Ask EuroSafe Imaging
Tips & Tricks
IR Working Group

Eye Dose Limits Achieving Regulatory Compliance in Interventional Radiology

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Regulations

- The Council Directive 2013/59/Euratom\(^1\) should, by now, be implemented by the Member States of the European Union.

- Transposition into the national legislation of those individual states should be completed.

- Radiology / Interventional Radiology departments should be familiar with BSS detailed requirement for radiation protection of workers\(^2\).
Main Messages Of the BSS

- Changes in justification
- Patient information
- Defined Responsibilities – Both for Licensees and Workers
- Dose reporting
- Diagnostic Reference Levels
- Medical Physics Role Clarification

**Lower Eye Dose limits**

Summary of the European Directive 2013/59/Euratom: essentials for Health Professionals in Radiology. European Society of Radiology (3)

DOI 10.1007/s13244-015-0410-4
Are we Achieving Compliance?

- A pilot survey on behalf of ESR undertaken in November 2018 suggested a lack of compliance (4)
  - Justification demonstrated the poorest compliance
  - Results achieved varied in relation to dose limits, patient information and accidental exposure notification
  - The results however should have far higher compliance with implementation of Diagnostic Reference levels (DRLs)
Becoming Compliant – Interventional Radiology

Radiation Protection is a tool for the management of measures to protect health against the risks (for people and environment) generated by the use of ionising radiation.

Mechanisms / tools include:

- Establishing Diagnostic Reference Levels (DRL’s)
- Mandatory Clinical Audit
- Abiding the regulatory **Dose limits**
- Developing Mechanisms for notification of accidental exposures
- Education (key in demonstrating the impact of using Personal Protective Equipment) (5)
The ESR published a call for action in 2018 to strengthen radiation protection across Europe\(^6\)

The key Actions support the implementation of BSS

Ask Eurosaf e Imaging published further guidelines in 2017 on Guidance on eye protection in interventional procedures\(^7\)
### BSS Occupational Dose limits
adopted from the ICRP

<table>
<thead>
<tr>
<th>Type of Dose Limit</th>
<th>Limit on Dose from Occupational Exposure</th>
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<tbody>
<tr>
<td><strong>Effective Dose</strong></td>
<td>20 mSv per year, averaged over defined periods of 5 years, with no single year exceeding 50 mSv</td>
</tr>
<tr>
<td><strong>Equivalent Dose</strong> to the Lens of the Eye</td>
<td>20 mSv per year, averaged over defined periods of 5 years, with no single year exceeding 50 mSv</td>
</tr>
<tr>
<td><strong>Equivalent Dose</strong> to the Skin</td>
<td>500 mSv in a year</td>
</tr>
<tr>
<td><strong>Equivalent Dose</strong> to the Hands and Feet</td>
<td>500 mSv in a year</td>
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Becoming Eye Limit Compliant in Interventional Radiology

- Use both ceiling suspended and mobile shields
- Utilisation provides more effective and practical protective measures against radiation induced eye lens opacities
- Minimising scatter that can enter the operator from the side
- Shielding screens reduce dose rate by a factor of between 5 and 25 \(^8\)
Becoming Eye Limit Compliant in Interventional Radiology

- Leaded eyeglasses with large lenses and protective side shields provide more protection, therefore are more safe.

- Use of lead glasses reduces the lens dose rate by a factor of at least 2.5 – 4.5\(^9\).

- To be used together with ceiling suspended and mobile shields when possible.

- Utilisation of both provides more effective protection.
Becoming Eye Limit Compliant in Interventional Radiology

- Disadvantages of wearing Glasses:
  - Weight
  - Discomfort
  - Optical prescriptive requirements
  - Potential fogging that reduces image perception

- Correct fitting for closeness, non-fogging and comfort should be carried out in all instances
Do we need monitoring?

Pilot study (5) demonstrated only 28.6 % dose limit compliance

The use of protective measures

(Screens / Lead glasses / Combination)

Should be an absolute requirement for operators carrying out Fluoroscopy or CT guided interventional procedures. (10)
Monitoring Recommendations

- Monitoring varies amongst institutions

- **The IAEA**$_{(11,12)}$ recommends:
  - The wearing of a *standard radiation dosimeter at collar level above* radioprotective garments.
  - Unprotected eyes receive approximately the dose indicated by such a monitor which *acts as a reasonable eye dose estimate*
Eye Limit Compliance

- Good Audit is mandatory to capture local practice.
- A reasonable method of accurate assessment is needed as suggested by the IAEA
- **Considering the evidence**
  - Individual Operator Eye Dose monitoring with a dedicated dosimeter should be carried out (13)


References


References


