

# COMMUNICATING RADIATION RISKS IN PAEDIATRIC IMAGING

Information to support healthcare discussions about benefit and risk



## EXECUTIVE SUMMARY



World Health  
Organization



# Executive summary

Advances in technologies using ionizing radiation have led to an ever-increasing number of clinical applications in the diagnosis and treatment of human disease. This has led to the expanded use of these technologies worldwide, which has positively impacted the paediatric population.

- Computed and digital radiography (CR and DR) are replacing conventional film-based radiography, providing images that are instantly available for analysis and electronic distribution, with lower costs and facilitated access.
- Computed tomography (CT) is a valuable tool for assessing paediatric illness and injury, often replacing less accurate or more invasive diagnostic procedures.
- Fluoroscopy-guided interventional procedures can replace surgical options which carry a relatively higher risk of adverse events in children.
- Nuclear medicine allows structural and functional evaluations, especially evident through hybrid techniques (e.g. PET-CT).
- Dental radiology has evolved and cone-beam CT is increasingly used in children by dentists and orthodontists in some regions to obtain 3D views of the face and teeth.

The use of radiation in paediatric imaging saves lives – the clinical value of imaging involving the use of radiation for the diagnosis of paediatric illness and injury is unquestionable. However, inappropriate or unskilled use of such technologies may result in unnecessary exposures that may increase risk and provide no added benefit to paediatric patients. While the radiation dose delivered during diagnostic procedures is low and is not expected to cause acute

injuries, image-guided interventional procedures may deliver doses high enough to cause deterministic effects such as skin injuries. Stochastic risks are of special concern in paediatric imaging since children are more vulnerable than adults to the development of certain cancer types, and have longer lifespans to develop long-term radiation-induced health effects. While individual radiation risks are at most quite small, enhancing radiation safety in paediatric imaging has become a public health issue due to the increasingly large paediatric population exposed, as well as the increased public awareness and often alarm on the part of the public.

The benefits of imaging children must be weighed against the potential risks of the radiation exposure. The ultimate purpose is that the benefit will outweigh harm. This demands policies and actions that recognize and maximize the multiple health benefits that can be obtained, which at the same time minimize potential health risks. This can be achieved by implementing the two principles of radiation protection in medicine: justification of the procedures and optimization of protection, summarized as “to do the right procedure” and “to do the procedure right”. Existing imaging referral guidelines can be used to support justification and enhance appropriateness of referral. These decision support tools can inform referrers and radiologists, together with patients/caregivers, for the choice of the appropriate examination. In radiation protection, optimization signifies keeping doses “as low as reasonably achievable” (ALARA). For medical imaging, ALARA means delivering the lowest possible dose necessary to acquire adequate diagnostic data images. Multiple opportunities exist for radiation dose reduction without any significant loss of diagnostic information.

Health-care providers requesting and/or performing radiological imaging procedures in children have a shared responsibility to communicate radiation risks accurately and effectively to patients, parents and other caregivers. They should be able to conduct risk–benefit discussions to inform the decision-making process as well – radiologists, radiographers, medical physicists and other mem-

bers of the imaging team should be able to conduct risk–benefit discussions with their colleagues, in particular paediatricians, family physicians, emergency medicine physicians and other referrers. Awareness among health professionals about radiation doses and associated risks in medical imaging can be low, however.

Effective and balanced communication of radiation risks requires sufficient background, education and resources to support the risk–benefit dialogue, particularly in paediatric patients. For example, it is important to communicate that risks can be controlled and benefits maximized by selecting an appropriate procedure, and using methods to reduce patient exposure without reducing clinical effectiveness. While the fundamentals of risk communication and risk–benefit dialogue are common to all health-care settings, the implementation of an effective communication strategy in paediatric imaging often requires unique considerations.

This document discusses different approaches to establish this dialogue in clinical settings including communication with the paediatric patient. It provides practical tips to support the risk–benefit discussion, including examples of frequently asked questions and answers, which may also be used to develop information materials for patients and their families. The document also discusses ethical issues related to the communication of radiation risks in paediatric imaging and proposes different scenarios and stakeholders involved when creating a dialogue in the medical community. Also discussed are concepts and principles of radiation protection, how they are applied to paediatric imaging and the key factors needed to establish and maintain a radiation safety culture in health care to improve practice – a pillar of radiation protection in medicine.

Those discussions are prefaced by a chapter that describes the types of radiation and sources of medical exposure of children, and provides an overview of the current trends in the utilization of ionizing radiation in paediatric imaging. It presents estimates of radiation doses for paediatric procedures and provides an overview of known and potential risks associated with radiation exposure during childhood.

Good medical practice encompasses effective communication about benefits and risks of health interventions. In this context, radiation risk communication is an essential component of good practice in medical imaging and has a key role to inform the appropriate risk–benefit dialogue between health professionals as well as with children, their families or caregivers.



# COMMUNICATING RADIATION RISKS IN PAEDIATRIC IMAGING

The use of ionizing radiation in paediatric imaging saves lives and in many cases prevents the need for more invasive procedures.

While every day applications of X-rays for medical imaging help millions of patients worldwide, inappropriate use may result in unnecessary and preventable radiation risks, particularly in children. A balanced approach is needed that recognizes the multiple health benefits, while addressing and minimizing health risks. Patients and families should have access to risk-benefit discussions about paediatric imaging when, where, and in the way they need to best understand the information and to be able to use it for making informed choices. Accurate and effective radiation risk communication is also necessary between health care providers who request or perform radiological medical procedures in children. By enabling informed decision-making, effective radiation risk communication contributes to ensure the greatest possible benefit of paediatric imaging, at the lowest possible risk. This document is intended to serve as a tool for health care providers to communicate known or potential radiation risks associated with paediatric imaging procedures, to support risk-benefit dialogue during the process of paediatric health care delivery.



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