EVALUATION OF INDIVIDUAL DOSIMETER USE, BY GOIÂNIA CITY RADIOLOGY PROFESSIONAL BY THE DEGREE 453.

Costa, R.F.

Federal Institute of Education, Science and Technology Goiás - Brazil.

ABSTRACT

Occupational exposure can induce stochastic effect that has no threshold dose. This means that small doses, even those below the limits, can induce them. The cancer and genetic effects are examples of such effects. Radiology professionals are exposed to small doses of radiation throughout their working life, so it is important that they use dosimeter correctly and to monitor the doses received. So we evaluate the use of personal dosimeter for radiology professionals in Goiânia. Through field research, descriptive character, with a quantitative approach. Using the information collection technique based on observation and a questionnaire with closed questions. From this, we sought to evaluate the knowledge of the use of the dosimeter. The universe of this research were the radiology technicians working in Goiânia. 5 questions were made to 79 radiology technicians and then noted its practice regarding the use of the dosimeter. The results showed that 92% of respondents said that during his working day is compulsory to wear a dosimeter, but only 63% used it regularly and 37% accompanied the monthly dose values. Only 67% of respondents know they should use it on the lead apron, while in practice, 62% use it properly. The correct use is fundamental to estimate the equivalent dose of the parts that are not protected by armor on display. The survey also revealed that 79% of technical know where to put it after their workday. And half of respondents use the dosimeter at the most exposed torso. Thus we conclude that the use of dosimeter is faulty and that the continuing education of professionals who are exposed to ionizing radiation is a need to improve the safety of services.

Key words: radiation, protection, dosimeter, dose, education.

E-mail: rogercosta1@hotmail.com

1. INTRODUCTION
Occupational exposure can induce stochastic effects, where the probability is proportional to the radiation dose received and has no threshold dose. This means that small doses even below the limits of radioprotection, can induce these effects, among which stands out the cancer. Radiology professionals are daily exposed to small doses of radiation throughout their working life, so it is important that they use personal dosimeter correctly [1]. So when exposed to ionizing radiation should:

1) use dosimeter at the most exposed torso.
2) use dosimeter on the lead apron.
3) after their dosimeters hours should be kept away from ionizing radiation sources, with the standard dosimeter [2].
4) Furthermore, it should be conducted annual training radiology professionals in radiological protection.

But in many cases they are not used properly by professionals [3]. Photographic dosimeters consist of a movie film set in a plastic holder which can be stuck on clothing [3]. The photographic method was the first to be used in the detection of radiation [5,6].

The exposure of the dosimeter to ionizing radiation sensitizes the film, darkening when it is revealed. The amount of darkening of the film is evaluated with a densitometer and is proportional to the radiation dose received. The main purpose of these devices is to monitor whether the exhibits, which workers are subjected, are being kept low, and ensure that dose constraints are not exceeded [3].

Thermoluminescent dosimeters (TLDs) are made up of crystals that accumulate energy when irradiated and re-emit in the form of light when heated, this property and called thermoluminescence. The light emission by crystals is represented by a curve that relates the light emitted by the heating temperature and this ratio determines the dose previously focused on the meter. TLDs are the most widely used.

It is the responsibility of radioprotection service holders through the doses of the individual dosimeter measurements, providing the investigation of cases of monthly effective doses greater than 1.5 mSv. In Brazil the values of lower monthly doses of 0.2 mSv are not considered to logging level [2.7]. The log level was defined as the value from which must be carried out numerical record of the measured value of the quantity of interest. Values lower than it is of little importance for radiological protection, being considered as zero [8].

The radiological protection system should strive to keep exposures below recommended thresholds, avoiding It is thus the stochastic effects. Therefore it is essential to train professionals about the correct use of protective equipment [1] and individual dosimeter.
In order to try to tailor the use of ionizing radiation to the rules established in this Regulation, in order to keep exposures below recommended limits. [2] Recent research has maintained that is of great relevance to evaluate the services under the criteria of radiation protection guidelines [9] and the need to maintain a permanent education with professionals who are exposed to ionizing radiation [10] and a greater knowledge and compliance with radiological protection standards would increase the protection of patient and professional [11, 12].

In Brazil it is essential the training of occupational health team every industry where radioactive sources, open or sealed, are handled, including therein health facilities [11,13], since there is deficiency in the journal control regarding the use of radiation sources and many companies do not promote training and lectures on radiation protection and hygiene, to its employees, not simply to encumber costs [14].

Recent work shows that professionals have received training and lectures on radiation protection, obtained more correct answers in questions about radiation protection of patients in collective environments [14].

Importantly, the companies of medical and dental diagnostic radiology should put into practice every day, which is established at the gate 453. For thus provide a higher quality service and security to the user [11,13]. And the continuing education of professionals and implementation of procedures aimed at reducing doses are actions that result in adequate control of radiation exposure [15].

In most developed countries [16] the use of ionizing radiation is growing every year, especially interventional procedures, and this has worried many researchers, since many companies did not fit the standards of radiation protection [17]. This is because some therapeutic procedures can be performed without the need for surgery, which presents a greater risk to the patient [18]. An example of this increase is the practice of cardiac catheterization, this procedure fluoroscopy is used for placement of central venous catheters and temporary pacemakers, and long-term use increases the risk of exposure to ionizing radiation to the doctor and his assistants. [19] In addition, research shows that the Brazilian patients are being exposed unnecessarily to radiation tests X-ray and tomography. The reasons range from examinations without the calibrated radiological equipment and poorly trained staff. So we stress the importance of putting into practice the estimated annual training at the gate 453, so that way is provided a service with higher quality and security [12] society.
So we evaluate the knowledge and the practice of radiology professionals in Goiânia, regarding the use of the dosimeter: in controlled area, with lead apron, where you keep it after their workday, in which part of the body is due using it and the annual training.

2. MATERIALS AND METHODS

2.1. Determination of sample size

To determine the sample size to be searched was used the following statistical formula:

\[ n = \frac{z^2 \cdot p \cdot q \cdot N}{(N-1) \cdot e^2 + z^2 \cdot p \cdot q} \]

Where:
- \( n \rightarrow \) sample size
- \( N \rightarrow \) population size
- \( p \rightarrow \) sample proportion
- \( q \rightarrow \) complementary ratio, where \( q = 1 - p \) or \( p + q = 1 \)
- \( e \rightarrow \) sample error (or pet)
- \( z \rightarrow \) tabulated value for desired confidence levels.

With \( N \) equal to 357 that is professional registered numbers working in Goiânia, \( p \) and \( q \) equal to 0.5, and equal to 10% which is the sampling error \( z = 1.65 \) and using the expression 1, we find that the size of the sample being searched to be 10% uncertainty is 79 professionals.

To interview the professionals used the information collection technique based on a questionnaire with closed questions, prepared for this purpose and it was delivered and collected personally. From this survey, we sought to assess the knowledge of the individual dosimeter use. The universe of this research are the radiology technicians who work in the city of Goiania. 5 questions were made to 79 radiology technicians and the results presented here has a 10% uncertainty. Also, we observe how professionals perform these activities on your desktop to be distorted between knowledge and practices of these professionals.

3. RESULTS
The results show that 92% of respondents said they know that during your working day is compulsory to wear a personal dosimeter. However, in practice the daily use of the dosimeter is only 63% of respondents. And 37% do not follow their monthly dose values and therefore do not know the values of doses they receive. This coincides with the results presented in other work. Where most of the technicians reported that they always used the individual dosimeter when they were controlled area, however, they had no regular access to dosimetric report, and did not know how to interpret it. The continuing education of professionals who are exposed to ionizing radiation is a need to improve the safety of services [10].

According to Ordinance 453 individual dosimeters intended to make individual doses measures should be placed on the lead apron and dose reading the value obtained must be multiplied by 1/10 [2].

We also evaluated the knowledge of these professionals regarding the correct positioning of the dosimeter when used along with the lead apron. Only 67% of the respondents know that the dosimeter is to be used on the apron, while in practical use dosimeter 62% with the lead apron properly. Professionals surveyed in two health institutions in Acre use the personal dosimeter on the lead apron. [9] The correct use of the meter is fundamental to estimate the equivalent dose of the parts that are not protected by shielding at the time of exposure [20]. In Brazil, the value considered for record-level is less than 0.20 mSv [2, 7]. So the doses with value below 0.2 mSv made with the dosimeter under the apron, would lead to incorrect values of equivalent doses of action of the parties unprotected by armor.

Individual dosimeters should be stored after your workday, away from sources of ionizing radiation, along with the standard dosimeter. The results show that 79% of technical answered correctly on the location to save your dosimeter after their workday. However research shows that many professionals do not put their dosimeters along with the standard dosimeter after-hours [1]. The correct way to store the device, prevents a dose of radiation that does not match the reality of occupational exposure is computed to dosimeter [3].

We asked the experts in that area of the body the individual dosimeter should be placed. And only half of the respondents replied that the correct place to put the dosimeter is the most exposed torso. Survey found that most establishments provide individual monitors for workers occupationally exposed to ionizing radiation, but workers are not properly instructed on their use of standards [1]. In another survey most technicians reported that always used the personal dosimeter in the trunk, and when necessary, on the lead apron.
We also asked staff about the annual training provided for in Ordinance 453, and the results show that only 21% of professionals have participated in training in the last year which shows the low commitment of companies to promote continuing education. Many companies believe that the training of its professionals in radiation protection may adversely affect your expenses, since, with greater knowledge then you might pasar to demand better working conditions [14].

4. CONCLUSIONS

1. Most professionals know that they must use personal dosimeter, but in practice only 63% of these use - the daily.

2. Around 67% of the respondents know that the dosimeter is to be used on the apron, while in practical use dosimeter 62% with the lead apron properly.

3. Almost 79% of technical answered correctly on the location to save your dosimeter after their workday.

4. Only half of the respondents replied that the correct place to put the dosimeter is the most exposed torso. This shows the lack of training and supervision by companies on the proper use of dosimeters.

5. And only 21% of professionals have participated in training in the last year, demonstrating the need to promote continuing education.

5. REFERENCES


