Canada Safe Imaging: Promoting Radiation Safety in Healthcare Institutions

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With pressing matters such as the growing penetration of Artificial Intelligence in our practices and the COVID-19 pandemic, which had such an impact on our lives, radiation safety may not be perceived as a high priority. But even as technology is improving and the individual doses delivered to patients are decreasing, the overall population’s collective dose in Canada keeps increasing. Therefore, it remains our role as radiologists to ensure the appropriate utilization of ionizing radiations in our departments and clinics continues to be addressed.

Background
The guiding principle that we follow for radiation exposure is the Linear No Threshold Theory (LNT), which states that the risk of developing a radiation-induced cancer increases linearly with the dose. This model has been validated on survivors of the Hiroshima atomic bomb, but for a one-time acute radiation superior to 100 milli Sievert (mSv), which is much higher than the doses we normally deliver in diagnostic imaging, with the exception of prolonged interventional procedures or multiple repeated CT’s in trauma. Acute or fractionated radiation doses below 100 mSv versus stimulative doses over a period of time are considered low dose exposure and there is much uncertainty with different risks models suggesting going from increased risks to health benefits.

In a recent statement, the Health Physics Society estimated that “because of statistical uncertainties in biological response at or near background levels, the LNT hypothesis cannot provide reliable projection of future cancer incidence from low-level radiation exposures”.

But, irrespective of the LNT debate, we have to follow best practices and keep radiation exposures and doses “As Low As Reasonably Achievable” according to the ALARA principle and the International Commission on Radiological Protection (ICRP), and the International Atomic Energy Agency (IAEA) has endorsed the LNT model for regulatory purposes.¹

Bonn Call-for-Action
In December 2012, the IAEA and the World Health Organization (WHO) cosponsored the International Conference on Radiation Protection in Medicine: Setting the Scene for the Next Decade which led to the publication of a set of priorities for stakeholders known as the Bonn Call-for-Action.

Ten main actions, and related sub-actions, were identified as essential to strengthen radiation safety. Following this conference, stakeholders from all over the world used these actions as point of reference for the expansion of their national and regional action plans.²

World-Wide Initiatives
Following the development of the Bonn Call for Action, a number of radiation safety campaigns in the world, led primarily by radiology societies, including Image Wisely and Image Gently in the United States, EuroSafe Imaging in Europe, AfroSafe Imaging (English and French), Latin Safe, Japan Safe, Arab Safe and of course Canada Safe Imaging were formed. These continental, regional and national radiation protection, quality and safety campaigns are all grouped under the umbrella of the International Society of Radiology which acts as a convener and facilitator through its Quality and Safety Alliance (ISRQSA).

Canada Safe Imaging
Following the lead of the worldwide initiatives, Canada Safe Imaging (CSI) was formed in 2015 to address the need for a national strategy as it relates to radiation safety for medical imaging in Canada, based on the recommendations of the Bonn Call for Action.

CSI is considered unique on the international stage for adopting a collaborative multi-disciplinary approach, involving radiologists, radiation technologists, medical physicists,

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researchers and other healthcare providers using or prescribing the use of radiation. The founding organizations are the Canadian Association of Radiologists (CAR), the Canadian Association of Medical Radiation Technologists (CAMRT) and the Canadian Organization of Medical Physicists (COMP), in collaboration with McMaster University, University of Waterloo and University of Manitoba.

CSI’s vision is 1) to strengthen medical radiation protection in patients and health care workers, and foster a culture of radiation safety in Canada; 2) to develop an action plan relating to radiation safety in medical imaging; 3) to support evidence-based best practice guidelines; 4) to facilitate a strategic approach to conduct scientific inquiry on the effects of radiation on human health.

Over the past few years, CSI’s mandate has been to develop a number of surveys and environmental scans to understand the Canadian and provincial landscape:

– Environmental scan of professional organizations involved with medical radiation;
– Survey on awareness and implementation of the Bonn Call-for-Action priorities in Canada, with the Canadian Agency for Drugs and Technology in Health (CADTH);3
– An evaluation of global radiation safety campaigns using a SWOT approach.
– A review of patient/physician awareness and dialogue.

In addition, CSI has partnered with the Radiation Safety Institute of Canada (RSIC) to provide administrative management and support, and launch the CSI “Questions About Radiation”, a toll-free number where patients and healthcare professionals can get answers to their specific concerns from medical physicists with a similar initiative in French in collaboration with the Centre d’Expertise Clinique en Radioprotection (CECR) in Sherbrooke.

Canada Safe Imaging Stars

To continue with the CSI vision, the next major initiative will be to promote radiation safety in our institutions, by developing a system based on the EuroSafe Imaging Stars, to recognize Canadian imaging facilities that apply and promote best practices in radiation protection following the recommendations of the Bonn Call-for-Action.4

With the CSI Stars, Canadian facilities will obtain stars on a scale from 1 to 5 based on their level of compliance with recommendations adapted from the Bonn Call for Action. Applicants will have to demonstrate that they fulfill the required number of criteria for each level, which will include: 1) Optimization; 2) Justification; 3) Quality and Safety; 4) Education; 5) Research; 6) Regulatory compliance.

Conclusion

Even if Canada has comprehensive federal and provincial regulations to address protection from ionizing radiations, the healthcare system can be fragmented and there is a need for a national strategy, which is the role of Canada Safe Imaging. Promoting the Star System in our institutions is a way to achieve this goal and create an additional level of trust between these institutions and their patient population.

Authors’ Note

None from the authors David Koff, Jane Castelli, and Sandor Demeter.

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References