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Symposium Mammographicum 2016

in partnership with the Association of Breast Clinicians
and NHS BSP Update on Physics of Digital Mammography

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ABSTRACT BOOK

Symposium Mammographicum 2016 Meeting Abstracts

Symposium Mammographicum is a UK registered charity founded in 1979. Its principal aims are to stimulate and support research and disseminate knowledge about the prevention, diagnosis and treatment of breast disease.

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Oral abstracts

14.10 – 15.15

4.2 Recall rate and reader confidence in the prevalent screening round: Is there an improvement after the addition of tomosynthesis to conventional mammography?

Dr Neil Upadhyay[1], Dr Neil Soneji[1], Dr Victoria Stewart[1], Dr Nigel Barrett[1], Dr Stella Comitis[1], Dr Sylvie Flais[1], Dr Angela Gupta[1], Dr Hema Purushothaman[1], Dr Keshthra Satchithananda[2], Dr Neelofer Zaman[1]
[1]West London Breast Screening Service, Imperial College Healthcare NHS Trust, UK; [2]South East London Breast Screening Service, King's College Hospital NHS Foundation Trust, UK

Purpose: To determine whether 3D tomosynthesis in addition to standard 2D screening mammography reduces single reader recall rate in women undergoing their first screening examination.

Methods: Regional ethics committee approval was obtained. 981 women undergoing first or prevalent round screen within the NHS Breast Screening Program (NHSBSP) were recruited following informed consent, for additional 3D tomosynthesis examination (Selenia Dimensions, Hologic). The age range of patients was 47-51.

Recruited patients were divided into eight groups. One of eight experienced mammography screen readers read the standard 2D examination of patients within their allocated group, and after a four week interval, read the 2D examination with the 3D tomosynthesis study for same patient. The reader made a decision on patient recall to further assessment at each sitting along with a confidence rating on their decision using a Likert scale. The recall rate and confidence ratings following evaluation of the 2D examinations were compared with the recall rate and confidence ratings following evaluation of both 2D and 3D examinations.

Results: After only 2D examination 17.1% of patients were recalled. For the 2D examination with 3D tomosynthesis 10.9% of the patients were recalled. The difference between the two groups was significant ($p<0.001$). Median confidence on the Likert scale was 7 for 2D examination and 8 for 2D and 3D together ($p<0.001$).

Conclusion: Addition of 3D tomosynthesis significantly reduces recall rate at first screen, with a modest associated increase in reader confidence and therefore could play an important future role in the NHSBSP.

4.3 The Changing Case Order to Optimise Patterns of Performance in Screening (CO-OPS) trial

Dr Sian Taylor-Phillips, Dr Matthew Wallis, Dr Alison Duncan, Ms Olive Kearins, Professor Aileen Clarke
University of Warwick, UK

Background: A vigilance decrement of decreasing sensitivity to detect visual targets with time on task has been observed in many repetitive visual tasks. [1,2] We investigated whether there is a vigilance decrement in the repetitive visual task of mammography film-reading, and whether reversing the case order for the second film-reader can reverse such a decrement.

Methods: A randomised controlled trial was conducted in English breast screening centres. [3] Batches of women's mammograms were randomised to be read in the same order by both film readers, or in the opposite order (i.e. one examining the batch backwards). Differences in cancer detection rate, recall rate and rate of disagreements between intervention and control arms were investigated using multi-level logistic regression analyses. Patterns of cancer detection rate and recall rate with time on task were analysed by adding position in batch to the models. Analysis of patterns of film-reader performance over a longer time period will be achieved by examining patterns when several batches are read in one reading session.

Results: 46 centres participated in the trial, each centre implemented the randomisation and intervention automatically through a change to the National Breast Screening Service (NBSS) software. 1,207,633 women were randomised to intervention or control group over a one year period at each centre. Results were collected from routine records, after annual reporting

requirements were complete. Women screened twice, and those who had mammograms of insufficient quality were excluded from the analysis, alongside those lost to follow up. Analysis is underway.

Conclusions: This study provides an example of how pragmatic integrated randomised controlled trials can be implemented in screening.

Trial Registration: ISRCTN46603370

References:

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4.4 Third-reading in the NHS breast screening programme. How arbitrary is arbitration?

Dr Jim Steel, Dr Simon Lloyd

Plymouth Hospitals NHS Trust, UK

Content: Third-reading in the NHS breast screening programme how arbitrary is arbitration?

Purpose/Background/Objectives: Arbitration is not as closely scrutinised in Quality Assurance as first and second reading. We wished to understand the impact of arbitration variation on cancer detection and recall in our region.

Methods: We analysed NBSS records of every screening episode performed in 5 units utilising single reader arbitration over 5 years. We identified all episodes arbitrated and calculated associated recall and cancer detection rates. We compared the arbitrators with extremes of recall and cancer detection rates, evaluating for statistical significance. We excluded episodes where either arbitrator had acted as first or second reader to reduce bias.

Results: 4.9% of 545,633 screening episodes went to arbitration. 29% of all recalls arose from arbitration. 14.7% of all cancers were detected following arbitration. There were significant differences between units in the proportions of cases going to arbitration, cases recalled and cancers detected following arbitration (all $p < 0.001$). There were significant differences between the recall rates of the arbitrators with the highest and lowest recall rates ($p < 0.001$ for 4 units, and $p=0.009$), with recall rates up to five times higher from one arbitrator to the next. There were significant differences between arbitrator cancer detection rates in 2 units ($p=0.02$ and $p=0.098$), with 3 units demonstrating a greater than two-fold difference in cancer detection rate between arbitrators.

Conclusions: The large degree of variation in the practice of solitary 3rd readers has not previously been described to our knowledge. This may have significant clinical impact. Quantitative guidelines may be helpful for new arbitrators in the NHSBSP.

4.5 Clinical performance of single-view Siemens digital breast tomosynthesis versus standard supplementary mammography for the assessment of screen-detected abnormalities – a multi-reader study

Ms Patsy Whelehan[1], Professor Sylvia Heywang-Koebrunner[2], Dr Sarah Vinnicombe[1], Dr Astrid Hacker[2], Dr Alexander Jaensch[2], Dr Adrian Hapca[8], Dr Rosie Gray[5], Mrs Maggie Jenkin[6], Dr Keith Lowry[7], Dr Rachel Oeppen[3], Dr Michael Reilly[4], Dr Michaela Stahnke[3], Professor Andy Evans[8]

[1]University of Dundee & NHS Tayside, UK; [2]Referenzzentrum Mammographie Muenchen, Germany; [3]University Hospital Southampton NHS Foundation Trust, UK; [4]Altnagelvin Hospital, UK; [5]Royal Cornwall Hospital, UK; [6]Derriford Hospital, UK; [7]Belfast City Hospital, UK; [8]University of Dundee, UK

Background and purpose: In the assessment of screen-detected abnormalities, digital breast tomosynthesis (DBT) can offer equivalent or improved accuracy over standard supplementary mammography (SSM)[1, 2]. However, it is difficult to generalise study results across equipment manufacturers because of wide design variations. We aimed to establish whether Siemens DBT is at least as accurate as SSM in the assessment of screen-detected soft-tissue mammographic abnormalities.

Materials and methods: Participants underwent single-view DBT (Siemens MAMMOMAT Inspiration) in addition to assessment with one or more supplementary mammographic views. All outcomes

were proven by histology or >2 year follow-up. 230 cases were available for analysis. Eight accredited UK NHSBSP readers, blinded to assessment outcome, retrospectively read all cases with A: screening mammograms plus DBT, and B: screening mammograms plus SSM. Readings were 9 weeks apart to avoid recall bias. Reading condition order was reversed in half the readers. Statistical analysis included ROC curves, compared by Chi Squared test.

Results: Based on the area under the ROC curve, the two methods are not significantly different (auROC 0.87 for DBT vs 0.86 for SSM, $p=0.49$). DBT sensitivity was not significantly different from SSM sensitivity (90% vs 86%, $p=0.10$) whereas DBT specificity was significantly lower than SSM (59% vs 64%, $p=0.0002$).

Conclusions: Overall, Siemens DBT is as accurate as standard supplementary mammography for assessing screen-detected, soft-tissue, mammographic abnormalities. It is therefore suitable for optional implementation subject to practical evaluation. The accuracy of DBT in this study was driven by higher sensitivity compared with SSM, while specificity was lower.

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4.6 Word of Mouth Mammogram e-Network (WOMMeN) hub: a Social Media enabled client and practitioner collaboration

Dr Leslie Robinson[1], Mrs Jo Taylor[5], Mr Alex Fenton[1], Dr Adam Galpin[1], Ms Cathy Hill[2], Dr Claire Mercer[1], Dr Joanne Meredith[1], Mrs Beverley Scragg[4], Miss Shaheeda Shaikh[2], Mrs Geraldine Shires[2]

[1]University of Salford, UK; [2]University Hospital of South Manchester, Nightingale Centre, UK; [3]Breast Unit, Bolton Trust, UK; [4]East Lancashire Hospitals NHS Trust, Breast Screening Unit, UK; [5]Unemployed Patient Representative, UK

Introduction: The WOMMeN hub uses Social Media (SoMe) to engage women (service-users and practitioners) in conversations about breast screening. The hub was conceived by service-users and practitioners over the period of two years using a range of methods. The presentation describes the process and the outcome.

Methods and Materials: Stage one concerned feasibility of concept[1,2]. Positive feedback led to stage two hub development. Women were recruited, through SoMe networks, to an on-line User Design group (UDG) hosted on a private Facebook Group. An analysis of UDG posts was carried out over a 7 month period (31/1/15-5/9/15) using Grytics[3] on-line group analytics tool. Posts were also analysed for content using a framework analysis[4].

Results: 89 women were recruited over the period analysed, approximately equally split between service users and practitioners. 206 posts eliciting 1124 further comments were analysed. Framework analysis showed women want honest information and discussions about: screening in general and for breast cancer breast anatomy the mammographic examination mammogram results breast cancer DCIS other pathologies and research. These themes consequently informed the hub content[5]. The high level of engagement between service-users and practitioners, and the numerous instances demonstrating clarification of misunderstandings about breast screening, confirmed that the facility to network with health professionals on the final hub would be crucial.

Conclusion: Engaging practitioners and service-users in the design of the hub has been invaluable to ensure it is fit for purpose. Using on-line methods to undertake this work has been convenient for participants and provided rich data.

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12.15 – 13.10

8b.1 Do they know what we do? Mammography as part of undergraduate radiography training and its potential for influencing the future workforce

Mrs Kathryn Taylor[1], Mrs Ruth Strudland[2]
[1]Cambridge Breast Unit, Addenbrookes Hospital, UK; [2]Radiography Faculty of Health & Science, University Campus Suffolk, UK

Introduction: How mammography is incorporated into undergraduate (UG) radiography training may influence student perception of the specialty and its potential as a future career option. We provide an overview of the academic and clinical content of UG radiography courses relating to mammography across the UK. Using mixed methods and an iterative, inductive approach supplying quantitative and qualitative data, we identify any variations and discuss possible causes which may help influence future training strategies.

Methods: A self-designed questionnaire containing open and closed questions was sent via online 'Survey monkey' to course leaders of all Higher Education Institutions (HEIs) offering BSc (Hons) Diagnostic Radiography courses in the UK. Responses were analysed for trends which were further explored by semi structured telephone interviews. These were transcribed and evaluated using a thematic analysis, the themes being categorised and coded

Results: 19 of 24(79%) HEIs responded to the questionnaire. Follow up telephone interviews were conducted with 5 course leaders to further explore themes. Academic teaching ranged from 3-25 hours over the 3 year course. Compared to other specialties 10(53%) HEIs spent less time on mammography with 12(63%) citing HCPC standards as the reason. 11(65%) HEIs sent students on mammography placements, 2(12%) sent females only. Range 2 days-2 weeks. Influences included availability of expert teaching and relationship with clinical departments. Positive engagement appeared to encourage students into mammography posts

Conclusion: Variation in undergraduate exposure to mammography appears to influence student perception of the specialty. Students views should be sought to add validity to these findings

8b.2 Preoperative role of Contrast Enhanced Mammography (CESM) in Breast Cancer

Dr Mohamad Hajaj, Dr Sana Pascaline, Mrs Katalina Horvath
Kettering General Hospital, UK

Background: Currently complex breast cancer cases are evaluated by MRI.

MRI has high sensitivity but also has high cost, long waiting time, claustrophobia and some false positivity issues.

CESM offers combined high quality digital mammograms and contrast enhanced image similar to MRI performance for diagnosis and staging of breast cancer (Fallenberg at el 2014.). The purpose of this study was to establish the sensitivity of CESM.

Methods: Prospective study – Kettering Breast Unit 2014 – 2015.

47 patients underwent CESM, 25 also had Breast MRI. Inclusion criteria for CESM were P4/5 finding and age 40- 70 years. Exclusion criteria were diabetes, nephropathy, allergy to contrast. CESM two-view images were obtained 2 minutes after the intravenous application of iodinated contrast.

Results: 47 histopathological results were compared to CESM predicted size.

The combined CESM average lesion size – 26.2mm, histopathological – 25.1mm. One false positive and one false negative CESM result.

CESM sensitivity 97%

CESM was more accurate in size prediction in 10 cases than MRI.

MRI was more accurate in 7 cases.

CESM and MRI were identical in 8 cases.

Conclusion: The high sensitivity of CESM and very close agreement in results of tumour size obtained by CESM, MRI and histopathology indicates that CESM could serve as a potential replacement for breast MRI. CESM provides faster, cheaper and a comfortable experience for the patient.

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8b.3 Changes in enhancing tumour volumes on magnetic resonance imaging in patients undergoing neoadjuvant chemotherapy for primary breast cancer – correlation with final pathological score

Dr Shelley Waugh[1], Dr Nazleen Muhammad Gowdh[2], Dr Sarah Vinnicombe[1]
[1]Ninewells Hospital, NHS Tayside, UK; [2]Aberdeen Royal Infirmary, NHS Grampian, UK

Purpose: Dynamic contrast enhanced (DCE) Magnetic Resonance Imaging (MRI) is widely utilised in monitoring neoadjuvant chemotherapy (NAC) for primary breast cancer. In the drive for personalised treatment, imaging metrics that can identify patients unlikely to respond to treatment are key to allow treatment change or surgical intervention. We sought to link changes in enhancing tumour volume (ETV) between baseline and interim MRI with pathological outcome, assessed using the residual cancer burden (RCB) score.

Methods: 103 patients undergoing NAC for biopsy proven breast cancer underwent baseline (pre-NAC) and interim (after 2 or 3 cycles) MRI on a 1.5 Tesla (T) or 3.0T scanner with DCE imaging using a T1 weighted 3D acquisition. ETV was analysed using the active contour segmentation tool in ITK-Snap[1]. ETV at both time-points was calculated twice by one observer, blinded to pathology and with a one-month interval between analyses.

Final pathology was assessed on surgical resections using RCB scores[2] and percentage change in ETV calculated for each category.

Results: Average percentage reductions in ETV for each RCB category were: pCR 93.5% (n=18), RCB-I 71.1% (n=14), RCB-II 59.4% (n=51) and RCB-III 33.0% (n=20) (Figure 1). Pair-wise comparison demonstrated significant difference between each group ($p<0.008$, paired t-test) with the Xion of RCB-I vs. RCB-II ($p=0.273$). Intra-observer reproducibility (IOR) assessment calculated the Coefficient of Repeatability of ETV as 1.5ml (1.1% percentage difference between visits).

Conclusions: These results demonstrate that percentage change in ETV correlates with RCB score. Good IOR indicates that this is a potentially useful clinical tool in prognostication.

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8b.4 A completed audit of detailed axillary ultrasound scan in re-staging of the axilla after neoadjuvant chemotherapy

Ms Anastasia Peppe, Mr Panos Pappas, Mr Mohammed Tahir, Dr Claire Kayser, Miss Nicola Roche, Mr Gerald Gui, Miss Fiona MacNeill, Mr Peter Barry, Dr Robert Wilson, Miss Jennifer Rusby
The Royal Marsden Hospital NHS Foundation Trust, UK

Introduction: With a more conservative approach to axillary surgery being considered after NACT, clinical re-staging becomes important in decision-making.

Methods: Data were collected on 460 patients who had proven axillary disease prior to NACT and underwent axillary lymph node dissection between January 2006 and December 2015. Patients were grouped according to whether axillary Ultrasound Scan (aUSS) was

undertaken before or after December 2012 when we started to document axillary response in detail. Post-chemotherapy aUSS reports and axillary pathology reports were classified as positive or negative for abnormal lymph nodes and for residual disease (pCR) respectively.

Results: The sensitivity of aUSS before and after the change of practice was 55% and 71% respectively. The specificity was 59% and 88% respectively. Negative predictive value (NPV) increased from 38% to 83%.

Conclusions: The high NPV makes aUSS a useful tool in re-staging of the axilla as part of treatment planning following NACT. Patients with aUSS negative axilla are likely to have a lower false negative rate of SLNB after NACT (Boughey et al). However, aUSS does not replace the need to identify and biopsy the nodes which were proven to be positive prior to NACT.

References:

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8b.5 Recall for assessment after post-treatment surveillance mammograms in breast cancer

Dr Monika Wassermann, Dr Christine Swinson, Mr Deepak Shrestha, Miss Kath Kirkpatrick, Mr Duraismay Ravichandran

Breast Unit, Luton and Dunstable University Hospital NHS Trust, UK

Background: National Guidelines recommend that patients treated for breast cancer should undergo post-treatment mammographic surveillance. Frequency and duration of surveillance varies widely within the National Health Service in England and there is little published data on the outcome. We have reviewed the results of results of surveillance in a single institution over a 5-year period.

Materials and Methods: Retrospectively we identified all patients undergoing surveillance mammograms from April 2010 to the end of March 2015 from the hospital database and reviewed the records of those recalled for assessment. At this time our follow up policy was yearly bilateral mammograms for 5 years after breast conserving surgery, and mammograms of the contralateral breast in years 1,3 and 5 after mastectomy, unless the patient was under 50 when similar surveillance continued until age 50.

Results: During the study period we carried out 3685 surveillance mammograms in 1089 patients, mostly following breast cancer. We recalled 149 patients with previous breast cancer, a recall rate of approximately 4%. 131 had previous invasive cancer and 18 DCIS. Recall was predominantly for a density or mass (63) or new micro-calcifications (61). 50 underwent further imaging only, 8 had cysts aspirated and 79 also underwent biopsy. As a result, we diagnosed 21 patients (14% of those recalled) with new a new malignancy (ipsilateral recurrence in 10, contralateral malignancy in 11).

Conclusions: In our institution, 14% of patients recalled following post-treatment surveillance mammograms over a 5 year period were found to have a new malignancy.

Poster abstracts

P1 Pathology and Positioning in mammography

Mrs Juliet Mazarura

NHS Birmingham, UK

Content: To demonstrate the importance of correct positioning techniques in mammography towards the diagnosis of breast pathology. To remind the breast imaging reporters of the importance of image quality when reporting mammographic images.

Introduction: Mammographic image quality can influence cancer detection rates and stage of detection (Yanpeng et al 2010). Taplin et al (2002) demonstrated that poor positioning was the main reason for low cancer detection rate and that the overall quality was also associated with increased interval cancers when cases of ductal carcinoma in situ were included. Achieving high quality mammograms may improve sensitivity and possibly reduce the false positive rate (Guertin et al 2014). Clinical images must meet the radiologists needs in order to serve the patient well (Cheeseman 2006). Factors affecting the clinical image quality of a mammogram are positioning of the breast, compression, sharpness, optimum exposure and contrast (Popli et al 2014). The mammographer must have advanced positioning and clinical skills to ensure that the area of concern is appropriately imaged, clearly seen and able to be characterized by the radiologist because what is missed or obscured on clinical images is not analyzed by the radiologist.(Cheeseman 2006). A good quality mammogram demonstrates all the breast tissue with maximum image detail.

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P2 A pictorial review of imaging in the augmented breast

Miss Clare Alison, Dr Harriet Russell, Dr Rebecca Geach, Dr Lucinda Hobson, Dr Dagmar Godden, Dr Helen Massey, Professor Iain Lyburn

Thirlestaine Breast Centre, UK

Content: The augmented breast historically presents problems in mammography due to obscuration

of breast tissue by the implant. This means that potential abnormalities can be missed on standard mammography.

In March 2015, following recommendations of a national audit within the National Health Service Breast Screening Programme (NHSBSP), we changed our local protocols to include an Implant Displacement Cranio-Caudal (CC) view (historically known as the Elklund technique CC) for women presenting for mammography with breast augmentation.

This was implemented in both the screening and symptomatic services. Where the displacement view is not possible due to the implant being immobile we take a true lateral view instead.

In our experience, in most cases, the images using the displacement technique demonstrate more of the anterior breast tissue than a standard CC view.

We present a pictorial review of six cases where the implant displacement view has demonstrated breast abnormalities otherwise obscured, or only partially imaged, on the standard mammographic views.

To conclude, our impression is that the implant displacement view is a useful technique for demonstrating abnormalities in the augmented breast.

P3 Quantitative review of Craniocaudal (CC) images

Ms Sarah Dunn
St Vincent Breast Screening, UK

Purpose: To review the quality of 25 CC images produced by every mammographer within St. Vincent's Breast Screen, part of Breast Screen Victoria. This review may highlight areas to improve the quality of these images. The CC image can often be overlooked as it is seen as the easier image to produce and less time and effort may be put into the production of this image. This study will investigate the quality of CC images at this service and potentially identify training needs.

Method: By using a comprehensive review system, 25 images from each mammographer currently screening regularly within the service are being assessed. These images are being reviewed with any common defects in the images being noted e.g.

- Areas such as tissue thickness
- Pectoral muscle to nipple distance measured (PNL)
- Image bias
- Nipple in profile

A summary of the findings will be presented at the second quarter Continuing Education Meeting (CEM) in May 2016.

Results: As this research is still being under taken there are no results so far.

Conclusion: Based on this research I will feed back to the Screening Mammographers in the St. Vincent's service current quality of their CC images and highlight any training needs.

P4 Technical assessment of a novel compression paddle – impact on technical performance

Ms Katy Szczepura[1], Mr William Mairs[2], Ms Catherine Taylor[2], Dr Claire Mercer[1]
[1]Diagnostic Radiography, University of Salford; [2]Christie Medical Physics and Engineering, Christies Hospital

Background: A novel compression paddle which measures applied pressure (kPa) rather than compression force (N) has recently been made available. Research shows that the use of this paddle could reduce patient discomfort without adversely affecting radiation dose and image quality.

This work assessed the impact of using this paddle, when compared to a standard 18 cm x 24 cm rigid paddle, on equipment performance.

Method: All tests performed using a GE Senographe Essential Full Field Digital Mammography system (amorphous silicon detector). Standard tests were assessed following methods described in IPEM Report 89 and NHSBSP Report 0604

Results: All safety checks found the new paddle functioned correctly, and there was no impact on light field size.

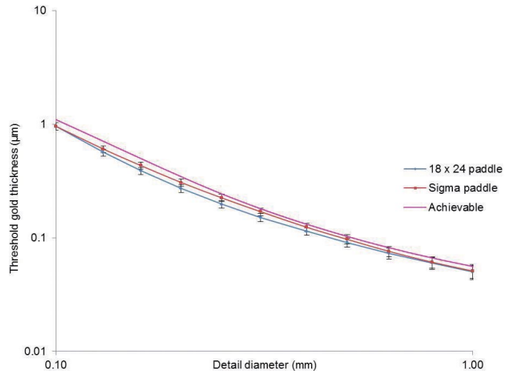
Average percentage difference, percentage difference range and Pearson correlation coefficients (r) were calculated for all variables. Very strong correlations were found for all tests.

	Average % difference	Range	r (correlation)
Output	-0.38	-1.4 – 0.6	0.99997
HVL	-0.51	-1.8 – 0.6	0.99866
Post Exposure mAs	0.11	-0.3 – 0.9	0.84995
CNR	-1.47	-4.3-2.3	0.99797
MGD (mGy)	-0.83	-0.5 – -1.3	0.99949

For uniformity, both paddles performed similarly

	18x24	Pressure Paddle
Maximum % deviation from centre	-5.2	-4.7

CDMAM results demonstrate that the pressure paddle has a slightly poorer curve than the 18x24, however this is unlikely to impact on clinical image quality.



Conclusion: Performance of pressure based paddle is comparable with the standard rigid 18x24 paddle, with no appreciable adverse effect on either patient dose or image quality.

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P5 Mammography compression Values and the Effect on Recall Rates to Assessment Review in the NHS Breast Screening Programme

Ms Deborah Watson
West of Scotland Breast Screening Centre, UK

Purpose: Optimal compression in digital mammography is crucial to enable accurate image interpretation and therefore appropriate visualisation of abnormalities.

There is conflicting evidence with regards to compression applied[1] – to encourage screening adherence, minimal compression is desirable – however to obtain a diagnostically acceptable image, compression must be sufficient to avoid false-positive recalls[2].

This is a retrospective analysis of 150 women recalled to the review clinic for suspected abnormality in the form of Asymmetric Density, Parenchymal Distortion or composite breast tissue.

Method: Compressed breast thickness and compression applied during screening will be measured against that applied at assessment review. This would ascertain whether screening compression is optimal and a true abnormality exists at review, or if compression is suboptimal and creates unnecessary call-backs.

Breast density and size, operator experience and level of professional qualification held will be investigated.

Results: It is our aim to review the data within our centre using inferential statistics in March 2016, report in April 2016 and re-visit the application of adequate compression through training sessions where appropriate.

Conclusion: As this audit is still in progress a final conclusion has not been reached however we expect it to demonstrate that poor compression leads to false positive recalls.

Depending on results, further investigation may include analysis of flexi versus fixed paddle mammography.

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P6 Mammographers awareness of breast compression

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Purpose: Following image appraisal there has been suspected variation in applied breast compression between Mammographers. Following the introduction of Digital Mammography there have been several discussions amongst staff regarding image quality. Adequate compression has been proven to reduce radiation dose and decrease the likelihood of geometric un-sharpness and motion artefacts.[1] As already proven, good compression results in adequate imaging. In contrast to this insufficient compression may result in detrimental image quality and lesion visibility resulting in potential for incorrect diagnosis.[2] This audit will assess Mammographer awareness of factors affecting how and why they apply their particular level of breast compression and aims to encourage self-audit and introduce changes to Mammography practice.

Methods: Staff group of 36 Mammographers will be audited to gain information on how they apply breast compression. In particular factors which influence how much breast compression is applied will be explored. The study group all work in a large Breast Screening Centre. Audit will be collected in the form of a multiple choice questionnaire. To avoid bias multiple choice options will reflect a wide scope of possible answers/outcomes. Questionnaire will be ready for staff participation March 2016

Results: Statistical analysis in the form of percentage, average and most commonly cited will be applied to audit. This will assist to determine factors affecting an individual's decision making process surrounding breast compression. Results will explore Mammographer perception of the impact their personal choices regarding breast compression has on the client. Results will be available for statistical analysis/conclusion April 2016.

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P7 Does compression force and paddle design affect the performance of breast density software?

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Purpose: Robust volumetric breast density measurements require methods that account for variations in breast thickness caused by the tilting of the compression paddle [1]. This study investigates whether automated density measurements are affected by compression paddle design and force applied.

Methods: Bilateral two-view mammograms were collected from six centres using compression paddles in either rigid or flexible modes. Volumetric breast density was assessed by two software tools Quantra™ (Hologic, Bedford, USA) and Volpara™ (Volpara Solutions, Wellington, New Zealand). Compression force and paddle mode was determined from DICOM header information. Women were stratified into groups defined by paddle mode and compression force quartiles. Software performance was quantified by Pearson's correlation coefficient (r) between measurements from CC and MLO views of the same breast. Fisher's z transformation was used to test for significant difference ($p<0.05$) between r.

Results: There were 6522 pairs of CC and MLO views using the rigid paddle mode and 6750 using the flexible mode. All measurements of breast volume were highly correlated in both rigid and flexible modes ($r=0.97, p<0.001$). For absolute dense volume and volumetric density both software tools demonstrated slight but significant reductions in correlation when the flexible mode was used compared to the rigid mode. (Quantra density from $r=0.89, p<0.001$ to $r=0.86, p<0.001$, Volpara density from $r=0.90, p<0.001$ to $r=0.89, p<0.001$). There was a downward trend in correlation coefficient as compression force increased for both paddle modes.

Conclusions: Compression paddle mode and applied force do affect the performance of breast density measurement software but the magnitude of this influence is small.

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P8 Digital Breast Tomosynthesis: an experience using reduced compression

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Mammography is the gold standard for breast screening and early detection of cancer. Women are discouraged to undergo screening due to pain experienced during compression hence detection of breast cancer is detected in the late stages despite availability of mammographic facilities. As a strategy to encourage women to come forward for screening, a study was done to determine the effects of reduced compression force on pain, anxiety and image quality using digital breast tomosynthesis (DBT). A prospective study was done using random sampling on 130 women with standard and reduced (50%,60%,70%) compression force. A validated questionnaire of 20 items on anxiety level and a verbal rating scale-4 on the pain level was given to subjects pre and post mammography. Cranio-caudal(cc) and medio-lateral oblique projection of both breast was done using the standard but only the cc projection of one breast was done with reduced compression. Two independent radiologists evaluated the images using image criteria score and BI-RADS. Standard compression showed a significantly higher score on pain and anxiety level compared to the reduced compression ($p<0.05$). Two independent radiologists scored the standard and reduced compression mammogram as equal with a score of 87.5% and 92.5% respectively using ICS scoring. The BI-RADS score showed only 10% difference between standard and reduced compression for both radiologist. Minimal compression force to immobilize the breast reduced anxiety and pain level without compromising the image quality hence women would be encouraged to do screening for early detection of breast cancer.

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P9 Pressure based mammographic compression: a feasibility study to determine operational level(s)

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Background: Research has established large variations in breast compression force within and between practitioners[1-3]. A requirement therefore exists for to standardise compression to improve client experience whilst minimising radiation dose and image quality differences[3].

Rationale: A new approach to breast compression, using pressure[4,5] rather than force, has been suggested to reduce patient discomfort and improve consistency. Using this approach, the optimal pressure, based on breast detector footprint and thickness, has not been investigated.

Methodological Detail: Ethical approval was granted for 25 participants, 5 in each age range: 20-29, 30-39, 40-49, 50-59, 60-69 and exclusion criteria applied.

Following standard mammography guidelines[6]each participant had their breasts compressed for 4 views (RCC/LCC/RMLO/LMLO), commencing 5kPa, stepping through 1kPa increments to toleration level(s). No x-ray images were acquired. For each pressure level, thickness and compression force were collated. The 4 views were repeated with a pressure mat placed on the image receptor (Xsensor[7]) footprint, compression force and thickness readouts were collated for each pressure level.

Results: Proposed Analysis

Data will be normalised and gradients calculated for: pressure versus thickness, force and footprint. Gradients will be used to identify the optimum pressure range for future clinical trials.

No results will be included within this presentation.

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P10 Comparison of 2.3 & 5 mega pixel (MP) resolution monitors when detecting mammography image blurring

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Purpose/Background/Objectives: Image blurring in Full Field Digital Mammography (FFDM) is reported to be a problem within many UK breast screening units resulting in significant proportion of technical repeats/ recalls [1]. Our study investigates monitors of differing pixel resolution, and whether there is a difference in blurring detection between a 2.3 MP technical review monitor and a 5MP standard reporting monitor.

Methods: Simulation software was created to induce different magnitudes of blur on 20 artifact free FFDM screening images. 120 blurred and non-blurred images were randomized and displayed on the 2.3 and 5MP monitors they were reviewed by 28 trained observers. Monitors were calibrated to the DICOM Grayscale Standard Display Function [2]. T-test was used to determine whether significant differences exist in blurring detection between the monitors.

Results: The blurring detection rate on the 2.3MP monitor for 0.2, 0.4, 0.6, 0.8 and 1 mm blur was 46, 59, 66, 77and 78% respectively and on the 5MP monitor 44, 70, 83, 96 and 98%. All the non-motion images were identified correctly. A statistical difference ($p < 0.01$) in the blurring detection rate between the two monitors was demonstrated

Conclusions: Given the results of this study and knowing that monitors as low as 1 MP are used i clinical practice , we speculate that technical recall/ repeat rates because of blurring could be reduced if higher resolution monitors are used for technical review at the time of imaging. Further work is needed to determine monitor minimum specification for visual blurring detection.

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P11 An evaluation of image grading at the Nottingham Breast Institute

Mrs Sarah Cardno[1], Miss Faye Wigley[2]

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Purpose of evaluation and objectives: To maximise cancer detection one of the mammographer's professional commitments is to monitor and maintain high standards of image quality by engaging in a peer review programme

PEER Review is part of the NHSBSP QA framework to ensure that standards of image quality are maintained and that individual performance is monitored to see if the standards of 75% good images are achieved. In order to accurately measure this, it is important that the criteria for image quality and grading are understood and the correct grades are given. As a training centre, Nottingham Breast Institute wanted to look at the differences in grading from individuals working at the unit, so that training could be given on the grading of images in-order to standardize marking.

Specific image standards are well documented in practice however there is often some level of subjectivity which could result in inconsistencies of image quality.

The purpose of this exercise was to investigate differences in individual interpretation of grading criteria and how applying these differences could result in a false reflection of the actual standards produced by the department.

Method: Films were selected and identified as the test images. These images were then graded by the staff members of the NBI, which included both Assistant

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Practitioners and Radiographers. The results were then analysed and recorded.

A presentation took place where the findings were discussed and a review of the grading criteria carried out.

The test was then repeated two weeks later and the results compared to the initial findings.

Results: There were inconsistencies in the initial grading of images. The data from the second test are still being collated and will be presented in the final poster.

References:

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P12 Assessing the Causes of Technical Recall Rates

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Background: During the second quarter of 2013, the technical recall (TR) rates for South East London Breast Screening Programme (SELBSP) increased from 44 to 87.

Methods: A retrospective review of three variables was carried out assessing the screening location mammographic view laterality (left or right breast) and number of TR identified per film reader.

Results: The audit revealed that MLO images are more likely to be recalled due to image blur compared with CC views. No difference was found in the number of TR between the left and right breast or screening location. The film readers varied immensely in the number of images they individually recalled. Image blur was recorded as the main reason for the TR which was attributed to a film reader.

Conclusions: The audit has identified three key areas that require further evaluation: whether or not image blur was simply overseen or dismissed by the mammographer whether those film readers with higher recall rates were recalling images that are actually of diagnostic quality and whether or not the conduct of the audit has driven mammographers awareness of image blur and thus decreased subsequent TR rates.

P13 Early experiences using the Ideal Hotelling Observer Method in routine mammographic QA to predict scores for CDMAM phantom

Ms Eugenia Kulama[2], Dr Lynn Martinez[1]
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Purpose/Background/Objectives: The CDMAM phantom is the basis of the image quality standards for digital mammography [2-6]. The ideal hotelling observer theory [1] states that it is possible to calculate the expected observer response for a detector based on measurements of a system's modulation transfer function (sMTF) and noise power spectrum (sNPS). This could be used to produce routine measurements which would overcome the known differences between CDMAM phantoms.

Methods: All the measurements are performed during routine testing. The sNPS is generated from images of a 5cm thick uniform stack of perspex imaged under AEC, using standard CDMAM exposure conditions. The sMTF is generated using a tungsten edge at 2.5cm above the breast support table sandwiched in 5cm of perspex, with the grid and compression paddle in place. Analysis of images was carried out using OBJ_IQ and the CDMAM predictions were calculated using in house software. Twelve mammography systems from four different manufacturers were tested on a number of visits, to establish short and long term consistency of the measurements.

Results: Our results have been compared with those of the CDMAM software and were found in good agreement, within the calculated errors, for all systems.

Conclusions: The measurements required to produce a synthetic version of the CDMAM results are quick and easy to carry out the results compare well with the CDMAM results and are more consistent than the comparable phantom measurements. Therefore we believe that this technique can be used as a routine QA measurement.

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P14 Modulation Transfer Function in Routine Testing of Full Field Digital Mammography Systems

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Purpose/Background/Objectives: The relative contrast at a given spatial frequency is called the Modulation Transfer Function (MTF). Calculating this number gives a quantitative result of the detectors resolution properties. A quantitative measurement would remove subjectivity in such a measurement. MTF can be measured via three methods. NHSBSP Equipment report 0604 [1] outlines the straight edge method for analysis within appendix 9. MTF can also be calculated using a resolution grating.

Methods: The TORMAX test object contains a resolution bar grating used in this study. Each bar pattern has a different spatial frequency, which is entered into the MTF calculation within IQworks for bar gratings. NHSBSP equipment report 0604 uses the frequency when MTF drops to 0.5 and 0.1 for both the vertical and horizontal directions as a baseline measure. This was taken on 30 different images. Results from different manufacturers where correlated to test the feasibility of manufacturer baselines.

Results: Three systems manufacturers noted within this study are GE, SiThree manufactures of systems within this study are GE, Siemens and Hologic. Each one has a different Nominal detector pixel size. It was found that MTF did correlate to pixel size, with GE systems (100µm) having lower spatial frequencies at MTF0.5 and MTF0.1 compared to Siemens systems (85µm) and Hologic systems (70µm).emens and Hologic. Each one has a different Nominal detector pixel size. It was found that MTF did correlate to pixel size, with GE systems (100µm) having lower spatial frequencies at MTF0.5 and MTF0.1 compared to Siemens systems (85µm) and Hologic systems (70µm).

Conclusions: It is possible to define manufacturer/system baselines using the MTF measurement. This allows for a pass/fail criteria upon acceptance checks. Furthermore this improves routine testing by giving an absolute value for resolution and contrast. Using IQworks to calculate the MTF, removes the chance of user error.

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P15 Audit of the visibility of calcification seen on specimen x-rays using the Kubtec and Faxitron cabinet x-ray imaging systems

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Purpose: The ability to demonstrate representative calcification on biopsy specimen radiographs is crucial to ensure adequate tissue sampling when assessing calcification. We carried out a prospective review of 10 patients to evaluate and compare the visibility of calcification on specimen x-rays using both the Kubtec (Xpert 20) and Faxitron (MX-20) cabinet x-ray imaging systems.

Methods: The specimens of 10 patients undergoing biopsy of calcification were imaged in both the Kubtec and Faxitron. The images were reviewed by 7 clinicians who noted the following for each case: the number of calcium flecks seen on each of the cabinet monitors and the PACS monitor the contrast on the monitors before

and after windowing and which cabinet x-ray system gave best visibility of the calcium specks overall. The results for all 7 clinicians were summated for all 10 patients.

Results: Kubtec and Faxitron showed 791 and 947 flecks on cabinet monitors, and 839 and 983 flecks on PACS monitor respectively. Better contrast pre-windowing was reported on Kubtec in 51 images, Faxitron in 14 images but was equal in 5 images. Better contrast post-windowing was reported on Kubtec in 4 images, Faxitron in 44 images and but was equal in 22 images. Overall calcium visibility was reported as best on Kubtec in 3 images, Faxitron in 49 images and equal in 18 images.

Conclusion: Overall, with windowing, Faxitron images gave better visibility of calcium flecks than Kubtec images, both on the cabinet monitors and on PACS. However, the Kubtec images showed better contrast prior to windowing.

P16 The detection of visual blurring in 1MP and 5MP monitors within mammography clinical practice

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Background: Over 12 months within a UK breast screening service the number of technical recalls, due to image blurring, was high. 40,954 clients imaged within annum 0.88% recalls, 1.16% repeats, 2.04% overall. Over half of clients recalled and 1/20th repeated due to image blurring. Highlighting a number of 'blurred' images were not being identified at the time of examination.

Aim: To identify if the 1MP acquisition monitor (reviewing mammograms) was adequate to identify image blurring.

Methods:

DataSet 1, 50 anonymised mammogram images: 35 images categorised as blurred (technically recalled) and 15 diagnostic images (not technically recalled). 2 images readers classified these images intra and Inter-observer variability measured (Cohen's Kappa).

DataSet 2, 100 anonymised mammogram images: 70 categorised as blurred, 30 categorised as not blurred (not technically recalled). 2 image readers and 4 practitioners classified these images twice with a 1 week interval on both 1MP and 5MP monitors.

Results:

DataSet 1: Kappa: 0.70

DataSet 2: Observers 1 and 2 displayed highest performance on both the 5MP (80, 82, 82, 81 classified correctly) and 1MP (69, 76, 63, 72 classified correctly).

Observer 6 performed well on both monitors, in particular 5MP (79, 83 classified correctly). Observers 3, 4 and 5 produced similar performance levels on both monitors (1MP: 60, 5MP: 53)

1MP: Four of the six observers' level of agreement reduced between 1st and 2nd reads

5MP: All but one observer achieved good agreement between 1st and 2nd reads

Conclusions: Overall the ability to detect image blurring clinically was improved on the 5MP monitor.

P17 BreastCheck, the National Breast Screening Programme in Ireland: 10 year review of a national programme prior to EUREF accreditation

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[1]National Screening Service, Ireland; [2]University College Dublin, Ireland

Introduction: BreastCheck, the national breast screening programme in the Republic of Ireland, acquired EUREF level 4 accreditation in 2015. Digital mammography was introduced in 2007 at the time of national expansion.

Purpose: To review the key performance indicators (KPIs) from BreastCheck over the 10-year period (1 January 2004 to 31 December 2013) prior to EUREF accreditation.

Methodology: Standard performance indicator data are routinely collected from BreastCheck screening units.

Results: 972,236 women were screened in the period. Uptake initially rose following national expansion in 2007 but fell in subsequent years to a low of 70.2% in 2013, with the fall most marked in women attending

for first screening. Following the introduction of digital mammography initial screening recall rates rose (average 4.9% in 2004 to 8.0% in 2013) while subsequent screening recall rates remained throughout the period within the target of <3%. Average rates of other KPIs were as follows: PPV 11.9% initial, 21.8% subsequent invasive cancer detection rate per 1,000 screened, 6.6 initial, 4.5 subsequent cancer detection rate <15mm 43% initial, 52% subsequent. DCIS rates were high, on average 21% of cancers detected at initial screening and 20% of cancers detected at subsequent screening however the majority (91% in 2013) were of intermediate or high grade. The standardised detection ratio rose steadily from 1.05 (2004) to 1.23 (2013). Strategies were put in place to improve uptake which have resulted uptake of >76% in 2015.

Conclusion: BreastCheck demonstrated sustained high-level performance in the decade prior to accreditation uptake remains a concern.

P18 The impact of Index of Multiple Deprivation (IMD) and Ethnicity on breast screening uptake in the North West of England

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Aim: To investigate the impact of index of multiple deprivation (IMD) and ethnicity on breast cancer screening uptake in the North West of England.

Methods: Data for screening uptake rates were collected from 2005 to 2014 using data from the North West Breast Screening Units and the annual breast screening statistics reports. These were correlated with IMD published in 2007 & 2010. The uptake rates were also correlated with ethnicity data obtained from the census 2011. Then, the results for ethnicity were adjusted for IMD.

Results: Both prevalent and incident uptake rates have declined from 2005/6 to 2013/14. Deprivation was shown to negatively correlate with breast screening uptake in all rounds, the strongest correlation being with prevalent screening rounds (IMD 2007 p=0.005 & 2010 p=0.016). The incident round negative correlation was IMD 2007 p = 0.002 (significant) & IMD 2010 p = 0.163 (not significant). For ethnicity, the Caucasian population showed a positive correlation while Asian, a negative correlation. This was more significant in the Pakistani and Bangladeshi groups. Interestingly, when the results were adjusted for deprivation, ethnicity did not show a significant correlation with uptake rates.

Conclusions: Our results clearly show that the more deprived an area, the lower the breast screening uptake rate. Moreover, the higher the proportion of Asian in a population, the lower the uptake rates and this is more significant in the Pakistani and Bangladeshi group compared to the Indian and Chinese. Overall the impact is most marked in the prevalent round.

P19 Predictors of changing patterns of mammography attendance and informed choice in England

Miss Rebecca Crosby, Dr Sian Taylor-Phillips, Dr Christopher Stinton, Professor Aileen Clarke
University of Warwick, UK

Background: Mammography uptake is declining. The reasons for this are unclear. It is unknown whether the decline is due to factors such as barriers to participation or if more women are making an informed choice not to attend. Personal characteristics and the woman's personal risk of breast cancer are thought to influence decisions of whether to attend and making an informed choice to attend (1). There is currently limited research on the effects of personal risk on informed choice and uptake specifically in mammography.

Aims: To explore if a woman's breast cancer risk profile influences likelihood of mammography attendance or informed choice. A second aim will evaluate if personal characteristics (e.g. age, socioeconomic status, location) influence informed choice in breast screening.

Methods: Personal risk information, understanding of, and attitude towards, breast cancer screening, and intention to attend screening will be collected by a questionnaire delivered to women through participating screening centres. An informed decision will be calculated using the model developed by Marteau *et al* (2). Each woman's personal risk estimate will be calculated using the Breast Cancer Risk Assessment Tool (3). Intention to attend will be compared with actual uptake obtained via screening centre data. The study will attempt to follow-up those who do not return questionnaires.

Conclusion: This research will be used to make recommendations for future informed choice and personalised risk communication decisions.

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P20 Strategies to address falling uptake of breast screening

Dr Patricia Fitzpatrick[1,2], Ms Sinead O'Neill[1], Dr Therese Mooney[1]

[1]National Screening Service, Ireland; [2]University College Dublin, Ireland

Background: Uptake rose following national expansion (2007) of BreastCheck, the national breast screening programme in the Republic of Ireland (ROI) but fell to a low of 70.2% in 2013, most markedly for first screening. There is no age-sex population register in ROI and the population register is collated from multiple sources deduplication and deactivation of deceased is standard, however some women on the register might not exist at known address. Financial recession cut funding for advertising. Women provide a mobile phone number at their first appointment.

Methodology: Three strategies were undertaken to address fall in uptake: (1) A text messaging reminder service was introduced for women attending subsequent appointments (2) Registered letters were sent to 13,696 clients on the BreastCheck Register who had received 3 invitations (over 3 consecutive screening rounds) and who had neither attended nor made contact with the programme (3) New national advertising campaign was introduced October 2014.

Results: 4,053 records were deactivated following returned registered letters and there were 386 calls to the FreePhone line, with 37.5% women wishing to re-engage with the programme.

The overall uptake rate increased by 6.3% uptakes by initial/subsequent also increased (Table 1).

Table 1. Uptake rates 2013/2014

	2013	2014
New initial	68.1%	69.0%
Previous round non attender	11.3%	12.9%
Overall Initial	41.2%	49.7%
Subsequent	85.7%	88.8%
Overall	70.2%	76.5%

Conclusion: The combination of removal of artefactual uptake decline and measures to address real decline have resulted in a rapid improvement in uptake in all categories of invitee uptake monitoring continues.

P21 Nudging women toward their breastscreen

Ms Vicki Pridmore

Breastscreen Victoria, Australia

Purpose: Using behavioural economics (BE), a series of two-arm randomized control trials tested the content of breast screening program invitations on uptake by:

- Responders to the first screening invitation
- Long term non-responders

Background: BreastScreen Victoria (BSV) screens 250,000 women annually. 20,000 women ignore their first invitation.

The UK Nudge Unit's successful application of BE to increase tax compliance prompted the testing of screening invitations using BE principles, to engage 'missing' women.

Methods: A modification to BSV IT infrastructure enabled rolling randomised trials to test letter variations against a control letter allowing BSV to confidently include (statistically significant) changes into business as usual.

The trials ran for three months and targeted two groups:

- Women due to receive their first invitation letter
- 36,000 women who had ignored their invitation

Results: For the cost of an iPad and some considered changes to the invitation letter, almost 2,000 additional women booked their first appointment during the trial period.

Conclusions: The nudges are working with statistically significant increases as evidence. Once included in business as usual, the estimated impact is 4000+ additional women screening annually.

BSV is now trialling the same approach on women returning for subsequent screening rounds.

P22 Could a pictorial breast screening invitation help to increase uptake to breast screening in a multi ethnic population?

Ms Karen Wren

University Hospitals of Coventry and Warwickshire

Study Aim: To investigate the viability of a pictorial breast screening invitation producing a higher uptake for breast screening amongst a multi ethnic population when used in conjunction with the national standard invitation. The effectiveness will be judged by the effect it had on previous non-attenders (PNAs).

Design: A non-probability sampling technique with a purposefully selected homogenous population from three preselected GP practices serving multi-ethnic populations.

Need for Study: The effectiveness of any screening programme is dependent on high acceptance. Low rates of coverage by certain populations would lead to health inequalities. Studies have established that screening coverage is not uniform across the population and that women from Black Minority Ethnic (BME) communities have lower uptakes to breast screening. Language has been cited as predominate barrier.

Services with populations of diverse culture, may find that translating invitations does not solve the problem. Converted transcripts are often of poor quality, inappropriate for people who cannot read their mother tongue or whereby there is no written form.

Whilst it is acknowledged that language problems may be a diminishing barrier amongst British born BMEs, it may still exist amongst older generations – the targeted population for breast screening.

There have been many worldwide interventions attempting to increase breast screening attendance amongst BMEs but a dearth in current UK studies which given the growing ethnic diversity is a concern.

P23 Breast Screen Singapore (BSS): The Challenges and Difficulties

Dr Jill Wong, Dr Patrick Teo

National Cancer Centre, Singapore

Background: Singapore has one of the highest breast cancer incidence rates in Asia and is also the No. 1 cause of cancer related mortality amongst Singaporean females. The national screening program, BSS, was introduced in 2002, with the aim to reduce mortality from this disease.

In this study, we illustrate the challenges and difficulties faced in BSS since its inception and why ultimately it may not achieve its primary aim.

Methods: The BSS database was searched for diagnosed cancers assessed at our center in 2014. A total of 134 clients were found and these were reviewed for 1) Known but undeclared symptoms at the point of screening 2) Delayed or defaulted from definitive treatment.

Conclusions: Theparticipation rate of BSS has remained at poor 10% since 2005, although the overall participation rate has increased from 29.7 % to 39.6%, as most of these take place outside of BSS. Amongst the cancers diagnosed at our assessment centre, some denied the presence of a lump at screening only to admit to it at assessment. This may be due to the heavy subsidy of screening compared to diagnostic mammography. There are also a number of women who subsequently either decline biopsy for a suspicious lesion or default from definitive surgery after a biopsy result of cancer. These numbers would adversely affect the overall mortality benefit for apparent screen detected cancers. More has to be done about patient education to achieve any measure of success of BSS.

References:

1. J Med Screen (December 2015), vol 22 no 4, 194-200. National Breast Cancer Screening Programme, Singapore: Evaluation of participation and performance indicators. EY Loy, D Molinar, K Y Chow, C Fock.

P24 What are your statistics? – An informative guide for film readers in the NHS breast screening programme

Mrs Monica Howard, Dr Eleanor Cornford

Nottingham Breast Institute, UK

Purpose: A mammography film reader's performance is identified and calculated using a range of assessment tools. They give the reader useful information to check and reflect on performance as an individual and in comparison to their peers.

We receive information from two main sources.

1. The National competency based assessment tool, PERFORMS, (personal performance in mammography) comprises of 60 difficult and challenging test case sets where a reader is assessed against the opinions of an expert panel of radiologists. Completion of this is mandatory and undertaken each year.

2. The NBSS computer system enables production of film reading statistics. In our region these are circulated to all film readers' annually.

New film readers are faced with a wealth of statistical information which can initially be confusing.

But, what do the assessment statistics show and how can we use this information?

Methods: Using innovative illustrations this poster will provide an explanation of the terminology used, provide formulae for the calculations and explain how this information relates to the NHSBSP QA standards.

Conclusions: This poster presentation aims to provide in a simple way an educational guide and reference for the mammography film reader. It will identify the assessment tools that measure a film reader's performance and explain how they are calculated. In so doing the film reader can better understand his/her statistics and use them in a constructive way to promote continued professional development.

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P25 Review of Evidence to Support Arbitration within Breast Screening: A Narrative Synthesis

Miss Lisa Hackney[1], Professor Ala Szczepura[1], Dr Louise Moody[1], Ms Becky Whiteman[1]

[1]University Hospital North Midlands NHS Trust, UK; [2]Centre for Technology Enabled Health Research, UK; [3]University Hospitals Coventry and Warwickshire NHS Trust, UK

Background: Double reading of mammography has been widely recommended to increase cancer detection rates[(1-3)]. However, when discordance between readers occurs, arbitration or consensus is required.

Primary objective – To identify evidence base to support effectiveness of different arbitration processes in mammography reporting.

Secondary objectives - To identify evidence relating to impact of (i) experience, (ii) reporting volumes, and (iii) education/ training on arbitrator performance.

Methods: Primary search of online databases (PubMed, Cinahl, Medline, Embase, Scopus, Web of Science, Cochrane Library). Secondary search of bibliographies of included articles. Grey literature databases searched (OpenGrey, OpenDOAR, Ethos, Zetoc). Articles restricted to English language. No limitations on study design. Survey of international experts to identify studies in progress.

Data extraction: Total 520 abstracts retrieved screened independently by two reviewers against inclusion criteria. Any disagreements resolved by third reviewer. Full text of 29 articles retrieved and independently assessed. Data extraction form used to collate key data relevant to objectives listed above.

Quality assessment: Two reviewers independently assessed quality of included studies using standardised quality appraisal tools, appropriate to study design. Third reviewer consulted to resolve any discrepancies.

Results: Systematic synthesis provides a narrative summary of main concepts and relationships within and between studies. Emerging themes relate to evidence on cancer detection rates, use of computer-aided detection and reading protocols. Evidence appears to be lacking regarding optimum arbitration process and attributes of personnel undertaking the task.

Final narrative synthesis to be complete June 2016.

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P26 The international use of mammographic screening test sets

Professor Alastair Gale, Dr Yan Chen

Loughborough University, UK

Purpose: There is growing international interest in using mammographic test sets to gauge levels of reading ability. To examine the utility of using such test sets the data of 1,009 radiologists from the USA, UK and other European countries were examined.

Method: At the Society for Breast Imaging Symposium (Florida, 2015), 247 American radiologists (US) read a test set of 20 recent challenging screening cases from the UK's PERFORMS scheme using 20 mammographic workstations and reporting these online. A similar mini-lab was run at the EUSOBI (London, 2015) meeting where 42 European radiologists (EU) read the same cases using four workstations. For comparison purposes the data of 720 radiologists (UK) who had read the same cases as part of the UK annual scheme were extracted.

Results: A one –way ANOVA showed that there was no significant difference between sensitivity among these groups (mean values: UK 78.94%, US 66.78% and EU 80.24%. p=n.s.). However, there was a significant difference in specificity between the UK and US ($p<0.001$) and between the UK and EU ($p<0.05$). Means were: UK 83.46%, US 82.18% and EU 74.05%. There was no significant difference between US and EU (p=n.s.).

Conclusions: When the same test cases are examined by radiologists from different countries then broadly similar sensitivity scores are attained, demonstrating the universality of radiological education. The main difference between the three groups was found for the US specificity scores which reflects the different clinical management of potential assessment cases as compared to European countries.

P27 Recall rate for benign breast lesions in breast screening program: how it can be minimized?

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Background: There is regional variation for recall rate of benign breast lesions in the screening program. Bedfordshire &Hertfordshire had 1.95% higher prevalent round recall rate than national average. Our aim was to assess benign solitary masses as a major contributor to the higher recall rate. [1]

Material and Methods: Retrospective data over three months period (September to November 2015), for all the women in the screening age group was collected. All patients with a density having a benign outcome were included. Women with a proven malignancy and benign or malignant calcification were excluded. Mammograms were reviewed with prior knowledge of results by an experienced film reader. Standard criteria for re-evaluation were applied.

Results: Total of 273 (n=273) women were recalled for assessment of a density, 60.8 %(n=166) were sent back to normal screening after initial assessment, 39.2% (n=107) underwent ultrasound or stereo guided biopsy in the assessment clinic and were proven to have benign pathology. Abnormalities detected included 32.71 %(n= 35) fibroadenoma, 12.14 % (n=13) fibrocystic change and 11.21% (n= 12) normal breast tissue. For 10.2% of women (n=11), an initial B1 histology report was accepted suggesting benignity was already highly suspected. 16.48% (n=45) women were unnecessarily recalled despite having entirely benign features i.e. well defined oval density.

Conclusion: Recall rate can be reduced by strict application of classification of benign breast lesions. It will not only reduce the psychological distress for these women but will also improve benign to malignant biopsy ratio.

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a high recall rate? Breast cancer Research 201012 (suppl 3):P52. Published online 2010 Oct 25. doi:10.1186/bcr2705 PMCID:PMC2978869

P28 The peripheral glandular zone – an important area for mammographic review

Dr John Waugh
Monash Breastscreen, Monash University, Australia

Background: Small invasive cancers may be difficult to perceive for a wide range of reasons, during a routine mammographic screening session. Reader fatigue and visual distraction by dominant benign lesions are just two of the recognised possibilities[1].

At the interphase between the denser fibro-glandular elements and the retro-glandular adipose tissue the mammographic features are particularly variable. This peripheral glandular zone (PGZ) has been previously identified as the site of a significant number of cancers occurring in women under the age of fifty[2].

This study is a review of missed invasive cancers (referred to as One Reader CAs), by location and their mammographic characteristics. Specifically, the proportion that was defined as lying in the PGZ (see diagram on poster).

Methods: This observational series reviews the location and features of 140 consecutive invasive cancers (missed by one of two Breastscreen readers) from 124,370 digital mammography screens" in a fully accredited Melbourne Breastscreen service, over a 32 month period.

Results:

Table 1: Location of One Reader CAs	Number n= 140	Percentage Total %
PGZ	104	74.3
Other (Non PGZ)	36	25.7
Total	140	100

Table 3: Recall category Of PGZ One Reader CAs	Number n = 104	Fraction % of total	Mean size at surgery (mm)	Median size at surgery (mm)
Mass	31	29.8	21.6	12
Asymmetric density	22	21.2	19.4	18
Architectural distortion	44	42.3	15.2	14.5
Calcification	7	6.7	13.6	5
	104	100	18	14

Conclusions:

- The PGZ was the location of 74.3% of invasive carcinomas missed by one experienced Breastscreen Reader
- Less than a quarter of One Reader CAs were located in the traditional areas of Mammographic Review
- Cancers detected by architectural distortion (alone) in the PGZ are the most challenging for readers (Table 3)
- Optimising detection of clinically significant cancers less than 20 mm diameter is a primary screening goal, and is associated with a 5 year of up to 98%[3].
- The Periphery of the fibro-glandular tissue is therefore an important Area of Review" as readers complete their visual search of a screening mammogram.

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3. Australian Institute of Health and Welfare & Cancer Australia 2012. Breast cancer in Australia: an overview. Cancer series no. 71. Cat no. CAN 67. Canberra: AIHW.

P29 Performance measures from the first four years of the Ontario High Risk Breast Screening Program

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[1]Cancer Care Ontario, Canada; [2]University of Toronto, Canada

Background: The Ontario Breast Screening Program (OBSP) has screened average risk women aged 50 to 74 since 1990 and was expanded in July 2011 to screen high risk women aged 30-69 with annual magnetic resonance imaging (MRI) and digital mammography. The objective is to evaluate screening performance measures from the first four years of implementation.

Methods: There are 30 OBSP high risk screening centres that provide referrals for genetic assessment, and offer screening MRI, digital mammography and diagnostic services. A woman is considered to be at high risk if she: has a known genetic mutation predisposing to a markedly elevated breast cancer risk is an untested first-degree relative of a gene mutation carrier has a family history and estimated lifetime cancer risk >=25% or had radiation therapy to the chest (before age 30 and at least 8 years previously). Performance measures will be compared by screening result from routinely collected information.

Results: Among 10,355 eligible women registered between July 2011 and June 2015 and followed to January 2016, 18,366 screens were performed. Of the 4,218 abnormal screens (recall rate of 23.0%), 4064 (96.3%) had a final result and 240 breast cancers were detected (positive predictive value of 5.9% cancer detection rate of 13.2 per 1,000).

Conclusions: Annual MRI and mammography for women at high risk for breast cancer was effectively implemented within an existing organized screening program. The program is achieving its goal based on the high cancer detection rate among women at greater risk for breast cancer.

P30 Learning from interval cancers-Scrutinising our dirty washing

Ms Susan Williams
Shrewsbury and Telford Hospitals NHS Trust, UK

Background: As regional review is problematic a recent quality assurance recommendation included a local review for interval cancers. We recently reviewed 186 outstanding interval cancers. Every case had minimum of 3 independent reads. Any case where 2 or more readers attributed a category 2 or 3 to the case was reviewed at a film-reader workshop. All cases assessed at the most recent screen on the same side as the subsequent cancer were included in the workshop.

Method: A total of 64 cases were identified and reviewed as part of the workshop. All readers currently active in the unit participated in the review. Each participant was given an anonymised code for reading, arbitration and assessments. A proforma was completed for each case reviewed, summarising the clinical details, relevant information and the group discussion points.

Common themes and key learning points were extracted from the findings.

Results: Three main themes were identified changes in practice and improved technologies, process errors and influences on the decision making process. Discussion points included the influence of improved techniques (equipment, process and practice) and the influences on decision making processes such as radiographic factors, errors in judgement, internal and external distractions and the rationalisation processes used to reach a conclusion. Timely reminders included review areas, quality assessment images, disease process and correlation of influencing factors.

Conclusion: The exercise was a valuable reflective process which encouraged debate and sharing of ideas. Action points were agreed and the key learning points disseminated to the wider team.

P31 Twelve month analysis of clinical override cases in a NHSBSP Screening Centre

Miss Ciara Dowling, Dr Dylan Wynn-Jones, Dr Jonathan Davies
Breast Test Wales, UK

Purpose/Background/Objectives: A 'Clinical Override' (C/O) is any significant history or observation, as specified in our Quality Manual [1], noted by the mammographer at the time of screening. A retrospective study was undertaken of C/O cases from a twelve month period (January – December 2014) within a NHSBSP Screening Centre. Number of assessment clinic (AC) appointments filled by C/O cases, rate of malignancy and mammographic presentations of these malignancies was investigated.

Methods: Relevant data was extrapolated from NBSS number of women screened, number recalled to AC, details of C/O cases and outcomes.

Results: 116 C/O cases were recorded from 32,344 women screened in 2014. 55% (n=64) of C/O cases were recalled to AC, the remaining 45% were returned to routine recall. Of the cases recalled 24 had a mammographic abnormality on screening mammography which would have generated a recall to AC regardless of C/O. 13 malignancies were detected from these 24 cases. Of the 40 cases recalled with no mammographic abnormality on screening mammography one malignancy and one benign papilloma were detected. In both of these cases the C/O symptom was 'lump' and mammography depicted dense glandular parenchyma pattern.

Conclusions: This audit confirms that when a malignancy is present in C/O cases it is usually evident on screening mammography. In addition, this audit demonstrates and supports our clinical practice of having a lower threshold for recall to AC for C/O cases of 'lump' when there is dense parenchyma pattern.

References:

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P32 A multivariable analysis of survival in screened and symptomatic patients

Mr Richard Harland[1,2]

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Objective: To answer the question 'Is a person with a screen detected cancer more or less likely to die than one who presented symptomatically?'

Method: I reviewed records of 3210 patients who presented through the symptomatic clinic (1808) or breast screening program (1402) with new or recurrent breast cancer between September 1991 and April 2012. Patients repatriated from screening to their local units were not included. Estimated ascertainment was 75-82% of all patients treated in the period. 806 patients had died. Median censored survival was 8.13 years (range 0-23.65). Iterative Cox regression analysis was used to determine the hazard of death from any cause with screen detection as one of several explanatory variables (Table). Variables were omitted when p>0.15. The model allowed for decreasing survival towards extremes of age. Private medical care was used as a surrogate for high socioeconomic class.

Results:

Table: Results of regression analysis

Variable	Hazard ratio	95% CI	P value
Screen detection	0.65	0.54-0.78	<0.0001
Non invasive only	0.48	0.33-0.69	<0.0001
Invasive size <16mm	0.77	0.64-0.89	0.0009
Invasive grade 1	0.74	0.57-0.95	0.0205
Nodes involved	1.06 per node	1.05-1.08	<0.0001
Stage III or IV	3.0	2.48-3.62	<0.0001
Oestrogen receptor -ve	1.30	1.07-1.58	0.0079
Progesterone receptor +	0.78	0.66-0.94	0.007
Adjuvant aromatase inhibitor	0.59	0.48-0.74	<0.0001
Adjuvant taxane	0.49	0.35-0.67	<0.0001
Age (Abs(age-53))	1.04 per year	1.03-1.05	<0.0001
Private care	0.56	0.43-0.74	<0.0001

Conclusion: Allowing for prognostic factors and treatment, detection by screening was associated with a 35% reduction in hazard of death compared to symptomatic presentation.

P33 Characteristics of metastatic breast cancer and the implications for breast screening

Dr Michael Crotch-Harvey

Macclesfield District General Hospital, UK

Objectives:

1. To define characteristics of lethal breast cancer.

2. Compare with screen detected cancers.

3. Develop strategies to maximise screen detection of aggressive cancers within the resources available.

Methods: Oncology imaging referrals between July 2008 and July 2015 were reviewed and those with metastatic disease identified from the clinical information provided. Data collected included age at presentation, screening history, histological characteristics and receptor status of the primary cancer. Comparative data

was obtained from a separate audit of screen detected cancers from January 2014 to June 2015.

As this was a retrospective audit, ethical approval was not sought.

Statistical comparison of mean tumour size in the two groups was performed with a two sample t-test.

Results: 204 women with metastatic breast cancer were identified. Mean age at presentation was 56.5 years, 40% occurring between the ages of 48-59. Adverse features predominated in women with metastatic breast cancer 50% were grade 3 and 41% grade 2. A strong correlation with high Ki67 proliferation index was noted 82% showed a Ki67 greater than 20.

Of 247 screen detected cancers, a total of 103 cases showed at least one adverse prognostic indicator (41%).

The mean size of tumours showing at least one poor prognostic indicator was 34mmm in the metastatic group and 17mm in the screening group (p<0.0001).

Conclusions: Breast screening does have the potential to detect biologically adverse breast cancers at an earlier stage. Intensified screening at the lower age range of the programme would appear likely to give the greatest benefit.

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P34 Impact of staging computerised tomography scan in the management of locoregional recurrence of breast cancer

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Leeds Breast Unit, Leeds Teaching Hospitals NHS Trust, UK

Objectives: To determine the impact of staging computerised tomography (CT scan) in the management of locoregional breast cancer recurrences.

Method: Patients presenting to Leeds Hospitals Trust with locoregional breast cancer recurrence between

January 2010 and December 2014 were identified using electronic patient records. Those with complete clinico-pathological details and staging CT at the time of recurrence (breast, chest wall or ipsilateral axilla to primary site) were included. Cases were stratified as: true positive (TP) = unequivocal metastases on CT report, histopathological confirmation of metastases had been obtained or increase in size on interval (3 month) scan demonstrated true negative (TN) = still metastases free at 6 months false positive (FP) = spontaneous resolution of abnormality on 3 month interval scan false negative (FN) = detection of lesions on interval scans within 6 months.

Results: 81 patients were included. The average time between primary diagnoses to recurrence was 4.91 years (0-42). Most were grade 3 cancers (n= 38) and node positive (n=65). 37 chest wall recurrences, 31 breast recurrences and 13 axillary recurrences were identified. 36/43 TN cases and 5/28 TP cases had surgery. 5 TP cases had small volume disease only. 6/7 FN cases (8.64%) had surgery inappropriately. There were no adverse impacts in the 3 FP cases. The sensitivity, specificity, positive and negative predictive values for staging CT were 80.00%, 93.48%, 90.32% and 86.00% respectively.

Conclusion: This study suggests that staging CT is a valuable stratifying tool that enables appropriate management in the vast majority of locoregional recurrences.

P35 Should shearwave elastography findings influence management of breast abnormalities in the one stop clinic?

Dr Sylvie Flais, Dr Anwen Newland
London North West Healthcare NHS Trust Ealing Hospital, UK

Background: Preliminary findings about shearwave elastography (SE) associated with ultrasound have been promising in breast imaging. We have used it as an additional imaging tool in the one stop clinic since our department purchased a GE LOGIQ E9 US machine in April 2014. SE was not done in all cases as only one probe was shared between 4 rooms. We present some interesting cases and discuss the impact SE may have had on management.

Method: We prospectively collected cases for which SE was immediately followed by biopsy. We present cases of radio-clinical discrepancy, mammography/ ultrasound discrepancy, and finally cases which for the final decision was influenced by the elastography findings (including second look ultrasound after MRI).

Results: We demonstrate cases of haematoma, fibroadenoma, diabetic mastopathy, granulomatous mastitis, local recurrence of breast carcinoma, B3 atypia and low grade DCIS demonstrated only on ultrasound. We show how the addition of SE may have altered patient management.

Conclusion: Although SE may be a useful tool, our experience demonstrates it is of limited value in deciding whether biopsy is necessary in the context of the one stop clinic.

P36 Audit of biopsy results of U3 masses

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London North West Healthcare NHS Trust, UK

Background: The UK U3 grading is considered an equivalent of BI-RADS 4a and 4b. The malignancy rate in the BI-RADS classification is better established than for the UK classification. The aim of the audit was to correlate the ultrasound grading with final histology to see whether our results were in line with expectations and review unexpected findings.

Method: All biopsies of U3 masses between November 2013 and January 2016 were prospectively recorded, along with age and histology result (core biopsy for most cases, post surgical if performed).

Results: 196 U3 masses were biopsied. Final histology was B2 in 77% (142 cases), B3 in 14 % (28 cases) and B5 in 13 % (16 cases). Imaging was reviewed in all B3-B5 cases to assess the accuracy of the initial grading. There was no significant disagreement, although in 2 cases the U3 grading seemed to have been influenced by the young age of the patients, and the findings could have been graded U4.

Conclusion: The result of our audit supports the U3 category being equivalent to the BI-RADS 4a grading, the expected rate for malignancy appearing lower than in the BI-RADS 4b sub category.

P37 Is a mammogram following cyst aspiration always required in the screening assessment clinic?

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Symposium Mammographicum Conference 2016

POSTER PRESENTATIONS

Background/Purpose: The authors had noticed a variation in practice from previous places of work to their current workplace, noticing that post cyst aspiration mammograms were often requested routinely. A retrospective audit was designed to look at the use of post cyst aspiration mammography.

Method: All patients attending breast screening assessment clinics undergoing US guided cyst aspiration during a four month period were included. Data included: additional post-aspiration films taken, dose, cyst size, management change and outcome. For interest the poster will also survey conference delegates on their current practice.

Results: 32 patients had cysts aspirated 27 *(84%)* of these patients had additional views following this. All cysts were simple on ultrasound and cytology was not requested in any cases. No patients required any additional intervention and the outcome was routine recall in all cases. The average additional dose to the patients undergoing further films was a mean AGD of 1.80. Case studies will demonstrate the use of mammography following cyst aspiration.

Conclusion: Post aspiration mammography confirms that the aspirated cyst corresponds to the mammographic finding.[1] This audit shows that undertaking this routinely increases patient dose and often does not change patient management. Post cyst aspiration mammography may be useful if there is radiological uncertainty that the cyst aspirated corresponds to the mammographic abnormality or if there is a concern about a masked underlying lesion or distortion.

References:

1. Saunders L.M, Lacz N.L & Lara J (2012) 16 year Experience with Aspiration of NonComplex Breast Cysts: Cytology Results with Focus on Positive Cases. The Breast Journal, Volume 18 Number 5 Pages 443-452.

P38 The added value of MRI in preoperative breast cancer staging

Dr Tamara Suaris, Dr Hannah DuPreez, Dr Charlotte Longman, Dr Rashid Akhter
St Bartholomews Hospital, UK

Breast MRI is now a standard breast examination breast radiologist. Breast MRI is indicated in a number of clinical situations in the preoperative staging of breast cancer where it is able to add value to the conventional imaging.

Aim to retrospectively review the MRI examinations and reports performed over the past 6 years. Cases where new findings were obtained from the preoperative MRI study will be identified. Further results from these additional scans may have changed the outcome/ management plan for the patient.

We will seek to identify the number and type of reason for call back. Further analysis will help identify the false positive rates.

Following review of the first 300 cases, we have identified approximately 30 cases where further imaging was recommended.

Of the MRI studies that were performed between 2010 -2013, 263 were for preoperative staging, and 13%, further breast US was recommended.

Recalls were subdivided Ipsilateral unsuspected focus, contralateral suspicious focus, and prominent/ suspicious axillary lymphadenopathy not previously identified.

We will identify the numbers and percentages of patients, where MRI idenitified further disease which changed management in women, and also in women with otherwise occult contralateral disease.

Further analysis needs to be completed on the rest of the MRI studies to identify how many women were diagnosed unsuspected contralateral cancers were identified.

P39 Imaging assessment of the axilla before and after neo-adjuvant chemotherapy

Dr Kate Downey, Dr Elizabeth O'Flynn, Dr Romney Pope
The Royal Marsden Hospital, UK

Background: Neo-adjuvant chemotherapy (NAC) is increasingly used to down-stage the breast and axilla in node-positive breast cancer with high rates of pathological complete response (pCR), particularly in triple negative and HER-2 positive subtypes (1,2). The Alliance Z1017 trial and subsequent studies (3,4) have demonstrated lower false negative sentinel lymph node biopsy (SLNB) rates when C5 metastatic nodes are clipped prior to NAC and excised at subsequent surgery. We describe our initial axillary marker clip

experience with radiological, surgical and pathological correlation.

Method: Over 11-months, 19 patients had marker clips inserted into C5 metastatic axillary/intramammary nodes under ultrasound guidance either before or early after starting NAC. A specimen radiograph was performed following excision to identify the clip and pathological results analysed.

Results: All clips were successfully deployed. Ultrasound visualization at interval follow up was variable. 1 patient did not have surgery (metastases), 7 are still receiving NAC. 9 underwent SLNB (7/9 pCR) and 2 axillary lymph node dissection (ALND) (2/2 pCR). The clipped node was the SLN in only 2/9 cases and obtained at further targeted dissection in 6/9.

Conclusion: Preoperative marking of positive axillary nodes prior to NAC is feasible, demands a multidisciplinary team approach and may prevent the need for ALND. The low rate of clip presence within the SLN suggests targeted dissection will reduce false negative rates.

References:

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2. Luangdilok S, Samarnthai N, Korphaisarn K. Association between Pathological Complete Response and Outcome Following Neoadjuvant Chemotherapy in Locally Advanced Breast Cancer Patients. J Breast Cancer. 2014 Dec17(4):376-85.
3. Boughey JC, Ballman KV, Le-Petross HT, McCall LM, Mittendorf EA, Ahrendt GM et al. Identification and Resection of Clipped Node Decreases the False-negative Rate of Sentinel Lymph Node Surgery in Patients Presenting With Node-positive Breast Cancer (T0-T4, N1-N2) Who Receive Neoadjuvant Chemotherapy: Results From ACOSOG Z1071 (Alliance). Ann Surg. 2015 Nov 26. [Epub ahead of print]
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P40 Audit of marker clip migration

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Purpose/Background/Objectives: Marker clips are used to localise the biopsy site following stereotactic vacuum-assisted breast biopsy for suspicious microcalcifications to enable future wire localisation if atypical or malignant histology warrants excision[1] and must remain accurately at the biopsy site following deployment. From our experience, clip displacement from the site of deployment is not an uncommon problem and the clip may migrate immediately after biopsy, or later on follow-up mammograms.

Methods: Our criteria is based on the NHS breast screening programme guidance (2009).[2] The standard we used was that >95% of clip markers should be within 10mm of the target in any mammographic plane. Data was collected from a period of 12 months on patients who had clip deployment at the intended site after stereotactic biopsy for suspicious microcalcification, and had a planned stereotactic wire localisation.

Results: A total of 24 patients had a follow-up mammogram prior stereotactic wire localisation and 21/24 had immediate mammogram post biopsy. 6/21 immediate mammograms and 10/24 follow-up mammograms demonstrated clip-to-biopsy site displacement rates of 29% and 42% respectively. 2/24 patients showed adequate clip placement on initial single view mammogram but demonstrated clip migration on follow-up mammography.

Conclusion: The accordion effect, fatty breasts, post biopsy haematoma and resorption of air all affect the accuracy of clip location.[3] We recommend: a) slow release of the springing action of the compression paddle to minimise the accordion effect b) two-view mammograms to be performed immediately post biopsy.[4-6]

References:

1. Bernaerts A et al. Clip migration after vacuum-assisted stereotactic breast biopsy: a pitfall in preoperative wire localization. *JBR-BTR. 2007 May-Jun90(3): 172-5.*
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3. Esserman LE, Cura MA, DaCosta D. Recognizing pitfalls in early and late migration of clip markers after imaging-guided directional vacuum-assisted biopsy. *Radiographics 2004 Jan-Feb24(1):147-56*
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P41 Breast specimen orientation: a radiology perspective

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Ipswich Hospital NHS Trust, UK

Purpose: This audit aims to critically evaluate our specimen labelling system with radiology correlation reporting for the purpose of multidisciplinary team meetings and overall patient management.

Background: Two-dimensional projection specimen radiographs are routinely used for intra–operative margin assessment with an aim to avoid local recurrence and unnecessary re-excisions (1). Traditionally specimen orientation is performed by use of a marking system however published literature suggests that there is diversity in practice (2). Our Breast surgeons' protocol is to mark the specimen with sutures and radiopaque clips at the periphery of the specimen a short suture with 1 clip at the superior margin, and a long suture with 2 clips at the lateral margin. The specimens are x-rayed using the FAXITRON BIOVISION cabinet x-ray system and performed solely by the surgeon.

Objectives: Retrospectively review selected patients for labelling errors in the identification of radiographic specimen margins for reporting.

- Assess the overall quality of images available for the radiology team to report findings.
- Make future recommendation in order to reduce misorientation and image quality errors.

Method: 46 specimen radiographs were identified through the radiology information system between 2012 and 2014. After exclusions, 58 localisation specimen radiographs were available for review against our standard unit protocol and a satisfactory standard quality of imaging.

Results/conclusion: The full results are not available at the time of submission and will be available the end of April.

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2. Volleamere, A. J. & Kirwan, C. C. (2013) National survey of breast cancer orientation marking systems. European Journal of Surgical Oncology (EJSO), (39) pp. 255 – 259.

P42 Are Additional Views at Assessment still Effective in the Digital Era?

Ms Julia Martin, Mrs Noelle Clerkin Lay, Dr Diane Johnston
Chelmsford and Colchester Breast Screening Unit, UK

Background: At breast screening assessment supplemental views are used to aid visualisation and classification of equivocal lesions, but now services are digital, the ability to manipulate the image post-exposure has transformed the way images are viewed. So should we still be taking as many additional views at assessment?

Aims: To what extent do extra views increase specificity and prevent unnecessary treatment in the digital era.

Methods: 2 months of assessment cases from July 1st and August 31st 2014 were retrospectively reviewed.

Using similar methods to Hayes, Mitchell and Nunnerley (1) the screening mammogram and extra views were reviewed separately by 3 film readers and rated independently on suspicion of malignancy (M1-5).

Special views were considered beneficial where they increased specificity and allowed an equivocal diagnosis to be upgraded to probable or definitive. The upgraded diagnosis had also to be consistent with any subsequent interventional diagnosis.

Results: 151 women were assessed over 2 months.

Magnification views were not found to alter the radiologic opinion for any of the women assessed but increased specificity was achieved with paddle views for 36% of cases. Three of these women had cyst aspiration and seven had no intervention.

Conclusions: Changes in practice have possibly led to the reduction in usefulness of magnification views. While these were the only views that clearly aided visualisation, calcification is generally routinely biopsied.

Increased specificity was achieved with paddle views (36%), but not to the same extent as in 1991, with asymmetries and distortions realising most benefit.

References:

1. Hayes R, Michell M, Nunnerley H. Evaluation of magnification and paddle compression techniques in the assessment of mammographic screening detected abnormalities. Clinical Radiology. 1991 44(3):158-160.

P43 Revisiting Kalbhen's technique for measuring breast volume using digital mammography. Is it a useful tool to estimate breast volume loss when considering breast conserving surgery?

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Taunton and Somerset NHS Trust, UK

Kalbhen described using mammography measurements to estimate breast volume in 1999[1]. In addition to breast width and height dimensions, the technique previously relied on manual measurement of the breast depth (compression thickness) in the cranio-caudal projection by the radiographer which is now recorded digitally making retrospective measurements, and volume assessment fast and simple.

This small case series looks to compare volume measurements of the predicted wide local excision specimen with the Kahlben breast volume, giving a ratio or percentage of anticipated tissue loss. In all cases specimen imaging was reported as confirming complete excision, however completion mastectomy was required. The wide local excision specimen weight and final mastectomy weight were used as a comparable ratio for control purposes.

There was variation seen between the volume and weight ratios. Breast density and site of tumour were assessed to ascertain their influence over the variations seen. A low specimen weight to mastectomy weight ratio compared to predicted volume loss ratio was a good predictor for residual disease despite radiographic assessment of the excised specimen.

References:

1. Kalbhen C, McGill J, Fendley P, Corrigan K, Angelats J. Mammographic determination of breast volume: comparing different methods. American Journal of Roentgenology. 1999 173(6):1643-1649.

P44 Marker placement accuracy following stereotactic- guided biopsy

Mrs Judith Kelly, Mrs Andrea Herbert, Mrs Sara Millington
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Background: It is common practice within breast imaging units following stereotactic-guided biopsy to deploy gel markers for future biopsy site location. Post insertion mammograms are performed to verify placement accuracy. We noticed some markers were not demonstrated in the desired position on occasion. Published literature discusses the 'accordian' hypothesis effect whereby the marker moves along a biopsy track following compression release.

Purpose: We conducted an audit to: ascertain how many markers appeared to be inaccurately sited following insertion after stereotactic-guided biopsy: marker type more prone to inaccuracy: analyse if any trends apparent, for example – 14g or 10g, breast type, patient biopsy position.

Method: No current standard marker accuracy guidance published. Royal College of Radiologists standard for wire localisation proximity to lesion was utilised 1. All 144 stereotactic- guided biopsies with marker placement from 2013-2015. Four different markers were used following either 14g, 10g vacora or EnCor vacuum-assisted biopsy. These included two types of 'SenoMark,' 'EnCor' and 'Hydomark.' Post

marker insertion mammograms were performed and marker proximity to lesion measured. Data regarding breast density BIRADS score, abnormality type, location, compression thickness reading and Newtons of compression force was recorded for each case.

Results: Three of the markers showed an inaccuracy rate ranging from 37-48%. The 'Hydromark' proved much better, demonstrating an inaccuracy rate of only 6%.

Conclusion: Findings from this audit suggest ideally exclusive use of the HydroMARK following stereotactic-guided biopsies (10/14g) in the immediate future. However, these are not compatible with the 'EnCor' biopsy system.

References:

1. Esserman L et al (2004) Recognizing Pitfalls in Early and Late Migration of Clip Markers After Imaging-guided Directional Vacuum-assisted Biopsy. RSNA *RadioGraphics* (24) 45-47 Issue 1.
2. Burnside E et al (2001) Movement of a Biopsy-site Marker Clip after Completion of Stereotactic Directional Vacuum-assisted Breast Biopsy. RSNA *Radiology* (Vol 221) 23-36 Issue 2.
3. Royal College of Radiologists (2003) Guidance on Screening and Symptomatic Breast Imaging (Second Edition). Board of the Faculty of Clinical Radiology The Royal College of Radiologists, London.

P45 Surveillance of women at higher risk of developing breast cancer – Our first year

Ms Celia Lucas, Dr Diane Johnston
Chelmsford and Colchester Breast Screening Service, UK

Background: Chelmsford and Colchester Breast Screening Service was commissioned in September 2014 to provide surveillance of women at increased risk of breast cancer. This High Risk Screening programme was established nationally to provide a consistent and high-quality service. We present our approach and the results from our first year.

Method: We closely follow the published imaging protocol according to age and risk factors.[1] Available mammograms are reviewed annually on the basis of background density to confirm the individual's imaging protocol over the age of fifty. All women requiring an MRI scan are invited to the department for an initial pre-imaging counselling appointment whilst those receiving only mammograms have a telephone consultation.

Results: 62 women were imaged in the first year. Of the MRI only group 2 women were recalled: one required an MRI guided biopsy (benign), the other an early imaging recall. Of women receiving MRI plus mammography 5 were recalled: 3 were positive for cancer and 2 were recalled early resulting in return to annual surveillance. In the mammogram only group 2 cancers were diagnosed.

Conclusion: Inviting women for pre-imaging counselling has aided compliance for MRI with no abandoned studies as compared to our symptomatic population. Verbal feedback indicates appreciation of the initial consultation as it aids understanding and preparation for imaging and results. Due to the high number of cancers diagnosed in our first year we were unsurprised to miss the minimum recommended recall rate standard.[2]

References:

1. NHSBSP Publication 74. Protocols for the surveillance of women at higher risk of developing breast cancer. Version 4 June 2013
2. NHSBSP Publication 68. Technical guidelines for magnetic resonance imaging for the surveillance of women at higher risk of developing breast cancer December 2012

P46 Clinical evaluation of multimodal ultrasound tomography for breast imaging

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Purpose: We evaluated the practical implementation of multimodal ultrasound tomography (MUT) for breast imaging in a clinical setting. Twenty-four healthy volunteers and thirty-two patients referred for breast imaging were scanned and exam comfort recorded.

Methods: We evaluated feasibility, investigation time, exam comfort of MUT compared to X-ray mammography (MG, n = 31), handheld ultrasound (US, n = 27), and magnetic resonance imaging (MRI, n = 4) in thirty-two patients.

Results: The MUT-exam was well tolerated by all 56 participants (24 volunteers and 32 patients) 55 bilateral exams were uneventful. One exam had to be repeated due to technical problems. MUT was well accepted and patient comfort (ranging from 1 to 10) was comparable to US (1.6 vs 1.5) and clearly better than MG (6.3). Total in room time was 38 +/- 6 min. 51 participants reported no discomfort (93%), four reported slight discomfort (7%). Four patients had a finding. The diagnostic biopsies showed tree malignant one benign, which were detected and correctly differentiated by MUT.

Conclusions: MUT is feasible in a clinical setting considering technical feasibility, examination time and patient comfort. Initial diagnostic findings warrant further studies in the context of possible alternative screening tool for breast cancer.

P47 Use of radioiodine seeds in localising impalpable breast cancer – how it affects surgical planning?

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Royal Victoria Infirmary, UK

Newcastle is the first unit in the UK to offer radioiodine seed localisation of impalpable breast cancer. This technique has many benefits over conventional wire localisation, in particular, improved patient experience and workflow dynamics.

We present a small series of patients undergoing seed localisation in whom a second tumour was identified at the time of seed placement, without any effect on their planned surgical date.

Since September 2014 we have placed over 150 radioiodine seeds, inserted 7 to 14 days prior to surgery under ultrasound guidance. The majority of patients underwent wide local excision with a small proportion undergoing therapeutic mammoplasty. 4 patients had a second lesion identified during seed insertion, all biopsied at this time and proven to be tumour. 3 patients were screening and 1 symptomatic case. The majority of the lesions were mammographically occult, in one case the index cancer was mammographically occult but presumed to have been the lesion seen on mammography. Despite the additional finding of further tumours, all patients had surgery completed as planned, without any alteration in their operation date. This would not have been possible using traditional wire localisation techniques.

Seed localisation is performed remote from the day of surgery, allowing any unexpected findings to be investigated in a timely manner, without an effect on surgical planning. The areas of further disease can be wire localised on the day of surgery. Radioiodine seeds help reducing the frequency of surgery cancellation, but also cost and patient anxiety due to delayed operations.

P48 Radiowave radar-based breast imaging system: an initial multi-site clinical evaluation

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[1]Great Western Hospitals NHS Foundation Trust Great Western Hospital, UK; [2]Bristol Breast Care Centre, North Bristol NHS Trust, UK; [3]Thirlestaine Breast Centre, Gloucestershire Hospitals NHS Foundation Trust, UK; [4]Bristol University, School of Clinical Sciences, UK; [5]Micrima Limited, UK

Objective: To determine the effectiveness of MARIA (Micrima Ltd, Bristol UK) – a non-ionising, non-compressing whole-breast scanning system utilising radiowaves– in symptomatic breast care clinics.

Methods: Patients attending symptomatic clinics at 3 sites were identified by clinicians as having a palpable lump. Following informed consent eligible patients underwent this prone imaging technique. The bilateral reconstructed 3D images were correlated with clinical information and other imaging studies including ultrasound and/ or mammography and, when relevant, core biopsy results to determine sensitivity scores. [Ethics approval (Yorkshire & The Humber and South Yorkshire REC 15/YH/0084, ClinicalTrials.gov NCT02493595)].

Results: Of 87 cases analysed to date, a sensitivity of 77% (67/87) was obtained for lesion detection (mean age 45.4 years, age-range 16-81). Sensitivity was 90% (28/31) for cysts and 85% for cancers (23/27). Sensitivity scores in pre-/ peri-menopausal women were 75% (44/59) (mean age 36.2, age range 16-55) and in women with dense breasts (BI-RADS c & d) were 90% (9/10) (mean age 43.4, age-range 23-79). Additional results will be ready for presentation at the Conference.

Conclusions: Initial results indicate the potential that the MARIA system offers as a well-tolerated non-ionising imaging modality that has been shown to be effective at detecting cancers in younger, pre-menopausal women with dense breasts. MARIA may contribute to overcoming some of the challenges posed by trying to optimise the balance between benefit and harm of screening in women of younger age. The results of this study are very encouraging. We are continuing to evaluate this exciting novel imaging technique.

P49 Evaluation of novel breast imaging technology of multimodal ultrasound tomography in BI-RADS IV patients

Professor Vasilis Marmarelis[2], Professor George Zografos[1], Dr Paraskevi Liakou[1], Dr Dimitra Koulocheri[1], Mr Michael Sofras[2], Dr Stefanos Hadjiagapis[2]
[1]University of Southern California, USA; [2]University of Athens, Medical School, Greece; [3]Mastoscopia S.A., Greece

Purpose: Initial clinical evaluation (not randomized clinical trial) of the new 3D breast imaging technology of Multimodal Ultrasonic Tomography (MUT) in 254 BI-RADS IV patients presenting microcalcifications, architectural distortions or small masses (<15 mm).

Methods: MUT performs 3D tomographic scanning of pendulant breast in water-bath using transmission ultrasound and constructs multimodal images of refractivity and frequency-dependent attenuation (calibrated relative to water). The multimodal images are fused into composite images of a computed Composite Index (CI). CI>1 indicates malignancy in the respective tissue voxel (0.5 mm x 0.5 mm x 4 mm). 3D MUT imaging was performed on 254 BI-RADS IV female volunteers (ages 32-78 years), who subsequently underwent biopsy. All volunteers signed the Informed Consent Form approved by the Research Committee of the University Hospital. The composite images were evaluated against the biopsy results.

Results: Histopathology revealed 83 malignant, 17 high-risk and 194 benign lesions. The pixels of 78 malignant lesions (94%) had CI>1 in the biopsy region, while the 17 high-risk lesions and 5 small DCIS (<4 mm) had 0.8<ci<ci1 were found near 14 benign lesions (within 25 mm) and in 52 cases away from the biopsy location.</ci

Conclusion: MUT can detect small (<15 mm) malignant breast lesions in BI-RADS IV patients and differentiate them from high-risk and benign lesions. When the additional MUT findings near and/or away from the point of biopsy are evaluated carefully in the future, the potential of MUT as a screening modality can be ascertained.

P50 Initial experiences in the implementation and use of Tomosynthesis in a district general hospital

Mrs Sarah Fox, Mrs Christine Batts, Mrs Bernadette Roberts, Mrs Janet Hendy
Northern Lincolnshire & Goole NHS Foundation Trust, UK

Purpose: This paper demonstrates the pathway taken to implement Tomosynthesis as a means of diagnosing small cancers in complex cases within a district general hospital. Numbers and types of patients were analysed post installation to assess the impact of using Tomosynthesis to aide diagnosis.

Method: A case of need was presented to the Trust and charitable fund committees justifying the proposed use of Tomosynthesis and associated infrastructure required. Records were analysed to demonstrate type of patient imaged including dense parenchyma, summation and use for satellite screening assessment.

Results: The pathway taken for purchase and implementation was complex with many papers required to justify new technology to numerous committees.

Between October 2013-February 2016 726 examinations were undertaken with a diagnosis of 57 breast cancers (7.85%) 51% (n = 371) examinations were undertaken for dense parenchyma with 23% (n=168) undertaken for summation. 11.8% (n=86) were undertaken as part of breast screening assessment with the remainder comprising symptomatic cases.

Conclusion: Implementation of Tomosynthesis has been a complex process which has proved to be a valuable asset to the Trust, in the interpretation and management of difficult cases.

P51 Tomosynthesis – can it find the difficult lesions?

Dr Nerys Forester, Dr Joanne Gholkar, Dr Brenda Kaye
Newcastle Teaching Hospitals, UK

Background: Tomosynthesis (DBT) creates a 3D picture of the breast, potentially providing more diagnostic information. Studies have shown it may offer improved screening, potentially identifying disease not seen on standard mammography. We decided to evaluate the performance of tomosynthesis in the setting of mammographically subtle/occult tumours identified by MRI.

Methods: Between 2014 and 2015, all patients undergoing 2nd look ultrasound following MRI for previously unidentified lesions, underwent DBT before USS. DBT analysed to identify areas of disease by two independent radiologists, without knowledge of prior outcomes. All lesions seen on MRI had confirmed pathology after USS and biopsy.

Results: 30 patients had DBT following MRI. The majority of cases had dense breast parenchyma. All had one or more lesions present. Tumour sizes ranged from 5-40mm. There were 9 benign cases and 21 cancer cases. Of 21 cancer cases 9 cases identified by both readers, 5 cases missed by both readers, 4 cases index cancer identified but both missed extra cancer foci and 3 cases where extra foci identified by one reader but not by second reader. For cancer cases, reader concordance = 18/21. From 21 cancer cases, there were 34 malignant lesions. Readers correctly identified 21/22 lesions, giving an overall PPV of 61-64%. 'Missed' cancer sizes ranged from 6-35mm.

Conclusions: DBT shows good reader concordance, but does have a significant tumour 'miss' rate. Deliberately picked cohort of difficult breasts to evaluate, but it appears that DBT suffers from similar disadvantages to mammography in dense breasts.

P52 Contrast Enhanced Spectral Mammography – The Kettering Model

Mrs Deborah Black, Miss Katalin Horvath
Kettering General Hospital, UK

Background: Contrast Enhanced Spectral Mammography is a relatively new imaging modality. In the UK CESM is primarily performed as a Radiologist/Clinician led initiative, usually in larger breast imaging centres. However, for the smaller breast imaging unit, a Radiologist led initiative is not practical.

Methodology: Can CESM be successfully incorporated into symptomatic assessment in any Breast Imaging Unit as a Radiographer led initiative?

Results: 'The Kettering model'

In order to integrate CESM into a rapid diagnosis clinic we identified the need to utilise the skills of our Mammographers and implement CESM as a Radiographer led initiative with Radiology input at a clinical supervision level only. Four Mammographers volunteered to expand their job role by undertaking cannulation training and becoming clinical leads for CESM.

The introduction of the Kettering Model offers Mammographers the opportunity to develop new skills without any further Masters level study, making it more widely achievable to both Band 6 and Band 7 practitioners.

We have observed benefits for both the patients and the Practitioners who perform CESM. Radiographers have reported increased job satisfaction. Continuing to diversify the job roles and responsibilities of Mammographers may help in addressing the national struggle to recruit into Mammography.

P53 Applications of Contrast Enhanced Spectral Mammography in the Symptomatic Setting

Mrs Rhonda Griffiths
Guys and St Thomas NHS Trust, UK

Contrast enhanced spectral mammography (CESM) is a relatively new technology, which aims to identify tumours that would otherwise be mammographically occult. It is currently in use in several European centres, in various centres in the UK and in 2015 was introduced to our unit atGuys Hospital. Our department is a large Symptomatic Breast Unit which also specialises in Breast Surgery and Oncology. We are also a regional referral unit for South East London.

The majority of CESM cases undertaken at Guys have been in accordance with our local written protocols. It has however also been used as a problem solving tool in more complex cases which have been discussed through the Multi Disciplinary Meeting. This poster will be a pictorial review demonstrating both typical and atypical CESM cases. Typical cases will include a patient under 40 with dense breasts and an elderly patient with multifocal disease. The more atypical cases will include a gentleman with suspicious findings, a neo-adjuvant chemotherapy patient and a patient who attended the unit for a wire localisation prior to her surgery.

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Conclusion: Over the last 12 months our unit has found that CESM has proved a useful additional mammographic tool for establishing extent of disease but also has had other benefits in more complex clinical scenarios.

P54 Use of Breast MRI in women assessed at screening – is it helping?

Dr Georgina Devenish, Dr Nest Evans
Breast Test Wales Screening Centre, UK

Aim: Retrospective 2 year review of breast MRI examinations performed following recall from screening and assessment.

1. To document reasons for doing MRI

2. To see if MRI influenced management correctly/significantly

3. To review indications for MRI

Method: Retrospective review over 2 years.

Results: 98 women referred. 86 MRI's performed

62% (54/86) for assessment of tumour size in lobular carcinoma which have been reviewed for this abstract. Details of the other groups will be included in the final poster.

MRI most sensitive modality for accurately sizing the tumour

Management altered by MRI in 6 /54 (11.1%)

2 correctly upgraded to mastectomy

2 incorrectly upgraded to mastectomy

1 contralateral cancer detected

1 indicated multifocal disease

Discussion: In both cancers correctly upgraded and one incorrectly upgraded the cancers were easily palpable clinically and borderline for conservation

MRI incorrectly upgraded 1 patient to mastectomy. The tumour was not palpable and was small on standard imaging.

MRI assessment did not alter surgical management in 88% of screen detected lobular cancers.

This suggests that standard imaging is adequate for lobular cancer sizing in this cohort which tend to be smaller than those presenting in the symptomatic setting

We should consider reserving MRI assessment only for those lobular cancers that appear borderline for conservation on clinical or radiological grounds.

P55 BREAST MRI – A district general hospital experience of service evaluation

Dr Amanjot Saravana Karuppiah, Dr Mohammad Hajaj, Mrs Natalie Wright, Dr Shafiq Gill, Mr Mohammad Ali Jahan
Kingsmill Hospital, UK

Objective: We have recently started offering contrast-enhanced breast MRI for measuring disease extent and also for measuring the size of residual invasive tumour after patients have undergone neo-adjuvant (pre- operative) chemotherapy (NAC). Tumour sizes measured on the MR images were compared with the size of disease/residual disease measured at pathology after surgery. The aim was to determine if our centre meets the acceptable standards for size concordance.

Subjects and Methods: Before undergoing surgery, 32 patients were imaged pre-operatively as selected by NICE guidelines and comparison made with the final pathological size.

Another 19 patients who underwent NAC were imaged before and after the NAC and size on final MR images compared to the pathological size.

A concordance of +/- 10mm from the final pathological size was deemed acceptable.

Results: In the non neo - adjuvant group, in 28 patients the final pathological size was within 10 mm of the preoperative MR size. In 2 patients there was extensive non-calcified low grade and intermediate grade DCIS which did not enhance. In 2 patients there was multi focal disease, which was biopsy proven pre operatively and it was difficult to tell the exact pathological size.

In the post NAC group in 7 patients the final preoperative MR size was within 10 mm of the final pathological size. In 5 the MR size was more than 50 mm out from the pathological size. In the remaining it was within 20 mm.

Conclusion: In patient's who have not undergone NAC our MR size is within acceptable criterion when compared to final pathological size validating the sensitivity of breast MR as a tool for accurate measurement of disease extent. In post NAC patients, there is a wide variation in the accuracy, this variation is attributed to several preoperative factors.

P56 An audit of clinical indications for Breast MRI

Dr Tamara Suaris, Dr Hannah DuPreez, Dr Rashid Akhter, Dr Charlotte Longman, Dr Joseph Davies
St Bartholomew's Hospital, UK

Background: Breast MRI has become a standard part of the imaging armoury of the diagnostic breast imaging team. Its role is most often used for preoperative cancer staging, but also for high risk family history screening and for implant assessment. There is the impression that there are increasing numbers of MRI performed. Using the EUSOMA MRI indications guidelines, we questioned whether there was indication drift occurring.

Methods: A retrospective review of all MRI requests accepted for women with known or suspected breast cancer accepted over a 3 year period was performed.

The indications were reviewed and aligned with the EUSOBI indications from 2008.

Any indication that fell outside of the guideline was highlighted and reviewed for acceptance

Results: Of the 296 MRI studies performed,263(89%) were preoperative staging studies. 70 patients in this group underwent MRI to assess treatment response to neoadjuvant chemotherapy. 17 patients (6%) underwent MRI for indications listed outside the EUSOBI guidelines. 16 (5.4%) of these had MRI to confirm malignancy was unifocal.

Further assessment will be made to identify if the index lesion was difficult to visualise, seen in the context of a dense parenchymal breast pattern.

Conclusion: Breast MRI is a useful modalilty in patients with known breast cancer. At our institution the majority of breast MRI is performed in accordance with EUSOBI guidelines. However a minority are performed to confirm known breast cancer is unifocal, an area that EUSOMA have been clear requires further research.

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P57 Acute breast pain: could it be sarcoidosis?

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Background: A common cause of acute breast pain is infection or abscess. Sarcoidosis, a chronic granulomatous disease, is rarely found in the breast (1). It typically presents as a breast mass. There are no recorded cases of acute pain as the main presenting symptom. We describe two patients who presented with breast pain due to primary sarcoidosis.

Method: Two women presented to the breast clinic with severe breast pain. A 24 year old black African woman presented with 3 week history of pain associated with an enlarging breast mass. She required in-patient admission for pain relief. A 32 year old Polish woman presented with a 4 week history of breast pain associated with a rapidly growing mass and fever.

Ultrasound scans of the breasts revealed 140mm and 200mm masses respectively and axillary lymphadenopathy. These areas were subjected to core biopsies.

Both of these women subsequently developed erythema nodosum on both shins.

Results: Breast biopsy histology revealed chronic inflammatory disease containing granulomata. The axillary biopsies showed reactive lymphadenopathy. The presence of erythema nodosum confirms the diagnosis of sarcoidosis.

Conclusion: We have presented two cases of an unusual presentation of sarcoidosis as acute breast pain. Although rare, it is a condition that should be considered. Its relationship with other benign and malignant breast disease remains uncertain and the literature will be reviewed (2)(3)(4)(5)(6).

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P58 Case study of unusual presentation of a rare lymphoma sub-type as breast lesions

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Purpose: Educational poster of a clinical presentation of T-Cell leukaemia/lymphoma as breast lesions, illustrated with mammography, breast ultrasound and CT scan

Method & Results: A 42 year old female presented with a history of breast lumps being investigated in her own country for the last 6 months.

Biopsies had been performed, results were not given and the patient was advised to have a bilateral mastectomy.

Clinically the breasts were lumpy and oedematous, suggesting bilateral inflammatory carcinoma. Ultrasound scan and tru-cut biopsy were performed and the patient was booked for staging with a bone scan and CT scan.

The bone scan results were normal.

The CT SCAN showed a large left breast mass, thickened oedematous skin and a large axillary node. It also showed two large masses within the right breast with small lymph nodes, enlarged spleen and a large 5 cm subcutaneous posterior abdominal wall mass.

Serology results: Anti-HTLV-I/II detected, Hepatitis B core and Hepatitis C antibody detected. Biopsy confirmed aggressive T cell lymphoma.

Conclusions: Although Breast lymphomas are rare and represent a fraction of Non-Hodgekin lymphomas, it should be considered in the differential diagnosis with unusual presentation.

T-Cell leukaemia/lymphoma is an aggressive lymphoma linked to infection by the human T-Cell lymphotrophic virus I and is more commonly found in South America, West and South Africa. The virus is acquired vertically from mother at birth. It affect adults with an average age of 58, M:F is 1.5/1.

Our patient is currently under the care of the haematology team and treatment had been established.

P59 Inflammatory breast carcinoma only seen on MR imaging-Case Report

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Background: The conventional imaging modalities including mammography and ultrasonography are of limited value in the diagnosis of inflammatory breast carcinoma (IBC), as it is difficult to delineate specific findings of the swollen dense breast. Pathological features of the retro mammary area showed marked interstitial edema and focal lymphatic involvement by tumor cells. These characteristic images obtained by MR imaging may be suggestive of IBC.[1]

Methods and materials: A 40-year old female presented with a two-month history of pain and itching in her left breast followed by negative findings on both physical examination and ultrasonography. The newly obtained mammography images (CR mammography) were also negative, apart from a discrete increase in the density of the left breast. An additional MR breast examination was performed on a 1.5 T MR system.

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Results: MR imaging showed an asymmetric, non mass like segmental linear and reticular pathologic enhancement, a marked interstitial edema as well as a pathological axillary lymph node, all indicative of IBC. The diagnosis of invasive ductal carcinoma with a pathological lymph node in the left axilla was histologically confirmed.

Conclusion: Our case report confirms greater sensitivity and specificity of MR imaging compared to ultrasonography and mammography in the early diagnosis of IBC.

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P60 Male Breast Cancer – Is It In Our Known BRCA Carriers?

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Background: Breast cancer in male population is less common than in women. BRCA gene carriers are at increased risk. Men who carry germline mutations in the BRCA2 gene have a higher risk of developing breast carcinoma than men in the general population. On the other hand, those who carry germline mutations in the BRCA1 gene may also be at a higher risk for breast carcinoma, but this association is not as well established. Are we seeing male breast cancer in our male BRCA carriers?

Methods: 5 years of data from the Royal Devon and Exeter Hospital was analysed (January 2010 – December 2015). We looked at the numbers of patients seen, those that were male and numbers of male cancer diagnosed. The latter cases were cross referenced with our BRCA carrier database.

Results: The throughput in the breast radiology department was 31,630 patients for the 5 years studied. 729 were male patients. 14 of them were diagnosed with breast cancer and treated accordingly. Age range between 62 and 88 years with a mean of 73.93. We display a pictorial review of these cases.

Conclusion: None of the male diagnosed cancers over a 5-year period were in male BRCA carriers.

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P61 Sternalis muscle: an important anatomical variant which may mimic a breast mass on mammography

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Background: The sternalis muscle is an anatomical variant in which a supernumerary muscle is found in the anterior thoracic region running parallel to the sternum. Occurring in 8%[1] of the population, the sternalis muscle exhibits wide variation in size between subjects and may be unilateral or bilateral. Sternalis may be demonstrated on mammography, typically as an opacity posteriorly in the medial breast on the craniocaudal (CC) view where it may mimic a breast mass[2]. Studies have reported a prevalence on mammography of 0.01-0.018%[2,3].

Case history: We review the imaging of two women who underwent assessment for suspected breast lesions which were subsequently demonstrated to be due to sternalis muscle. Both women were recalled from the NHS Breast Screening Programme for assessment of suspected unilateral breast masses present on the standard CC projection only. At assessment, an additional inferiorly pulled on mediolateral oblique (MLO) projection demonstrated the sternalis in one case. Targeted ultrasound was normal in both cases. Both women underwent dynamic contrast enhanced magnetic resonance imaging (MRI) which demonstrated the sternalis muscle with no evidence of a breast lesion.

Conclusions: The sternalis muscle is an uncommon but important anatomical variant which should be considered in the differential diagnosis of a posteromedial mass seen on mammogram CC views. Its presence can be confirmed with MRI. By recognising this variant unnecessary intervention can be avoided.

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P62 A case of synchronous male breast cancer and lymphoma diagnosed in the axilla. A review of literature and findings of sentinel node biopsy procedure

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Background: Limited previous case studies have been published regarding synchronous diagnosis of breast carcinoma and lymphoma in the axilla. We believe this is the first reported such case in a man. Male breast cancer is associated with later presentation and more advanced stage disease[1]. Earlier work has suggested that sentinel node biopsy should be avoided in cases such as this due to tumour collision and false negative results[2], although other work contradicts this in cases of B cell lymphoma with sinus preservation[3]. This case outlines the features at presentation, the radiological findings and pathological outcome.

Results: A 69 year old male was diagnosed by core biopsy with a grade 3 ductal carcinoma of the left breast and small cell lymphoma of the left axilla at initial presentation. CT staging revealed widespread supra and infra-diaphragmatic lymphadenopathy but no visceral metastases. A sentinel node study was performed using dual technique, alongside mastectomy and axillary clearance to ascertain the true nodal status. 32 nodes were removed, all of which contained lymphoma. The radioactive hot and blue node were the same node and no carcinoma was found in this at final histology.

Conclusion: In cases of high suspicion such as male presentation or high grade breast disease, with a synchronous lymphoma diagnosed in the axilla, sentinel node techniques are useful for diagnostic and prognostic purposes.

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P63 Imaging the male breast – when and how?

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Background: Male breast cancer is extremely rare affecting approximately < 1% of male population. Although less common than female breast cancer, there is often a delay in diagnosis due to lack of awareness. We reviewed all the cases of male breast cancer diagnosed at our institute over a 5 years period from Jan 2011 to Dec 2015. Clinical examination (P score), radiological findings (R score) were correlated with histological findings. We reviewed the current guidance on male breast cancer imaging.

Methods: Retrospective analysis of all male patients referred for breast cancer in our institute over 5 years (Jan 2011 till Dec 2015). Details collected from CRIS/PACS and pathology results.

Results: A total of 22 cases of male breast cancer were diagnosed. Most patients (n=20) had clinical examination score of P3 and above. However, 2 patients had clinical coding of P1 with history of

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nipple discharge and P2 (clinically eccentric benign lesion ?epidermoid cyst).

Conclusions: Several published clinical guidelines suggests imaging for patients with clinical coding of P3 and above. However, our data have shown that male breast cancer could be missed if we strictly adhere to suggested guidelines. We suggest offering imaging for all male breast lesions which are eccentric, not clinically gynaecomastia or which have worrying history such as blood stained nipple discharge.

P64 Phyllodes Tumours: a review of clinical, radiological and pathological features

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Phyllodes tumours are identified following core biopsy of indeterminate (M3/U3) breast masses, or excision of presumed fibroadenomas. If the latter, excision is often without margins, increasing local recurrence risk.

Retrospective review of pathology database for phyllodes identified on core or excision biopsy between January 2008 and December 2015 examining radiological and pathological features, recurrence rate and incidence of malignancy.

41 cases of phyllodes diagnosed in eight years. Age ranged from 14–80 years and size from 11–76 mm. In 34, initial core biopsy showed either phyllodes or fibroepithelial lesion with features of phyllodes. One biopsy revealed PASH. 6 were initially fibroadenomas, excised for size or patient request, found to be phyllodes on excision. Final excision revealed benign/borderline phyllodes in 30, 2 malignant phyllodes, 7 fibroadenomas, one metaplastic carcinoma and one borderline phyllodes with DCIS. Six patients had a M/U score of 4 or more, however, there were no radiological indicators to distinguish between benign and malignant tumours. In 9 patients, tumour extended to margins without re-excision. One patient has had two recurrences of benign phyllodes, each one year following surgery. On both occasions margins were involved. One patient developed an incidental contralateral invasive carcinoma after 3 years.

Phyllodes tumours are rare, comprising less than 1% of breast neoplasms. However, management can be difficult when discovered in excision biopsy specimens when there was no intent to excise with margins. We have shown that recurrence rate is very low, and management strategies that mandate margin re-excision may be unnecessary.

P65 Systematic review of breast lesions of uncertain malignant potential (B3 lesions) and their risk of malignancy

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Borderline breast lesions (B3 lesions) can coexist with malignancy. The magnitude of this risk varies between studies and lesion subtypes. Determining the true risk of invasive or in situ malignancy within each lesion sub type within the B3 lesion group allows risk stratification and improves management strategies.

Systematic review to determine the incidence of malignancy identified by surgical excision biopsy, following the diagnosis of a B3 breast lesion at core biopsy. We conducted a literature search (MEDLINE, Embase, HMIC, Scopus and Web of Knowledge), identifying relevant studies between 1980 and 2014. We appraised the literature, and extracted data allowing meta analysis, determining malignancy risk for all lesions.

Searches returned 2289 citations, with 11 more identified from other sources. Duplicate and unsuitable articles were removed leaving 209 records. From these, 26 abstracts/posters/reviews and 54 full text articles did not meet inclusion criteria. Data extraction was performed from 129 studies. The table shows lesion specific malignancy rates.

	Number Malignant Lesions	Total Number Lesions	Rate of Malignancy (%)
Papilloma	351	2278	12
ADH	1114	4031	27
Radial Scar	88	934	8
Lobular Neoplasia	345	2014	17
FEA	179	1413	11
AIDP	69	213	32
All B3 lesions	**2160**	**11423**	**17**

Whilst many studies have assessed the risk of malignancy following the diagnosis of a B3 lesion, these are often small and lack statistical power. This study is a comprehensive, inclusive assessment of the available literature, on which to base tailored management strategies in the future.

P66 Systematic review of papillary lesions with and without atypia and their risk of malignancy

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Papillary lesions can coexist with malignancy, however, the magnitude of this risk varies between studies and presence of atypia. As part of a larger systematic review, we analysed malignancy risk of papillary lesions with and without atypia.

Methods: Systematic review to determine incidence of malignancy identified by surgical excision biopsy, following diagnosis of a papillary lesion at core biopsy. A literature search (MEDLINE, Embase, HMIC, Scopus and Web of Knowledge) was conducted to identify relevant studies between 1980 and 2014. Critical appraisal, data extraction and meta-analysis to determine malignancy risk for all lesions performed.

Results: Following analysis of literature searches, 41 articles identified which included data on papillary lesions. Of these, 25 articles did not specify whether or not the lesions were associated with atypia. In 16, results were reported depending on the presence or not of atypia. Overall there were 2778 papillary lesions, 351 of which were upgraded to malignancy at surgical excision biopsy (12.6 %). There were 298 lesions with atypia, from which 91 were upgraded to malignancy (30.5%) and 1162 without atypia, of which 90 were upgraded (7.8 %).

Conclusion: Studies have assessed the risk of coexisting malignancy in papillary lesions, however, these are often small. This comprehensive review shows that papillary lesions, when associated with atypia on core biopsy, have a high rate of associated malignancy suggesting all papillary lesions with atypia should be considered for excision. Papillary lesions without atypia show a lower rate of associated malignancy, and could be safely managed with surveillance strategies.

P67 The impact of introducing VAB on B3 results and preoperative diagnosis of breast disease: A 4 year retrospective analysis

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Purpose/Background/Objectives: Breast lesions with B3 histology have uncertain malignant potential and conventional management is surgical excision to exclude malignancy. The study aim is to determine the effect of vacuum assisted biopsy (VAB) on our B3 results.

Methods: Retrospective data was acquired for the period 2011-2015 for all image guided samples yielding a B3 result.

Results: 184 image guided biopsy samples returned B3 histology. 109 cases (59%) presented with calcification, 75 cases (41%) with a mass, 26 cases (14%) were detected as distortion and 24 cases (13%) involved cystic abnormalities. 129 samples were acquired using a 14 gauge core biopsy needle and 55 samples were obtained using a 10 gauge VAB system. Accuracy of repeat image guided sampling ranged between 50% in 2011-12 up to 85% in 2012-13. The improvement in accuracy correlates to the period after which VAB sampling was acquired. On average 57% of the total number of 42 cases of reported ADH over 4 years were subsequently upgraded. VAB was used as a repeat sampling method in 4 of these cases. Despite this being inadequate to generate any statistical power, the repeat samples returned the same result as the final histology in all but one case, equating to 75% accuracy rate.

Conclusion: The association of B3 lesions with malignancy poses a diagnostic and management challenge requiring a multidisciplinary approach. The data collected suggests we should increase the repeat VAB rate on B3 lesions to try to increase our preoperative accuracy, in turn reducing need to progress to excision biopsy.

P68 Biopsy of all U2 masses for patients older than 25. Is it time to revisit this guideline?

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Background: Biopsy of all U2 masses is recommended for patients aged 25 and older. Referrals to breast clinics

has increased and improved ultrasound machines may have lead to better detection of small lesions. Some patients report long lasting pain following biopsy. Does biopsy always benefit patients?

Method: Biopsies of U2 masses performed between November 2013 and January 2016 were prospectively recorded, along with the age of the patient and the histology result (post-surgical if excised).

Results: 237 biopsies were performed in women aged 25 to 81. 100% of patients aged 25-29 (48 cases) had a B2 result. In the 30-34 age group (54 cases) there was one B3 result and one malignancy (incidental low-grade DCIS within an excised fibroadenoma, biopsy B2). In those aged 35 years and over, 96% of results were B2, with one malignancy (papillary carcinoma at surgery, B4 biopsy). Imaging was reviewed in all B3-B5 cases.

Conclusion: The yield for malignancy is very low in this group of patients (2/237). Could strict adherence to U2 criteria and the use of new ultrasound techniques (elastography) help to avoid biopsy in some patients?

P69 Large Volume Biopsy in B3 lesions – does weight matter?

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B3 breast lesions have an associated risk of malignancy, partly due to errors from sampling size, when small volume cores are used for diagnosis.

With the increasing use of large volume, vacuum assisted biopsy (VAB) for first line stereotactic biopsy, larger samples can be obtained which are more representative of the whole lesion. Does weight of biopsy samples obtained predict the risk of lesion upgrade following repeat biopsy?

Single centre, prospective analysis of B3 breast lesions diagnosed by 10G stereotactic VAB between January 2012 and December 2015, with second line sampling by 7/8G VAB. Pathology records reviewed – initial sample weight and any malignancy at subsequent VAB recorded. Data analysed using logistic regression analysis (Stata).

Over 4 years, 395 B3 lesions identified, of which 134 were initially diagnosed using 10G VAB and went on to have a second line VAB. 10G VAB tissue weights ranged from 0.56g–10g. 12 lesions were upgraded to malignant at second line VAB (9% upgrade rate). Logistic regression analysis of risk of upgrade to malignancy demonstrated that increasing tissue sample weight led to a 54% reduction in the odds of malignancy (p=0.068). 11 of 12 upgrades to malignancy occurred if initial tissue samples were <3g.

Risk of malignancy underestimation in B3 lesions is directly related to tissue sample weight. If the initial sample is of sufficient weight, upgrade on repeat sampling is rare. Future management strategies could incorporate weight of initial 10G sample to determine whether repeat biopsy in subgroups of patients are necessary.

P70 Stereotactic guided breast micro-calcifications: comparative study of cost using vacuum assisted biopsy and 14G core needle biopsy

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Purpose: 14G Core Needle Biopsy (14G CNB) and Vacuum Assisted Biopsy (VAB) has contributed enormously to the pre-operative diagnosis of breast cancer. The aim of this study is a retrospective review of cost effectiveness of (n=1585) patients who had stereotactic guided micro-calcification (MC) biopsy from April 2012 to March 2015 in a large Breast Screening Centre.

Methods: The pathological outcomes for all stereotactic guided biopsies for MC in the three years 2012-2015 were compared with all VAB (523) outcomes. Microsoft Excel (2010) was used for statistical analysis.

Results: We observed gradual increase in total number of stereotactic guided biopsies over time with a sharp decline in the proportion of diagnostic VAB between 2012 and 2015 with reduction of costs in 2014/15. Reduction in VAB numbers has not significantly changed the outcome of needle biopsy when compared with VAB outcome alone. Non-operative diagnostic rate for all ages were consistent over three years.

Non-Operative Diagnostic Rate for All Ages			
Year	Invasive	Non-invasive	Overall
2012/13	99.51	97.92	98.67
2013/14	99.30%	97.96%	98.96%
2014/15	99.69%	95.93%	98.45%

Conclusion: The cost would have been significantly higher if VAB used as First Biopsy Approach (FBA) in all cases. The rate of diagnostic stereotactic guided VAB for FBA halved between 2012/13 and 2014/15. This study showed that 14G CNB can still be regarded as an effective FBA if used selectively as it demonstrated high specificity and cost effectiveness compared to VAB. The reduction in VAB numbers has not changed non-operative diagnosis for invasive and non invasive rates of breast cancers.

P71 Digital breast tomosynthesis-guided vacuum-assisted breast biopsy – How we do it

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Background: Digital breast tomosynthesis (DBT) has revolutionized the detection of breast cancer by reducing the effect of tissue superposition[1,2]. It allows for more confident assessment of lesions and is routinely used in many centers for assessment of both symptomatic and screening-detected abnormalities. DBT-guided vacuum-assisted biopsy has been shown to allow maximum precision, shorter procedure time and lower radiation exposure compared to prone stereotactic vacuum-assisted breast biopsy[1,3].

At our institution, we have introduced the use of DBT-guided breast biopsy into daily practice to more accurately sample microcalcifications and ultrasonically-occult soft tissue abnormalities.

Content: There are several variations in how DBT-guided biopsy can be performed. We will demonstrate how to safely and effectively plan and perform DBT-guided biopsy using Hologic's 3D-guided biopsy system with tomosynthesis and an ATEC-Suros, 9 Gauge biopsy kit. This can be done with the patient in an upright or decubitus position.

The presentation will describe how to achieve technical success in lesion targeting in difficult cases such as distortions and lesions of low density. Variations in technique will be discussed. The potential complications will be explained including strategies on how to prevent such complications.

Case examples will be used to demonstrate the technique and potential challenges.

Conclusion: At the end of the presentation, the audience should have an insight into the value of DBT-guided biopsy over prone stereotactic guided biopsy and how to perform the procedure safely.

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P72 Incorporating a same day stereotactic biopsy service within a mammography assessment clinic

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Background: In 2013, within one screening site in the UK, only 50% of women were able to have their biopsy on the same day, not adhering to best practice guidance. As a consequence a number of working practices were altered in an attempt to improve the service. A re-audit demonstrated 67% compliance whilst a reportable increase, further additional changes were required. Following service changes a further audit was conducted.

Methods: Service changes that were introduced included: rescheduling the clinics, altering the appointment schedule, procuring a specimen cabinet, introducing disposable biopsy needles. Retrospective data analysis was collected over a 5month period following these service changes.

Results: Following these service changes the unit achieved 98% compliance with same day biopsies.

Conclusions: There was a highlighted deficiency within this service in same-day stereotactic biopsies at first assessment visits against recognised standard and best practice guidelines. The re-audit evidenced that the changes implemented were effective and that the service now complied with standards. The changes that have been implemented are sustainable if continually managed.

P73 Initial experiences of performing DBT guided core biopsy procedures

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Interventional image guided needle core biopsy procedures are performed to achieve a non-operative definitive diagnosis, either under ultrasound, stereotactic x-ray or more recently digital breast tomosynthesis (DBT) guidance.

DBT is a form of 3D imaging of the breast, a relatively new tool in breast imaging. It can improve diagnostic accuracy by decreasing the problem of overlap as it produces tomographic images of the breast, which can be viewed sequentially in mm slices (2, 3 &4).

In this unit DBT is used in conjunction with spot films at the discretion of the radiologist/consultant radiographer to further improve mass visibility and lesion classification accuracy (4&6). With increased conspicuity of lesions, DBT provides optimum visualisation of the area during core biopsy. It allows precise and quick targeting by eliminating the difficulties associated with inaccuracies in the process of triangulation encountered during stereotactic core biopsy(7).

Protocol locally recommends first line 14g core biopsy in most instances. 10G VAB is mainly used as the second line procedure following a B1, B3 or B4 result at initial core biopsy(1). The majority of these procedures are performed by advanced practitioners.

The aim of this poster is to relay our initial experiences in performing DBT guided procedures over the last 12 months in the form of a pictorial review of 3 challenging cases where the application of DBT biopsy has helped to improve patient pathway.

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P74 Breast Cancer Patient Pathway – Are we meeting the 62 day target?

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Background: Breast imaging has seen significant advances both in technology and surgical oncoplastic techniques, resulting in an increased workload for imaging. With these advances the question being asked is – Is the 62 day target achievable?

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Methods: A retrospective audit of patients who attended the breast clinic and had surgery for breast cancer between 1st April 2015 and 30th June 2015 was performed. The imaging data, number of interventions, MDT attendance and days taken to perform this was recorded. Patients were subdivided into 2 pathways:

Pathway 1- Imaging → MDT → Surgery

Pathway 2- Imaging → MDT → Further Work-up → Surgery

Patients having neoadjuvant or neoendocrine (NACT) treatment were excluded from this audit.

Results: Total number of patients: 138 but 18 excluded as NACT. 120 patients – 75 patients (62.5%) followed pathway 1 and 45 patients (37.5%) followed pathway 2.

Range of waiting times

Pathway 1

21 days to 86 days-Average = 43.05 days.

Breaches= 3 (2 patient choice)

Pathway 2

24 days to 190 days-Average = 54.25 days.

Breaches= 4 (3 patient choice)

Further work up included further imaging in 21 cases imaging with further biopsies in 22 cases and imaging and surgical review in one case.

Conclusion: Despite the advances in imaging and surgical techniques the 62 day target is still achievable provided processes are in place allowing for the additional work up to be performed. Just under 40% of our cancers required additional imaging +/- biopsies to aid surgical planning, highlighting the increasing complexity of managing breast cancer.

P75 Determining the cost savings associated with implementing percutaneous vacuum extractions of benign breast lesions without atypia, to possibly increase the size of lesions removed from 1.5cm up to 3cm

Miss Victoria Rhodes, Dr Tagreed Toma
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Purpose: The high cost of surgical excision of benign breast lesions (BBL), the current financial concentrain and excessive demand on acute services, which results in cancelling elective surgeries not infrequently initiated this retrospective study. The aim is determining the cost savings associated with implementing percutaneous vacuum extractions of benign breast lesions without atypia, to establish the possibility of increasing the size of lesions removed via this method from the current 1.5cm upto 3cm.

Method and Results: In the last year, 561 patients underwent surgical excision of BBL without atypia, as day stay surgery, costing £2579.01/surgery. Whereas 19 patients had percutaneous vacuum extractions of BBL at a cost of £ 222.50/ procedure, requiring an average 30 minutes radiology time. All the above is based on using a single chambered needle, some of the lesion might have been excluded due to their size.

With the recent acquisition of a 6 chambered vacuum needle, we calculated the cost/ procedure to be £ 245, still significantly less than a day stay surgery.

Conclusion: Reviewing the above, we are encouraging the breast unit team to identify and refer more of benign lesions without atypia for Vacuum extraction, following MDT discussion.

We are willing to change the current practice by accepting the extraction of larger lesions up to 3 cm diameter, using the 6 chambered Needle, considering the procedure has been well tolerated by previous patients, regardless of age, and with no recorded post procedure complications X bruising. We will revisit this subject next year and re-calculate cost savings.

P76 Does an increase in referrals to a tertiary family history clinic represent more high risk women seeking genetic testing?

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Barts Health NHS Trust, UK

Introduction: The publicity surrounding Angelina Jolie's bilateral risk-reducing mastectomy in May 2013 increased public awareness of hereditary breast cancer which led to an increase in GP referrals to our tertiary Family History (FH) clinic. This study aimed to identify if this increase in referrals represented more high risk women seeking genetic testing.

Methods: Retrospective analysis of all referrals to FH clinic was conducted from January – April 2013

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and compared with referrals in the same time period of 2014. Electronic patient records were analysed to determine the risk profile of the patients and the outcome of any referral to clinical genetics.

Results: A 26% increase in the number of referrals was noted. All were women with a median age of 47 (range 24-72) years. The risk profile of the patients after clinical review is tabulated below:

	January–April 2013 Total 131	January–April 2014 Total 178
	Number (%)	Number (%)
High risk	57 (44)	60 (34)
Moderate risk	44 (33)	48 (27)
Population risk	14 (11)	43 (24)
Did not attend	16 (12)	27 (15)

All high risk patients were referred to clinical genetics in line with NICE guidance of which 2% tested BRCA positive in each group.

Conclusions: The 'Angelina Jolie effect' led to an increase in the number of referrals of population risk women to our tertiary FH clinic with no significant increase in the detection of moderate and high risk patients.

P77 Evaluating time to breast cancer diagnosis among screened women undergoing assessment within and outside a breast assessment centre

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Background: Timely coordinated diagnostic assessment following an abnormal screening mammogram reduces patient anxiety and may optimize breast cancer prognosis. The Ontario Breast Screening Program has offered organized assessment through Breast Assessment Centres (BAC) that coordinate follow-up tests after an abnormal mammogram through a formal defined pathway for over 10 years. This study evaluates differences in diagnostic pathway characteristics and time to diagnosis for women undergoing assessment through and outside a BAC.

Methods: This study identified screen-detected breast cancers among two concurrent cohorts of women age 50 to 69 diagnosed through a BAC and outside a BAC between 2002 and 2010. Of the 155,866 women with an abnormal mammogram, 9,044 with breast cancer were eligible (47% BAC 53% outside BAC). The association between number and type of assessment procedures and time to diagnosis by breast assessment type was estimated with logistic regression.

Results: Women diagnosed through a BAC were more likely to have their first assessment procedure within 3 weeks of an abnormal screen (OR: 1.22 95%CI=1.10, 1.36), have three or fewer assessment procedures (OR: 1.59 95%CI=1.45, 1.73), have imaging and biopsy at their first assessment (OR: 2.00 95%CI=1.78, 2.24) and receive a core/FNA biopsy (OR: 2.01 95%CI=1.75, 2.30) compared to those diagnosed outside a BAC. They were also more likely to have a definitive diagnosis within 7 weeks after an abnormal screen (OR: 1.86, 95%CI=1.70, 2.05).

Conclusions: Women with breast cancer were more likely to have a timely diagnosis and fewer appropriate assessment procedures with organized assessment through a BAC.

P78 The communication of benign biopsy results in the NHS breast screening programme

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Background: The national service specification for breast screening states that results should be given in-person[1]. Although this guidance is mostly followed in the case of malignant results, some centres deliver benign biopsy results by telephone. Some patients may prefer receiving their results by telephone, as it may reduce wait time and potentially minimise distress[2]. However, telephone results may not be as extensive as in-person encounters, which could leave patients with a lower understanding of their results. There is limited research on the impact of communication method on patient outcomes[3].

The aim of this project is to explore patient understanding, anxiety and preferences in relation to different communication methods in the delivery of benign biopsy results.

Methods: Current practice at UK breast screening centres (e.g. who delivers results) will be recorded using a survey. Results will be used to inform the main study.

The main study will be a survey of women, recruited during their initial assessment clinic at twelve English breast screening centres. Women with a B2 diagnosis will be followed up with a repeat postal questionnaire, assessing the outcome measures of anxiety, understanding and preferences, alongside how their results were delivered.

Multiple regressions, adjusted for confounders, will be used to measure whether the method of communication used (telephone/in-person) affects the women's levels of understanding and anxiety. Important confounders for consideration are individual level variables such as age, and centre level variables such as urban/rural setting.

Results will be used to inform policy guidelines for the NHS Breast Screening programme.[4]

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P79 Women's experiences of mammography – a qualitative study with breast screening clients and staff

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Background: Mammography is often painful and unpleasant, but effective interventions to improve the experience remain scarce. Surprisingly little qualitative investigation of the topic has been conducted in the UK and no published study has included heterogeneous samples of both clients and mammography staff from the NHS breast screening programme. We aimed to achieve a thorough, contemporary understanding of experiences of screening mammography by exploring the perspectives of the women who participate and the radiography staff who perform the examinations (mammographers).

Methods: We conducted semi-structured qualitative in-depth interviews and thematic data analysis. Clients and mammographers were recruited from three NHS breast screening centres in London and Scotland.

Results: Clients had positive attitudes to breast screening but mostly low knowledge about potential harms of screening. Any dissatisfaction with levels of knowledge or information concerned the mammography procedure rather than screening effectiveness. The mammographer data indicated that some women attend for breast screening under pressure from others.

Pain and coping with it were prominent themes. Regarding communication, clients placed more importance on the mammographer's manner than on what was said, and recognised differences in mammographers' abilities to put them at ease. For mammographers, empowering clients within the confines of a taxing technique and maintaining compassionate care when faced with challenging client behaviours were causes of strain.

Conclusions: Future intervention development should focus on the information and support needs of women prior to the mammography appointment and on effectively training and supporting mammographers to deal with emotionally charged situations.

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P80 Investigating whether breast density is a risk factors for lower patient satisfaction after Breast Conserving Therapy

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Background: Poor cosmetic outcome is associated with psychological morbidity (1). The BREAST-Q is a validated Patient Reported Outcome Measure designed to evaluate patient satisfaction/quality of life. Anecdotally, surgeons report that closing the defect after wide local excision is easier when the breast is denser and we therefore hypothesised that increasing breast density may be independently associated with increased scores for the satisfaction with breasts domain of the BREAST-Q. This was investigated as part of a larger study of outcome of breast conservation.

Methods: Ethical approval was obtained. Consecutive women who had unilateral BCS were invited to complete the BREAST-Q. Satisfaction with breast score was dicotomised by median score. Univariate binary logistic regression analysis was undertaken. Variables with p<0.1 were taken forward to multivariate analysis.

Results: 200 women participated. Median age was 64.7years (IQR,55.6-71.5). Median satisfaction score was 68 out of 100 (IQR,55-80). BMI, type of axillary surgery, size of tumour on ultrasound, weight of specimen, nodal status and delayed wound healing were all significant on univariate analysis. Size on mammogram and breast density were not significant factors. On multivariate analysis, increasing BMI (<25, 25-30,>30 kg/m^2) and ultrasound size (<10,10-20,>20mm) were independently associated with lower satisfaction.

Conclusion: High BMI and USS tumour size are associated with lower satisfaction. Percentage breast volume excised has previously been associated with satisfaction (2). Our hypothesis about breast density and satisfaction has not been shown to be correct.

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P81 Differences in acute and persistent pain following ultrasound and stereotactic guided vacuum-assisted breast biopsy (VABB) – results of a pilot survey

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Purpose/background/objectives: Vacuum assisted breast biopsy (VABB) is a minimally-invasive modality enabling target lesions identified within breast tissue to be either sampled or removed. A biopsy needle is advanced percutaneously to the target under stereotactic, ultrasound or MRI guidance, whence multiple samples are harvested. This pilot-survey explored whether differences in acute and persistent pain intensity occurred between ultrasound and stereotactic guided VABBs.

Methods: A questionnaire-based survey was undertaken basic demographic and procedural data for patients was recorded at the time of VABB. Participants completed a pain/analgesia diary detailing the intensity of pain experienced and analgesia taken over the 7 day post-VABB period. Participants were contacted at 3 months post-VABB to determine the presence of persistent pain.

Results: 49 participants were recruited and 38 completed questionnaires were returned (27 US, 11 stereo'). Statistically significant differences were observed in the intensity of pain experienced post-biopsy by patients who underwent US and stereo VABB on day 1 3.4 (SD 2.8) vs 1.4 (SD 1.6)*P*=0.04, day 4 1.3 (SD1.5) vs 0.2 (SD 0.6) *P*=0.03, day 6 0.7 (SD 0.9) vs 0 *P*=0.03 and day 7 0.7 (SD 1.0) vs 0 *P*=0.03. No procedural differences existed between the groups. 3 patients (8%) reported persistent pain at the 3-month time point, all had undergone US guided VABB.

Conclusions: Patients undergoing US guided VABB experienced more intense pain in the week following biopsy than those undergoing sterotactic guided VABB and appeared to experience more persistent pain. Further work is required to determine the cause of these findings.

P82 A study into under-breast soreness (UBS) and its impact on breast screening

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Background: Mammographers frequently image women affected by UBS. When questioned, most women are unaware that a common cause is Intertrigo, and are unsure of treatment options. In some women, the problem is so severe; it can hamper the acquisition of high quality images and affect the overall breast screening episode.

Aim: The study aims to raise awareness of UBS in women attending breast screening, and to educate them on Intertrigo.

Objectives: To explore what women know about UBS, what information is available and what advice mammographers could give to maximise compliance, optimise image quality and improve the overall breast screening experience.

Methods: An awareness questionnaire was given to all women attending breast screening, along with a leaflet about UBS.

Results: 1917 women were asked to complete a questionnaire and 1643 did so (response of 86%). 55% had not heard of UBS, and 90% had never seen any information on it. Of the 328 women (20%) who had experienced UBS, 7% had discussed the problem with a healthcare professional. 4% reported that having UBS would prevent them attending screening.

Conclusion: Of these women, more than half had not heard of the condition, and very few had discussed it with a healthcare professional. It appears UBS would not stop the majority of women attending screening. A limitation of this study is the bias towards health conscious women attending breast screening. Further work could examine the non-attenders knowledge on UBS.

P83 NHSBSP patient dose survey 2015

Dr Jennifer Oduko, Professor Kenneth Young
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Purpose/Background: The NHS Breast Screening Programme conducts patient dose surveys[1] every three years, as part of its quality system. Data are gathered for almost every X-ray set in the programme, for 50 or more women, to ensure that doses are within the limits and to compare doses from different systems. In the 2015 survey, almost all the data is for digital systems, as the transition to digital imaging was nearing completion. Only information on digital systems is presented here.

Methods: Physics services in the UK provided data to the national centre for analysis. Details of exposures were recorded by radiographers during examinations, or extracted from image DICOM headers with appropriate software. Data on X-ray set performance were obtained from regular measurements carried out by physics services. All services used the same database to record information, which was loaded into a single database for analysis.

Results: Data were recorded for approximately 460 X-ray sets and 40,000 women. The average mean glandular dose (MGD) to the standard breast (45mm thickness of Perspex) was 1.60.1mGy. The overall average MGD for oblique views of 50-60mm thick breasts was 1.50.1mGy, but for different systems values ranged from 0.80.1mGy (Philips MicroDose L30) to 1.70.2mGy (Hologic Dimensions). Further data will be included in the final presentation.

Conclusions: The measured doses were well below the limits, which are a remedial level of 2.5mGy for dose to the standard breast, and 3.5mGy, the national diagnostic reference level 50-60mm breasts.

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P84 The role of the multidisciplinary team (MDT) in developing symptomatic mammography image interpretation and reporting (MIIR) expertise

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Aim: To explore how radiographers develop expertise in symptomatic mammography image interpretation and reporting (MIIR) and gain acceptance as multidisciplinary team (MDT) members.

Methods: Realist evaluation and qualitative methods, involving interviews and non-participant observation of clinical practice, were used to develop and test theories which explained how and why radiographers involved in symptomatic MIIR might substitute for radiologists in diagnostic breast multidisciplinary teams.

Findings: Professional roles and responsibilities were defined by organisational boundaries and cognitive 'task-work' knowledge and skill. Functional success in role depended on 'social' status within the MDT.

Radiographers' social status within the breast MDT was hierarchical. In the 'community of practice' social learning model, trainee and newly qualified MIIR radiographers had 'peripheral' membership of the MDT their journey to 'active' MDT membership involved learning to perform their role 'better' through sustained interaction with other team members. As radiographers displayed higher level MIIR skill and knowledge within the breast care MDT they became recognised, accepted and acknowledged as radiologist substitutes who contributed to clinical decision making. Consultant radiographers functioned as 'core' MDT members because they 'proved' they could substitute for radiologists.

Conclusion: This study highlighted the importance of 'social' (situated) learning in addition to cognitive learning in the development and application MIIR expertise for radiographers. Development of expertise and team contribution were inter-related radiographers achieved competent and confident MIIR through legitimate membership of, and participation in, the MDT.

P85 Computer-based training intervention to reduce unnecessary repeat images

Ms Ann Mumby

West of Scotland Breast Screening, UK

Purpose: Technical repeats impact on radiation dose as well as lengthening appointment time which increases screening costs. Studies have suggested that possibly 50% of original images repeated for positional errors would have been diagnostically acceptable by radiologists.[1]

Digital Mammography enables technically inadequate images to be seen immediately and repeats taken without recalling the women. However, the emphasis on producing a technically perfect film the first time may be reduced, and the radiographer may be tempted to retake a suboptimal but diagnostically acceptable image.[2]

Training mammographers to be aware of these issues and to support accurate grading of digital image quality and appropriate decision-making on technical repeats is required.

A computer-based training intervention intended to reduce unnecessary technical repeats has been developed.

The aim of this study is to investigate the validity and efficacy of the intervention and to evaluate its impact on clinical practice.

Method: Twenty radiographers from two Scottish breast screening units have undertaken the test set. Level of agreement with the gold standard classification and consistency between radiographers will be measured.

Intervention: Half of the radiographers then undertook the training intervention, assessing the training images and receiving immediate feedback on their decision compared with the gold standard.

Post-intervention assessment:

Following an interval of at least two weeks all radiographers then re-assessed the test set and their levels of agreement will be compared with the gold standard.

Results: The data is being analysed and results will be available for presentation, demonstrating whether the training intervention is efficacious.

References:

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P86 European radiographers challenges in mammography education and clinical practice: an integrative review

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Purpose: Although guidelines have been produced, there is variability within European countries regarding mammography imaging practice, and staff training. The aim of this study was to systematically synthesize available evidence on European radiographers' challenges in clinical education and practice concerning mammography.

Methodology: A systematic search was conducted in CINHAL, ERIC and MEDLINE, including qualitative and quantitative peer reviewed studies, systematic and integrative reviews, intervention or observational studies comprising Johanna Briggs Institute levels of evidence for effectiveness or meaningfulness 1[1]. Studies published in English language during last 5 years' period were included (2010-2015). Investigators dual rated study quality, discrepancies were resolved through consensus.

Results: 16 papers were included in the review. Thematic analyses of selected study results produced six categories of challenges. The main challenges addressed in mammography education were related: low level of knowledge (1) mainly with multiprofessional approach, image quality assessment, new technologies and competence for patient counseling. Lack of commitment and motivation (2) in taking part of training. Finally insufficient information about training opportunities and few feedback on the performance (3).

The main challenges addressed in clinical practice, were deficient image quality (4) mainly positioning, artifacts identification and removing, exposure optimization, and breast compression, as well as quality control procedure (5) and image quality assessment (6).

Conclusion: The need for training has been highlighted in this review for multiprofessional approach for breast cancer detection. Challenges in education/training and in clinical practice were observed reviling room for improvements in both areas.

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P87 A Breast Screening Unit CPD e-journal club: pilot introduction and evaluation

Rose Bridgewater

Northampton Breast Screening and Symptomatic Service, UK

Introduction: This poster describes the introduction and pilot of an e-journal club to meet the departmental and professional needs of practitioners at the Northampton Breast Screening Service.

Registration with the Health and Care Professions Council,[1] The Nursing and Midwifery Council[2] and the College of Radiographers' accreditation scheme for Assistant and Advanced Practitioners[3,4] requires mandatory Continuous Professional Development (CPD). Our department-wide (i.e. multidisciplinary) e-journal club will enable staff to satisfy this requirement. The approach is innovative because it encourages both an individual approach but also develops a community of learners.

Methods: The e-journal club will be piloted using three breast imaging and practice-related journal articles, distributed via email at two-monthly intervals accompanied by a set of critical questions. These will stimulate self-guided reflection which can be uploaded into an e-portfolio. In addition, discussion with other members of the initial study group will be encouraged.

Articles will be chosen to reflect the whole practitioner cohort, and group discussions will be enhanced by invited 'guests' and membership participation to engage the diverse cohort of practitioners within a broader concept of practice CPD.

The pilot will be evaluated with a questionnaire and verbal feed-back using a focus group technique. The results of the pilot study will be used to further develop the e-journal club.

Conclusion: Whilst the e-journal club is still at its formative stage, early evidence suggests that this innovative approach will achieve the departmental and professional objectives whilst achieving participants' satisfaction with this flexible approach to CPD.

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P88 Introducing @WeMammographers into the mammography community

Mrs Cathy Hill[1], Dr Claire Mercer[2]
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Purpose/Background/Objectives: To establish mammography as a professional group within the social media community and establish its use for continued professional development (CPD), research dissemination and education.

Methods: Within nursing the social media community is strong the @We twitter communities having high educational content. The development of @WeMammographers from initial concept to delivery was achieved in 6 stages:

- Initial concept, proposal, marketing strategy
- Design
- Management tool
- Delivery schedule
- Launch
- Future strategy

It was recognised, in the development stages, that there were blurred distinctions between personal and professional identities. The importance of maintaining strong professional judgments and established principles were used to guide individuals who were new to 'tweeting'.

Results: Sum all activity demonstrates, since launch in June 2015, the site had 266 followers as far as Australia, USA and Europe. In July, a month after launch, the site had 70k impressions over the month. Key themes that have been discussed are: 'social media awareness', 'communication within mammography', 'technique', 'diagnosis and treatment'.

@WeMammographers was simultaneously introduced within education in a PostGraduate Mammography Course and had a positive impact upon the learning experience of the students.

Short and long term gaols include:

- Regular monthly 'topics for debate'
- Introduction of a 'google docs' page to track and manage twitter content
- Inclusion of @WeMammographers into the educational delivery of the mammography module
- Introduction of 'tweet chats'

Conclusions: @WeMammographers has a bright future within the mammography forum as a tool for sharing best practice which can be utilised for education, CPD and dissemination of research.

P89 Mixed messages – an audit of NHS Trust policies regarding use of Social Media

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Background: NHS information Strategy[1]promotes the use of Social Media (SoMe) to engage online with patients in innovative ways. The WOMMeN breast screening SoMe hub has been developed in response to this strategy. The College of Radiographers has funded work to identify practitioner attitudes to the hub. One key finding has been that some practitioners feel actively discouraged from using SoMe by their Trust communication policies. This is at odds with the NHS strategy[1] and the Society and College of Radiographers' SoMe Guidelines[2]. We report an audit of NHS Trust policies to confirm/dispute these perceptions.

Methods: The NW of England's breast screening programme comprises ten NHS Trusts we accessed their SoMe policies, online or from the communications team with permission.

A framework analysis method was used[3]. After initially reading the policies, two mammographers developed a framework for more detailed analysis of content and tone. They then independently analysed the policies using the framework demonstrating a high level of agreement upon final consensus.

Results: Across the policies there were inconsistent messages, Xing regarding patient confidentiality.

Seven Trusts were prohibitive in tone, incorporating rules and restrictions on use, three were encouraging, including guidance on how to use SoMe in a positive way. One was enabling, providing staff training.

Conclusion: Practitioners across one region receive inconsistent messages regarding SoMe. This is at odds with national strategy and professional body guidance. We maintain that this is a barrier to the use of SoMe, depriving practitioners of professional collaborative benefits and stifling innovation for patient benefit.

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2. Society of Radiographers 2015 SoMeRAD: Guidance for the radiography workforce on the professional use of social media.
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P90 A mammographer-led online information service for clients invited for breast cancer screening: exploring the professional's perspective

Dr Leslie Robinson[1], Ms Cathy Hill[2], Dr Marie Griffiths[1], Mrs Beverley Scragg[4], Miss Shaheeda Shaikh[2], Mrs Geraldine Shires[2], Ms Julie Stein Hodgins[3], Mrs Jo Taylor[5], Ms Cathy Ure[1], Dr Julie Wray[1]
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Background: Allied Health Professionals are being encouraged to engage in health promotion[1]breast screening awareness is a possible context for mammographers. In addition, NHS information strategy[2] highlights the potential of social media (SoMe) for innovative ways of engaging with service-users. This may pave the way for mammographers to become involved in breast screening awareness-raising using online media. However, it is not clear what they feel about such a suggestion. This CoRIPS[3] funded study explored practitioners' perceptions of SoMe as a professional tool.

Methods: This action research study comprised 4 workshops: London, Nottingham, Manchester and Leeds. Following a recruitment campaign to all NHSBSP programmes, approximately 85 participants of various grades attended. After providing examples of SoMe use in the health context, groups of participants listed barriers. Individuals then ranked these barriers using a Nominal Group Technique[4]. The top 4 barriers were reflected back to participants to identify solutions.

Results: The top ranked barriers were:

maintaining professionalism misinterpretation of meaning/on-line communication skills accuracy of information support from manager/employer confidence in using technology.

Solutions were suggested for all the barriers and participants were generally supportive of SoMe for engaging with breast screening service-users.

Conclusion: SoMe offers exciting opportunities to engage differently with breast screening clients, with the potential for reducing anxiety and improving experience. It is not without challenges however, including a need for enabling Trust SoMe communication policies and online communication skills training. A robust evaluation of the benefits of SoMe in this context is also needed to justify these recommendations.

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P91 MAMMO-50: Mammographic surveillance in breast cancer patients over 50 years of age-the results of the 2 year feasibility study.

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Introduction: For breast cancer patients 50 years and older at diagnosis, there is no evidence or consensus on the optimal frequency or duration of follow-up including mammography. Mammo-50 aims to provide sound cost-benefit evidence whilst also investigating alternative methods of follow-up.

Methods: A multi-centre, randomised controlled, phase III trial of annual mammography versus 2 yearly for conservation surgery and 3 yearly for mastectomy patients. The 2-year feasibility study aimed to set up at least 100 actively recruiting centres by month 24 and / or recruit 1400 patients. In addition user perspectives and reasons for non-participation were explored.

Results: To date (4th May 2016) 1899 patients have been randomised in 108 sites and an additional 6 sites are in set-up. The results of the feasibility phase showed that the study could recruit the required number of patients from the 100 centres. This is truly a multi-disciplinary trial with 52% of patients randomised by surgeons, 29% by radiologists and 19% by others (i.e. nurses, oncologists).

Of patients randomised, 78% have undergone conservation, 87% have invasive disease, 82% are aged 55-75 years, 83% are ER + ve and 73% are undergoing hormone therapy. Patients most commonly enter the trial due to altruism and the main reason for non-participation is that they do not wish to change their mammographic schedule.

Conclusions: This is a feasible and important trial which will provide clinicians with valuable information to guide their future follow-up practice.

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