



## GUIDE TO MEDICAL X-RAY OPERATING AND SAFETY PROCEDURES

These guidelines were prepared by the Radiation Control Section of the Arkansas Department of Health and are provided to you as a guide for compliance with Section 3 of the Rules for Control of Sources of Ionizing Radiation, 20 CAR Pt. 3. The intent of these instructions is to minimize radiation exposure of x-ray personnel and patients. They are not intended to limit or restrict exposure of x-ray personnel and patients. They are not intended to limit or restrict more detailed instructions and procedures that may be necessary at each facility.

1. A controlled area is to be maintained by the operator. Radiation areas are to be posted with "Caution, Radiation Area" signs.
2. The operator of the x-ray system should select the appropriate exposure factors for the examination, which will yield the best quality image at the lowest possible patient exposure. A centimeter-measuring device should be used to determine the thickness of each part of each patient to be x-rayed.
3. Operators should be familiar with quality control, such as determining the best film-screen combinations, developer temperature and replenishment frequency, kVp, mA/mAs factors, and accurate positioning in order to minimize retakes and to produce optimum quality radiographs.
4. All x-ray examinations shall be ordered by an individual authorized to do so in the State of Arkansas.
5. All personnel should be aware of the applicable provisions of the Rules for Control of Sources of Ionizing Radiation, 20 CAR Pt. 3 a copy of which is maintained in the x-ray office or may be accessed via the internet at [Code of Arkansas Rules](#)
6. The x-ray field should always be limited to the area of clinical interest by proper selection of cones or collimating of the field.
7. Employees shall never hold a patient, film, or image receptor, except in emergencies. If a patient must be held for radiography, mechanical supporting or permissible restraining devices should be used. If the use of these devices is not possible, an individual who is beyond the child-bearing age should be selected for the purpose of holding a patient or film. This individual shall be protected with appropriate shielding, such as protective gloves and apron and will be so positioned that the useful beam will strike no part of his body, except hands and arms. In no case should a pregnant female hold a patient, film, or image receptor.
8. Protective devices such as lead gloves and aprons should be made available to all employees if their use is indicated. Personnel should also utilize protective shielding barriers to the fullest extent and should always stand behind the barrier provided when making x-ray exposures.
9. The user should be aware of all recent statements of positions in safe x-ray procedures, such as the use of patient gonadal shielding and imaging of fertile females.
10. Only individuals required for the radiographic procedures shall be in the radiographic room during exposures.

11. The primary beam shall only be directed towards a primary barrier.
12. Neither the tube housing nor the collimator shall be hand held during exposures.
13. All x-ray equipment is to be installed following the manufacturer's specifications and will be equipped with appropriate collimation, which if used properly, will limit the size of the useful beam to the area of clinical interest. In addition, the tube has aluminum or equivalent filtration from the x-ray beam and shall not be removed or altered except for mammography.
14. Each occupationally exposed employee who has been provided with a personnel monitoring device shall wear his/her assigned monitor. These devices should remain in the facility when not in use. Each individual shall be notified annually of exposure exceeding 100 mrem, and all exposure records should be made available to employees upon request. When a control badge is supplied it should be kept in an area free of man-made radiation.
15. The annual occupational radiation exposure limits must not be exceeded. As stated in RH-1200, these limits are 5 rem total effective dose equivalent, 15 rem to the lens of the eyes, and 50 rem to the skin of the whole body or extremities per calendar year. No employee under the age of 18 shall be allowed to receive a radiation dose in excess of 500 millirem total effective dose equivalent per calendar year.
16. All personnel should make every effort to keep their radiation exposure As Low As Reasonably Achievable (ALARA). It is at the discretion of the facility's management whether to impose quarterly or monthly ALARA dose limits.

### **Fluoroscopic Procedures**

1. The technique factors which yield the lowest possible patient exposure rate consistent with the highest quality image should be employed. Periodic determinations of patient exposure rate should be made.
2. Shielding shall be in place between the patient and fluoroscopist.
3. Protective aprons of at least 0.25 millimeters lead equivalent shall be worn in the fluoroscopy room by each person whose body is likely to be exposed to 5mR/hr or more, except the patient.
4. The 5-minute cumulative timing device should be reset before each fluoroscopic procedure.
5. Personnel monitoring devices shall be worn outside of the protective apron, preferably on the collar.

### **Portable Procedures (if applicable)**

1. The operator shall stand behind a portable shield or at least six (6) feet from the patient and well away from the useful beam. If a portable shield is not used, the operator should use a lead apron.
2. The useful beam shall not be directed towards other patients that may be present in the room. Whenever possible, other patients should not be located closer than six (6) feet from the tube head.

**Other Procedures (if applicable)**

1. For operating room, cysto room, therapeutic, and/or other special procedures, the registrant shall provide additional operating and safety procedures. Also, for therapeutic equipment, these procedures shall include special surveys, calibration of machines, interlock checks, and record keeping and review.

**FOR INFORMATION CALL:**

Arkansas Department of Health  
Radiation Control Section (501)  
661-2301