

Swiss concept for the education in radiation protection in the medical field

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Abstract

The Swiss Federal Office of Public Health (SFOPH) is the regulatory body ensuring that anyone applying ionizing radiation in the medical or academic field has adequate training in radiation protection. The Swiss legislation differentiates between two types of qualifications, which form an integral part of any official authorization to apply ionizing radiation: a) technical qualification and b) expertise in radiation protection. The former refers to the actual medical skills; the latter designates expert knowledge, which is required to fulfill the legal obligations.

Since 1994 medical doctors have to attend a SFOPH accredited course to obtain the qualification of expert in radiation protection. Physicians who had a license for an X-ray unit before that date had to give proof of the required expert knowledge within a time period of 10 years, either by attending a course or by passing an examination organized by the SFOPH. A novel tool was implemented in 2004, which allowed the examination to be done online via Internet

A foreign education in radiation protection is recognized by the SFOPH, if it is equivalent to an education undertaken in Switzerland. With the bilateral agreement between Switzerland and the EU and the ensuing free movement of workers, a marked increase in the number of requests for the recognition of foreign educations in radiation protection has been observed. The assessment of equivalence represents a significant challenge with respect to work load and required knowledge of the concepts for the education in radiation protection in the EU member countries.

1. Legal basis

The training requirements for people applying ionizing radiation in Switzerland are based on the Radiation Protection Law of 22 March 1991 [1], the Radiation Protection Ordinance of 22 June 1994 [2] and the Ordinance on Education in Radiation Protection of 15 September 1998 [3]. Any use of ionizing radiation, which could be a threat to people or the environment, must be authorized by the regulatory authority. In the medical and academic field, the Swiss Federal Office of Public Health (SFOPH) is the regulatory body. Since 1994, two types of competencies are required as pre-requisite to an authorization: technical knowledge and expertise in radiation protection. Technical knowledge refers to the knowledge that is required to apply ionizing radiation and the take responsibility for the protection of third persons, skills that are specific for a given profession. Expertise designates the knowledge that is required to fulfill the legal obligations like quality assurance checks or the instruction of collaborators in radiation protection. While technical knowledge is required by each person, that applies ionizing radiation, expertise is only demanded from one person per organization, who holds the corresponding responsibility for a given authorization.

This paper will focus on the radiation protection educational concepts for medical doctors in particular for diagnostics using conventional X-ray units. Applications in this area are classified according to the dose of the examination and the type of application (see table 1): the requirements for technical knowledge are specified accordingly and training and education are generally integrated into the curricula of basic and specialist medical studies. Technical knowledge in the low dose range is considered to be acquired / obtained with the diploma as a medical doctor. For applications delivering higher doses, a specialist title covering the relevant applications or an equivalent radiological training is additionally required. One part of specialist medical education generally consists of a SFOPH accredited course in radiation protection. For radiotherapy and for applications with non sealed radioactive sources the attendance of a specific course is always required. Expert knowledge in radiation protection can only be obtained in a course that must be accredited by the SFOPH.

Application	Dose range	
	low	high
conventional X-ray	thorax/extremities	remaining
radioscopy and interventional radiology	extremities	remaining

Table 1. Classification of radiology according to dose range and type of application.

In the sector of conventional diagnostic radiology, the elements of technical and expert knowledge are being taught in a combined course of 40 lessons which comprises both theoretical and practical elements and ends with an examination. A course covers the entire range of topics that are relevant from the radiation protection point of view: legal basis, tasks of the expert, radiation physics, radiation biology, measurements of dose distributions, practical radiation protection, medical aspects, methods of radiological examination, and image processing. Different courses are being offered for diagnostic radiology in low dose and in the higher dose range. Courses for the higher dose range are differentiated, in particular for the practical part, where the techniques (conventional radiology vs. radioscopy) are quite different.

2. Implementation of the legal requirements

The obligation for medical doctors to attend a course in radiation protection exists since 1994, when the ordinance on radiation protection came into force. A time period of 10 years to fulfill this legal obligation was given to physicians who had been granted an authorization for an X-ray unit before that date. These physicians also had the opportunity to give proof of the required knowledge in radiation protection by performing an exam organized by the SFOPH, without attending a course. An additional tool was implemented in 2004, allowing the exam to be done online via Internet. The first courses in radiation protection were conducted in 1997 when the extent and elements of education and the preconditions for the acknowledgement of a course by the SFOPH had been defined.

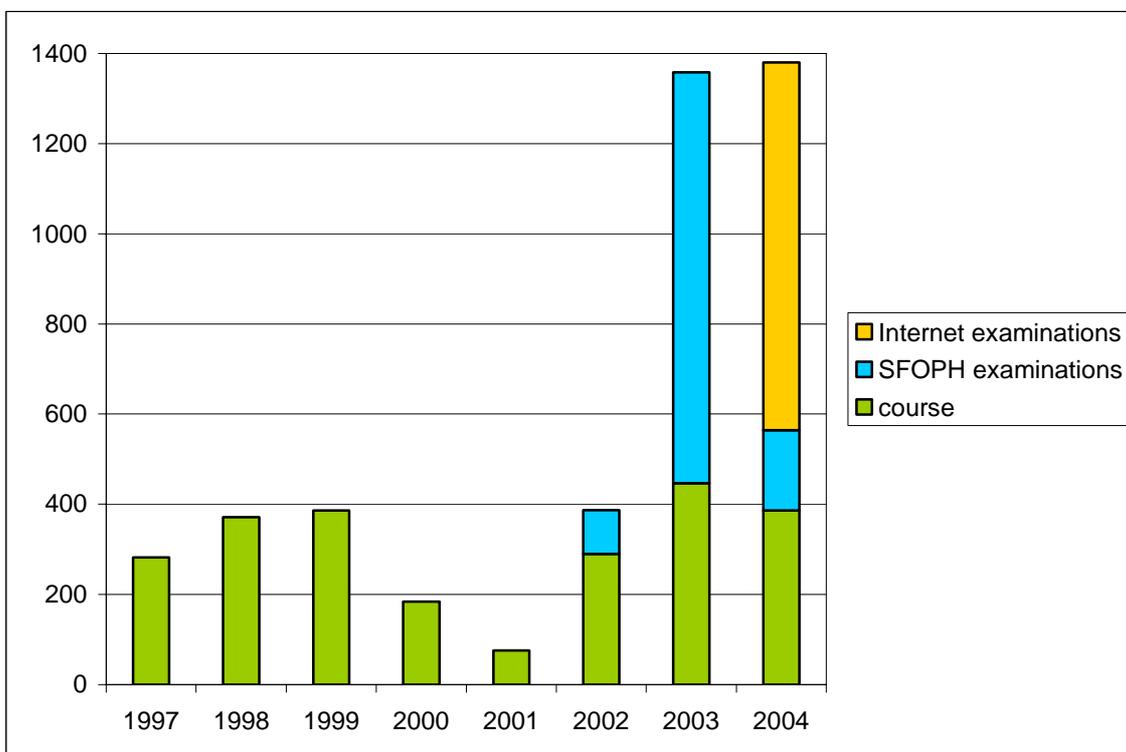


Figure 1. Number of medical doctors that obtained the qualification of an expert in radiation protection.

Between 1997 and 2004, a total number of 4424 physicians obtained the qualification of expert knowledge in radiation protection. 2422 physicians attended a 5-day course, 2002 passed the exam only, of which 816 physicians chose the Internet version (see figure 1). The time required to be

prepared for an examination by reading specialized books was comparable to the course duration. Because of the larger flexibility in the scheduling, in particular for the online examination, a majority of the physicians chose the "exam only" option as soon as it was available. The exam consists of different types of multiple choice questions. A score of 60% had to be achieved in order to pass and the exam could be repeated once in case of failure.

3. Experiences with the Internet examination of expertise in radiation protection

Setting up an online examination procedure as a means to give proof of the legally required knowledge in radiation protection was a novel project for our office. Two types of issues had to be considered: a) legal and b) technical ones. A number of requirements had to be fulfilled in order to ensure the online examination would be performed according to the rules [4]. The examination also had to run regardless of the operating system, web-browser, or speed of the internet-connection. Access to the test was granted once it had been checked whether the candidate fulfilled the conditions for admission to the online examination. The exam, once started, had then to be completed within 60 minutes. Along with the candidate details, his computer was technically identified and each keystroke was recorded with a timestamp. This allowed to fully reconstruct any given exam. Only one examination could be performed within 24 hours from a given computer, which aimed at preventing team work as far as technically possible.

After controversial discussions in the beginning, in particular within the medical societies, the online examination has turned out to be very positive. It was widely accepted by physicians and could be performed, with very few exceptions, by all candidates without technical problems. With respect to the pass/failure rate, no differences could be observed between online and classical examinations. The collaboration between our authority, which granted access to an examination and supervised it, and the company, that developed the actual internet application and was responsible for technical support, was outstanding, despite a geographical distance of more than 100 km. Since all data were already present in digital form, the work load for the evaluation of the results and the recording of successful candidates was reduced substantially. Thanks to this good experience our office is open to applications of innovative tools like e-learning or online examinations. However, such instruments are not suitable for all types of contents of radiation protection education and are not accepted by all candidates. Therefore they should be considered as a supplement to conventional methods.

4. Challenges for the future: the recognition of foreign educations in radiation protection

The medical field in Switzerland is characterized, to a larger extent than in most countries of the European Union, by a high proportion of physicians and dentists, who have obtained their education in a foreign country. Amongst other factors, this situation is due to the fact that a great number of citizens of EU-countries speak one of the three official Swiss languages, German, French or Italian. Although no exact data are available, it is reasonable to assume that 20-40 % of physicians in Swiss hospitals have done some part or the whole of their studies abroad. For instance a total number of 1546 Swiss specialist titles were given to physicians in 2004; in the same period 534 foreign specialist titles were recognized as equivalent. With the bilateral agreements between Switzerland and the European Union and the associated agreement on the free movement of workers, the number of physicians and dentists with an education in a foreign country, who exercise their profession independently, has increased considerably, when compared to the situation prior to these agreements.

An education in radiation protection that has been obtained in a foreign country is recognized by the SFOPH, if it is equivalent with respect to the extent and contents to an education performed in Switzerland. Requests for the acknowledgment of the expert knowledge in radiation protection by physicians are normally submitted in connection with a request for the license of an x-ray unit. Since June 2002, when the bilateral agreements came into force, a marked increase of requests for the recognition of foreign educations in radiation protection has been observed (see figure 2).

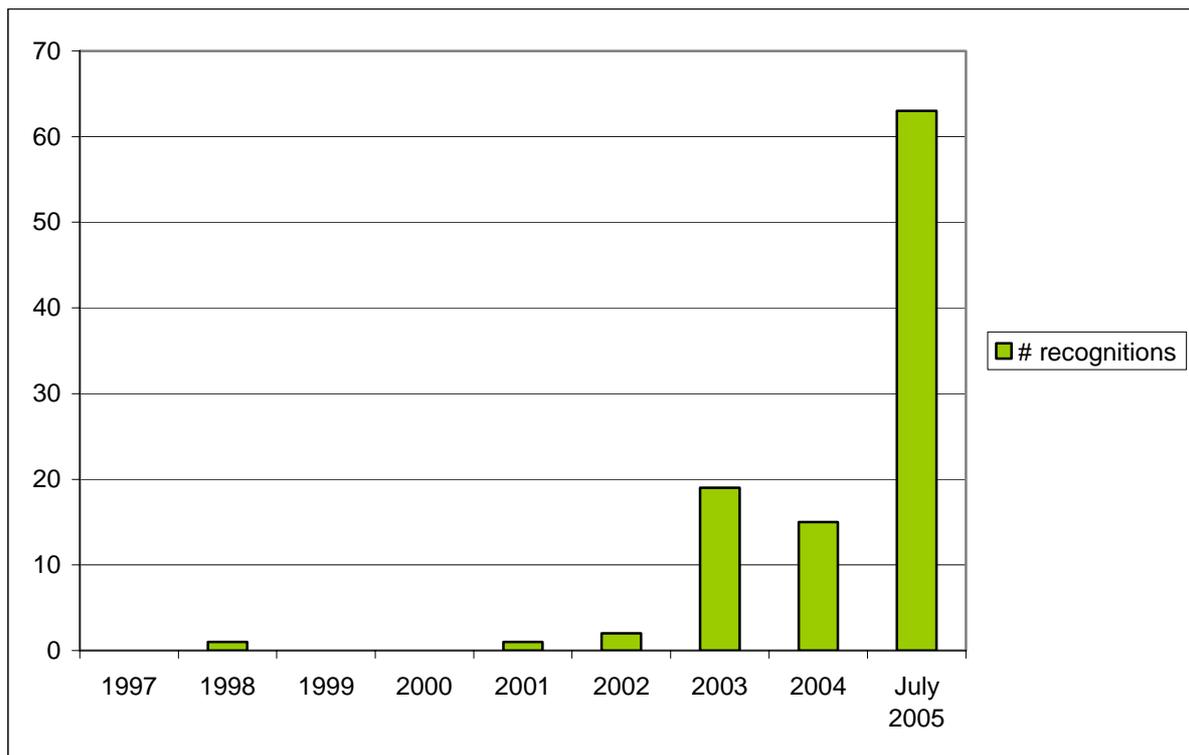


Figure 2. Number of SFOPH recognized expert educations performed in an EU member country.

Because of this strong increase in number of requests and because education in radiation protection is not harmonized internationally, the assessment of equivalence is a big challenge with respect to the required knowledge of the specific concepts and requirements for education in radiation protection in every European Union member country. Challenges that can be mastered best on an international level by a good co-operation between the responsible authorities and the experts that are active in this area.

Acknowledgement

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References

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