TG108 Workshop: Optimisation of Radiological Protection in Digital Radiology Techniques for Medical Imaging

Section 5: Consideration for Paediatric Patients (and Their Families)
Sensitivity to radiation

- Children are in general more radiosensitive than the average adult.
- The cells in many of their organs are more sensitive to radiation damage.
- They have a longer lifetime to manifest any radiation health effects.
- Keeping doses low is especially important.
Children come in a wide range of sizes

- Selecting exposure factors is more difficult because of the range in size and extra care is needed.

- Patient age is a poor predictor of body thickness and weight is generally preferable for assessing exposure requirements.

- The boundary definition based on the individual scan indication is particularly important for paediatric patients, as their organs are in closer proximity.

- Collimation is critical.
Why children “Are not small adults”…

- Childrens understanding and responses to different situations vary, as well as their behaviour.

- Staff carrying out paediatric exposures must understand the ability of the patient to cooperate, as well as the influence of size on the exposure.
Children “Are not small adults”…

- Childrens’ physiology and diseases that we image differ at different ages. E.g., cancers are typically large sarcomas unlike adult carcinomas.

- Staff must know what alternative examinations are available for different clinical indications, especially techniques not involving ionising radiations that are available locally.
Particular technical factors

Radiography and fluoroscopy

- A grid is usually unnecessary for infants and children under the age of 4 years.
- Addition of copper filtration removes lower energy photons
- Selection of pulsed fluoroscopy on the lowest possible settings when possible
- Use dose reduction methods when available, including virtual collimation and last image hold.
- Develop paediatric specific protocols for common condition for all modalities
Paediatric considerations in CT

- Patient size specific protocols are particularly important for CT because of the higher dose levels.
- Protocol optimisation requires an understanding of clinical indications, patient sizes, and the ability of patients to cooperate...
- When planning a CT scan of a child:
  - Have you considered alternative imaging such as ultrasound or MRI?
  - Scan only the indicated area of the body (do not over-range).
Protocol Optimisation for Children: growing number of resources on open web sites

- Image Gently protocols for digital radiography: ‘Back to Basics’
- Fluoroscopy, CT, and interventional procedures for paediatric exposures
Important differences from adult digital optimisation

The need for specific education

- The core team of radiological professionals must have specific education and training in optimisation techniques for imaging infants and children.
- Referring clinicians, parents, carers and children must be given sufficient understanding of the process.
- This might be through use of information leaflets and web aids, to allow them to be involved in the decision-making process.
Important Differences from Adult Digital Optimisation

- Shared decision making applies from the time when imaging is being considered, through performance of the examination, the diagnosis, and decisions about management of the patient.
- Include all stakeholders in the justification, paediatric care and communication
- Whichever possible have trained personnel
- Adapt protocols for unique circumstances
Paediatric Radiology Key Messages

- The core team must have adequate education and training in optimisation of imaging for infants and children.
- Use of patient weight (as a proxy for patient thickness) rather than age is a better way to develop digital radiology protocols.
- Use dose reduction methods when practicable with fluoroscopy.
- Virtual collimation, removal of the grid, pulsed fluoroscopy on the lowest possible setting, additional copper filtration, last image hold.
- Develop paediatric specific protocols for common conditions for all modalities. Pay particular attention to CT.