College of Radiographers Industrial Partnership Research Grants
Final Report Form

1. Principal Investigator	Ann Mumby
2. Project Title	**Can a computer based training tool help to improve radiographer's decision making on when to perform repeat mammography views on quality grounds?**
3. Amount of Grant	£7500

4. Did you spend the money as indicated in your proposal (if not why)?
Yes

5. Did you reach your intended project outcomes (if not why)?
Outcome for project was reached but inconclusive

6. What are your significant findings?
The findings did not show any significant improvement in decision making

7. Have you submitted the work for publication (if so where)?
No

8. Have you presented the work at a national/international event (if so where)?
This work was presented at Symposium Mammographicum 2016 and at ECR 2015

9. Please provide an executive summary of your work

Computer based training intervention to reduce unnecessary repeat images

Introduction

With the transition from film screen to digital mammography increased technical rates were noted in the NHS Breast Screening programme and internationally. The risk of unnecessary repeats persists, arising from the eased speed with which an image judged inadequate can be repeated, and from the desire of radiographic staff to produce the best image possible and avoid the need for a woman to be recalled by their reader. Reducing unnecessary repeats would save resources and reduce radiation dose.

Studies of computer based training tools for radiology tasks in screening mammography have demonstrated improvements in reader performance and reduction in inter-observer variability. Similar benefits may be possible for computer-assisted training of radiographers. Therefore, a computer based training tool has been developed to improve radiography decision making on when to repeat a mammography image.

The aim of the study was to obtain preliminary data on the validity and efficacy of this training intervention.

Method and material

A set of mammograms judged to have a range of imperfections which might challenge radiographers' judgements on whether the images were acceptable was selected by the lead investigator. These cases were loaded into the computer interface and subjected to review by three radiographers with national level training expertise, two of whom were qualified in mammography image interpretation. Observers indicated whether each image met specific criteria derived from NHSBSP guidelines. The purpose of this expert review was to set the reference standard for whether each image should be repeated or not. Each expert read all the cases twice and the reference standard for Accept or Reject was set as the majority decision of all six reads per case, with the lead investigator arbitrating when the expert classifications were tied at 3-3. The case set was then divided into "test cases" and "training cases".

Twenty participants with a range of mammography experience were recruited from two breast screening centres Scotland. These were then divided into equally-sized control and intervention groups. Both groups read the test cases at the beginning and end of the study period. Between the two test set observations the intervention group also read the training set in which they were given immediate feedback on what the "correct" accept/reject decision should have been.

All data was captured by the software tool and exported and to and analysed in Microsoft excel and SPSS statistics package. Agreement with the reference standard opinion for each image was assessed before and after the train intervention using descriptive and kappa statistics.

Results

Nineteen participants completed the trial, eight in the intervention arm and eleven in the control arm. Two from the control group were excluded because of protocol deviations ie interval between before and after test set reads was less than two weeks. Numbers in control and intervention arms in the two centres were 5&4 and 4&3 respectively.

Mammography experience in the final sample was similar in the two groups. In the control arm there were two film readers, one stereo biopsy practitioner and one

mammography trainer and in the intervention arm no film readers, two stereo biopsy practitioners and one mammography trainer.

Time intervals were recorded as stated.

Percentage agreement with the reference standard increased in two of nine controls and four of eight cases in the intervention group. It was unchanged in one of each group and decreased in six of nine controls and three of eight cases.
Agreement with the gold standard according to Cohen's kappa was extremely low for both first and second reads of the test set in both groups and most of the kappa scores were not statistically significant.
All of the cases accepted higher numbers of images at their second read compared with three of nine controls.

Conclusion

This tool shows initial potential that it would help to improve the assessment skills of radiographers looking at mammography images.
Further work with a more balanced set of images and with radiographers of less years' experience is required to demonstrate its efficacy.