There are a number of European Council directives associated with the uses of ionising radiations. These are now mostly dated and inconsistencies between various directives are showing. The European Commission therefore set about resolving these inconsistencies and also simplifying them by forming one overarching directive. This directive is entitled “basic safety standards for protection against the dangers arising from exposure to ionising radiation” or more simply it is known as the “recast BSS” (Basic Safety Standards). This directive brings together five Euratom Council directives on radiation protection, namely:

- Council Directive 96/29/Euratom, basic safety standards

The Ionising Radiation (Medical Exposure) Regulations (2000 amended 2006) was derived from the original 97/43 Council Directive.

In this article we shall explore the implications of the adoption of the recast BSS on the role of the medical physics expert (MPE).

The involvement of the MPE in the areas of radiotherapy, nuclear medicine and diagnostic and interventional radiology has been requalified under the recast BSS. It states (Article 57) that in medical radiological practices, a medical physics expert shall be appropriately involved, the level of involvement being commensurate with the radiological risk posed by the practice. In particular:

a. In radiotherapeutic practices, other than standardised therapeutic nuclear medicine practices, a medical physics expert shall be closely involved.
b. In standardised therapeutic nuclear medicine and diagnostic practices, as well as in radiodiagnostic and interventional radiology practices, a medical physics expert shall be involved.
c. For other simple radiodiagnostic procedures, a medical physics expert shall be involved, as appropriate, for consultation and advice on matters relating to radiation protection concerning medical exposure.

d. For the 1997 directive, the MPE was only required to be available in nuclear medicine and involved as appropriate for consultations in diagnostic radiology. This significant change in the involvement of the MPE, particularly in radiology, identifies the impact from the important technological and scientific advances leading to increased use of high dose procedures such as in CT and interventional radiology and also of the strengthened emphasis placed on the hazards associated with patient exposures to ionising radiations. These developments have lead to enhanced requirements for both the justification of the medical exposures and on the requirements for optimisation of practices in these areas.

In the recast BSS (Article 4 (40)) the MPE is defined as “an individual having the knowledge, training and experience to act or give advice on matters relating to radiation physics applied to medical exposure, whose competence to act is recognised by the competent authorities”.

The important point to note here compared with the 1997 directive is that MPEs may advise as well as act and also note they will need to have their knowledge and experience recognised by our regulators. There is a requirement placed on our government (Article 15) to establish education, training and retraining to allow the recognition of medical physics experts (as well as radiation protection experts, occupational health services, and dosimetry services). To understand the training requirements of an MPE it is useful to firstly identify their role under the directive.

In the recast BSS (Article 85) it states that:

1. Within the healthcare environment, the medical physics expert shall, as appropriate, act or give specialist advice on matters relating to radiation physics as applied to medical exposure.
2. Depending on the medical radiological practice, the medical physics expert shall take responsibility for dosimetry, including physical measurements for evaluation of the dose delivered to the patient, give advice on medical radiological equipment, and contribute in particular to the following:
   a. optimisation of the radiation protection of patients and other individuals subjected to medical exposure, including the application and use of diagnostic reference levels;
   b. the definition and performance of quality assurance of the medical radiological equipment;
   c. the preparation of technical specifications for medical radiological equipment and installation design;
   d. the surveillance of the medical radiological installations with regard to radiation protection;
   e. the selection of equipment required to perform radiation protection measurements;
   f. the training of practitioners and other staff in relevant aspects of radiation protection.

Where appropriate, the task of the medical physics expert may be carried out by a medical physics service.

Secondly, it is also important to understand the specific actions to be taken regarding the equipment associated with the medical exposure of patients to ionising radiations in which, of course, the MPE will need to be appropriately involved. These actions are found in Article 59 (2) of the BSS and require governments to ensure that:
a. all medical radiological equipment in use is kept under strict surveillance regarding radiation protection;
b. an up-to-date inventory of medical radiological equipment for each medical radiological installation is available to the competent authorities;
c. appropriate quality assurance programmes and dose or administered activity assessments are implemented by the undertaking; and
d. acceptance testing, involving the medical physics expert, is carried out before the first use of the equipment for clinical purposes, and performance testing is carried out thereafter on a regular basis, and after any major maintenance procedure.

To ensure each of the European Member States puts in place comparable training programmes for MPEs, the European Commission issued a tender for contractors to provide guidelines on the MPE. The contract was awarded to a group of institutions, including the Institute of Physics and Engineering in Medicine (IPEM) among others from around Europe. The work of this consortium is now virtually completed and the guidelines are expected to be issued by the European Commission during the summer of 2012. The work of the consortium (tender no TREN/H4/167-2009) is currently available online at http://portal.ucm.es/web/medical-physics-expert-project/inicio. The guidelines will identify the educational and clinical training requirements to become an MPE.

In particular, the guidelines will specify the educational achievement required to achieve the status of MPE in relation to the European Qualification Framework (EQF) where level 6 equates to our BSc level, level 7 to our MSc level and level 8 to our PhD level qualifications. However, the EQF also allows individuals to reach these levels by alternative comparable means. To reach the status of an MPE, the guidelines will require an individual to hold:

- a BSc (or to demonstrate an appropriate number of credits have been achieved at level 6) in a physical science, i.e., one that contains a significant physics and mathematics component;
- an appropriate MSc (or level 7 with an appropriate number of credits) in medical physics that includes both core medical physics and a specialisation in one area of medical physics associated with the use of ionising radiation, i.e., in either nuclear medicine, radiology (diagnostic and interventional) or radiotherapy;
- appropriate clinical training at an intermediate level between EQF level 7 and 8 and of two years full-time duration leading to an award of clinical accreditation in medical physics.

This must then be followed by two years full-time structured experience, supported by CPD that ensures that the experience has been obtained at a high level commensurate with EQF level 8.

In our case in the UK currently, the system leading to recognition of the MPE should be satisfied when a person demonstrates they have structured high level experience of two years full-time duration after having achieved the status of clinical scientist in medical physics. A suggested alternative (my own personal view) to the two years structured experience may be less structured high level experience over a longer time period. I suggest it could take around six years post registration for a typical clinical scientist to gain the equivalent of two years structured experience. Under our new modernising scientific careers programme (at the time of writing only established in England) for training healthcare scientists, a similar system should apply.

It may, however, be possible for an individual to reach the status of an MPE in two years following registration as a clinical scientist or recognition as a healthcare scientist if they embark on a higher specialist scientific training programme (watch out for future developments).

Whatever training route is taken, the recognition by our regulatory authorities of an individual having achieved the status of MPE is likely to be administered, in my opinion, by a professional organisation such as the Institute of Physics and Engineering in Medicine (IPEM).