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EMERGING TRENDS
IN MEDICAL IMAGING:
FROM PATIENTS TO PIXELS
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Quantitative Assessment of Entrance Surface Doses for Trauma Patients During Multifield Plain Radiography Procedures: A Phantom Study

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Introduction: Trauma patients often require several radiographic examinations, leading to increased exposure to ionizing radiation. Optimizing imaging parameters is essential to ensure patient safety while maintaining diagnostic accuracy. This study aims to compare entrance surface doses (ESDs) between standard guideline-recommended imaging parameters and those used in clinical practice to support radiation dose optimization. **Methods:** The ESDs were directly measured using thermoluminescent dosimeter (TLD) chips placed on a whole-body PIXY® phantom. For the indirect method, ESDs were estimated using data on the X-ray tube radiation output and exposure parameters (kVp and mAs), following the guidelines of the International Atomic Energy Agency (IAEA) Technical Report Series No. 457. Measurements were performed across five different X-ray anterior-posterior (AP) projections, including skull, chest, abdomen, pelvis, and lumbar. Exposure settings were selected based on two approaches: standard and clinical exposure conditions. **Results:** The analysis showed notable differences in X-ray exposure parameters between standard guidelines and clinical practice. For standard exposures, mean ESDs (direct method) ranged from 0.22 mGy (chest) to 1.35 mGy (skull), while clinical exposures showed a wider range, from 0.20 mGy (chest) to 2.46 mGy (abdomen). Similar trends were observed with the indirect method. Overall, the ratio of clinical to standard ESDs ranged from 0.51 to 1.00. **Conclusions:** The findings highlight significant differences in ESDs between standard and clinical imaging protocols, underscoring the need for greater adherence to guideline-recommended parameters. This comparison supports efforts toward radiation dose optimization, promoting safer and more consistent radiographic practices.

Keywords: entrance surface dose, radiography, exposure factor, TLD, quality control