

This RIN provides guidance for workers [nurses, respiratory technologies, etc] who assist in medical procedures that involve the use of x-ray equipment. The purpose is to help employers and employees take appropriate actions to ensure such workers are aware of and are effectively protected against radiation exposure during these procedures. Employers need to be aware of their obligations to protect these workers in accordance with the requirements for ionizing radiation as specified in the *WorkSafeBC Occupational Health and Safety Regulation* ([see Part 7, Div 3](#)).

GENERAL RECOMENDATIONS

- All workers involved with medical x-ray procedures must be aware of the radiation hazards involved and adhere to workplace safety protocols.
- Except when the worker is required to assist directly during an x-ray procedure, the worker should maximize the distance between themselves and the x-ray equipment during its use to help minimize their radiation exposure.
- All persons required to be present during an x-ray procedure must take advantage of available protective devices (i.e. lead apron).
- Holding devices should be used to support patients whenever practicable. If workers are asked to assist, they must be provided with lead aprons and gloves, and be positioned so as to avoid the x-ray beam. No worker should regularly perform these duties.
- X-ray equipment must be operated only by individuals who are properly trained for the equipment and the procedures being performed.
- A female worker should immediately notify her employer upon knowledge that she is pregnant in order that appropriate steps may be taken to ensure that her work duties during the remainder of the pregnancy do not exceed the dose limits for a pregnant worker as given in the *OH&S Regulation*.
- A pregnant worker or a worker considering starting a family is entitled to counselling and further education on radiation protection issues and concerns regarding reproduction.

X-RAY PROCEDURES

- Portable x-ray units must be used only if the condition of the patient is such as to make it impossible for the x-ray procedure to be performed in the x-ray department. During the x-ray procedure, the x-ray beam should be directed away from occupied areas if possible, and every effort must be made to ensure the x-ray beam does not irradiate any other persons close by. Patient support devices should be used.
- During general fluoroscopic procedures, all workers required to be in the room during the fluoroscopy procedure should wear protective clothing, lead aprons. When workers are to be at the side of the patient during fluoroscopy, appropriate protective clothing must be worn by these workers.
- For guidance on mini "C" arm procedures, please refer to our [RIN 14 - Protection During Orthopaedic Uses of Mini C-arm Units for Imaging Upper and Lower Extremities](#).
- During angiographic and interventional procedures, all workers assisting during the x-ray procedure must wear protective clothing and personal dosimeters (TLD badges). X-ray protective glasses should also be worn. As the patient is the largest source of scatter radiation, this scatter can be reduced by using the tube under the patient. If the tube is horizontal, stand on the side of the image intensifier/digital plate. Full use must be made of the protective devices provided with x-ray equipment, such as shielded panels, drapes, covers, ceiling-suspended lead acrylic screens, etc. All workers who are not required to be next to the patient during these procedures must stand back as far as possible from the patient and, if at all possible, should stand behind a protective shield.

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PERSONAL PROTECTION

a) Personal Radiation Monitoring

The Occupational Health and Safety Regulation requires the employer determine if any worker exceeds or may exceed the action level dose of 1 mSv/year and to implement an Exposure Control Plan for such workers, including the provision of personal dosimeters (radiation monitoring badges) for the designated workers. Worker exposure is determined for the whole body (effective) dose and is measured by wearing a badge (personal radiation monitoring device) on the body, underneath any protective clothing that is used. In addition to body badges, staff may require secondary dosimeters for measuring exposure to hands and head/eyes, if these parts would receive higher exposure.

To determine whether other staff would require radiation monitoring devices (e.g. TLD badge), answer the following:

1. Do any annual body doses at your facility exceed 1 mSv/year? The results of dose received by currently monitored staff, as supplied by your dosimetry service provider, should be reviewed and dosimeter assignments adjusted.
2. Do doses delivered to the unprotected areas (not covered by a lead apron) such as the head, neck and hands need to be assessed? Different dose limits apply to the eyes and to extremities (i.e. hands and feet).

If your answer to either of the above questions is YES, staff should consider wearing TLD badges. To monitor the head or eyes, an additional dosimeter is worn outside the lead apron at the neck level or on a head band. Doses delivered to hands during x-ray procedures can also be monitored by wearing a dosimeter(s) on the wrist or wearing special ring dosimeters on the fingers. When ordering badges, it is important to correctly designate which body area each dosimeter will be worn on. For information on approved dosimetry service providers and on the selection and care of lead aprons, please refer to our [RIN 7 - Update on Personal Dosimetry Services](#).

The whole body exposure limit for workers in the OH&S Regulation is 20 mSv/year. The Regulation also references [Health Canada's Safety Codes](#), giving radiation protection requirements for diagnostic x-ray equipment and facilities.

b) Lead Aprons

Lead aprons are protective apparel that should be kept in good condition. They should be tested annually or as required under existing regulations or accreditation programs, and when damage is suspected. Lead aprons are available in different lead equivalence and different sizes. In selecting a lead apron, make sure the lead equivalence is suitable for your intended use and that the lead apron fits well. For further information on lead aprons, please refer to our [RIN 10 - Proper Selection, Care, Quality Control and Disposal of Lead Aprons](#).

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