

Protect the patient:

1. Select the adequate protocol

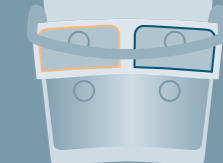
- Choose a proper organ program
- Use low dose acquisition
- Use **Fluoro Loop** (Store Fluoro)
- Use Low Dose 3D protocols

1.



1.

Acquisition ↑ Low Dose Acquisition ↑

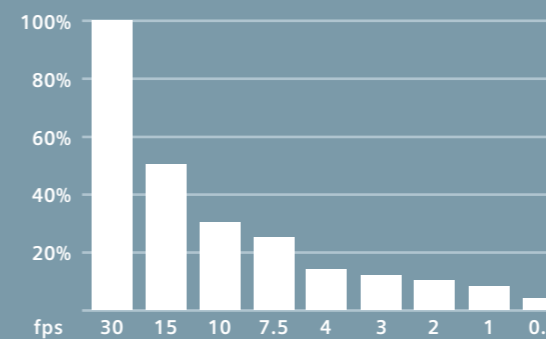


2. Minimize footswitch-on time

- ↓ Footswitch-on time ⇒ ↓ Skin dose
Example: 1/2 x time on the pedal ⇒ 1/2 x skin dose, 1/2 x dose area product

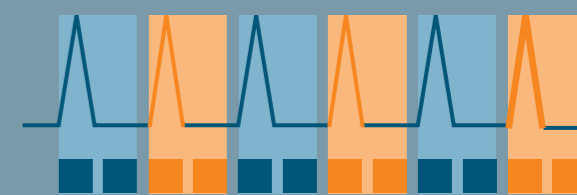
3.

Patient dose



3.

Pulsed fluoroscopy



3. Use low frame rate

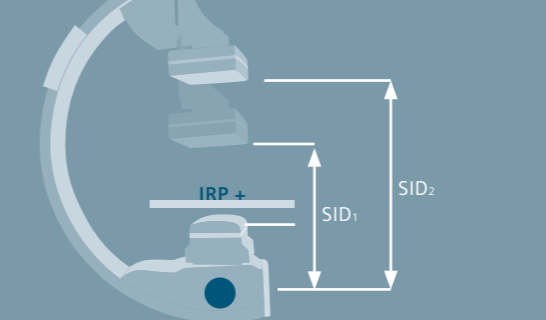
- ↓ Frame rate ⇒ ↓ Skin dose
Example: 7.5 vs. 15 fps ⇒ 50% vs. 100% of skin dose and dose area product
- **CAREvision**: Individually adjustable frame rate from 30 fps down to 0.5 fps

4. Zoom out as much as applicable

- ↑ Zoom size ⇒ ↓ Skin dose
⇒ ↑ Skin dose area product (only for open collimation)
- Effect on image quality:
 - For large patients at dose rate limit: ↑ Zoom size ⇒ ↑ Image quality
 - For small patients: ↓ Zoom size ⇒ ↑ Image quality

5.

SID = Source-Image Distance
IRP = Interventional Reference Point



5. Lower SID as much as applicable

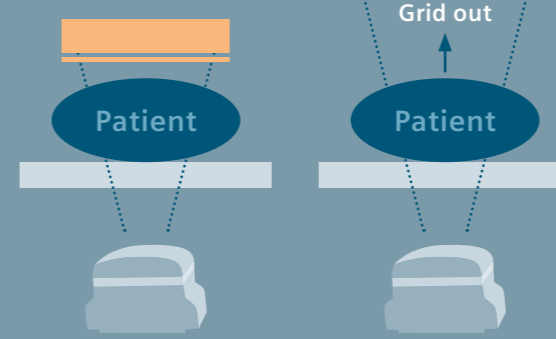
“Quadratic Law”:

- Dose at IRP is proportional to SID_2 (source image distance)
Example: ↓ SID from 120 to 105 cm ⇒ ↓ Skin dose by approx. 24%
- Effect on skin dose area product (ideal conditions):
Dose area product = const (for full field)

6.

Grid in

Grid out



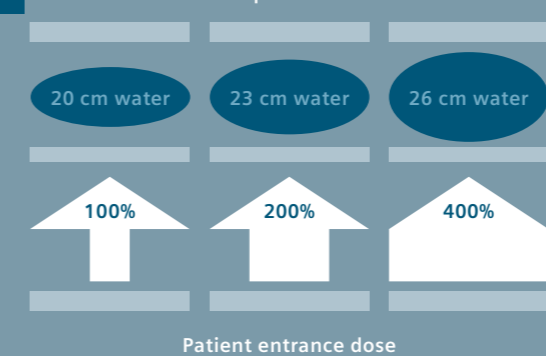
6. Remove grid and increase SID

“Air Gap Technique” (for small patients only, <20 kg)

- Remove anti-scatter grid ⇒ remove this “absorber”
- Lift up receptor as a scatter reduction measure

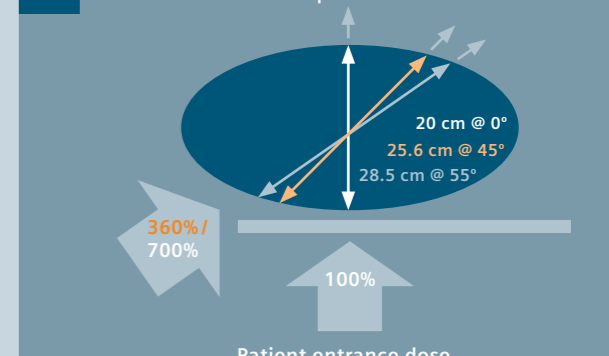
7.

Constant patient exit dose



7.

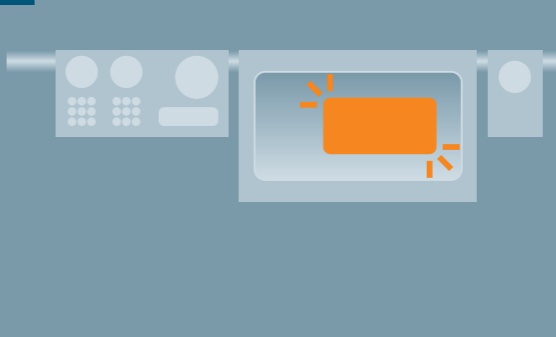
Constant patient exit dose



7. Use shallow angles as much as possible

- For every 3 cm patient thickness, entrance dose is doubled (for const. exit dose)
- Shallow angles ⇒ ↓ skin dose

8.



8. Monitor skin dose

- **CAREwatch**: Display of dose measures (at IRP): Acc. patient entrance dose, dose area product, dose rate
- **CAREguard**: Three (adjustable) skin dose limits for audible and visual warnings

Courtesy of Dr. David Lord, Head of Interventional Radiology at Westmead Children's Hospital, Sydney, Australia

Reducing radiation dose in the interventional lab

Recommendations for your daily routine