


EDITORIAL

Greater than the sum of the parts: Impact of radiographer clinical image interpretation

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Emergency care requires prompt and accurate diagnoses to provide the best outcomes for patients. Modern healthcare is increasingly complex, often utilising multiple and rapid investigations to diagnose patients and guide treatment decisions. Worldwide, driven by a growing and ageing population, emergency care and imaging have seen sustained increases in activity and a renewed focus placed on the efficient use of resources while improving patient care and outcomes.¹

Many imaging departments are unable to meet the rapid reporting turnaround to support emergency care, and rightly prioritise limited radiologist resource to the interpretation of complex cross-sectional imaging performed on the sickest patients. As a result, radiographs are often interpreted by the clinician with patient management decisions made in the absence of a clinical report.

There is a growing emphasis on team working within healthcare to improve patient outcomes and reduce errors, with a shift from volume-based to value-based healthcare.¹ Preliminary image evaluation (PIE) or preliminary clinical evaluation (PCE) by radiographers is advocated as one way to reduce the number of diagnostic errors associated with incorrect interpretation of radiographs,² with team work highlighted as a fundamental component of high-quality imaging services by the Royal College of Radiologists and College of Radiographers.³ There is a growing recognition of the role human factors play in safe and effective healthcare, with medicine relatively slow to adopt these philosophies and practices.⁴ Medical imaging risks failing to learn from other areas of medicine where communication and organisational culture are being improved, if we do not actively embrace the value and contribution that all team members can make.

Preliminary image evaluation has evolved based on the success of radiographer abnormality detection systems

implemented over 30 years ago. When compared to earlier studies, radiographer PIE often demonstrates lower accuracy than abnormality detection research due to the increased knowledge that is required when moving from a binary normal/abnormal decision, to a system requiring a correct description of both the anatomical area affected and type of abnormality present.⁵ However, PIE has a greater clinical value as it removes ambiguity associated with a Red Dot system and the right for wrong reason paradox. With binary (red dot) radiographer abnormality detection systems a false-positive interpretation, for example a fracture 5th metacarpal that is a normal unfused epiphyseal plate and a false-negative decision (missed distal radius fracture), both result in an 'abnormal' classification however patient management may be adversely affected by the incorrect interpretation.

Brown et al.⁶ report on a large clinical audit of the accuracy of radiographer preliminary image evaluation performed at a single busy emergency department over 12 months. In their review of 6290 radiographs they reported mean sensitivity and specificity of 71.1% and 98.4% respectively. The high specificity reported by Brown et al. may be due in part to the low abnormality prevalence often found in clinical practice.⁷ Crucially, there was a very low non-participation rate of 5.1% among the cohort of 35 radiographers, suggesting that radiographer PIE is an acceptable intervention and is sustainable. Although sensitivity was lower, the radiographers confidently and consistently identified normal radiographs, potentially contributing to streamlined decision making and rapid discharge.

Radiographers participating in PIE have identified confidence as a potential barrier.⁸ Undergraduate education equips radiographers with the fundamental knowledge for PIE and is a first post competency according to many professional regulators, for example

Australia (Medical Radiation Practice Board of Australia)⁹ and the United Kingdom (Health and Care Professions Council).¹⁰ However, despite variable content and duration of training, a consistent finding is that ongoing education of radiographers improves PIE performance and emphasises the need for co-ordinated workplace training.

Radiographers with greater post-registration experience have been shown to be more accurate when providing PIE in clinical practice, most likely reflecting the spectrum and volume of cases seen.^{11,12} A strength worth noting of the Brown et al.⁶ study involved the inclusion of a broad range of radiographers, and emphasised the value of structured workplace learning and postgraduate education in image interpretation for radiographers in order to maximise the benefits of PIE to patients and clinicians.

Diagnostic radiographers are the first healthcare professional to see an image, with Brown and colleagues demonstrating that radiographer PIE can be introduced into routine clinical practice.⁶ Importantly, studies have also suggested that there is an accumulative or synergistic effect, with radiographers and emergency physicians often identifying different pathologies. In one of the first studies of radiographer preliminary interpretation, Berman and colleagues found that while both radiographers ($n = 68$) and emergency physicians ($n = 63$) had a similar number of false negatives, only 28 were common to both professional groups.¹³ McConnell et al.¹⁴ also demonstrated the benefit of collaborative image interpretation, with the combined accuracy of radiographer PIE and emergency physician improved by 1.2%. Of the 21 radiographs within the Brown et al.⁶ audit that underwent review by an experienced consultant radiologist, there were nine instances where the initial radiologist report was found to be incorrect, despite the radiographer PIE being available at time of reporting. A consistent finding, echoed across the literature, is that when imaging examinations undergo multiple reviews by different healthcare professionals there is often an increase in overall accuracy, with fewer misdiagnoses and improved patient outcomes.

Radiographer PIE is not, and will never be, a substitute for a definitive clinical report provided by a suitably qualified healthcare practitioner, often a consultant radiologist but increasingly a reporting radiographer.¹⁵ A PIE is a mechanism to increase the information available to clinicians making treatment decisions in the absence of a clinical report.

There are implications for the profession and more importantly, patients as well as for referrers needing imaging examinations and the outcomes of imaging

exams, wherever radiology/radiography is practiced. Increasing demand, coupled with robust evidence supporting the effectiveness of PIE by radiographers means that the status quo should not be an option. With appropriate training and support, radiographer preliminary image evaluation is an effective, efficient and sustainable mechanism to reduce interpretation errors in an emergency care setting.

Conflict of interest

The authors declare no relevant conflicts of interest.

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