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# RADIATION PROTECTION IN MEDICAL DIAGNOSTIC RADIOLOGY IN THE CITY OF SOBRAL, BRAZIL

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## ABSTRACT

The objective of this study was to evaluate the suitability to radiation protection of four diagnostic radiology medical services in the city of Sobral-CE, Northeast of Brazil, and to analyze results of the literature for the cities of Rio Branco-AC, North of Brazil, and Rio de Janeiro-RJ, South-east of Brazil. In Sobral-CE, it was performed interviews and direct observations with reference to Brazilian law, the National Ordinance No. 453/1998 of the Ministry of Health that regulates the operation of medical and odontological diagnostic radiology services. The results show the occurrence of many items in disagreement with the standard. The technical and operational infractions have basically due to unfamiliarity with the legislation, the lack of investment in training and/or professional development courses.

## 1. INTRODUCTION

The discovery of X radiation transformed the paradigms of natural sciences and medicine practices [1]. Despite the numerous benefits of using radiation, it should be attentive to the potential of ionizing radiation to cause somatic and/or genetic changes.

The International Commission on Radiological Protection (ICRP) was created 30 years after the discovery of X-ray, in order to develop standards for radiation protection and establish dose limits on the use of ionizing radiation. In Brazil, the National Ordinance No. 453/1998 of the Ministry of Health incorporates principles of ICRP to establish basic requirements for radiation protection and quality control for medical and odontological diagnostic radiology services [2].

In 2005, the National Health Surveillance of Brazil published the document "Medical Diagnostic Radiology: Security and performance of equipments", establishing procedures for carrying out a set of quality control tests and radiometric survey for diagnostic radiology medical equipment to check its performance [3].

Few diagnostic techniques were so durables as the techniques that use X-ray. In medicine four techniques are widespread in obtaining morphological and physiological information with non-invasive procedures using ionizing radiation, they are: radiography, fluoroscopy, mammography and computed tomography.

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Given the importance of evaluation of the radiation protection in medical radiological services, this study intented to evaluate the suitability to radiation protection of four diagnostic radiology medical services in the city of Sobral-CE and to analyze results of the literature for the cities of Rio Branco-AC and Rio de Janeiro-RJ, Brazil.

## 2. METHODOLOGY AND RESULTS

In this work it was visited four diagnostic radiology medical services, one public and 3 private. It was analyzed nine radiology equipments, they were: three conventional X-ray, three CT scanners, two mammography and one fluoroscopy equipment. It was performed interviews and direct observations based in the Decree No. 453/98.

In all services, the professionals that work in monitored area were using a dosimeter, as recommended by the Ordinance. This result was more satisfactory than that obtained by [4] in the city of Rio Branco-AC, in which nine radiology technicians of one institution was not carrying any kind of monitoring.

All nine rooms visited, the operator had direct visibility of the patient in, but in two of them the operator had no direct visibility of the door. The lighting and radiological protection notices and warning to pregnant patients and attendant were observed in seven of the nine rooms. The quality control tests were updated for all nine equipments.

Ordinance No. 453/98 requires that every radiology department must have individual shields of lead for patients, staff and attendant, as well as appropriate supports in order to preserve the integrity the shields [2]. The three conventional X-ray, three tomography and one fluoroscopy services had all the individual shields necessary. However, for the mammography services, only one of the establishments had such shields. All of them were in good condition and had adequate supports. In Rio de Janeiro, [5] evaluated radiology departments in public and university hospitals and found that 85% of them presented individual shields in acceptable conditions and that 50% had insufficient number of individual protective clothing. They also noted that some shields had fissures [5]. Similar problem was verified by [4] in the city of Rio Branco-AC which evaluated two publics institutions with radiology service. One of the institutions had insufficient aprons and none was found protectors of gonads and thyroid.

Ordinance MS 453/98 stipulates that all establishment that has radiology service shall maintain a regular training program and update the entire radiology team. Only one of the four establishments visited performs annual training with professionals. In Rio Branco-AC, fifteen radiology professionals in both institutions reported that they did not have any training of radiological protection and quality control during their career.

In one of the institutions the box with the standard dosimeters was in improper location in the tomography control room. No one of the four visited services the overdose has been reported. All conventional X-ray equipment the radiation emission only occurs with continuous pressure of shooting button and the focus-receptor distance was greater than 120 cm, as required by the Ordinance.

The three mammography equipments possessed specific processors. In one of the services the monthly image test had been carried out for over a year. Other establishment possessed the phantom to perform monthly this quality control test.

The three CT scanner had simulators of calibration and lead aprons.

In the fluoroscopy equipment the radiation emission only occurs with continuous pressure of shooting button. This service possessed image intensifier system and the equipment signalize when exposure time reach 5 min, as provided by the Decree No. 453/98. The fluoroscopy equipment has a regulator diaphragm of useful beam.

## 3. CONCLUSIONS

The results show the occurrence of some items in disagreement with the Ordinance. It can be observed that the city of Sobral-CE presents better results and all equipments had quality control tests updated. It should be happen because most of the establishments visited in this work was private, in which supervision is more intense. Another issue that must be taken into account is the year of conducting the researches, the researches of Rio Branco-AC and Rio de Janeiro-RJ were made a few years ago, it is expected greater compliance of the legislation of that time to today. In general, the technical and operational infractions have basically due to unfamiliarity with the legislation, and lack of investment in training and/or professional development courses.

## 4. REFERENCES


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