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Methodological approaches to evaluating the practice of radiographers' interpretation of images: A review

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Abstract Recent initiatives to modernise the National Health Service describe how improving pay structures and staff working lives can be achieved in the form of advanced practitioner and consultant posts. Role development in Radiography represents a fundamental change to professional practice of radiographers and is subject to the provisions of the statutory and professional codes of conduct which govern such practice. In Diagnostic Radiography the response to Government initiatives has led to a change in practice so that radiographers in these new posts provide reports for a variety of imaging modalities. At the same time as there have been changes in the practice of Radiography, the discipline of evidence-based medicine has emerged. Changes in clinical practice should be underpinned by evidence from research. The purpose of this paper is to discuss the methodological approaches used to conduct research that evaluates one of the most salient areas of development in Radiography practice, that is the role of radiographers as advanced or consultant practitioners when interpreting plain radiographs. We begin by discussing what an evaluation is and two broad approaches for conducting health services research, and then appraise the evidence about radiographer reporting in the context of these methods of evaluation. We then suggest future considerations about the methodological approaches to evaluating radiographer reporting practice and identify where there are evidence gaps and the need for further research to inform evidence-based Radiography.
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Introduction

In June 1990, the National Health Service (NHS) and Community Care Act was introduced in the United Kingdom to help address the increasing demand in health care.[1]

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This Act gave effect to the *Working for Patients* 1989 White Paper,[2] which announced the internal market reforms for the NHS. These reforms included a review of consultant contracts and their 'job descriptions' which engendered a climate that blurred the distinction of tasks between medical and allied health care professionals. More recent initiatives to modernise the NHS, the *NHS Plan*[3] and *Meeting the Challenge*,[4] describe how improving pay structures and staff working lives can be achieved in the form of advanced practitioner and consultant posts. The challenge to radiographers to meet the criteria for these new posts has been to develop their roles by demonstrating expertise and leadership in the research, clinical and professional environment.

Role development in Radiography represents a fundamental change to professional practice of radiographers and is subject to the provisions of the statutory and professional codes of conduct which govern such practice.[5] In Diagnostic Radiography the response to Government initiatives since 1990 has led to a change in practice so that radiographers in advanced practitioner and consultant posts provide reports on, for example, abdominal ultrasound examinations or plain radiographs, perform and report on barium studies, and undertake the injection of radiopharmaceuticals in nuclear medicine (NM) and of contrast media in computed tomography (CT), magnetic resonance imaging (MRI) and urography. Most notably, the subject of non-medically qualified staff reporting radiographic examinations has been debated and contested.[6] During the 1990s the change in Government policy and a shortage of radiologists resulted in the relaxation of restrictions on radiographer reporting. This has been reflected with the development of educational programmes to train radiographers to report[7] and evidence of a considerable increase in radiographers reporting on radiographic examinations.[8,9] Moreover the College of Radiographers vision has been that ''all radiological examinations carried out by radiographers, irrespective of the imaging modality used, should receive a radiographic report''[10] and now the College encourages the introduction of radiographic reporting at undergraduate level.[11]

At the same time as there have been changes in the practice of Radiography, the discipline of evidence-based medicine (EBM) has emerged. EBM is the conscientious, explicit, and judicious use of robust evidence in making decisions about the care of individual patients.[12] The practice of EBM means integrating individual clinical expertise with the current best external evidence available. In short, changes in clinical practice should be underpinned by evidence from research. The purpose of this paper is to discuss the methodological approaches used to conduct research that evaluates one of the most salient areas of development in Radiography practice, that is the role of radiographers as advanced or consultant practitioners when interpreting plain radiographs. We begin by discussing what an evaluation is and two broad approaches for conducting health services research, and then appraise the evidence about radiographer reporting in the context of these methods of evaluation. Finally we suggest future considerations about the methodological approaches to evaluating radiographer reporting practice and identify where there are evidence gaps and the need for further research to inform evidence-based Radiography.

What is an evaluation?

The evaluation of health care is the process of choosing between alternative health care policies (which in its widest sense also includes alternative professional groups reporting on radiographic images) by estimating the net value of each in terms of effectiveness (the extent to which benefits are brought to patients in routine circumstances) and efficiency (where acceptable effectiveness is achieved with the most prudent or optimal mix of resources).[13,14] Two broad approaches to conducting health care evaluation are primary and secondary research.

Methods of health care evaluation for primary research

Primary research is concerned with the collection of data directly from research subjects for the express purposes of a study. Russell (1983) described three approaches to evaluating practice using primary research methods[13]:

- observational studies — when various policies to be compared can all be observed without intervention;
- quasi-experimental studies — when a policy to be evaluated is replaced with another such policy the two policies can be compared *as if* the data had arisen from a scientific experiment;
- experimental studies — when there is an intervention in the status quo using random allocation for the sole purpose of evaluating alternative policies.

Problems of attributing an effect to a particular policy in observational and quasi-experimental studies usually concern the lack of a suitable control group, the influence of unknown prognostic variables affecting patient outcome, regression towards the mean (when a new policy is introduced because of poor outcomes during a short period of time then there is a natural tendency for outcomes to improve whatever the new policy) and the Hawthorne effect (the tendency for data to be biased because research subjects are aware they are being observed). Randomisation, blinding and other methods of controlling bias are essential for ensuring that the results of research studies are valid. Randomisation in experimental studies also provides a probabilistic basis for statistical inference.[15]

Furthermore, the evaluation of radiographers in a reporting role has been expressed as a chain of events[16] as described in Fig. 1, which is adapted from Fineberg and colleagues, who in the 1970s described how to measure the effects of alternative diagnostic technologies.[17] When discussing primary studies about radiographer reporting we shall consider whether studies have been designed using observational, quasi-experimental, or experimental methods and which levels of the evaluative hierarchy have been addressed. As the focus of this paper is to discuss health services research methods that have direct implications for clinical practice, then primary studies that explore research into the perceptual-cognitive processes that

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