

Ask EuroSafe Imaging Tips & Tricks

Paediatric Imaging Working Group

Communicating Radiation Risks in Paediatric Imaging

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Introduction

- The risk of developing cancer from low-level radiation such as with diagnostic imaging is based on the linear non-threshold model:
 - A linear relationship exists between dose and risk.
 - There is no threshold value below which risk is zero.
- It is still unknown if this model is correct.
- In absence of certainty, it should be assured that the dose used does not exceed the dose necessary for an image of adequate diagnostic quality.

Age- and sex-averaged additional cancer incidence risk associated with radiological procedures in children compared with baseline cancer risk:

Risk qualification	Probability of cancer incidence in the general population (% LBR)	Probability of cancer incidence in the general population if adding this extra level of risk (% LBR + % LAR)	Proposed risk qualification
Catheterization intervention	42	42.36	Moderate
Catheterization diagnostic	42	42.25	Low ^a
CT angiography head	42	42.16	Low
CT chest	42	42.15	Low
CT abdomen	42	42.12	Low
CT angiography abdomen	42	42.12	Low
CT pelvis	42	42.10	Low
CT head	42	42.06	Low
Barium swallow oesophagus	42	42.05	Low
Barium enema colon	42	42.04	Low
Perfusion lung scan	42	42.04	Low
Fluoroscopy tube placement	42	42.04	Low
Chest PA and lateral	42	42.00	Negligible

Data for the USA population (Johnson et al. – 2014).

Communicating risks

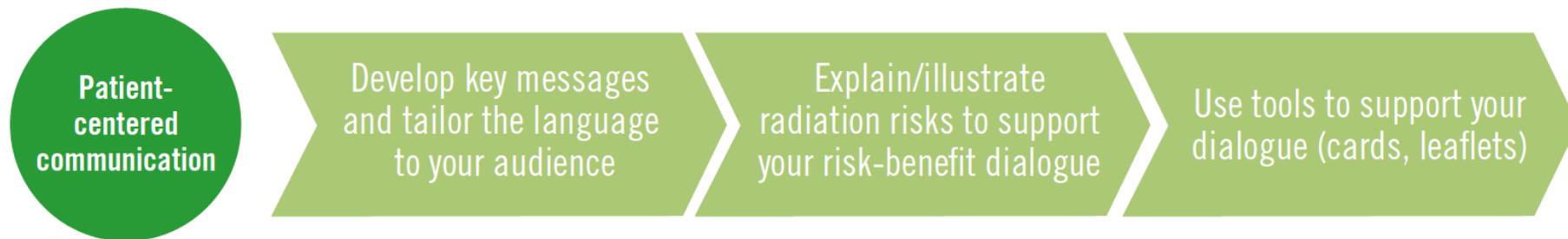
- Communicating risks and benefits of a radiological procedure is an essential component of medical care.
- It should be ensured that patients, parents and caregivers receive the information they need in a way they can understand.
- Each patient and family may be different.

Communicating risks

- Expert and public perceive the risk differently:
 - Expert considers risk to be directly related to the magnitude of the hazard, amount of exposure and vulnerability of the exposed population.
 - People at risk often see the hazard through the lens of emotions such as fear, anger and outrage.
 - A “one-in-a-million” risk is perceived as a low risk by an expert, whereas patients and/or parents may perceive that the “one” could be them or their loved one.

Dialogue in a clinical setting

- Aspects to be considered when establishing a dialogue in a clinical setting:



Adapted from: Communicating radiation risks in paediatric imaging – WHO 2016.

Dialogue in a clinical setting

- Aspects to be considered when establishing a dialogue in a clinical setting – **Remember to:**
 - Talk slowly
 - Use plain language and avoid medical terms
 - Use analogies and metaphors
 - Avoid too many statistics
 - Repeat key messages
 - Encourage questions

Practical examples

- Comparisons can be made with other sources of radiation:
 - Imaging procedures and equivalent period of exposure to natural background radiation
 - Equivalent exposure to cosmic radiation in air travel (50 μ Sv for a transatlantic flight)
- Comparison with equivalent level of risks with daily activities such as crossing a street or driving a car.

Question	Possible responses
“Why are you recommending this radiological examination?”	“We need more information to clarify your child’s diagnosis, and to direct our treatment. This radiological examination can rapidly and accurately provide that information.”
“Are there any risks of this radiological examination?”	“One concern is the possibility of cancer resulting from the radiation from this examination.”
“How great is this risk?”	“The risk from this radiological examination is very small, if a risk at all. We are not certain that there is a risk at very low doses, like those doses in the vast majority of X-ray procedures or CT.”
“How does the risk from this radiological examination compare to the risk of [my child’s presenting condition]?”	<p>“I have considered your current situation carefully, taking into account many factors.” Depending on the circumstances:</p> <ul style="list-style-type: none"> • “I have significant concern that your child has an injury or serious medical condition. The risk of this radiological examination is at most very small by comparison, so this radiological examination is the right test to perform.” • “At the present time, your child appears to have very low risk of a serious medical condition. Although the potential risks from the radiological examination are very small, this is not the best test at this time. If your child’s condition worsens, this radiological examination might become necessary.”
“When will these risks occur?”	“The risk of missing a serious diagnosis will occur now, in the coming minutes/ hours/days. The potential effects from small radiation doses such as this radiological examination would take longer (several years).”

Brodeur & Frush (2014) in : Communicating radiation risks in paediatric imaging – WHO 2016.

Conclusion

- The information provided should be centred on the clinical utility and the impact of the procedure on the outcome.
- The measures to reduce radiation can be included in the discussion with patients/parents.
- The expected outcome of the discussion is that patients/parents trust the caregivers.
- Overestimation of radiation risks might result in not doing a procedure that will positively affect the outcome of the patient.

References and further reading

- Communicating risks in paediatric imaging – WHO 2016 ISBN 978 92 4 151034 9.
- Johnson JN et al (2014) Cumulative radiation exposure and cancer risk estimation in children with heart disease. *Circulation* 130:161-167.
- Broder JS, Frush DP (2014) Content and style of radiation risk communication for pediatric patients. *J Am Coll Radiol* 11:238-242.
- Brody AS et al (2014) Don't let radiation scare trump patient care: 10 ways you can harm your patients by fear of radiation-induced cancer from diagnostic imaging. *Thorax* 69:782-784 .