

## Evaluation of Entrance Surface Dose (ESD) for Chest, lumbar Spine and Abdomen X-ray Procedures in a Selected Hospital in Sri Lanka

**G. P. N. T. Ehalagasthanna<sup>1</sup>, D. M. Satharasinghe<sup>1</sup>, U. N. Hishaam<sup>1</sup> and Jeyasingam Jeyasugiththan<sup>\*1</sup>**

<sup>1</sup> Department of Nuclear Science, University of Colombo, Sri Lanka

\* jeyasugiththan@nuclear.cmb.ac.lk

Ionizing radiation is harmful to living beings because it can break apart biologically important molecules such as DNA. Therefore, it is important to enforce radiation protection where radiation is used in medical diagnosis by following justification, optimization and individual dose limitation. Introduction of quality control (QC) programs and regular dose audits assist to ensure that the dose delivered to the patient is in accordance with the principle of As Low as Reasonably Achievable (ALARA). The radiation risk in general diagnostic X-ray imaging can primarily be quantified by the Entrance Surface Dose (ESD), which is known as the radiation dose measured on the surface (skin) where the X-ray beam enters the patient, including the backscatter radiation. The primary aim of this present work is to evaluate the ESD using the normalized X-ray tube output for common diagnostic X-ray examinations of the chest, lumbar spine and abdomen. Moreover, the obtained ESD values were compared with internationally published Diagnostic Reference Levels (DRLs) to identify the procedures which require optimization. The resultant third quartile value of ESD for chest PA, chest lateral, lumbar-sacral spine AP, lumbar-sacral spine lateral and abdomen AP were 0.59, 2.50, 7.56, 14.11 and 5.95 mGy, respectively. These values were significantly higher than the DRLs set by the international bodies. The major contributor to the high doses reported in this study has been identified as low kVp and high mAs combination. The results suggest that efforts are required to reduce patient doses further while securing the image quality. Therefore, a standard operating protocol should be used among all radiography units in Sri Lanka. Furthermore, a proper quality control program should be conducted in X-ray facilities to ensure the accuracy of diagnostic procedures and minimize the radiation dose. A national survey is required to set diagnostic reference levels for all X-ray examinations across hospitals to compare institutional doses and take remedial actions where necessary.

**Keywords:** Entrance surface dose, X-ray, X-ray tube output