Inspection of Cardiology departments

Reidun Silkoset, 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

![Graph showing personnel doses for Medical staff in Norway]

Topics

- Justification
- Optimisation
- Staff training in RP
- Organisation of the radiation protection (RP)
- Protection of staff and patients
- Personal dosimetry
- Quality assurance & quality control
• Tool for optimisation
• Multi-disciplinary team
• Dose limiting techniques

Observations

Work technique
Shielding
Exposure parameters
Filtration

Use power injectors for contrast

“...this study has shown a dose reduction of approximately 50% to the operator using a power injector to deliver contrast media”

**Shielding**

**Optimisation at one hospital**
- **Coronary angiography**

<table>
<thead>
<tr>
<th>Standard dose DAP (Gycm²)</th>
<th>January - February 2014</th>
<th>March-April 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>40</td>
<td>21</td>
</tr>
</tbody>
</table>

After inspection, reduced standard dose with 48%:
- Training
- Pulse mode 15 p/s – 7.5 p/s
- Reduced mA
- Work technique

**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.

**Decreased number of high patient doses**

<table>
<thead>
<tr>
<th></th>
<th>January-February</th>
<th>March-April</th>
</tr>
</thead>
<tbody>
<tr>
<td>Procedures with DAP above 250 Gycm²</td>
<td>37</td>
<td>1</td>
</tr>
</tbody>
</table>

Total procedures: 394, 347

**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

<table>
<thead>
<tr>
<th>Category</th>
<th>Jan-Feb</th>
<th>Mar-Apr</th>
</tr>
</thead>
<tbody>
<tr>
<td>High staff doses</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>Optimization &amp; DRL</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>Incident reporting</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Follow-up high patient doses</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Education &amp; training</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

Total: 17 Non-compliance & 23 remarks
Decreased personal doses

**Hp[10]**

<table>
<thead>
<tr>
<th>January-February</th>
<th>March-April</th>
</tr>
</thead>
<tbody>
<tr>
<td>14 mSv</td>
<td>Total reduction personal doses 68%</td>
</tr>
</tbody>
</table>

Evaluation of the inspections (EasyResearch)

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

<table>
<thead>
<tr>
<th>Mean score (1-5)</th>
<th>Do you agree with the Non-compliance and remarks given at the closing meeting?</th>
<th>What is your total impression of the inspection?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>😊😊😊😊😊 (4.1)</td>
<td>😊😊😊😊😊 (4.5)</td>
</tr>
</tbody>
</table>

Did the inspection bring any changes in the departments afterwards?

- Yes: 92%
- No: 8%

Incident-based inspection

**Incident report**


**Not optimal work technique**

Estimated skindose 29Gy
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?

Reference

[Image of reference page]
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