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Radiation Dose Assessment of Patients undergoing Lumbar Spine Radiography

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ABSTRACT

Patient dose measurement is an important tool for dose optimization and patient protection in diagnostic radiology. It is to safeguard both the medical personnel and patient from undesirable effect of radiation. The present study examines the entrance surface air kerma (ESAK) and effective dose of 150 patients undergoing routine lumbar spine radiographic examinations in nine health care centers consisting ten radiological units in Southern part of Nigeria. Patient dose were evaluated using mathematical equations based on exposure factors. The estimated mean ESAK values ranged 1.68 mGy to 12.66 mGy for lumbar spine AP and ranged from1.91 mGy to 10.53 mGy. The mean effective dose ranged from 0.10 mSv to 2.15 mSv for lumbar spine AP and ranged from 0.04 mSv to 0.22 mSv for lumbar spine LAT. The results obtained in this study were higher than the doses reported in UK 2010 review in some health care centers.

Key words: Radiation, X-rays, Radiology, Effective dose

INTRODUCTION

Patient dose measurement is an important tool for dose optimization and patient protection in diagnostic radiology. It is to safeguard both the medical personnel and patient from undesirable effect of radiation. The present study examines the entrance surface air kerma (ESAK) and effective dose of 150 patients undergoing routine lumbar spine radiographic examinations in nine health care centers consisting ten radiological units in Southern part of Nigeria. Patient dose were evaluated using mathematical equations based on exposure factors. The estimated mean ESAK values ranged 1.68 mGy to 12.66 mGy for lumbar spine AP and ranged from1.91 mGy to 10.53 mGy. The mean effective dose ranged from 0.10 mSv to 2.15 mSv for lumbar spine AP and ranged from 0.04 mSv to 0.22 mSv for lumbar spine LAT. The results obtained in this study were higher than the doses reported in UK 2010 review in some health care centers. The higher doses obtained can be attributed to the use of higher tube load (mAs) during examinations, which shows lack of optimization of exposure settings. Customary X-beam finding is a huge wellspring of radiation openness among the populace. Consequently, there is the requirement for X-beam assessments to be directed involving procedures that keep the patients' openness as low as could be expected, however doesn't think twice about picture quality. To have the option to keep dosages as low as sensible attainable, it is important to comprehend the variables that impact patient portions and picture quality. The Basic Safety Standard (BSS) suggests advancement strategies in radiology for direction. In the advancement of X-beam assessment strategies, the patient portion ought to be portrayed by an amount that better records for radiation hazard. Information on organ and compelling portion are important in the event that the danger of radiation openness is of concern.

Patient portion is frequently depicted by the patient's entry surface portion, which is estimated on the patient's skin at the focal point of the X-beam shaft. An option is to take free-in-air estimations without the commitment of backscatter radiation from the patient and express as far as episode air kerma (IAK) Radiation portion to the different organs or tissues in the body can't be estimated straightforwardly in patients going through X-beam assessments, yet they can be assessed with sensible precision on the off chance that adequate information on the X-beam assessment boundaries are accessible. Patient dosimetry in radiological assessment is essential due to developing demonstrative procedures. It is vital to give data on understanding dosages to all pertinent partners for constant streamlining. This study assessed radiation portion to organs of patients during LS radiography by utilizing PCXMC, a PC based Monte Carlo program that works out organ dosages in clinical X-beam assessments. For grown-up patients, the outcomes have shown that most of entry surface portion values from both chest and midsection assessments were inside suggested upsides of indicative reference levels. For youngster patients, the mean entry surface portion from chest assessments in three age bunches were 0.131 mGy (0-1 y), 0.136 mGy (1-5 y), and 0.191 mGy (5-10 y). These qualities were viewed as generally high contrasted with the European reference levels and distributed outcomes in the writing.

In any case, for midsection assessments, entrance surface portion values were generally lower than European reference levels. Patient viable dosages were assessed utilizing a PCXMC 2.0 Monte Carlo program. The outcomes for the two grown-ups and kids were viewed as moderately lower than the qualities detailed by worldwide distributions. Because of the wide varieties of entry surface portion and the higher radiation dosages conveyed to kid patients, this study suggests executing a quality confirmation program in such emergency clinics to accomplish streamlining between great picture quality and least portion as per the as low as in all actuality feasible standard. When radiation passes through the body, some of it is absorbed. The x-rays that are not absorbed are used to create the image. The amount the patient absorbs contributes to the patient's radiation dose. Radiation that passes through the body does not contribute to this dose. The scientific unit of measurement for whole body radiation dose, called "effective dose," is the millisievert (mSv). Other radiation dose measurement units include rad, rem, roentgen, sievert, and gray. Doctors use "effective dose" when they talk about the risk of radiation to the entire body. Risk refers to possible side effects, such as the chance of developing a cancer later in life. Effective dose considers how sensitive different tissues are to radiation. If you have an x-ray exam that includes tissues or organs that are more sensitive to radiation, your effective dose will be higher. Effective dose allows your doctor to evaluate your risk and compare it to common, everyday sources of exposure, such as natural background radiation.

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