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Optimization of patient radiation protection in pelvic X-ray examination in Ghana

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Abstract

Pelvis X-ray examinations inevitably involve exposure of the gonads to ionizing radiation. In line with the principle of keeping doses as low as reasonably practicable (ALARP), accurate patient dose measurement is vital if we are to ascertain that these exposures are fully optimized. The study aimed to provide patient dose estimates for pelvis examination being undertaken at 10 separate hospitals in Ghana in order to provide an initial quantitative indication of each site's typically achievable radiation safety and quality standards. The method employed was adapted from established methods and peer reviewed literature, such as the International Atomic Energy Agency (IAEA) publications on optimization of the radiological protection of patients undergoing radiography, fluoroscopy, and computed tomography examinations in some countries in Africa, Asia, and Eastern Europe. Dose measurements were calculated on 323 patients (137 (42%) male, 186 (58%) female, ages, 38.56yr ± 9.0; range 20–68). The entrance surface dose (ESD) was determined by an indirect method, using the patient's anatomical data and exposure parameters utilized for the specific examination. The Quality Assurance Dose Database software (QADDs) developed by Integrated Radiological Services Ltd. in Liverpool, UK was used to generate the ESD values. The study identified variations in the technique factors used compared with the recommendations in the European Commission (EC) quality criteria. Eighty percent of the hospitals recorded lower ESD values below IAEA recommended diagnostic reference levels (10 mGy) and 40% of the hospitals exceeded the UK national reference value (4 mGy). However, one hospital consistently recorded higher ESDs than the other hospitals. The variations in the data recorded demonstrate the importance of creating awareness by the radiographic staff on quality assurance and standardization of protocols to ensure satisfactory standards and optimized radiation dose to patients and staff.

Key words: patient radiation protection, gonadal dose, patient dose audit

Biography

Eric Kwasi Ofori studied M.Phil. at City University, London and then transferred to University of Liverpool, UK to pursue Ph.D. degree in Health Sciences (Medical Imaging). He currently lectures in diagnostic imaging equipment in the Radiography Department, School of Allied Health Sciences, and University of Ghana. He has published 10 papers in reputed journals and has supervised 50 undergraduate and 20 postgraduate projects. His research areas include quality assurances issues in diagnostic imaging, patient radiation protection and diagnostic imaging techniques.