

JOINT POSITION STATEMENT AND CALL FOR ACTION FOR STRENGTHENING RADIATION PROTECTION OF PATIENTS UNDERGOING RECURRENT RADIOLOGICAL IMAGING PROCEDURES

This Position Statement was developed by the International Atomic Energy Agency (IAEA) jointly with the European Federation of Organizations for Medical Physics (EFOMP), European Society of Radiology (ESR), Global Diagnostic Imaging, Healthcare IT and Radiation Therapy Trade Association (DITTA), Heads of European Radiological Competent Authorities (HERCA), Image Gently Alliance, International Organization for Medical Physics (IOMP), International Society of Radiology (ISR), International Society of Radiographers and Radiological Technologists (ISRRT), in collaboration with the World Health Organization (WHO).

INTRODUCTION

Medical imaging is immensely beneficial in the diagnosis and management of many health conditions. Benefits of a given medical imaging procedure far outweigh inherent radiation risks when the procedure is both clinically indicated and correctly performed, using the minimum necessary radiation exposure to achieve the diagnostic or interventional objective. The [Bonn Call for Action, jointly issued by the IAEA and WHO](#), emphasized the need for enhanced implementation in clinical practice of the principles of *justification and optimization*, the right procedure performed right, spotlighting radiation protection and safety for each patient exposure.

While this effort continues, a need for additional consideration of radiation protection has arisen recently in a particular context; namely, the number of patients afflicted with clinical conditions for the appropriate management of which they may be subject to recurrent imaging procedures including modalities that use ionizing radiation.

BACKGROUND

In recent years, automatic exposure monitoring systems have become available in many hospitals, facilitating exposure tracking of individual patients in addition to being effective tools for optimization. The data provided through these systems have indicated that a sizable number of patients receive concerning high cumulative doses from recurrent imaging. The need for a deep look into the issue motivated the IAEA to convene a [Technical meeting on Radiation Exposure of Patients from Recurrent Radiological Imaging Procedures](#) (March 2019) with representatives of IAEA Member States, international organizations and professional bodies from a spectrum of specialties – radiological medical practitioners, medical physicists, medical radiation technologists/radiographers, radiation biologists, radiation epidemiologists, manufacturers, radiation protection specialists, radiation safety campaign representatives, and patient representatives. The meeting attendees discussed data available to date on recurrent imaging, deliberated interpretation of those data and proposed actions for enhancing radiation protection of patients. A second [Technical Meeting on the Justification and Optimization of Protection of Patients Requiring Multiple Imaging Procedures](#) was organized by the IAEA online 19-23 October 2020, to further discuss the way forward. Subsequent multidisciplinary interactions led to refinement of the following statement, aiming to integrate different perspectives.

PURPOSE

The purpose of this Position Statement is to guide processes such that patients with medical conditions which prompt more frequent imaging procedures receive needed medical care, without undue exposure to ionizing radiation. The appropriateness and performance of examinations in care pathways for recurrent imaging utilization require additional considerations. Authorities, manufacturers and health professionals need to develop and implement suitable strategies and solutions focused upon improved radiation protection.

IT IS RECOGNIZED THAT ADDITIONAL ACTIONS ARE NEEDED TO:

☑ Assess the level of recurrent radiological imaging and associated radiation doses

First, greater research is needed to fully understand the distribution, frequency, and magnitude of recurrent imaging which utilizes ionizing radiation in various parts of the world.

☑ Identify clinical conditions where recurrent radiological imaging is likely to lead to relatively high cumulative doses in patients

Models for predicting the patient populations most likely to undergo the most serial imaging and to accumulate relatively high radiation doses need to be improved - made comprehensive, easy-to-use, and widely available.

☑ Develop strategies for radiological imaging in clinical conditions that require recurrent imaging

Professional medical and allied societies need to further expand, as warranted, imaging strategies for patients with long-term illnesses and clinical conditions that require recurrent imaging in acute or chronic settings, in terms of the type of imaging needed and its frequency. This would also take into account new technologies, applications, and scientific evidence on clinical effectiveness weighed against risks and, where appropriate, preference could be given to non-ionizing modalities such as ultrasound or MRI. In these actions, priority needs to be given to patients with higher life expectancy for whom stochastic risk can't be neglected.

☑ Ensure justification and appropriateness of the entire series of radiological procedures for a patient

When a series of imaging procedures can be reasonably foreseen for a patient, the most appropriate procedures for the patient and the clinical condition need to be chosen, weighing their frequency and cumulative benefits and risks. Insofar as possible and reasonable, clinical and radiation dose information from the patient's previous imaging procedures needs to be made available to help strengthen the appropriate decision-making process.

☑ Monitor radiation exposure history of patients

Automatic radiation exposure monitoring systems, designed to meet local, regional or national needs and standards, have to be disseminated as well as integrated with other healthcare IT systems including electronic health records. In addition to their contribution for optimization and other aspects of practice improvement through monitoring of modality-specific measurable dose metrics and relevant exposure data, monitoring systems need to provide for effective tracking over time of radiation exposure history of individual patients that may include one or more of the following more generic metrics: type of radiological procedure, estimated effective dose or patient-specific organ dose estimates. Such tracking options will need further consideration with involvement of applicable clinical specialty representation, to assure that radiation history is necessary, relevant, available, transferrable between facilities, and practical for both immediate and longer-term imaging care decisions for patients. Researchers and the industry need to refine and standardize appropriate approaches for dose estimates while accounting for the uncertainties of these estimates.

☑ Further reduce doses through technological developments

The industry plays an essential role in dose reduction. The need for further development and implementation of lower-dose equipment as well as non-ionizing alternative technologies is highly emphasized. Mechanisms are needed to increase awareness and adoption of dose-efficient technologies in all countries.

☑ Customize imaging protocols to address each patient clinical problem

A greater number of optimized imaging protocols which consider the patient size, age and the specific clinical condition need to be developed, made available and utilized. This includes baseline imaging protocols that suffice for clinical needs while minimizing radiation dose. Some situations requiring recurrent imaging might entail lesser radiation exposure than other exams of the same anatomical region but in other clinical contexts. Optimization requires involvement of a team of radiological medical practitioners, medical radiation technologists/radiographers and clinically qualified medical physicists.

☑ Strengthen radiation protection education and training of health professionals

Education and training of the referring medical practitioners, radiological medical practitioners, medical physicists, and medical radiation technologists/radiographers need to be enhanced to allow for effective management of individual justification and optimization, in line with the concept of personalized medicine. This requires development of further knowledge on risks associated with protracted or repeated exposures, compared with the anticipated benefit for a given patient.

☑ Strengthen communication

This statement is intended to prompt greater dialogue.

Focusing on radiation risk has the potential to instill fear among patients and referrers and might compromise patient care. When communicating any dose information, in particular to stakeholders outside the radiology community, it is paramount to contextualize the benefit gained from the imaging exam relevant to the dose. Improved information and communication tools are needed to ensure that physicians or patients do not decline a justified radiological procedure, especially in conditions that require recurrent imaging, solely because of a perceived or potential radiation risk associated with the procedures.

The development process of this initiative needs to actively engage stakeholders at the local level, based upon increasing awareness about and shared management of patient populations most likely to undergo repeated imaging procedures.