

Letters, Techniques and Images

Do fluoroscopy systems influence the level of scatter radiation exposure during endoscopic procedures?

Radiation exposure (RE) has biological consequences and the risk is cumulative. There is increasing awareness regarding the risks of RE to patients and providers from endoscopic procedures that use fluoroscopic guidance.^{1,2} A major source of RE during fluoroscopy is radiation scattering from the patient as the incident beam makes contact with the body surface. Although the simplest way to reduce RE is by decreasing fluoroscopy time, this may not always be possible.³ We compared the performance of two fluoroscopy systems, fixed Eview (Omega Medical Imaging, Orlando, FL, USA) and Elite Mobile C-arm (OEC 9900; GE Healthcare, Wauwatosa, WI,

USA) in an attempt to identify means of reducing RE to endoscopy personnel. The Eview system has a scatter shield below and above the table and a motorized variable source-to-image distance that can be lowered towards the patient, reducing scatter radiation and enhancing image quality. The Elite Mobile C-arm has a unique X-ray tube and cooling system that allows full-resolution imaging for longer periods.

In the present study, we used a National Electrical Manufacturer's Association (NEMA XR 21UL) phantom to simulate patient anatomy. Scatter RE to the endoscopist, anesthesiologist and radiology technician was simulated using three test subjects. Radiation was delivered for 2 min using the automatic fluoroscopic technique, and exposure to predefined body areas (chest, abdomen and eyes) was measured using a dosimeter. The median cumulative RE to the three test subjects for all body parts was significantly lower with the Eview compared to the Elite Mobile fluoroscopy system (5.9 vs 28.3 uGY/min; $P=0.0001$). RE to individual body parts of the test subjects is shown in Table 1.

In the present study, when compared to the Mobile C-arm, radiation scatter was significantly less when using the fixed Eview fluoroscopy system. More data are required to validate our promising preliminary findings in an attempt to reduce RE to both patients and endoscopy staff.

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Table 1 Comparison of total radiation exposure between the two fluoroscopy units for all endoscopy staff personnel

Area of exposure [†]		Mean (SD)	Radiation exposure (uGY/min)		P-value
			Elite Mobile	Eview	
Eyes, chest/abdomen			42.8 (40.1)	8.1 (7.1)	
	Median		28.3	5.9	0.0001
	IQR		12.2–51.7	1.7–13.1	
	Range		10.2–130.3	1.1–21.7	
Eyes	Mean (SD)	23.3 (8.6)	4.4 (2.7)		
	Median	26.7	3.8	0.0003	
	IQR	12.2–29.7	1.7–7.7		
	Range	12.0–32.5	1.6–8.0		
Chest/abdomen	Mean (SD)	62.3 (49.8)	11.7 (8.3)		
	Median	51.7	13.1	0.0469	
	IQR	10.9–118.0	2.1–19.7		
	Range	10.2–130.3	1.1–21.7		

[†]Distance of the test subjects from the phantom: endoscopist (42.06 cm, erect posture, measured at eye and abdomen levels); anesthesiologist (74.98 cm, seated, measured at eye and chest levels); radiology technician (155.14 cm erect posture, measured at eye and abdomen levels).

Elite Mobile C-arm (OEC 9900; GE Healthcare, Wauwatosa, WI, USA); Eview (Omega Medical Imaging, Orlando, FL, USA).

IQR, interquartile range; SD, standard deviation.

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