Invited Editorial

THE TIME TO MEASURE RADIATION SAFETY CULTURE IS HERE

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WHAT IS RADIATION SAFETY CULTURE?

Radiographers may take for granted that a major daily role is the radiation safety of themselves, other staff and patients. The assumption is often that when patient doses are assessed, diagnostic reference levels established or radiation dose optimised, a safety culture exists. However, this is not true. The aforementioned are safety actions. Only when everyone in an organisation participates, by taking responsibility for radiation safety, and there is observable implementation of safety culture traits, only then can a claim be made that a radiation safety culture is in place.[1] The International Atomic Energy Agency (IAEA) defines radiation safety culture as "the assembly of characteristics and attitudes in the organisation, its managers and workers", which assures that safety matters are addressed with the urgency they warrant.[2] Professionals must therefore create this culture which entails not only practices and knowledge but also beliefs (or attitudes) regarding radiation protection.[3]

WHY IS RADIATION SAFETY CULTURE IN HEALTH CARE IMPORTANT?

With a positive radiation safety culture in place, the radiation safety of staff and patients will be improved due to the impact on lower dose[3] and the monitoring of occupational dose. Medical use of radiation accounts for 98% of the population dose contribution from all human-made sources and represents 20% of the total population exposure. Annually worldwide, more than 4200 million diagnostic radiology examinations are performed, 40 million nuclear medicine procedures are carried out, and 8.5 million radiotherapy treatments are given.[4]

Many incidents are still reported where detrimental patient effects occurred due to unintended exposure in interventional radiology, nuclear medicine, interventional cardiology, diagnostic imaging and radiation therapy. It has even been suggested that in some parts of the world, medical errors are a significant cause of patient death and injury. The need exists to prevent these detrimental effects that arise from medical errors or unintended exposure. The incorporation of radiation safety culture into healthcare settings can help prevent injuries and deaths, and help reduce unnecessary or unintended radiation dose to patients and staff overall.[2]

STRATEGIES RADIOGRAPHERS CAN USE AS A STARTING POINT

As a starting point, radiographers can take personal responsibility for the safe operation of their facility, the safety of themselves, other workers and the public. A questioning attitude is another strategy listed as one of the 10 safety culture traits based on the work of the United States Nuclear Regulatory Commission, adapted by the IAEA specifically for the field of healthcare.[2] One practical way to question discrepancies and foster a radiation safety reporting culture is to implement an event reporting system that records instances where the observed dose exceeds expected levels. Events like this can be used as case studies and opportunities to learn, provided that no blame is assigned to any participants in the procedure.[5] Education is essential to know the risks of ionising radiation, the core principles and regulations of radiation protection. Insufficient knowledge is a barrier to implement culture.[3] The system developed by the International Commission on Radiological Protection (ICRP) forms the basis of protection regulations all over the world.[6] The system of radiological protection (the 'System') developed by the ICRP over almost 100 years shaped radiological protection strategies: justification, optimisation, and application of dose limits.[7] SAHPRA's Directorate Radiation Control bases its radiation safety regulations, dose limits, and protection standards on the recommendations of the ICRP.[8] Continuous education processes are therefore imperative to maintain and improve a radiation safety culture.[9] Organisations with a sound radiation safety culture provide opportunities to learn about ways to ensure safety is implemented. Operating experience is highly valued, and the capacity to learn from experience is well developed. Training, self-assessments, and benchmarking are used to stimulate

learning and improve performance. Safety is kept under constant scrutiny through a variety of monitoring techniques, some of which provide an independent "fresh look".[2]

Radiation safety culture is shaped by striking a balance between zero tolerance for poor behaviour and the recognition and celebration of positive achievements such as positive inspections, no accidents for a time period, and dose decreases across all employees.[9] Efforts to change culture must recognise that culture rarely undergoes dramatic shifts. Rather, culture tends to evolve over time.[5] Since it is not static, it demands continuous evaluation and systematic improvement, using both quantitative and qualitative tools to measure how effectively it is implemented and whether it is truly achieving its intended goals.[3]

The elephant in the room, invisible radiation, has been tamed for centuries. The time is here to face another giant by not shying away from measuring our radiation safety culture. If you can measure it, you can either maintain or improve it.

REFERENCES

1. World Health Organization. Enhancing radiation safety culture in health care: guidance for health care providers. Geneva: World Health Organization; 2024. [cited 2026 May 12]. Available from: https://www.who.int/news-room/fact-sheets/detail/ionizing-radiation-and-health-effects
2. International Atomic Energy Agency. Safety culture trait talks. [cited 2026 May 12]. Available from: https://www.iaea.org/sites/default/files/21/01/radiation-safety-culture-trait-talks.pdf
3. Ploussi A, Efstathopoulos EP. Importance of establishing radiation protection culture in radiology department. World J Radiol. 2016; 8(2):142–47. doi:10.4329/wjr.v8.i2.142
4. World Health Organization. Ionizing radiation and health effects [Internet]. Geneva: World Health Organization; 2023 Jul 27. [cited 2026 May 12]. Available from: https://www.who.int/news-room/fact-sheets/detail/ionizing-radiation-and-health-effects
5. Patankar M. Safety culture. [cited 2026 May 12]. Available from: https://www.imagewisely.org/Imaging-Modalities/General-Radiation-Safety/Safety-Culture
6. International Commission on Radiological Protection. Radiological protection in medicine. ICRP Publication 105. Ann ICRP. 2007; 37(6):1–71. [cited 2026 May 12]. Available from: https://www.icrp.org/publication.asp?id=ICRP%20Publication%20105
7. Rühm W, Applegate K, Ban N, Bochud F, Bouffler S, Kun-Woo C, Clement C, Gallego E, German O, Hirth G, Hosono M, Kai M, Laurier D, Liu S, Martinez NE, Romanov S, Schneider T, Sutton DG, Wojcik A. Essentials of the system of radiological protection. J Radiol Prot. 2025; 45(3):033002. doi:10.1088/1361-6498/ae02a2
8. South African Health Products Regulatory Authority. Guideline regarding protective clothing. 2022. [cited 2026 May 12]. Available from: https://www.sahpra.org.za/wp-content/uploads/2022/09/SAHPGL-RDN-XR-22_v1-Guideline-for-Protective-Clothing.pdf
9. International Radiation Protection Association. Guiding principles for establishing a radiation protection culture. 2014. [cited 2026 May 12]. Available from: https://www.irpa.net/members/irpa-guiding%20principles%20on%20rp%20culture%20-2014%20.pdf