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Comparison of Occupational Radiation Exposure in Interventional Pain Medicine Physician wearing Chest versus Hand Dosimeters

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Physician Safety, Occupational Radiation, Dosimeter

Abstract

Occupational radiation exposure amongst physicians is an essential topic in the discussion of workplace safety. Many opinions exist for the varying types of dosimeters to accurately estimate exposure during radiation producing procedures. Some argue ring dosimeters worn on the finger are superior due to proximity to the working field, while others note their positionality and perceived effect on dexterity. This study's aim was to compare radiation exposure recordings between the commonly worn chest dosimeter and ring dosimeters to elucidate discrepancies that may lead to more impactful safety measures. We conducted a randomized control trial over six months with ten interventional pain physicians that were evenly divided into a control group with a standard chest dosimeter and an experimental group with both chest and hand dosimeters. The control and experimental groups had similar average six-month radiation recording on the chest dosimeters (158.8 mrem vs. 122.8 mrem $P = 0.473$) indicating a similar overall exposure within the time period. Per OSHA guidelines, acceptable six-month absolute radiation exposure for the chest is substantially lower than the extremities (2500 mrem vs. 37500 mrem). Due to these differing thresholds, radiation recordings were calculated as a percent of the allowable six-month maximum for the hand and chest dosimeters within the hand group, to compare the relative exposure between the two devices. The average percent of six-month maximum radiation exposure was significantly higher on the chest dosimeter compared to the ring (4.9% vs. 0.63% $P = 0.0069$). Although within acceptable limits, our study indicates the chest dosimeter recorded nearly nine times the acceptable percent maximum compared to the hand dosimeter. This discrepancy highlights that chest dosimeters may be the safer, more conservative, option when monitoring occupational exposure and that the use of a ring dosimeter alone may underestimate radiation to other parts of the body.