
Volume 7 - Issue 2, 2007 - Features

Transitioning to Digital Mammography for Screening - Maximising Cost Benefits

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Due to its associated high costs and comparative newness, very few breast screening units in the UK use digital systems. Here, the budget for the breast screening programme, including the actual cost of screening, is approximately £52 million per year. As one of the pioneers of digital (BSU) has had a chance to experience the complexities encountered in transitioning from a film-based to a digital system.

I joined the University Hospital at Coventry & Warwickshire to set up the Warwickshire, Solihull & Coventry Breast Screening Programme, just as the UK's National Breast Screening Programme (NHSBSP) was being rolled out. Every three years we invite a population of 150,000 women from the local area to attend screening. In view of the known advantages of digital mammography (image manipulation, storage and transferability) we agreed to pilot a full field digital system on a mobile unit in 2005 for the (NHSBSP). We therefore replaced one of our existing three film-based mobile screening units with a full-field digital mammography unit. We also run two peripheral hospital centres and a static unit that runs all assessment and administration for the screening programme.

Our mobile van was fitted with Sectra's digital 'Micro Dose Mammography' system, with a mammography mini PACS. Collaborating on the pilot allowed us to perform the physics and clinical testing of the equipment that prompted our subsequent decision to implement the equipment long term. We ran the testing on patients who were being recalled for follow up studies, to compare the new digital and old film-based systems, which demonstrated that they were equivalent in image quality. Following the pilot, we took a three-year lease of the equipment. Before this, we were completely film-based.

Justifying the High Cost

One of our first goals was to test claims for improvement in throughput and if we could reduce the standard six-minute appointment times. We offered training to radiographers in the use of the new digital equipment and then evaluated seven, six, five and four minute appointments. While the new equipment coped well with four-minute appointments, the patients were not satisfied and felt the process was too hurried. Finally, five-minute screenings proved acceptable to patients and radiographers which allowed us to offer two extra appointments per hour, an improved rate of 20%.

However, the high expense of the equipment coped well with four-minute appointments, the high throughput alone. We are now looking at extending the operating hours of the mobile units through to the evenings, in order to fully realise potential benefits. This also gives patients more options when scheduling appointments. We are now planning to invest in digital mammography equipment for our two peripheral hospital locations, which also run surgical referral clinics, resulting in increased workflow on these fixed sites as well as the vans. This will enable us to reduce the number of mobile vans from three (one digital, two film-based) to two digital vans. This will go to a tendering process and enable significant cost benefits. It will also allow for reduced film and storage costs, for both symptomatic and screening, as well as improving patient service.

One of the biggest workflow issues for film based mammography is, of course, the time and costs of getting the previous films from storage and loading the multiviewer. As our established patients still have a film-based history, we are currently in a sort of halfway-house requiring the use of multi-viewers. It will take one screening round (three years) for majority of patients to have a fully digital record.

Transitioning to Digital in the UK

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The NHSBSP provides free breast screening for all women in England aged 50 to 70 years. Over 1.5 million women are now screened in the UK each year. The NHSBSP relies on its computer system, the National Breast Screening System (NBSS), to run call/recall, patient management, data collection and to provide standard statistical returns for monitoring and analysis of the programme. NBSS does not currently have a RIS functionality, so results still have to be separately entered onto both PACS and NBSS. This means the savings on clerical and administrative work have not yet materialised. The NHSBSP aims to offer 90% of attendees a first offered assessment appointment within 3 weeks of attending for screening. Despite the hybrid system of film and digital based equipment, the pilot did not affect our ability to achieve this target.

In the next financial year, we anticipate the national programme will be able to add desktop integration and RIS functionality to NBSS. I am hopeful, once the building blocks are in place, the programme can start to contemplate the costs of new equipment and national data warehousing.

One of the undeniable advantages of digital is the removal of film processing. Apart from the obvious environmental advantages, it is considerably easier to quality control both mammography machines and the work stations. IT solutions for centrally monitoring technical quality are already well advanced in Belgium. Teleradiology might be a mixed blessing. The European Union is currently consulting about safe-guarding patients when they, or their images, cross national boundaries. Monitoring breast screening services is already hard enough when they are self contained. The introduction of cross border film reading will represent a real challenge.

CAD and Digital Mammography

We currently don't have Computer Aided Detection (CAD) attached to the full field digital system, as there is doubt regarding the benefits of CAD over the double-reading system currently in place in the UK. Double reading of mammograms has been shown to improve detection of breast cancer by 9-15%. Both the retrospective and prospective studies on CAD have been hard to interpret with very variable results, although it is in almost routine use in the USA where single reading by low volume users is the current practice. In the UK, where there are predominantly large volume users, results are likely to be different. "CADET I" took a prospective look at over 10,000 cases retrospectively, showing a small increase in cancer detection rate, but at the cost of a higher recall rate. The cost of the additional recalls outweighs the savings in film reading time, so it is unclear whether CAD brings real benefits. The follow-up "CADET II" study is randomising 30,000 women to evaluate double-reading versus a single reading with CAD. It is funded by the CRUK and the NHS Breast Screening Programme in Manchester, Coventry and Nottingham. This should answer most of the outstanding questions.

Conclusion

As the surrounding IT infrastructure develops and the cost of equipment becomes more reasonable, digital mammography will become more viable in the UK. We are not sure yet, but on balance, I guess that large population-based screening programmes that use digital mammography will be marginally more expensive to run. In order to keep costs down, we need to significantly increase utilisation of the mammography equipment, which can be a problem in rural areas where it is difficult to find the staff or the volume of patient needed to make it perfect.

Published on : Sun, 1 Apr 2007