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A Brief Scientific Studies on Radio–imaging Facilities in Manipur, India and Safety Compliances

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Abstract:

Understanding of radiological safety condition of diagnostic radiology facilities is indispensable for radiation safety of patient, radiation worker and general public. Radiation dose is directly proportional to stochastic effect of radiation (mainly cancer). There is rapid growth of radio-diagnostic facilities in Manipur. However, no measure is seen from the authorities concerned towards compliance with radiation safety standard. It is also learned from private X-ray centres that there is no inspection from AERB till date nor they are enrolled in ELORA (Electronically Licensing of Radiation Application) of AERB, Mumbai. This paper reports the findings in the preliminary studies which would lead to understanding the radiation safety standard, pros and cons and its impact to the environment.

Keywords: Radio-imaging, AERB, ELORA, Quality Assurance Tools

1. Introduction

The assessment of radiological safety standard among the diagnostic radiology centers is very important because radiation dose contribution to the world population from radiation practices is largest from diagnostic radiology. There is also rapid growth of diagnostic radiology facility in India. It has been reported that hundreds of pieces of X-rays equipment were added to radio-diagnostic facilities annually (AERB report: 2005 – 2015).

Fig.1: Quality Assurance Tools and X-ray Machines available in the Radio Imaging Lab of Dhanamnjuri Community College, Imphal under the Deen Dayal Upadhyay Centre for Knowledge Acquisition and Upgradation of Skilled Human Abilities and Livelihood (DDU KAUSHAL Kendra)

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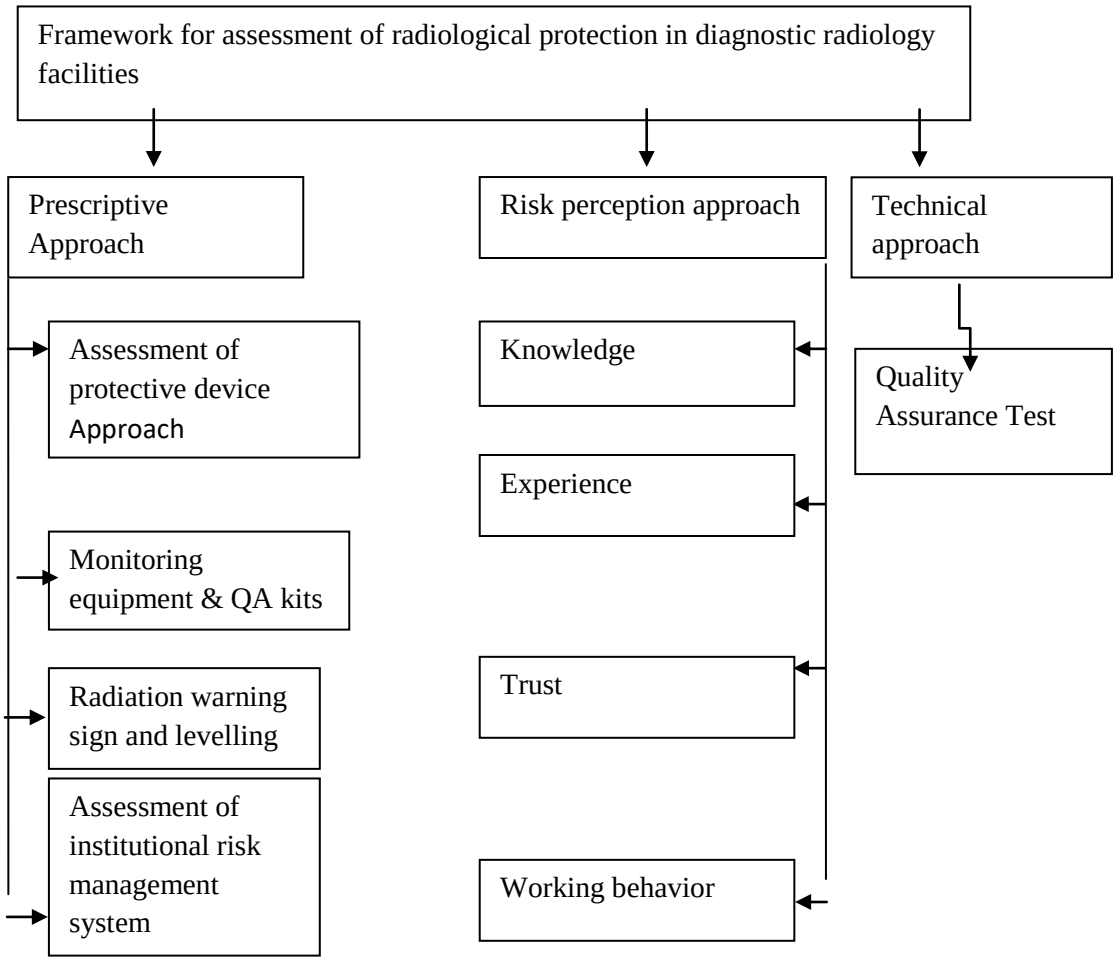
There is a mandate for these facilities to function as per the applicable provisions of the Atomic Energy Act 1962 (AEA 1962), and the Atomic Energy (Radiation Protection) Rules, 2004 (RPR 2004) promulgated under the said act. To protect radiation workers, patients and the public in the facilities, the AERB published a safety code for x-ray equipment in the year 1986, and the same being revised in 2001 and 2015. Some of the parameters mentioned in the codes/standards for achieving radiological protection in the facilities are the availability of qualified workers, protective devices, personal monitoring devices, radiation warning system, quality assurance (QA), servicing and maintenance of x-ray equipment, etc.

In India there are limited studies on the assessment of radiological protection systems available in the facilities. Their studies did not reveal in detail the deviation of radiological protection systems from the national regulatory requirements and safety standard of AERB/IAEA. This study attempts to integrate risk assessment based on technical approach (mainly Quality Assurance test) and risk perception approach (Questionnaire).

2. Experimental

Assessment of radiological protection in diagnostic radiology facilities may be performed as per the framework given below:



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2.1. Study site:

30 radiation facilities located in Imphal have been assessed about their protection system. Quality Assurance test was performed using QA kits available at Dhanamanjuri Community College, D M College of Science, Imphal. The following test was possible:

- **KVp test:** testing of set value at the control console and x-ray quality.
- **mAs test:** testing of set value at the control console and X-ray quantity.
- Optical and X-ray beam alignment testing.
- Testing of X-ray film quality
- Radiation survey in and around the radiation facility.
- Resolution test
- HVL test
- TVT test

3. Result & Discussion:

The safety assessment of radiological practices in the radio diagnosis centres located in Imphal is shown in figure (below). The assessment of radiation dose received by radiation worker is one of the most essential parts for protection of the workers from the harmful effects of radiation. This assessment is mandatory in India as per Atomic Energy (Radiation Protection) Rules, 2004. However, except two radiology centres, other centres in this study do not use personal monitoring devices (PMD). Use of the same PMD for more than 5 years was found in one government hospital. Although this government hospital has radiation survey meter, it does not carry out radiation protection survey around the room having radiation generating equipment.

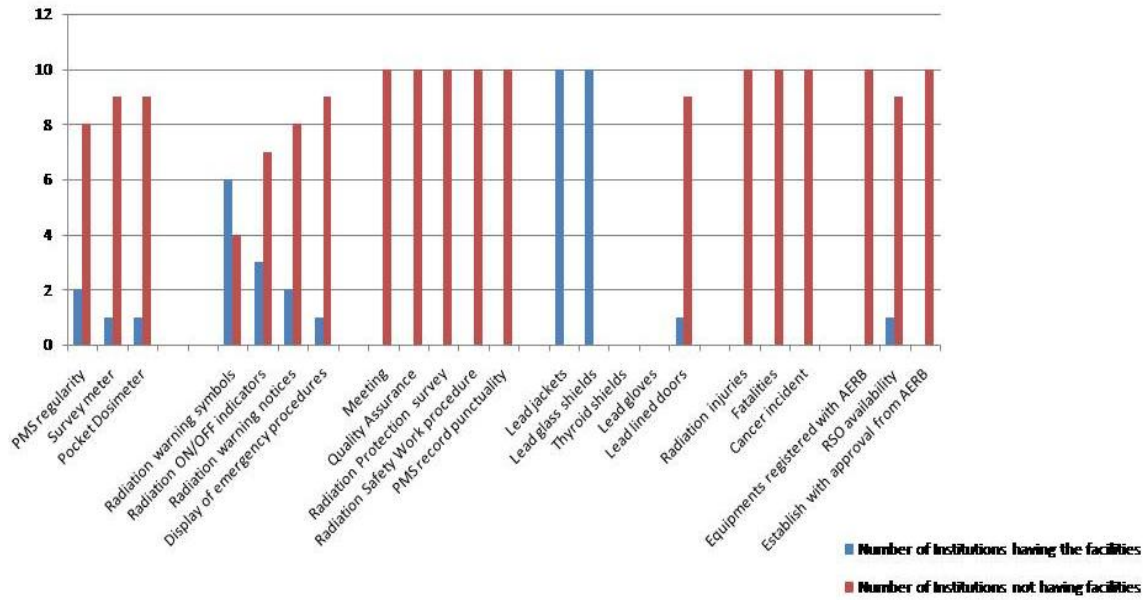

Fig. 2: Preliminary report of Radiation protection system of Radiodiagnosis centres in Imphal

The display of radiation warning symbols, radiation ON/OFF indicators, radiation warning notices and emergency procedures at the appropriate places having radiation generating equipments enable the workers for taking precautionary action before exposing to ionising radiation. Although workers are aware of importance of these safety measures, only 60 % radio diagnosis centres displayed radiation warning symbols, 30% radio diagnosis centres have radiation ON/OFF indicators and 20% radio diagnosis centres displayed radiation warning notices on the entrance door of the room housing for radiation generating equipments. As

these radiation warnings are not displayed, people visiting the centre were not aware of presence of radiation in their seating areas. The people crowding inside the radiation generating room and its door are also observed during the study. The operation of the machine was observed in presence of crowd. These centres except only one government hospital do not have radiation emergency plans.

All the radio diagnosis centres under this study do not have records of conducting meeting on radiation safety, quality assurance of radiation generating equipments, radiation protection survey, radiation safety work procedures and PMD records. Except one government hospital, other radio diagnosis centres do not have lead lines doors in the radiation generating rooms. The common feature available to all the radio diagnosis centres was lead apron jackets. However, it was observed that few workers used it during the operation of the radiation generating equipments.

References:

1. UNSCEAR, *Sources and effects of ionizing radiation*, United Nations, New York (1993).
2. AEA 1962 *Atomic Energy Act 1962* (accessible at http//dae.nic.in/?q=node/153).
3. AERB 2005 – 2015 *Atomic Energy Regulatory Board*, Annual Report 2005 to 2015 AERB, Mumbai – 4000 94, India.
4. Rehani MM and Tsapaki. Impact of the International Atomic Energy Agency (IAEA) actions on radiation protection of patients in many countries. *Radiat Prot. Dosimetry* 147 (2011) 34-37.
5. Devan TS, Jayaraman T, Sharma BA, Assessment of radiological protection system among diagnostic radiology facilities in NE India. *J Radiol Prot*. 37(2017)68-83.
6. Sonawane, A. U., Singh, M., Sunil Kumar, J. V. K., Kulkarni, A., Shirva, V. K., & Pradhan, A. S. Radiological safety status and quality assurance audit of medical X-ray diagnostic installations in India. *Journal of Medical Physics / Association of Medical Physicists of India*, *35*(4), (2010) 229–234.
7. Nabadwip S.S. Arunkumar B.S and Bliss, Patient Dosimetry using Borate Glass Phosphor during external Radiotherapy of cancer patient, International Journal of Material Physics, 3(2), (2012) 69-74.