Modulating C-Arm Settings to Reduce Radiation Exposure During Vascular Access Procedures

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Purpose:

Determine if reducing the maximum frame rate of the C-arm results in a noticeable decrease in radiation exposure to the operator.

Background:

The study involves one practice which owns two dialysis access interventional suites at different locations. Each lab has two procedure rooms with one C-arm in each. Both interventional suites utilize the same C-arm machines, procedure tables, similar patient armrests, the same armrest aprons, and have comparably sized rooms. One lab, named Lab A, set the maximum frame rate of their C-arms to 4 fps. The second lab, named Lab B, utilized an 8 fps setting. This comparison study took place over the first 9 months of 2019. The radiation exposure of two physicians from each lab was measured utilizing film badge dosimeters that all the physicians carried throughout their procedures. The physicians from Lab A will be called physician 1 and physician 2. The physicians from Lab B will be called physician 3 and physician 4. The method of analyzing the maximum frame rate setting's effect on radiation exposure was by using a ratio of the radiation exposure accumulated over a year, measured by the physicians' badge readings (in mrem), to the number of procedures each physician performed. The procedures mainly included: catheter insertions and exchanges, angiograms, angioplasties, stent placements, and declots.

Results:

The ratios of radiation exposure (in mrem) to the number of procedures were as follows:

-Physician 1 (Lab A using 4 fps) → 28 mrem ÷ 743 procedures= **0.0377**
-Physician 2 (Lab A using 4 fps) → 15 mrem ÷ 344 procedures= **0.0436**
-Physician 3 (Lab B using 8 fps) → 230 mrem ÷ 519 procedures= **0.4432**
-Physician 4 (Lab B using 8 fps) → 178 mrem ÷ 452 procedures= **0.3938**

Average Radiation Exposure Per Procedure For Each Physician
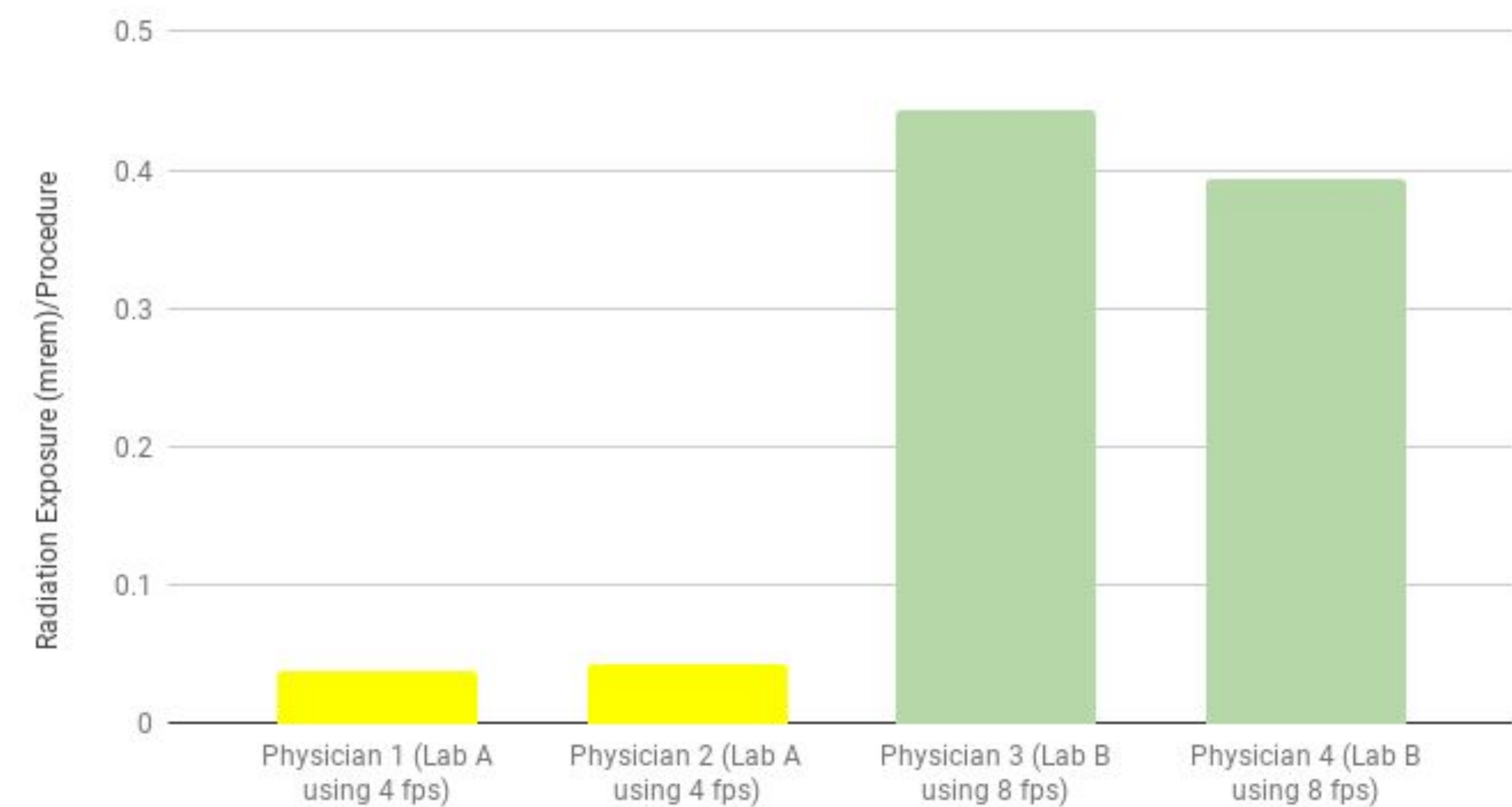
Conclusion:

The study revealed that decreasing the maximum frame rate from 8 fps to 4 fps reduced radiation exposure to the operators severalfold. Thus, it is recommended to utilize lower frame rate settings for vascular access procedures if possible.