

The Impact of PACS on Radiograph Interpretations in an Orthopedic Outpatient Clinic

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Abstract

We found no significant change in the accuracy of clinicians' reading of skeletal radiographs before and after PACS-introduction. The level of inter-rater agreement between clinicians and radiologists was high in both periods, but they disagreed in significantly more cases after PACS.

Keywords:

Radiology Information Systems, Diagnostic Errors, Program Evaluation

Introduction

It is suggested that diagnostic accuracy may be maintained when images are viewed on monitors rather than on film under optimal conditions [1], [2]. A previous study of chest radiograph interpretation before and after the introduction of a Picture Archiving and Communication system (PACS) indicates that this may apply also in a "real life situation" [3].

This study assesses the impact of PACS on the accuracy of clinicians' radiograph interpretation at an orthopedic emergency outpatient clinic. The study was approved by the Norwegian Social Science Data Service (NSD).

Methods

The basic design of this study was a before-after study using two cross-sectional data collections. Clinicians' and radiologists' assessment of the same images were classified independently as either positive (certain or possible skeletal injury) or negative (all others). Cases where the clinician and radiologist disagreed were independently reviewed by two radiology specialists. Cases with agreement and the results of the review constituted the gold standard.

Differences were analyzed using the independent samples T-test, inter-rater agreement using Cohen's kappa. Significance levels (predetermined at $\alpha < 0.05$) are reported.

Results

Table 1 presents the clinicians' interpretation of the radiographs before and after PACS. There was no significant difference between pre-PACS (0.95) and post-PACS accuracy (0.93, $p=0.36$).

Table 2 presents the classification of the clinicians' interpretation relative to the radiologists'. The level of inter-rater agreement was high in both periods. The Cohen's kappa value was 0.83 before and 0.77 after PACS. However, the clinicians and radiologists disagreed in significantly less cases before than after PACS (7.2% vs 10.2%, $p<0.05$).

Table 1

Pre-PACS		Gold standard	
		positive	negative
Clinician	positive	163 (28,0%)	23 (3,9%)
	negative	8 (1,4%)	389 (66,7%)
Post-PACS		Gold standard	
		positive	negative
Clinician	positive	237 (30,9%)	37 (4,8%)
	negative	13 (1,7%)	481 (62,6%)

Table 2

Pre-PACS		Radiologist	
		positive	negative
Clinician	positive	160 (27,4%)	26 (4,5%)
	negative	16 (2,7%)	381 (65,4%)
Post-PACS		Radiologist	
		positive	negative
Clinician	positive	225 (29,3%)	49 (6,4%)
	negative	30 (3,9%)	464 (60,4%)

Conclusion

Our results indicate that diagnostic accuracy is maintained when film-based radiology routines are replaced by PACS in an emergency orthopedic outpatient clinic.

References

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