How much is enough: factors affecting the optimal interpretation of breast screening mammograms

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How much is enough? Factors affecting the optimal interpretation of breast screening mammograms.

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1. Introduction

PERFORMS (Personal Performance in Mammographic Screening), a self-assessment scheme for mammographers is undertaken as an educational tool by film-readers involved in reading breast-screening films in the UK. The scheme was devised in collaboration with radiologists and mammographers to form a reliable basis for assessing the performance of film-readers involved in screening breast films. The scheme has been running as a bi-annual exercise since its inception in 1991. In addition to completing the scheme each year, the scheme is also available for mammographers doing screening mammograms. The scheme is a free and anonymous exercise consisting of difficult screening cases and provides immediate and confidential feedback to all film readers on their respective performance based on a radiological “gold standard.”

PERFORMS cases with a view to elucidating which practices were a) most common and b) were associated with the large and small group of participants. This work is supported by the UK National Health Service Breast Screening Programme.

1.2 Results

3.8, 12.5 for specificity and sensitivity measures. There were no significant differences for measures of specificity or for recall and malignancies detected.

Figure 10. Malignancies Detected by Weekly Case Volume

For overall ROC measures Student Newman Keuls post-hoc tests showed that groups 6-10 years and 11-15 years performed significantly better than higher experienced groups of 16+ years (p<.05). This trend was consistent for all sensitivity measures (p<.005), where there were no significant differences for all other measures (p>.05).

Figure 11. ROC Measures for Overall Case Volume

In order to establish which of the three factors (session time but more notable years of experience and case volume) had more of an affect on performance measures, all three were entered into a multiple regression analysis. A weak but significant model emerged in which volume was not a significant predictor of any performance measure, years of experience was significant for all performance measures, but session time was not. As expected, the larger the volume of cases read per week, the better the performance on all measures.

For all sensitivity measures, experience groups of 11 years and over performed significantly better than groups 1-10 years (p<.05), which in turn performed significantly better than the lowest experience group of 1 to 5 years (p<.005). Experiences groups of 1-5 years and 6 to 10 years performed significantly better than higher experienced groups of 11-15 years (p<.05), and over 15 years.

The overall performance data taken from the PERFORMS scheme for the current year showed that mammographers who read for more than 30 minutes per task performed significantly better than those who read for less than 30 minutes. Furthermore, the main factors affecting performance were shown to be volume and case experience. Those with more experience and volume of cases also show greater sensitivity levels. From multiple regression analysis, years of screening experience, rather than any particular practice habit, affects performance on the PERFORMS test set.

Figure 12. ROC Measures for Overall Case Volume