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## INTRODUCTION

Health Services make extensive use of Ionising Radiations for both diagnosis – bone densitometry, dentistry, X-Rays, CT Imaging, Nuclear Medicine – and for treatment – radiotherapy and sealed and unsealed radioactive isotopes. A wide range of different health professions are involved in using ionising radiations, and require training to ensure that the techniques are used safely, both for staff and patients. In view of the significant risk if ionising radiation is used inappropriately, training of staff is covered internationally by safety guidance and European Directives, which are incorporated in UK legislation as The Ionising Radiation (Medical Exposures) Regulations 2000 (IR(ME)R, 2000). The legislation is now enforced by the UK Care Quality Commission (IR(ME)R, 2006).

IR(ME)R identifies staff who are directly or indirectly involved in the exposure of patients to ionising radiation as referrers, operators, or practitioners. Operators and practitioners require specific training, and the Regulations include a syllabus, specifying the topics which need to be studied.

Referrers are state registered healthcare professionals who make the request for the diagnostic test or treatment. Traditionally, for diagnosis, this has been a medical doctor, but over the past few years this has been extended to other groups of staff who can refer for specific tests under a protocol agreed with the Radiology department. For example, nurses in Accident and Emergency Departments can request x-rays of the ankle, nurses on wards can request pre-operative chest x-rays, and physiotherapists can request x-rays for specific sports injuries.

Whilst medical doctors receive basic training at Medical School to refer patients, this is not the case for nurses and other healthcare professions, who require local in-service training to take on this role.

The IAEA (2012) identify that it is desirable that referrers are knowledgeable about radiation effects in regard to the various dose ranges involved in diagnostic examinations and are responsible for keeping their knowledge of radiation up to date.

Traditionally in the UK, training has been provided for referrers by medical physicists, radiographers and radiologists at approved one or half day courses, with staff being issued with certificates of attendance. However, attendance at such courses can be difficult for a variety of reasons, including increased work pressure on staff. Moreover, the universal use of computers within the National Health Service (NHS) and at home, provides an opportunity for e-learning.



Figure 1 - Example of a slide from one of the sessions

## Elements of the Teaching Package

The primary source for the content of this training was taken from the syllabus in Schedule 2 of IR(ME)R.

In addition, there have been studies that demonstrate some of the elements which should be covered in referrer training. Several studies show that physicians are frequently poorly informed about radiation levels associated with nuclear medicine and radiological examinations, and also do not appreciate the wide range of radiation doses delivered by diagnostic examinations.

Because staff may want to access e-learning for short periods of time during a quiet period at work, or at home, e-IRMER is split up into specific sessions that can be completed in less than 20 minutes by a typical learner. Some of the topic headings in Schedule 2 of IR(ME)R needed to be split, and other brief topics were merged.

It was also necessary to ensure the e-learning could be undertaken in a linear fashion, so that learners would cover any prerequisite areas first, and that the initial general radiation sessions did not overlap with more specialist sections.

To date, the sessions adequately cover the learning needs for referrers for diagnostic x-rays and can also act as a refresher for operators working in this field, and sessions on Radiotherapy and Nuclear Medicine are in development.

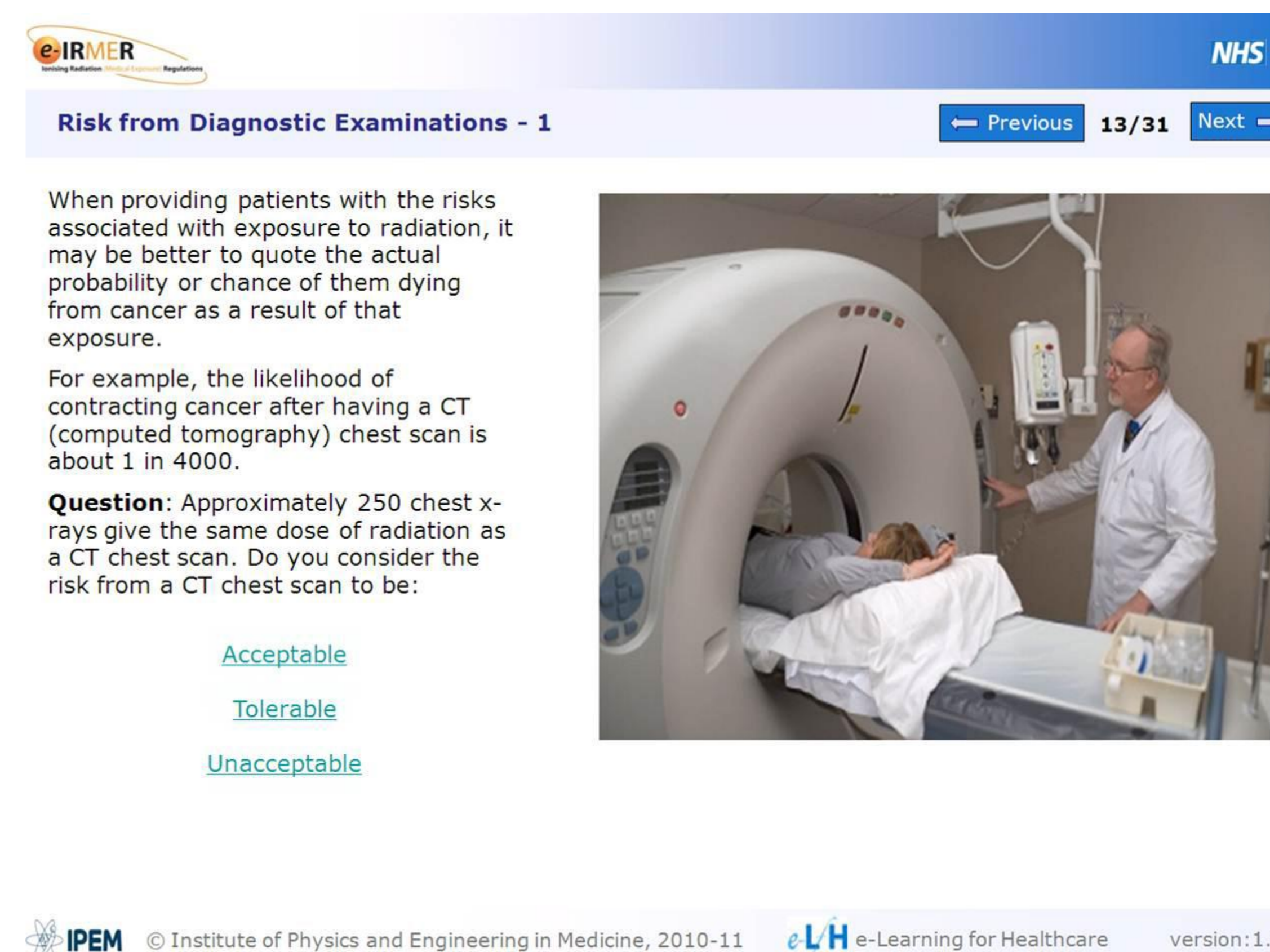


Figure 2 - Example of a slide from one of the sessions

Each session was developed by individual authors, initially in Microsoft PowerPoint, and reviewed by one of the authors of this paper. Examples is shown in Figures 1 and 2.

Each session includes one or more knowledge check slide at stages through the session, and has a number of self-assessment questions at the end of the session, to test the knowledge gained by the learner. An example is shown in Figure 3. The session concludes with an option to print a certificate to confirm completion of the session.

The sessions were then reviewed and converted into suitable format for learners to access via a dedicated website hosted by e-Learning for Healthcare (e-LfH) <http://www.e-lfh.org.uk>.

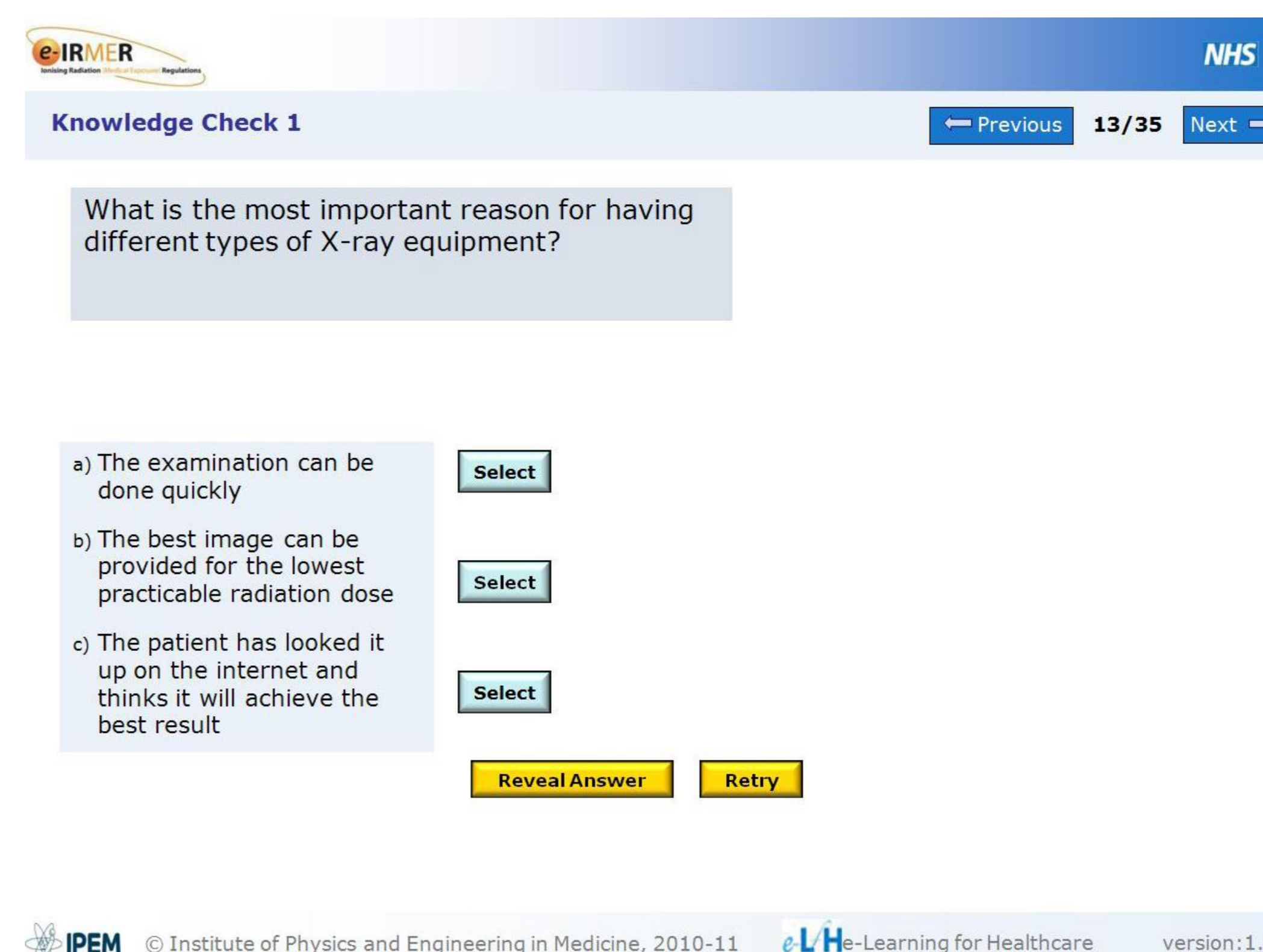


Figure 3 - Example of knowledge check question

## Conclusion

A radiation safety e-learning package has been developed for UK healthcare staff, which aims to comply with the requirements of IR(ME)R. It is hoped that this will appeal to staff and ensure there is a greater uptake of training, and subsequently improvements in radiation safety for both patients and healthcare staff.

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