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Preliminary Clinical Evaluation: The What/Where/How (WWH) Approach to Scoring

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INTRODUCTION

"Preliminary Clinical Examination" (PCE) is defined as: "the practice of radiographers whereby they assess imaging appearances, make informed clinical judgements and decisions and communicate these in unambiguous written forms to referrers"[1]. A lack of evidence regarding the diagnostic radiographers' ability to accurately comment is perceived as one of the barriers to the implementation of PCE[2]. The aim of this project was to develop a robust scoring system that enables comprehensive evaluation of PCE quality regardless of profession.

METHODOLOGY

Final year diagnostic radiography students (n=87) participated in an image interpretation test , consisting of 30 musculoskeletal images with equal prevalence of normal and abnormal status, developed using **RadBench** [3]. Sensitivity, specificity and accuracy were calculated based on their image classification.

PCE comments were marked by using the WWH scoring system (developed from the WWH approach[4]). The same comments were also marked with the scoring system used in the rapid reporting session of the final FRCR Part B[5] examination for comparison.

FRCR scoring system (total score = 30)

Image type		Candidate response	Mark
Normal image	–	Correctly classified.	+1
	–	Incorrectly classified (appropriate false positive).	+0.5
	–	No answer given.	0
	–		
Abnormal image	–	Correctly classified and correctly identified.	+1
	–	Correctly classified but incorrectly identified (only partially correct comments were considered incorrect for this project).	0
	–	Incorrectly classified (false negative).	0
	–	No answer given.	0

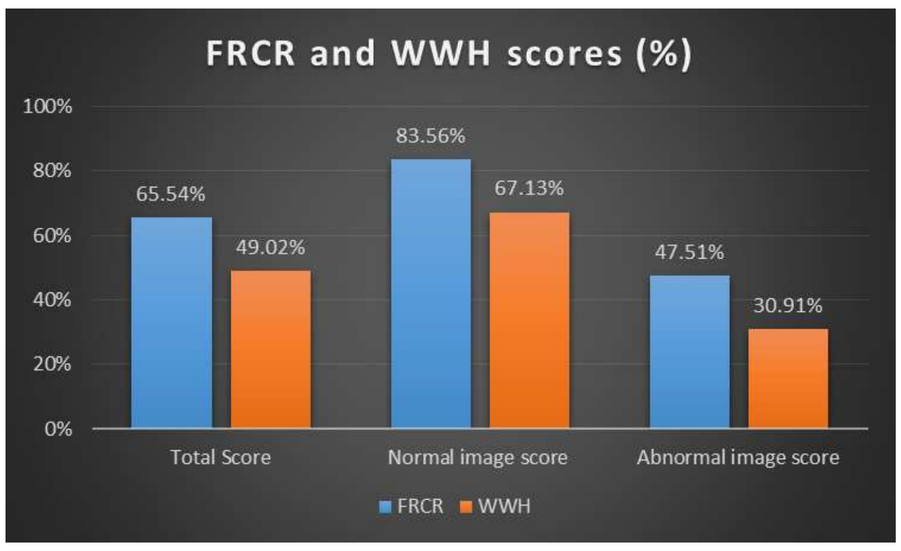
WWH (WHAT/WHERE/HOW) scoring system (total score = 90)

Image type		Candidate response	Mark
Normal image	–	Correctly classified.	+3
	–	Incorrectly classified (appropriate false positive).	+0
	–	No answer given.	+0
Abnormal image	–	Correctly classified. Marks depend if the comment: **fully** satisfies (+1), **partially** satisfies (+0.5) or fails to satisfy (+0) evaluation criteria of the each category below:	
		Type of abnormality (WHAT)	+1 (max)
		Location of the abnormality (WHERE)	+1 (max)
		Displacement/angulation of the abnormality (HOW)	+1 (max)
	–	Correctly classified but incorrectly identified.	+0
	–	Incorrectly classified (false negative).	+0
	–	No answer given.	+0

Example of the WWH approach

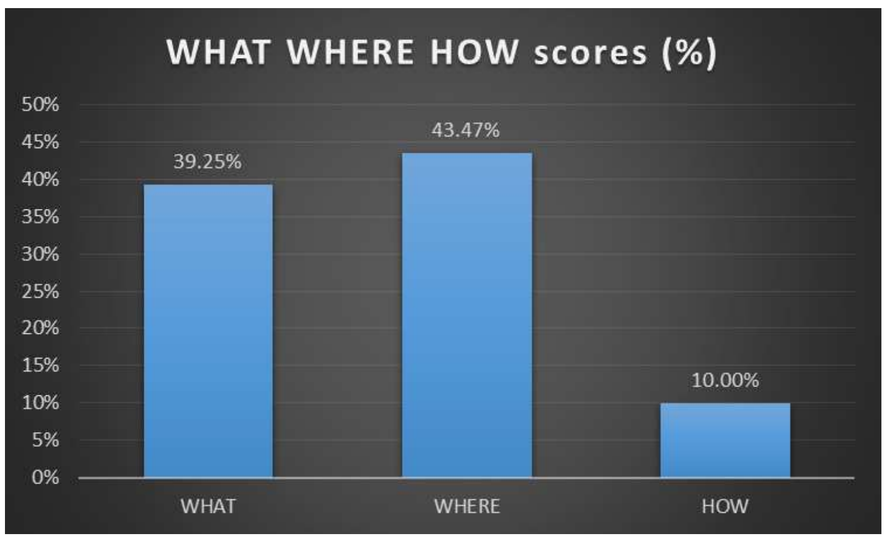
RESULTS & DISCUSSION

Mean accuracy, sensitivity and specificity based on binary logic were 73.3%, 79.6% and 67.1% respectively although once the accuracy of the PCE is considered these reduce regardless of the scoring system because often the decision was 'right but for the wrong reason'. PCE commentary results in differences between the FRCR and WWH scoring approaches.



FRCR's mean normal image score (83.6%) was higher than WWH score (67.1%). This is because FRCR record a mark (+0.5) for incorrect classification (false positive) of normal images, while WWH does not. **The WWH's normal score system perfectly mirrors specificity.**

FRCR's mean abnormal scoring is dichotomous and lacks the granularity of the WWH system which has more evaluation criteria per image (ranging between 4 and 11 depending on the number of fractures and location of the injuries).



The PCE score should ideally correlate with observers' accuracy in order to provide useful information to the referring clinician. Whilst most comments state the location (WHERE), less state the type (WHAT), and very few refer to angulation or displacement (HOW).

Analysis of the PCE is a useful indicator for targeting professional development. The same model could be applied to radiology reports, regardless of profession, to provide an auditable assessment of quality.

CONCLUSION

On the basis that the radiographer written PCE needs to be accurate and reliable in order to aid patient triage by the referring clinician, the WWH approach to scoring provides a more robust assessment than FRCR relative to the actual diagnosis, and is therefore recommended as a more desirable approach.

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