

Radiation Protection of Staff during Fluoroscopy

1. Use protective devices!

Advisable skirt type lead apron to distribute weight

0.25 mm lead equivalence but with overlap on front to make it 0.5 mm on the front and 0.25 mm on the back (Provides >90% protection)



Lead glass eyewear with side protection



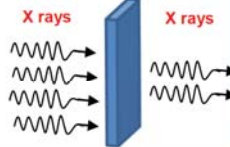
Thyroid protection

2. Make good use of time-distance-shielding (TDS) principle

Minimize time

Maximize distance as much as clinically possible

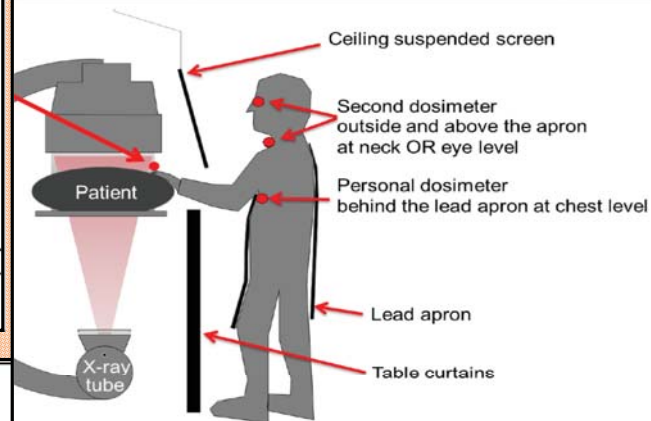
Use shielding



7. Use personal dosimetry

Use at least **two** dosimeters

- One **inside** the apron at chest level
- One **outside** the apron at neck or eye level



3. Use ceiling suspended screens, lateral shields and table curtains

They provide **more than 90% protection** from scattered radiation in fluoroscopy

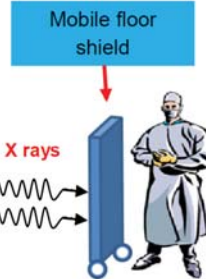
Mobile floor shielding is advisable when using cine acquisition



Ceiling mounted screen

Lateral shield

Table curtain



X rays

6. Keep X ray tube under the patient table and not over it.

Undercouch systems provide better protection from scattered dose



Image receptor

X ray tube

4. Keep hands outside the primary beam unless totally unavoidable

Hands inside the central area of the primary beam will increase exposure factors (kV, mA) and doses to patient and staff



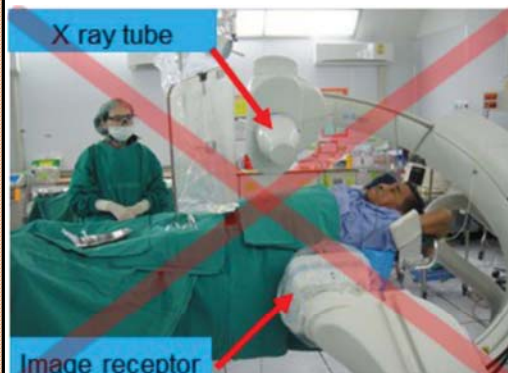
Right!



Wrong!

5. Only 1% - 5% of radiation falling on the patient's body exits the other side

Stand on the side of transmitted beam (detector side) which contains only 1% to 5% of the incident radiation and scatter thereof



X ray tube

Image receptor

Radiation Protection of Staff during Fluoroscopy

Responsibilities

Southeast Hospital is responsible for safe use of x-rays and for effective monitoring of occupational exposure.

You are responsible for following appropriate safety precautions, and for properly wearing and handling your personnel dosimeters.

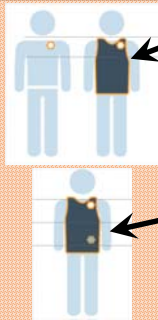
ALARA

Southeast Hospital is committed to maintaining occupational radiation exposures ALARA.

As Low As Reasonably Achievable

That requires effectively monitoring occupational exposures. And that requires that you wear and handle your dosimeters properly.

Personnel Monitoring



- If your job activities cause significant radiation exposure, you are assigned a "collar" dosimeter to be worn outside your protective garments ("lead").
- If you receive high doses to the collar dosimeter, you will be issued a second, "waist", dosimeter to be worn under your protective garments.



- If you "declare" in writing that you are pregnant, then you may be issued a "fetal" dosimeter, to be worn under the lead apron.
- The yellow dot on the person icon shows where the dosimeter is to be worn.
- Don't swap collar and waist dosimeters.

Dosimetry Reports are posted monthly to Compass/Departments/Radiation Safety/Personnel Dosimetry Reports.

How to read a dosimetry report

Participant Number	Name		Dosimeter	Use	Rad. Type	Rad. Quality	Dose Equivalent (mrem) for Periods Shown Below											
							Current Month			Current Quarter			Year to Date			Lifetime to Date		
	ID Number	Birth Date					Period Shown Below			Quarter to Date			Year to Date			Lifetime to Date		
							DDE	LDE	SDE	DDE	LDE	SDE	DDE	LDE	SDE	DDE	LDE	SDE
00857	GDOU\ P SOH\#/\ OYHVWHU		Pa	COLLAR	P	M	72	72	72	72	72	72	12	27	152	532	133	916
			Pa	WAIST	P	M	3	2	2	3	2	2						
				ASSIGNED			7	13	72	7	13	72						
				NOTE			Assigned dose based on EDE1 + Lens.175 Calculation											

Assigned Dose

EDE: The Effective Dose Equivalent is calculated as $EDE = (0.04 \times \text{collar}) + (1.5 \times \text{waist})$.

The EDE should be much less than the collar reading, but the assigned EDE will be about 38 times too high if the dosimeters are reversed.

Don't reverse the dosimeters.

Lens.175: If you wear protective eyewear during fluoro (and submit a signed attestation of use) the LDE is calculated by multiplying collar dose by 0.175. Without the Lens.175 factor the LDE might exceed the MPD and require a report to OSHA.

Maximum
Permissible
Dose (MPD)

SDE MPD = 7,500 mrem per calendar quarter
LDE MPD = 1,250 mrem per calendar quarter
DDE MPD = 1,250 mrem per calendar quarter

If you exceed the MPD, a violation report must be sent to OSHA.

ALARA Investigation Levels

Level 1 = 0.1 x MPD; Level 2 = 0.3 x MPD.

The Radiation Safety Officer investigates each quarterly occupational exposure that exceeds ALARA investigation levels and reports the results to the Radiation Safety Committee, including any corrective action. This allows upward trends in individual doses to be addressed before they become excessive.

Please return your dosimeters at the end of each month. We cannot meet our responsibility for keeping occupational exposure As Low As Reasonably Achievable without effective personnel monitoring.