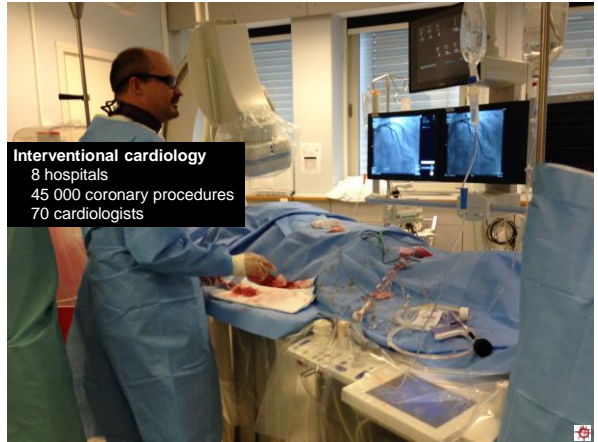


Inspection of Cardiology departments

Reidun Silkset, Senior Adviser

Section for Medical Applications
Norwegian Radiation Protection Authority

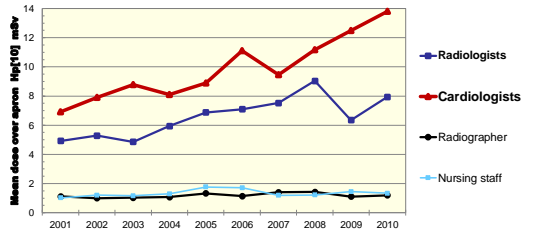


Why inspections in Cardiology?

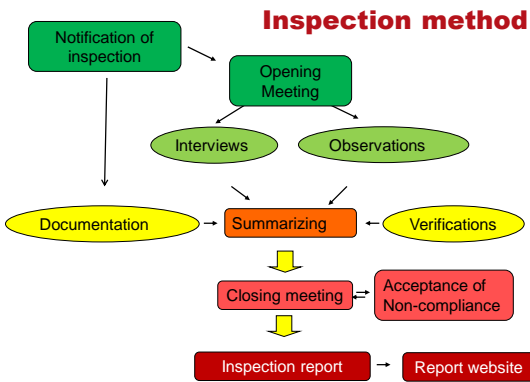
- High-dose and increase in the number of procedures
- Skin burns of patients have been reported
- Cardiologists in Norway have no formal education and training in radiation protection



Personnel doses for Medical staff in Norway



Development of mean doses over apron (D > 0 mSv) for medical staff in the period 2001-2010 (NRPA Report 2011:11)



Topics

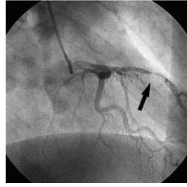
- Justification
- Optimisation
- Staff training in RP
- Organisation of the radiation protection (RP)
- Protection of staff and patients
- Personal dosimetry
- Quality assurance & quality control



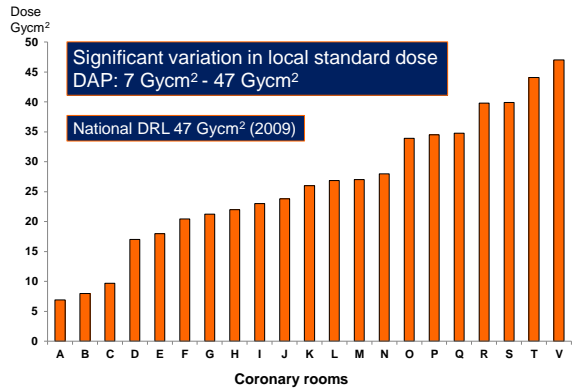
Documents & Interviews

Local standard dose & National DRLs
- Coronary angiography

- Tool for optimisation
- Multi-disciplinary team
- Dose limiting techniques



Coronary angiography
Tidsskrift for Den norske legeforening, 2006



Observations



Observations



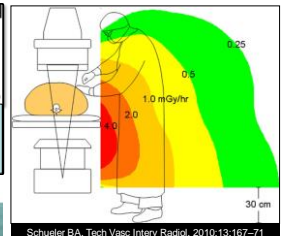
Observations



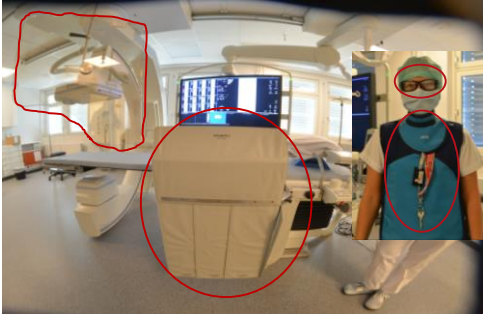
Use power injectors for contrast

Original article
Step back from the patient: Reduction of radiation dose to the operator by the systematic use of an automatic power injector for contrast media in an interventional angiography suite
Hans Stefan F. Lønnef and Espen Hege (Oslo)†
†Department of Interventional Radiology, The Interventional Centre, Oslo University Hospital, Oslo, Norway; ‡Department of Radiology, Oslo University Hospital, Oslo, Norway

"In conclusion, this study has shown a dose reduction of approximately 50% to the operator using a power injector to deliver contrast media"



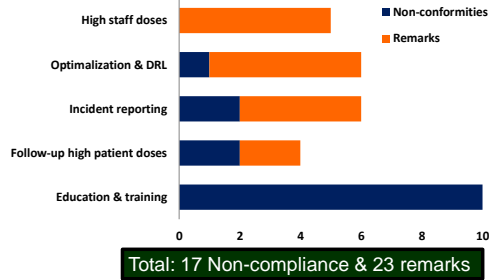
Shielding



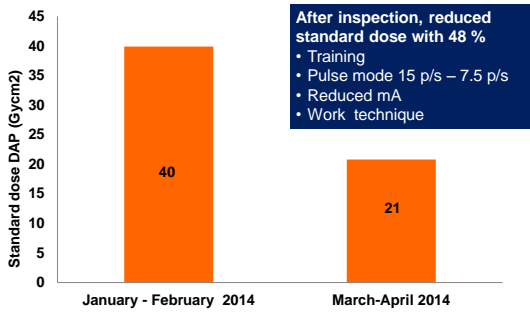
Most common results

Non-compliance – a finding that are in conflict with existing legislation

Remarks – a finding which is not in conflict with legislation, but a comment that may improve the quality, safety or practice



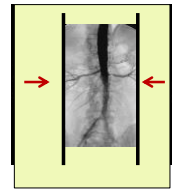
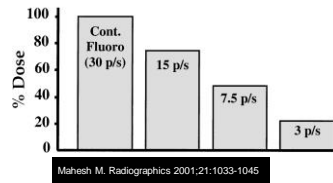
Optimisation at one hospital - Coronary angiography



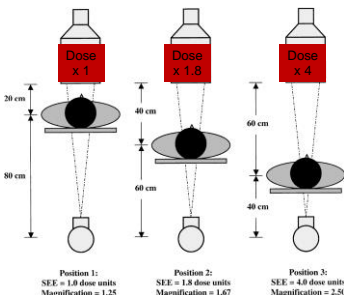
Dose reduction technologies

- Pulsed fluoroscopy

- Collimation



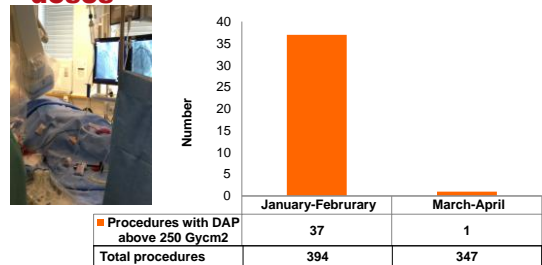
Effect of geometric magnification on entrance skin dose



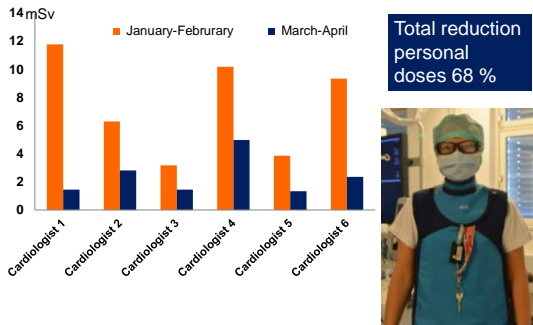
Keep the X-ray tube as far as possible from the patient and the image receptor as close as possible to the patient.

Maheesh M, Radiographics 2001;21:1033-1045

Decreased number of high patient doses



Decreased personal doses Hp[10]

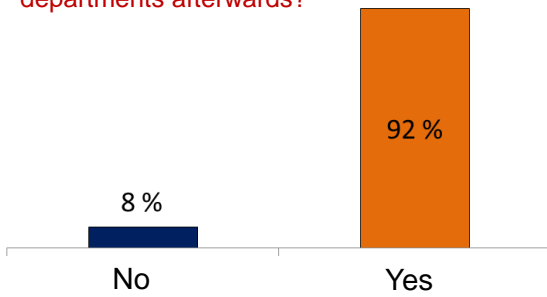


Evaluation of the inspections (EasyResearch)

Average score on a scale from 1 to 5, where 5 is the best



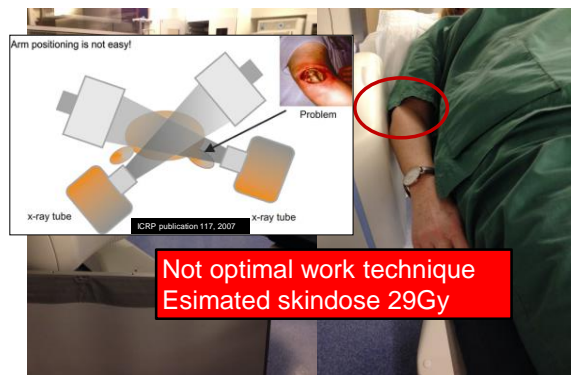
Did the inspection bring any changes in the departments afterwards?



Incident-based inspection



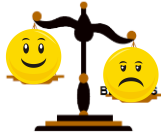
Incident report
 Examination and intervention at a x-ray room. Patient with occlusion in a. mesenterica and stenose in a. truncus iliacas. Skindose estimated to maximum 29 Gy.



Conclusion

- Significant variation in local standard dose
- Substantial lack and variation in level of RP at the cardiology departments
- Inspections are an effective tool to increase the awareness of RP and improve RP and safety

- Is our inspections a success?

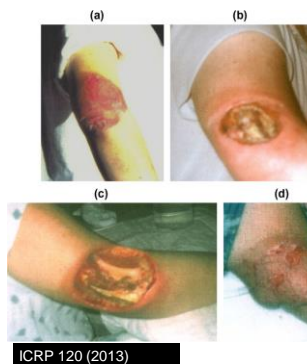
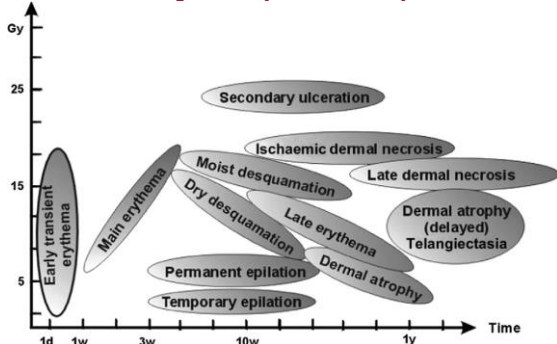


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Vevsreaksjoner (ICRP 120)



- (a) 3 weeks: area of sharply demarcated erythema.
- (b) 5 months: tissue necrosis.
- (c) 6.5 months: deep ulceration with exposure of the bone.
- (d) Following surgical flap

A 49-year-old woman presented with supraventricular tachycardia. Radiofrequency catheter ablation was performed. During the electrophysiology procedure, her right arm was in the x-ray beam near the port. Fluoroscopy time was 20 min. Skin dose data are not available. She presented 3 weeks later with a skin lesion on her right elbow. If the patient's arm had been positioned outside the x-ray beam, the injury could have been prevented or its severity decreased.

Event-based inspection

Radiation Protection Regulations

Section 19

Duty to warn in the event of accidents and abnormal events

The undertaking shall immediately give notice of accidents and abnormal events to the Norwegian Radiation Protection Authority. The terms "accident" and "abnormal events" mean:

(a) events which cause or may have caused unintended exposures of employees, patients or other persons significantly above normal levels

(b)

Positioning the patients body parts out of the x-ray beam, if possible

