

Awareness of ionizing radiation and its effects among clinicians



Ionizing radiation is widely used to diagnose many diseases and relevant hazards are known to be an important limitation of its application. It is believed that the awareness of ionizing radiation dose value is one of the main stages in patient radiation protection. The widespread use of radiation for medical diagnosis ensures that diagnostic medical radiology represents by far the most significant man-made source of exposure to ionizing radiation for population in the western world and also the developing countries.^[1] The US National Council on Radiation Protection and Measurement had reported that medical X-rays and nuclear medicine account for 15% of all radiation exposures. In the UK, estimated 100-250 deaths occur each year from cancers directly related to medical exposure to radiation.^[2] In view of the significant benefits to patients from medical radiation exposures, the principal concern of radiological protection is the reduction of unnecessary exposures. These unnecessary exposures are examinations that are either unlikely to be helpful to the patient management or involve doses that are not as low as reasonably practicable to meet specified clinical objectives. According to Ujah *et al.*^[3] it has been estimated that over 70% of the world population is exposed to medical X-rays annually, and about 95% of all man-made radiation is from diagnostic X-rays. It is instructive to note that the objective of any diagnostic radiological procedure or examination is to produce images of a patient of sufficient quality to provide adequate diagnostic information for clinical use.^[4] However, the somatic and genetic health risks associated with exposures to X-rays dictate that these examinations should be achieved with the minimum amount of radiation levels. Clinicians are aware of radiation hazards but do not have appropriate awareness about radiation dose delivered by different imaging modalities.^[5] Studies have shown that physicians have poor knowledge of radiation doses of radiological examinations that are requested and performed in clinical practice. The correct estimations of patients dose by clinicians in investigations of plain radiography, computed tomography (CT) scan, contrast media radiography and mammography is not appropriate.^[6] Most doctors underestimate the dose delivered in above-mentioned radiological examinations. Implementation of radiation protection courses and education of practical users including radiation safety during medical education programs could be an effective method to reduce the patient dose in medical exposures. Appreciable level of awareness of radiation

hazards among clinicians helps in the appropriate use of referral guidelines and dosage reduction for patients. The application of radiation can aid the patient by providing doctors with medical diagnosis, but the exposure must be reasonably low enough to keep the statistical probability of cancers or sarcomas (stochastic effects) below an acceptable level and to eliminate deterministic effect (i.e., skin cataracts).^[7] To understand the perception of radiation awareness among clinicians, qualitative studies would help in better understanding the barriers and how to improve the radiation awareness among the practitioners. A dose of radiation given should be enough to answer the clinical question but as low as reasonably achievable (ALARA) to minimize the risk to the patient. Modern imaging equipment allows adjustment for patient size and anatomy to allow closer adherence to the ALARA principle (e.g., using adjusted CT settings in children compared to adults, the amount of radiation is reduced by a factor 6–7).^[8] This is important since the lifetime cancer risk for children exposed to radiation is substantially higher than for adults. Studies have reported the inadequacy of knowledge about ionizing radiation and its carcinogenic potential among referring physicians in the absence of referral guidelines. Surprisingly, a minimum of 20%–40% of CT scans could be avoided if clinical decision guidelines are followed.^[9] In pediatrics, a brief information handout can improve parental understanding of the risk related to exposure to ionizing radiation, without causing to refuse studies recommended by the referring physician. Patients are likely to be satisfied more by the availability of quality control and dose management mechanisms being in place rather than by information on radiation doses that he/she may not understand.^[10] There is also a role for continued collaboration between radiologists and emergency physicians to create (local) protocols. Weighting of radiation dose had a better analysis than the detailed radiation knowledge. It is suggested that continued medical education is to be imparted to the consultants. The requisition form should provide radiation doses and associated risks which will allow the requesting consultant to consider the information and discuss the risks with the patient. Implementation of radiation protection courses and imparting education

of practical issues including radiation safety should be made mandatory at undergraduate and postgraduate levels.

Reddy Ravikanth

Department of Radiology, St. John's Medical College,
Bengaluru, Karnataka, India
E-mail: ravikanthreddy06@gmail.com

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