



Medical fluoroscopy is a form of x-ray imaging in which a continuous image is displayed on a monitor. It is a tool for guiding and monitoring diagnostic and therapeutic procedures, as well as for the visualization of internal structures. Some procedures, such as the placement of stents inside the body, require a lengthy exposure time and can result in high radiation doses to both patients and staff.

During fluoroscopy procedures, the operator may stand near the patient in order to use interventional devices. This increases the risk of radiation exposure to the hands from the primary beam, and to the whole body and the eyes from scattered radiation. In addition, complexity and the possible need for anesthesia require the presence of multiple workers in the room during the procedure. These workers may be exposed to scattered radiation from the patient.

Reducing Radiation in the Fluoroscopy Room

- Dose reduction technologies within the equipment should be used as much as possible.
- Use of fluoroscopy should be limited to the necessary evaluation of moving structures.
- Acquisition of still images should be limited to the minimum necessary for diagnosis and documentation.
- Over-table x-ray tube positions should be avoided as they increase the radiation risk to the eyes and upper body of attending medical personnel. Under-table systems direct the backscatter toward the floor and away from the operator.
- When using the machine in a horizontal or lateral angulated position, the operator and staff should stand on the image-receptor side of the patient, since scattered radiation is most intense on the entrance-beam side of the patient.
- The best way to avoid unnecessary exposure is appropriate radiation dose protection training, specifically as it relates to fluoroscopy. This extends to all operators and assistants who may be in the room during the procedure and should include training in ergonomic positioning to reduce operator fatigue.
- The facility should periodically audit the outcomes of procedures, including patient doses, and share the audit information with each operator. Periodic review of personnel dosimetry shall also be performed, and the results shared with all monitored personnel.

Personal Protective Equipment and Shielding

Facilities have the responsibility to provide radiation protection to each individual working in the room during fluoroscopy procedures. In the fluoroscopy room, radiation protection typically takes the form of movable shields and wearable

protective gear. The equipment should be ergonomically designed in order to be used most effectively.

- Lower extremity shields are usually unobtrusive and can provide significant protection against scattered radiation. These shields can be either on wheels or mounted to the table.
 - Ceiling-suspended shields are also available to protect the head, especially the eyes, but they can interfere with the operator's ability to perform certain procedures.
- For personnel that must be in the room but do not need to be near the patient, transparent mobile shields can provide sufficient protection. The operator and other staff members can also stand behind these devices during image acquisition.
- All personnel not protected by a large mobile shield should wear a well-fitted lead apron. Care should be taken that the apron is not too heavy for the wearer in order to prevent back pain during a lengthy procedure.
 - The use of thyroid shields is recommended, especially for younger personnel.
 - Individuals who may have their back to the patient during exposure should wear an apron that wraps around the body.
- To prevent overexposure to the eye during fluoroscopy procedures, the operator and assistants should wear eye protection (with shielding for side exposure) made from 0.25 mm lead-equivalent glass, which can attenuate around 90% of the radiation.
 - The facility is responsible for providing each wearer with eyewear that is sized to the individual's face, provides appropriate radiation protection, has the individual's correct optical prescription, and is comfortable to wear.
- To reduce overexposure of the operator's hands, radiation-attenuating surgical gloves can be worn, especially in high-exposure situations.
 - Although these gloves are both sterile and flexible, they may increase hand doses by reducing tactile feedback leading to increased fluoroscopy time. In addition, the gloves may give the wearer a false sense of security.
- Hands should never be placed in the primary beam, with or without protection, unless it is necessary for the safety and care of the patient.