Q.A. Collectible

*Sponsored by CRCPD's Committee on Quality Assurance
in Diagnostic X-Ray (H-7)*

Typical Patient Fluoroscopic Exposure Rate

Federal law prescribes maximum tabletop dose rates for fluoroscopic units, but what is the exposure rate to a "typical" patient? One method for estimating typical patient exposure rates for <u>routine</u> (upper gastrointestinal procedures) fluoroscopic procedures follows:

1. Have the operator set the controls as they normally would for routine fluoroscopy.

2. Place a suitable phantom equivalent to 9 inches of water, (7-7/8" of Lucite* works) in the beam, and collimate the x-ray field size so that the phantom will intercept the entire useful beam. Make sure the entire beam is attenuated by the phantom and the beam is large enough to cover the image receptor.

3. If the unit has automatic exposure controls:

    a) Assure the grid is in its usual position for routine fluoroscopy.

    b) If the x-ray tube is under the table, place the nearest part of the imaging assembly at 14 inches above the tabletop.

4. If the x-ray tube is above the table, the exposure rate should be measured with the x-ray tube positioned where the facility normally uses it.

5. Place an ionization chamber between the phantom and the x-ray tube and make an exposure. Record the mA, kVp, R/minute, and any other applicable technique factors.

6. The exposure rate is determined at:

    a) One centimeter above the table top for under-table x-ray tubes

    b) 30 centimeters above the table top for over the table x-ray tubes

    c) 30 centimeters from the input surface of the fluoroscopic imaging assembly for C-arms.

7. The "typical" patient exposure rate should not exceed 5 roentgens per minute. If the exposure rate is significantly above 5 roentgens per minute, further investigation is warranted by service personnel.

*NOTE: For convenience, a 9 inch x 9 inch (approximately 2 gallon) cubitainer, which could be filled to capacity with water at the facility, could be used as a phantom.

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8. Calculations:

a) Undertable x-ray tube

$$\frac{(R/m)\ (SCD)^2\ (C.F.)}{((\text{Source to Panel Distance}) + \text{One Centimeter}))^2}$$

b) Overhead x-ray tube

$$\frac{(R/m)\ (SCD)\ (C.F.)}{((\text{Source to Tabletop Distance}) - (30\ cm))^2}$$

c) C-Arm

$$\frac{(R/m)\ (SCD)^2\ (C.F.)}{((\text{Source to Input Phosphor distance}) - (30\ cm))^2}$$

C.F. = Calibration factor for chamber at kVp used

SCD = Source to chamber distance

R/m = Roentgens per minute (raw data)

9. The phantom can also be used to confirm the automatic exposure controls, if present, are functioning. After testing the typical patient exposure rate, simply divide the phantom in half, and see if the dose rate changes.

10. Please note that this procedure does not provide any information in image quality. Previous Q.A. Collectibles have provided information on resolution and low contrast performance.

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