



EDITORIAL COMMENT

Radiation exposure. A serious public health care problem

Exposição à radiação: um grave problema dos cuidados de saúde pública

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Health care workers who perform fluoroscopy for heart procedures, including doctors, nurses, and technicians, are among the most exposed to ionizing radiation (IR). Of all X-ray procedures, fluoroscopy-guided heart procedures lead to the greatest radiation exposure.^{1–4} According to a recent study,⁵ interventional cardiologists and electrophysiologists have a two to three times higher annual exposure than that of radiologists, as they are closer to the X-ray source and experience radiation exposure with the patient, whereas diagnostic radiologists are generally shielded from it.

Being exposed to IR, can cause serious health problems. It can damage the DNA of cells, leading to mutations and genetic defects, and in the long term, it is reasonable to anticipate problems such as skin and blood damage, cataract, infertility, miscarriage, birth defects and cancer. The probability of adverse health effects from radiation is proportional to the dose received, but no level of radiation exposure is completely safe.

The World Health Organization⁴ estimates that about 3.6 million health care workers are exposed to IR worldwide in a daily routine. However, the actual number may be higher, as many countries do not have adequate systems for monitoring and reporting occupational exposure. Moreover, some health care workers may not be aware of the potential hazards or may not follow the proper safety measures.

X-ray exposure is a significant occupational hazard for healthcare professionals, who are exposed to IR daily and it is a serious public health concern that requires urgent attention and action.

The WHO recommends that all countries adopt and implement the International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources, which provide guidelines for ensuring the safety of workers, patients, and the public. The WHO also urges health care workers to follow the ALARA principle (As Low As Reasonably Achievable), which means minimizing their exposure to ionizing radiation as much as possible, without compromising the quality of diagnosis or treatment.^{1–3}

Therefore, it is imperative that health care professionals involved in these procedures be aware of the radiation exposure and be provided with the tools necessary to protect and monitor themselves. Preventive measures include using radiation only when the benefits outweigh the risks, restricting access to areas where radiation is used, training workers in safe use of equipment and sources of radiation, organizing regular inspection of medical radiation devices, determining the level of exposure of different occupational groups, monitoring exposure and organizing medical surveillance of exposed workers, encouraging female workers to report if they become pregnant and reallocating them to tasks without radiation exposure, developing standard operating procedures for action in case of accidental exposure, reporting all accidental and planned exposures above the limit, reporting cases of occupational injuries and diseases due to radiation exposure,

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and providing workers with adequate personal protective equipment.¹⁻³

When standard radiation protection tools are used in the cat lab, doses to the operator and staff do not typically approach thresholds of tissue reactions.¹⁻³

Costa et al.⁶ reported a survey among associates of the Portuguese Association of Interventional Cardiology to evaluate the awareness of interventional cardiology health professionals to the deleterious effects and protection practices for ionizing radiation in interventional Cath Labs at a national level.

The results rather astonishing. They reported that 66% of responders were unaware of their own radiation exposure category and only 60% reported the systematic use of dosimeter, monthly read in only 65%, albeit mandatory by any safety standards for protection against IR. Eyewear protection by the first operator (closer to the radiation source), was only being used “frequently” by 49.2%, despite the lens of the eye being one of the most radiosensitive tissues in the body, and there is still considerable uncertainty surrounding the relationship between dose and radiation cataract development. Two-thirds were familiar with the legally established limit radiation dose for workers. Not surprisingly, most of the survey responders had non-certified training in IR procedures and only 32.0% had attended their yearly occupational health consultation. The good news is that most survey responders were concerned about operator (96%) and patient (90%) radiation exposure during procedures.

I admit, as an interventional cardiologist myself, that some of this poor behavior on critical safety issues may be a lack of a right perspective on how dangerous IR is, despite being less, invisible, odorless, tasteless, tactless. However, it may kill if neglected.

Let me share a bit(ter) perspective on IR.

One recent study regarding Italian health care workers exposed to IR by Andreassi et al.⁵ reported that compared with health care workers who did not work in Cath Labs, those who did had 7.1 times greater risk for back, neck or knee problems, 6.3 times greater risk for cataracts and 2.8 times greater risk for skin lesions. Individuals who had worked in a Cath Lab for at least 16 years were found to have the highest risk for such conditions, and these workers were also found to be at a three times higher risk for developing cancer than those who worked in other health care settings.

Busy interventional cardiologists and electrophysiologists are exposed to about 5 millisieverts (mSv) of radiation each year. Over a 30-year career, these health care workers might be exposed to around 50–200 mSv – the equivalent of 2500–10 000 chest X-rays, almost one chest X-rays for each workday for 30 years.⁷⁻⁹

If persistent, such behavior, in the future, may preclude a serious public health care problem among much needed health care professionals who have been exposed to ionizing radiations.

Before drawing conclusions and deciding on actions, I must declare that this study has flaws that were properly stated by the authors. It was only sent to registered APIC members, which encompasses a very restricted sample of healthcare workers working in an environment exposed to IR. Electrophysiology/pacing and pediatric cardiology were not considered. As such, the survey findings may not be generalizable to all national Cath Labs or non-APIC members. Nevertheless, it is an important alert on a very important safety issue that deserves attention and would strongly benefit from a newer, broader national survey involving all healthcare workers exposed to IR. It is also important to note that the other studies mentioned in this editorial, also declared similar limitations.

Conflicts of interest

The author has no conflicts of interest to declare.

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