Clinical sciences poster: An Evaluation of the Prostate MRI Learning Curve Amongst 50 Radiologists: How Does Experience Impact Reporting Accuracy?

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INTRODUCTION:

Recently, Multiparametric Prostate Magnetic Resonance Imaging (mpMRI) has dramatically increased and is now utilized in more than 15% of prostate cancer cases[1-3]. Existing meta-analyses both articulate the benefits of mpMRI -with clinically significant disease detection rates averaging 89% [6], yet flag the significant heterogeneity within the published research.

More radiologists must be trained in prostate MRI interpretation[7], which is known for a steep learning curve[8]. Though evidence supports the effectiveness of various training methods (didactic and self-directed[9]), there is a crucial literature gap regarding the amount of actual training radiologists require to effectively interpret prostate MRI.

OBJECTIVES:

Evaluating the learning curve by analysing the accuracy rates of 50 radiologists via a novel prostate MRI training tool (MRI PRO).

METHOD:

We evaluated the learning curve for 50 board-certified radiologists who have used MRI PRO (www.mripro.io), which has an online viewer of 300 deidentified prostate mpMRI cases, acquired using 3 tesla (T) mpMRI scans using Prostate Imaging-Reporting and Data System (PI-RADS) 2.0 technical guidelines. Radiologists record their answer via a pro forma questionnaire (Diagram 1) and submission of answers is required before revealing the matched histopathology.

The radiologists were grouped into cohorts according to self-reported level of prior experience. The first 50 cases performed by each user were evaluated for sensitivity, specificity and PI-RADS accuracy, which was defined as the total number of correct PI-RADS scores assigned by the user out of all 50 cases. A separate analysis of transition zone lesion sensitivity was performed.

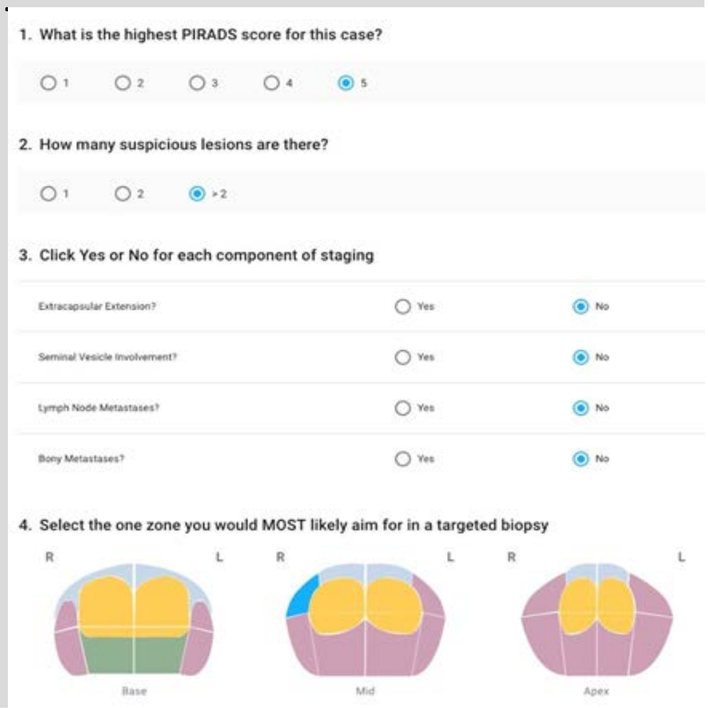
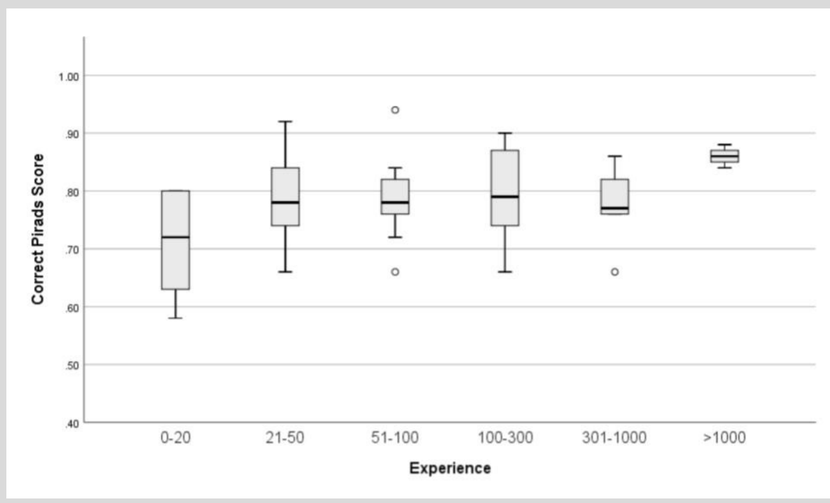


Diagram 1: Pro forma Answer Template used by the Radiologists in the Study.

RESULTS

Overall PI-RADS score

Overall PI-RADS accuracy ranged from 58.0% and 94.0% with a mean of 77.9%. There was a moderate correlation (Spearman Rho = 0.33, $p<0.05$) between PI-RADS accuracy and experience. (Graph 1)



GRAPH 1: PI-RADS Score Accuracy Stratified for Each Cohort

Specificity and Sensitivity

Specificity ranged from 54% and 97% with an average of 81.7%, and demonstrated a mild correlation (Spearman coefficient = 0.259, $p<0.05$) with experience. Sensitivity ranged from 35% and 88% with an average of 64.12%, and showed a moderate correlation (Spearman coefficient = 0.491, $p<0.05$) with experience.

Transition Zone Sensitivity

This ranged from 20% and 83%, with an average of 55.4%. There was a moderately strong association with experience (Spearman's rho = 0.446)

DISCUSSION

We confirmed the learning effect associated with prostate mpMRI accuracy. Overall PI-RADS accuracy improved rapidly over the first 50 cases, with small and persist improvements afterwards, and the most experienced cohort of users, who have performed more than 1000 cases, were most accurate. Specificity is predominantly learnt in the first 20 cases, and very little improvement is made thereafter. Sensitivity continues to improve gradually with experience. Transition zone lesion detection is the hardest skill to acquire, with improvements noted only after 300 and 1000 cases.

A limitation of our study is that our definition of lesion detection, true positive/sensitivity, was more difficult than other studies, where our users had to take the additional step of selecting the lesion on a 36-segment diagram of the prostate and state the number of lesions. This is to ensure a correct answer could not be guessed. This may result in an under-reporting of sensitivity described estimated between 0-15% compared to other studies, but not affect the shape of the learning curve in this study as this definition was evenly applied across participants and timelines.

CONCLUSION

The learning curve of prostate MRI was demonstrated through sensitivity, transition zone sensitivity, specificity and correct PI-RAD scores.

It is important that Radiologists are aware of the learning curve, so that the excellent results described in academic journals may be reproduced in clinical practice.

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