

## Evaluating Radiation Dose for Interventional Radiologists Performing Spine Procedures

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**Abstract :** While radiologist numbers specialized in spine interventional procedures are limited in Kuwait, the number of patients demanding these procedures is increasing rapidly. Due to this high demand, the workload of radiologists is increasing, which might represent a radiation exposure concern. During these procedures, the doctor's hands are in very close proximity to the main radiation beam/ if not within it. The aim of this study is to measure the radiation dose for radiologists during several interventional procedures for the spine. Methods: Two doctors carrying different workloads were included. (DR1) was performing procedures in the morning and afternoon shifts, while (DR2) was performing procedures in the morning shift only. Comparing the radiation exposures that the hand of each doctor is receiving will assess radiation safety and help to set up workload regulations for radiologists carrying a heavy schedule of such procedures. Entrance Skin Dose (ESD) was measured via TLD (ThermoLuminescent Dosimetry) placed at the right wrist of the radiologists. DR1 was covering the morning shift in one hospital (Mubarak Al-Kabeer Hospital) and the afternoon shift in another hospital (Dar Alshifa Hospital). The TLD chip was placed in his gloves during the 2 shifts for a whole week. Since DR2 was covering the morning shift only in Al Razi Hospital, he wore the TLD during the morning shift for a week. It is worth mentioning that DR1 was performing 4-5 spine procedures/day in the morning and the same number in the afternoon and DR2 was performing 5-7 procedures/day. This procedure was repeated for 4 consecutive weeks in order to calculate the ESD value that a hand receives in a month. Results: In general, radiation doses that the hand received in a week ranged from 0.12 to 1.12 mSv. The ESD values for DR1 for the four consecutive weeks were 1.12, 0.32, 0.83, 0.22 mSv, thus for a month (4 weeks), this equals 2.49 mSv and calculated to be 27.39 per year (11 months-since each radiologist have 45 days of leave in each year). For DR2, the weekly ESD values are 0.43, 0.74, 0.12, 0.61 mSv, and thus, for a month, this equals 1.9 mSv, and for a year, this equals 20.9 mSv /year. These values are below the standard level and way below the maximum limit of 500 mSv per year (set by ICRP = International Council of Radiation Protection). However, it is worth mentioning that DR1 was a senior consultant and hence needed less fluoro-time during each procedure. This is evident from the low ESD values of the second week (0.32) and the fourth week (0.22), even though he was performing nearly 10-12 procedures in a day /5 days a week. These values were lower or in the same range as those for DR2 (who was a junior consultant). This highlighted the importance of increasing the radiologist's skills and awareness of fluoroscopy time effect. In conclusion, the radiation dose that radiologists received during spine interventional radiology in our setting was below standard dose limits.

**Keywords :** radiation protection, interventional radiology dosimetry, ESD measurements, radiologist radiation exposure

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