Definition of Institutional Diagnostic Reference Levels in Pediatric Interventional Cardiology Procedures

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Background
Children may be more sensitive to radiation induced cancer because of:
- Higher organ specific risk factor
- X-ray beam centered in a region with close proximity to more radiosensitive organs

Objectives
This study evaluates paediatric IC radiation doses in a dedicated cardiology center with the objective of characterising patterns in dose variation. The ultimate purpose was to define Institutional Diagnostic Reference Levels (DRLs) for different types of paediatric IC procedures by age range.

Methods-Types of Procedures
- Diagnostic Cardiac Catheterization
- Aortic Angioplasty
- Pulmonary Artery Angioplasty
- Atrial Septal Defect (ASD) occlusion
- Pulmonary valve dilatation
- Patent Ductus Arteriosus (PDA) occlusion
- Electrophysiology study and Radiofrequency Ablation
- Pacemaker Implantation

RESULTS: The size of the patient is the major cause of increasing patient dose.

<table>
<thead>
<tr>
<th>Hospital</th>
<th>Total Procedures collected</th>
<th>X-ray Machine</th>
<th>Antiscatter grid</th>
<th>Acquisition frames per second</th>
<th>Fluoroscopy pulses per second</th>
</tr>
</thead>
<tbody>
<tr>
<td>Onassis Cardiac Surgery Center</td>
<td>477</td>
<td>SIEMENS Zee Biplane angiography machine with flat panel detector</td>
<td>Yes</td>
<td>30 f/s</td>
<td>7.5 p/s</td>
</tr>
</tbody>
</table>

Conclusions
- Our study suggests preliminary institutional DRLs for paediatric interventional procedures for 4 age groups.
- It shows that age influences radiation dose comparable to recently published data.
- Paediatric DRLs should be established to further optimise radiation dose and clinical practice.
- Detailed guidelines are needed on how to organise patient dose surveys and how to establish DRLs