Journal of Medical Diagnostic Methods
ISSN: 2168-9784

Stein, J Med Diagn Meth 2012, 2:1
DOI: 10.4172/2168-9784.1000e105

Editorial Open Access

Are Radiation Safety Principles Being Applied in Day-to-Day Practice by All of Those Involved in Clinical Decision Making?

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Computed Tomography (CT) is a diagnostic method that delivers a small, although significant, amount of ionizing radiation. The number of CT studies performed each year in the pediatric population has been increasing. This reflects the utility of CT for making accurate diagnoses in certain pediatric conditions, but also a significant number of unnecessary studies in the clinical setting [1]. The problem is that pediatric population is more sensitive to radiation. A recently published retrospective cohort study showed that in a pediatric population, CT was associated with a small increase in the risk of developing leukemia and brain tumors [2]. The association between radiation and the development of tumors was shown by studies of the Japanese population exposed to the atomic bombs during the Second World War [3]. However, there are no previous studies proving an association of cancer and the low doses of radiation administered in CT. This recent study addresses any doubts about the potential harms of CT radiation, and relinquishes suggestions that this is not a relevant health concern or that CT radiation could even be beneficial.

There are three principles for radiation protection: justification, optimization and dose limitation. ALARA means "As Low as Reasonably Achievable" and is a principle of optimization in radiation safety for diagnostic methods using ionizing radiation. This principle was created based on the linear hypothesis, which states that any level of radiation dose exposure could increase the risk of genetic mutations and cancer [4]. Radiation safety campaigns promote mainly ALARA and state that all those involved in such diagnostic methods should follow this principle. This includes radiation safety staff, radiation safety committees, research faculty and all radiation workers [4,5]. However, from a patient perspective, justification for radiation exposure also needs to be understood and promoted. However justification for an imaging study is usually in the hands of referring physicians.

In recent years, the Society of Paediatric Radiology (SPR) has been attempting to educate both the medical community and patients about the radiation issues involved in CT. Image Gently is a pediatric radiation safety campaign supported by the SPR that has successfully advocated radiation safety principles, especially ALARA [5]. However, there is evidence to suggest these type of campaigns have been more successful at targeting radiologists and technologists than referring physicians. In a recent publication investigating the awareness of the effects of diagnostic imaging radiation amongst pediatricians it was shown how little they knew about this subject [6]. The problem is that in the majority of situations, it is pediatric physicians who decide which radiological modality will be used for diagnosis in day-to-day pediatric patient care. It therefore follows that requesting physicians should be better informed about the possible consequences of radiation. For example, clinicians frequently request CT as primary investigation for appendicitis. Although CT has better sensitivity and specificity than ultrasound for diagnosis of appendicitis, ultrasound is an inexpensive non ionizing radiation method that can diagnose appendicitis with high accuracy [7] and in the majority of the cases this should be the imaging modality of choice for initial investigation in the pediatric population. CT can then be used for cases in which ultrasound was not able to establish the diagnosis.

So how can we improve the education of physicians with regard to radiation exposure from diagnostic imaging in future? Medical students currently often learn about the use of diagnostic imaging primarily from clinicians rather than radiologists. The radiology curriculum in many institutions in the United States is not prioritized and includes no formal teaching on limiting radiation exposure to patients from diagnostic imaging [8]. Even when radiologists are interested in teaching medical students, there is no timetabling for academic activities because of demands to perform increasing numbers of clinical imaging studies. The result is a poor understanding of radiation safety among medical students, residents and clinicians [8].

It is time to effectively translate the knowledge of radiation safety to the general medical community, by teaching and guiding general doctors and specialists the best way to perform disease investigation and request studies respecting the radiation safety principles. Campaigns, such as Image Gently and Image Wisely, should continue their excellent work in promoting radiation safety among radiologists, technologists and the general community. The promotion of such campaigns in wider forums such as medical conferences, which cater for clinical specialists and not just radiologists, would be one potential approach. However, radiologists also should be more engaged in medical school education, and become involved in editions of important clinical textbooks by writing specific chapters on radiological methods and radiation safety. Hopefully, extending and intensifying the teaching of radiation safety to medical students will result in reduced radiation exposition of patients in the future, if not; we may experience a public outcry following the results of excessive radiation in children.

References

1. Brenner D, Elliston C, Hall E, Berdon W (2001) Estimated risks of radiation-induced fatal cancer from pediatric CT. AJR Am J Roentgenol 176: 289-296.
2. Pearce MS, Salotti JA, Little MP, McHugh K, Lee C, et al. (2012) Radiation Exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. Lancet 380: 499-505.
3. Pierce DA, Shimizu Y, Preston DL, Vaeth M, Mabuchi K (2012) Studies of the mortality of atomic bomb survivors. Report 12, part 1. Cancer: 1950-1990. 1996. Radiat Res 178: AV61-AV87.
4. UW Environmental Health and Safety (1999) ALARA Program, Radiation Safety Manual. 1-9.

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Received November 02, 2012; **Accepted** November 03, 2012; **Published** January 08, 2013

Citation: Stein NR (2013) Are Radiation Safety Principles Being Applied in Day-to-Day Practice by All of Those Involved in Clinical Decision Making? J Med Diagn Meth 2: e105. doi:10.4172/2168-9784.1000e105

5. Image Gently Impact (2011) The Alliance for Radiation Safety in Pediatric Imaging.

6. Eksioglu AS, Uner C (2012) Pediatricians' awareness of diagnostic medical radiation effects and doses: are the latest efforts paying off? Diagn Interv Radiol 18: 78-86.

7. Balthazar EJ, Birnbaum BA, Yee J, Megibow AJ, Roshkow J, et al. (1994) Acute appendicitis: CT and US correlation in 100 patients. Radiology 190: 31-35.

8. Gunderman RB, Siddiqui AR, Heitkamp DE, Kipfer HD (2003) The Vital Role of Radiology in the Medical School Curriculum. AJR Am J Roentgenol 180: 1239-1242.