

Ask EuroSafe Imaging Tips & Tricks

Paediatric Imaging Working Group

Collimation in Plain Radiography

Claudio Granata (IRCCS Istituto Giannina Gaslini, IT)

Joana Santos (ESTeSC-Coimbra Health School, PT)

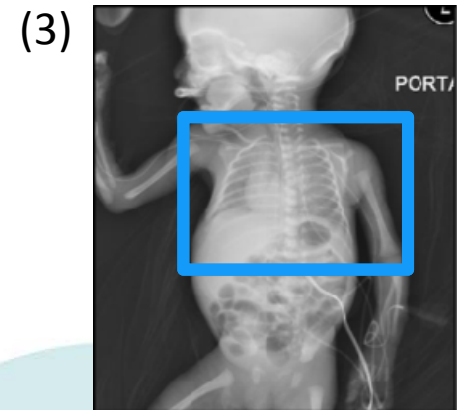
Elina Samara (Valais Hospital, CH)

Introduction

- The risk of exposure to radiation, especially in paediatrics, is a permanent topic on the agenda of global organisations like the ICRP, UNSCEAR, the IAEA and the WHO⁽¹⁾
- Paediatric radiographs are one of the first examinations for pathology diagnosis⁽²⁾

Introduction

- Technology development, although the high potential for dose reduction, in fact may contribute to a dose increase, due to incorrect use
- One example is the incorrect use of the imaging post-processing tool electronic collimation⁽³⁾

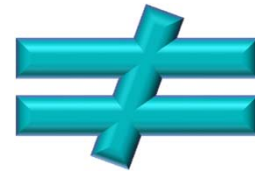


Procedure Optimisation

- Measure patient thickness
- Avoid the grid for body regions with less than 10 to 12cm
- Use of shielding materials
- **Appropriate collimation to the interest area**
- Verify the exposure parameters and the image quality⁽³⁾



Confusion

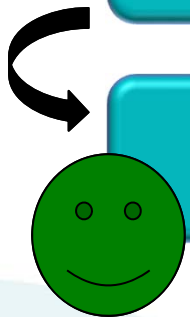


Beam Collimation

Electronic
Collimation

Radiation
protection

Image cropping



- The term “electronic collimation” is often misinterpreted as a radiation protection act, due to its proximity to the term “beam collimation”.

Experimental Tests



**Phantom
CIRS™ ATOM
model 705**

DAP increased by 17% per cm²
increased in beam collimation⁽⁴⁾

17
%



Additional Information

- Correct beam collimation will decrease radiation dose and improve the image quality, especially for digital images⁽⁵⁾
- Correct beam collimation will reduce the dose of the accompanying person
- Attention: A field that is too small may increase the risk of an erroneous diagnosis or require a second exposure for the child

Conclusion

Electronic collimation contributes to children overexposure⁽⁶⁾

Anatomic beam collimation is recommended as the best practice in digital systems⁽⁷⁾

Increase the awareness to use beam collimation instead of electronic in order to decrease patient exposure

References

- www.icrp.org, www.unscear.org, www.iaea.org, www.who.int
- Medina LS, et al Evidence-Based Imaging in Pediatrics: Optimizing Imaging in Pediatrics. Springer. 2010
- www.imagegently.org
- G. Paulo et al. 2016 Analysis of overexposed areas in paediatric plain radiography, ECR 2016
- Zhang M, Liu K, Niu X, Liu X. A method to derive appropriate exposure parameters from target exposure index and patient thickness in pediatric digital radiography. *Pediatr Radiol* 2013;43(5):568–74.
- Bomer J, Wiersma-Deijl L, Holscher HC. Electronic collimation and radiation protection in paediatric digital radiography: revival of the silver lining. *Insights Imaging*. 2013;4(5):723–7.
- Herrmann TL, Fauber TL, Gill J, Hoffman C, Orth DK, Peterson P a, et al. Best practices in digital radiography. *Radiol Technol*. 2012;(1):83–9.
- Goske MJ, Charkot E, Herrmann T, John SD, Mills TT, Morrison G, et al. Image Gently: challenges for radiologic technologists when performing digital radiography in children. *Pediatr Radiol*. 2011;41(5):611-9
- Andriole KP, Ruckdeschel TG, Flynn MJ, Hangiandreou NJ, Jones a K, Krupinski E, et al. ACR-AAPM-SIIM practice guideline for digital radiography. *J Digit Imaging*. 2013 Mar;26(1):26–37.