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STUDY OF OBSERVING THE STANDARDS AND SECURITY PRINCIPLES IN DIAGNOSTIC RADIOLOGICAL CENTERS IN SISTAN AND BALUCHESTAN HOSPITALS, IRAN

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ABSTRACT

Background and Objective: Due to the fact that outfitting and establishing a radiological center has many costs and the technologies related to this equipment are continually developing and progressing, taking into consideration and observing the international standards of these centers are necessary and is led to increased efficiency and useful lifetime of the apparatuses and economy in economic costs. This article aims to study the condition of diagnostic radiological parts of Sistan and Baluchestan hospitals and its comparison with the standards determined for these centers through national and international organizations like ICRU¹, NCRP² and ICRP³. **Materials and Methods:** In this descriptive study, the condition of physiological atmosphere, the condition of personal protection apparatuses of radiographers and patients as well as the status of radiography apparatuses has been studied using a three-partite questionnaire. In the next stage, the collected data have been through questionnaire, dosimeter and thermometer compared to the standard amounts and the qualitative and quantitative statuses of the radiographic centers has also been analyzed. **Findings:** The results achieved in this study indicate that the compatibility mean of the status quo with the international standards is 58 percent. In addition, none of these radiological centers are provided with standard darkroom and sufficient alarming signs and there was no archives regarding personnel protected from radiation in 44 percents of his center. Radiographic rooms have some defects and problems in 50% and lack of radiation leakage in 64%.

Conclusion: According to the results achieved and the significant differences between international standards and the condition of the centers under study, applying the periodic monitoring and regularly quality control programs are necessary.

¹International Commission on Radiation Units and Measurements

²National Council on Radiation Protection and Measurements

³International Commission on Radiological Protection

Keywords: Sistan and Baluchestan, Radiography Standards, Radiation Protection, Radiology.

INTRODUCTION

Radiography is one of the most significant methods to diagnose many diseases and the effective use of this technology is made possible only through observing the standards. Hence, taking into consideration the current condition in radiographic centers and its comparison with standards such as ICRU, NCRP and ICRP is a key factor to be assured about the appropriate function this apparatuses.

On the other hand, the radiographic center is the most expensive one in each medical center and the investment made in this center is more than the one in other centers in such a way that the measures taken for being radiation protection, ionized air conditioning, the purchase and installment of the radiographic apparatuses and also providing the required physical atmosphere to different imaging apparatuses imposed much costs to the medical center, especially that the biological effects of the radiation are emphasized for the radiographers, patients and entourages(1).

According to the reports issued, more than 80% of the referents to hospitals have a kind of radiography and the problem in giving services in these centers in one hand caused an inappropriate radiography being presented and the necessity to be repeated, and also it is led to an inappropriate diagnosis and or lack of diagnosis on the other hand which is resulted to the lack of patient's health being endangered (2). On the other hand, if the protective principles are not observed and inappropriate radiographies are made, the ionizing radiation using in these centers put the personnel and patients health in danger (3).

The studies performed in 51 public and private centers in Tehran showed that this center has many problems in terms of the issues related to radiological personnel, 89%, the radiographic room 82%, protective coverings, 77% and radiation leakage 37% (4). On the other hand, quality control of radiological apparatuses is one of the most significant methods to diagnose the current problems in such a way that applying the quality control programs in some centers in Iran is led to the employees and patient's dose be reduced more than 70 % on average and concurrently the quality of radiographic images are significantly increased (4).

Finally existing some problems such as lack of uniformity of X-ray field, the failure of collimator in appropriate adjusting the field of view, lack of conformity between the optical field and X-ray field, lack of observing the radiation protection principles, lack of providing film and appropriate drug, lack of using radiation protection especially for children, lack of appropriate filtration of the apparatus and the defect of various parts of emerging and fixing apparatus are led to irreparable damages being made to the personnel and patient's health (5,6).

Therefore, according to the necessity mentioned, this study aims to take into consideration the amount and type of defects in radiological centers of Sistan and Baluchestan's hospitals and a final result being presented to resolve this problem.

MATERIALS AND METHODS

The criteria being studied in this article have been divided into four groups as follows:

- 1- The condition of radiographic room and control room in terms of dimensions, light, radiation leakage, Cast conditioning (height, condition, Cast), the condition of entrance door(position,

height, being locked from inside) and warning posters for pregnant women, the danger of exposure (number, type and the place being installed), exposure Red Light, conservative equipments, loudspeaker, the distance of the tube from control room, the size of lead glass, height and position of lead glass to the X-ray room, flooring condition and walls (safety shield) (2,3,7,14,16,18).

- 2- The condition of radiographic rooms in terms of the type and duration of the apparatus, the keys to move tube in different directions, the keys to move radiography bench, film sync, the function of grid, the condition of tube elbow and the condition of fluoroscopy (8,9,10,11).
- 3- The condition of darkroom in terms of entrance door, dimensions, the place and position related to radiographic room, light leakage, inner construction in terms of light reflection, ventilator (power and anti-light), the lamp of the darkroom (the type of filter, the distance from the film and the power of lamp), film inbox (light leakage), the preparation of drug, the required lighting, the fixing and emerging apparatus (type and duration), the condition of emerging and fixing pump, the warmer of emerging and fixing apparatus, the rollers, the store to preserve drugs and no radiating films (light, moisture and ventilation)(12,13,15,17).
- 4- The condition of dosimeter of radiographic centers in terms of the number of dosimeters, using dosimeters, controlling the beige films, the medical brochures of the personnel employed in the center, periodic experiments, the one

who is responsible for the center's physical health, the applications of lead shields (lead coverings, lead glasses, Thyroid shield shields, Gonad shield, lead glasses, lead gloves) (2,3,7,14,16,18).

At the final stage, the information related to the condition of physical atmospheres, the condition of radiographic apparatuses, the personnel information and the equipments for personnel and patient's protection were collected by referring to the radiological centers.

To perform the dosimetry, the one named DIADOS E made in PTW manufacture calibrated for the X-rays with 40 kvp to 150 kvp was used. In addition, a thermometer with measurement range of - 10 to 150 degrees centigrade and ± 1 accuracy was used to check the temperature of emerging and fixing medicine. A building meter was also used to measure the dimensions.

Findings

The condition of 9 radiological centers, both educational and non-educational, was examined in this study, the number of studies apparatuses were 21 ones in which 5 apparatuses were useless and out of service.

The functional duration of the apparatuses was 1 to 32 years with the mean functional duration of 10 years.

The results of this study indicate that the condition of radiographic rooms, compared to the defined standards on average was 50% (figure 1), the condition of radiological apparatuses 77% (figure 2), the condition of control room was 65% (figure 3) and the condition of darkroom was 44% (figure 4) and the dosimeter condition and personnel protection was 52% (figure 5).

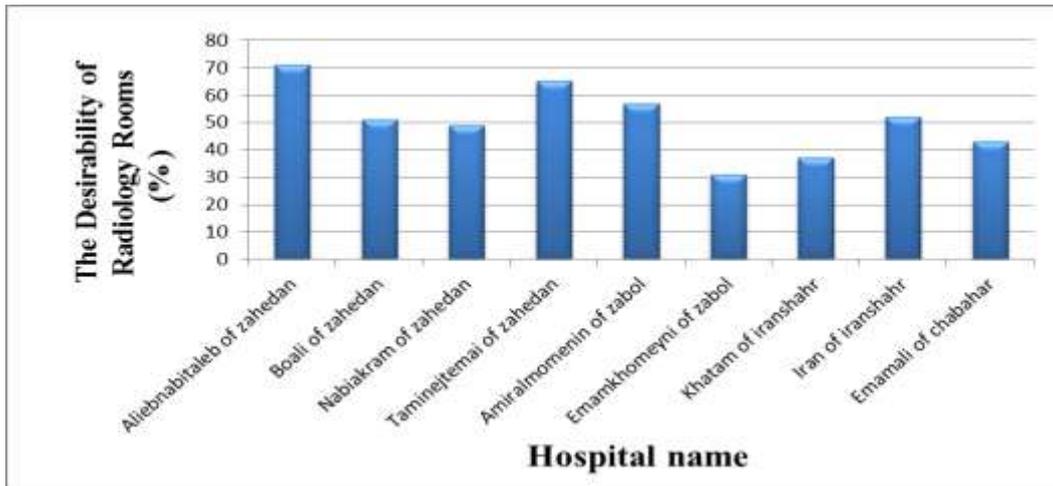


Figure 1: the condition of radiological centers of Sistan and Baluchestan's hospitals in 2010.

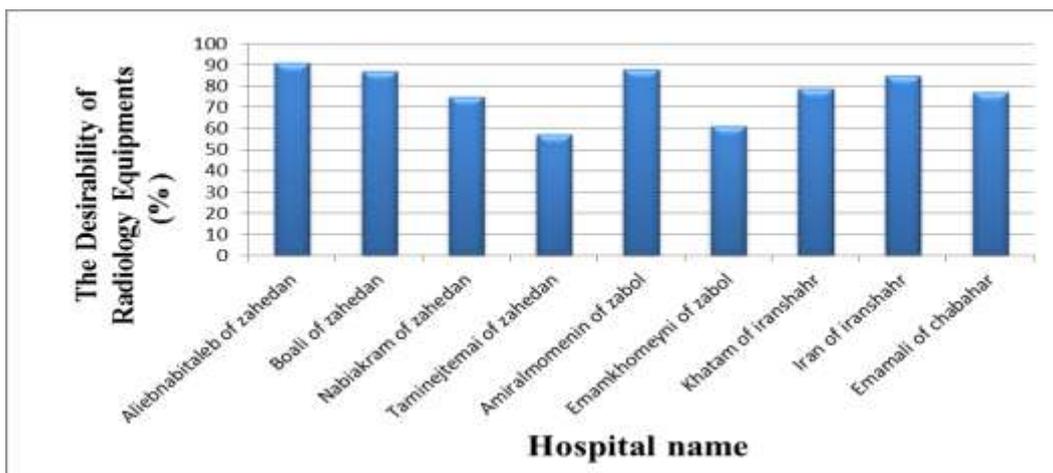


Figure 2: the condition of radiological apparatuses of Sistan and Baluchestan's hospitals in 2010.

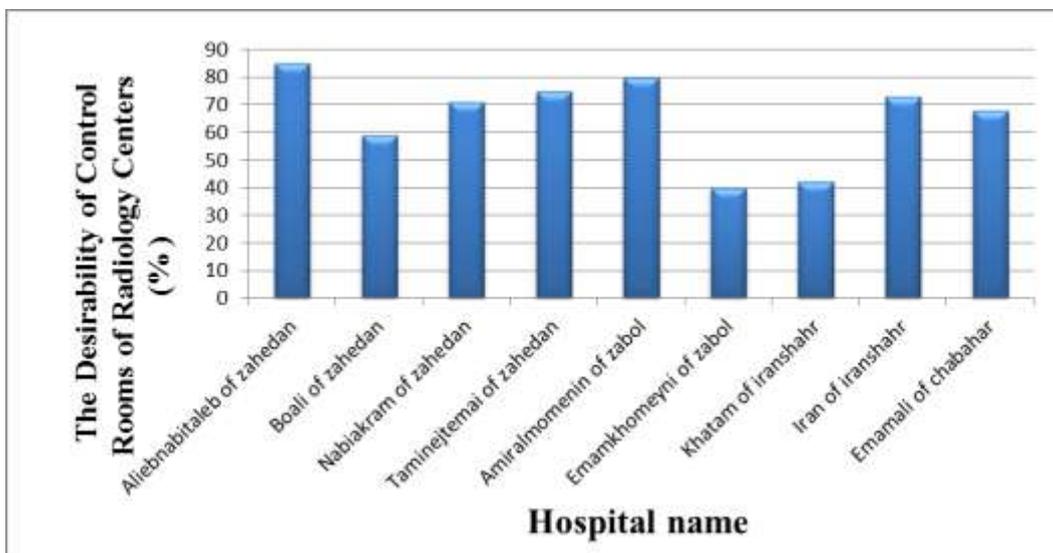


Figure 3: the condition of control room of radiological centers in Sistan and Baluchestan's hospitals in 2010.

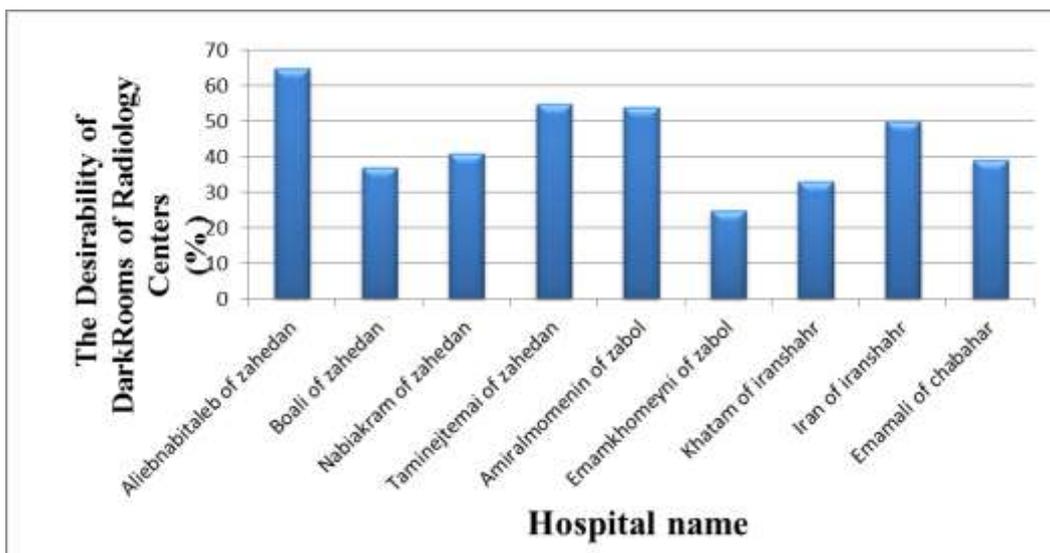


Figure 4: the condition of darkrooms of radiological centers of Sistan and Baluchestan's hospitals in 2010.

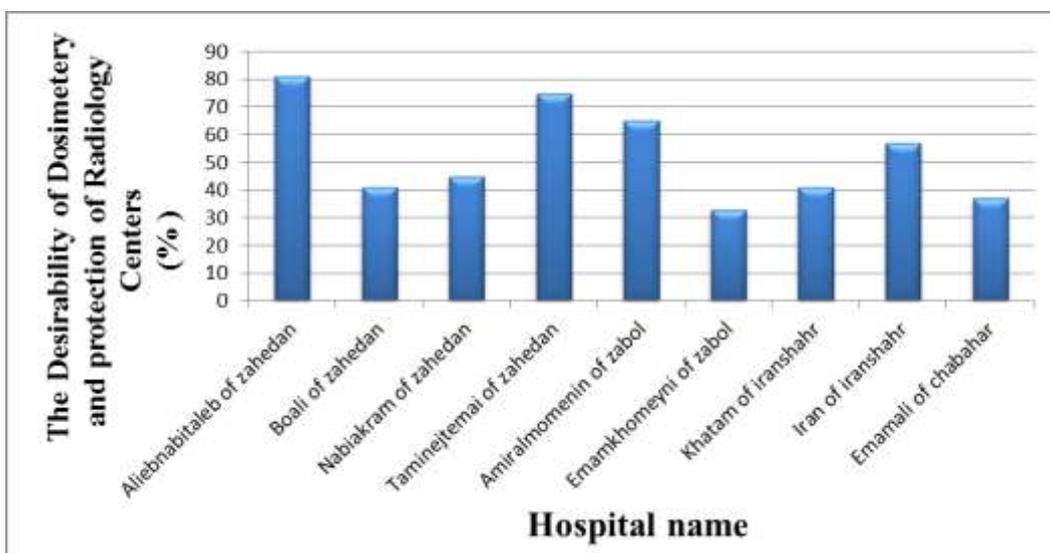


Figure 5: the dosimetry conditions and the radiation protection of radiology personnel in Sistan and Baluchestan hospitals in 2010.

In performed studies, it was observed that the condition of side rooms are desirable in 25% compared to defined standards. In addition, the results of applied studies of radiological centers showed that 44% of the concerned centers have more than 20% of radiation leakage. On the other hand, none of the studied centers have the required maintaining equipment and hardware of radiological centers.

The results achieved showed that 66% of darkrooms in radiological centers are

defected with observable light leakage and there is no lamp system in the darkroom. On the other hand, 55% of the centers under study had not appropriate emergence and fixation temperature in a standard condition which indicates the inappropriate condition of emerging and fixing apparatuses. In addition, 53% of Casts are defected in all hospitals in terms of appropriate efficiency.

77% of the radiological centers have direct fluoroscopic problems and only 33% of the

hospitals are provided with thyroid shield, Gonad shield, lead glasses and lead coverings. Concerning the sign alarms, 55% of the hospitals under study were in an appropriate condition in terms of exposure danger lamp, the warning poster of pregnant women and also the poster of exposure danger.

The condition of radiological centers regarding controlling the exposure personnel shows that 44% of radiographic centers were bereft of medical brochure and the periodic experiment results of the personnel. Furthermore, 33% of the studied radiological centers did not choose a person responsible for medical physics to supervise and follow the cases related to personnel protection and periodic control.

DISCUSSION

The study of the findings achieved in this study indicates this reality that the radiological centers have not been controlled and supervised in an organized way. On the other hand, the results obtained show that only 33% of the hospitals are provided with thyroid and Gonad shield and lead glasses and coverings, which this amount is unpromising given the fact that these apparatuses are essential for the protection of children and adolescents against the radiation. This study also indicate that quality control of radiological apparatuses are essential for optimizing the radiological centers and also preventing from the economical resources being wasted away.

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