

Not just a photograph - Do clinical staff requesting x-ray examinations understand radiation?

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Background

Diagnostic Radiographers use X-rays, a form of ionising electromagnetic radiation to produce images of the body in order to aid medical staff to diagnose and therefore determine the most appropriate intervention/treatment for patients.

As a form of radiation, the use of x-rays carries a level of risk. The doses used with plain x-ray examinations are small and have no immediately evident harmful effect. However each x-ray delivers a very slight increase in the chance of cancer occurring in later life. 1 chest x-ray carries a 1 in 1,000,000 additional risk. This risk increases with the number of examinations had and with the amount of X-rays used or dose. For example, Computed Tomography (CT) scans are higher dose examinations. 1 CT abdomen scan carries an additional lifetime risk of cancer of 1 in 2000 (National Radiation Protection Board 2001).

The use of x-rays for medical imaging are therefore governed by legislation; **The Ionising Radiation [Medical Exposure] Regulations (IR[ME]R) 2000**. Under this, those people asking for x-ray examinations (Referrers) have a legal responsibility for that dose of radiation, like a prescription. They therefore need to understand radiation and the associated risk for different examinations, and must consider these before requesting an examination.

It has emerged from national and international studies that many referrers have an inadequate level of understanding of x-rays and the doses involved, as well as having no awareness of the legislation involved.

This is especially concerning due to rapid increase in the use of medical imaging. Last year in England over 41 million imaging tests were done, over 54% were plain x-ray examination (22, 292, 755)(NHS England 2017). In 2016 the trust conducted imaging investigations on 211,751 patients (excluding MRI), of those 171,079 were plain x-ray(see figure 1).

The use of medical imaging is undeniably indispensable to modern medicine. However the culture of seeing x-rays like photographs needs to be addressed. In the early part of the last decade in the U.K, an estimated 100-250 deaths per year would be a result of cancers directly related to radiation from medical imaging (Shiralkar *et al* 2003). Estimates for the number of cancers likely to be a result of medical radiation per year vary between 700 and over 1800 (Uri 2012, Parkin & Darby 2011).

Supporting Evidence

A study entitled **'Radiation Awareness amongst Junior Doctors'** was an influential factor in choosing this topic (Selmi and Natarajan, 2016). The study assessed junior doctors' knowledge of ionising radiation of routinely requested investigations.

The following are some of their findings:

- 1/49 doctors knew of any legislation and could name IR[ME]R
- 0% correctly estimated the doses of abdominal x-rays, a CT head or CT thorax, abdomen & pelvis scans (CT TAP).
- 43% underestimated the dose of a CT TAP despite 89% routinely requesting this examination.

Call for Action

Bonn Call for action is an action plan to improve radiation protection in medicine established by the International Atomic Energy Agency and World Health Organisation (2013). This movement therefore aims to minimise the level of radiation received by the population from medical imaging. Conducting this project would aim to fulfil the following of their proposed actions:

- Number 4) To strengthen radiation protection education and training of health professionals,
- Number 8) To strengthen safety culture in health care.

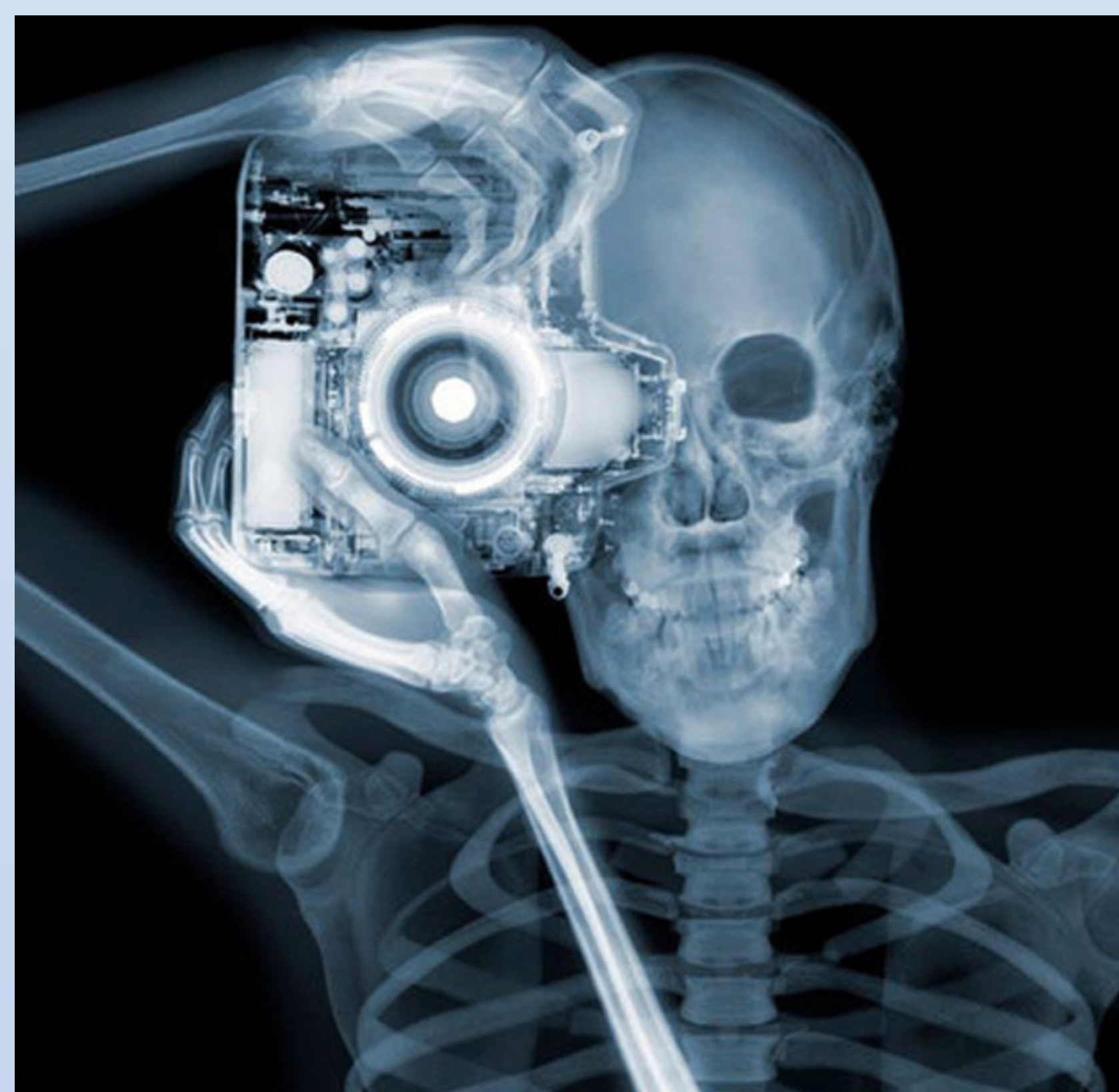
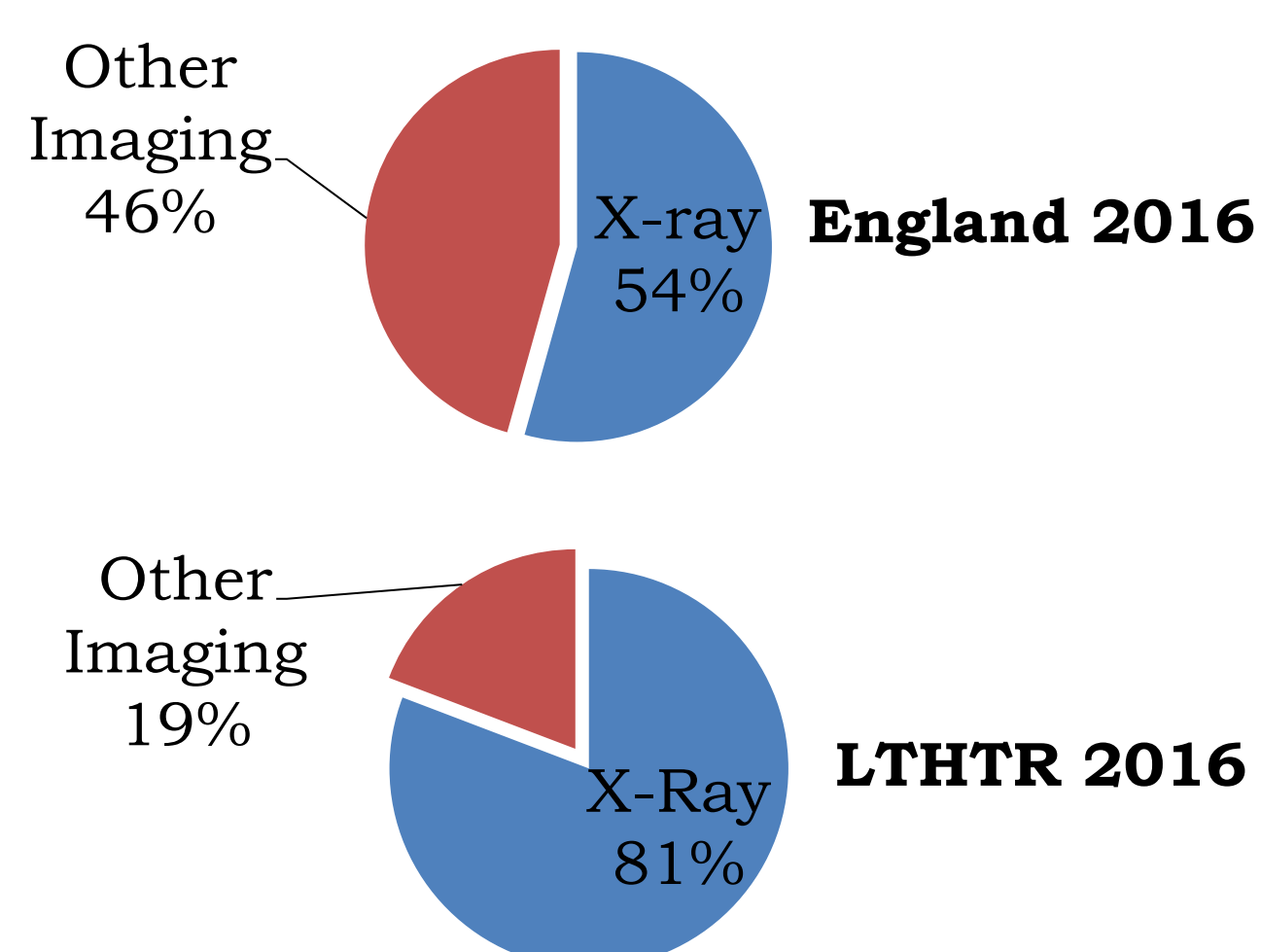


Figure 1: Number of Imaging tests



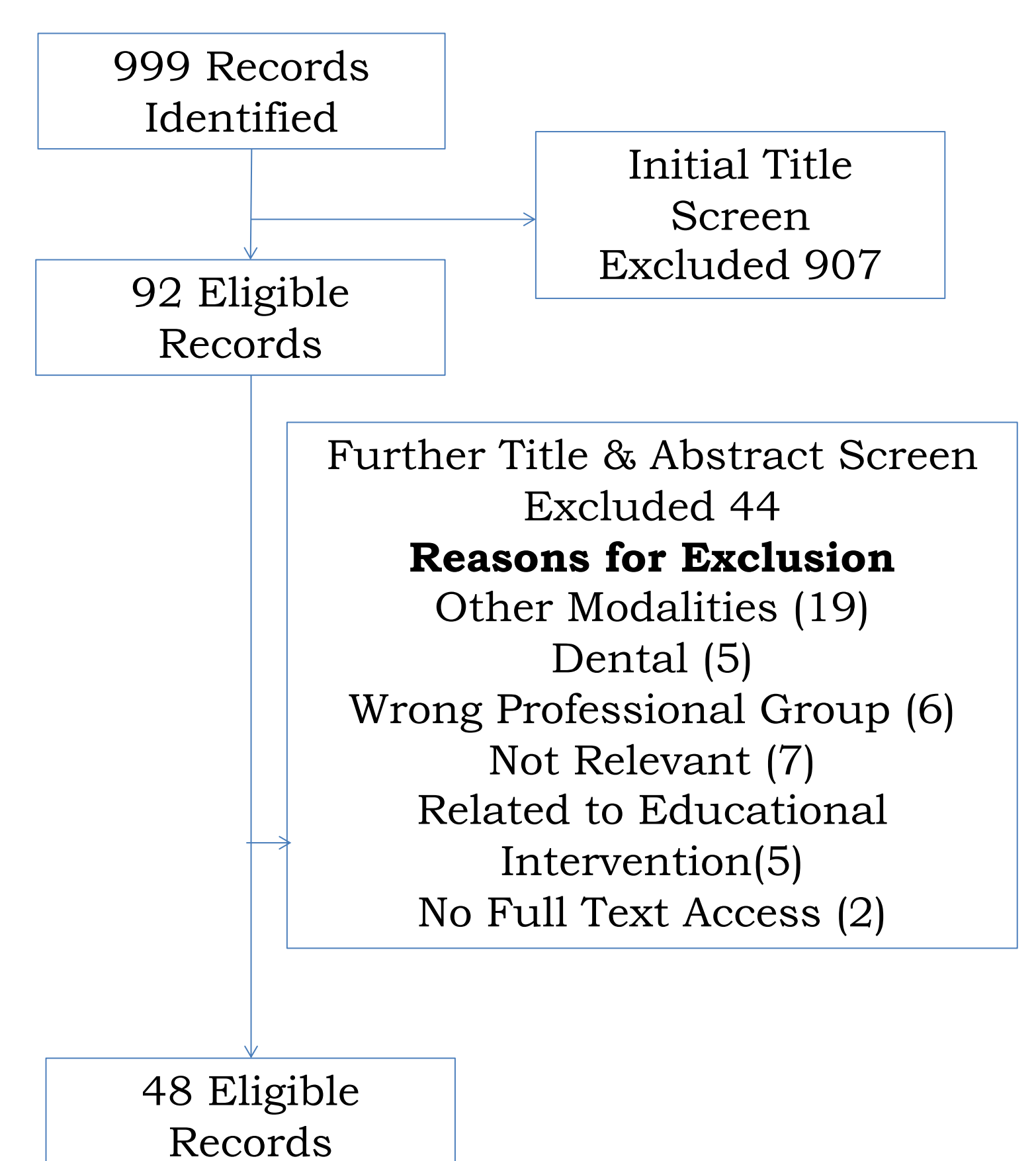
Aims & Objectives

- ✓ To assess the understanding of different groups of referring staff (For example, Junior doctors, Consultants, nurses (Non-medical Referrers) etc) of ionising radiation, associated doses and the laws and guidelines around requesting examinations.
- ✓ To determine if there is any noticeable differences in the quantity and quality of requests for plain x-ray examinations between referral groups.
- ✓ To develop an educational intervention to increase awareness of ionising radiation, the implications, legislation and guidelines of its use in diagnostic medicine.



Literature Search

A search strategy was developed including the MeSH terms radiation, knowledge, and health personnel. The Medline database was searched from 1980 to 2017 to find existing relevant research. The flow diagram below shows how the search results have been screened to date.



The remaining 48 records will be read fully for further inclusion/exclusion. A further search will be conducted of two other databases (Embase and ERIC) to ensure that all relevant papers have been identified.

Next Steps

- ✓ Complete selection of existing papers from literature search
- ✓ Data Extraction
- ✓ Critical appraisal
- ✓ Evidence synthesis with summary

References

- ✓ National Radiation Protection Board (2001) X-rays: How safe are they?
- ✓ Shiralkar S, Rennie A, Snow M, Galland RB, Lewis MH et al. (2003) Doctors' knowledge of radiation exposure: questionnaire study. *BMJ* 327: 371-2.
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- ✓ Parkin DM and Darby SC. (2011) Cancers in 2010 attributable to ionising radiation exposure in the UK. *Br J Cancer* 6 (105) (Suppl 2): S57-S65
- ✓ Selmi M and Natarajan MD. (2016) Radiation awareness amongst junior doctors. *J Adv Radiol Med Image* 1 (2): 205
- ✓ IAEA and WHO (2013) Bonn Call for Action: 10 Actions to improve radiation protection in medicine in the next decade.