

Comparison of digital mammography and film screen mammography

Issues for health service planners and practitioners

1. Mammography in Scotland

- 1.1 In the UK, a breast screening programme is offered on a three-yearly basis to all women aged between 50 and 64 years. In Scotland in 2003 this covered a population of 465 200 women. The upper age limit for screening by invitation has been extended to 70 years and this is currently being implemented.¹ There is evidence that screening by mammography reduces the mortality from breast cancer by 35% in women aged between 50 and 69 years.² Women with symptoms indicative of breast cancer (e.g. a breast lump) may also be referred for diagnostic mammography.
- 1.2 Film-screen mammography (FSM) involves the x-ray of the woman's breast with the image recorded on a film in a cassette. Digital mammography can be acquired by two different methods. In computed radiography (CR), the image is recorded on a reusable plate which is scanned by a laser reader to produce a digital image. This is currently used in some units in Scotland. Full-field digital mammography (FFDM) also requires that the breast is x-rayed but the machine converts the x-rays into digital signals which can be viewed on a computer screen. Small-field digital mammography is widely used for x-ray guided biopsy of breast lumps. FFDM is not currently available in any units in Scotland but is available in a few units in other parts of the UK.
- 1.3 Digital mammography can allow electronic archiving of images whilst using a laser printer can produce hard copies of digital images. Where images are stored in a Picture Archiving and Communications System (PACS) there may be no requirement for hard copies. PACS is currently used in a number of NHS Board areas in Scotland and will become more widely available in the next year or so. Furthermore, digital mammography can facilitate electronic transmission to obtain a second opinion or for remote interpretation of the mammogram.

Further information

1. NHS Quality Improvement Scotland. 2003. Breast Screening National Overview.
2. Vainio H and Bianchini F. eds. 2002. Breast cancer screening. IARC Handbook of Cancer Prevention, 7. Lyon: IARC.
3. Ho C, Hailey D, Warburton R *et al.* 2002. Digital mammography versus film-screen mammography: technical, clinical and economic assessments. Technology Report no 30. Ottawa: Canadian Coordinating Office for Health Technology Assessment.
4. Blue Cross and Blue Shield Association. 2002. Full-field digital mammography. Technology Evaluation Centre, Assessment Program, 17(7).
5. ECRI. 2000. Mammography computer-aided detection (CAD) systems for breast cancer screening. TARGET Report #740.

2. Costs and benefits of digital mammography

- 2.1 Digital mammography, both CR and FFDM, allows image manipulation which may avoid the need for repeat exposures and therefore reduce retake and recall rates. Contrast manipulation of digitised images should allow improved visualisation of lesions in the dense breast tissue of younger women.
- 2.2 FFDM may reduce radiation exposure although this has not been demonstrated. The clinical significance of reduced exposure to radiation resulting from reduced retakes and recall rates required for either CR or FFDM is not clear.
- 2.3 Two studies on screening for breast cancer by CR mammography indicated that there is no difference in diagnostic accuracy between this technique and FSM.³
- 2.4 A review of three studies of varying quality compared breast cancer screening by FFDM with FSM.⁴ The results of these studies differed with one trial reporting significantly lower recall rates and biopsy rates in the group undergoing FFDM. However none of the trials reported differences in cancer detection rates between the two methods.
- 2.5 The reported studies comparing FFDM with FSM in diagnostic populations (i.e. following a positive screening result or symptomatic referral) are of variable quality and results are mixed.⁴ Given the available evidence, no conclusions can be derived as to the relative effectiveness of FFDM and FSM for diagnostic purposes.
- 2.6 Computer-assisted diagnosis software can be used with digital images produced either by CR or FFDM and may improve diagnostic accuracy by providing a second opinion.⁵ There are several ongoing trials in the UK to assess the effectiveness of computer assisted diagnosis in breast screening.

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- 2.7 In summary, at present no clear advantage in clinical effectiveness has been demonstrated for digital mammography over FSM.
- 2.8 Two economic evaluations comparing digital with conventional mammography are available. In both of these evaluations, it was assumed that the technologies have equivalent clinical effectiveness. The cost of digital and conventional mammography was modelled in a Canadian primary economic evaluation.³ Costs of FSM and CR were assumed to be comparable; however, FFDM had significantly higher annualised costs due to the higher costs of equipment purchase and maintenance. A UK comparison of the costs of FFDM with FSM indicated that the costs of the FFDM system would be almost twice that of FSM.⁶ However, eliminating the need for hard copy printing and assuming an increased patient throughput of 20% showed FFDM and FSM costs to be potentially comparable. Cost savings from this increase in throughput might not be achievable in smaller screening centres.
- 2.9 Larger trials of FFDM are required to assess the impact on costs of increased throughput and reduced recall rates. Further information on the costs of PACS is also necessary for a full economic evaluation.

6. Legood R and Gray AM. A cost comparison of FFDM with FSM in breast cancer screening, HERC, Oxford [ongoing research].
7. http://www.wacrin.org/current_protocols.html#A6652 [Accessed 23 January 2004].

3. Further information

- 3.1 The Digital Mammographic Imaging Screening Trial, sponsored by the US National Cancer Institute, has been designed to assess the cost effectiveness of FFDM compared with FSM.⁷ The target enrolment of 49 500 women was reached in late 2003 and results should be available by 2005. This trial will provide more accurate data on staff savings from increased throughput which may offset the higher equipment costs of FFDM.

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