

ABSTRACT

Diagnostic radiology uses X-rays and therefore requires an adequate radiation protection system to protect radiation workers, patients, and the public. One of the main components of radiation protection is room shielding. This study aimed to calculate the shielding requirements for general radiography rooms at RSUP Dr. Kariadi based on NCRP Report No. 147, evaluate the conformity between the calculated shielding requirements and the existing barriers, and verify radiation protection adequacy through environmental radiation exposure measurements. The study objects consisted of four general radiography rooms: Philips C50 Radiology Central, GE Proteus Radiology Central, Siemens YSIO Max Radiology Central, and GE Proteus Radiology Garuda. The research was conducted through field observation, collection of technical data on X-ray units and room layouts, measurement of source-to-occupancy distances, determination of design parameters, calculation of primary and secondary shielding requirements, evaluation of existing barrier thicknesses, and analysis of environmental radiation monitoring data from February to April 2026. The results showed that shielding requirements were influenced by barrier type, occupancy-point distance, occupancy factor, use factor, pre-shielding, and the contribution of primary and secondary radiation. The highest shielding requirement was found for the secondary barrier of the laboratory roof in the Philips C50 Radiology Central room, with a value of 0.98 mm Pb, while the crosstable doors in all rooms required 0.80 mm Pb. The evaluation showed that the existing 2 mm Pb barriers fulfilled the theoretical shielding requirements. Environmental radiation verification showed the highest exposure rate of 1.0881 $\mu\text{Sv/h}$ in the operator area of the Philips C50 Radiology Central room. Therefore, the evaluated general radiography rooms were considered to have adequate shielding based on NCRP Report No. 147 calculations and environmental radiation exposure verification.

Keywords: barrier, general radiography, NCRP Report No. 147, radiation exposure, shielding.