How we read; How we arbitrate in the NHSBSP. Does it matter?
A Welsh Perspective

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NHSBSP: What we do in the UK

- Invite women age 50-70 every 3 years for screening mammography.
- Perform 2 view mammography MLO and CC
- IR(ME)R and QA standards regulate acquisition of images
- Radiographers trained in mammography to same standard
- Mammography quality audited (TR Rates)
- Increased screening cohort to include high risk women (varies)
- Assess women with suspected cancer on mammography
- Diagnose cancer.
NHSBSP: Why?

- Breast cancer highly prevalent disease
- Historically in UK, high morbidity and mortality rates
- Early detection of disease
- Reduce mortality from breast cancer
NHSBSP: How?

- Double read mammograms with experienced and trained readers (sensitivity)
- A form of arbitration is used to reduce recall rate (specificity)
- Assessment
- BUT the method varies from region and within centres
- Does this matter?
- How do we get quality data on readers?
- How can we show this method works?
Background data for the Welsh Screening programme
BTW set up for reading

- DOUBLE BLIND DOUBLE READ
- Pair more experienced with less but only readers who are trained in assessment can read against any other.
- Arbitration varies due to unit size, consensus in North but single arbitrator in South and West. (service constraints)
- 3 monthly workload and recall rates to each Clinical lead
- 6 monthly QA reports(about to introduced in England)
Pros and Cons

- Robust individual, unit and national data on reading and assessment performance.
- Can produce regular reports for individual readers from training right through measured against national standards and against peers. (produced by PHW informatics from NBSS)
- Readers tend to act as “only” reader may lead to higher recall rates and worry about potential exposed misses.
- PACS issues: BTW acquired a system by where no annotations from the first read are seen and with no indication that the image has been recalled.
BTW Screening activity
Cancer detection rate (per 1000 screened), all ages, by invite/referral type, 2013-14 to 2015-16

<table>
<thead>
<tr>
<th></th>
<th>2013-14</th>
<th></th>
<th>2014-15</th>
<th></th>
<th>2015-16</th>
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<tr>
<td>Screened</td>
<td>Cancers</td>
<td>Rate</td>
<td>Screened</td>
<td>Cancers</td>
<td>Rate</td>
<td>Screened</td>
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<td>84,803</td>
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Cancer detection rates BTW
Cancer detection per 1000 women screened by age
Recall rates BTW
Individual recall rates

National Standards;
Recall rate (prevalent): <10% (min), <7% (target)
Recall rate (incident): <7% (min), <5% (target)
Reader cancer detection rates

**National Standards:**

*Invasive cancer detection* (prevalent): 3.6 per 1000 (min), 5.1 per 1000 (target)

*Invasive cancer detection* (incident): 4.1 per 1000 (min), 5.7 per 1000 (target)

Small invasive cancer detection (prevalent): 2.0 per 1000 (min), 2.8 per 1000 (target)

Small invasive cancer detection (incident): 2.3 per 1000 (min), 3.1 per 1000 (target)
This was the only finding of statistical significance
0.02 p value (chi squared test)
Is double reading still a requirement in the NHSBSP in the digital era?

Dr Liz Edwards
Dr Kate Jenkins
Guy Stevens
AGM October 2016
Introduction

- There is a current workforce crisis in breast radiology.
- This review is to determine if double blind double reading continues to be necessary as since the introduction of digital mammography individual cancer detection rates have increased.
- Are single reader recalls contributing to the detection of pathologically insignificant cancers?
Methods

- This is a retrospective analysis of prospectively collected data from the NBSS database at Breast Test Wales South East.
- The readers included had varying levels of experience from trainee to 20 years+.
- All single reader recalls that were assessed and diagnosed as cancer were included from 2010-2015.
- Pathological data was collected including size, tumour type, grade and node positivity.
- Data pre and post digital screening mammography were evaluated.
Results

- 412 women were identified for analysis as single reader recalls.
- 295 were invasive and 115 non-invasive
The majority (81.7%) of malignancies detected would correspond to TMN stage 1.

- Of the invasive malignancies identified:
  - 95 were grade 1
  - 162 were grade 2
  - 36 were grade 3 at final pathology.
Results

Type of invasive carcinoma

Lobular: 56
Ductal: 197
Mixed: 20
Tubular: 12
Mucinous: 4
Unclassified: 1
Other: 5

Number of cases
Pathological size

Pathological size

<table>
<thead>
<tr>
<th>1-20mm</th>
<th>21-50mm</th>
<th>&gt;50mm</th>
<th>not sized</th>
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<tbody>
<tr>
<td>Non-invasive size</td>
<td>Invasive size</td>
<td>Non-invasive size</td>
<td>Invasive size</td>
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Results

- 90.8% patients were node negative at subsequent surgery.
Results

- On average 13.9% of all cancers detected were attributed to a single reader recall throughout 2010-2016.

<table>
<thead>
<tr>
<th>Calendar Year</th>
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<th>Cancers</th>
<th>Ca det rate per 1000 scr</th>
<th>Single call cancers</th>
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<th>Single call ca as % of overall ca</th>
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<tr>
<td>2010</td>
<td>48928</td>
<td>466</td>
<td>9.5</td>
<td>75</td>
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<td>16.1</td>
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<td>547</td>
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<tr>
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<tr>
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<td>55069</td>
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Comparison to BTW South 2014/15

**Malignancy detected as a %**

- **Invasive**: 71.6%
- **Non-invasive**: 27.91%
- **Microinvasive**: 0.49%

**BTW South data 2014/15 as a % of total cancers detected**

- **Invasive**: 77.48%
- **Non-invasive**: 21.44%
- **Microinvasive**: 1.08%

**Invasive grade as a %**

- **Grade 1**: 32.2%
- **Grade 2**: 54.9%
- **Grade 3**: 12.2%

**Single reader recall as a % of single reader recalls**

- **Invasive**: 25%
- **Non-invasive**: 53%
- **Microinvasive**: 21%
Conclusions

- Single reader recall detected cancers make up a significant proportion of the cancers detected and are pathologically significant.
- Cancer type, grade and size matches the profile of cancers detected by double reading.
- Digital implementation has not affected the overall single reader cancer detection rate per thousand.
- It remains important to continue with double blind reading despite workforce issues and despite individually good cancer detection rates.
Ongoing work

- Review single reader recall mammograms and assess on:
  - location,
  - lesion,
  - size on initial mammogram,
  - subtlety
  - breast density
  - mammographic views visible
- Aim to review 2013-2015 = 237 cases
- 100 cases so far (All of 2013 and some of 2014)
Pathology of the 100 cases

100 cases

26 invasive
74 non-invasive

Type of invasion

- ductal
- lobular
- mixed
- tubular
- other
- unknown

Number of cases
Results so far...

- Categorising lesions identified as asymmetric density/mass and spiculate lesion/distortion can vary from reader to reader.
- These have been grouped together in this graph.
Subtlety rating

- Rating from 1-5
- Subtlety 1-5 (1=very subtle 5=obvious)
- Very subjective particularly as known abnormality on films
- Conducted in reading room conditions
BI-RADS score

- Subjective
- **A: fatty**: breast is almost entirely fat (<25% fibroglandular tissue)
- **B: scattered fibroglandular**: breast has scattered fibroglandular dense tissue (25-50% fibroglandular tissue)
- **C: heterogeneously dense**: breast tissue is heterogeneously dense (50-75% fibroglandular tissue)
- **D: dense**: breast tissue is extremely dense (>75% fibroglandular tissue)
Location of abnormality on screening mammography

Visible on screening views

1 view
2 views

Location of abnormality on screening films
Single call cancer
Examples
Examples
Examples

Asymmetric density
LUOQ
Invasive ductal carcinoma grade 1
Examples – lady complaining of abscess
Invasive ductal grade 3

Skin thickening, Generalised breast changes

Node (involved)
Reflection on results so far

- Most are visible including calcification and are often on two views
- Most are scattered fibro-glandular breast tissue, rather than dense breast tissue
- ? Misinterpreting asymmetric densities/mass
- Most are found UOQ
- Small element of human error identified in recording findings
And Finally

More collaborative audit

Embrace personal figures (some pain but a lot of gain)

Double reading is very important and inherent to a high quality screening programme

Thank you
Is double reading still a requirement in the NHSBSP in the digital era?

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Breast Test Wales, Public Health Wales
E-mail – kate.jenkins2@wales.nhs.uk

INTRODUCTION

There is a current workforce crisis in breast radiology. This review is to determine: if double blind double reading continues to be necessary as since the introduction of digital mammography(2011) individual cancer detection rates have increased; and are single reader recalls contributing to the detection of pathologically insignificant cancers?

METHODS

This is a retrospective analysis of prospectively collected data from the NBSS database at Breast Test Wales (S. E.) of all single reader recalls subsequently diagnosed as cancer (2010-2015). Readers had varying levels of experience from trainee to 20 years+. Pathological data was collected including size, tumour type, grade and node positivity. Data pre and post digital screening mammography were evaluated. Staffing complement in the study period includes 12 qualified readers and 2 trainees.

RESULTS

412 women were identified for analysis as single reader recalls. Of the single reader recall cases, 295 were invasive and 115 non-invasive (Fig.1). The majority (81.7%) of malignancies detected would correspond to TMN stage 1. Of the invasive malignancies identified, 95 were grade 1, 162 were grade 2 and 36 were grade 3 at final pathology (Fig. 2). 13.9% of all cancers detected were attributed to a single reader recall (average of 2010-2015 data), increasing the unit cancer detection rate by 1-2 per thousand (Fig. 3). All readers contribute to the single recall rate regardless of reader status.

CONCLUSIONS

Single reader recall detected cancers make up a significant proportion of the cancers detected and are pathologically significant (Fig. 4 and Fig. 5). Cancer type, grade and size matches the profile of cancers detected by double reading (Fig 6 and 7). Digital implementation has not affected the overall single reader cancer detection rate per thousand.

It remains important to continue with double blind reading and to consider trainee recalls at arbitration despite workforce issues and despite individually good cancer detection rates.