

Creating a nationwide breast screening programme: How Scotland provides a model for the rest of the world

Introduction

Breast cancer is the most common cancer in women and according to NHS Scotland, nearly 1,000 women per year die from the disease in Scotland¹. Although breast cancer can affect younger women, it is much more prominent in older women, particularly after the menopause.

To reduce the number of women who die from breast cancer, women in Scotland between the ages of 50 and 70 are offered breast screening every three years under what is known as the Scottish Breast Screening Programme (SBSP). The screening process uses an X-ray test called a mammogram that can spot cancers when they are too small to see or feel. And while screening doesn't prevent cancer, detecting it during stages 1 and 2 dramatically increases a person's chance of survival².

However, due to the COVID-19 pandemic and the challenges posed to staff, the working environment and women accessing screening,

the Scottish Government announced the temporary pausing of all Adult screening programmes, including the SBSP from the 30 March 2020. In practice this meant women were not offered an appointment for screening during the pause. The SBSP was re-started on the 3 August 2020, however, the temporary pause has increased the backlog of women awaiting their offer of invitation for breast screening.

During the nine months of the pandemic in 2020 (April-December), there were 2,681 patients diagnosed with breast cancer, which is 19% lower than would have been expected in this period had COVID-19 not happened³. Public Health Scotland (PHS) statistics also show that there were large falls in those diagnosed at early stages, with stage 1 down 35% and stage 2 down 15%. It was recognised within this PHS report that the key impacts of the pandemic on breast cancer diagnoses were multi-factorial:

- **Key messaging and advice for the public to 'stay at home' and 'protect the NHS';**
- **The pausing of the breast screening service from end of March until early August 2020;**
- **The designation of both diagnostic and treatment procedures across the NHS with resultant increased turnaround times and reduced capacity;**
- **The initial switching of some surgical procedures to other treatments, such as hormone therapy (which may have meant staging at diagnosis was not complete for some patients);**
- **Initial suspension of surgical procedures, followed by use of private facilities to maintain the service**

However, as we tackle the ongoing impacts of COVID-19, innovative technologies can be used to ease pressure on a stretched workforce while widening access to services, no matter where people live.



Scotland leading the screening charge

Operational since 1988, SBSP consists of six static screening Centres in Glasgow, Edinburgh, Ayrshire, Dundee, Aberdeen, and Inverness. These Centres are supported by nineteen mobile units⁴.

As part of the digitisation of SBSP in 2014/15, NHS Scotland installed the Philips Vue PACS V12.2 – a picture archiving and communication system - across the six Breast Screening Regional Service Centres. The Philips platform underpins the Scottish Breast Screening Programme, providing national access to breast imaging via a Global Worklist, alongside Symptomatic Services and the national picture archiving and communication system (PACS) solution.

Philips also provides the digital image solution for the Screening Programme's mobile vans, which

can operate regardless of location and network strength. This capability allows a patient to visit any mobile van location and have their images securely transferred back to one of the nation's six Breast Screening Centres for analysis. Half of the mobile fleet now has 4G installed, allowing even faster transfer of data improving the efficiency with which a patient can be diagnosed.

SBSP, through approximately 270,000 screening events per year, has created a globally recognised imaging database that has led to improved screening analysis, workflow efficiencies and ultimately, delivered better patient outcomes.

In 2021, the Philips Vue PACS in Scotland has been refreshed with the latest hardware and software versions to ensure women in Scotland between the ages of 50 and 70 continue to receive this critical service.

Improving access to care

Around 250,000 women are invited for screening in Scotland each year. In the three-year period between 2016/17 - 2018/19, 546,379 women aged 50 - 70 attended a routine breast screening appointment which equates to around 7 in 10 women (72.2%) taking up the invitation for screening⁵. Screening is estimated to prevent around 130 deaths from breast cancer in Scotland each year⁶.

Of critical importance to the SBSP is its remote capability and flexibility. Approximately 1.15 million people or one fifth of Scotland's population are based in rural areas, potentially living several hours from one of the six Breast Screening Regional Service Centres. SBSP's mobile vans enable easier and more affordable access to screening services for those living in rural areas, who already have higher transport and living costs than those in urban areas⁷.

Dr Gerald Lip, Clinical Director of North East (NE) Scotland Breast Screening Service for NHS Grampian

"If a woman needs repeat imaging and happens to be closer to another Centre whether on holiday or for family reasons, she can have that imaging done and it will be tracked by the PACS."

Streamlining patient workflows and enhancing interoperability

Image sharing across Scotland has been a significant clinical success, creating substantial value for patients and the health system alike. Today, patients move through complex local clinical networks without imaging availability complications.

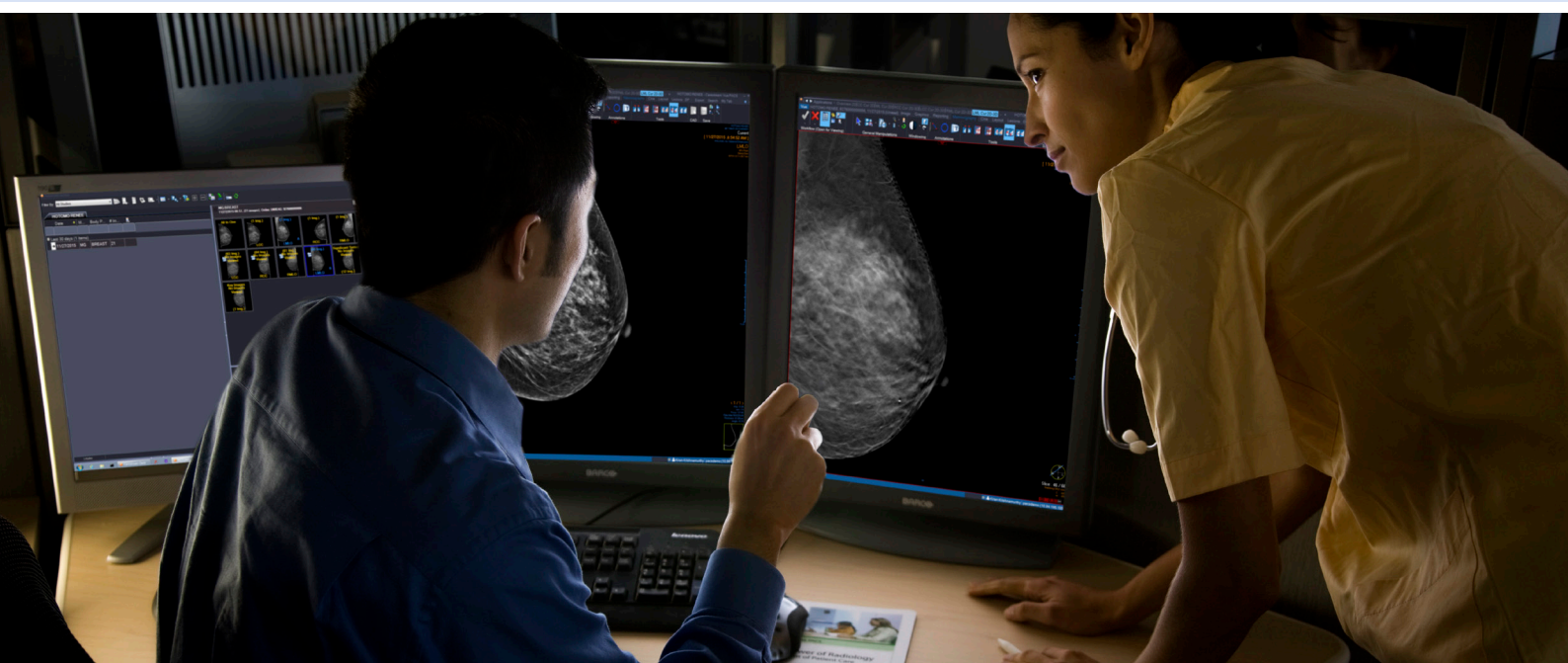
A woman's screen imaging history is made available as appropriate to other hospitals, enabling clinicians to compare new scans with prior studies from other health services. Between SBSP screening Centres, there is a national reporting mechanism which means there

is now the ability for Centres to provide support for each other in the case of staff shortages.

The PACS significantly improves patient assessment and supports the activity of multidisciplinary meetings to optimise patient management and safety. The programme ensures that if a patient has moved to a different part of Scotland, any previous scanning images will be available for radiologists and clinicians to view, meaning patients are able to receive a faster diagnosis.

Dr Gerald Lip, Clinical Director of NE Scotland Breast Screening Service for NHS Grampian

"The national reporting function enabled by the Global PACS solution allows Centres to report and support each other. For instance, in the case of a staffing issue due to absences from sickness amongst readers, cases for reporting can rapidly pile up. The use of this function allows readers from across Scotland to provide mutual aid and assistance in ensuring all Centres are at a similar level in reporting."



Increase in efficiency and delivering national cost-savings during COVID-19

With the NHS under increasing pressure to deliver care during COVID-19 and facing significant challenges the Philips Vue PACS managed service solution, with one supplier delivering the contract for the Breast Screening PACS, provides a number of key benefits:

- Enhanced security, including the latest OS support and patching, with a 99% uptime guarantee.
- Greater flexibility, with Radi-CS/Radinet Pro installed allowing remote calibration and monitoring, while an annual physical inspection and calibration is carried out on-site.
- Improved user experience optimised through high brightness/definition colour monitors. These space saving monitors are specifically designed for breast imaging with the narrowest bezel available on a 5MP screen.

Looking Ahead: Using Artificial Intelligence (AI) to improve accuracy and efficiency in breast screening

There is a radiologist supply shortfall in Scotland⁸, compounded by long lead times for training both radiologists and advanced practitioners.

Currently, images are reported by two trained image readers, with specific training in mammography, who are required to meet performance criteria of the SBSP for both detection and recall rate.

The potential of AI is ready to be realised by healthcare, particularly breast imaging services. Given the repetitive and high-volume nature of mammographic reporting, there is the potential for AI to maintain or increase cancer detection rates without increasing recall rates. At this time, AI has not been

approved for use within the national breast screening programmes. Within the SBSP, a research study is underway that will inform the UK National Screening Committee decision on whether AI can be adopted, but the timeframe for this is still unclear.

Critically, Philips' technology will enable health services to take advantage of AI screening, which may be able to add a layer of qualification to the image screening process, reducing variation in analysis and providing image readers with an essential second opinion. The net result may be increased capacity to see, screen and provide results to patients, whilst helping the NHS tackle backlogs.

Dr Gerald Lip, Clinical Director of NE Scotland Breast Screening Service for NHS Grampian

"It is hoped that this will ultimately benefit women by providing faster results turnaround, relieve pressure on the workforce and reduce inequality providing a benefit to the entire population from the urban Centres to rural regions due to the national PACS solution providing a common interface for the algorithm."



Conclusion

NHS Scotland can be proud of the SBSP; it continues to be extremely successful and a model for the rest of the world to aspire to. Philips has supported the SBSP for more than five years and, prior to the pandemic, helped Scotland achieve higher early-detection rates and higher treatment success.

The national PACS solution means that the six Scottish Breast Screening Programme Centres can support each other, while women can have their images reported back to one of the Centres in a secure manner from the mobile screening units. This is of critical importance in a country where one fifth of the population are based in rural areas.

As the country emerges from the pandemic, addressing ongoing healthcare service delivery challenges and delays in screening, diagnosis and treatment, is a key priority for the SBSP. However, it is clear that there is an opportunity to leverage technological capabilities, including the future use of AI, to increase system-wide capacity and improve access to care.

References

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⁷ <https://www.gov.scot/binaries/content/documents/govscot/publications/research-and-analysis/2017/02/scottish-index-of-multiple-deprivation-rural-deprivation-evidence-and-case-studies/documents/rural-deprivation-an-evidence-review/rural-deprivation-an-evidence-review/govscot%3Adocument/rural%2Bdeprivation%2Bevidence%2Breview.pdf>

⁸ <https://www.rcr.ac.uk/sites/default/files/clinical-radiology-scotland-workforce-census-2019-summary-report.pdf>

