

# AFOMP Policy No 5: career progression for clinical medical physicists in AFOMP countries

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**Abstract** This policy statement, which is the fifth of a series of documents being prepared by the Asia-Oceania Federation of Organizations for Medical Physics Professional Development Committee, gives guidance on how clinical medical physicists' careers should progress from their initial training to career end. It is not intended to be prescriptive as in some AFOMP countries career structures are already essentially defined by employment awards and because such matters will vary considerably from country to country depending on local culture, employment practices and legislation. It is intended to be advisory and set out options for member countries and employers of clinical medical physicists to develop suitable career structures.

**Keywords** Medical physicists · Career progression · Policy · Professional development

## Preamble

A qualified clinical medical physicist is defined in AFOMP Policy No 1 “The Role, Responsibilities and Status of the Clinical Medical Physicist in AFOMP” [1] as “a person who is qualified with a master university degree or equivalent in physical science or engineering science and working in alliance with medical staff in hospitals, universities or research institutes. In addition to his/her university degree or equivalent, a Clinical Medical Physicist shall have specialist training in the concepts and techniques of applying physics in medicine including training in the medical application of both ionizing and non-ionizing radiation. This person must have a thorough knowledge in one or more sub-fields of medical physics, including radiotherapy physics, imaging physics, nuclear medicine physics and radiation protection.”

A clinical medical physicist's career can span more than 40 years, including the time spent in medical physics

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education and training. During their careers, medical physicists should initially engage in a period of specialised training and education following graduation in a relevant physical or engineering science. This will normally be followed by many years of practice where the medical physicist could be involved in

- clinical practice;
- research and development;
- education and training;
- management;
- professional contributions.

The path that a medical physicist's career takes will depend on many factors such as

- personal interest and performance of the medical physicist;
- whether the medical physicist is employed in the government or the private sector;
- whether the medical physicist also has a university academic appointment;
- whether the career path is defined by an employment contract;
- whether the medical physicist has left active participation in the profession for a period;
- opportunities for continuing professional development;
- the socio-economic status of the country that the medical physicist is working in.

While medical physicists in some countries, especially those working in the government sector, are employed under contracts that define a career advancement pathway through various stages of seniority, this is not the case for many medical physicists.

The purpose of this policy is to define how a medical physicist's career should progress and to offer guidance to those who employ medical physicists as to how they can develop career structures that will enable their employees to optimise their career and performance. This will lead to improved medical physics professional standards and improved health care delivery.

## Education and training

To ensure that clinical medical physicists will be able to practice independently and safely, it is imperative that they receive appropriate education and training. While in the past most medical physicists were trained in the profession through informal on-the-job experience in an apprentice-like fashion, the complexity of modern medical technology and the depth and breadth of scientific and technical knowledge and understanding required, this is no longer appropriate. Education and training must now be well-structured, formal,

comprehensive with appropriate assessment and examination of the trainee medical physicist's skills and knowledge being undertaken, resulting in formal certification by a recognised competent body (such as the certifications by the Australasian College of Physical Scientists and Engineers in Medicine or the American Board of Radiology).

AFOMP Policy No 1 "Recommendations for the Education and Training of Medical Physicists in AFOMP Countries" [2] details how medical physicists should be educated and trained. Relevant education, training and certification structures have been defined by the International Atomic Energy Agency [3–7], the International Organization for Medical Physics [8], and by the International Medical Physics Certification Board [9], and education, training and certification schemes should conform to their recommendations. Generally, those entering the profession should have an undergraduate degree in an appropriate physical science or engineering. This should be followed by a masters-level or higher degree in medical physics that consists of a comprehensive lecture program on medical physics theory and technology, anatomy and physiology, and a research project. Finally, a structured program of in-house training must be undertaken at a properly-equipped hospital department that should last for a minimum of 2 years.

For the period that a medical physicist is being trained in-house in a hospital department, they should be accorded all of the rights of an employee in that department, including being remunerated at a medical physicist level. The training of medical physicists should be carried out formally in the form of residency training in a similar manner to other health professionals such as doctors.

## Career structure

In the private sector, it is not common for a defined career structure to exist. In several countries, where public sector medical physicists work under a negotiated national, state or provincial employment contract, a career structure is defined by way of a salary/seniority structure through which medical physicists can progress. AFOMP, in principle, supports that such structures be adopted by all medical institutions as they often provide guidance as to how a medical physicist's career is progressing and they often define the level of responsibility and expertise required at each stage of the structure.

It is recommended that medical physicists are employed under negotiated agreements that define levels of qualifications, skills, attributes, experience, responsibilities, performance and accomplishments that must be achieved to be promoted from one level to the next.

For example, the following 4-level structure could be used for guidance. The titles accorded to each level should

be chosen according to local terminology. The structure will not be strictly implementable in all AFOMP countries and hospitals, but development of a similar structure is encouraged. Likewise, the expectations of the capabilities, experience and responsibilities of the medical physicists at each level, nor the number of years that a medical physicist should spend at each level and the number of levels are not strict. Therefore it is expected that each hospital or country will use this suggested structure only for background information and will develop their own structure to suit local conditions. It is also expected that it will be used to develop a balanced workforce with appropriate numbers of medical physics being employed at each level.

### Level 1

A Level 1 medical physicist is one who has completed an undergraduate degree and who is in clinical training (including masters-level academic education) or in the first few years of their career after completing their certification. Such medical physicists would normally be employed at this level for the first 5 to 8 years of their employment including their time in clinical training.

The medical physicist will not have any responsibility for equipment or processes. Their work responsibilities would be of a general nature and would be under the direction of a medical physicist employed at a higher level. They would train and work on less complex phases of medical physics while continuing to broaden the scope of their understanding of all phases of clinical physics, especially in their chosen medical physics specialization.

### Level 2

A Level 2 medical physicist is one who has completed a formal clinical medical physics training program of the duration and standard recommended by the International Medical Physics Certification Board or the International Atomic Energy Agency and has sufficient experience to act independently as a medical physicist. A medical physicist would normally be employed at this level in the 6th–15th years of their employment as a medical physicist. They would normally be specialized in an area of medical physics such as radiotherapy or diagnostic imaging.

At this level, a medical physicist would be expected to be able to

- work independently with reference to a Level 3 or 4 medical physicist;
- define a problem and formulate strategies for solving it;
- interpret novel or non-standard data;

- make value judgments in unfamiliar situations;
- communicate scientific advice clearly and accurately to others;
- recognize fault situations and take appropriate action.

Their responsibilities will include, amongst others:

- participating in the training of Level 1 medical physicists, technologists and other staff;
- participating in the specification of new equipment;
- participating in or leading the commissioning of new equipment, procedures and techniques;
- providing medical physics support clinical services relevant to their specialization;
- measuring and analyzing data as part of quality assurance programs;
- performing calibrations of equipment and participating in the maintenance of equipment;
- participating in safety programs;
- keeping abreast of current developments in their specialization;
- participating in committees and other activities within their hospital department;
- leading the provision of a special procedure (e.g., brachytherapy, targeted radionuclide therapy);
- providing advice to medical physics colleagues, technicians, technologists, researchers, medical specialists and other staff;
- participating in research programs;
- participating in medical physics professional organization activities at a local level;
- presenting papers and posters on medical physics research and development at scientific meetings.

### Level 3

A Level 3 medical physicist is one who has extensive experience post-training, and has a significant level of responsibility, leadership and management in the department in which they are employed. They are recognised locally as an expert in all aspects of their specialization. A medical physicist would normally be employed at this level in the 12th and later years of their employment as a medical physicist. They would have extensive experience in their area of specialization and would be contributing to research and development, if possible, in their local environment.

At this level, a medical physicist would be expected to be able to, in addition to what is expected of a Level 2 medical physicist

- lead and coordinate the work of Level 1 and 2 medical physicists;
- manage colleagues under their control;

- participate in strategic planning for their department;
- have developed links to a university to participate in teaching and research where possible;

Their responsibilities will include:

- coordinating the training of Level 1 medical physicists and other staff, and providing teaching;
- leading the specification of new equipment;
- leading the commissioning of new equipment, procedures and techniques;
- providing medical physics support clinical services relevant to their specialization;
- ensuring the provision and reliability of quality assurance programs;
- overseeing and validating calibrations and maintenance of equipment;
- playing a leading role in safety programs;
- leading strategic developments in the provision of services in their specialization;
- making budgetary decisions;
- participating in committees and other activities within their hospital as a whole;
- ensuring the provision of a special procedures (e.g., brachytherapy, peptide receptor radionuclide therapy);
- provide advice to consultants and other medical staff, radiographers, manufacturers and service engineers, and other physics staff;
- participating in medical physics professional organization activities at a national level;
- developing and coordinating medical physics research and development projects.

#### Level 4

A Level 4 medical physicist is one who has overall responsibility for planning, organizing and leading the medical physics staff in providing support for therapeutic and diagnostic medical procedures, calibrating and commissioning of equipment, education of medical physicists and other technical and clinical staff, research and development in a hospital or group of hospitals. They are recognised nationally, and possibly internationally, as an expert in all aspects of their specialization, but are able to lead medical physicists in all medical physics disciplines. A medical physicist would normally be employed at this level in the 15th and later years of their employment as a medical physicist. They would be likely to have an adjunct academic appointment in a university.

At this level they would be expected to

- lead the strategic development of medical physics services in their hospital(s);

- lead medical physics service planning and development in support of clinical needs;
- lead departmental budgetary planning and control;
- manage all staff to ensure effective delivery of medical physics services;
- organize, delegate and motivate others;
- assist in the development of skills and experience for staff;
- engage and communicate effectively with senior management at hospital and national level;
- represent their department at all levels in their hospital(s);
- lead the development and implementation of local and national protocols and procedures;
- coordinate and develop the research and development strengths within the medical physics department to national and international levels;
- maintain and develop research communication programs, particularly with local tertiary (i.e., university-level) institutions;
- formulate academic activities involving teaching and training;
- actively participate in medical physics professional organizations and related scientific organizations and committees at a national and international level;
- provide advice to radiology and radiation oncology departments on the strategic planning development of radiology and radiation oncology services and equipment technology acquisition.

#### Professional development

It is vital that a medical physicist stays up-to-date with developments in their area of practice; therefore all medical physicists should be engaged in a program of professional development. AFOMP Policy No 4 “Recommendations for Continuing Professional Development Systems for Medical Physicists in AFOMP Countries” [10] should be consulted and a system implemented in each hospital.

#### Temporary cessation of employment

It is quite possible that at some point in their careers, medical physicists may cease their employment for a period because of health issues, extended family leave, etc. Provision should be made to enable such medical physicists to re-enter the medical physics workforce so that the profession will not lose their expertise and experience.

While temporary cessation is likely to have a negative effect on career advancement, strategies should be employed

to minimize the impact. For example, where possible, a program of continuing professional education should be followed during the absence so that the medical physicist will stay up-to-date with the technology and techniques used in the profession.

### Academic appointments

Interaction between clinical medical physicists and universities should be encouraged where possible. This would promote the medical physics profession to students and encourage joint research projects to the benefit of the university, the medical physicists, and their department. It must be recognised that this can be difficult to implement, especially where the medical physicists are located remotely from a university with an interest in medical physics.

Medical physicists at the more senior levels should encourage and lead research and development projects within their own departments, and contribute to teaching in postgraduate medical physics programs in universities. A formal adjunct academic appointment to a university should be made for medical physicists, where possible, to secure clinical/academic interaction and facilitate applying for joint research grants. Joint employment appointments for medical physicists between a university and a clinical department are also encouraged. Both employing parties cooperating to ensure that the dual nature of the position is taken into account when considering career progression and promotion to higher professional levels within each organization.

### Professional status

A certified medical physicist will normally have had at least 5 years of tertiary education and training. Increasingly, medical physicists complete a doctorate and will have had eight years tertiary education. It is expected that they will also have completed at least two to three years of clinical training and passed examinations by a recognised body before they are certified. Thus a certified clinical medical physicist will have had 7–11 years of tertiary education and training.

Physics is recognised as being one of the more challenging sciences to study and understand, and it requires those studying it to a graduate level to also have skills in mathematical, computational and experimental techniques. With regard to this and the specialised nature of their expertise, contracts under which medical physicists are employed should recognise that their education, training and expertise is usually at a different level to that of other medical scientists and technologists. Thus employment

contracts for medical physicists should be separate to those of other medical employees.

The status of the medical physicist in a clinical environment should be equivalent to that of a qualified medical specialist. This appears to be the situation in several countries.

While being a medical physicist is a recognised occupation by the International Labour Organization and is listed in the International Standard Classification of Occupations (ISCO-08) [11], there is reluctance in some countries to officially recognise the medical physics profession as an occupation. Medical physics professional organizations should encourage their governments to formally recognise the profession of the medical physicist and the important role of the medical physicist in radiation medicine.

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