

ABSTRACT

This study aims to evaluate the collimation accuracy and radiation leakage of X-ray machines at the Radiology Installation of RSUD Kardinah Tegal in order to ensure radiation protection. The research method used is a quantitative descriptive approach by conducting direct measurements of collimation and radiation leakage parameters, then comparing the results with standards established by BAPETEN and related regulations. The collimation test was performed using a collimator test tool on two X-ray units, namely Hitachi and Apelem, with evaluation parameters based on percentage deviation relative to the Source to Image Distance (SID). Meanwhile, radiation leakage testing was carried out using a survey meter at several points around the X-ray tube housing at a distance of 1 meter from the focal spot. The results showed that the Hitachi X-ray unit had collimation deviations of 1% in the X-axis and 1.5% in the Y-axis, thus meeting the acceptance criteria. The initial test of the Apelem X-ray unit showed deviations of 1.4% in the X-axis and 2.5% in the Y-axis, which did not meet the standard. After collimator adjustment, the deviations decreased to 0.1% in the X-axis and 1.6% in the Y-axis, fulfilling the acceptance criteria. Radiation leakage test results for both units indicated that all measured exposure values were below the permissible limit of ≤ 1 mGy/hour, thus considered safe.

In conclusion, the X-ray machines at the Radiology Installation of RSUD Kardinah Tegal generally comply with radiation safety standards after corrective actions on the collimation system. Periodic evaluation is essential to maintain equipment performance and ensure optimal implementation of radiation protection principles.

Keywords: collimation, radiation leakage, X-ray, radiation protection, quality control