

Disposable radiation-absorbing surgical drapes results in significant dose reduction

Marc RHM van Sambeek
Joep AW Teijink, Philippe W Cuypers, Carla Kloeze
Department of Vascular Surgery
Catharina Hospital
Eindhoven



Disclosure

Marc RHM van Sambeek

I have the following potential conflicts of interest to report:

Consulting and speakersfee

WL Gore & Associates

Medtronic

Unrestricted research grants

Medtronic

Abbott Vascular

Not related to this presentation

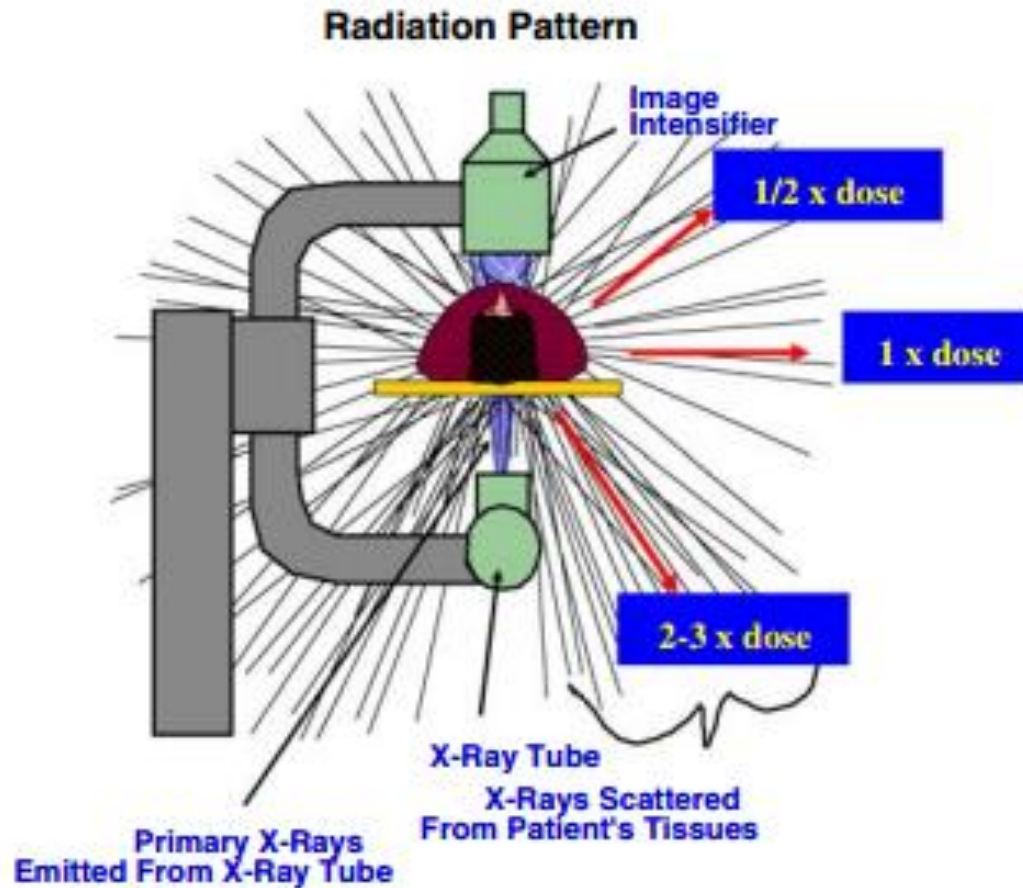
Radiation exposure

Despite precautions like a lead apron and thyroid shield, the increasing use of EVAR and other endovascular interventions results in considerable fluoroscopic exposure of the intervening physician.

Low-energy scattered radiation scatters in all directions from the patient during fluoroscopy.

This scatter radiation is the main source of exposure for medical staff during fluoroscopic procedures

Radiation scattering



Risks of radiation

Chronic exposure to lowdose radiation confers a small risk of stochastic effects, including malignant disease, skin damage, or eye problems.

Recently the International Commission on Radiological Protection (ICRP) reported that the equivalent dose limit for the lens of the eye should be reduced from 150 to 20 mSv per year, averaged over a 5-year period, with no year's dose exceeding 50 mSv.

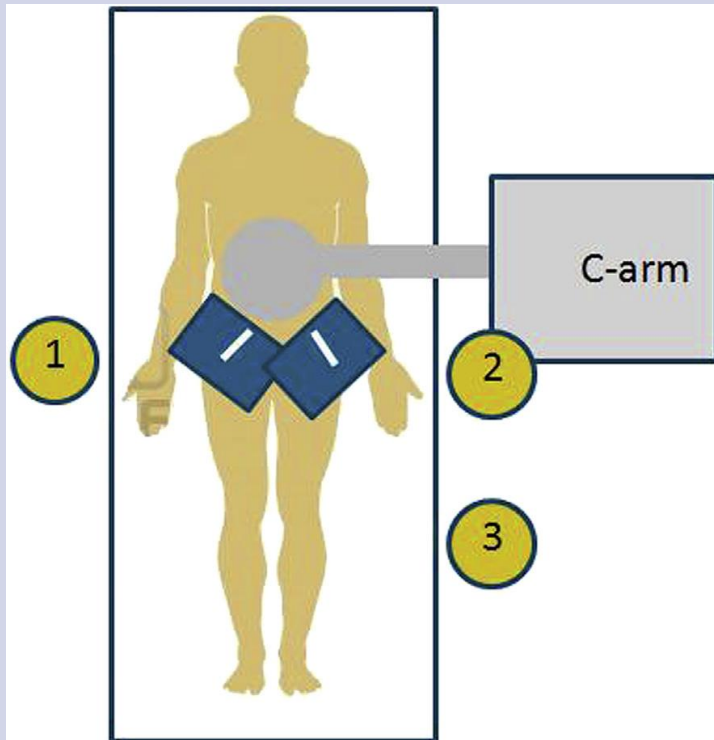
Radiation safety

This reduction in eye dose limit and the applicable ALARA principle demands additional dose-protecting measures for operating staff performing EVAR procedures, especially in a non-dedicated endosuite, where no additional dose-protecting measures, like lead flaps or shields, are available.



Radiation-absorbing drapes

Radiation-absorbing surgical drapes



The drapes are commercially available, sterile, disposable, lead-free surgical drapes. They have a uniform thickness of a few millimeters and contain bismuth and barium. The dose-reducing function is comparable to 0.4e 0.8 mm lead.

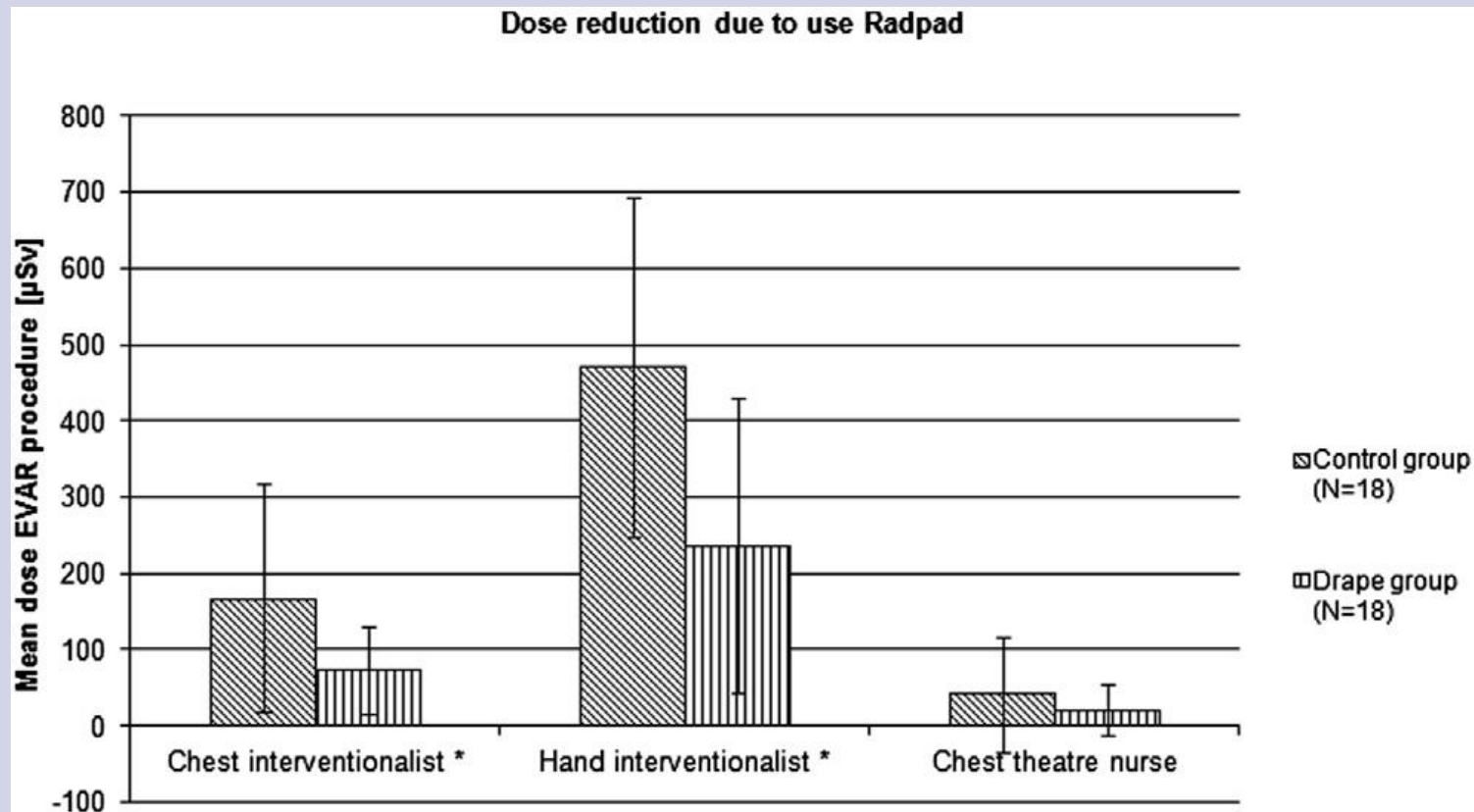
Randomised controlled trial

From June 2012 to October 2012,
36 consecutive EVAR
procedures were randomly
assigned to be performed with
or without the use of radiation-
absorbing surgical drapes

*(Radpad; Worldwide Innovations &
Technologies Inc., Kansas City, MO)*



Results



Results

| | Control group | Drape cohort | <i>p</i> |
|--|----------------------|----------------------|--------------------|
| Number of procedures | 18 | 18 | |
| Operator | | | |
| A | 9 | 4 | |
| B | 7 | 10 | |
| C | 2 | 4 | |
| Fluoroscopy time (s) | 841 (208–1089) | 669 (515–1385) | |
| DAP (cGycm ²) | 9458 (1497–16510) | 8638 (2896–22991) | 0.613 |
| Dose per procedure in front of apron chest operator (μSv) | 167.7 ± 134.1 | 73.0 ± 50.9 | 0.008 ^a |
| Dose/DAP per procedure chest operator (mSv/Gycm ²) | 0.023 | 0.011 | 0.023 ^a |
| Dose per procedure on hand operator (μSv) | 470.3 ± 222.4 | 236.8 ± 193.1 | 0.002 ^a |
| Dose/DAP per procedure hand operator (mSv/Gycm ²) | 0.050 | 0.025 | 0.000 ^a |
| Dose per procedure in front of apron chest theatre nurse (μSv) | 41.9 ± 74.8 | 21.4 ± 33.3 | 0.29 |
| Dose/DAP per procedure chest theatre nurse (mSv/Gycm ²) | 0.006 | 0.003 | 0.086 |

This results in a decrease in the annual dose on the chest of the interventionalist 55%.
 The annual dose on the hand of the interventionalist of 49%.
 The annual dose on the chest of the theatre nurse of 47%.

Conclusion

The use of disposable, radiation-absorbing drapes significantly reduces scatter radiation exposure for the interventionalist, resulting in a lower risk of the stochastic effects of radiation.

The staff during EVAR procedures are additionally protected by the use of these drapes.