

## Determination of patient dose in diagnostic x-ray radiography

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In Sri Lanka various x-ray examinations such as general radiography, computed tomography, mammography, dental radiography and fluoroscopy are used in both government and private sector hospitals. X-ray examinations give the largest man made contribution to the radiation doses received by the population. Due to higher usage of general radiography x-ray machines, it is important to maintain the dose from them close to the guidance levels.

Quality Assurance & Quality Control (QA & QC) tests were performed to check the accuracy and reproducibility of important parameters of 12 x-ray machines. Entrance Surface Doses (ESD) for different x-ray projections were also measured using LiF(Tl) thermo luminescence dosimeter with a patient simulating phantom. Percentage differences of ESDs from the corresponding guidance levels recommended by International Atomic Energy Agency Basic Safety Standards (BSS) Safety Series 115 were calculated.

Six x-ray machines passed all QA & QC tests and the other six x-ray machines failed in at least one or more tests. The average percentage difference of 108 measurements of ESDs is -20% with a standard deviation of 46% and there are values from -91% to 98%. 51 values are smaller than -30% (underexposed) and 18 values are larger than 30% (overexposed). Underexposed or overexposed x-ray films do not provide enough diagnostic information and they may lead to incorrect diagnosis and/or retake of radiograph, unnecessary exposure of the patient and higher cost. Since radiographers selected the exposure time, tube current and tube potential for different projections and 64% of their selections did not give the proper dose, it is clear that the relevant radiographers did not follow the BSS guidance levels properly. All selected hospitals use medium-speed (200) film- screen combinations and according to BSS guidance levels ESDs can be reduced by a factor of 2 to 3 if high-speed (400-600) film-screen combinations are used. ESD reduction is important especially for the cases where several x-ray images are needed for the diagnosis.