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EVALUATION OF IONISING RADIATION PROTECTION PRACTICES IN HOSPITALS AND DIAGNOSTIC CENTRES HAVING X-RAY AND CT SCAN FACILITY IN ASSAM

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ABSTRACT:

Objective

To evaluate radiation protection practice and procedures among the hospitals and Diagnostic centre of Assam using X-RAY and CT Scan that could lead to hazards such as somatic and genetic damages to the patients and to the radiation worker. And to find the stop gap between the rules laid by Atomic Energy Regulatory Board, Govt of India and the Health care Institution

Methodology

A validated questionnaire was distributed to 131 Hospital as well as to the diagnostic center which are having X-RAY, CT Scan or both the facility. This health care centres are located different district of Assam to balance the geographic distribution.

Results

Out of 131 healthe care Centre (Hospitals & Diagnostic centers) participants 18 of them refused to answer the questioners which is 13.4%. 113 Centres have answered all the parameters from where all most 100 % have safety apparetus like lead gloves, lead aprons and have door with lead sheet in the procedure room. It is found that 45% of these group have TLD facility in their centers and 56% of these use Hazards symbol on the door of the equipments room. It is also found that 74% of this group do regular quality control to keep the equipments fit for X-ray emission

Conclusion

By conducting the study it is found that there is an extensive need to improve the radiation safety measures in the Hospitals and Diagnostic centers of Assam to protect the radiation worker and the patients as well. Though the infrastructure like lead sheet door and the lead gloves and lead aprons are there in all centers but it is annoying that a few percent of the health care institution are having radiation monitoring equipments like TLD for their worker. Moreover a very simple hazards symbol is missing from a good number of these centers which can warn general public or patients before they do the procedure. Govenment organisation must look in to the current trands in radiation protection and make more concentrated efforts to comply the AERB norms to protect the harmful effect of ionising radiation.

KEYWORDS: *Protection, Radiation, ionising, X-ray, CT scan.*

INTRODUCTION

A new era in medical science has started in 1895, while German physicist W Rontgen discovered X-ray. Based on this theory in letter years CT scan was developed but by the time it was also established that this ray can ionise the cellular structure and cause harm to the human body. Increasing demand of radiological investigation to diagnosed diseases increases the radiation exposure to the patients as well as to the radiation staff. Though technology has edge on diagnosis of diseases but it is often worsened by a lack of appropriateness and

awareness on radiological safety by the health care organisation and the radiation worker who run the technology.

"AERB - the Indian regulatory body of Department of Atomic energy Govt of India laid down several norms for radiology, nuclear medicine and radiotherapy in health care Institution of India to be abide by for the reason of safety to the patients and radiation worker. AERB was constituted in 1983 by the President of India by exercising the powers awarded by Section 27 of the Atomic Energy Act, 1962 (33 of 1962) to carry out certain regulatory and safety functions under this Act. The regulatory authority of AERB is derived from the rules and notifications propagated under the Atomic Energy Act, 1962 and the Environmental (Protection) Act, 1986. Aim of AERB is to ensure that the use of this ionizing radiation does not cause undue risk to health and environment"

Radiation risk: X-RAY, CT SCAN, are the device used for diagnostic purpose in different diseases, emit x-Ray which is called ionizing radiation capable of altering the DNA structure of human cell if exposed for a long time. For example Rontgen who discovered X-Ray died of lung cancer though he was not a smoker. Madam Curie who discovered radium died of aplastic anemia. American socialite called Eben Byers died in 1932 after ingesting radiation over the course of several years. Two scientists from the USA died after working with fissile materials without using protective clothing or shielding in 1946. The demise due to Atom Bomb in Hiroshima and Nagasaki was owing to wide scale radiation poisoning. The seriousness of the property caused by radiation were not fully understood until the 1940. The increased cancer risk associated with radiation exposure were first documented by Hermann Joseph Meller in 1927 who receive the Nobel prize in 1946.However, before the effects were understood, many people were badly affected because of radioactive hazards. Firstly Radiation can directly hit on the DNA of the cell secondly radiation can ionized the water molecule and produced free radical which can damage the cell by damaging the DNA. The most horrible thing is that mutations or changes in the DNA due to radiation can be passed to the next generation. Individual monitoring for Radiation workers such as Radiologist, radiographer and the employees working with radiation unit are one of the most important aspects of a radiation protection Programme. In India, Department of atomic Energy started a centralized personnel monitoring service to radiation workers in 1952. Radiation workers are monitored using this system called TLD thermo-luminescent dosimeter badges. This TLD's used by Radiation workers are periodically checked and exposure of radiation are determined. This badges are wear at the chest or waist level, and if a lead apron is used it is kept under the apron.

In this study probably first time of this type in Assam few radiation safety parameters are taken to evaluate or to find the actual radiation safety procedures whether follows by the health care institution or not.

MATERIAL AND METHODS

Primary data were obtained from a survey in 131 odd Health Care Institution and Diagnostic center of Assam covering all most all the district. A questioner of around 16 question which had been validated in advance to perform a prospective observational study and was divided in three section. In this paper a section consisting of six parameters are taken to understand the actual status related to safety apparatus and monitoring equipment that are used in Health care and Diagnostic centres. This section is focussed on :

1 use of basic safety apparatus like lead apron by the radiographer or his assistant during procedure.

2. Use of lead gloves to protech the hands of radiographer in some critical scan

3. Use of hazards symbol for public awareness in the departments.

4. The use of Thermo-luminescent dosimeter badge. The TLD, is a radiation dosimeter that measures ionizing radiation exposure in cumulative manner helpful to find the radiation dose to the radiation worker in normal and accidental exposure while working with X-Ray or CT scan. It is a small badge need to wear in the chest level or on the wrist.

5. The quality control of the equipments which is very much important to know the actual status of emitting radiation dose to the patients during CT Scan or X-Ray

6. Use of lead sheet in the door of the scan room which prevent exposure to general public while a scan is in progress.

The data are collected mostly from the radiographer counter checked by the radiologist or by the hospital authority. Questionnaire dependability was assessed as internal consistency using Cronbach's alpha coefficient

The questionnaire was put over a period of 18 months to 131 participants' hospital and Diagnostic Center equally distributed across all the district of Assam. The questionnaire was completed by the radiographer and was examined by the authority or by the radiologist and collected immediately giving a copy to the authority to avoid any bias.

Ethical committee check was not considered as the survey population did not include any at-risk groups.

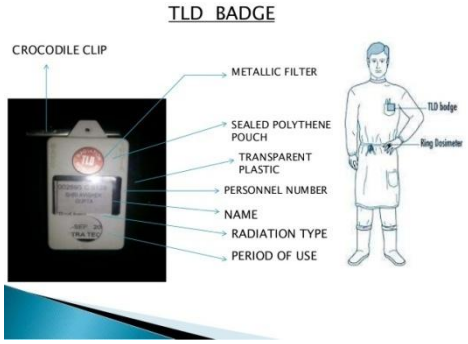
Results:

Out of 131 health care Centre (Hospitals & Diagnostic centres) surveyed 18 of them refused to answer the questioner which is 13.4%. 113 Centres have answered all the parameters from where all most 100 % have safety apparatus like lead gloves, lead aprons and have door with lead sheet in the procedure room. It is found that 45% of this group have TLD facility in their centres and 56% of these use Hazards symbol on the door of the equipments room. It is also found that 74% of this group do regular quality control to keep the equipments fit for X-ray emission

Discussion

This is the first survey of this type carried out in Assam to evaluate the radiation protection norms in terms of availability of basic apparatus and the radiation measuring equipments which are the first line of safety measures in a health care Institution or in a Diagnostic Centre where X-Ray and CT scan are used for diagnostic purposes. Our findings from the large survey show an inaccurate awareness and willingness of authority to provide the required the safety apparatus. This also shows gross violation of AERB Govt of India norms on radiation safety by the Health care.

Analysing the present study it is found that 45% of this group are having facility of TLD badges for measuring radiation dose to the radiation worker which are recorded in the film of the TLD. This TLD are sent to AERB authorised agency periodically to find the actual dose that are receive by the individual radiation worker for a certain period. If by any chance the dose becomes excess form the desired level the Radiation worker is given rest for certain periods depending on the excess dose so that the hazards occured can be neutralised. This TLD is very much important to find the accidental exposure which is not common but not least.. On the other hand 55% of this group which is more than half of the total surveyed sample do not have this most essential measuring tool it means gross violation of AERB rules as well as health care authority's reluctant to protect their own employees from radiation safety.



Almost half of the respondent around 43% of the total surveyed fail to put the hazards symbol in the radiology department or in the equipments room by which the authority fail to warn the patients and their attended about hazards of ionising radiation. It was in 2007 Atomic Energy Regulatory Board, Austria

introduced the ionising symbol which latter country's Atomic Energy Agency adopted to warn or to make people aware about the hazards of ionising radiation. However 57% of this group have applied sticker or warning signal in their departments showing social responsibility in this regard.

International ionizing radiation trefoil symbol

It is another important finding that 65% of this group do regular Quality Control and servicing of their X-Ray or CT scan periodically which means to keep the radiation producing equipment in good condition to deliver accurate dose of X-ray emission to the patients. QC are done by authorised agency and important for the patients safety as well as to the radiation worker. 35% of this group do not do any QC of their CT or x-Ray though AERB has guidelines in this regard

The only positive finding is that all the Hospital and the diagnostic centers which is 100% have lead apron, Lead gloves for their radiation worker and have lead sheet on the door to protect the public in general in their CT and X-Ray room. This is because the AERB's compulsory rules for the vendor or the supplier to supply these items along with the X-Ray or CT Scan equipments. Most of the suppliers of these are foreign company and are generally strict follower of norms.

lead Gloves and Lead Apron

Summarising: the discussion an awareness drive on ill effect of ionising radiation to the hospital authority and to the Radiation worker is required along with strict implementation of AERB norms need to be ensured by the State authority in this regard.

CONCLUSION

The study shows that:

1. Radiation safety measures in the Hospitals and Diagnostic Centres of Assam are inadequate to protect the radiation worker and the patients form the hazards of Ionising Radiation.
2. Awareness on Radiation safety among the Radiation worker of the Health care and Diagnostic Center where X-Ray and CT scan are used for diagnosis are very less
3. Inadequate inspection system by the State authority to bring all the radiation establishment to follow the norms laid by AERB in this regard.

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