



## Review

# Knowledge of radiation legislation and guidelines amongst foundation doctors is inadequate for safe practice in the current era of radiology



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## ARTICLE INFORMATION

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It is important for safe practice in radiology that junior doctors are aware of the guidelines and legislation surrounding ionising radiation; however, it has been demonstrated over many years that knowledge in these areas is poor with potential impacts on patient safety. As the reliance of the National Health Service (NHS) on radiological imaging increases, it is vital that lasting intervention is implemented to prevent harm. This commentary highlights key issues in this area with results from a recent audit and suggests potential solutions.

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## Introduction

The reliance of NHS medical practice on radiology is increasing: 5 million computed tomography (CT) examinations and 3.4 million MRI examinations were performed in England in 2017, compared to 3.3 million CT and 2.3 million MRI examinations in 2012.<sup>1</sup> As outlined by the Clinical Radiology UK Workforce Report 2017, the gradually increasing number of radiology consultants is insufficient to keep up with the number of imaging examinations being requested. This is resulting in a backlog costing millions (£116m in 2017) in outsourcing in order to keep up with government targets, which in many areas are not being met.<sup>2</sup> Consequently, it has never been more important that junior doctors of all grades understand the guidelines and

legislation behind radiation-based imaging, as well as the importance of safety when using ionising radiation. The Ionising Radiation (Medical Exposure) Regulations 2000 (IR(ME)R; updated in 2018) sets out the responsibilities in order to protect patients, including minimising unnecessary radiation doses and ensuring benefits outweigh the risks of radiation exposure.<sup>3</sup> Guidelines set out by the Royal College of Radiologists (RCR) detail the various clinical situations when certain types of scan are required.<sup>4</sup> Both the legislation and guidelines work synchronously, not only to prevent patients undergoing unnecessary doses of radiation, but also to avoid unnecessary scan requests that add to the workload of both radiographers and radiologists and delay urgent reports.

## Audit

The RCR AuditLive collection provides audit templates to allow trainees to carry out audits across NHS trusts in a standardised fashion.<sup>5</sup> One of the available audits aims to

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assess Foundation Doctors' knowledge of radiation safety and legislation,<sup>6</sup> which has been performed multiple times in NHS trusts throughout the UK since its initial publication in 2011,<sup>7–11</sup> although the results of similar audits have been published as early as 2003.<sup>12</sup> In all cases, the results are unanimously poor.

The audit involves asking doctors to self-declare their knowledge on legislation and guidelines via a questionnaire with further questions regarding background radiation and radiation dose of commonly requested diagnostic imaging. The audit does not aim to assess detailed knowledge of these topics; the questions ask for a "yes or no" answer regarding whether the respondent has a basic awareness of their existence and importance. For questions asking for common radiation doses, answers are requested to be given in terms of dose relative to a single chest radiograph rather than absolute figures.

To highlight one recent example, the audit was carried out at Barts Health NHS Trust in November 2018 across a sample of 55 foundation doctors with the following results: 29% were aware of any legislation regarding ionising radiation; 38% were aware of any legal obligation to provide accurate information when requesting imaging; 20% were aware that the Department of Radiology have the right to withdraw ordering rights; 9% were aware of the book 'Making the Best Use of Clinical Radiology Services' released by the RCR; no one of that 9% had ever referred to it; 82% were aware of background radiation; zero answers regarding radiation doses of common imaging techniques were correct, increasing to 2% when given a 25% margin of error; 87% had been asked to request an investigation by a senior without being sure of the indication; 16% felt that they had had adequate teaching regarding radiology referrals.

Of additional note, regarding the knowledge of relative radiation doses, answers for the relative dose of both a CT head and a CT abdomen–pelvis ranged from 5 to 10,000 equivalent chest radiographs and 15 of the responses (27%) gave answers of "zero" or were left blank entirely.

## Solutions

Given that the RCR standard for the audit states that 100% of Foundation doctors should have a basic awareness of legislation and 90% should be aware of common radiation doses, there is an obvious need for intervention in the form of local education in this case prior to recycling the audit; however, the aforementioned projects from other trusts have demonstrated similar findings and suggested comparable intervention with no obvious sign of improvement on a national scale over an extensive period of time. For a large-scale issue such as this, local audit and quality improvement projects are insufficient to guarantee lasting change.

There are already many methods available for providing standardised education at a postgraduate level, which are currently used throughout the NHS, that could be utilised to improve knowledge. For example, prior to starting work, all junior doctors must pass the Prescribing Safety

Assessment<sup>13</sup> as well as completing online training modules provided by their respective NHS trust. The Foundation Programme curriculum outlines the necessary skills and knowledge in which a doctor must demonstrate competency before being allowed to progress.<sup>14</sup> Knowledge of radiation exposure and imaging guidelines do not feature in any of these. Furthermore, for trusts in NHS England the iRefer guidelines are only partly available as part of an optional learning module for users of e-Learning for Health<sup>15</sup> with the full guidelines only available to members of the RCR; the guidelines are available in full for free in all other countries of the UK.<sup>16</sup> The addition of a specific training module, curriculum aspect, or introductory teaching session (or availability of iRefer guidelines for all doctors) would be a minimal cost compared to the potential benefit.

Given the increasing ubiquity and necessity of radiology in modern clinical practice, it could be suggested that a more formal inclusion in the undergraduate medical curriculum is warranted. For example, the salient points of IR(ME)R 2000 could be included in the professional development syllabus that already emphasises the importance of other legislation pertinent to patient safety, such as the Mental Health Act<sup>17</sup> and landmark cases regarding informed consent.<sup>18</sup> Introductory radiation physics, including tissue effects and dose calculations, could be incorporated into the basic sciences that make up a significant part of pre-clinical training.

A more extreme approach, made more theoretical given the already increasing workload within the radiology department, could be a greater involvement of radiology consultants and senior trainees in basic clinical training. Currently, radiology does not feature as a "core specialty" in undergraduate or Foundation training; rotations in the department are possible but limited in number and seen as supernumerary. Increasing the opportunities for junior trainees to gain first-hand experience and teaching in the department could have significant benefits on their use of imaging in their clinical practice and future interactions with radiology as a service. As standardised assessment throughout the UK is set to be introduced in 2022,<sup>19</sup> influence from senior radiologists involved in education on the new syllabus could be a step towards the far-reaching influence that is required.

## Conclusion

Increasing workforce numbers and spend on resources are temporary solutions, which are already being shown to be insufficient in solving the problems facing modern radiological practice. Attention needs to be directed towards the key users of the service, namely junior doctors, amongst whom it has been demonstrated repeatedly that knowledge surrounding fundamental principles is inadequate. Improving understanding at an early point in training will put clinicians in a better position to make appropriate referrals throughout their career, potentially helping to improve wait times for both scans and reports

and reducing patients' exposure to radiation. One may argue that there are many more urgent issues to be highlighted that have a far more immediate risk of causing harm to patients. Nevertheless, the recent statistics demonstrating the increasing strain on radiology suggest that there may be a more immediate threat than we think.

## Conflict of interest

The authors declare no conflict of interest.

## References

- Royal College of radiologists. *UK workforce report 2017*. 2018. Available at: [https://www.rcr.ac.uk/system/files/publication/field\\_publication\\_files/bfcr185\\_cr\\_census\\_2017.pdf](https://www.rcr.ac.uk/system/files/publication/field_publication_files/bfcr185_cr_census_2017.pdf). [Accessed 28 November 2018].
- Care Quality Commission. *Radiology Review: a national review of radiology reporting within the NHS in England*. 2018. Available at: <https://www.cqc.org.uk/sites/default/files/20180718-radiology-reporting-review-report-final-for-web.pdf>. [Accessed 28 November 2018].
- Ionising radiation (medical exposure) regulations*. 2018. p. 121. Available at: [http://www.legislation.gov.uk/ukxi/2018/121/pdfs/ukxi\\_20180121\\_en.pdf](http://www.legislation.gov.uk/ukxi/2018/121/pdfs/ukxi_20180121_en.pdf). [Accessed 28 November 2018].
- Royal College of Radiologists. *iRefer Guidelines: making the best use of clinical radiology 2017 (updated May 2017)*. 2017. Available at: <https://www.irefer.org.uk/>. [Accessed 28 November 2018].
- Royal College of Radiologists. *AuditLive*. 2018. Available at: <https://www.rcr.ac.uk/clinical-radiology/audit-and-qi/auditlive>. [Accessed 28 November 2018].
- Royal College of Radiologists. *Foundation doctors' knowledge of radiation legislation and exposure 2016*. 2016. Available at: <https://www.rcr.ac.uk/audit/foundation-doctors%E2%80%99-knowledge-radiation-legislation-and-exposure>. [Accessed 28 November 2018].
- Moussa A, Abu-Omar A, Bempah T, et al. 'Foundation doctors' knowledge of radiation legislation and exposure. BIR Annual Congress; 2015. Available at: <https://www.eposters.net/poster/foundation-doctors-knowledge-of-radiation-legislation-and-exposure>. [Accessed 4 December 2018].
- Lai S, P Lim K, Parirenyatwa R. *Foundation doctors' knowledge of radiation legislation and exposure: a completed audit cycle*. SRT Annual Meeting; 2017. Available at: <https://www.eposters.net/poster/foundation-doctors-knowledge-of-radiation-legislation-and-exposure-a-completed-audit-cycle>. [Accessed 4 December 2018].
- Parvizi N, Mutch S, Moore N. Foundation doctors' knowledge of radiation legislation and exposure. *Clin Radiol* 2015;**70**:S15.
- Toghyan H, Rizzo S, Ahmed S, et al. Foundation doctors' knowledge of radiation legislation and RCR referral guidelines. *Clin Radiol* 2014;**69**:S17.
- Khan MO, Khan MS, Janjua O, et al. Knowledge of radiation legislation and radiation exposure in common radiological investigations among final year medical students, foundation doctors, specialist radiology registrars and radiographers at a UK university teaching hospital. *BJR Open* 2018. 0(0):20180014.
- Shiralkar S, Rennie A, Snow M, et al. Doctors' knowledge of radiation exposure: questionnaire study. *BMJ* 2003;**327**(7411):371–2.
- Available at: *The British Pharmacological Society. Prescribing safety assessment*. 2018. Available at: <https://prescribingsafetyassessment.ac.uk/>. [Accessed 5 December 2018].
- Available at: *UK foundation programme. The foundation programme curriculum 2016*. 2016. Available at: <http://www.foundationprogramme.nhs.uk/curriculum/introduction.html>. [Accessed 5 December 2018].
- (updated 2018). Available at: *e-LFH. About the Ionising Radiation (Medical Exposure) Regulations programme*. 2012. Available at: <https://www.e-lfh.org.uk/programmes/ionising-radiation-medical-exposure-regulations/>. [Accessed 5 December 2018].
- Available at: *Royal College of radiologists. Accessing iRefer*. 2018. Available at: <https://www.rcr.ac.uk/clinical-radiology/being-consultant/rcr-referral-guidelines/accessing-guidelines>. [Accessed 8 January 2018].
- Mental Health Act*. 2007.
- Board MvLH. UKSC 11*. 2015.
- About the medical licensing assessment*. General Medical Council; 2018. Available at: <https://www.gmc-uk.org/education/standards-guidance-and-curricula/projects/medical-licensing-assessment/about-the-mla>. Accessed 08-01-2018.