ABSTRACT

Radiation shielding evaluation is an important step prior to installing new X-ray equipment to ensure that the radiation dose received by workers and the public remains below the dose limits set by radiation safety standards. One modality that requires special attention in radiation shielding planning is CT scanning, as it produces scattered radiation that can affect surrounding areas. Various calculation methods have been developed to determine the optimal shielding thickness, including the American Association of Physicists in Medicine (AAPM) Report No. 39/National Council on Radiation Protection and Measurements (NCRP) Report No. 49, NCRP Report No. 147, and the British Institute of Radiology (BIR) 2012. This study aims to compare radiation shielding thickness calculation methods for CT-Scan rooms based on these three guidelines to determine the most suitable method in the context of a specific medical facility. The study was conducted in the 128-Slice GE Revolution Evo MSCT Room at Dr. Kariadi General Hospital in Semarang from October 2024 to May 2025. Data was obtained through measurements of scatter point distances, collection of Dose Length Product (DLP) data and wall composition, as well as measurements of actual dose rates using a dosimeter. Analysis was performed using three shield thickness calculation methods (AAPM Report No. 39/NCRP Report No. 49, NCRP Report No. 147, and BIR 2012) and compared against the Dose Limit Value (DLV) to evaluate the adequacy of radiation protection. The study results showed that the AAPM Report No. 39/NCRP Report No. 49 method yielded greater shield thickness compared to the NCRP Report No. 147 and BIR 2012 methods. The BIR 2012 method was deemed the most efficient as it considers patient scattering and gantry attenuation. Although theoretical calculations have not fully reduced the dose rate below the DLV, actual measurement results indicate that all areas meet the established limits.

Keywords: *radiation shielding, CT-Scan, NCRP Report No. 49, NCRP Report No. 147, and BIR 2012.*