**Reducing Invasive Cardiologist Radiation Exposure with a Novel Lead-Based Arm board (RADAR)**

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**ABSTRACT:**

**Background**: Given potential adverse health risk of ionizing radiation during invasive cardiac procedures, guidelines recommend reducing radiation exposure to patients and operators. We evaluated whether the use of a novel lead-based (LB) arm-board results in lower radiation exposure to the operator compared to usual practice.

**Methods**: We performed a single center randomized trial to evaluate primary operator radiation exposure during invasive cardiac procedures with or without the use of the LB arm-board compared with standard (ceiling, table and pelvic) lead shielding alone. Operator radiation dose was measured using a personal dosimeter at the level of the left chest pocket (external to worn lead) and left forearm. Co-primary outcomes included radiation dose (μSv; mean ± SD) to operator at the chest and forearm level. Secondary outcomes included air kerma, dose area product, and radiation dose to the patient (measured with dosimeter over umbilicus).

**Results**: 346 patients who underwent 351 procedures (175 with LB arm-board) were randomized. Mean age was 66.2 (±11) and 66% were male. 333 (95%) were radial procedures and 135 (38.5%) had coronary intervention. Baseline clinical and procedural characteristics, including fluoroscopy time (p=0.654) and number of cine acquisitions (p=0.611), were similar between the two groups. Compared with standard lead shielding alone, use of LB arm-board significantly reduced the radiation dose to the primary operator at the chest (58% reduction; 7.3±10.3 vs. 17.3±17.2 μSv; p<0.001) and forearm (65% reduction; 14.8±19.1 vs. 42.4±48.9 μSv; p<0.001). There was no difference between groups in air kerma (0.97±0.91 vs. 0.99±0.68 Gy; p=0.840) or dose area product (54.7±45.9 vs. 59.4±41.6 Gy\*cm2; p=0.318). Radiation dose to the patient at the abdomen was not increased with the LB arm-board (184±289 vs. 215±303 μSv; p=0.318).

**Conclusions:** Radiation dose to the primary operator was significantly reduced, without an increase in dose to the patient, with the addition of a novel, lead-based arm-board when compared to the standard lead shielding. We recommend the integration of the LB arm-board in everyday clinical practice.