University of New Mexico
Fluoroscopy Safety Guidelines for Workers

Fluoroscopy is capable of producing high radiation fields that could result in patient injury or unnecessary radiation exposure to workers if safe practices are not employed. Knowledge of machine operations and radiation reduction methods are critical to preventing adverse outcomes while enhancing clinical objectives.

1. **Who can operate**? Only ARRT-certified x-ray technologists, Radiologists, and Physicians credentialed in Fluoroscopy may operate a fluoroscopy machine. Initial and annual radiation safety refresher training must be documented.

2. **Minimize fluoroscopy time**: Use fluoroscopy only as needed and only when an interpreting physician is viewing the monitor. Pay attention to the 5-minute timer. Features such as freeze frame and "last image hold" should be used. Always record the total fluoroscopy time, number of acquired images, and the DAP and Air Kerma reading (with units such as mGy-cm^2 and Gy respectively) used for each patient case, in a retrievable record such as the patient chart.

3. **Recording modes** of fluoroscopy such as cineradiography and digital acquisition modes have dose rates that are many times higher than regular fluoroscopy. Use recording modes SPARINGLY.

4. **Maximize distance away from x-ray tube**: Stand as far away from the x-ray table as possible consistent with good clinical practice. To reduce exposure, stand on the image intensifier side for lateral and oblique views. For improved image quality and lower dose, an under-table tube configuration is best, with the tube far away from the patient, and the image receptor close to the patient (small air gap).

5. **Use personal shielding**: Lead aprons effectively protect operators from scatter. Anyone within 6 feet of the fluoroscopy machine MUST wear a lead apron. Use a wrap-around style apron if your orientation to the beam will change throughout a case. Aprons should be certified by a qualified Medical Physicist. Thyroid shields and lead eyeglasses are also recommended for operators who regularly work at tableside in high risk fluoroscopy suites.

6. **Use structural shields**: Lead drapes hanging from the image intensifier of stationary fluoroscopy units significantly reduce operator exposure and should always be used. C-Arm configurations may have ceiling-mounted clear view lead shields or table-mounted shields that extend to the floor.

7. **NEVER place your hands in the primary beam** (if your hands are visible on the monitor, they are in the beam). If your hands are routinely near the primary beam, a ring badge should be worn as allowed by sterile field standards.

8. **Collimate** the x-ray beam to as small an area as possible to capture the area of clinical interest. This reduces the risk of skin injury to the patient, and also reduces scatter to the operator.

9. The **automatic brightness control (ABC or AEC)** feature will increase the x-ray output (R/min) with increasing patient thickness and density of anatomy in the beam. Keep this in mind when imaging large patients and/or bony structures.

10. **Pulsed fluoroscopy modes** (as opposed to continuous mode) should result in lower patient radiation exposure when used correctly. Patient dose is reduced with lower frame rates (fps) and can be an effective radiation safety tool as long as image quality remains clinically acceptable.

11. **Alternating C-arm gantry angles** helps to minimize the risk of skin injury by not exposing the same area of skin to the primary x-ray beam and is recommended for lengthy studies if doing so will not interfere with the clinical objectives.

12. **The radiation output (R/min) of each operating mode** should be available to operators. The output multiplied by the fluoroscopy time provides a quick estimate of patient skin entrance dose.

13. **Informed consent** should be obtained before performing lengthy fluoroscopy studies. The patient should be made aware of the risk of radiation-induced skin injury with the symptoms and area of anatomy clearly identified.

14. Before independently operating any C-Arm, the operator shall have the equivalent of the **manufacturer's applications training** to fully understand the capabilities, patient dose reduction options, dose metric displays, and radiation safety tools for that particular machine.