

IOMP Policy Statement No. 1 (9 Sept 2009)

The Medical Physicist: Role and Responsibilities

1 Introduction

This policy statement provides general guidelines for member organizations in defining the role and responsibilities of medical physicists. It serves as a reference for medical physics professional organizations and health care authorities in their planning and development of the medical physics services in radiation medicine, and for academic institutions for education and training of medical physicists. This policy document should be read in conjunction with IOMP Policy Statement No. 2 (Basic Requirements for Education and Training of Medical Physicists).

2 Definitions

2.1 Medical Physics

Medical physics is a branch of physics that is concerned with the application of physics concepts and techniques to the diagnosis and treatment of human diseases. Medical physics may further be classified into a number of sub-fields, including the following¹.

2.1.1 Radiation Oncology Physics

2.1.2 Medical Imaging Physics

2.1.3 Nuclear Medicine Physics

2.1.4 Non-ionizing Radiation Physics

2.1.5 Physiological Measurements

2.2 Medical Physicist (MP)

A MP is a health professional who is qualified with a university degree or equivalent (level corresponding to masters degree) majoring in physical or engineering science with specialist education and training in the concepts and techniques of applying physics in medicine.

2.3 Certified Medical Physicist² (CMP)

A CMP is a medical physicist who has been certified by a national or an international professional certification body to have the level of expertise to practice independently in one or more sub-fields of medical physics.

2.4 Further Professional Classification of MPs

Depending on operational needs, there may be other classification of MPs, e.g., Trainee/Resident Physicist, Consultant Medical Physicist, etc.

3 Roles and Responsibilities of Medical Physicists

Medical physicists are mainly involved with the application of medical physics principles and techniques for treatment and diagnosis of human disorders, illnesses and disabilities, and the protection of the patients, staff and members of the public from ionizing and non-ionizing

¹ Depending on the professional environment there may also be close links to neighbouring sciences as Biophysics, Biological Physics, Health Physics, etc.

² Different terminologies are used in member organizations, e.g. Qualified Medical Physicist, Qualified Expert, etc.

radiation hazards. The roles and responsibilities of medical physicists may be oriented toward clinical service (which includes technical and radiation safety aspects), management, education, and research and development. Some key roles and responsibilities of medical physicists are listed in the Appendix. The principal functions and responsibilities of medical physicists can be summarized as follows:

- Establishment, implementation, and supervision of radiation protection and safety programs
- Measurement of radiation
- Establishment, implementation, and supervision of quality assurance programs
- Optimization of physical aspects of diagnostic and therapeutic procedures
- Commissioning and supervising the delivery of complex or new clinical procedures
- Technical specification of equipment and design of installations
- Acceptance and commissioning of equipment
- Technical supervision of maintenance
- Research and teaching

The exact role and responsibilities of medical physicists may vary among countries, depending on socio-economic background, training, service models, and national health and regulatory policies. Furthermore, the tasks of medical physicists evolve with time as new medical technologies and methodologies are introduced into the clinic. For this reason, the list should be subject to regular review and update.

4 Education and Training of Medical Physicists

Medical physicists should have received appropriate education in physics or engineering science and professional competency training in one or more sub-fields of medical physics. To maintain and enhance their professional competence, practicing medical physicists should each undergo a continuous professional development program. The recommended basic requirements for education, training and continuous professional development of MPs are given in IOMP Policy Document No. 2.

5 Professional Certification of Medical Physicists

To help strengthen the training and professional development of MPs and to ensure professional competency and high standard of practice, IOMP recommends that an appropriate means for professional certification of medical physicists be established by national member organizations, either by implementing their own national certification schemes or in collaboration with other established national or international certification bodies.

Appendix

Roles and Responsibilities of Medical Physicists

The key roles and responsibilities of medical physicists include the following:

Safety:

- 1 Establishing and implementing programs to ensure the quality, safety, correct maintenance, and effective use of therapeutic and diagnostic medical equipment³.
- 2 Supervising the management and custody of radiation sources.
- 3 Formulating radiation protection guides and procedures specific to hospital environment and other professional groups and organizations; conducting specialized measurements and producing protocols to optimize radiation exposure of patients, and minimize radiation dose to staff and the general public.
- 4 Performing risk assessment, radiation protection design, shielding calculation on radiological installations.
- 5 Participating in and contributing to the development and implementation of national and international standards, laws and regulations relating to patient safety, particularly to radiation and radioactive materials.
- 6 Supervising and managing radiation workers and other health professional workers as relevant.

Clinical:

- 7 Calibrating radiation sources, external and internal, and measuring radiation in therapeutic and diagnostic radiological procedures to ensure the correct and accurate delivery of radiation dose to a patient.
- 8 Optimizing the physical aspects of diagnostic and therapeutic procedures.
- 9 Implementing, advising, and supervising the delivery of new clinical procedures.
- 10 Developing, implementing, and supervising a quality assurance program for equipment and procedures involving the delivery of ionizing and non-ionizing radiation in diagnostic and therapeutic procedures.
- 11 Participating at patient discussion conferences and advising healthcare personnel with regard to issues involving delivery of radiation dose.
- 12 Performing or supervising the performance of others in radiation treatment planning and dose calculation, and design and fabrication of treatment aids and treatment-beam modifiers for individual patient treatments.
- 13 Advising and consulting with physicians on the physical and radiobiological aspects of patient treatments.

³ “Equipment” in this context is taken to include hardware and associated software, when applicable.

- 14 Advising and consulting with physicians on the development of safe and effective techniques and procedures in the application of ionizing and non-ionizing radiation in diagnosis and therapy of human diseases.
- 15 Performing or supervising others to perform acquisition, analysis and interpretation of clinical image and/or data for the purpose of studying/diagnosis/treatment of human disorders and illnesses.
- 16 Providing consultation and support on medical informatics and computer network management.

Management and Planning:

- 17 Conducting or providing consultation/support on the conduct of specialised examinations of patients, improving patient care and clinical services, developing innovative imaging and other diagnostic procedures for specific medical applications.
- 18 Planning, directing, conducting, and participating in supporting programs and remedial procedures to ensure effective and safe use of ionizing and non-ionizing radiation in patients.
- 19 Performing or providing consultation on planning, development and implementation of new clinical services and facilities.
- 20 Providing consultation on strategic planning of medical equipment technology; preparing specification for equipment acquisition; performing or supervising testing, commissioning, and management of medical equipment.

Research and Development:

- 21 Conducting research and development of new technology, methodology and procedure in radiation therapy, diagnostic radiology, nuclear medicine and other clinical services.
- 22 Conducting research into human disorders, illnesses and disabilities; investigating biophysical techniques associated with any branch of medicine.
- 23 Supporting the physical aspects of clinical trials and research involving the delivery of ionizing and non-ionizing radiation to patients for diagnostic and therapeutic purposes.
- 24 Developing novel instrumentation and physiological measurement techniques, mathematical analysis and applications of computers in medicine in response to clinical need for patients.
- 25 Preparing, publishing and presenting scientific papers and reports.

Teaching:

- 26 Teaching the principles of medical physics and radiation safety to physicians, residents, graduate students, medical students, technologists, and other health care professionals.
- 27 Mentoring trainees and junior staff in medical physics.