36 Portland Place
London W1B 1AT, UK
www.bir.org.uk

Symposium Mammographicum 2012 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.

ISBN 10: 0-905749-77-4
ISBN 13: 978-0-905749-77-8

British Library Cataloguing-in Publication Data
A catalogue record for this book is available from the British Library.

Published by The British Institute of Radiology

Typeset by The British Institute of Radiology

This publication is available online at http://bjr.birjournals.org/site/SympMamm_2012.pdf

Oral presentations

Session 4.1 – Challenges of screening

4.1 (1) Six year longitudinal study of pressure force in screening mammography

Mercer, C.E.[1]; Hogg, P.[2]; Szczepura, K.[2]; Denton, E.[3]; McGill, G.[4]

[1]Royal Bolton Hospital NHS Foundation Trust, United Kingdom; [2]University of Salford, United Kingdom; [3]Norfolk and Norwich University Hospital Trust, United Kingdom; [4]The Christies NHS Foundation Trust, United Kingdom

Background Previous research[1] identified compression is more heavily influenced by practitioners than clients. This retrospective longitudinal study (6 years) assessed three consecutive screening attendances to determine how pressure varied within and between practitioners and clients.

Method Retrospective selection of 500 clients; commencing at 50 years. One centre, GE DMR+ analogue. Recorded data: practitioners, compression, breast thickness, BI-RADS density, dose estimations. Exclusion criteria included: breast surgery, previous/ongoing interventions, and implants.

Results Significant pressure variations over 3 screens noted for the same client. Amount of pressure applied highly dependent upon the practitioner. 3 practitioner compressor groups demonstrated: high (mean 126N), intermediate (mean 89N) and low (mean 67N). When the same practitioner performed the 3 screens, pressure variation was low (–40N to +25N). When practitioners from different compressor groups performed 3 screens variations were higher (–20N to +100N). Retrospective dose analysis demonstrate mean reductions of 0.07 mGy (MLO), 0.05 mGy (CC) from an image taken by low compressors compared to an image taken by high compressors.

Conclusions Amount of pressure used highly dependent upon practitioner factors. Implications for radiation dose, image quality consistency and client experience over sequential attendances.

Reference

1. Mercer. C. E, Hogg P, Lawson R, Diffey J. Practitioner variability of breast compression in Mammography, UK Radiological UK Radiological Congress 2011 ISBN 10: 0–905749–72–3; ISBN 13: 978–0–905749–72–3.

4.1 (2) Identification of potential under-performance in breast screening interpretation

Chen, Y.; Gale, A.G.; Dong, L.

Loughborough University, United Kingdom

Purpose To determine whether under-performing breast screeners can be identified quickly.

Methods UK breast screeners voluntarily undertake the PERFORMS scheme where they read the same set of challenging cases. From the data, any outlier (an individual who is performing significantly lower than their peers) can be identified. However, this can take several months. To see if potential under-performers can be quickly identified the anonymous data of 283 participants were re-analysed by bootstrapping the information from 1,000 groups (of sizes 4–50 individuals). From this, a distribution of 1,000 estimated outlier threshold values was constructed. Then the accuracy of these estimations was determined by calculating the median value and standard error of this distribution and comparing it with the known actual outlier threshold value.

Results Using data from as few as 50 individuals allowed a good approximation of the known outlier cut off value.

Conclusions Individuals who are performing markedly differently to their peers can be identified by examining the data on the PERFORMS scheme of groups of 50 individuals. This approach is being implemented in the PERFORMS scheme which enables individuals who have difficulties to be identified very early after taking part and then helped to improve their performance.

4.1 (3) The effect of pain in mammography on participation in breast cancer screening: a systematic review

Whelehan, P.; MacGillivray, S.

University of Dundee, United Kingdom

Purpose/Background Despite the common perception that mammography is painful, known relevant studies vary in their assessments of any deterrent effect on breast screening participation. We therefore undertook a systematic literature review to assess the current evidence and quantify the proportions of women dissuaded from breast screening by mammography pain.

Methods Searches were run in 10 online databases. Articles were included if they contained: data from a

screening (rather than diagnostic) setting; a focus on pain or discomfort; information on attendance or re-attendance; empirical data clearly connecting the two.

Results Thirty-three articles met all inclusion criteria. Where women who had not re-attended gave their reasons, painful mammography accounted for 11–46% of non-re-attendance in programmes similar to the NHSBSP. From a separate group of studies, the overall crude odds ratio for re-attendance in the presence of prior mammography pain was 0.52 (95% CI: 0.35–0.76). Estimates of the deterrent effect of concern about pain on initial attendance range from 4% to 27% and several studies have found significantly lower crude odds ratios of attendance in women who believe that mammography is painful.

Conclusions Mammography pain accounts for a substantial proportion of non-re-attendance in breast cancer screening and is implicated in some initial non-attendance.

4.1 (4) Reminder invitations in breast screening: Are they worth it?

Fitzpatrick, P.; Mooney, T.; Fleming, P.
National Cancer Screening Service, Ireland

Objective BreastCheck – The National Breast Screening Programme in Ireland, screens women biennially.[1] In an era of financial constraint the aim of this study was to quantify the impact of reminder invitations on uptake and cancer detection.

Method Examination of BreastCheck's clinical database (2000–2010) to determine the number of women screened following first invitation and after a reminder; comparison by age group and screening phase with outcomes of re-call rate, cancer detection and true positive rate.

Results Of 819,182 first invitations sent, 448,974 (54.8%) women attended. An additional 245,157 (66.2%) women attended after reminder invitations, increasing uptake by 29.9% to 694,131 (84.7%) and cancers detected by 1,550 (35%). Women awaiting a reminder were less likely re-called for assessment (3.9%) than respondents to first invitation (4.04%) (p=0.004). Younger, mainly initial women were more likely re-called for assessment after first invitation. There was no difference between cohorts for cancer detection rate or true positive rate.

Conclusion Reminders increased uptake, strengthening evidence from international studies showing positive outcomes from reminder interventions. For programme efficiency, attendance at first invitation is optimal. For maximum programme effectiveness, attendance must be encouraged with reminders.

Reference

1. www.cancerscreening.ie

Session 4.2 – Challenges of mammography

4.2 (1) Automating the collection of data for patient dose surveys

Oduko, J.M.[1]; Mungutroy, E.H.L.[2]; Bowron, M.[2]
[1]NCCPM, Royal Surrey County Hospital, United Kingdom; [2]Jarvis Breast Screening Centre, United Kingdom

Background Patient dose surveys are carried out every 1–3 years in the NHSBSP [(1)], and after major equipment changes. For each X-ray set, radiographers traditionally record exposure parameters for 50–100 women, which is large enough for good statistics but not too burdensome for staff. With digital imaging, most of the data collection can be automated.

Method A computer programme was developed to read the DICOM headers of digital images and extract relevant parameters. It was used to obtain data for 100 and for 500 women, in the format used in dose calculation software supplied by NCCPM. Another set of data was recorded manually by viewing images for 50 women on PACS and typing values into a spreadsheet. The times taken to produce results by each method were compared.

Results Recording parameters from images viewed on PACS took 2 hours for 50 women, followed by 2 hours entering the data. Using the computer programme took 15 minutes of working time to acquire the data for 100 women, or 20 minutes for 500 women.

Discussion and Conclusion Using the computer programme saved considerable staff time. An added advantage is that values taken from the DICOM headers contain no errors of recording or transcription. Larger samples are easily processed by the programme if more data on specific sub-groups is required (e.g. small breasts).

Reference

1. Cush S et al, Quality assurance guidelines for mammography: Including radiographic quality control. NHS Cancer Screening Programmes, 2006 (NHSBSP Report 63).

4.2 (2) Improving consistency of application of mammographic compression – an exploratory calibration study

Taylor, M.[1]; Hogg, P.[2]; Szczepura, k.[2]; Mercer, C.[3]; Denton, E.[4]
[1]Pennine Acute NHS Trust, United Kingdom; [2]Salford University, United Kingdom; [3]Royal Bolton Hospital, United Kingdom; [4]Norfolk and Norwich University Hospital, United Kingdom

Purpose Variations in application of mammographic compression exist both between and within practitioners. Aim was to perform an exploratory calibration study to improve consistency of application of compression.

Method Ethical approval obtained for 250 participants. One machine selected for calibration, 250 randomly selected patients invited to participate, 235 agreed and 940 compression datasets recorded comprising of breast thickness, density and applied compression. Graphs were generated for different breast densities and paddle sizes, equations derived and trendlines applied to show line of best fit.

Results It was found four graphs could be used to denote rates of change of breast thickness against applied compression for the different paddles. Critical gradients were then applied. Results for the designated machine showed; high rate of change up to 9 daN; intermediate up to 13 daN; low rate of change up to 17 daN.

Conclusion Compression should be applied past 9daN and up to 13daN with consideration of patient tolerance. Between 13–17 daN the low rate of change of breast thickness implies that cessation of compression should be considered. At 17 daN where there is no further change in breast thickness, compression should be terminated. This calibration data could be used to guide practice thereby improving patient experience and reducing potential variation in image quality.

4.2 (3) Does mammography contribute to the management of symptomatic disease in women between 35–39 years of age

Abeyakoon, O.; Genevere, A.; Ingram, C.; Jolley, I.; Betarse, D.; Hatsiopolou, O.
Sheffield Teaching Hospitals, United Kingdom

Purpose Mammography plays a significant role in assessing patients who present with symptomatic benign/malignant breast disease. In the UK, women over the age of 50 are offered breast cancer screening using mammography. The screening programme is currently trialling age extensions to patients between 47–73 years of age. Younger women are known to have a higher percentage of glandular tissue making mammography more challenging in assessing disease. In our institution symptomatic patients under the age of 35 were assessed with targeted ultrasound. Women over the age of 35 underwent bilateral mammography as well as targeted ultrasonography. Recently published UK Best Practice Diagnostic Guidelines recommend the use of mammography for patients over the age of 40. The purpose of our study is to evaluate the contribution of mammography in the 35–39 year age group.

Methods We retrospectively queried our CRIS/PACS systems and identified 840 cases referred to the Sheffield breast unit between Jan 2009–2011. 59 patients who had not had both examinations (patient choice or non-attendance) were excluded from the study. We reviewed the mammography, ultrasound and histology results of 781 patients.

Results See figure and table on following page.

Conclusions Routine mammography did not contribute or alter the management of any patients in our study. We now follow the RCR best practice guideline in routine clinical practice.

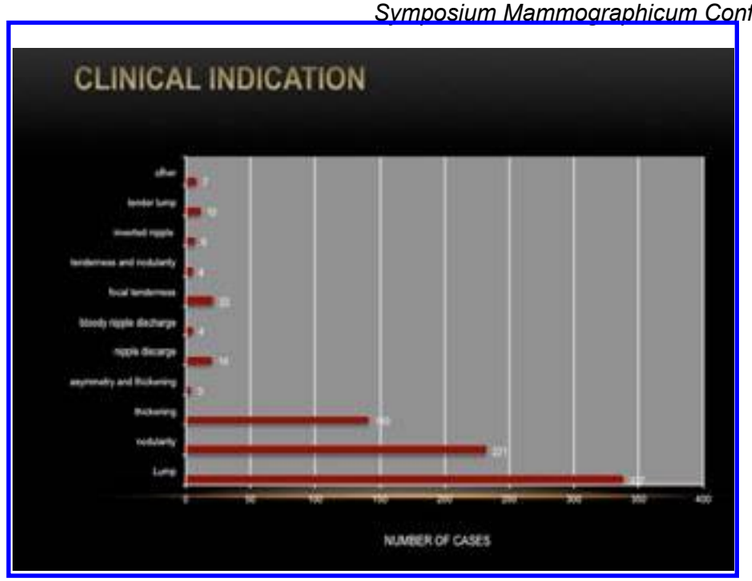
Reference

Best practice diagnostic guidelines for patients presenting with breast symptoms. Editors Alexis M Willett, Michael J Michell, Martin J R Lee. November 2010. (http://www.cancerscreening.nhs.uk/breastscreen/future-developments.html).

4.2 (4) Promoting early symptomatic presentation in older women with breast cancer: training mammographers to deliver a 5 minute scripted intervention

Forster, A.S.[1]; Forbes, L.J.L.[1]; Hopkins, V.[2]; Sellars, S.[3]; Patnick, J.[3]; Ramirez, A.J.[1]
[1]King's College London PEPG, United Kingdom; [2]Addenbrookes NHS UK, United Kingdom; [3]NHS Cancer Screening Programmes, United Kingdom

Purpose Promoting early presentation of breast cancer symptoms in older women attending for final round of breast screening may reduce stage at diagnosis cost-effectively, and is unlikely to lead to over-diagnosis. We have developed a mammographer-delivered intervention to equip women with the knowledge, motivation and skills to detect breast



M and U SCORE	Number of patients	Histology where relevant
M1 / U1 (Normal Mammogram and Ultrasound)	509	
M1 / U2 (Normal Mammogram / Benign US)	119 (cysts, lipomas, fact necrosis, ductal ectasia, fibro adenomas)	4 US guided core biopsies for suspected fibroadenononomas – 3 fibroadenomas, 1 fibrocystic change.)
M1 / U3 (Normal Mammogram / Indeterminate US)	30 (1 too superficial to biopsy, 1 sebaceous cyst)	28 core biopsies (2 invasive carcinomas, 26 benign breast disease)
M2 / U2 (Benign Disease on both mammogram and US)	67 (45 cysts, 18 fibroadenomas, 3 fibrocystic change, 1 implant rupture)	19 (18 fibro adenomas, 1 fibrocystic change)
M3 / U1 (Indeterminate on mammography/Normal US)	4	4 Stereotactic Core Biopsies (1 benign lymph node, 1 adipose tissue, 1 fibroadenomatoid hyperplasia, 1 fibroadenoma)
M3 / U2 (Indeterminate Mammography, Benign on US)	9 (2 cysts that were aspirated, 7 had a core biopsy)	7 (4 fibroadenoma, 1 ductal hyperplasia, 2 normal breast tissue)
M3 / U3 (Indeterminate Mammography and US)	22 (4 had tiny clusters of cysts, 18 proceeded to biopsy)	18 (12 fibroadenomas, 1 hamartoma, 3 normal breast tissue, 2 invasive carcinomas)
M3 / U4 (Indeterminate Mammography / Suspicious on US)	2	2 (1 fibroadenoma, 1 invasive carcinoma)
M3 / U5 (Indeterminate Mammography/ Malignant on US)	5	5 (2 invasive carcinoma, 2 DCIS and invasive carcinoma, 1 fibrocystic change)
M4 / U3 (Suspicious Mammography / Indeterminate US)	1	1 Fibroadenoma
M4 / U5 (Suspicious Mammography/ Malignant US)	1	1 Ductal Carcinoma
M5 / U5 (Malignant on Mammography and US)	12	12 (6 invasive carcinoma, 2 DCIS, 2 DCIS and invasive Ca, 1 Granular tissue, 1 lost to f/u)

changes and present promptly to primary care. The Promoting Early Presentation Intervention improves breast cancer awareness four-fold for up to 3 years [(1)]. 32/63 mammographers were trained across 4 screening services to deliver the intervention, as part of a pilot of implementation in routine practice, commissioned by The NHS Breast Screening Programme.

Methods The training involved two 3-hour group sessions and performance feedback on practice interventions delivered by the trainees to clients as an integral part of their final screening mammogram.

Results 27 were competent to deliver the intervention post-training, according to standardised quality criteria. All improved their confidence to promote early presentation and felt empowered by their extended health promotion role. The administrative challenges of organising training were mainly overcome.

Conclusion It is feasible, effective and empowering to train mammographers to deliver an intervention to promote early symptomatic presentation of breast cancer in older women.

Reference

1. Forbes LJL, Linsell L, Atkins L, Burgess C, Tucker L, Omar L, et al. A promoting early presentation intervention increases breast cancer awareness in older women after 2 years: a randomised controlled trial. British Journal of Cancer 2011;105:18–21.

4.2 (5) An audit of prognostic indicators in symptomatic women aged 70–80 years diagnosed with breast cancer in 2007–2010 in South Wales. Could screening have improved their outcomes?

Gower Thomas, K.; Edwards, E.; Matytsina, L.
Breast Test Wales, United Kingdom

Objectives To look at prognostic indicators of symptomatic breast cancer in the elderly women diagnosed at two South Wales hospitals and compare previous and current screening history of these patients.

Methods Prospectively collected data on 282 women (70–80 years) with symptomatic breast cancer obtained between 2007–10, including date of diagnosis, histological size, grade, node status. NPI and molecular markers and treatment regimens were recorded. NBSS records were compared and the attendance of these patients at screening was collated.

Results Of 282 women, 41 were screen detected, the remainder presented symptomatically. 50% of women diagnosed with symptomatic breast cancer had moderate/poor prognosis, 21% with excellent/ good prognosis. 51% of all symptomatic women were regular screening attendees, 15% had never attended and 14% never invited. However, 12% of all cases were intervals cancers, even though the patients were regular attendees.

Conclusions Many patients were regular attendees and the cancers would likely have been picked up earlier if these had been invited. The Welsh screening programme has not been extended to include women over 70. Breast cancer in the elderly does not necessarily have a good prognosis; therefore an early detection by screening is beneficial in terms of clinical management.

Reference

Eisinger, F. et al. 2011. Uptake of breast cancer screening in women aged over 75 years: a controversy to come? European Journal of Cancer Prevention 20 (supplement article), pp. 13–15.5.

Session 4.3 – Challenges of Diagnosis

4.3 (1) Digital Breast Tomosynthesis influences the change in mammographic signs of breast lesions

Iqbal, A.[1]; Michell, M.[1]; Wasan, R.[1]; Douiri, A.[2]; Evans, D.[1]; Peacock, C.[1]; Morel, J.[1]
[1]King's College Hospital, United Kingdom; [2]King's College London, United Kingdom

Background The purpose of this study is to analyse the change in mammographic signs of lesions from full-field digital mammography (FFDM) to Digital Breast Tomosynthesis (DBT).

Methods The study participants underwent bilateral two view FFDM and two view DBT. The sample size consisted of 186 lesions in which the mammographic signs changed between FFDM and DBT which were evaluated from a cohort of 1080 cases. For this study only soft tissue lesions comprising of lesions of circumscribe and spiculate types, parenchymal distortion and asymmetric density were included. Micro-calcifications were excluded because based on our experience during phase-1 trial, DBT characterization of micro-calcification was inferior to FFDM [1].

Results Fifty six (30%) lesions were malignant on histology and 130 (70%) were normal/benign. 35/37 spiculate lesions assessed on DBT turned out to be malignant on histology. Of the 11 spiculate masses identified on FFDM, 5 were found to be cancerous. 12

/15 classified as distortion on DBT were malignant; in contrast to 5 /23 distortions on FFDM. The difference in the distribution of spiculate mass and distortion was significant (Fisher's exact test p-value < 0.001).

Conclusions The study demonstrates that DBT provides additional information to the radiologist which allows more accurate classification of mammographic features and probabilities of malignancy.

Reference

1. Michell MJ, Iqbal A, Wasan RK, Douiri A, Evans DR, Peacock C, Morel JC, Lawinski CP: Phase I Trial to Determine the Performance of Digital Breast Tomosynthesis versus Two Dimension Digital and Film-Screen Mammography. RSNA, 96th Scientific Assembly and Annual Meeting, Chicago, USA, 28 Nov – 3 Dec 2010; abstract SSQ01–02.

4.3 (2) Imaging the axilla in patients undergoing neoadjuvant chemotherapy. Can post chemotherapy imaging predict residual nodal disease?

Litton, K.J.; Young, P.

Cardiff and Vale Breast Centre, United Kingdom

Purpose/Background/Objectives Neoadjuvant chemotherapy is an effective treatment in patients with locally advanced breast cancer. It is being used more frequently. Knowing whether there is metastatic disease in the axillary lymph nodes is important and currently it is not known if post chemotherapy sentinel lymph node biopsy is accurate [1,2]. The purpose of this study was to review the pre- and post-chemotherapy imaging findings in the axilla and correlate with surgical and histology results.

Methods__Patients who had undergone primary chemotherapy and surgery from 2008-present were included. Ultrasound, MRI and cytology/histology reports were reviewed.

Results Of 26 patients, 20 had a positive pre-treatment diagnosis of nodal disease. 11 (55%) of these still had positive nodes proven at surgery (post-chemotherapy). Only 2 patients with positive nodes proven at surgery had abnormal nodal morphology on end of chemotherapy MRI.

Conclusions Post chemotherapy nodal histology can remain positive despite the nodal morphology returning to normal on imaging. Post chemotherapy surgical management of the axilla needs to be decided on the pre-chemotherapy staging of the axilla.

References

1. van Deurzen CH, Vriens BE, Tjan-Heijnen VC et al. Accuracy of sentinel node biopsy after neoadjuvant chemotherapy in breast cancer patients: A systematic review. *Eur J Cancer.* 2009;45(18): 3124–30.
2. Jones JL, Zabicki K, Christian RL et al. A comparison of sentinel node biopsy before and after neoadjuvant chemotherapy: timing is important. *The American Journal of Surgery.* 2005;190: 517–520.

4.3 (3) Does ductal atypia within B3 lesions predict malignancy?

Forester, N.D.[1]; Holmes, C.E.[2]; Sibal, N.[2]; Thampy, N.[2]; Howitt, R.[2]; Black, F.[2]; McLean, L.[2]

[1]Newcastle Teaching Hospitals NHS Trust, United Kingdom; [2]Newcastle Teaching Hospitals NHS Trust, United Kingdom

Purpose B3 lesion management is challenging with malignancy risk varying between subgroups[1]. We assessed whether ductal atypia in the initial core is a predictor of malignancy.

Methods Retrospective review of B3 lesions after 11/14G core biopsy (09/2009–08/2011). Presence of ductal atypia or incidental lobular in situ neoplasia (LISN) in initial core was recorded. All lesions had excision biopsy with final pathology recorded. Logistic regression analysis (Stata 11) was used to quantify the relative risk of malignancy.

Results

147 B3 lesions:
23 radial scar/complex sclerosing
54 papillary
40 atypical intra-ductal proliferation/flat epithelial atypia or both
15 incidental LISN
15 other pathology
(Fibroepithelial lesions excluded as none demonstrated ductal atypia)
Ductal atypia present in 52 lesions and LISN in 20.
31/147 lesions had B5 diagnosis at excision, 25 initially showed ductal atypia and 2 LISN.
Ductal atypia in initial core biopsy had an odds ratio of 16.44 for upgrade to malignancy at excision biopsy (95%CI 5.23–51.63, p<0.001). LISN had an odds ratio of 1.97 for upgrade to malignancy (95%CI 0.33–11.63, p=0.45).

Conclusion Ductal atypia, but not LISN is a significant predictor of underlying malignancy in B3 lesions. These lesions have 16 times the odds of malignancy vs. those without ductal atypia and may benefit from large bore biopsy to improve preoperative cancer detection.

Reference

1. Rakha EA, Lee AH, Jenkins JA, Murphy AE, Hamilton LJ, Ellis IO. Characterization and outcome of breast needle core biopsy diagnoses of lesions of uncertain malignant potential (B3) in abnormalities detected by mammographic screening. Int J Cancer. 2011 Sep 15;129(6):1417–24. DOI: 10.1002/ijc.25801.

4.3 (4) We use vacuum assisted biopsy (VAB) as a second line procedure in breast screening – should it be first line ?

Sharma, N.; Dall, B.J.G.

Leeds Teaching Hospitals NHS Trust, United Kingdom

Introduction Many breast screening centres are moving to using VAB as 1st line biopsy procedure. In our institution VAB is used as a second line procedure due to multi-site working and cost.

Method This is a retrospective audit reviewing all breast screening patients referred for VAB. The information was obtained from the radiology database and pathology database. The mammographic abnormality, indication for VAB, histology and subsequent management were recorded.

Results 76 VAB were performed from 1st April 2010–31st March 2011. 6 were performed 1st line – 2 B5b, 1 DCIS, 2 B3 with atypia (both had diagnostic biopsy after MDT discussion – 1 B3 with atypia on 5 year follow up and 1 DCIS) and 1 B2 benign. 70 were performed as second line. 5/70 were B4 on core biopsy and all upgraded to cancer on VAB 1 B5b and 4 B5a. 46/70 had VAB as B3 lesion on initial core biopsy and 1 C3 ? papilloma. 22 were B3 with atypia (1 upgraded to B5b and 5 B5a) and 25 with no atypia (1 upgraded to B5a). 17/70 were B1 on core biopsy – 1 B5a, 1 B3 (5 year FU) and 15 were benign. 1 case VAB failed and patient had diagnostic biopsy – B3 papilloma.

Conclusion VAB as a second line procedure is used for the further evaluation of B1, B3 and B4 lesions. If VAB was used as a 1st line procedure the number of upgrades from conventional core to VAB would be less and the treatment pathway would be more efficient and timely

Reference

Non-operative diagnosis of screen-detected ductal carcinoma in situ: the contribution of vacuum-assisted breast biopsy Anthony J Maxwell and M D Janick Harake Bolton Breast Unit NHSBSP Publication no. 59, January 2005.

Poster presentations

P.1 A Monte Carlo simulation toolkit for optimization studies of digital mammography

Sakellaris, T.[1]; Pascoal, A.[1]; Koutalonis, M.[2]
[1]Faculty of Engineering, Catholic University of Portugal, Lisbon, Portugal; [2]Bart's and the London NHS Trust, Clinical Physics Department, London, United Kingdom

Purpose/Background/Objectives Development of a simulation toolkit for the design of optimization studies of digital mammography.

Methods A validated Monte Carlo model for conventional mammography [1], which considers a breast phantom with lesions, was extended to include an a-Se detector, a grid and a moving focal spot for oblique irradiations. A dose calculation algorithm was included. The code was associated with a graphical user interface (GUI). The detector model simulates X-ray-matter interactions, and produces images considering the energy absorbed inside a-Se and Poisson noise. Its validation was made comparing the simulation presampling MTF (MTF_{pre}) with theory [2]. The grid simulation is based on a compartmental approach of photon transport and was validated comparing the signal difference to noise ratio improvement factor (SIF) with published data. The simulation of oblique irradiation uses Euler transformations and it was validated comparing the simulation MTF due to oblique X-ray incidence (MTF_{obl}) with theoretical predictions [3].

Results The MTF_{pre} as well as MTF_{obl} differed 1.2 % from theoretical and the SIF 4.7 % from published values.

Conclusions The validated model associated with the GUI provides a user-friendly simulation toolkit for optimization studies of digital mammography, with perspectives of its use in breast tomosynthesis.

References

1. Spyrou G, Panayiotakis G, Tzanakos G. MASTOS: Mammography Simulation Tool for design Optimization Studies *Med Inform* 2000;**25**:275–93.
2. Zhao W, Ji W G, Rowlands J A. Effects of characteristic x rays on the noise power spectra and detective quantum efficiency of photoconductive x-ray detectors *Med Phys* 2001;**28**:2039–49.
3. Que W, Rowlands J A. X-ray imaging using amorphous selenium: inherent spatial resolution *Med Phys* 1995;**22**:365–74.

P.2 Digital mammography in Portugal: a national survey on technology and practices

Reis, C.[1]; Sakellaris, T.[1]; Carrasqueiro, S.[2]; Pascoal, A.[3]
[1]Faculty of Engineering / Catholic University of Portugal, Portugal; [2]National Higher Education School for Public Health, UNL, Portugal; [3]Faculty of Engineering /Catholic University of Portugal, Portugal

Objectives Characterise digital mammography (DM) in Portugal and compliance with international guidelines. Map technology installed and assess performance of selected equipment. Investigate staff practices in DM.

Methods Equipment installed was characterised (sources: governmental bodies industry, hospitals, scientific/societies). 3 questionnaires targeted at radiologists (RL), radiographers (RG) and chief-radiographers (CRG) were applied in 56 departments and the performance of equipment was assessed using IPEM and EUREF guidelines.

Results 441 systems were identified. 270 CR and 53 DR (2 tomosynthesis). 39.3% of departments participated representing 29 RD, 46 RG and 19 CRG. Manufacturer guidance drive protocols (52.6%). 29.0% RG is not aware of the dose indicator and training needs (intervention, artifacts). 78.94% of sites outsource QC. Most RD (82.76%) prefer DM for dense-breasts and pathology. SFM is preferred by 27.58% for adipose-breasts and by 13.79% for μcalcifications. All RD and RG agree DM provides higher accuracy and 36.96% RG report it increases workload. 79.31% of RD would join volunteer certification. IQ and dose data was collected on 20 sites.

Conclusions Mammography in Portugal is performed mainly with CR technology. Manufacturer recommendations drive protocols in use. Opportunities for optimization of DM were identified and will be discussed.

References

CP Lawinski, JA Cole, DP Emerton, PJ Clinch AM Buyers' guide Digital mammography, KCARE, London, KCARE, 2008 European Reference Organisation for Quality Assured Breast Screening and Diagnostic Services (2012) European Guidelines. Http://www.euref.org/european-guidelines National Health Care Breast Screening Programme Commissioning and Routine Testing of Full Field Digital Mammography Systems – NHSBSP Equipment Report 0604, London, 2009.

P.3 The need for a 'normalisation factor' with the contrast detail phantom 'CDMAM'

Higgins, M.S.; Jones, R.P.; Connolly, P.A.; Couch, T.; Moores, B.M.
IRS Ltd, United Kingdom

Background 'CDMAM' is a contrast-detail phantom used for image quality (IQ) assessment in full-field digital mammography (FFDM). 'CDCOM' software analyses CDMAM images. Physicists use CDMAM/CDCOM to:

• Determine whether a FFDM system passes minimum image quality standards.

• Ascertain whether a system can achieve minimum standards within the constraints of NHSBSP dose limits. Consequently, when a FFDM system's IQ is near the 'acceptable' boundary, whether or not the system passes depends on the CDMAM used.

Method CDMAM/CDCOM results were obtained on FFDM systems using two CDMAMs. One CDMAM was scored pre- and post-'service'.

Results One CDMAM scored systems less favourably and invariably indicated unacceptable IQ. This same CDMAM was 'serviced', improving results so that systems which had previously failed now passed.

Conclusions Variations between CDMAMs resulted in differences in scores they give. CDMAM/CDCOM results can show NHSBSP tolerances passing/failing dependent on the CDMAM used i.e. some physicists/CDMAMs pass systems whereas others would recommend adjustments to improve IQ, or even advise suspending equipment use. To minimise CDMAM result and consequent recommendation variability, a normalisation of CDMAM results is recommended.

CDMAMs suffer wear and tear, negatively affecting results, and thus should be routinely 'serviced', with normalisation factors updated if necessary.

Reference

NHS Breast Screening Programme. Equipment Report 0604 Commissioning and Routine Testing of Full Field Digital Mammography Systems. Sheffield: NHS Cancer Screening Programmes, Apr 2009.

P.4 Breast cancer risk factors in South Asian women presenting with breast cancer at the Nightingale Centre, Manchester

Levy, L.; Jain, A.K.
The Nightingale Centre and Genesis Prevention Centre, United Kingdom

Aim To study breast cancer risk factors in South Asian breast cancer patients.

Methods We retrospectively studied breast cancer risk factors in South Asian breast cancer patients diagnosed at the Nightingale Centre, Manchester. The Nottingham Prognostic Index was calculated for all invasive cancers.

Results 59 cases including 28 screening and 31 symptomatic cases have been studied. The age range for screen detected cancer is 51–73 years (mean 60.5) and 28–79 yesr (mean 48.5) for symptomatic cases. 4% screening but 16% symptomatic cases were 11 years of age or younger at menarche. 9% screening and symptomatic cases were 30 years old at their first pregnancy. Both groups had 3.5 average number of live pregnancies. 17% screening and 24% symptomatic cases did not breastfeed. 10% of symptomatic but 25% of screening cases had a positive family history. Only 4% screening but 29% symptomatic cases had previous breast disease. Average tumour size was 16.6 mm (range 3–50) for screening and 36mm (range 13–120) for symptomatic cases. 13% screening but 37% symptomatic invasive cancers had poor prognosis Nottingham Prognostic Index scores.

Conclusion There is no significant difference in breast cancer risk factors between symptomatic and screening patients. However, symptomatic cancers present earlier and are more aggressive.

References

V A McCormack, P Mangtani, D Bhakta, A J McMichael, I dos Santos Silva. Heterogeneity of breast cancer risk within the South Asian female population in England: a population- based case control study of first-generation migrants. British Journal of Cancer,2004;90(1):160:66.

Jain AK. South Asian Women at the Crossroads- rising breast cancer incidence, poor breast cancer awareness and poor screening uptake. http://behalal.org/health/uk-south-asian-women-at-the-crossroads/ NHS Evidence October 2010 .

P.5 Macrolane injections for breast enhancement; the effect on the NHSBSP

Mercer, C.E.[1]; Borrelli, C.[2]
[1]Bolton Hospitals NHS Foundation trust, United Kingdom; [2]St. George's Healthcare NHS Trust, United Kingdom

Purpose Macrolane is an innovative product advertised for breast enhancement. There have been no documented clinical trials in the UK and no study

of long and short term effects in breast tissue. Women who are considering breast shaping with Macrolane will want to be reassured that the enhancement filler will not adversely affect the efficiency of future mammograms and/or the breast tissue itself.

Method In one case study, mammography after Macrolane injection for breast augmentation was evaluated. This will be presented together with display of mammography images and before and after pictures. The reported advantages of Macrolane over breast surgery are highlighted and the site of injection is demonstrated.

Results In one case study it was concluded that the mammograms were easy to evaluate. Results of this case study will be presented. Presentation on mammography suggests multiple cysts or fibroadenomas and may hinder diagnosis.

Conclusions Clinical trials have highlighted that hyaluronic-acid-based materials have been shown to be safe when used around the face and in small volumes. Issues surround the use in and around the breast and the long term effects are unknown. Issues in breast screening require immediate address. Immediate awareness raising to all breast practitioners is considered a necessity.

P.6 Is there a case for the continuing use of 14 gauge needles in stereotactic breast biopsy?

Gray, A.K.; Carmichael, E.J.
SE Scotland Breast Screening Centre, United Kingdom

Background Many breast screening centres have adopted the use of large volume core biopsy devices for all cases of microcalcification. This is a costly technique. The South East Scotland Breast Screening Centre has adopted a selective approach to the use of large volume biopsy devices.

Purpose The aim of this audit was to measure whether this approach is justified.

Methods All stereo core biopsy results from April 2010 to March 2011 were examined. The number of repeats and the final surgical outcome of all stereotactic biopsies were recorded. A total of 206 cases were audited.

Results Retrospective analysis of the stereotactic core biopsy results from the South East Scotland Breast screening centre was performed. 3 repeat biopsies had B5a on 2nd biopsy prior to B5b at surgery.

	Total Biopsies	Repeats	Upgrades
14 Gauge Needle	98 47.5%	9 4.3%	7 3.3%
10 Gauge Needle Vacuum assisted	108 52.5%	8 3.8%	7 3.3%

Although a total of 6.7% of our biopsies were upgraded at surgery of these 3 had an invasive component >10 mm 11 had an invasive component <10 mm with 3 of these less than1mm There was no statistical difference in the number of repeats or surgical upgrades using either method.

Conclusion The continued use of a selective approach is justified.

All needles used were manufactured by Bard Limited, Forest House, Brighton Road, Crawley RH11 9BP.

P.7 An audit of the standard of care of patients with breast cancer who are treated with primary endocrine therapy

Gower Thomas, K.; Edwards, E.; Lazenby, S.
Breast Test Wales, United Kingdom

Objectives Primary endocrine therapy (PET) is used to treat women with ER positive breast cancer, unsuitable for or choosing to avoid surgery. It is more commonly used in older women for whom there are no specific guidelines to on which to base treatment decisions, thus such patients may not be receiving an appropriate standard of care.

Methods All patients currently on follow up on PET were identified. For each patient the following categories of information were collected from a prospectively maintained data: initial assessment, reasons for treatment with PET, and follow up records.

Results 75 patients were reviewed. The average age was 85 years (range: 44–99 years). The average length of follow up was 23 months (range: 1–78 months). The standard of initial patient assessment and follow up was not consistent. The reasons for use of PET often unclear; 23% of patients who were fit for surgery opted to have PET. In over 50% of patients the side effects of treatment were not addressed, the most important being bone health.

Conclusions There are few guidelines regarding follow up care for breast cancer, and none specific to PET. The standard of care for patients on PET can be improved upon, possibly through the inclusion of more elderly women in clinical trials and the creation of more specific guidelines.

Reference
Brown H, Wyld L, Garg DK, Kumar ID and Reed M. 2004. Stage and treatment variation with age in postmenopausal women with breast cancer: compliance with guidelines. British Journal of Cancer. 90 (8), pp. 1486–1491.

P.8 Radiographic Quality Control Monitoring and Breast Dose Audit – removing the pain and increasing the gain

Connolly, P.A.[1]; Higgins, M.[2]; Jones, R.[2]; Wilde, R.[2]; Moores, B.M.[2]
[1]Integrated Radiological Services Ltd., United Kingdom; [2]IRS Ltd., United Kingdom

Background IRS provides medical physics support to 40 mammography units delivering symptomatic and screening mammography in 33 locations across the UK. Full field digital mammography has presented many new challenges for physicists and mammographers conducting routine QC and breast dose audits.

Methods and results The recording and analysis of QC measurements has been greatly improved using a simple spreadsheet tool but with the added feature of being able to automatically download the user measured data to a remote medical physics site thereby facilitating near real-time medical physics support for routine QC. The spreadsheets have been implemented in 25 of the 40 mammography units to date. Breast dose information is extracted directly from the image DICOM header permitting annual breast dose audit data to be collected whilst conducting routine medical physics visits. This has been implemented for 17 NHSBSP mammography units and has allowed us to collect 3400 patient dose records to date.

Conclusions These new applications have resulted in improving the implementation of mammography QC with the added benefit of time and cost-saving improvements for medical physicists and mammographers. We have eliminated the need for mammographers to complete spreadsheets or paper records and has had the added advantage of speeding up the audit of breast dose in digital mammography

P.9 Study into the impact of fully implementing the NHSBSP 47–49 years age extension on the North & East Devon Breast Screening Service

Currie, R.J.[1]; Vece, S.[2]; Clarke, C.[2]; Bayles, S.[2]
[1]Royal Devon and Exeter NHS Trust, United Kingdom; [2]InHealth, United Kingdom

Purpose Expansion of the NHS Breast Screening Programme was announced in 2007 to extend the age range of invited women to 47–73yrs. We wanted to assess the impact on our service of fully implementing the age extension in 47–49 yrs.

Method This was a retrospective study over a 12 month period. Data collected included the numbers of all eligible women from the 47–49 age group invited, attended, recalled for assessment, biopsied and biopsy results. These figures were compared with 50–70yrs.

Results 5624 women aged 47–49 years were invited with 4250 (76%) attending for screening. 396/4250 women were recalled for assessment (9.3%). From the 396 women recalled to assessment clinic 102/396 (25.8%) had a biopsy performed. This compares to 28404 women invited aged 50–70 years with 22022 attending (78%). 1010/22022 were recalled (4.6%). From the 1010 recalls 250/1010 (24.8%) had a biopsy. Our service had an extra 4250 mammograms to perform from the age extension equating to an extra 355.2 hours of screening time. An extra 396 assessment clinics were required with an extra 102 biopsies and results appointments.

Conclusion Our experience has shown full implementation of the 47–49 years age extension has led to increased workload throughout the screening pathway. We discuss the changes we have made to accommodate this, and show how with planning, the age extension can be achieved.

P.10 Is Imaging (mammogram and/or Ultrasound) helpful in assessing patients presenting with nipple discharge (ND) to symptomatic breast clinic?

Bhandari, A.[1]; Rathinaezhil, R.[2]; Zammit, C.[2]
[1]North Tees Hospital, United Kingdom; [2]Brighton and Sussex University Hospitals NHS trust, United Kingdom

Background Imaging is performed as part of the triple assessment in patients with nipple discharge. ABS guidelines recommend imaging only in patients over the age 40 but most units offer imaging to all.

Aim Analyse the correlation of imaging in patients who underwent surgical intervention (major duct excision) for nipple discharge.

Methods Retrospective study over 6 years between 2005 and 2010. 133 patients had 140 procedures (8 bilateral).

Results 53% (70/133) blood stained, 39% (52/133) non blood stained and 8% (11/133) no nipple discharge

at presentation. 14% (19/133) had no cytology and 6 patients had needle biopsy. 98% (131/133) had mammogram and/or US. 76% (99/131) had normal imaging, and the rest either abnormal imaging. [12% (16/131) had abnormal US, 9% (12/131) had abnormal mammogram and US 3% (4/131) abnormal mammogram only]. There were 11 cases of in situ or atypical hyperplasia during the study period. Mammogram was normal in two in situ breast cancers and abnormal in 5 insitu and 4 atypical hyperplasia (ADH).

Conclusion In this small study we found 8% of the patients presenting with nipple discharge had ADH or DCIS. No invasive malignancy was found. Majority were found when radiology especially US was abnormal suggesting radiology is useful in assessing patients with nipple discharge even if it is not blood stained.

P.11 Are women satisfied with digital mammography?

Martin, J.
Colchester Hospital NHS Foundation Trust, United Kingdom

Objectives This service evaluation explored factors affecting satisfaction to evaluate whether FFDM is perceived as acceptable to women as FSM.

Methods The study took place in a breast screening unit in the East of England equipped with two Siemens Mammomat FSM machines and one GE Seno Essential digital machine. Mixed methods were employed to generate both quantitative and qualitative data to evaluate satisfaction. A convenience sample of 296 women attending screening over 3 weeks completed a validated satisfaction survey(1) and a purposive sample of 6 screening women were interviewed to elicit qualitative data about the experience.

Results A response rate of 96% was obtained for the survey and high overall satisfaction rates were reported for all ages. Mann Whitney *U* tests confirmed there was no significant difference in experienced discomfort or satisfaction between FFDM and FSM. No significant link was found between discomfort and intentions to return for another mammogram. Mammographers preferred using FFDM by almost 2:1.

Conclusions FFDM did not affect the high levels of satisfaction found in this service. Factors perceived as important to women were convenient and short appointments, a mammogram that was not too painful and friendly and approachable staff. As satisfaction was shown to hinge on the attitude of the mammographer, their positivity towards FFDM can only be of benefit.

Reference

1. Løken, K., Steine, S., Sandvik, L., and Laerum, E. (1997) 'A New Instrument to Measure Patient Satisfaction with Mammography. Validity, Reliability, and Discriminatory Power', Medical Care, 35(7) pp. 731–741.

P.12 Can preoperative imaging size and weight of surgical specimen, in patients undergoing wide local excision for breast cancer predict margin status?

Lumb, B.; Edwards, E., Gower Thomas, K.
Breast Test Wales, United Kingdom

Objectives Investigate relationship between excised specimen weight at breast conserving surgery and positive margins and the value of predicting optimal specimen weight preoperatively analysing imaging findings.

Methods Retrospective audit of 359 patients undergoing second surgery for positive margins. Prospectively collected data collated from the NBSS database on surgeon, margin status, specimen weight and preoperative radiological size for each and compared with patients with clear margins. Assuming the ideal excised volume is a sphere, the radius of which is calculated from the lesion size with the addition of a clear margin, using a resection margin of 12mm in order to allow for the 2 mm margin recommended by NICE, the calculation as: Ideal Excised Volume = 4/3 π(Radius of lesion + 12 mm)^3.

Results Percentage therapeutic operations with positive margins ranged from 2.7% to 9.5% with an average of 6.15%. The average weight of specimen varied by surgeon from 106 g to 55 g and the number of positive margins cases ranged from 3 to 24.

Conclusions Positive margin rates are influenced by surgeons; specimen weight is unrelated. The study showed that preoperative assessment of specimen size could be useful in reducing positive margins. Further work needed on how specimen size is predicted and also how it is affected by other factors.

References

1. National Institute for Health and Clinical Excellence. 2010. Improving Outcomes inBreast Cancer – Draft. [Online] Available at: http://www.nice.org.uk/nicemedia/live/10886/28762/28762.pdf [Accessed 9 June 2011].

2. Douglas-Jones AG, Logan J, Morgan JM et al. Effect of margins of excision on recurrence after local excision of ductal carcinoma in situ of the breast. J Clin Pathol 2002; 55: 581–586.

P.13 Audit of preoperative hookwire localisations in a busy symptomatic unit

Sanders, A.M.; Sharma, N.; Dall, B.J.G.
Leeds Teaching Hospitals NHS Trust, United Kingdom

Background The complexity of pre-operative localisations is increasing with the use of marker clips, vacuum assisted biopsy (VAB), MRI, neoadjuvant chemotherapy and oncoplastic surgery.

Method A retrospective audit of hook-wires performed in 2010 using the radiology and clinical databases. We recorded: lesion size, type, biopsy result, marker clip, localisation method, whether diagnostic or therapeutic, number of wires, surgery and histology.

Results 262 patients had 276 localising procedures; 179 ultrasound (US) and 97 X-ray (XR). 18/262 (7%) patients had 2 wires. 77/276 (28%) had a marker clip in situ which was used for localisation in 36 (4 US,32 XR). 226 therapeutic wires: 41/226 (18%) had re-excisions; 23 further WLE, 18 mastectomy. 12 with close margins on specimen needed re-excision. 50 diagnostic wires: 11 malignant, 39 benign. 9 complex cases had a diagnostic procedure at time of WLE for ipsilateral or contralateral cancer; 5 malignant, 4 benign. Pre-operatively the cancers were 5 cases already going to theatre and had a diagnostic localisation rather than VAB so as not to delay surgery, 5 cases MDT advised excision and 1 leiomyosarcoma.

Conclusions 1. A single localising wire in most cases will achieve a satisfactory re-excision rate. 2. Diagnostic wires accounted for 18% of our wires in which 22% were malignant. This needs to be monitored and reduced if possible.

P.14 3 minute stereo core biopsy. How to reduce the risk of poor decision making, the time the procedure takes and discomfort for the patient while increasing success in obtaining calcification

Cook, J-L.; Taylor, S.J.
Great Western Hospital, United Kingdom

Failure to obtain calcification at stereo biopsy is mainly a consequence of patient movement and this is proportional to the time the procedure takes. In our department the three radiologists had different procedures for taking stereo biopsies. The various techniques were studied and pared down to a minimum number of steps. The time taken to perform a biopsy is now often less than 4 minutes and calcification is obtained almost invariably in the first 6 biopsies. Reluctance to perform stereo biopsy, that can lead to erroneous decision-making in the clinic with regard to whether a biopsy is needed, has been reduced. An audit of practice before and after adoption of this technique will be presented.

P.15 Effect of change in image quality on cancer detection in digital mammography

Warren, L.M.[1]; Mackenzie, A.[1]; Cooke, J.[2]; Given-Wilson, R.M.[3]; Wallis, M.G.[4]; Chakraborty, D.P.[5]; Dance, D.R.[1]; Bosmans, H.[6]; Young, K.C.[1]
[1]Royal Surrey County Hospital NHS Foundation Trust, United Kingdom; [2]Jarvis Breast Screening and Diagnostic Centre, United Kingdom; [3]St George's Healthcare NHS Trust, United Kingdom; [4]Cambridge University Hospitals NHS Foundation Trust, United Kingdom; [5]University of Pittsburgh, United States; [6]University Hospitals Leuven, Belgium

Purpose Image quality performance of a mammography system is assessed quantitatively using the CDMAM phantom. This measurement demonstrates differences in performance between systems. But, does this mean there is a difference in cancer detection?

Methods An observer study was performed using a set of 162 normal a-Se images, into which half had 1–3 simulated calcification clusters inserted. These images were copied and modified to simulate five additional image qualities (IQs): different digital detectors (CR and DR), dose levels and image processing (IP) algorithms. Observers located and rated clusters within the images. The data was analysed using JAFROC analysis. CDMAM images at the same IQs were analysed to give threshold gold thickness (Tg), which was then compared to the observer's performance.

Results We found a significant reduction in detection of calcification clusters with CR compared with DR and with reduced dose level ($p<0.05$). Detection was not significantly different between the two IP algorithms. A correlation was found between Tg and performance of the readers ($p<0.05$).

Conclusions We found the CDMAM phantom to be a good predictor of calcification detection. We have several ongoing studies which investigate the effect of differing IQ on the detection of radiological features

besides calcification, using simulated masses and real non-calcification cancers.

P.16 Clinical performance of digital mammography systems in a breast cancer screening programme – an update

Keavey, E.; Phelan, N.; O'Connell, A.M.; Flanagan, F.; Larke, A.; O'Doherty, A.; Connors, A.M.
BreastCheck, National Cancer Screening Service, Ireland

Purpose The aim of this study was to expand previously presented data comparing the clinical performance of three digital mammography system types in a population based breast screening programme, from a 2 year to a 5 year period.
Method 28 digital mammography systems from three different vendors were included in the study. The retrospective analysis included 456,345 screening examinations of women aged between 50 and 64 years over a five year period. All images were double read and assigned a result on a 5-point rating scale to indicate the probability of cancer. Women with a positive result were recalled for further assessment and biopsy if necessary. Key clinical performance indicators including cancer detection rates and recall to assessment were analysed and the results presented.
Results No statistically significant difference in overall cancer detection rate or in the detection of invasive cancer and ductal carcinoma in-situ (DCIS) were observed in either the prevalent or subsequent screening examination categories. Equally, no disparity was found between systems for prevalent recall rates. However some differences were observed for recall rates at subsequent screening which were explored.
Conclusions The results demonstrate comparable cancer detection performance for the three imaging system types operational in the screening programme.
References

1. Hambly NM, McNicholas MM, Phelan N, Hargaden GC, O'Doherty A, Flanagan FL. Comparison of digital mammography and screen-film mammography in breast cancer screening: a review in the Irish breast screening program. AJR 2009;193:1010–1018
2. Karssemeijer N, Bluekens AM, Beijerinck D, Deurenberg JJ, Beekman M et al. Breast cancer screening results 5 years after introduction of digital mammography in a population-based screening program. Radiology 2009;253:353–358

P.17 Optimising paddle and detector pressures and footprints in mammography

Darlington,A.[1]; Hogg, P.[2]; Szczepura, K.[2]; Maxwell, A.[3]
[1]Pennine Acute NHS Trust, United Kingdom; [2]University of Salford , United Kingdom; [3]Royal Bolton Hospitals NHS Foundation Trust, United Kingdom

Introduction The breast is compressed during mammography between a fixed detector plate and a moveable compression paddle. This study compares detector positions relative to the breast to determine which give the most balanced surface pressures and contact areas (footprints).
Method A breast phantom of similar compression characteristics to female breast was constructed. Positioning (CC) was in line with recommended practice. A multi-sensor pressure mat was used and breast/detector and breast/paddle pressure readings were taken simultaneously. Hologic Selenia and Selenia Dimensions units were used, each with two paddles, at 60N, 80N and 100N and at five vertical detector positions relative to the infra-mammary fold (IMF).
Discussion For each of the conditions, paddle and detector footprints and pressures were extracted and the relative pressures indices of footprint and pressure for paddle and detector were calculated. A detector position of +1cm or +2cm gave the best pressure and footprint balance (approximately 50:50). At baseline (detector at IMF), higher pressures were from the paddle. A detector position below the IMF gave the worst balance.
Conclusion For our phantom, optimum footprint and pressure balance occurred when the detector was 1 to 2cm above the infra-mammary fold. This may have implications for clinical practice. A volunteer study is planned.

P.18 Physics tomosynthesis quality control tests for the TOMMY trial

Strudley, C.J.[1]; Oduko, J.M.[1]; Looney, P.[1]; Young, K.C.[1]; Gilbert, F.J.[2]
[1]NCCPM, Guildford, United Kingdom; [2]University of Cambridge, United Kingdom

Introduction In the absence of national guidance, a protocol for physics tomosynthesis QC has been developed to monitor the performance of Hologic Dimensions systems installed for the TOMMY trial.
Method Existing methods for measuring dose and CNR were extended to tomo. Tomo CNR was assessed from images of a square of 0.2mm Al and averaged over five focal planes. Geometric distortion was assessed using a phantom containing a grid, and resolution in the vertical direction using a phantom containing 1mm Al balls. Latterly these two tests have been combined using a phantom containing a rectangular array of Al balls. Tomo image quality was assessed using a CDMAM test object.
Results Tomo CNR appears to vary with phantom thickness more than 2D CNR, but the validity of comparison is debateable. No geometric distortion was seen within tomo focal planes and was within 1mm in the vertical direction. Resolution in the vertical direction was 10–12 mm for 1 mm balls. Tomo CDMAM results were poorer than 2D results for the smallest and largest details, but this does not take account of the advantage that tomo has in reducing obscuration by overlying structure. The combined geometric distortion and vertical resolution test object allowed faster and less subjective automatic analysis.
Conclusion The tools and methods developed may form the basis for a national protocol for physics tomosynthesis QC.

P.19 Technical performance of the seven Hologic Dimensions tomosynthesis systems used in the TOMMY trial

Strudley, C.J.[1]; Looney, P.[1]; Young, K.C.[1]; Gilbert, F.J.[2]
[1]NCCPM, Guildford, United Kingdom; [2]University of Cambridge, United Kingdom

Introduction Seven Hologic Dimensions systems with tomosynthesis have been installed for the TOMMY trial. The technical performance of the seven systems in both conventional and tomosynthesis modes was assessed to ensure that NHSBSP standards were met and that the seven systems were matched.
Method Each system was tested before the trial and at six monthly intervals. Measurements of 2D dose, CNR, detector response and image quality were carried out in accordance with current NHSBSP standards. Measurements of dose, contrast to noise ratio (CNR), geometric distortion, vertical resolution and image quality in tomo mode were made. Detector characteristics were measured at the start of the trial.
Results Initial measurements on the seven systems showed that the average dose to the standard breast was 1.41 mGy for 2D and 1.89 mGy for tomo. The maximum differences in measurements between systems were 9% for 2D and tomo dose, 10% for 2D and tomo CNR, 10% for 2D threshold gold thickness for 0.25 mm details, 6% for modulation transfer function at 5 mm^{-1} and no significant differences for tomo geometric distortion and resolution in the vertical direction.
Conclusion All systems met the UK standards for conventional digital mammography. Conventional and tomosynthesis technical performance was well matched between the seven systems.

P.20 Awareness of breast cancer signs and risks among women attending the National Breast Screening Programme in Malta.

Muscat, E.
Malta National Breast Screening, Malta

Background Breast cancer is a global health issue and a leading cause of death among women worldwide[1] with a lower than average reported survival rate in Malta[2].
Aim The study evaluated the awareness of breast cancer signs and risks and the use of early detection methods in Maltese women.
Methodology A descriptive design using a quantitative approach was used and data gathered using a self-administered questionnaire on a sample of 397 women. The dependent variables were awareness of signs and risks of breast cancer and the use of early detection methods such as mammography and breast self-examination. Descriptive cross-tabulation statistics and Pearson's Chi-Square test of association were used to assess the distribution of responses.
Results Recognition of well-known signs and risks of breast cancer was good but moderate or low for other less known factors. There was also limited awareness of lifetime risk and women were not making use of the appropriate early detection methods at the recommended intervals.
Conclusion The study has identified a number of gaps in breast cancer awareness and an inappropriate reliance by women on the benefits of detection techniques. The reported survival rate could be enhanced by a better knowledge of the risks and signs of breast cancer.
References

1. Shibuya K, Mathers CD, Boschi-Pinto C, et al, (2002), Global and regional estimates of cancer mortality and incidence by site: II. Results for the global burden of disease 2000, BMC Cancer, 2, 37 –63

2. WHO Regional Office for Europe, (2009), Environment and Health Performance review: Malta, available from: https://ehealth.gov.mt/download.aspx?id=2449

P.21 Impact of lower age extension on assessment clinic workload

Ridley, N.T.F.; Brown, S.; Wilmot, K.; Taylor, S.J.
Great Western Hospital, Swindon, United Kingdom

Background We use a simple ABC classification system to streamline the patient pathway during assessment clinics. Abnormalities are graded A, B or C at consensus depending on mammographic suspicion and the anticipated time required for assessment. C represents the most complicated or suspicious cases. Our clinics are mixed according to the ABC stratification improving efficiency and reducing waiting times. Following the age extension we were interested to see if the younger age group (47–49 years) has a different ABC mix.
Methods We reviewed retrospectively 30 patients in the 47–49 year group compared to 30 patients in the >50 yr group.
Results 47–49 (average age 48 years): A 18 B 6 C 6. 3 cancers. 1ER. 26RR >50 (average age 57 years): A 16 B 8 C 6. 4 cancers. 2ER. 24RR.
Conclusion Even with these small numbers, as expected there are more cancers in the older age group and a slight increase in patients graded as B. If these trends continue with larger numbers it suggests that the 47–49 year old age group will have a slightly lower impact upon our assessment workload. It may be possible to slightly increase the numbers assessed in this lower age group per clinic.
Reference
Breast screening assessment clinics: as easy as ABC Taylor S, Ridley N, Brown S, Gillhespy N Breast Cancer Research 2008, 10(Suppl 3):P40 (7 July 2008)

P.22 Radiographer tomosynthesis quality control tests for the TOMMY trial

Strudley, C.J.[1]; Oduko, J.M.[1]; Barnard, A.[1]; Young, K.C.[1]; Gilbert, F.J.[2]
[1]NCCPM, Guildford, United Kingdom; [2]University of Cambridge, United Kingdom

Introduction In the absence of national guidance, a protocol for radiographer tomosynthesis QC has been developed and implemented at the seven sites where Hologic Dimensions tomosynthesis systems were installed for the TOMMY trial.
Method The daily system check and monthly AEC thickness test were extended to include tomo images of the PMMA blocks. Additional weekly tests were introduced: A 2D and a tomo image were taken of a plain PMMA phantom, and a tomo image of a PMMA phantom containing a 1 mm aluminium ball. Weekly images were sent to Guildford for analysis.
Results The daily and monthly tomo tests were easily assimilated into the radiographers QC routine. Analysis of weekly images has enabled central monitoring of dose, detector response and noise for both 2D and tomo modalities at each centre. During the first few months doses at each centre typically varied by 1–3% (2D) and 0–10% (tomo) and signal to noise ratios varied by 2–6% (2D) and 4–8% (tomo). Some artefacts and changes in the uniformity of tomo images were seen, but these were not apparent on clinical images. The dimensions of the reconstructed aluminium ball in the weekly tomo images have not varied.
Conclusion The experience gained should be useful in defining a national protocol for routine tomosynthesis QC.

P.23 Breast Screening – why the low uptake? Is there anything that can be done to improve the situation?

Gower Thomas, K.; Parry, B.; Humphries, A.
Breast Test Wales, United Kingdom

Aims To explore the reasons behind the low uptake for breast screening and discover if anything could be done to improve the situation.
Method Women from two contrasting GP practices, were randomly selected to complete a questionnaire concerning attitudes towards breast screening. A further 1080 women underwent telephone questionnaire to ascertain their attitudes to screening and their knowledge of breast cancer symptoms.
Results 96% of the GP surgery women attended screening; 88% were likely to re-attend. 44% felt very well informed regarding the subject of breast screening and 42% felt that more advertising surrounding the subject was necessary. Women's knowledge of breast screening was heavily influenced by friends and family experience rather than from the screening service. Knowledge of breast cancer symptoms was limited.
Conclusions Low uptake for breast screening may be due to a lack of health seeking behaviour and perceived inconvenience of appointments. The low number of females feeling well informed about breast screening suggests that interventions, e.g. advertisement, are required to increase women's knowledge of the subject in order to encourage attendance.
References
NHS Breast Cancer Screening Programme. What is Breast Screening? [accessed 24 June 2011]. Available from: http://www.cancerscreening.nhs.uk/breastscreen/breast-screening.html
Vernon SW, Vogel VG, Halabi S, Jackson GL, Lundy RO, Peters GN. Breast cancer screening behaviours and attitudes in three racial/ethnic groups. Cancer,1992;69: 165–174.

P.24 Intermittent attendance at breast screening; why do women skip rounds and why do they return?

Fitzpatrick, P.[1]; Mooney, T.[1]; O'Neill, S.[1]; Fleming, P.[1]; Owens, M.[2]
[1]National Cancer Screening Service, Ireland; [2]UCD School of Public Health, Physiotherapy & Population Science, Ireland

In addition to women who never attend breast screening, some skip rounds, either the first [first previous non-attender (FPNA)] or after attending [subsequent PNA (SPNA)] and then return to screening. Little is published regarding such intermittent attendance.
Postal questionnaire to 2,500 women attending BreastCheck[(1)]; FPNAs, SPNAs and two control groups. Logistic regression used to compare attitudes to breast screening both when missed appointment and on return to screening, between PNAs/controls and FPNAs/SPNAs.
Response rate 72%. Significantly more controls than FPNAs had family history of cancer. More FPNAs had 3rd level education (33.2% v. 23.6%;p=0.002) and fewer had private insurance than controls (57.7% v. 64.8%;p=0.04). Reported excellent/good health was lower in SPNAs than controls (72.7% v. 84.9%;p<0.001). More controls agreed 'mammogram could find a small impalpable breast lump'. More SPNAs than controls agreed they 'would rather not know if had breast cancer' (14.4% v. 7.7%;p=0.001). Fewer agreed that 'family/friends had positive experiences of breast screening' (72.7% v. 80.8%;p=0.005). Significantly more FPNAs than SPNAs stated that family/friends or GP advised attendance.
Intermittent attenders do not fit typical sociodemographic patterns of non-attenders at screening. Persistent GP recommendation and 'word of mouth' are important influences on women's return to screening.
Reference
1. www.cancerscreening.ie

P.25 The impact of implementing digital imaging in a breast screening service

Bradley, N.[1]; Mercer, C.E.[2]
[1]Bolton Hospital NHS Foundation Trust, United Kingdom; [2]Mercer, United Kingdom

Objectives To identify the processes involved in the implementation of digital imaging within a breast screening service at static and satellite sites. The advantages and limitations of digital imaging within the breast screening environment will also be considered together with the duties of a PACS administrator.
Method To evaluate direct digital mammography equipment and its integration with the PACS, CRIS and NBSS systems and how this impacts upon working processes. A demonstration of how the network effectively interlinks with all these systems will be provided. The newly established role of PACS administrator within the breast screening service and how they maintain the systems efficiently will be outlined.
Results It is paramount for breast screening units to share their experience of direct digital equipment and radiology systems integration so that practitioners, managers and units as a whole can learn the best way to implement and avoid disruption when bringing these systems live.
Conclusions The limitations of digital imaging such as downtime and the importance of patient demographics is examined. The importance of good staff training to ensure efficient workflow at all stages of the screening process is highlighted. The implementation of digital imaging in the breast screening unit has identified the essential requirement for a PACS administrator role.

P.26 Initial experience from a DGH of Shear Wave Elastography (SWE) in small screen detected breast cancers

Rajan, P.[1]; Aylwin, A.[2]
[1]Princess Alexandra NHS Trust, United Kingdom; [2]Epping Breast Unit, United Kingdom

Objective The reproducibility of quantitative data with Shear wave Elastography with little inter observer variability is known. The role of SWE in small cancers is still uncertain. This retrospective review of cases aimed to assess the characteristics of SWE

in categorising small cancers, which are traditionally detected at breast screening.

Methods All small screen detected cancers(less than 15mm) from April 2011 to March 2012 which had an ultrasound with Shear Wave elastography, were reviewed. Aixplorer® ultrasound system (SuperSonic Imagine, Aix en Provence, France) was used to acquire images. The ROI was placed on the area of maximum stiffness on the colour maps and the maximum stiffness, mean stiffness and SD were simultaneously recorded .

Results The total number were 24 patients, ages ranged from 51 to 76 years. Of these 14 consecutive patients had adequate date sets and were included. All patients were scanned by 2 consultant breast screening radiologists. The tumour size ranged from 3 to 15 mm. The mean elasticity values from the area of maximum stiffness around tumour ranged from 13 to 228 kPa with an average 58 kPa.The elasticity of normal tissue ranged from 3.5 to28. The SWE ratio ranged from 1.6 to 8.2.

Conclusion The smaller lesions had a lower maximum stiffness which fell outside the range of what was deemed to be malignant in other studies.

References

1. Quantitative shear wave ultrasound elastography: initial experience in solid breast masses. Breast Cancer Research 2010, 12:R104. Andrew Evans et al.
2. Breast lesions: quantitative elastography with supersonic shear imaging – preliminary results. Radiology 2010, 256:297–303.Athanasiou A et al.
3. Quantitative assessment of breast lesion viscoelasticity: initial clinical results using supersonic shear imaging. Ultrasound Med Biol 2008, 34:1373–1386. Tanter M et al.

P.27 Improving the quality of care for people with learning disabilities. Derby Breast Units Experience

York, J.; Cheung, S.

Royal Derby Hospitals NHS Foundation Trust, United Kingdom

This poster will demonstrate, using several different case studies, how individual pathways have been developed locally for patients who have a variety of learning disabilities. How their individual needs are addressed so they can attend for screening or symptomatic appointments and where necessary go through the care pathway with respect, dignity and compassion to successful cancer treatment. In Derby we have an excellent relationship with the local learning disabilities team and have meetings about patients who need to access our services. The individual needs of the patient are taken into account and an individual patient pathway is used so that the patient may receive effective and appropriate care. People with learning disabilities often experience difficulties when accessing healthcare. It is important to ensure healthcare services and professionals ensure the same standard and access to care for all. An independent inquiry into access to healthcare (Michael J. 2008) stated health staff have limited knowledge about learning disabilities and fail to understand that a right to equal treatment does not have to be the same, but can be adapted to meet an individual's needs.

References

Michael J. Independent Inquiry into Access to healthcare for People with Learning Disabilities. (2008) DH, London.

Disability Rights Commission (2006) Equal treatment closing the gap.

Disability Rights Commission, London Rees G. (2011) Increasing Access to Cancer screening Programmes. Learning Disability Practice Vol. 14(7) 14–19.

Blair J. (2011) Care adjustments for people with learning disabilities in hospitals. Nursing Management Vol. 18(8) 21–24 .

P.28 Breast screening uptake amongst the Muslim community

Shaikh, S.

NHS Pennine Breast Screening, United Kingdom

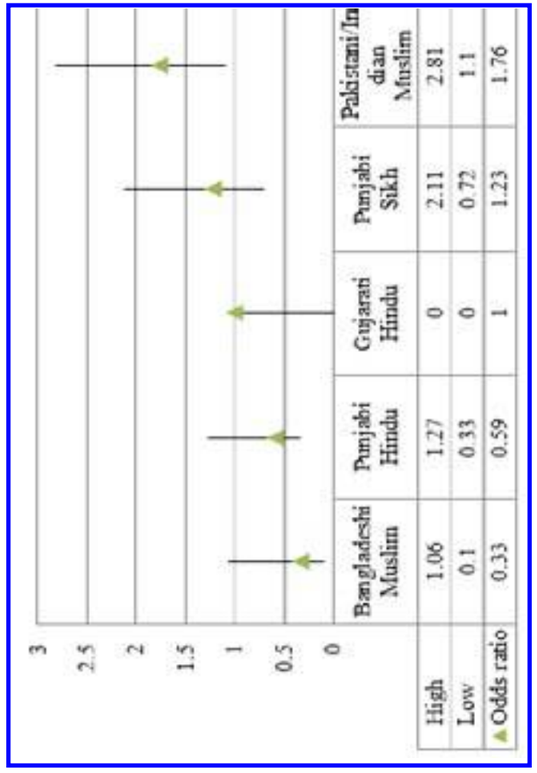
Background Breast cancer amongst South Asian Muslim women. Breast screening uptake is poor with 80% chance of five year mortality Advanced stage presentation common. Approximately 76% more likely to develop breast cancer compared to non-Muslim South Asian women. Population expected to double in the next twenty years.

Forest plot of odds ratios for developing breast cancer in women between ethnic groups in England: 1; Bangladeshi Muslims: 0.33; Pakistani Hindus: 0.59; Pakistani Sikhs: 1.23; Pakistani/Indian Muslims: 1.76; Gujarati Hindus = Reference

Objectives Investigate the influence of religious/ spiritual factors in ascertaining novel concepts to promote the uptake of breast screening amongst the Muslim community. The poster sheds light on the following: Community profile, community participation strategies, key recommendations.

References

1. McCormack VA, Mangtani P, Bhakta D, McMichael A J and Silva Santos I (2004). Heterogeneity of breast cancer risk within the South Asian female



population in England: a population-based case–control study of first-generation migrants. British Journal of Cancer. 1: 160–166.
2. Health Education Authority: Black and Minority Ethnic Groups in England: The second health & lifestyle survey London. London 2000.

P.29 A national digital mammography image resource

Looney, P.T.[1]; Halling-Brown, M.[1]; Given-Wilson, R.[2]; Wallis, M.[3]; Cooke, J.[4]; Dance, D.R.[1]; Mungutroy, E.H.L.[4]; Young, K.C.[1]

[1]NCCPM, United Kingdom; [2]St. George's Healthcare NHS Trust, United Kingdom; [3]Addenbrookes Hospital, United Kingdom; [4]Jarvis Breast Screening Centre, United Kingdom

Research into digital breast imaging with X-rays (mammography and tomosynthesis) often requires the large-scale collection of mammographic images, associated data and annotations. This has led us to design and implement a flexible image repository which prospectively collects images and data from multiple screening centres.

In the OPTIMAM project we have created tools to anonymise, encrypt and securely transfer the images as well as allowing the marking and sending of associated data. The tools integrate with the screening centre's X-ray systems and PACS using DICOM functionality. The automatic selection of cases and transfer of associated data is achieved by interfacing with the NBSS database. The raw and processed images, annotations and associated data are collated in a centralised store.

To date we have collected 9550 images from 1093 individuals. The data contains 215 cancers (153 masses and 62 calcification clusters) and 30–40 cancers are added each month. Our interactive web-based portal is being used to conduct observer studies at remote sites. The portal can also be used to make the images and tools more widely available. Planned developments include training modules, interval cancer evaluations, and display of tomosynthesis images.

A novel system has been developed that will assist future training and research on 2D and tomosynthesis digital mammography.

P.30 Unusual lesions identified on breast Imaging at the Royal Victoria Infirmary breast screening unit, Newcastle-Upon-Tyne: a pictorial review

Sibal, N.; Holmes, C.E.; Forester, N.; Gholkar, J.; McLean, L.

Newcastle Breast Screening Unit, United Kingdom

Background Unusual lesions identified on breast imaging, either incidentally or in the investigation of a symptomatic lesion can present a diagnostic challenge. These lesions include systemic diseases, benign tumours, and primary or metastatic malignancies [(1)].

It is important to identify these, ensuring the appropriate further imaging and referral pathway.

Materials and method Those identified with unusual lesions either on breast ultrasound, mammography and breast MRI have been recorded. This was interrogated retrospectively. Cases were identified with significant extra-mammary or unusual findings and confirmed with patient records. Noteworthy cases have been identified, summarised and presented here.

Results Review of four cases includes an angioma in a patient with Cowden's syndrome, chest wall lipoma with intra and extra thoracic involvement, a mediastinal mass involving sternum which presented as a breast mass and breast mass confirmed as a dermatofibrosarcoma protuberans. Some of these altered the patient pathway and one affected the planned surgical approach.

Conclusion It is important for breast radiologists to be familiar with the mammographic appearances of a variety of lesions that are seen on breast imaging. This pictorial overview illustrates four of these cases. In each case there is radiologic-pathologic correlation.

Reference

1. Breast or chest? A diagnostic conundrum. Br. J. Radiol. May 1, 2005; 78(929): 471–472.

P.31 QA and digital equipment. Breast units are increasingly equipped with digital mammography machines. The equipment has become easier to handle physically, but has the QA become easier to Comprehend?

Bonsall, J.; Farmer, S.; Galloway, F.; Atkinson, S.
Derby Breast Unit, United Kingdom

Our aim is to look at tests performed and done as routine checks, in order for all mammographers in the department to take part in the Quality Assurance of new digital machines. Quality Assurance of digital equipment is still developing and the evidence of tests done now will influence the checks done and their frequency for the future. High standards of records must be maintained as future evolution of technologies increases. An outline of the basic daily and weekly tests will be shown and an explanation of apparatus needed. In some cases manufactures built in tests have been approved by the physicists, other tests are NHSBSP standard tests. A brief explanation of measurements taken with examples of how characteristics of the image quality can vary; Example, Radiation exposure against image density. Straight forward definitions to understand general terms used such as; Signal to Noise Ratio, are given to make sense of records kept. An emphasis on good record keeping is made with checks done in an organised and repeatable way, As QA radiographer, I wanted to give a concise explanation of tests done in our department, allowing mammographers to have an idea of what all the figures (which they work hard to collect) mean.

Quality Assurance of National Breast Screening.

P.32 Utilising LEAN methodology for workflow re-design / paperless systems in a digital screening mammography service

Mercer, C.E.
Bolton Hospital NHS Foundation Trust, United Kingdom

Purpose The introduction of a digital mammography unit into a new site initiated a number of changes to practice. New workflow arrangements were developed along with the identification of costs savings for the department. Identification of how using LEAN/BICS principles can assist workflow re-design and assist with service delivery.

Method The identification of how small changes to workflow can assist in client flow and increase service outcomes; which in turn will assist other services moving to digital mammography. Using LEAN/BICS principles we designed the room layout and sub wait to enable best flow and aimed to reduce the flow time for mammogram images and documents being received by 80%. We identified a potential cost saving to the department by the introduction of better flow and improved the rate of staff engagement by 50% by assisting in the development of new workflow documents.

Results Improved flow time for the receipt of mammograms back at base site from 2–3days to immediately; improving the accessibility of images for double reading. Staff engagement for workflow procedures and involvement from the beginning for the design of the process.

Conclusions The re-design process of 'transportation' of documents to NBSS paperless system. The reduction of flow time by ceasing use of taxi service 90% of the time achieving saving of £12k to department.

P.33 Incidental skin lesions: A guide for Radiographers and Radiologists

Ridley, N.T.F.; Wilmot, K.; Vincent, F.; Taylor, S.
The Breast Unit, Great Western Hospital, United Kingdom

Purpose During the course of their work performing screening and symptomatic mammograms, assessments and ultrasounds Radiographers and Radiologists may encounter skin lesions on the breast, chest and upper back. Most of these will be of little significance but rarely an important abnormality such as a melanoma could be seen. An understanding of less important conditions may also be of some value. Some conditions such as Paget's disease may relate to breast pathology.

Method A review of the dermatological literature was performed. The following conditions were considered important to highlight. Melanoma, Squamous cell carcinoma, Rodent ulcer, Pagets disease, Psoriasis, Eczema, Hidranenitis Suppurativa, Sebaceous cyst, Mycosis fungoides, Pityriasis versicolour

Results An educational poster has been designed for our unit and screening vans. This shows skin lesions and in a few cases mammographic correlation. A copy of which will be presented.

Conclusion Radiographers and Radiologists need to be aware of skin conditions. If there is concern the patient should be informed and advised to consult their GP.

Reference

P Buxton, R Morris-Jones. ABC of Dermatology. 3rd edition. London: BMA; 1998.

P.34 Large-scale digital image gathering framework for the TOMMY trial

Cameron, G.G.[1]; Waiter, G.D.[1]; Gillan, M.G.C.[1]; Mungutroy, E.H.L.[2]; Tate, C.[3]; McInally, F.[4]; Iqbal, A.[5]; Murphy, J.[6]; Gilbert, F.J.[7]
[1]University of Aberdeen, United Kingdom; [2]Jarvis Breast Screening Centre, United Kingdom; [3]University of Manchester, United Kingdom; [4]Central and East London Breast Screening Service, United Kingdom; [5]King's College Hospital, United Kingdom; [6]West of Scotland Breast Screening Service, United Kingdom; [7]University of Cambridge, United Kingdom

Background The TOMMY trial[1.] requires the collection, aggregation and re-distribution of around 6 terabytes of anonymised image data from six NHS sites to and from a central university repository. A protocol and technical framework has been developed to achieve this.

Method Bandwidth is limited, and reliability cannot be assumed across heterogeneous networks. The network system must be very simple to use for easy integration into standard work patterns. Since no existing system satisfied the requirements, a new system has been devised which provides fully automated, overnight, secure data transfer, automatic recovery, continuation of previously-interrupted transfers and guaranteed end-to-end file integrity. The system is based on mature, industry-standard network protocols and applications.

Results The system is in routine use at all six sites, with approximately 1 terabyte of data already transferred. The system has proved its robustness against network interruptions; transfers have resumed automatically without user intervention.

Conclusions The system described here provides a new framework which satisfies the requirements of large-scale inter-network transfer of medical image data, and has proved to be simple, efficient and robust in practical use.

Reference

1. TOMMY trial: A comparison of TOMosynthesis with digital MammographY in the UK NHS Breast Screening Programme (http://www.hta.ac.uk/2296).

P.35 Evaluation of the advantages of dedicated digital specimen radiography with direct digital specimen mammography

Milnes, V.A.; Morel, J.C.; Iqbal, A.; Michell, M.J.
King's College Hospital, London, United Kingdom

Background The aim is to compare the efficiency of work flow patterns and image quality between dedicated digital specimen radiography and direct digital specimen imaging. New specimen radiography systems are now available using similar digital technology to standard digital systems with a smaller focal spot enabling improvement in image resolution. In addition there are potential advantages to work flow patterns.

Material and methods Wide Local Excision (WLE), Vacuum Assisted Biopsy and 14 g core biopsy samples were imaged with a Hologic Trident Specimen Radiography System and a Direct Digital Mammography Unit. WLE specimens were imaged without magnification on all systems. Biopsy specimens were imaged with magnification. Two readers assessed each set of images. The number of micro calcifications and visibility of each lesion was assessed on a four-point scale. A qualitative evaluation of the user experience of each unit is also being undertaken.

Results A total of 75 specimens will be reviewed. A qualitative questionnaire will be employed and appropriate statistical analysis will be conducted.

Conclusion Inferences will be drawn based on the outcome of results.

P.36 A case of microcalcification within the nipple: pathway to diagnosis

Goldthorpe, Z.
Somerset Breast Screening, United Kingdom

Background Microcalcifications are a mammographic abnormality commonly detected through

screening often requiring image guided biopsy to confirm diagnosis. The nipple and areola contain ductal structures and as such are a site for malignant change but there are few reported cases of calcification at this site. With the advent of digital mammography which gives better subareolar and nipple imaging, abnormalities in this previously hidden zone may become more frequently noted.

Methods A 59 year old lady was recalled from screening with pleomorphic calcifications seen within the right nipple. Magnification views isolated them to the lateral nipple. Ultrasound identified the calcifications within the nipple but standard 14 gauge guided needle core biopsy was felt to be inappropriate so sampling was undertaken using a 4 mm hand held punch biopsy device. A solitary core of tissue was taken under local anaesthetic after ultrasound skin marking. Specimen X-ray confirmed the presence of representative calcification.

Results Histology showed chronic inflammation, hyalinization of ducts and calcification with no evidence of malignancy. The lady was returned to routine screening.

Conclusions This case highlights the benefits of digital mammography in peri-areolar imaging and the use of a punch biopsy as an alternative to standard core biopsy techniques for superficial lesions.

Reference

Karssemeijer N, Bluekens AM, Beijerinck D, Deurenberg JJ, Beekman M, Visser R, van Engen R, Bartels-Kortland A, Broeders MJ. Breast cancer screening results 5 years after introduction of digital mammography in a population-based screening program. Radiology. 2009 Nov;253(2):353–8.

P.37 Effective use of advanced practice in the Dorset Breast Screening Assessment Clinics

Taft, A.; Wain, M.
Dorset Breast Screening Unit, United Kingdom

The purpose of this poster is to highlight the extent to which advanced practice is used in the assessment process at the Dorset Breast Screening Unit, from film reading, review of assessment films, clinical examination, ultrasound, stereotactic and ultrasound guided core biopsies through to referral and provision of results. The poster will be a pictorial representation of the types of advanced practice used within the assessment process, highlighting the number of staff involved and the training undertaken. Statistics will be included to illustrate the percentage of the assessment process which was undertaken by advanced practitioners in 2011.

References will be used to support statements where required.

P.38 Ultrasound of gel marker clips: A pictorial review

Rajpopat, M.; Satchithananda, K.; Stewart, V.R.; Williamson, R.; Ralleigh, G.; Gupta, A.; Barrett, N.; Zaman, N.; Cunningham, D.; Svensson, W.; Lim, A.; McDonald, D.; Upadhyay, N.; Hughes, E.; Flais, S.
Imperial College Healthcare NHS Trust, United Kingdom

Purpose Confident visualisation of gel marker clips inserted into the breast following biopsy is crucial to permit accurate wire localisation prior to surgery and to allow follow-up of lesions. However identification with ultrasound can be challenging several weeks following placement. We present a pictorial review of the progressive changes in ultrasound appearances over time of these clips. Furthermore techniques to aid clip visualisation using more advanced ultrasound applications are illustrated.

Methods The ultrasound appearances of clips in a range of patients with different breast densities were retrospectively reviewed at intervals from the day of insertion to localisation.

Results Grey scale images of the clips were recorded at the time of wire localisation and images were supplemented with the automated breast volume scanner (ABVS), MicroPure application (Toshiba®) and the strain characteristics on elastography.

Conclusion Ultrasound localisation of intra-mammary clips can be difficult. Knowledge of appearance changes with time and the use of advanced techniques is vital for breast practitioners.

P.39 Withdrawn by author

P.40 Lessons learned from transition from analogue to digital breast screening

Rajpopat, M.; Satchithananda, K.; Stewart, V.R.; Williamson, R.; Ralleigh, G.; Gupta, A.; Barrett, N.; Zaman, N.; Cunningham, D.; Svensson, W.; Lim, A.; McDonald, D.; Upadhyay, N.; Hughes, E.; Flais, S.
Imperial College Healthcare NHS Trust, United Kingdom

Symposium Mammographicum Conference 2012

POSTER PRESENTATIONS

Aim In the current climate optimising productivity is vital within breast imaging departments. We highlight the unique demands breast imaging makes on PACS and describe strategies that can be implemented to ensure efficient breast imaging workflow and hence maximise output.

Methods An in depth evaluation of the implementation of transition from analogue to digital screening

Results The issues will be considered under the following headings:

The requirements of PACS:

- Image acquisition, high quality image display for image interpretation, report display and storage, archiving for future review.
- Implementation of operational group with key stake holders

The demands of screening:

- Images are taken at multiple satellite locations.
- High quality images need to be transferred digitally and securely to be read at a centralised location.
- A large volume of women are screened requiring large storage capacity.

Technical considerations:

- The large file size of mammograms (8–54 MB) due to high resolution of images means that 4 views would be equivalent to an entire CT scan.
- Integration with main PACS vs mini PACS.

Conclusion We review implementation of digital screening of a large metropolitan breast screening service, problems that were encountered and strategies and solutions to resolve them.

P.41 Consensus Audit of Routine Recall Patients Following NHSBSP Assessment – an Effective Quality Assurance Mechanism

Cox, D.; Alishah, N.; Khan, H.
Sandwell & West Birmingham Hospitals NHS Trust, United Kingdom

Background Seven out of eight women who attend for NHSBSP assessment are returned to routine recall(1), currently with no requirement for further review of assessment documentation. In a large breast service where clinics are held on more than one site, and lead by a number of different imaging clinicians, it is important to ensure consistency of assessment practice is maintained across the programme and that it is in line with NHSBSP standards.

Method City, Sandwell and Walsall Breast Screening Service is the largest in Birmingham screening over 160,000 women. In 2010–2011 966 women were recalled to assessment. In our service, as part of quality assurance, all documentation and imaging for women discharged to routine recall following assessment are subject to consensus review.

Results This was introduced in 2009 and since inception over 1000 women have undergone review. Review is undertaken within a specified time period following assessment with a consensus determining the outcome of either Routine Recall or Further Assessment. Utilising this audit mechanism we have successfully detected and diagnosed a small percentage of additional breast cancers.

Conclusion Consensus Routine Recall audit is not only a valuable educational process but also an effective mechanism for enhancing assessment and improving cancer detection. We would therefore advocate implementation in other services.

[1]Reducing the Risk. NHS Breast Screening Review. Sheffield, NHS Cancer Screening Programmes, 2000

P.42 Skill mix – one step beyond

Young, B.
Derby Breast Unit, United Kingdom

What do you do as a service manager when you have several "bits" of jobs to fill? Additional work load in a variety of roles, all adding up to just a few hours in each, leaves you a problem when existing staff are either not willing or not able to take up these extra hours. If you were one of the original pilot sites for the Skill Mix project, then skill mix is what immediately comes to mind. A new job description needs to be written, accepted and banded. There needs to be a team approach to the shortlisting and interviews. Skill Mix moves forward. The Derby Breast Unit has taken this step forward and this poster presents our results.

Reference

New ways of working in the NHSBSP. Produced jointly by NHSBSP, Department of Health, Society of Radiographers and Healthwork UK.

P.43 Paddle motion analysis – preliminary research

Kelly J.[1]; Hogg P.[2]; Millington, S.[1]; Sanderud A.[3]; Willcock C.[2]; McGeever, G.[2]; Tinston S.[2]; Kelly S.[1]

[1]Countess of Chester Hospital NHS Foundation Trust, United Kingdom; [2]University of Salford, United Kingdom; [3]Oslo and Akershus University, College of Applied Sciences, Norway

Background Some digital mammography images display blur. Blur can obscure pathology and demand the need for repeat imaging. Blur may be induced by paddle movement. This study evaluated 6 paddle options on two mammography machines to determine whether paddle motion occurs.

Method Two calibrated linear potentiometers recorded paddle motion at 0.5 second intervals for 90 seconds. To mimic clinical conditions a deformable breast phantom was mounted in a semi-mobile fashion to a rigid backboard. For each paddle the phantom was compressed under various conditions. For each compression condition 'machine given' pressure and breast thickness readings were recorded at time zero (T0) and 90 seconds (T90).

Results and discussion 'Machine 1' (2 paddles): From T0 to T90: no change in machine given breast thickness; for pressures the mean drop was 11 N (range=5–20 N; SD=3.7; $p<0.01$); paddle motion was observed for all acquisition conditions (average=1.8 mm; range=0.48–6.86 mm; SD=1.7; $p<0.01$). 'Machine 2' (4 paddle options): no change in machine given breast thickness; for pressures the mean drop was 12 N (range 2–29 N; SD=8.0; $p<0.01$); paddle motion was observed for all acquisition conditions (average 1.8 mm; range=0.44–7.46 mm; SD=1.9; $p<0.01$). Most motion occurred in the first 20 seconds. Given that the phantom characteristics are similar to female breast it could be that paddles may move during mammography image acquisition.

Conclusions and further work At compression cessation: machine given breast thickness readings are insensitive to paddle motion; machine given pressure readings demonstrate significant reductions; compression paddles move. Further research is planned: 1. Extend our paddle motion analysis research to consider additional machines; 2. Determine what amount of motion is required to be perceived visually.

Author index

AUTHOR INDEX