

Establishment of Diagnostic Reference Levels for Computed Tomography Examination at the University of Ghana Medical Centre

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Abstract : Introduction Diagnostic Reference Levels are important indicators for monitoring and optimizing protocol and procedure in medical imaging between facilities and equipment. This helps to evaluate whether, in routine clinical conditions, the median value obtained for a representative group of patients are within an agreed range from a specified procedure is unusually high or low for that procedure. This study aimed to propose Diagnostic Reference Levels for Computed Tomography examination of the most common routine examination of the head, chest and abdominal pelvis regions at the University of Ghana Medical Centre. Methods: The Diagnostic Reference Levels were determined based on the investigation of the most common routine examinations including head Computed Tomography examination with and without contrast, abdominopelvic Computed Tomography examination with and without contrast, and chest Computed Tomography examination without contrast. The study was based on two dose indicators; the volumetric Computed Tomography Dose Index and Dose-Length Product. Results: The estimated median distribution for head Computed Tomography with contrast for volumetric-Computed Tomography dose index and Dose-Length Product were 38.33 mGy and 829.35 mGy.cm, while without contrast, were 38.90 mGy and 860.90 mGy.cm respectively. For an abdominopelvic Computed Tomography examination with contrast, the estimated volumetric-Computed Tomography dose index and Dose-Length Product values were 40.19 mGy and 2096.60 mGy.cm. While without contrast, the estimated values were 14.65 mGy and 800.40 mGy.cm respectively. Additionally, for chest Computed Tomography examination, the estimated values were: 12.75 mGy and 423.95 mGy.cm for volumetric-Computed Tomography dose index and Dose-Length Product respectively. These median values represent the proposed diagnostic reference values of the head, chest and abdominal pelvis regions. Conclusions: The proposed Diagnostic Reference Level are comparable to recommended International Atomic Energy Agency and International Commission Radiation Protection Publication 135 and other regional published data by European Commission and Regional National Diagnostic Reference Level in Africa. These reference levels will serve as benchmarks to guide clinicians in optimizing radiation dose levels while ensuring accurate diagnostic image quality at the facility.

Keywords : diagnostic reference levels, computed tomography dose index, computed tomography, radiation exposure, dose-length product, radiation protection

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