

Encouraging the assistance to courses on radiation protection in one medical school

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Abstract

Medical education and training should include credits on Radiation Protection. Physicians are the professionals with a high responsibility to improve the use radiation on humans for diagnosis or therapeutic activities. Radiation, always, causes deleterious effects beside beneficial results. Every use of radiation on patients should be justified and optimised. An updated approach has been developed to provide that formation to medical students at the University of La Laguna, ULL, (Spain). It basically consists on connecting the knowledge in Radiation Protection during the time of formation as medical doctors with the practical use of radiation after graduation. Many medical doctors with different specialities need one additional title as "Director of X-Ray medical facilities". Collaboration between the Regulatory Organism (CSN) and ULL have permitted make the offer of that title to the students when they have finished the career. Thus, the assistance to courses on Radiation Protection has improved very much.

1. Radiation Protection should be part of medical education and training

The use of ionising radiation in medicine is the main cause of irradiation to human kind due to artificial sources of radioactivity. Currently, in most European countries, the use of radiation in medicine is responsible of 15-25% of the total dose received in average by a person. Most of this dose is attributed to medical diagnostic uses, especially due to the use of X-rays. Considering the latest technical developments in the field, it is very likely that the use of X-ray for diagnostic purposes will increase in the future. The past months have brought a wave of advances. The last improvements in CT scanning, use highly specialized X-ray machines to take multiple, finely layered pictures of the heart and surrounding blood vessels. During the last years we have assisted to a spectacular improvement in technical and number of different techniques in interventional radiology, so many surgical operations have been obliterated.

The dramatic boost in the use of X-rays and in minor quantity the use of radioactive substances to make some explorations in Nuclear Medicine, like PET or PET/CT scan in order to get structural and functional information about many parts of the organism, has increased the attention on the responsibility of doctors using radiation. In fact, the people responsible for radiation protection in most countries have worried constantly about this issue. All use of radiation rests on the application of the principles which have been established by the International Commission of Radiation Protection (ICRP): Justification, Optimisation and individual Dose Limits (1). It has always been considered that the patients do not have dose limits. This is because the use of radiation upon them, for medical reasons, should provide them larger benefits than the risks involved in the use of radiation. However, the intrinsic difficulties which exist in the correct use of the justification and optimisation principles (which are applicable to patients), have, recently, resulted on the proposal of reference dose levels (2). These levels allow the quantification of the increment in the radiological risk of the patients as a consequence of the use of radiation for diagnostic purposes.

All of the above has resulted in the conclusion that medicine students should receive an adequate education in radiation protection. This education should allow them to acquire sufficient knowledge and attitudes so that the future use of radiation on patients will be carry out following the principles of justification and optimisation, for both the patients and the health care personnel. In addition, the dose limits will be applicable.

2. European and Spanish legislation concerned with Radiation Protection in Medical Schools.

The European Union Directive 97/43/EURATOM (3) has clearly established the necessity of a certain level of education and training in Radiation Protection for medical students. The aim of this directive is to achieve the main objective of the safety use of radiation: "the doses should be as low as reasonably achievable". The European Commission has fixed the main way to follow in order to get the accomplishment of the medical activity with the Radiation Protection philosophy.

This organisation has generated a great number of norms so that the utilisation of radiations in Europe will provide maximum benefits with minimum risks. The following norms are an example:

Spain has made a quick transposition of the European Directives to the national legislation. Some of the already published legal norms at the Official Journal of the Kingdom of Spain are directly linked to the medical practice.

The Spanish legal norm RD 815/2001 (4), clearly establishes that all medicine students must have completed successfully a course in radiation protection that will allow him/her to play an active part in the development and fulfilment of the norms that permit the accomplishment of the radiation protection objectives. However, the legal norm neither has a clear relation of the educational objectives that must be fulfilled in the course nor the contents of a unified programme that can be given at the faculties of medicine. Therefore, the level of radiation protection knowledge that the students must have is left open for interpretation by each faculty. This has resulted in a very uneven situation at the various medicine faculties in Spain.

3. Strategies to change the feeling on Radiation Protection education and training of Medical students.

There are several norms in the Spanish legislation that regulate the medical use of ionising radiation and which directly affect the medical personnel. The following ones stand out: Regulation of the Health Protection against ionising radiations; Royal Decree about the use of X-rays machines and Royal Decree about the justification of the use of ionising radiation on patients.

This legislation directly affects future specialists in X-ray diagnosis, radiotherapy and nuclear medicine. It also affects other specialists, which, occasionally, use radiation in their professional activities such as doctors in orthopaedic surgery, urology and digestive system. Furthermore, some of these legal norms, also, affect any medical doctor in Spain since they are allowed to request the use of radiations on patients for diagnostic purposes like in other countries. It is for this reason that it is stated in the Royal Decree 815/1991, that the practice of this measure is a responsibility shared between the prescribing doctor and the specialist doctor. It is, however, the latest one the doctor with the final word about whether the exploration is to be carried out or not.

Medicine students in Spain are informed about their need to study courses before their degree is completed that will provide enough education and training in radiation protection. However, in many cases, this information is not received in the same degree. In general, the students consider that it is unpractical and of little use to study radiation protection for their correct development of their activity as medicine doctors.

Medicine faculties in Spain have tried to fulfil the EU recommendations in relation to the students of medicine, which are also in the Spanish legislation. Thus, they are offering students a voluntary course (with different denominations), that serves them to obtain sufficient knowledge in radiation protection.

For the last 9 years, the University of La Laguna has offered an optional course called "Radiation Protection in Medicine". The fact that the course is optional implies that the student is free to select it and complete the 3 credits (30 hours), which have been assigned to the course. For one or other reason, the course has been followed by only a few students (20 per year). This is a small amount in comparison to the total number of students that complete their degree every year (about 150). The last year the number of credits assigned to this matter was 4,5.

It is established in the Spanish legislation the number of hours (18 hours of theory, 4 hours of practice and 3 hours of seminars) required to obtain part of the diploma of director of X-ray installation for

medical diagnostic purposes. Similarly, it is also established in the same legislation the programme which has to be passed via an examination in front of a tribunal chosen by the Spanish Nuclear Safety Board to obtain the second part of this diploma. A summary of the programme is given below:

Theory lessons: Radiation Physics (4 hours); Physical Characteristics of X-ray equipments and rays (1 hour); Detection and Measurement of radiations (3 hours); Radiobiology (2 hours); Radiation Protection (2 hours), Radiation Protection applied to Radiodiagnostics (3 hours); National Legislation and Norms (2 hours); European Legislation and Norms (1 hour).

The practical lessons must cover the use of radiation detectors, the estimation of personal doses and doses to the public, shielding efficiency, quality control and the labelling of working areas.

Since X-rays is by far the main use of radiation by doctors, both as a doctor that prescribes the exposure or as specialist responsible of its realisation, it was considered that an approach to increase the number of students following the radiation protection course could be to provide them the chance to obtain the diploma of director of X-ray installation. For this purpose, the National Nuclear Safety Board (CSN) has established a series of requirements that have to be fulfilled in order to homologate any R.P. course which is given in any place in Spain. This can be found in the current legislation (5).

The Professor responsible for the Medical Physics at the University of La Laguna proceeded to complete the following steps, which were needed to homologate the RP course:

- a) Fitting the main part of the programme so that it would include the number of theoretical and practical lessons established in the legislation to obtain the title of Director of X-ray installations.
- b) Negotiating with the University authorities and the CSN to allow the personnel from the CSN to inspect the development of the courses and ensure the correctness of the education and training provided with respect to what it is established in the legislation.
- c) Establishing a contract between the Faculty of Medicine and the Radiodiagnostic Service of the University Hospital (which is located right by the faculty), to allow carrying out the practical lessons in installation under real conditions, using for this purpose anthropomorphic phantoms.
- d) Establishing a contract with the Medical Physics Service at the University Hospital to be able to use their instrumentation for the detection and measurement of radiation needed to 1) characterise the functioning of the X-ray equipments; 2) determinate the doses to patients due to the use of those equipments and 3) study the quality of the image receptors which are later used by medical specialist.

Once the previous steps were completed, the homologation was obtained. From that moment, it was offered to the students the possibility to study the same course but with the option to obtain, after their degree is completed, the title of directors of X-ray installation for medical diagnostic purposes. Of course, they have to certify that they have successfully passed the examination of the course in the conditions which are established by the CSN.

This course is offered to all the students at the faculty, although it is recommended that have previously passed the mandatory course in Medical Physics. In general, the R.P. course is mainly taken by third year students, though it is also taken by other students, including those nearly finishing their degrees.

The homologation of this course by the CSN, allowing the students to obtain the previously mentioned diploma, has radically changed the number of students that follow the course. The first year after the homologation of the course, the number of students which followed the course grew slightly. The second year (Academic year 2005-2006), the increment in the number of students has been spectacular, more than 48% with respect to the previous year. Therefore, using the strategy of the homologation, one can fulfil in an easier manner, the European and Spanish legislation.

4. Conclusion

Encouraging medicine students to carry out courses in radiation protection is difficult because they generally consider this subject as something far away of the main interest of their degree.

It is essential to inform students about radiation protection. Their potential capability to order the use of radiation on patients is a factor that helps to awake the curiosity, which will allow them to obtain an adequate education on this subject.

Assuring the medicine students that taking the radiation protection course at their faculty, following the conditions established by the national radiation protection regulator organisation, will allow them to obtain in the future the specific diploma that allows them to constitute legal cabinets where to use X-rays equipments, is a procedure which meets both the needs with the recommendations.

Following the previously indicated steps of encouraging, informing and assuring the students at the University of La Laguna has drastically increased the number of students that take every year the course of radiation protection and, thus, the number of students that complete their degree with an adequate knowledge on radiation protection.

References

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