

ABSTRACT

Advancements in medical technology have driven the increased use of non-invasive radiation-based procedures, such as fluoroscopy in interventional radiology rooms (CathLabs). The high radiation exposure involved in these procedures necessitates the implementation of effective radiation protection systems. This study aims to analyze the thickness and shielding materials used in three fluoroscopy rooms at Dr. Kariadi Central General Hospital (RSUP Dr. Kariadi)—Philips Allura FD10, Philips Azurion 7 M20, and Philips Azurion 7 M12—using the NCRP-147 and BIR calculation methods. The evaluation results show that the shielding combination of 25 cm of brick and 3 mm of lead (Pb) used in the CathLab rooms effectively attenuates radiation. The highest recorded exposure rate was 0.1 $\mu\text{Sv/h}$ at the patient door of CathLab 1, which remains below the safety limits established by BAPETEN (Indonesian Nuclear Energy Regulatory Agency). The BIR method resulted in thicker shielding requirements compared to NCRP-147 due to its adoption of a more conservative dose constraint; for instance, CathLab 4 required 93.9 mm of concrete and 2.2 mm of lead. Nevertheless, both methods indicated that the radiation shielding is within safe limits, with maximum exposure values of 1.6 $\mu\text{Sv/h}$ in controlled areas and 0.2 $\mu\text{Sv/h}$ in public areas. This study concludes that the current radiation protection system in the CathLab rooms at RSUP Dr. Kariadi complies with national safety standards. However, regular monitoring is necessary to anticipate potential fluctuations in exposure dose. The current combination of shielding materials is considered efficient and can serve as a reference for optimizing radiation protection systems in similar interventional radiology facilities.

Keywords: *Radiation Protection, Interventional Radiology CathLab, Radiation Shielding, NCRP-147 and BIR*