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Methods employed for chest radiograph interpretation education for radiographers: A systematic review of the literature



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ABSTRACT

Objectives: This systematic review aimed to determine the strength of evidence available in the literature on the effect of training to develop the skills required by radiographers to interpret plain radiography chest images.

Key findings: Thirteen articles feature within the review. Sample size varied from one reporting radiographer to 148 radiography students/experienced radiographers. The quality of the articles achieved a mean score of 7.5/10, indicating the evidence is strong and the quality of studies in this field is high. Investigative approaches included audit of participants' performance in clinical practice post formal training, evaluation of informal training and the impact of short feedback sessions on performance.

Conclusion: All studies demonstrated positive attributions on user performance. Using a combination of training techniques can help maximise learning and accommodate those with different preferred learning types.

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curve of the Receiver Operating Characteristic (ROC) analysis was estimated to be 0.95.⁶ However, the evidence on the education of

radiographers and competence within this relatively new field of

Introduction

Role progression in image interpretation within radiography can reduce patient waiting times, ensure patient safety and decrease costs.^{1,2} Chest image interpretation is a challenging and skilful task; the large variation in patient anatomy, the range of pathologies which can present on a chest image and the appearance of different pathologies add to the complications arising when undertaking this task.³ Initial training and education can provide a solid base to address these complications and familiarise interpreting clinicians with them.⁴ The role of radiographers within chest image interpretation varies greatly with Preliminary Clinical Evaluation (PCE) and clinical reporting roles now available in the United Kingdom (UK).^{4,5} On reviewing the limited evidence available on performance by reporting radiographers, chest image interpretation mean specificity and sensitivity was reported to be 95.4% and 95.9%, respectively.⁴ This result was similar to that of the top 20 radiologists reported by Potchen et al. (2000) where the area under the

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chest image interpretation by radiographers is limited. Little is known about alternative training methods available, merits of how this training is undertaken and outcome measures of tested training methods. A review of current education/training provided for radiographers on chest image interpretation is required to assess whether radiographers are being adequately trained and whether the methodology employed can influence the accuracy of radiographers in this area of practice.
 Methods

A systematic literature review was performed by searching the following healthcare databases: Medline (1949-present), Pubmed (1947-present), Cumulative Index to Nursing and Allied Health (CINAHL) (1937-Present), the Cochrane Library Database (1974-Present) Scopus (1823-Present) and Embase (1980-Present). The "Medical Subject Heading" (MeSH) was used to identify related keywords. The search strategy was developed using variations of the following keywords: radiographer, radiologic technologist/ technician, x-ray, image, film, radiograph, chest, thorax and axial.

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Articles were included if they were in English, focused on chest radiograph image interpretation, involved radiographers as participants and featured a form of training in the interpretation of chest radiographic images. Articles were excluded if they featured a modality other than plain chest imaging, or if they were articles on the imaging examination, dose, quality or technology, were case specific or focused on patient safety and care/service evaluation.

The lead author reviewed all abstracts and identified papers which met the inclusion criteria. The other authors independently screened these papers to ensure they met the inclusion criteria. All authors met to compare findings; any differences in reviewers' judgements were resolved through discussions until consensus was reached.

Data was extracted by the lead author using a predesigned form and this data was entered into the results tables.

For the purpose of the review, the quality of the studies were assessed based on a variation of the questions provided in the Critical Appraisal Skills Programme Oxford UK (CASP)⁷ tools for a cohort study and diagnostic study. The combination was used as no suitable alternative was available for these mixed methods papers. If the answer to a question was 'yes' the article was scored 1, if the answer to a question was 'can't tell' or 'no' a score of 0 was awarded for that question.

Results

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart summarises the literature review search results (Fig. 1).⁸ A total 645 articles were identified within the searches; following application of the inclusion/exclusion criteria, 13 articles were reviewed. A summary of the articles is provided in Table 1. The quality of the studies was high ranging from scores of 6–10. Studies scored lower if they gave little information on the recruitment process, only one person acted as the reference standard, if they failed to list the confounding factors of their studies or focused solely on the detection of one chest pathology.

A total population of 649 participants were assessed on their chest image interpretation accuracy between the years 1978-2016. Of these participants, 466 were students or experts within the radiography or reporting radiography profession or equivalent. Just over 30% of the studies were completed within the last six years (2010–2016), featuring approximately 69% (445/649) of overall participants and approximately 69% of radiographer (students and qualified personnel) participants (323/466). The sample size within studies varied greatly. The smallest study featured one reporting radiographer.⁹ The largest studies featured 148 and 134 radiography students or experienced radiographers.^{10,11} The numbers of participants within the other studies ranged from 1 to 40. A total of 10 studies were conducted in the United Kingdom (UK), where the role progression of chest image reporting by radiographers is established,^{5,12,13} one study was conducted in Africa, one within America and one within South Pacific countries (to include participants from Fiji, Solomon Islands, Vanuatu, Cook Islands, Kiribati and Niue).

The measurements recorded by each study are provided in Table 1. One study utilised a questionnaire and recorded



Figure 1. Summary of literature review search records using PRISMA group flow chart (2009).

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