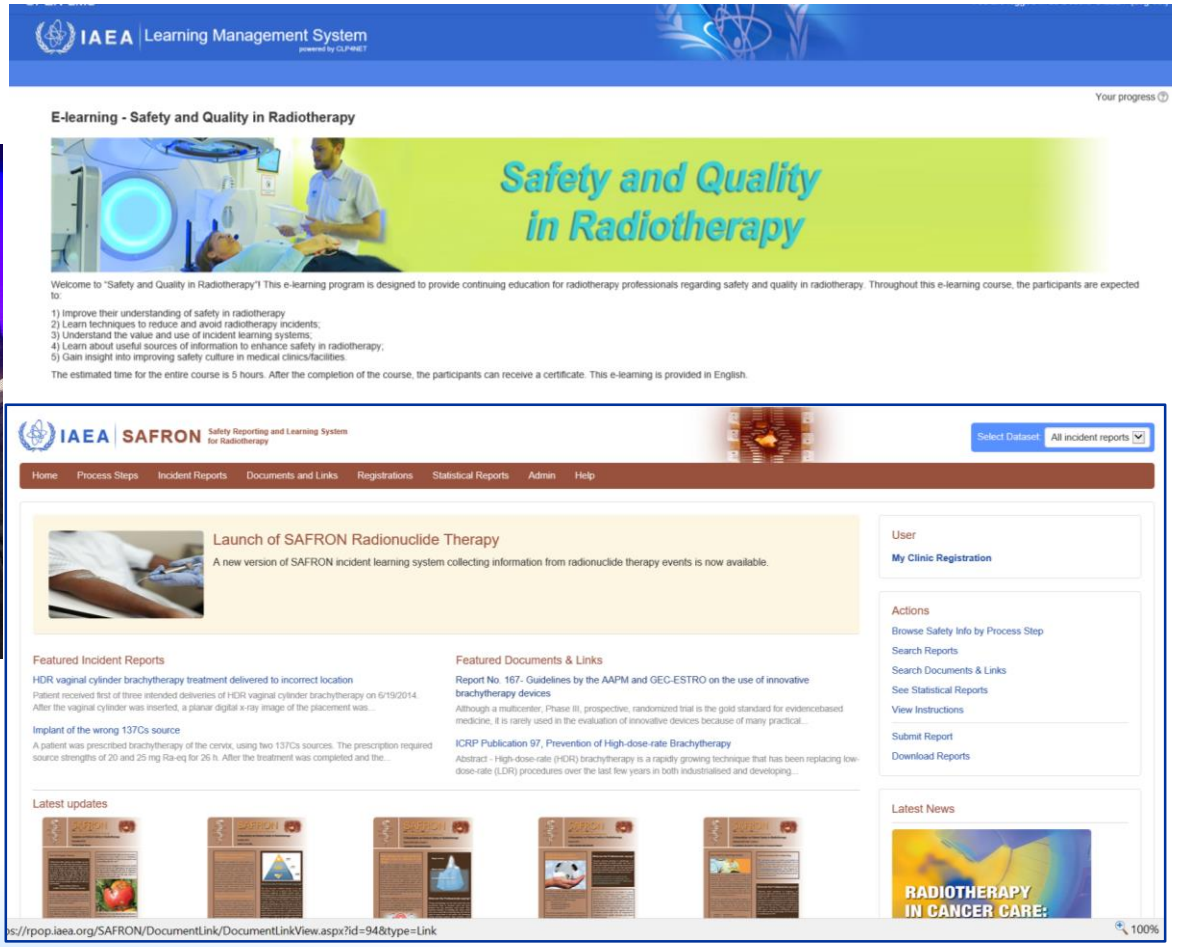
Ensuring quality and safety through guidance

- Equipment quality assurance
- Training material Human Health Campus and Radiation Protection of Patients web training
- Standards and Guidance
- Code of practices

Radiotherapy, nuclear medicine and imaging equipment must meet both safety and quality standards to ensure effective treatment

Prevention of Unintended and Accidental Exposure in Radiotherapy and Radionuclide Therapy





Upcoming training

Co-sponsored by EFOMP and ESTRO

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Thank you!