

ORIGINAL REPORT

Radiation protection knowledge among radiologists in northwest Spain[☆]



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KEYWORDS

Radiology;
Radiation exposure;
X-rays

Abstract

Objectives: To estimate radiologists' level of knowledge of and their implication in radioprotection.

Methods: An anonymous and supervised survey was conducted during a work meeting.

Results: Of the 65 questionnaires handed out, 63 were returned. In general, the radiologists surveyed considered their level of knowledge to be low, and it was statistically demonstrated ($p=0.018$) that the level of knowledge they believed they had was related to the number of correct answers. The level of knowledge that radiologists believed they had was also related ($p<0.05$) with the years of experience, and it was higher in the more experienced radiologists.

Conclusions: There is an important margin of improvement in knowledge about radiation protection.

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PALABRAS CLAVE

Radiología;
Exposición a la radiación;
Rayos X

Conocimientos en materia de radioprotección en radiólogos del noroeste de España

Resumen

Objetivos: Estimar el nivel de conocimientos de los radiólogos y su implicación en el uso de medidas de radioprotección.

Métodos: Se realizó una encuesta anónima y supervisada durante una reunión de trabajo.

Resultados: De los 65 cuestionarios facilitados, se devolvieron 63. En líneas generales, los radiólogos consideraron su nivel de conocimientos como bajo, y quedó estadísticamente demostrado ($p=0,018$) que el nivel de conocimientos que creían tener guardaba

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relación con el número de respuestas correctas. También guardaba relación ($p < 0,05$) con los años de experiencia, y era más alto en aquellos más experimentados.

Conclusiones: Hay un importante margen de mejora en el nivel de conocimientos en materia de radioprotección.

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Introduction

Ever since its discovery, the number of medical studies that use ionizing radiations has increased exponentially. Such an increase has been especially significant during the last 10–15 years, since over 10 million radiological examinations are conducted each day in the world.¹ Limiting the dose of cumulative radiation could lead to a loss of diagnostic quality in the imaging studies,² which is somehow ironic if we think that, in many countries, exposure to ionizing radiation both for the general population and labor exposure – but not for medical examinations, has already been restricted. As a consequence, patients may be receiving doses above the limits established for the employees and not being told anything about it.¹ With the approval of European regulations,³ the centers and personnel in charge have the obligation of informing the patients and registering all sorts of datasets on the doses of radiation administered. Considering the justification, optimization, and restriction of dose and reference levels established by the International Commission on Radiological Protection (ICRP),² it seems like a perfect time to assess the degree of commitment and knowledge of radiologists on this issue. This has been the goal of this study.

Material and methods

During a regional scientific meeting held back in October 19, 2016 on radioprotection, one anonymous face-to-face survey was conducted among the participant radiologists before the start of the meeting. Prior to conducting the survey, the radiologists who attended were informed on the goal of the questionnaire and its foreseeable future publication, taking the return of the questionnaire covered as the informed consent to collaborate. Nonetheless, the regional ethics committee was consulted, and it ruled that the return of the survey per se was enough authorization to participate. The survey consisted of 14 questions including personal demographic data (work experience, level of education), subjective knowledge on radioprotection and technical issues (type of optimization, use of protectors during the routine clinical practice and questions on the dose of radiation administered in some of the most commonly used techniques both in plain X-rays and computed tomography [CT] scanners). An example of these questions is shown in Fig. 1. All questionnaires were supervised in order to ensure that the answers were given without any external help. Both confidentiality and anonymity were maintained according to the Declaration of Helsinki.

The statistical analysis was conducted using free software (code R, version 3.0.0). In the first place, one descriptive study was conducted. In order to detect any possible associations among variables, both the Pearson's chi-square test and the Fisher's exact test were conducted. Seven (7) of the questions had one (1) correct answer only. With such tests, one new variable was created with values between 0 and 10 based on the correct answers given. For example, a value of 10 meant that the radiologist surveyed answered correctly to seven (7) questions, and a value of 0 that he did not answer correctly to any of the questions. When it comes to the remaining answers, the surveyed radiologists were categorized based on their years of experience, level of knowledge, type of specialized training, and clinical practice of each and every one of them. In order to detect any possible inter-group differences, an analysis of variance (ANOVA) and Levene's test of homogeneity of variances were conducted using the Student's *t* test as a comparative of the values measured among the different groups.

Results

A total of 63 questionnaires were returned out of the 65 that were handed out. Most of the radiologists surveyed had few years of experience (from 0 to 4 years of experience: 30; from 4 to 10: 14; from 10 to 20: 8; over 20: 11) and regarded their own level of knowledge as low (high: 2; moderate: 28; low: 32; does not know or does not answer (DK/DA): 1). Most said they used CT scanners often or always (always or very often: 22; often: 32; only when they are on call: 6; never: 2; DK/DA: 1) (Fig. 2), and X-rays (always or very often: 17; often: 26; only when they are on call: 10; never: 9; DK/DA: 1). Most surveyed radiologists (25) use bismuth protectors occasionally (Fig. 3) and, in general, the protocols to conduct CT scans are optimized based on criteria from one radiophysicist or another radiologist (26), or the manufacturer (22) (Fig. 4). When grouping the seven (7) questions with one correct answer only, a new variable was created with values between 0 and 10. A value of 10 indicated that the radiologist surveyed answered correctly to the seven (7) questions, and a value of 0 suggests he did not give any correct answers. When conducting an analysis based on the years of experience, training, and on how often the radiologists worked with CT scans or X-rays, no statistically significant differences were seen. Only when data were segmented based on the level of knowledge that the radiologists thought they had is when statistically significant differences can be seen (Fig. 5). Since only two (2) surveyed

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