


Major Review of the Scottish Breast Screening Programme

March 2021



***National
Services
Division
(NSD)***

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2. Executive Summary & List of Recommendations

Overview

Our Breast screening service is in need of reform. We need to improve uptake overall but especially for those women living in our most deprived communities. These are the communities who for many years have had a lower uptake of health services overall and this has been heightened in the context of the recent Covid pandemic. This review was commissioned to allow a comprehensive assessment of the delivery of the Scottish Breast Screening Programme. In addition to addressing the inequalities in uptake the review was asked to take account of current pressures in the breast screening programme, recent incidents affecting the programme, and previous reviews undertaken, and to make recommendations on future service delivery.

Breast screening policy in NHS Scotland (and across the UK) is that all women aged 50-70 years +364 days are invited for breast screening once every three years. Women over the age of 71 can self-refer. Breast screening in Scotland is delivered via six Breast Screening Centres across the country, complimented by the provision of a fleet of 20 mobile breast screening units. The service offers 2-view digital mammographic screening to approximately 750,000 women across Scotland in each three-year screening round. Seven women in every 1,000 women screened are found to have invasive cancer.

The service performs relatively well against clinical service standards, however over the past decade there has been a steady decline in overall uptake of breast screening which, if continued, would threaten the effectiveness of the screening programme. Average performance on overall uptake over the last 10-years is 72%, just above the minimum standard established. We know that once women do participate in breast screening they are more likely to continue in future years; and we know that women from our more deprived areas are less likely to attend for breast screening, currently with under six in ten women (59.5%) from the most deprived communities attending for screening compared with almost eight in ten women (79.7%) living in our least deprived areas, a difference of over twenty percentage points. In this review we geographically mapped uptake across Scotland and whilst we can see that most areas meet or exceed the minimum uptake standard expected (70%), and small areas of under-target performance can be identified across Scotland, the central belt of Scotland has by far the greatest concentration of areas of lower levels of uptake.

Improving access to breast screening is particularly challenging, with screening delivered on a locality basis across Scotland to minimise travel and distance for all, as these are potential barriers to attendance. There is also a clear need to continually focus on improving participation by women in our most deprived communities. The review explored barriers to breast screening uptake with women who do not normally participate in breast screening, and makes recommendations to support improving the uptake of breast screening. Review recommendations also include developments that focus on modernisation of the delivery of the programme across Scotland to support better access.

Key recommendations

The Scottish Breast Screening Programme currently invites women for screening based on the GP practice with which they are registered, and we recommend that a new approach to

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breast screening call-recall be taken forward which is more person-centred and is based on calling individual woman (rather than the GP Practice they belong to) based on their Next Test Due Date.

There remains a consensus view across the Scottish Breast Screening Programme that in the longer-term screening centres and symptomatic breast services should be further co-located, and there is good progress being made in this regard. Feedback we received from women who don't routinely attend for breast screening included a number of 'environmental factors' relating to the design, location and delivery of breast screening. The review also noted that a significant number of appointments are lost to late cancellation and non-attendance in the current model (a 24% level of non-attendance overall). This has highlighted the need to both improve mobile screening provision where geography and population size require a mobile programme, and to take the opportunity of improving the screening venue in urban and semi-urban areas which have the population base to sustain more static screening provision. The inequalities gap in the level of uptake between our most and least deprived communities, referred to above, is a Scotland-wide issue. The Breast Screening Programme should therefore continue to target action to tackle these inequalities in access, recognising that initiatives may vary across population groups and rural, urban, and semi-urban territories according to need. Given the volume, and concentration of areas of lower levels of uptake, the review recommends in particular the development of a strategy for static satellite screening centre provision in the central belt of Scotland.

Currently, approximately 3000 women per year are being invited to attend for breast screening while they are receiving treatment for breast cancer, or when they are in mammographic follow-up following a diagnosis of breast cancer. Whilst this does ensure that no women are inappropriately excluded from the programme, it can cause confusion and unnecessary distress. This review recommends that IT and PACS systems are developed to safely facilitate the temporary removal from calling to breast screening for women on follow up surveillance programmes. We also noted that by removing these cases from uptake calculations there would be an improvement in uptake overall (ranging from 0.6% to 0.8% improvement in uptake at breast screening centre level in our calculations).

The review overviewed the current Scottish breast screening workforce to help capture key workforce issues and risks. We recommend the development of an overarching workforce plan for the Scottish Breast Screening Service, focussing in particular on role development and role redesign, training capacity, leadership for major developments which will help to automate aspects of activity, and benchmarked staffing levels.

Technology is a key enabler for modernising and improving the breast screening pathway. Scotland's Digital Strategy for Screening is already taking forward a number of key initiatives to support modernisation and development of the breast screening service, and these are vital to support choice and improved access for women. Artificial Intelligence (AI) in breast screening mammography is a key part of the digital strategy, and the review has supported the development of this programme by developing the outline strategic case for AI with the support of colleagues from across the service and from within the Industrial Centre for Artificial Intelligence Research in Digital Diagnostics iCAIRD. We recommend that the Scottish Breast Screening Programme should progress to prospective evaluation and proof of concept for AI in breast screening, with a view to future adoption in the service subject to positive evaluation and formal approval from the UK National Screening Committee for AI to be used in breast screening.

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To help support capacity in screening assessment, the SBSP should consider enabling Digital Breast Tomosynthesis in screening centres across NHS Scotland. The review also recommends that a single, co-ordinated capital replacement programme for screening mammographic x-ray units be developed.

The review heard from many users of the Scottish Breast Screening (IT) System (SBSS) a frustration over the lack of data available to support operational, performance and strategic planning at Breast Screening Centre level. Obtaining and using data was also a significant constraint for the review. New developments such as the new National Screening Digital Service Management Board (NSDSM Board), and the planned Screening Intelligence Platform (SIP) should help to improve this in future. As part of recommendations to improve data, intelligence, and analytical capability the review recommends that funding allocated for SBSS development in the 'Committed Development Resource' should be reviewed with a view to increasing resource to better support users and the service overall.

Breast Screening Standards are key to improving the quality of the SBSP. The review recommends the further progression of work to develop a Quality Management System approach to the development and application of standards, and a streamlining of national and local level reporting where possible.

All recommendations are more fully outlined in the review report, and we are particularly grateful for the support and engagement of the service in this review, which has been responding to Covid-19 throughout and necessarily focussing on adaptation and recovery. We hope that this review will lead to a redesign of service and improve uptake amongst all women living in Scotland.

Heather Knox
Independent Review Group Chair

List of Recommendations

<u>Overarching Theme</u>	<u>Strategic Recommendation</u>	<u>Page</u>
<p>ACCESS</p> <p>Breast Screening Call / Recall</p>	<p>1. Develop a new approach to call-recall</p> <p>The Review Group recommends that a new approach to breast screening call-recall be taken forward which is more person-centred and is based on calling individual woman (rather than the GP Practice they belong to) based on their Next Test Due Date. Development of the Scottish Breast Screening System algorithm should also incorporate age, Area of Residence, and screening location to enable identification of women becoming newly eligible for breast screening, and local geographical cohorting of invites.</p>	<p><i>Page 21</i></p>
	<p>2. Developments to Scottish Breast Screening System</p> <p>NSD and DaS should take forward the further specification work necessary to support development of the Scottish Breast Screening System. The Breast Screening Programme Board should advise and support this development, recognising that a person centred focus; incorporation of the new CHI functionality; and the potential to further automate planning, forecasting and allocation are key drivers for change and development.</p>	<p><i>Page 23</i></p>
<p>ACCESS</p> <p>Central belt screening satellites</p>	<p>3. Static satellite screening centre provision</p> <p>The Review Group recommends that further work is progressed to develop a Scottish Breast Screening Service strategy for central belt satellite static screening centre provision, including their locations. This should develop an agreed approach, common planning assumptions for the SBSP, service configurations, and further scope and identify potential central belt satellite facilities in liaison with NHS Boards.</p>	<p><i>Page 23</i></p>

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<p>ACCESS</p> <p>Self-Referrals in over 70s</p>	<p>4. Over-70 self-referrals</p> <p>The Review Group recommends that the Breast Screening Programme continues to support self-referral in the over 70's until the AgeX trial reports in 2026.</p> <p>The Review Group acknowledged however that the Breast Screening Programme is under significant pressure following the Covid pause, and that full capacity has not yet returned. Whilst Covid pressure continues, the Review Group recommended that available screening capacity should be used for the 50-70-year age group, rather than for a group in whom there is currently no conclusive evidence of mortality benefits.</p>	<p>Page 26</p>
<p>ACCESS</p> <p>Women currently on treatment or in breast cancer follow-up</p>	<p>5. Managing invitations for women currently on treatment or follow-up for breast cancer</p> <p>The Review Group recommends that the Breast Screening Programme develops the use of exclusion codes in SBSS to facilitate the temporary removal from calling to breast screening for women on follow up surveillance programmes. The text of the screening invitation letter should also be improved to better explain why the Breast Screening Programme continues to invite women who may have had recent mammograms, are in treatment or follow-up for breast cancer, or have previously had both breasts removed. Record linkage to support cross-referencing of databases should be scoped. The Breast Screening PACS reprovisioning should be used as an opportunity to provide a mechanism for coding follow-up mammograms so that they can be identified. Scoping should be undertaken around the potential to move to more standardised national follow-up guidance across Scotland</p>	<p>Page 33</p>
<p>ACCESS</p> <p>Family History Screening</p>	<p>6. Consideration of bringing Family History/High Risk screening within the remit of the national screening programme.</p> <p>Overall, the review group noted that there were more potential opportunities present now within breast screening than at the time of reporting the previous review of Family History (2009) – in particular a single, standardised IT system (SBSS), and some initial evidence from experience that clinical examination may be removed from the family history pathway acceptably. The review group acknowledged that a larger piece of work would be needed to fully assess</p>	<p>Page 37</p>

Overarching Theme	Strategic Recommendation	Page
	<p>the potential advantages, feasibility, benefit, and costs of integrating with screening, or whether key improvements could be made in the family history pathway independently. The group recommended that any further work should be referred for national cancer policy consideration, potentially in the context of supporting greater service integration and co-location.</p>	
<p>UPTAKE</p> <p>Reduce barriers to Breast Screening</p>	<p>7. Improve the understanding and perceived value of breast screening</p> <p>Media campaigns will help to communicate both the value of screening and to provide cultural contextualisation by clarifying the prevalence of breast cancer in Scotland and the populations at risk. There are advantages to employing a variety of channels to help convey the importance of breast screening (e.g. television advertising) and its relevance to this audience (through trusted sources using social media channels for example). The value of screening can be emphasised through GP reinforcement, and normalisation within these communities will be helped by encouraging informal conversations (between both peers and health professionals), for example on social media.</p>	<p>Page 14</p>
	<p>8. Increase the convenience of appointments</p> <p>Greater flexibility of appointment scheduling and availability would enable better access and uptake. Consideration should be given to a range of service elements: reminder texts or telephone calls which can help to retain screening appointments on the radar, an online appointment cancellation and rebooking system to provide a greater sense of individual control and convenience, and evening and weekend appointments for those who find it hard to adjust weekday commitments or rely on support from others. Increased appointment availability in rural and semi-urban locations would provide some flexibility for women in these areas.</p>	<p>Page 14</p>
	<p>9. Improve the acceptability of breast screening</p> <p>There is a need for better engagement with women to demystify the screening process and provide reassurance. This could take the form of informal social support via social media channels, enabling telephone or online support e.g. live chat, peer conversations, and the sharing of positive</p>	<p>Page 14</p>

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	<p>stories from women who have been screened. Facilitating easy access to concise, straightforward information and honest description e.g. videos of the process would also be helpful. Engagement and empathy during the appointment is vital in encouraging repeat screening. Mammographer sensitivity and consideration is key, and longer appointment times or (peer) support in the waiting area would enable questions to be asked and reassurance provided. The use of gowns that do not need to be fully removed while the mammogram is being taken would also help in addressing the modesty concerns.</p>	
	<p>10. Increase the user-friendliness of screening venues</p> <p>This should be considered at both a practical and an emotional level. Co-location of breast screening services with existing GP or well woman services would facilitate attendance by providing a local, familiar and professional environment, together with more discreet access to the service. At a psychological level, these venues were perceived to be friendlier, with the expectation of a more personalised experience and the opportunity to be accompanied. Larger mobile units with ‘warmer’ waiting areas can also help to provide a more reassuring environment. Better communication of the adjustments that can be made for women with disabilities is key, ideally through personalised invitations.</p>	Page 14
<p>WORKFORCE</p> <p>Workforce planning</p>	<p>11. Development of an overarching workplan for the Scottish Breast Screening Service.</p> <p>Host NHS Boards should further develop their workforce plans, incorporating areas highlighted in the review. NSD should support development and incorporation into a single, Scottish Breast Screening Programme-wide, workforce plan for the commissioned service. The Breast Screening Programme Board should provide support, overview and endorsement of the plan.</p> <p>Workforce planning and commissioning of Breast Screening Centres by NSD should have regard to projected population changes by Breast Screening centre, as reported.</p>	Page 41
<p>TECHNOLOGY & EQUIPMENT</p>	<p>12. Scotland’s Digital Strategy for Screening</p> <p>The Review Group recommends that a number of key initiatives are taken forward to support modernisation and</p>	Page 49

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Digital Strategy	development of the breast screening service, as part of the Digital Strategy for Screening and a digital roadmap is developed to capture all future developments.	
TECHNOLOGY & EQUIPMENT Artificial Intelligence in breast screening mammography	<p>13. Evaluation and Proof of Concept of Artificial Intelligence in breast screening mammography.</p> <p>The Review Group recommends that the Scottish Breast Screening Programme should progress to prospective evaluation and proof of concept for Artificial Intelligence in breast screening mammography, with a view to future adoption in the service subject to positive evaluation and formal UK NSC approval that AI can be used in the screening programme.</p> <p>The Review Group approved the outline strategic case for Artificial Intelligence in breast screening mammography, and supported the further business case development process, to be led by DaS, with advice and support from the Breast Screening Programme Board.</p>	<i>Page 50</i>
TECHNOLOGY & EQUIPMENT Digital Breast Tomosynthesis	<p>13. Use of digital breast tomosynthesis (DBT) in the assessment setting</p> <p>The Scottish Breast Screening Programme (SBSP) should consider enabling DBT for use in the assessment setting in screening centres across NHS Scotland. A business case should be developed by NSD, in collaboration with host NHS Boards, to realise the benefits and efficiencies identified. Consideration should be given to linking the enabling of DBT with x-ray unit replacement as part of a national managed equipment replacement programme, should this be agreed, and the route is more cost effective.</p>	<i>Page 51</i>
TECHNOLOGY & EQUIPMENT Mammography equipment replacement	<p>14. Development of a single, co-ordinated capital replacement programme for mammographic x-ray units</p> <p>The review group recommends that a single, co-ordinated capital replacement programme for mammographic x-ray units in the Scottish Breast Screening Service should be developed, to support the prioritisation of capital with host NHS Boards and inform National Infrastructure planning.</p>	<i>Page 54</i>
STANDARDS	<p>15. Streamlining of reporting</p> <p>The Review Group recommends that for national and local level reporting, reporting against breast screening standards</p>	<i>Page 57</i>

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<p>Standards reporting and development</p>	<p>and performance be streamlined by NSD in liaison with NHS Boards, where possible, taking into the account differences in the level of detail required for different stakeholders. Defining this should be supported by the Monitoring and Evaluation Group.</p>	
	<p>16. Development of a Quality Management System</p> <p>The Review Group recommends that initial work with NHS Healthcare Improvement Scotland to develop a Quality Management System approach to the development and application of standards should be progressed. This should be taken forward through the development of a national screening Quality Management Framework being led by the National Screening Oversight Team. This work also links to wider related work on screening metrics being taken forward for the National Screening Oversight Board.</p>	<p>Page 59</p>
<p>DATA</p> <p>Improving data, intelligence and analytical capacity</p>	<p>17. Improve data availability, and data reporting across the Scottish Breast Screening Programme.</p> <p>Funding allocated for SBSS development in the ‘Committed Development Resource’ should be reviewed by DaS and NHS Boards with input from NSD, with a view to increasing resource to support user development requests prioritised, and SBSS data reporting functionality, including the provision of patient level data extracts routinely to Public Health Scotland.</p> <p>The review noted that the forthcoming development of the Screening Intelligence Platform (SIP), intended to provide a single point of access to linkable data from all of the National Screening Programmes, may assist in improving analysis and automated dashboard reporting.</p> <p>Geographical Information System analytical capabilities for the Breast Screening Programme should be developed further by PHS to support tackling inequalities, to assist Breast Screening Centres in planning screening schedules, and for strategic planning of screening delivery locations.</p> <p>Given the concentration of areas with poorer levels of uptake in the Central Belt of Scotland, associated with inequalities, a specific focus and central belt strategy targeting uptake maximisation, and improving the targeted location of screening delivery should be developed.</p>	<p>Page 60</p>

3. Introduction

Objectives & Scope of the review

The review of the Breast Screening Programme in NHS Scotland was commissioned to take account of previous reviews, recent incidents affecting the programme, current pressures and future options for delivery. National Services Division (NSD), the (then) Breast Screening Quality Assurance Reference Committee and the six Breast Screening centres advised that a fundamental review of the delivery of Breast Screening programme was required due to a number of factors including:

- Call and Recall
- Programme Slippage and Waiting Times
- Programme Standards
- Adverse Events
- Workforce

The scope of the review did not include a review of whether breast screening should continue to be made available, or the current National Screening Committee advised parameters. This is the remit of the UK NSC which advises the Scottish Government.

In the scope of review:

- Future requirements and population needs
- Expected Standards of Delivery
- Basis of Call/Recall processes (GP Practice Calling)
- Location of screening
- Workforce requirements
- Evidence base for current SBSP policies - in relation to age parameters & self-referral, radiology reading, workforce practice
- Technology – IT and new technology potential
- Addressing health inequalities, tackling known barriers to screening, and improving access to ensure that those in greatest need benefit fully

Out of scope of the review:

- Other Screening programmes
- Future risk stratification of breast screening (evidence is not yet proven)
- Use of Genetic testing for breast screening (evidence unlikely to be available)
- High level governance of breast screening (SG review of Screening)

Review Objectives

- To review the current Breast Screening Programme in Scotland.
- To make recommendations on the future delivery of the Programme.
- To make recommendations on policy direction for the Breast Screening Programme
- To develop costed options for service redesign for consideration by NSD, the screening programme governance structure, NHS Boards and Scottish Government

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The Scottish Screening Committee gave support for the major review in November 2018, and subsequently the review was granted Ministerial approval in June 2019.

Approach to the review and Review Governance

The review was informed by standard NSS project management methodologies. The standard approach to reviews as formally conducted by NSD was adapted because of the complexity of the SBSP and the number of independent work streams involved.

An Independent Review Group and Review Team (Review Group secretariat) was established with wide membership from key stakeholders, including the third sector. The review was chaired by an NHS Board Chief Executive.

The Review Team was responsible for the day to day management of the review. The Independent Review Group took responsibility for guiding the review, appraising evidence collected, and producing the review recommendations.

Strategic guidance and assurance were provided by the NSD Senior Management Team. Expertise was obtained from other parts of NSS, in particular Digital and Security, Procurement and Facilities teams in Health Facilities Scotland, and from Public Health Scotland.

The review was originally planned to be undertaken over a twelve-month period commencing in October 2019, however an extension of six months was subsequently approved for the review programme to allow for significant delays in obtaining data, and to help compensate for the impact on the review of the covid-19 response. The review was therefore undertaken over October 2019 to March 2021. The review report, following approval by the Independent Review Group in March 2021, will be taken through internal governance within NSS, and submitted to the Breast Screening Programme Board and the National Screening Oversight Board. The final report will be submitted to the Scottish Screening Committee thereafter.

4. THE CURRENT SERVICE

Background

Breast screening policy in NHS Scotland (and across the UK) is that all women aged 50-70 years +364 days are invited for breast screening once every 3 years. Women are invited to participate in breast screening based on calling the eligible women within the GP practice with which they are registered. Women over the age of 71 can self-refer for breast screening once every 3 years.

Configuration and operational delivery

Breast screening in Scotland is delivered via 6 breast screening centres across the country, complimented by the provision of a fleet of 20 mobile breast screening units. Operationally the six breast screening centres are hosted to deliver screening services across their catchments by NHS Boards (six Boards). The mobile fleet is scheduled and staffed by the centres, with medical physics, facilities and procurement support provided centrally via National Services Scotland (NSS), Procurement, Commissioning and Facilities (PCF).

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The breast screening service offers 2-view digital mammographic screening on a 3-yearly basis to approximately 750,000 women across Scotland in each 3-year screening round. The service reads and interprets the mammograms directly, and sends out the results. All breast screening mammograms are double-read by 2 readers (radiologists, or advanced practice radiographers), with independent third party arbitration for cases where there is disagreement.

Where an abnormality is identified on the mammogram the service invites the woman for comprehensive clinical assessment. Onward referral to local symptomatic breast services for treatment is made when necessary.

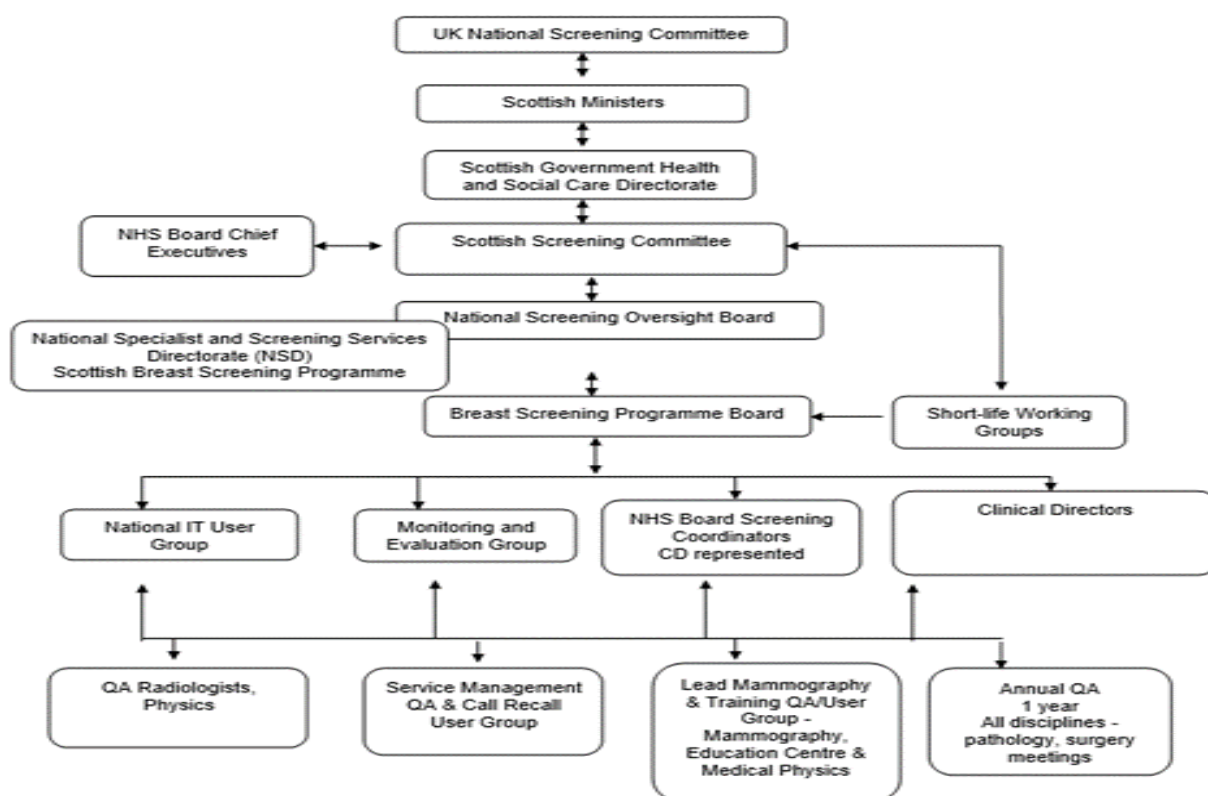
Digital mammography has been in place across the whole of Scotland since 2015.

National service co-ordination and service governance

The service is nationally coordinated via NSS National Services Division (NSD) which supports the service level agreement, annual performance review, and annual reporting. NSD co-ordinates the planning and programme development work for the service at national level, involving NHS Boards and other delivery partners.

Governance of the service nationally is via the Breast Screening Programme Board. The governance structure is outlined in figure 1 below. A Monitoring and Evaluation Group is in place to examine the key data from the service and to support service quality assurance and development. A National Users Group delivers and manages the development plan for the IT system which underpins the service – the Scottish Breast Screening System (SBSS).

Figure 1: Governance Structure of the Scottish Breast Screening Programme



High level overview of current activity, costs, and performance

Published data for breast screening for the 3-year period from 2016/17 to 2018/19 shows that a total of 546,379 women attended a routine breast screening appointment, from 756,341 invited, equating to an attendance rate of 72.2% across Scotland¹. This is just above the minimum standard of 70%. The invasive cancer detection rate was 6.8 per 1,000 women screened for women aged 50-52 and new to screening, and 7.0 per 1,000 women screened for women 53-70.

In 2018/19, the number of screen-detected breast cancers in women of all ages was 1,738. Of these, 87.7% (1,524) were invasive breast cancers. Just under half (49.2%) of these were less than 15 mm in size. Such small tumours are unlikely to be detected by physical examination, highlighting the importance of screening in the early detection of breast cancer.

The SBSP costs for 2019/20 are just over £ 15.5 million with pays accounting for around 74% of overall costs. These costs equate to a cost of around £76 per woman screened.

Previous reviews of Breast Screening

In 2011 a review of Breast Screening was undertaken by the SBSP chaired by Mr Calum Campbell (CEO NHS Borders at the time). This considered the review of service delivery and future model for the service and involved describing key pressures and costs:

- Assessing performance against the 6 domains of quality
- Reviewing geographical distribution
- Considering commissioning and planning models for the service
- Setting out organisational, financial and staffing implications of implementing digital mammography and
- Developing a sustainable staffing model

Not all of the recommendations could be taken forward at the time, either because of pressures in breast services or because they were not approved by Scottish Government.

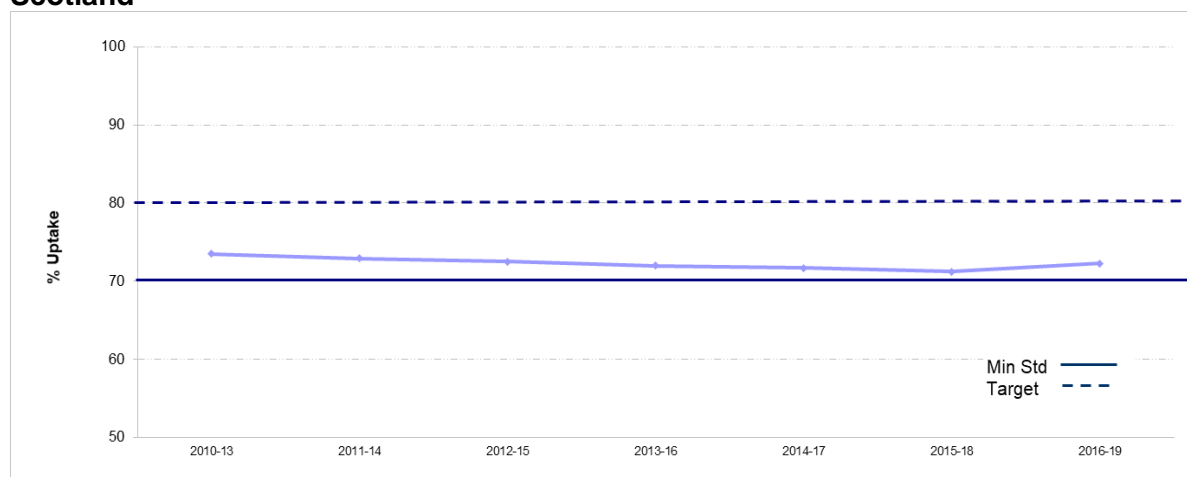
5. AN OVERVIEW OF UPTAKE OF BREAST SCREENING IN SCOTLAND

Uptake over time.

Over the past decade the general trend in overall uptake of breast screening has been a small but steady decline, as Figure 1 below shows. Average performance on uptake over the last 10-years now sits at 72% (range: 71.2% to 73.5%).

¹ Public Health Scotland: Scottish Breast Screening Programme Statistics 2018/19 Annual update to 31 March 2019

Figure 1. Percentage overall uptake 2010 - 13 to 2016 - 19 (3 year rolling periods), Scotland



1 Routine appointments only, self /GP referral and early recall appointments are excluded.
 2 Breast Screening year runs from 1 April to 31 March.
 3 Women are invited to attend screening once every three years and NHS Boards are not necessarily screened evenly throughout the three-year period.
 Source: Scottish Breast Screening Programme (SBSP) Information System - KC62 Returns

Within this pattern of steady decline, the overall level of performance of individual Breast Screening Centres is relatively consistent over time. Analysis of programme overall uptake across rolling three-year periods covering almost a decade from 2010 – 2019 shows this (Table 1).

Table 1

Rolling 3 year periods from 2010/11 - 2012/13 to 2016/17 - 2018/19	% Uptake (Age 50-70)		
	Min	Max	Average
Screening Programme			
South East of Scotland	70.0	71.8	70.8
East of Scotland	75.9	77.2	76.6
North East of Scotland	78.9	81.3	80.1
South West of Scotland	73.4	75.6	74.3
North of Scotland	77.8	79.7	78.9
West of Scotland	67.2	70.1	68.5
Scotland	71.2	73.5	72.3

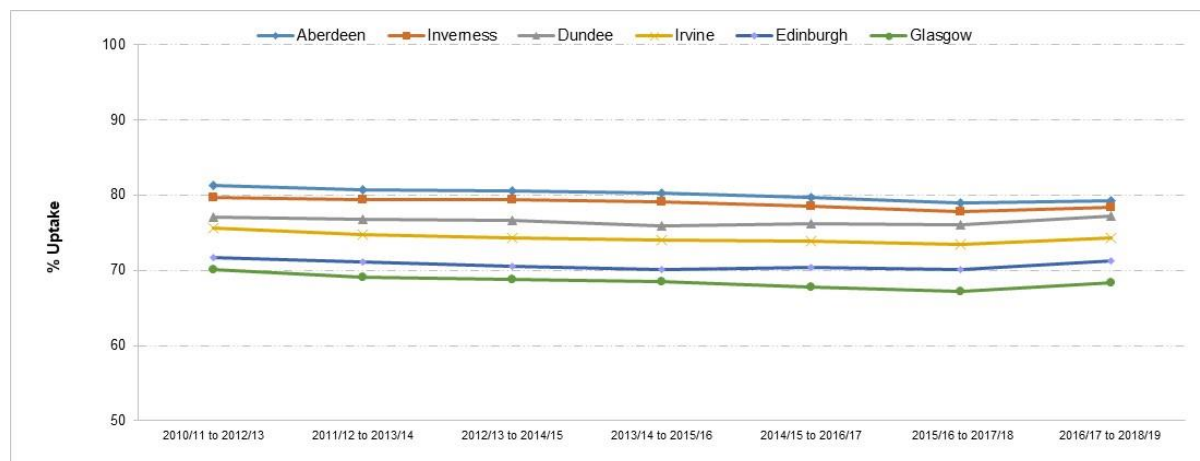
Breast Screening programmes in the North of Scotland perform well (North East usually near or meeting the upper achievable standard for uptake of 80%, and North of Scotland usually achieving uptake in the high 70% range close to the upper achievable standard). The East of Scotland Breast Screening programme and the South West of Scotland deliver uptake performance at the mid-70 percent level. The South East of Scotland programme delivers uptake on or just over the minimum standard of 70%, and the West of Scotland delivers a little under the minimum uptake standard. Using historical data over a longer period than ten years shows similar levels of typical performance for the centres, potentially suggesting social and population causes rather than service design (see appendix 1).

Figure 2 below details overall trends in uptake for this same time period, at Breast Screening Centre level.

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Appendix 1 gives more detail of individual three-year rolling periods, shows long term trends in overall uptake for the programme, and shows min/max/avg. performance at Breast Screening Centre level analysed over a longer time period (2004-2019).

Figure 2: Trends in Breast Screening Centre overall uptake: 2010-2013 to 2016-2019



The two larger screening centres in the South East of Scotland (Edinburgh) and in the West of Scotland (Glasgow) are more challenged in delivering the minimum uptake standard for the programme. Notably, in postcode level uptake analysis undertaken as part of the review we observed that geographical areas with uptake below 50% participation are almost exclusively in the West of Scotland breast screening centre programme catchment area (Glasgow City, Renfrewshire, and North Lanarkshire) with only 1 other postcode area in Scotland, Leith EH6, falling into this category.

In line with the above, data from the Scottish Breast Screening Programme over the recent three-year period from 2016 to 2019 now shows a 72.2% all Scotland uptake for the programme overall (Table 2).

Table 2

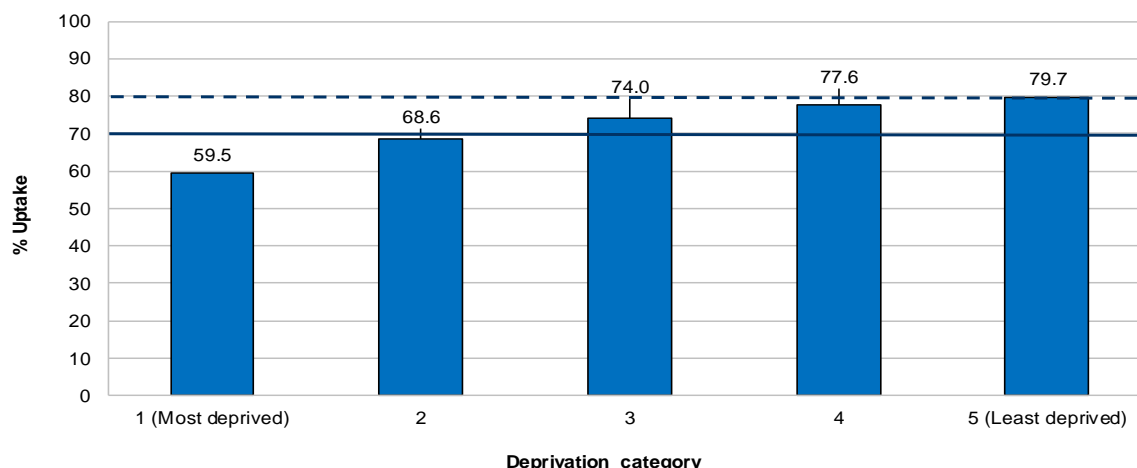
Scottish Breast Screening Programme: REVISED KC62 Standards							
Three Year Period Covering 2016/17 to 2018/19							
	Edinburgh	Dundee	Aberdeen	Irvine	Inverness	Glasgow	Scotland
Overall uptake (tables A, B, C1, C2)							
No of women screened (Age 50-70)	133,682	54,124	63,697	59,356	33,708	201,812	546,379
No of women invited (Age 50-70)	187,427	70,083	80,383	79,908	43,042	295,498	756,341
% Uptake (overall) (Age 50-70)	71.3	77.2	79.2	74.3	78.3	68.3	72.2

Uptake for newly eligible women (prevalent uptake, women age 50-52yrs) was 69.4% in this 2016/17 – 2018/19 period. Incident uptake (women age 53-70yrs) was 87.5%.

We know that women from more deprived areas are less likely to attend for breast screening, with under 6 in 10 women (59.5%) from the most deprived areas going for screening compared with almost 8 in 10 women (79.7%) living in the least deprived areas, a difference of over twenty percentage points (Figure 3)². Appendix 1 also shows attendance data, by deprivation category, by NHS Board in Scotland.

² Public Health Scotland: Scottish Breast Screening Programme Statistics 2018/19 Annual update to 31 March 2019

Figure 3: Breast screening percentage uptake by deprivation quintile, Scotland: 2016/17 - 2018/19 combined.



Data visualisation

The review geographically mapped uptake of breast screening across Scotland by uptake level. The data-set used covered the period 2016 – 2019 and included NHS Board area of residence, Health and Social Care Partnership, Local Authority area, age group, and deprivation quintile. Data on the number of screens, number invited, number of cancers detected, and uptake were calculated to postcode sector level.

Public Health Scotland’s Geospatial Service was subsequently requested to use this data to prepare geographical maps of breast screening uptake by datazone. These are shown below.

At the highest level of overview (figure 4) the map shows the concentration of NHS Board areas which fail to meet the minimum standard (70%) for breast screening uptake. These are NHS Greater Glasgow and Clyde and NHS Lanarkshire. Figure 5 shows an overview of uptake, by uptake level, across Scotland.

Figure 4

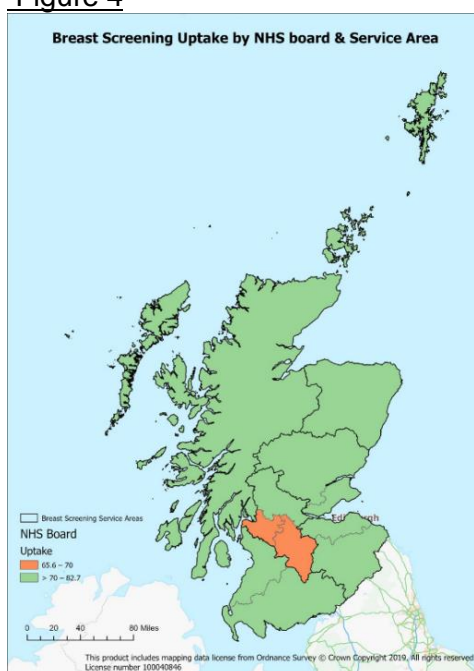
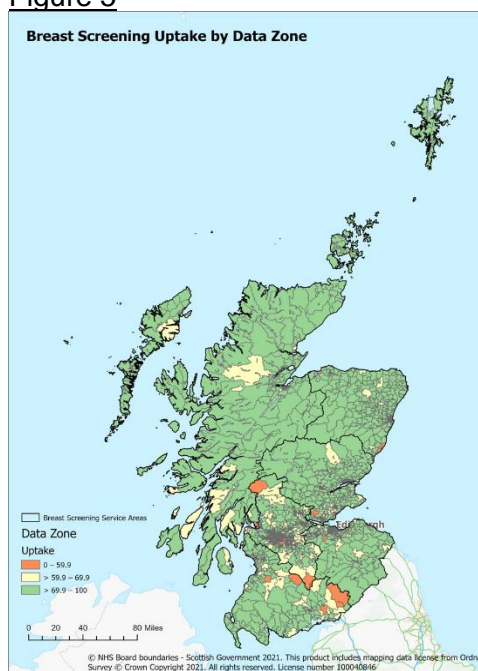


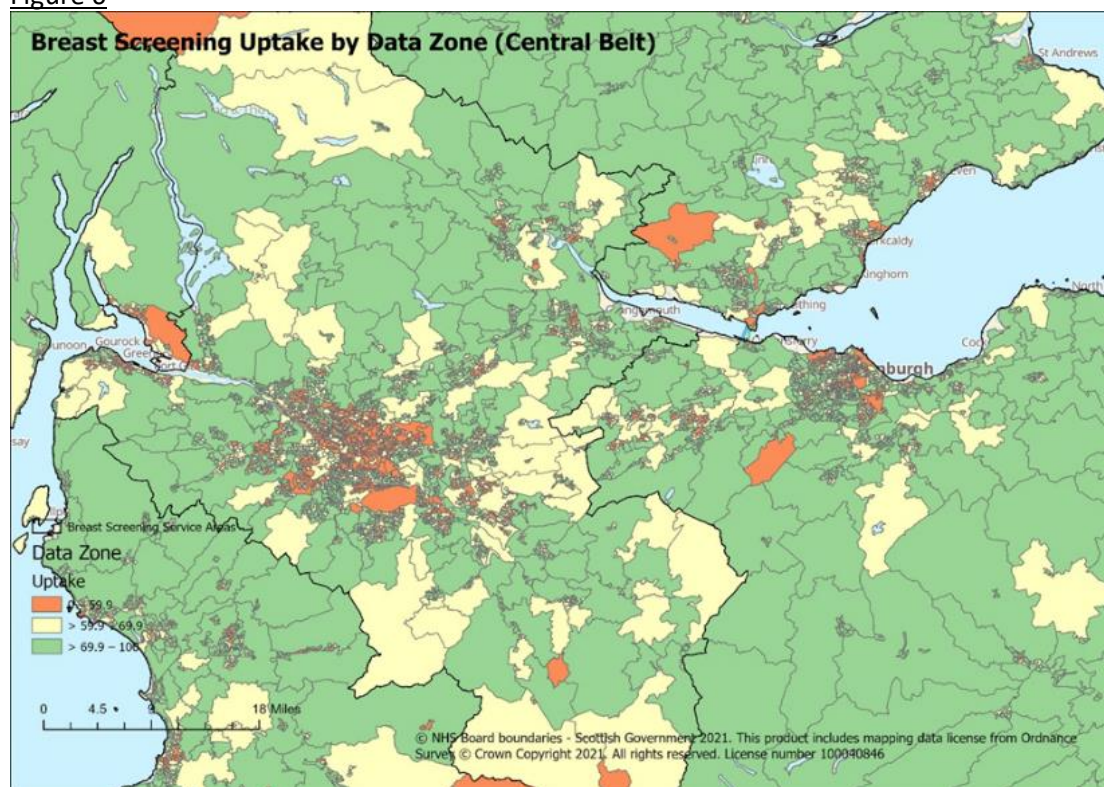
Figure 5



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As indicated in figure 5 above, most areas meet or exceed the minimum uptake standard for the programme. Areas of under-target performance can be identified across Scotland, however the central belt of Scotland has by far the greatest concentration of areas of lower levels of uptake (see figure 6, below). Given population density, the central belt area has the largest share of the eligible population invited for breast screening in Scotland, with lower levels of uptake in the most deprived areas served.

Figure 6



Appendix 2 shows uptake by data-zone for each Breast Screening Centre in Scotland.

The geospatial maps shown have been developed as an interactive tool, with the ability to zoom in / out to individual geographical areas of varying sizes, for example drilling down to uptake data at individual datazone level. This functionality was developed to support the work of the review, and it built on the new availability of activity data at postcode level. However, the geographical information system capability should be developed further to support local Health Board screening leads and Health Promotion Specialists to further identify inequalities and areas of targeted opportunity. Such a tool would also assist Breast Screening Centres in planning the screening schedule, particularly the strategy for mobile location. For strategic planning, the same geospatial maps could be used to support demand modelling, including consideration of variables such as travel time and distance for various scenarios and potential screening delivery locations. Some initial exploratory work in this area has been undertaken with the Public Health Scotland Geospatial Service as part of the review process, however COVID constraints prevented full engagement and development of any site specific scenario planning or options development with individual sites.

Given the challenges noted above in the Central Belt of Scotland associated with inequalities in uptake, a specific focus and development of a central belt strategy on uptake

maximisation and location of screening delivery would potentially support improvement. Improved use of local geographical data may also support the greater involvement of Health and Social Care Partnerships in community engagement and health promotion.

6. LEARNING FROM WOMEN WHO DO NOT ATTEND FOR BREAST SCREENING

Exploring barriers and facilitators to breast screening uptake among disadvantaged groups and communities in Scotland

The review commissioned a study via NHS Health Scotland (now part of Public Health Scotland) to explore the barriers to breast screening uptake among disadvantaged groups and communities. The study aimed to explore the barriers and enablers for women who don't attend for breast screening, and to provide recommendations to the Review.

Specific objectives included:

- To explore women's knowledge and understanding of the breast screening service generally and how it relates to other screening and healthcare decisions they make.
- To identify whether they considered attending for breast screening when invited and what factors impacted their final decision not to attend.
- To identify whether there was anything about the time, location or set up of the service that impacted their decision not to participate.
- To explore what, if anything, would encourage them to participate and what, if any, options they feel would improve the breast screening service for them.
- To explore any other barriers that have impacted their participation in screening.
- To explore any other enablers that would make them reconsider attending screening.
- To identify learning on improving uptake to inform the Scottish Review of Breast Screening.

A qualitative approach was adopted to enable detailed exploration of women's attitudes to, and views of, breast screening. Individual depth interviews were deemed to be the most effective method as it would provide a more comfortable and intimate environment for discussing this sensitive topic.

It was originally intended that these interviews take place face-to-face in the respondent's home. However, due to the COVID-19 outbreak and subsequent lockdown immediately prior to the fieldwork period, this was changed to a telephone interview method. A total of 36 depth interviews were conducted, with each running to around 60 minutes in duration, and conducted by senior researchers.

All interviews were undertaken in privacy in the respondent's own home, across Health Board areas where minimum uptake standards of 70% were not met in the period 2015/16 to 2017/18: NHS Greater Glasgow & Clyde, NHS Lanarkshire and NHS Lothian and NHS Fife. Urban, semi-urban and rural locations were covered.

The audience of interest to this study was **women aged 50-70 living in Scotland's most deprived communities who do not engage with the breast screening programme, ie these individuals were not representative of the screened population as a whole. Of specific interest were the views of the following groups:**

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- **women aged 50-54 who live in deprived communities**
- **eligible women who are living in rural deprived communities**
- **eligible women with a disability living in deprived communities.**

A summary of key results, conclusions and recommendations is outlined below. The full study report is appended at appendix 3.

Summary of key results

The factors impacting on uptake of breast screening amongst this target audience spanned three key contexts: individual, social and environmental, with the extent of influence of each varying across the sample.

Individual factors: Three key areas of misconception about breast cancer and screening were evident: a strong association of the risk of breast cancer with having a family history of the disease, an association of the risk of breast cancer with older women (70+ years), and some sense that breast cancer is less 'hidden' than other cancers, and as such that there was little need to attend for breast screening if self-examination revealed no lumps.

Social factors: Breast screening was not perceived by the majority of this audience as having become normalised. This was due to a perception that neither breast screening nor breast cancer had high salience in their own social context or in the wider media. Furthermore, personal conversations and mutual encouragement to attend for screening appeared to be limited, with some cultural taboos remaining with respect to talking about or exposing their breasts.

Environmental factors: A number of factors relating to the design and delivery of the breast screening service impacted on (regular) uptake and served to reduce the sense of ease of attendance and further bolstered emotional reservations.

Consideration of attendance -

A pre-set breast screening appointment encouraged consideration of attendance, with many admitting that they would not proactively make an appointment. Active consideration was largely limited to the first appointment however, with emotional reactions often driving behaviour in respect of subsequent invitations (usually based on earlier experience).

Barriers to attendance -

These encompassed both practical and psychological barriers:

- *Screening appointment: time, location, availability*

The unpredictable nature of both work patterns and personal circumstances meant that forward planning to accommodate pre-set appointments could be difficult. Furthermore, many were reluctant to ask for time off work to attend screening appointments as they felt these were not viewed as a priority by their employers.

In semi-urban and rural areas, the limited availability of appointments in a local venue served to increase the inconvenience of attendance, with travel to other towns adding to the time and cost involved in accessing the screening.

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For women with a disability, travel to a venue which was not local posed a range of additional considerations such as increased anxiety and greater inconveniencing of the individual who would accompany them to the appointment. Consideration of physical access needs and the anxiety caused by a time restricted appointment constituted further barriers for some of these women.

- *Screening venue: siting and set-up of mobile units*

Siting of mobile screening units within local supermarket car parks caused emotional discomfort for some. The external branding of the units was perceived to overtly indicate their purpose, with a sense of personal embarrassment further increased by the unit's very public entrance.

The environment of the mobile units themselves was perceived by many to be sterile and unwelcoming, which together with the minimal personal engagement from staff reported by some, served to increase any existing anxiety.

- *Screening procedure: impersonal experience*

The entire experience (pre, during and post the x-ray) was described as functional and detached which served to engender a sense of vulnerability and lack of personal control.

Some women perceived screening staff attitudes to be uncaring and reported that they were made to feel as if they were making an unnecessary fuss or exaggerating the discomfort.

- *Screening procedure: personal discomfort*

Experience of pain during the mammogram and or embarrassment at being naked from the waist up was a strong barrier to attendance.

Conclusions

Whilst the women in this target audience had high level awareness and understanding of the purpose and process of breast screening, its importance and self-relevance was not acknowledged by a significant proportion of them.

The inconvenience of appointments presented practical barriers which hindered uptake. The current system for scheduling appointments has a number of drawbacks:

- Pre-set appointments that are several weeks in the future are often not helpful for this audience who cannot always predict their work or family commitments so far in advance.
- The inability to schedule appointments out with working times makes attendance difficult for many.
- There is limited awareness that appointments can be cancelled or rescheduled, and the need to telephone within working hours to do so is inconvenient.
- Limited appointment time flexibility, particularly in semi-urban and rural locations, leads to appointments not being pursued.

The location and design of the screening venue can constitute further barriers to uptake:

- Where the screening venue is not local, travel time, inconvenience or the cost involved can limit access, particularly in semi-urban and rural locations.

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- The accessibility of the mobile units can be an issue for women with restricted mobility, many of whom were not aware that adjustments could be made if requested
- Attendance at a mobile unit can serve to limit willingness to considered breast screening: perceived to lack discretion from the outside, with the internal environment viewed as sterile, cramped and lacking sufficient privacy.
- Limited emotional accessibility can also an issue for those attending mobile units as there is no or limited opportunity to be accompanied.

Psychological concerns constituted a significant barrier for some of the women in this target audience. These related both to the embarrassment and pain experienced during the screening process, but also to perceptions of the impersonal nature of the process, and the lack of empathy and understanding from screening staff. The resulting sense of unacceptability of the experience impacts negatively on preparedness to consider further screening appointments and leads to the spread of adverse stories.

Recommendations

The following is recommended for consideration in helping to increase the uptake of breast screening amongst this target audience:

- *Improve the understanding and perceived value of breast screening*

Media campaigns will help to communicate both the value of screening and to provide cultural contextualisation by clarifying the prevalence of breast cancer in Scotland and the populations at risk. There are advantages to employing a variety of channels to help convey the importance of breast screening (e.g. television advertising) and its relevance to this audience (through trusted sources using social media channels for example). The value of screening can be emphasised through GP reinforcement, and normalisation within these communities will be helped by encouraging informal conversations (between both peers and health professionals), for example on social media.

- *Increase the convenience of appointments*

Greater flexibility of appointment scheduling and availability would enable better access and uptake. Consideration should be given to a range of service elements: reminder texts or telephone calls which can help to retain screening appointments on the radar, an online appointment cancellation and rebooking system to provide a greater sense of individual control and convenience, and evening and weekend appointments for those who find it hard to adjust weekday commitments or rely on support from others. Increased appointment availability in rural and semi-urban locations would provide some flexibility for women in these areas.

- *Increase the user-friendliness of screening venues*

This should be considered at both a practical and an emotional level. Co-location of breast screening services with existing GP or well woman services would facilitate attendance by providing a local, familiar and professional environment, together with more discreet access to the service. At a psychological level, these venues were perceived to be friendlier, with the expectation of a more personalised experience and the opportunity to be accompanied. Larger mobile units with 'warmer' waiting areas can also help to provide a more reassuring

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environment. Better communication of the adjustments that can be made for women with disabilities is key, ideally through personalised invitations.

- *Improve the acceptability of breast screening*

There is a need for better engagement with women to demystify the screening process and provide reassurance. This could take the form of informal social support via social media channels, enabling telephone or online support e.g. live chat, peer conversations, and the sharing of positive stories from women who have been screened. Facilitating easy access to concise, straightforward information and honest description e.g. videos of the process would also be helpful. Engagement and empathy during the appointment is vital in encouraging repeat screening. Mammographer sensitivity and consideration is key, and longer appointment times or (peer) support in the waiting area would enable questions to be asked and reassurance provided. The use of gowns that do not need to be fully removed while the mammogram is being taken would also help in addressing the modesty concerns.

Taking forward the study findings

The insights and key themes from the study findings and identified actions were collated by the review team and used in the review process to support individual workstream areas.

Additionally, study findings were shared to support Screening Service Design work developing in the National Screening Oversight Function. Key findings and actions were presented against the 'User Journey' framework of Awareness; Engagement; Experience.

A facilitated workshop with key stakeholders in the NHS, community and voluntary sector was planned in order to maximise engagement and build consensus around the findings. NHS Board Equality Leads were initially engaged to support this next stage work, however due to Covid impact both on the research timetable and within the service this was not taken forward. The conclusions and recommendations arising from the study would however usefully support future public engagement and consultation on taking forward the major recommendations of this review.

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It is important to note that the research deliberately selected participants on the basis of previous low/non-engagement with breast screening, with a view to find ways to reduce the barriers to screening in this "hard to reach" group. Their views are therefore not representative of the wider screening population. Centres undertake regular participant feedback questions and generally report good levels of satisfaction with the service.

7. ACCESS

Improving access to breast screening is particularly challenging for the programme, with screening delivered on a locality basis across Scotland (to minimise travel and distance for all as potential barriers to attendance), and with the need to continually focus on improving participation by women in our most deprived communities (with uptake being approximately 20% lower in our most deprived communities compared to the least deprived). National screening policy, IT systems, local service configuration, and breast service clinical pathways all effect and seek to support access to breast screening. Access was a key workstream within the review, and this section outlines consideration of: call and recall for breast screening; aspects of the use of current capacity; self-referral; inviting women for screening who are on breast cancer treatment or follow-up pathways; and the link with breast cancer Family History services.

Breast Screening Call/Recall - options & suggested future model

Reviewing call and recall processes

In the Scottish Breast Screening Programme women are currently invited for screening based on the GP practice with which they are registered. Women are attached to one of the six Breast Screening Centres based on their current GP Practice registration, or, for non-registered women, based on their Area of Residence. GP Practices are 'opened for calling' by Breast Screening Centres and women who are eligible to be called from the practice are allocated an appointment for screening. Allocation to appointments from the block set aside for the Practice has historically been a randomised process, and is not based on previous invitation or attendance dates.

Breast Screening is therefore unlike some other screening programmes where the offer is based on the participants' age or a specific recall date. Practice based calling was introduced at the outset of the breast screening programme to support screening delivery on a locality basis, whereby women are invited to a screening location close to their home or GP practice. It was adopted to minimise travel for women, as distance from a screening delivery location is understood to be a barrier to attending for screening.

Women can telephone to change their appointment time, and all women within a geographical area can choose to attend the local Breast Screening Centre or an alternative mobile location if they are unable to attend an appointment while the mobile screening unit is within their locality.

Adverse events

There have been two major adverse events in the Scottish Breast Screening Programme in recent years, both involving a failure to invite women who were eligible for screening. The causes of these incidents related to the limitations of the former breast screening IT system to track women who moved between GP practices (and subsequently were not issued with an invitation to screening as a result), and slippage in the screening programme schedule which meant that women who were eligible in the screening round, but had matured to over the agreed screening age (70 yrs. and 364 days) by the time their Practice was called for screening, were not invited. Safeguard reports have subsequently been developed and implemented in the Scottish Breast Screening System to avoid these events from reoccurring.

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Previous discussion with the Scottish Screening Committee, associated with responding to adverse events and the performance of the Scottish Breast Screening Programme, have given rise to consideration of whether options to change the way in which women are invited to breast screening should be explored as a longer term strategy. Subsequently, call/recall processes for breast screening were placed in the scope of this review.

Breast Screening Call/Recall options workshop

In order to explore potential methods for call/recall that may improve the Scottish Breast Screening Programme a workshop was held with participation from members of the review group, breast screening services in Scotland, and NHS Board screening co-ordinators.

Potential methods examined included the following criteria:

- Practice based calling (the current method)
- Age
- Postcode
- Date of Last Screen/Next Test Due Date

Practice based calling

The consensus from the workshop was that practice based calling is not currently working effectively, and is not future proof. Increasing incidence of GP practice mergers (often with little advanced notice) and changes, the continual need for safeguarding reports to help track women moving between GP practices, the large geographical area covered by many practices, and the move away from GP screening-list validation were key issues. It was however acknowledged that practice based calling was well established and understood, with the breast screening IT system in place to support this method. Participants also flagged the potential to refine the existing system of practice based cohort management to improve screening clinic scheduling and the allocation of appointments.

Age

Calling for breast screening based on age alone was considered an unsuitable method. This method would involve calling from all geographical areas of the screening centre catchment simultaneously, and would require all locations to be visited in every year of a screening round which would be inefficient and unfeasible. It was acknowledged however that age based calling would be an easier process for women to understand.

Postcode

Calling for screening based on postcode would deliver what was deemed to be an essential focus on the geographical location for screening delivery. Postcode based calling was seen as potentially suitable for both urban and rural areas, would remove the current problematic issues associated with GP practice based calling, would offer the potential to link to locality and community groups to support health promotion and tackling inequalities, and would allow whole geographical areas to be called together. Relatively minor changes would be required to be made to the Scottish Breast Screening System to base calling cohorts on postcode clusters rather than GP practices. The benefit of calling on postcode alone was

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questioned however, and it was acknowledged that geographical planning support from the Scottish Breast Screening System would be required. Safeguard reports would still be required to pick up participants moving between different geographical areas.

Date of Last Screen/Next Test Due Date

Date of Last Screen/Next Test Due Date was regarded as an important criterion; however, it was considered that this would be better utilised in combination with another of the criteria for calling. Next Test Due Date was regarded as more *personalised* to individual women, and potentially a more efficient method of calling. Concerns around access and the potential negative effect on uptake were raised however if Next Test Due Date was used alone for calling, given there would be no geographical criteria.

Preferred option

Following consideration of the options identified the preferred way forward was to use a combination of the criteria (rather than any single-criteria based method), focusing heavily on geographical location. A method based on a combination of *Postcode and Date of Last Screen/Next Test Due Date* was initially preferred and prioritised for further development. It was felt that this model would retain the benefits of the current practice-based calling model, but would avoid issues associated with reliance on GP list data, and introduce flexibility which would lead to improvements. This method was seen as suitable for both urban and rural locations, would be feasible to develop in the Scottish Breast Screening IT System, and would retain a 3-year programme based on location. A mechanism to capture women who move in/out of geographical areas, and for inviting women becoming eligible for screening was noted as necessary.

Developing call-recall functionality in the Scottish Breast Screening System

The review team requested an examination of how the Scottish Breast Screening IT System (SBSS) may be developed and used to implement potential alternative methods for calling women to the Breast Screening service in Scotland.

The external supplier of SBSS was asked to outline possible alternative methods focusing on:

- a) Shifting the focus for when a woman is selected for calling and when and how she is called to a screening appointment. Moving away from a call date associated with a GP practice to a call date (due date) associated with the woman herself.
- b) Managing the youngest cohort (50-53yrs age group) to ensure that they are called in a timely manner based on their age and not based on which GP Practice they are attached to.
- c) Moving to a selection and allocation model that uses the data within the Scottish Breast Screening System to assist the system users to determine where and when it is appropriate to relocate the mobile screening units, to screen the eligible population routinely and efficiently.

Whilst at the same time keeping the principles of calling the majority of women as close to their place of residence as possible.

Moving the call date from the practice onto the individual woman, and considering clustering the eligible women due for calling in a manner that allows women to be called as close

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possible to their place of residence, was identified as a potentially feasible option that could be used as alternative to practice-based screening, subject to further specification.

Developing this option would potentially change how the 'callable cohort' in SBSS was managed, away from a fairly static cohort list generated at the point of opening a practice, to a more dynamic cohort list based around, for example, women due to be called in the next 6 months. This potentially would allow SBSS to better manage current anomalies caused by:

1. Women moving practices: as women would now keep their own call date, and would become eligible based on their last screened date not on their old or new practice scheduled date
2. Practice merges: These no longer have any effect on the woman's call date
3. Newly eligible women at 50 years of age: would be brought into the system and allocated a recall date based on their DOB
4. Movements into Scotland: these women would be allocated a recall date based on the day they entered SBSS, or based on previous screening history from other parts of UK.

In the current calling model, SBSS uses GP Practice to group women in the *eligible cohort* for screening. An alternative grouping based on the recall date assigned to the woman, and her Area of Residence would be required, to enable calling clients by due date and screening location. Postcode areas may assist in a possible geographical grouping mechanism, however a more permanent solution to mapping to geographical area would be essential to allow the SBSS system to map a person to their nearest screening site. With incorporation of the new CHI, SBSS functionality should improve in this regard, potentially better facilitating mappings between screening sites and client locations.

In this method, although the focus will shift from calling the Practice to calling to person, the use of GP Practice to assist in appointment allocation and ensuring that women are screened at a local location may also be retained in some form within the SBSS allocation process.

Taking forward work on further specification

It is recommended that further specification and development work be taken forward to develop this strategic option, and also to explore the further potential for more automated and advanced planning for screening schedules.

Breast Screening Centres and system users should be central to the design of further specification for system development, particularly around incorporating operational business processes for appointment allocation and mobile screening clinic scheduling.

As a shorter-term development to assist improvement to current call-recall processes, use of new functionality recently developed in SBSS should be explored and used. This recent functionality allows Breast Screening Centres to prioritise individuals on Practice lists based on their date of last screen (historically a random process). SBSS now also orders women into first time screening invites; previous attenders; and previous non-attenders.

Strategic Recommendation

The Review Group recommends that a new approach to breast screening call-recall be taken forward which is more person-centred and is based on calling individual woman (rather than the GP Practice they belong to) based on their Next Test Due Date.

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Development of the Scottish Breast Screening System algorithm should also incorporate age, Area of Residence, and screening location to enable identification of women becoming newly eligible for breast screening, and local geographical cohorting of invites.

NSD and DaS should take forward the further specification work necessary to support development of the Scottish Breast Screening System. The Breast Screening Programme Board should advise and support this development, recognising that a person centred focus; incorporation of the new CHI functionality; and the potential to further automate planning, forecasting and allocation are key drivers for change and development.

Capacity utilisation, and the potential to improve access and patient experience

Location of services – long term service integration

There remains a consensus view across the Scottish Breast Screening Programme that in the longer-term screening centres and symptomatic breast services should be co-located. This is in line with the agreed recommendations of the 2012 review of breast screening in Scotland. Two centres currently operate this model (North of Scotland and East of Scotland). In the four areas where breast screening is currently not co-located NHS Board systems are either actively progressing co-location plans as part of wider acute hospital capital plans (NHS Grampian and NHS Lothian), or at screening service level would support working towards colocation (South West, and West of Scotland BSC). Co-location is broadly supported for reasons of potential service efficiency, improved communications and pathway management, as well as the advantages of single premises and facilities. In many areas Clinical Directors already have clinical management responsibility across symptomatic and screening services, and some screening service managers already work across screening and symptomatic.

Location of services – design and delivery

Feedback received from women who don't routinely attend for breast screening included feedback on a number of 'environmental factors' relating to the design and delivery of the breast screening service and how these may impact uptake. These included both the location of screening delivery, and the practical and psychological barriers to attendance.

Feedback on the user-friendliness of screening venues focussed on the mobile units. Women flagged the potential to locate screening clinics in health centres or community hospital facilities for example as a way of providing improved, more discreet, user-friendly and accessible environments than mobile provision. This was balanced with feedback on travel time and distance, particularly in rural and semi-urban areas, where it was thought that too great a distance presented a barrier to participation. This highlights the need to both improve mobile screening provision where geography and population size require a mobile programme, and to take the opportunity of improving the screening venue in urban and semi-urban areas which have the population base to sustain more static screening provision.

Satellite screening centres

Discussion with Breast Screening Centre teams around service delivery (location of current services and key operational issues, capital / premises strategy, the degree of integration with symptomatic services etc.) led to interest in exploring the concept of 'satellite screening

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centres' as a means to improve service delivery. Such units, as satellites from the main static screening centre base, would allow for more fixed, permanent access points for screening and a reduced reliance on the mobile fleet.

Geographical maps of inequalities in uptake in breast screening (referenced earlier in this report) were developed and used to support this discussion, noting that the central belt of Scotland has by far the greatest concentration of areas of lower levels of uptake and, given the population density, the largest proportion of invites for breast screening. Centres in the central belt of Scotland indicated that satellite screening facilities would potentially be beneficial. The three centres outside of the central belt did not feel that more static provision would assist delivery. Work to explore the concept further was taken forward with the central belt screening centres.

Current capacity utilisation

To help consider current capacity utilisation, screening clinic appointment data was reviewed over a two-year period (18/19 – 19/20) using data drawn from the Scottish Breast Screening System (SBSS). Appendix 4 shows a summary of utilisation data across the SBSP, and for each breast screening centre.

A summary of the picture for the whole Scottish Breast Screening Programme is noted in the table below. Overall this shows slightly better utilisation in static centres than mobile provision. Data shown in appendix 4 for the central belt centres shows a better utilisation / lower DNA rate in static provision. Data for the North centres and South West shows the opposite, a relatively better utilisation / lower DNA rate in mobile screening rather than static.

		Static and mobile	Mobile	Static
All SBSP	Total appointments available over the 2 yrs (total capacity)	638,743.00	467,308.00	171,377.00
	Total Num. of appointments remaining filled on the day	576,212.00	424,287.00	151,899.00
	Total Num. attended appointment over the 2 yr period	429,093.00	312,421.00	116,652.00
	Number DNA'd over the 2 yrs	140,751.00	105,652.00	35,093.00
	% Appointments remaining filled on the day	90.2	90.8	88.6
	% DNA from appointments remaining filled on the day	24.4	24.9	23.1
	% Utilisation (proportion attending appointments remaining filled on the day)	74.5	73.6	76.8

Appointments data reviewed included the over-booking of clinics (therefore the utilisation statistics in the table above are accurate after programmed over-booking has been taken into account). Overall a significant number of appointments are lost to late cancellation and then, further to this, a high proportion of staffed capacity is lost to DNA's (24% DNA overall).

The case for more static satellite provision in the central belt

Each of the three central belt Breast Screening Centres indicated support for a hybrid model with more static centres to replace some of the mobile fleet.

The primary drivers for this change are:

- the potential to develop a more client focussed service based on feedback (see benefits below).
- the increasing difficulty of finding suitable community sites for the mobile fleet.

It has become increasingly problematic over recent screening cycles to identify suitable mobile location sites. The service has no funding to pay for sites and has previously relied on local community/commercial sites being offered free of charge. Some of the issues have been highlighted as a result of the pandemic, namely closed carparks, closed public buildings, closed community properties and lack of toilet facilities for staff and also clients. It is worth noting that there are no toilet facilities on the current mobile fleet.

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Both the West of Scotland and the South East Scotland services wish to explore the possible use of static centres for central belt locations, where the population numbers would allow continuous screening at the location over the whole 3-year cycle.

Two potential location models have been suggested, both of which would capitalise on public transport links and car-parking availability, and both would therefore optimise patient access and consequently attendance.

- Use of NHS, Community, or Local Authority facilities
- Use of retail facilities and centres.

High level modelling by Breast Screening Centres has indicated that up to 70% of the eligible population for the central belt (and up to 95% for the South East) could be encompassed by this change if fully implemented for all suitable geographical areas.

Benefits anticipated include:

- Familiarity of location for clients and staff alike
- Potential for better uptake in deprived areas by reducing the barriers to attendance for these communities
- Allow service to reconfigure to book strictly by age or by post-code
- Allow clients to self-book at any time within 2 months in advance of due date
- Allow clients to choose location closer to home or closer to work / leisure
- Avoidance of the 3-yearly negotiation and uncertainty about the location of sites
- Allow clients to rebook to catch up following a cancellation or non-attendance, with no cut-off date as the facilities are always present
- Simplification of communication, relevant signage/paperwork/advance publicity
- Better link with community at location
- Cost savings (savings on mobile unit replacement, transport, supplies)
- Service resilience and efficiency will improve
- Potential for extended day working, not currently realistic on mobile units due to staff safety and travel consideration
- Provide static facility for each sub-region of catchment areas
- Image transfer by fixed broadband connection rather than less robust 4G or manual delivery would give more resilience
- Greater use of skill-mix, associate staff on-site supported remotely by senior radiographers
- Reduced carbon footprint

The potential for rationalisation of screening centre boundaries, and the potential to share screening facilities, is also noted.

Appendix 5 details submissions developed for the review from the West of Scotland and the South East of Scotland Breast Screening Centres. The South East service also highlighted four hospital or Community Treatment Centre facilities in areas with low uptake levels and high deprivation which, if NHS facilities were preferred, would be of initial interest.

Reducing barriers to attendance and increasing convenience

Section 5 of this report outlined key barriers to participation and attendance of screening appointments. Satellite Screening Units, situated in populous areas with the greatest potential to target improved uptake in surrounding communities, offer the potential to better

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respond to many of these. Greater appointment flexibility could be provided (including the availability of appointments, supporting choice of convenient attendance, potential for evening and weekend provision etc.); a more accessible physical environment; and more discreet and user-friendly facilities.

Strategic recommendation – central belt screening satellites

The Review Group recommends that further work is progressed by NSD, supported by the Breast Screening Programme Board, to develop a Scottish Breast Screening Service strategy for central belt satellite static screening centre provision, including their locations. This should develop an agreed approach, common planning assumptions for the SBSP, service configurations, and further scope and identify potential central belt satellite facilities in liaison with NHS Boards.

During the period of the review, COVID lockdown measures have meant that neither service leadership teams nor the review team have been able to visit potential satellite sites and develop discussion with site management regarding feasibility, scope, and potential. The review team has progressed some initial geographical mapping work (assessing travel times, distance, demand base) however as insufficient engagement has been undertaken with potential sites this has not been used to inform strategy, and instead has been limited to illustrative work only and to help develop the necessary dataset with Public Health Scotland. Potential exists to build on this with the Public Health Scotland Geospatial service.

Self-Referrals in over 70's

Background

Breast Screening programmes in all four UK nations routinely invite participants aged 50 to 70 years old for triennial screening. Although participants aged 71 and over do not receive screening invitations, they can self-refer for screening every three years. Self-referrals were paused in Scotland when screening restarted following the Covid-19 pause and currently remains so to allow limited screening capacity to be used for the age 50 to 70-year-old population. Self-referrals were also paused temporarily in the other UK nations but have now recommenced in England and Northern Ireland

Evidence

There is a lack of randomised-controlled evidence around the risks versus benefits of screening participants aged over 70 years. The evidence that does exist is mixed and there is no clear consensus of opinion. Although the risk of breast cancer increases with age, cancers affecting participants in this age-group are more likely to be slower growing³. The survival benefits associated with screening may be reduced by co-morbidities affecting life-expectancy and also a higher risk of complications/side-effects of treatment⁴. The risk of harm from over-diagnosis and subsequent over-treatment also increases⁵. A review paper concluded that individualised decisions about continued screening participation should be made after consideration of estimated life expectancy⁶.

³ Diab SG, Elledge RM, Clark GM. Tumor characteristics and clinical outcome of elderly women with breast cancer. *J Natl Cancer Inst* 2000;92:550–6.

⁴ Bell RJ, Burton RC. Do the benefits of screening mammography outweigh the harms of overdiagnosis and unnecessary treatment? *no. Med J Aust* 2012;196:17.

⁵ Evans A and Whelehan P. 2011. Breast screening policy: Are we heading in the right direction? *Clinical Radiology* 66: 915e919.

⁶ Walter LC and Schonberg MA. 2014 Screening Mammography in Older Women: A Review *JAMA*. 311(13): 1336–1347. doi:10.1001/jama.2014.2834.

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Cost-effectiveness modelling of screening participants older than 70 estimated that screening would lead to over-diagnosis in 6.2% of screen-detected women at the age of 72 years, increasing up to 37.9% at the age of 90 years. Under commonly quoted willingness-to-pay thresholds in the United Kingdom, the study suggested that an extension to screening up to the age of 78 years represents a cost-effective strategy⁷.

In 2018, the Welsh Breast Screening Programme (Breast Test Wales) conducted an evaluation of screening participants aged over 70⁸. They found a deprivation gradient, with participants in the most deprived quintile accounting for significantly less of the screen appointments, compared with the least deprived. The Cancer detection rate was 1.6% of and was significantly associated with a past history of breast cancer.

Of the 2,543 patients aged over 70 with breast cancer recorded on national data systems, 14% had been referred from the screening programme. The screening-referred participants were significantly younger, likely to reside in less deprived areas, had more non-invasive tumours and were more likely to undergo conservation treatment compared to the non-screening diagnosed group.

The median survival was longer for the screening-diagnosed participants. Survival was poorer for those residing in the two most deprived quintiles and decreased with age with a marked decrease occurring between the age of 80 and 90 years. The factors significantly and independently associated with poorer durations of survival were non-screening referral and increasing age.

The consensus view of the participant focus groups was in favour of screening over 70 years. However, there was recognition that this may cause alarm to elderly participants. The participants would prefer to see the programme extended with routine invitations and two specific suggestions were made: the option to opt-out following invitation; a staggered (by increasing age group) roll-out.

Citizens Juries were conducted in Australia⁹ amongst participants aged 70–74 regarding the acceptability of ceasing to invite that age-group for government-funded mammography screening. Participants were of diverse sociocultural backgrounds/levels of educational attainment. Both juries concluded by majority verdict that the screening programme should continue to send invitations and promote screening to the 70-74-year age group. Reasons given for the majority position included: (1) sending the invitations shows that society still cares about older participants, empowers them to access preventive health services and recognises increasing and varied life expectancy; (2) screening provides participants with information that enables choice and (3) if experts cannot agree, the conservative approach is to maintain the status quo until the evidence is clear. Reasons for the minority position were the potential for harms through over-diagnosis and misallocation of scarce health resources.

To gain a conclusive answer around the effectiveness of screening participants aged over 70 a cluster-randomised trial (AgeX)¹⁰ is under way in England. The trial began in 2009 and has randomised more than 4 million participants to receive, or not receive, one additional breast screening invitation. Screening records of trial participants are linked electronically with

⁷ Rafia R, Brennan A, Madan J et al. Modeling the Cost-Effectiveness of Alternative Upper Age Limits for Breast Cancer Screening in England and Wales. *Value in Health* 19: 404 – 412

⁸ Breast Test Wales (2018). Service evaluation of screening over-70s.

⁹ Degeling C, Barratt A, Aranda S et al. Should women aged 70–74 be invited to participate in screening mammography? A report on two Australian community juries. *BMJ Open*: 8:e021174. doi:10.1136/bmjopen-2017-021174.

¹⁰ AgeX Trial Overview. <http://www.agex.uk/about/>

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routinely collected government records to help assess the short-term and long-term effects of the additional screening.

Following the suspension of routine breast screening throughout the UK in March 2020 due to COVID, and the subsequent pressure on breast screening capacity, the AgeX investigators decided in May 2020 that further randomisation into the trial should cease permanently. The trial itself will continue as follow-up by electronic linkage to routine government records continues throughout the 2020s and beyond. For breast cancer mortality the first report is scheduled to be on the follow-up to 2026, after which there will be subsequent reports on longer follow-up.

Self-Referral Activity in Scotland

Data from SBSS for the period 2016/17 to 2018/19 were extracted and participants who were screened at the age of 71 years or over were identified. Those who had received a screening invitation and were being screened at age 71 due to slippage were excluded so that only true self-referrals to screening were considered.

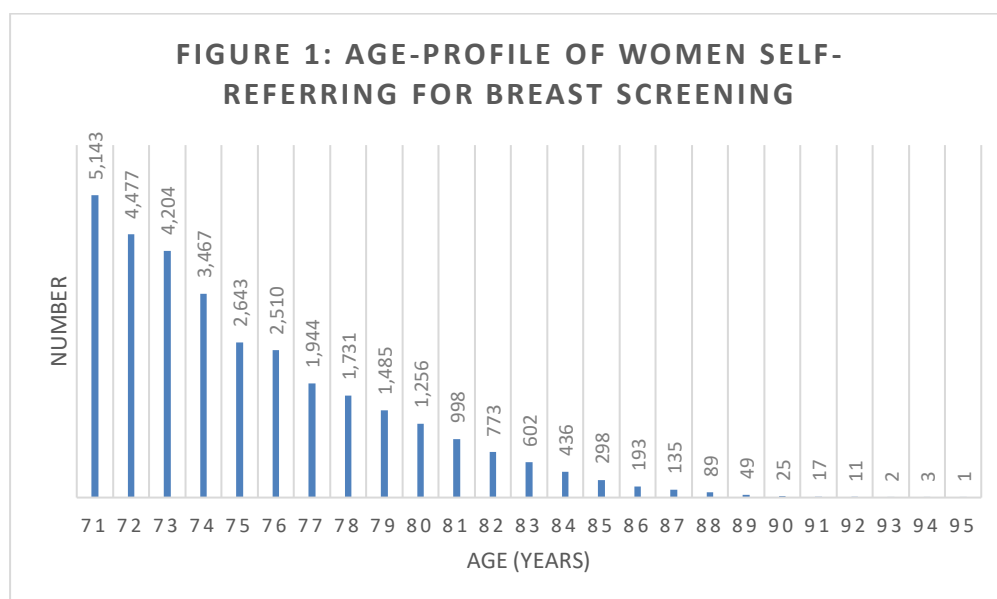
Over the three-year period, a total of 32,492 participants self-referred into the Scottish Breast Screening Programme. The proportion of total screening activity comprising self-referrals was 5.7% overall but this varied considerably by Screening Centre (see Table 1). Rates were lowest in the West of Scotland (3.9%) and highest in the North East and South West (both 7.2%).

Table 1: Self-Referral Activity by Screening Centre

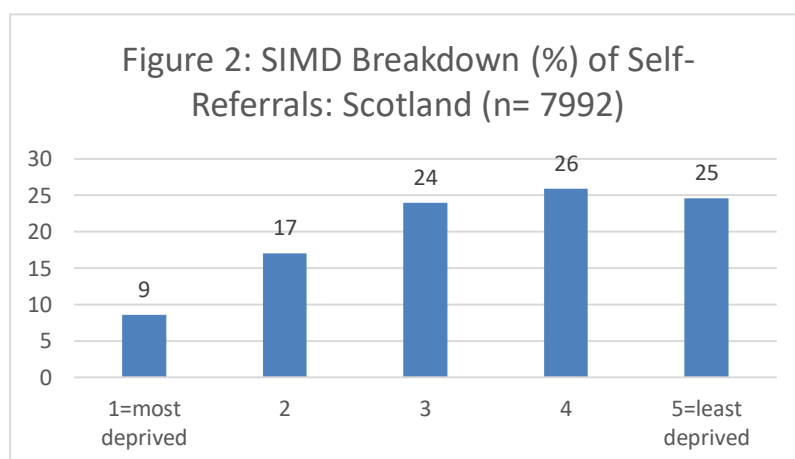
Breast Screening Centre	Number of Self-Referrals	% Self-referrals (of total screening activity)
East	3442	6.0
North East	4868	7.2
North	2463	6.9
South East	9249	6.5
South West	4338	7.2
West	8132	3.9
Scotland	32,492	5.7

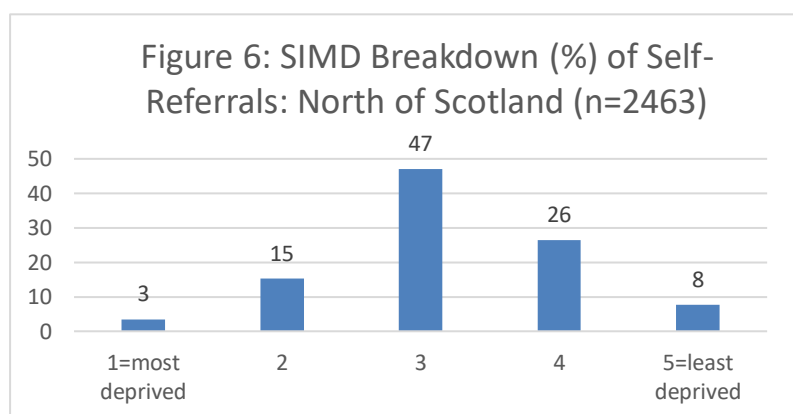
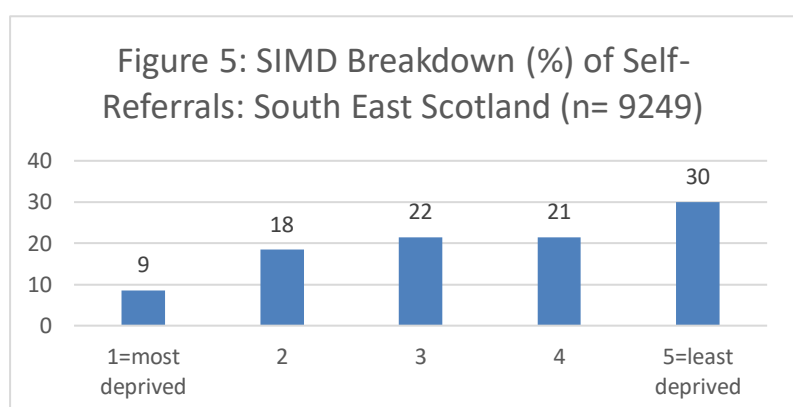
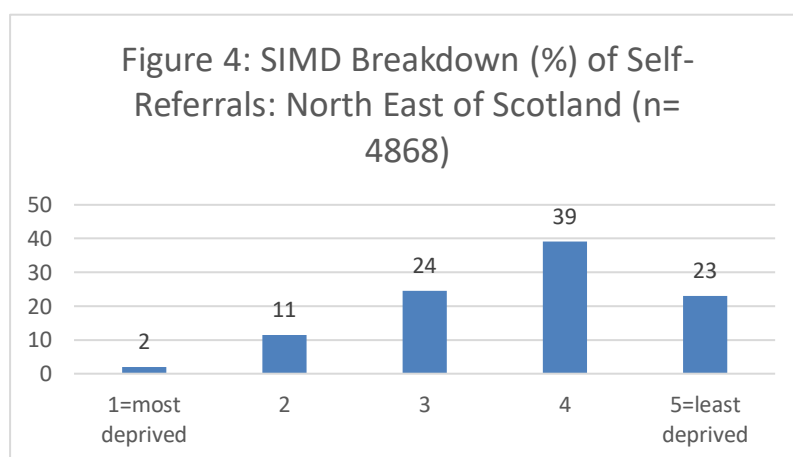
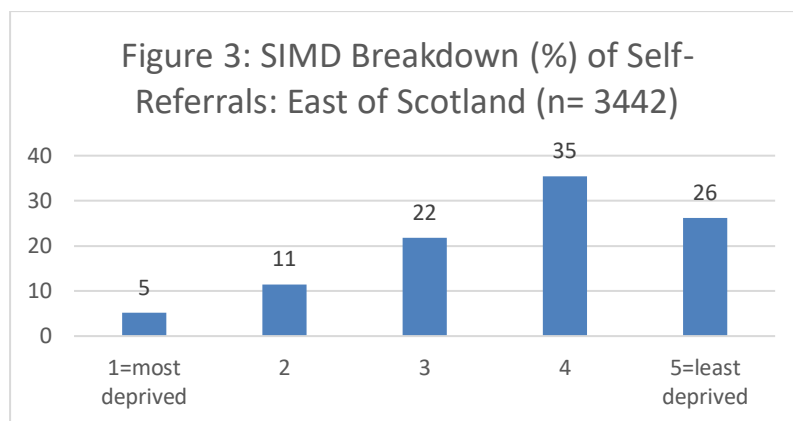
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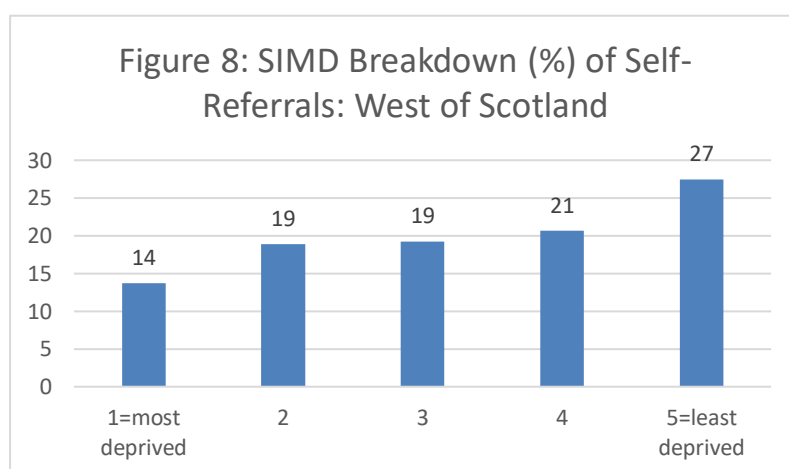
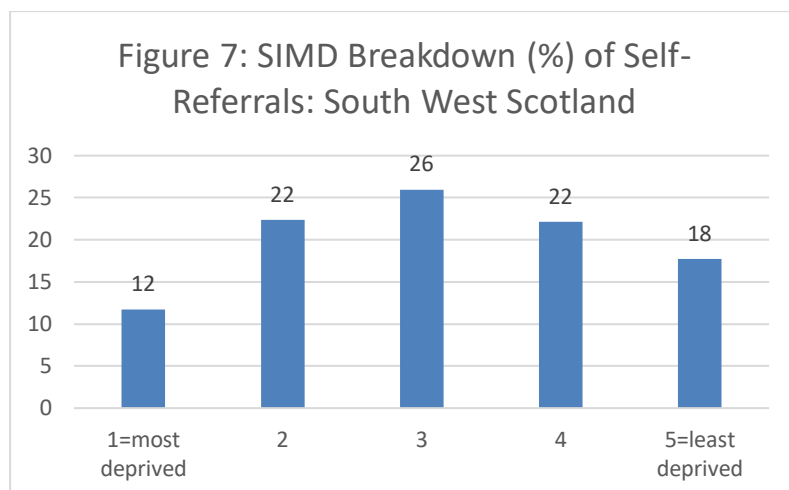
Figure 1 shows the age profile of participants self-referring for breast screening. The majority (65%) were aged 75 years and under. 85% were aged under 80 years.



Figures 2-7 show the SIMD breakdown of self-referrals in each of the six screening centres. At a Scotland-wide level and in most screening centres, a gradient exists between the least and most deprived participants, with 53% of self-referrals coming from SIMD 4 and 5 (least deprived quintiles) compared to 26% from SIMD 1 and 2 (most deprived quintiles). The gradient is less marked in the North of Scotland but this may be because data zones in rural areas tend to cover a large land area and reflect a more mixed picture of people experiencing different levels of deprivation. The gradient in the South West (which also covers a significant rural area) is also less marked than across the rest of the country.







It's important to note that the number of women aged 71 years and over in each national SIMD quintile also varies significantly by Board, i.e. some Boards have only a very small number of women in the most deprived quintile which affects the self-referral SIMD gradient. Unfortunately, it was not possible to obtain a SIMD breakdown for the exact populations served by each screening centre as some health boards are screened by more than one centre. Appendix 6 contains the SIMD profiles of the over-70 female population in each health board.

Screening Outcomes

The mean cancer detection rate amongst self-referring participants was 1.4% which is higher than the overall cancer detection rate in the 50 to 70-year-old screening cohort (0.9%). This is because breast cancer incidence increases with age. In addition, service feedback indicates that many of these women have previously been screened, and may include worried women with breast symptoms, some of which have been reported to their GP. These factors, as well as age, may influence the higher cancer detection rate in this group. When analysed by deprivation, the cancer detection rate was relatively stable within each quintile.

Table 2: Cancer Detection

SIMD 2020 Scotland level	Self-Referral Screens	% SIMD	Number of Cancer Cases Detected	% Cancer Detection
1=most deprived	2777	9	42	1.5
2	5538	17	83	1.5
3	7779	24	103	1.3
4	8406	26	128	1.5
5=least deprived	7992	25	108	1.4
Total	32492	100	464	1.4

Conclusions

Between 2016/17 and 2018/19 32,492 participants self-referred for breast cancer screening in Scotland which was 5.7% of total breast screening activity. Self-referral rates vary from 3.9% in the West of Scotland to 7.2% in the North East and South West. This is a significant amount of additional workload, especially for the smaller centres. Participants from the most deprived quintiles are under-represented amongst self-referrals which has the potential to widen further inequalities in screening and cancer outcomes that already exist within the core screening age-range.

As expected, the cancer detection rate is higher in this group than in the 50 to 70 age-group. Without data linkage to national cancer datasets and a longer period of follow-up it is not known whether continued screening after age 70 brings mortality benefits. This question will only be answered when the AgeX trial reports in 2026. In addition, cancer detection rates are significantly higher in self-referring participants who have a past history of breast cancer.

Evidence from Wales and Australia shows that participants aged over 70 support the policy of continued screening, despite the potential risk of over-diagnosis/over-treatment and increased risk of treatment side-effects.

Population projections from Scotland suggest that if current self-referral patterns continue, numbers will increase year on year due to the ageing population (see Table 3).

Table 3: Projected Self-Referral Activity

Baseline 2016/17 - 2018/19 Self-Referrals (Scotland)	5 Year Projection	10 Year Projection	20 Year Projection
32,492	35,839	37,626	45,716

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Going forward, potential options for the Scottish Breast Screening Programme include:

1. Status quo until AgeX trial reports in 2026 (including decision to restart self-referrals once Covid pressures have lessened).
2. Suspension of over-age referrals until AgeX trial reports in 2026.
3. Consider further restriction/targeting of self-referrals, e.g. previous history of breast cancer.

The options were discussed with the Review Group and Option 1 was the preferred approach as the group accepted that it would be challenging to deviate from the position in the other UK nations in the absence of robust evidence on the issue. The group also agreed that it would not be appropriate to make a recommendation to cease or restrict self-referral without further public engagement and consultation. It was also acknowledged however that the Breast Screening Programme is under significant pressure following the Covid pause and capacity has still not returned to 100% due to social distancing requirements that prevent over-booking of clinics. It was agreed that whilst significant Covid pressures continued, the available screening capacity should be used for the core 50-70 years' age group rather than for a group in whom there is currently no conclusive evidence of mortality benefits.

Further discussion took place around the possibility of future research activity to target the self-referral opportunity on a sub-set of over 71's who might most benefit. This would be considered targeted screening though and is currently outwith the remit of the screening programme.

Inviting women on the breast cancer follow-up pathway

A number of women are being invited by the Scottish Breast Screening Programme to attend for breast screening while they are receiving treatment for breast cancer, or when they are in mammographic follow-up following a diagnosis of breast cancer.

Inviting women who are currently on a treatment or follow-up pathway causes both confusion and unnecessary distress to them. As such these invitations may be deemed inappropriate; however current national UK breast screening guidance requires these invites to be issued as a failsafe measure. Current policy and guidance states that everyone except those women who have had a bilateral mastectomy, or who have previously signed a disclaimer letter to remove themselves from the breast screening invitation process, should be invited¹¹.

Previous procedures in place to identify women who would benefit from suspension from screening, or removal

Historically, General Practitioners were asked to check screening lists for accuracy and to identify women for permanent or temporary removal from screening. Breast screening 'Prior Notification Lists (PNLs)', produced from the Community Health Index (CHI), with details of each woman registered with a given practice were used to support this process. GPs were asked to permanently remove women who were known to have had bilateral mastectomy, or who were terminally ill, or temporarily remove women identified with recent breast cancer, mammogram, or were otherwise not well enough to attend. This process was stopped in

¹¹ Full policy can be found: <https://www.gov.uk/government/publications/opting-out-of-breast-screening/guidance-on-opting-out-cease-from-breast-screening>

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light of inaccuracies in practice returns, resulting in some women not being invited for screening when they should have been. For this reason, and after a review of the resource involved, breast screening programme policy changed to cease list validation by GPs.

Suboptimal patient experience, and a lack of co-ordinated care

As well as complaints and correspondence from women seeking to improve the process, Breast Screening Centres frequently deal with distressed women contacting the centre to query their invitation for screening. For women who have been diagnosed as an interval cancer this is particularly distressing and confusing.

Where women who are on follow-up do attend their screening appointment for mammography, this may consequently disrupt their acute hospital-led mammographic follow-up schedule (via which, annual mammography will already have been arranged), causing wasted appointments in the acute sector and additional difficulties for the clinicians rearranging follow-up schedules.

With separate, unlinked, breast screening and symptomatic breast service / acute imaging IT systems, and no reliable system in place currently to allow breast screening to routinely identify women in breast cancer follow-up, there is a risk that women may also receive unnecessary radiation (attending for screening within a 6-month period of having attended a hospital follow-up appointment for mammography). Acute hospital PACS systems (where the follow-up mammographic image is stored) are separate to the breast screening PACS system, making cross-checking and confirmation more challenging for the service.

The size of the problem, and impact on capacity

Cancer registry data was matched onto the breast screening review data extract (covering 2016-2019) to determine the number of individual woman invited to screening who already had a breast cancer diagnosis before her first offered screening appointment. There were 9,003 women in total aged between 50-70, and who were not a self-referral to screening, that had a cancer up to 5 years prior to their first offered screening appointment¹². This equates to approximately 3000 women per year. Removing these women from uptake calculations shows an estimated 0.7% improvement in adjusted uptake for the Breast Screening Programme overall (range of 0.6% to 0.8% improvement in uptake at breast screening centre level). Developing IT systems capability to account for and adjust the uptake calculation in this way routinely would be beneficial and show a truer picture of programme uptake.

During the period of this review, following the restart of breast screening services (after a pause in screening activity due to COVID-19) the West of Scotland Breast Screening Centre carried out a snapshot audit of contact from women on the follow-up pathway. In August 2020 the centre was contacted by 99 women from 20 GP practices who cancelled their

¹² Breast cancer surveillance protocols including the length of time women are in mammographic follow-up vary considerably across Scotland, however for this analysis we used a five-year period. A further 3,604 women with existing breast cancer matched onto the review data extract outside of the five-year period, going back to 8 years prior to first offered screening appointment.

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appointment and advised that they were on a breast cancer follow-up pathway, a further 110 women contacted the centre in September 2020.

Whilst many women do contact the Breast Screening Centre to cancel their appointment there is no routine exclusion code applied to the record and therefore cancellation negatively affects the level of recorded uptake, and overall programme performance. If cancellations are late notified to the centre the ability to reuse the appointment slot may be lost, which reduces capacity.

Proposed improvements:

- Short term: Use of exclusion codes in SBSS

The Scottish Breast Screening Programme National Users Group (NUG) has proposed the scoping and development of a change to the national breast screening IT system, SBSS, to facilitate exclusion periods for women on follow up surveillance programmes. The ability to add in start and end dates for exclusion could be developed. A system report could be run which shows all women excluded from screening due to follow up. The day after the exclusion period ends, the patient would automatically return to routine recall status. A proposed method of identifying women would be via local clinicians in the short term and potentially the Scottish Cancer Registry and Intelligence Service (SCRIS) and could be applied following agreement from a senior member of screening admin staff. The exclusion code should be applied for 5 years and automatically removed. There would be the ability to switch back to routine recall manually or extend the follow up period if the patient developed another cancer.

This change is now proposed for inclusion on the development matrix for SBSS changes, to be prioritised within the technical development programme.

For women identified as having received a recent mammogram, SBSS already has functionality to record a reason of “cancelled recent mammogram”. This should be systematically applied to the record of those who contact centres to advise of recent mammograms. Although this cancels the current screening offer, again it is reliant the woman making contact with the breast screening centre.

The measures above will assist in codification and quantifying the issue. Both recording of data, and integrated IT System functionality need to be significantly improved before policy could be changed and women temporarily removed from calling to the breast screening programme. In the absence of reliable systems, there is a considerable risk that if the wrong period of time is used for temporary removal, a woman may not start to be called again at the correct time. Failing to commence screening invitation at the appropriate time may introduce a risk of potential legal action should a further cancer occur.

- Short term: Improve the text of the screening invitation letter

The current invitation letter used across the Scottish Breast Screening Service already asks women invited to contact the Breast Screening Centre if any of the following are relevant:

- *have had breast X-rays within the last six months.*
- *are currently being treated for breast cancer or having follow-up tests.*
- *have had both breasts removed.*
- *have a disability/special requirements or are a wheelchair user.*
- *have breast implants.*

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The letter also refers to the potential that the invitation may have been received inappropriately, and again asks women to contact the centre in such instances so that records can be amended.

The wording of the current breast screening invitation letter should be improved to better explain *why* the Breast Screening Programme continues to invite women who may have had recent mammograms, are in treatment or follow-up for breast cancer, or have previously had both breasts removed.

- Longer term: Scoping the potential for IT linkage to support cross referencing of databases

There are currently no links between the Scottish Breast Screening System and any hospital IT system. Hospital systems do not have any automatic means of identifying follow-up protocols. Data from the Scottish Cancer Registry could potentially provide information on women diagnosed, however any potential transfer of information to SBSS would require to be followed-up manually by looking at correspondence. Accepting that there would be a responsibility at breast screening centre level for gaining accurate and up to date information, the scope to improve IT linkages should be further explored.

- Longer term: Integrated national PACS solution

With the PACS reprovisioning for breast screening due in 2023, it is planned to combine the six currently separate breast screening PACS archives together with the National Global PACS archive. This could potentially serve as a national database for imaging, offering the potential of coding follow-up mammograms so that they could be identified. The data quality would need to be robust for call/recall, however this would potentially provide a single source of truth for demographics nationally and would minimise risks of loss to recall or follow up if the patient moves within Scotland, or develops a metachronous cancer during the follow-up period which may reset the timing of follow up. This solution has been proposed to the NSS PACS Reprovisioning team from Breast Screening and has been added to the “must have” requirements for the output based specifications to be presented to vendors later this year.

- Longer term: Follow-up standardisation

A survey of regional cancer networks undertaken to enquire about breast follow-up arrangements in local NHS Boards revealed that follow-up protocols for breast patients vary considerably throughout the country. This variation in practice further challenges the ability of the breast screening programme to safely introduce temporary exclusion arrangements for screening. Moving to standardised national follow-up guidance across Scotland would minimise risk.

A number of Health Boards are considering moving to Patient Led Follow Up (PLFU). Traditionally patients have been seen in a clinic every year by a nurse, clinician or surgeon in addition to having annual mammograms. Under the PLFU process, women attend for annual mammograms, and are only recalled to clinic for further assessment if there are any concerning changes. Women can also self-refer with a new symptom at any time. This process has been established in the South West of Scotland centre for 5 years where there is a robust database of all patients on PLFU. If a standardised minimum dataset for follow-up

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patients was agreed nationally, this could possibly serve as a cross reference for exclusion.

Strategic Recommendation

Inviting women who are currently on a treatment or follow-up pathway causes both confusion and unnecessary distress to them. However, it does ensure that no women are inappropriately excluded from the programme. Recent issues in another screening programme have highlighted the risk that this poses. The Review Group recommends that NSD, PHS, and DaS supported by the SBSS National Users Group:

- Develop the use of exclusion codes in SBSS to facilitate the temporary removal from calling to breast screening for women on follow up surveillance programmes
- Improve the text of the screening invitation letter to better explain why the Breast Screening Programme continues to invite women who may have had recent mammograms, are in treatment or follow-up for breast cancer, or have previously had both breasts removed.
- Scope the potential for IT linkage to support cross-referencing of databases
- Use the Breast Screening PACS reprovisioning as an opportunity to provide a mechanism for coding follow-up mammograms so that they can be identified
- Scope the potential to move to more standardised national follow-up guidance across Scotland

Family History Screening

Background

The Review Group asked the review team to reflect on the potential impact of genomics on breast screening. In doing so, the Review Group recognised that genetics was a topic placed out of scope for the review, however the group wished to gain a better understanding of the genetics landscape, direction of travel, and any key issues that may influence the current review. Following review, the group recognised that genomics for breast screening is still in development and establishing the evidence base, however noted the increasing focus on risk-based approaches to screening delivery. Subsequent discussion around risk management, and the acknowledged high level of demand in breast symptomatic services, led to the group questioning whether family history activity would be better provided via breast screening services.

Review of Family History Screening

The review considered:

- Previous review work undertaken to examine what the impact would be on the Scottish Breast Screening Programme (SBSP) if the six breast screening centres across NHS Scotland were to take responsibility for the ongoing management of women with a family history of breast cancer. This work had been undertaken in the context of the release of CEL 6 (2009) 'Cancer Genetics Services in Scotland – Management of Women with a Family History of Breast Cancer'. We noted that the previous review concluded that it did not believe there is any merit in moving the management of women with a family history to the breast screening service. The

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previous review did however recognise the potential for closer working through greater service integration / co-location of screening and symptomatic services - potentially more closely aligning family history and screening service provision over time.

- Work undertaken in 2013/14 via a short life working group to address the applicability of the recommendations from NICE guideline 164 for the Scottish population. NICE guideline [CG164] covers familial breast cancer: classification, care and managing breast cancer and related risks in people with a family history of breast cancer. This was published in June 2013, and updated in November 2019.
- The current Family History patient pathway in Scotland including primary care services, genetics services, and breast symptomatic services

The review noted that there is currently no accurate overview of the number of patients, or the number in each risk category, in the family history services across Scotland. There remains no standardised IT system and a reliance on paper based or local IT systems.

It was also noted that currently, scheduling for breast family history surveillance is undertaken locally in each breast symptomatic unit, commonly using virtual clinics to book and manage the scheduling of women. There would therefore be potential advantage in centralising family history surveillance calling via the Scottish Breast Screening IT system (SBSS), thereby providing a standardised system and improving safety. This would only be an option if services were to be integrated, and a business case for development would be required as the SBSS system is based on a 3-year call/recall protocol and would require further system development to accommodate more frequent recall patterns for family history women.

Additionally, whilst clinical guidelines (NICE guideline 164) are in place and adapted for the Scottish population, other elements of the family history service pathway could potentially be improved by integration with screening services. Quality assurance and reader standards could be developed for the service, and (with a single, standardised IT system) a better overview of annual activity nationally could potentially be gained, which would also support greater insight into cancer detection in this group etc.

Review recommendation

Overall, the review group noted that there were more potential opportunities present now within breast screening than at the time of reporting the previous review of Family History (2009) – in particular a single, standardised IT system (SBSS), and some initial evidence from experience that clinical examination may be removed from the family history pathway acceptably. The review group acknowledged that a larger piece of work would be needed to fully assess the potential advantages, feasibility, benefit, and costs of integrating with screening, or whether key improvements could be made in the family history pathway independently. The group recommended that any further work should be referred for national cancer policy consideration, potentially in the context of supporting greater service integration and co-location.

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The review group noted the following key issues, which may inform any further consideration:

- Clinical guidelines and associated clinical management and referral support is already in place and the NICE guidelines (which cover complex assessment and clinical management issues) have been adapted for use in Scotland. The Primary Care and Genetics service elements of the pathway are well established. The strengths associated with current clinical guidelines, GP, Genetics service, and surveillance clinic provision should be retained and developed.
- There is a need to assess the level of benefit that may be gained from improving image quality, reader standards, and quality assurance if integration with screening is further considered.
- There is a need to assess the benefit, feasibility, and cost of incorporating patient calling to various surveillance protocols into the SBSS, to potentially provide a single national and standardised system.
- Access to, and arrangements for MRI capacity and reporting via the breast screening service would need to be considered for high-risk women on the family history pathway.
- There is a need to assess the evidence for clinical examination as part of the current pathway for women in high-risk categories, and the desirability and options for change.
- The capacity available in the Scottish Breast Screening Service including additional clinic/ additional staff capacity requirements would need to be fully assessed – given that all / most of the activity from the current surveillance clinics delivered by NHS Boards in each region would need to be transferred.
- Learning from the pathway arrangements, standards, and assurance systems in place to support family history screening in Breast Screening services in England and Wales.

8. FUTURE POPULATION DEMAND

Future eligible population by age band and Breast Screening Centre

Approach and methodology

Population forecasts were developed for each Breast Screening Centre, and for all Scotland overall. The analysis, given at appendix 7, outlines changes in the overall eligible population (females, 50–70), gives a breakdown by population age band (from age 40 to 71+), and includes population trends for females over 71 years of age.

The methodology employed utilised GP practice population data provided by the primary care team in Public Health Scotland (data from CHI file, GP registered patients, 2018 &

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2019), with SBSS Breast Screening Centre lookup by GP Practice code at April 2019, and NRS Health & Social Care Partnership (HSCP) population projections (2019 – 2043).

Change to the eligible population over time

At the outset of this review, the task of examining demand and changes in the eligible population was linked, in part, to tackling programme slippage. The planning assumption stated in review initiation was that the number of women eligible for Breast Screening continues to increase and this will continue for another 10 years.

For the eligible 50-70 population overall this analysis suggests that the next 10 years is a picture of static levels of demand or a small decline in the eligible population for all centres except the South East of Scotland which sees some growth in the eligible population.

Longer term, the all Scotland forecast shows a small reduction in demand (-4.1% over the next 20 years, see table 1 below). Within this, the longer term forecasts show significant reductions in the eligible population in the North of Scotland Breast Screening Centre and the South West of Scotland Centre.

Table 1 – Scotland Projections women age 50-70: Percentage change over time by Breast Screening Centre

Area	10 Year Change (2029)	% change	20 Year Change (2039)	% change
East of Scotland Breast Screening Centre	-1,912	-2.7	-5,824	-8.2
North East of Scotland Breast Screening Centre	-353	-0.4	-1,699	-2.1
North of Scotland Breast Screening Centre	-1,042	-2.4	-4,607	-10.5
South East of Scotland Breast Screening Centre	7,421	3.7	9,227	4.6
South West of Scotland Breast Screening Centre	-3,306	-4.1	-13,201	-16.2
West of Scotland Breast Screening Centre	-302	-0.1	-15,618	-5.3
Scotland	508	0.1	-31,722	-4.1

For females in the 50–59-year age bands the ten year forecast shows that all centres will see a significant decrease in the youngest age group for screening, those under 55, and longer term this is sustained in the North of Scotland and South West Centres.

For females in the 60-69 bands, the 10-year estimate shows that all centres see an increase in this bracket.

All centres see a significant increase in the number of women aged 71+ years in their catchment areas (range from 14% to 22% by 2029, and longer-term a minimum of 35% and maximum of 48% increase across centres).

Changes in the proportion of women in the population who are over 71 years have been used to help consider the recommendation on over-age self-referral to breast screening, reported in section 5. Recognition of a static / declining trend rather than a continual increase in demand has informed the work of the review as we have progressed. Workforce

planning and commissioning of Breast Screening Centres should have regard to projected population changes by centre reported above.

9. BREAST SCREENING WORKFORCE

Current workforce and sustainability

An overview of the current SBSP workforce taken from the Service Level Agreements in place (19/20) for the six breast screening centres in Scotland shows a total of 256.44 *w.t.e.* clinical, administration, and support staff across the programme. This includes staffing for training and education roles (as these are delivered via the West and South East Screening Centres). NSD staffing in support of the SBSP; Medical Physics (Health Facilities Scotland); and Fleet Management (Health Facilities Scotland) are excluded, and separate agreements are in place to cover these functions and specify resource.

The review undertook a survey of current staffing across the breast screening programme in the last quarter of 2020. This was requested to better understand the current picture of staffing by professional group / job type, and to help capture key workforce issues in each staff group. The summary overview from this survey is shown at Appendix 8. The survey showed a total current staffing of 250.81 *wte* (a small difference of -6 posts overall across the whole screening programme against the SLA *wte* gross total. Totals from all centres varied slightly from their SLA totals, and this is likely to be a result of reconciling information from local host Board budget establishments against SLA categories, and capturing the exact split of resources across screening and symptomatic services).

As one would expect, radiographic staff are the largest group at circa 147.72 *wte* (131.88 *wte* Radiographers: all grades / posts including CD time, and Consultant Radiologists at 15.84 *wte*, incl. CD time), followed by Administration at 58.74 *wte*, and Transport officers at 18.64 *wte*.

A similar survey for the 2012/13 review showed 249.36 SBSP staff net of central (Health Facilities Scotland) staff. Over the period 2012-13 to 2018/19 there has been a 10% increase in the number of women invited for screening. The service has digitised over this period, and an increase in the number of Advanced Practitioners, Consultant Mammographers, mammographers (including trainees), and Assistant Practitioners can be seen.

There is no common, recognised staffing establishment for a breast screening centre. General (PHE) guidance on composing and leading breast screening services are available, as well as a service specification covering service and quality indicators, and guidance for mammography^{13, 14, 15}. Few benchmarks are available or utilised (other than mammography, referenced below). As a result, the SLA with each host Health Board in Scotland is based on funding by service function and allows each centre to develop and vary their staffing

¹³ <https://www.gov.uk/government/publications/breast-screening-leading-a-service/breast-screening-best-practice-guidance-on-leading-a-breast-screening-service>

¹⁴ NHS public health functions agreement 2019-20, Service specification No. 24 NHS Breast Screening Programme

¹⁵ NHS Breast Screening Programme Guidance for breast screening mammographers Third edition December 2017

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compliment per local requirements. Staffing levels and issues are discussed at each mid-year and annual review with each screening centre. Vacancies and job evaluation are dealt with at host NHS Board level in line with local and national policies. This overall approach is in line with NHSBSP guidance which states that local staffing levels should take account of factors such as service configuration and local skill mix.

Across Scottish Breast Screening Centres some differences in skill-mix in radiography can be seen with variable proportions of advanced and assistant roles in the team. Within this, there are relatively few Consultant Radiographer posts including in the large centres in Glasgow and Edinburgh (note: The Clinical Director for the South East Service is a Consultant Radiographer, wte captured in the survey against CD rather than Cons. Radiographer).

Resource allocated to support the Clinical Director role is variable however feedback within the review has suggested that SPA time and personal time is also used to cover necessary duties. Leadership, including supporting major developments and change that may arise from service review, require time to work within the wide networks involved. A Clinical Directors' group exists to aid co-ordination and communication, and nominated CDs represent the programme on various governance groups, however there is no Clinical Director lead for the SBSP overall.

Few health promotion posts are funded and commissioned through the direct service, with a reliance on Public Health NHS Board Screening Co-ordinators (with variable resource / job plan time for Breast Screening) and NHS Board Health Promotion departments to support this. Discussion within the review has suggested that where Health Promotion resource exists within centres this greatly assists in targeted efforts to support improvement in engagement and uptake. Breast Screening Centre CDs commonly called for an improvement in Health Promotion in their presentations to the Independent Review Group.

Some centres have described redesign (reduction) of the Administration Team as a result of changed working practices recognised following the introduction of SBSS. Where teams work across screening and symptomatic services this change may not be as straightforward. The relatively large 'other admin' group in the West of Scotland Centre includes Scottish Mammography Education College and training related staff. Should SBSS be developed further (for example to support planning, forecasting of the screening schedule, and allocation of appointments), with a potential shift to dynamic cohort management based on a changed call-recall model, the administration resource may require further redesign.

Key workforce risks, and Initiatives taken forward

A descriptive overview of key workforce issues for each Breast Screening Centre is outlined at Appendix 8. Key risks and issues include:

- Clinical Director succession planning – 4 centres currently have either a vacant CD post; known imminent retirement of the CD in post, a CD of retirement age (no planned retirement date as yet), or CD retired and returned and planning to fully retire within 2 years. All also cover senior clinical duties across Radiology, Consultant Radiography, and Breast Clinician roles.

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- Vulnerability due to radiology understaffing in both breast symptomatic and screening units (with East of Scotland facing particular issues with long-term absence and further planned retirement)
- Loss of experienced radiographers, including Advanced Practitioners, and the necessity (given recruitment constraints) to replace these with radiographers requiring mammography training, leading to reduced capacity in the service during the training period
- Being at, or close to, the number of Assistant Practitioner roles that can be incorporated into the multidisciplinary team within the current supervision model of service
- Constraints on backfilling posts following the progression / development of Advance Practice posts, due to insufficient training capacity / supervision locally and / or constraints within the SMEC pathway including recent covid related training constraints
- The need for succession planning for the training resource (SMEC trainers) with 3 of 7 trainers at retirement age in the next 5 years
- Limitations in Consultant Pathologist numbers reporting to breast activity
- Very little contingency due to relatively small numbers of screening staff in some centres, and balancing the competing pressures involved in prioritising resource working across symptomatic and screening services where staff/equipment are shared, with an occasional reported pressure to prioritise symptomatic demand.
- Significant over-reliance on locum staff, including a large proportion of image reading undertaken by locums and/or previous 'high-volume readers' who have now left the service (see below).

A number of approaches have supported the service over recent years including:

- Maximising skill mix in Advanced Practice including advanced practice in imaging reading and stereotactic biopsy, supporting both screening and assessment service capacity
- Development and appointment of Consultant Radiographers, further supporting capacity across screening and assessment, clinical leadership, training and research.
- Working across screening and symptomatic services, regardless of the degree of formal service integration in a single managed unit, to allow a wider pool for capacity planning
- Maximising Assistant Practitioners replacing radiographer staff where possible within current guidelines
- Flexible and imaginative recruitment to the Breast Clinician role, drawing from a number of medical disciplines. And enhancing this approach with the further utilisation of Clinical Nurse Specialists.
- Developing the role of Clinical Nurse Specialist in the assessment service and building links to CNS provision in acute services.

Mammography – benchmarking, role development and opportunities

Professional standards for radiographers are specified by the Society and College of Radiographers (SCoR).

Breast Screening was one of the instigators of the four tier structure for role development in radiography. The service uses a 4-tier model of skill-mix originally developed in 2002. The 4 tier model includes:

- **Assistant Practitioners** – these staff complete routine screening images, with supervision
- **Mammographers** - complete routine screening views, including work in assessment clinics.
- **Advanced Practitioners** – have undertaken additional training to undertake additional activities such as film reading, biopsy, or use of ultrasound.
- **Consultant Radiographer** – with advanced training, skilled in additional activities such as teaching and research.

In its 2019 annual UK-wide diagnostic radiography workforce census, the Society and College of Radiographers reported a vacancy rate in Scotland of 6.3%, this is lower than the UK average of 9.6%, however was a rise from the Scottish figure of 5.7% in 2018¹⁶. Vacancies were greatest at band 5 and 6. The survey also noted that 3.7% of respondents' (UK wide) diagnostic radiography workers are due to retire in the next two years, with the largest segment in the most senior roles at band 8b and 8c.

Staffing levels

NHS Breast Screening Programme Guidance for breast screening mammographers provides some guidance on staffing levels for mammography. Guidance on staffing levels quoted per 10,000 eligible population relate to direct delivery of a screening service and are intended for activity in mammography screening and assessment clinics only. They guide the level of wte staffing directly required to deliver mammography screening activity. This does not for example include elements of Advanced Practice activities where mammography is not undertaken, activities such as image reading, biopsy, ultrasound, training roles, or any managerial responsibilities, these are additional.

NHS Breast Screening Programme guidance on mammography staffing levels is based on uptake level and population, as below.

Mammography staffing level guidelines

Uptake Rate %	w.t.e. per 10,000 eligible population
65-75	1.3
76-85	1.5
86-90	1.6

¹⁶ https://www.sor.org/sites/default/files/document-versions/diagnostic_workforce_census_2019.pdf

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A survey of mammography staffing levels, using this guidance, was undertaken with the six Breast Screening Centres in Scotland as part of the review during mid 2020. The results are outlined in Appendix 8. In summary the results indicate an overall deficit of 5.9 wte posts overall. Three centres show a mammography staffing deficit: *East of Scotland, South East, and West of Scotland*, with other centres balanced or showing a small additional level.

The estimates derived from this survey are a snapshot in time, and rely on centres own determination, in a standardised way, of the proportion of wte mammography staffing available for screening mammography activity. Eligible population forecasts undertaken within the review show a relatively static picture of demand over the next decade and beyond, with only the South East centre eligible population rising. Subject to further discussion with centres to agree the treatment of skill mix in the team (advanced and assistant practitioners) survey results should be used to guide staffing levels agreed required and funded in Service Level Agreement with centres.

Role Development, and Opportunities for further improvement

As part of the survey centres were asked to identify further role development, improvement opportunities, and training requirements in mammography.

Role developments suggested included:

- Training and appointing more Consultant Radiographers to support the shortfall in radiology
- Developing the role and scope of Assistant Practitioners in line with Society of Radiography guidance around scope of practice, supervision, and governance requirements
- Further sharing of roles and development opportunities jointly with breast symptomatic services

Improvement opportunities suggested included:

- Potentially (and keeping within emerging policy and guidance) working towards 2 Assistant Practitioners working independently on mobile units
- Working in partnership with symptomatic services / merging to create a centre of excellence
- Moving to more online working with SBSS data and PACS image transfer capabilities realised nationally.

Training requirements were noted as:

- Further Assistant Practitioner Certificate in Mammography training, and further mammography training for new recruits
- Advance Practitioner training including consultant level training
- National training days / staff development days as a means to encourage all centres to learn together, help standardise working practices, and promote staff development and training
- Future proofing of the SMEC training team to prevent a drop in service level nationally

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- Expanding the potential of the SMEC training team – with potential to be expanded, and generate more revenue (currently fee paying students may have to be declined to accommodate (non-paying) breast screening students).

Image reading capacity (reader survey)

As reported in the Strategic Case for Artificial Intelligence in Mammography developed by the review, to help consider the image reading workforce capacity the review conducted a survey of image reading undertaken in 2018/19 and 2019/20. The results showed that a significant proportion of the reader workload was covered either by staff who have now retired from the service, locum staff, or staff who have returned from retirement. In one center *two-thirds* of the reads in the 2-year period surveyed were delivered by staff now retired or left the service. In 2 centers, approximately a *third* of reads were delivered by staff now retired or locums. In 3 centers, approximately a *fifth* of reads were delivered by staff now retired or locums. This highlights the not only the ongoing risk associated with historical reliance on relatively few 'high volume readers', reliance on locum cover, and the impact on delivering screening results from the service within 2 weeks of an adequate screen, but the need for advanced radiographers in image reading, cross-border image reading developments, and subject to proof-of-concept and UK NSC policy endorsement an AI solution to add significant capacity into image reading.

Developing workforce capacity

Developing a more sustainable service –

The review of Breast Screening undertaken in 2012 considered the sustainability of staffing, future workforce requirements for breast screening, and synergies with symptomatic breast services as evidence suggested that a significant number of staff were approaching retirement age. The review noted that:

- Following recruitment policy change for trained radiographic staff, new graduates could be employed within the programme for the first time (previously, a minimum of two years' experience was required)
- First-stage screening mammography could now be undertaken by assistant practitioners, supervised by a radiographer
- That these initiatives have eased (the then current) recruitment issues, provided greater flexibility for the future, and supported more experienced staff in extending their roles to take on additional duties, easing pressure on radiological staffing.
- That the above alleviated the immediate threat to the programme in the majority of areas.
- However, no workforce plan existed for all of the centres combined, that retirements of more experienced staff may still prove an issue, and whilst the changes in recruitment policy provide some flexibility to help manage risk - a sustainable workforce plan must remain an objective for SBSP.
- Closer working with symptomatic services would provide better resilience throughout breast services potentially leading to a more sustainable service with a more flexible, expanded and stable workforce pool.

As previously noted, newly qualified staff are now commonly recruited (however with a training period impact in the service), Assistant Practitioners often appointed to replace

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radiographer staff where possible, and much Advanced Practice skill mix has been developed in the multidisciplinary team, including the development of a number of Consultant Radiographers. Alongside this, the service has developed the Breast Clinician role and Clinical Nurse Specialist role to further support the assessment service. A significant number of joint posts are in place with symptomatic services, alongside integrated capacity planning to support sustainability.

Going forward there should be a focus on:

- Further development and recruitment to Consultant Radiographer roles to support the assessment service capacity and clinical leadership
- Maximising new opportunities that may be available in extending the scope of the Assistant Practitioner role (the SCoR has approved arrangements for assistant practitioners working on mobile facilities with remote supervision, and PHE has now published implementation guidance¹⁷)
- Developing the training resource and curriculum to ensure adequate capacity to support training and development needs at all levels of radiography
- Leading on innovation in Artificial Intelligence in mammography to take the opportunity it offers to reduce (*by half*) the screening image reading demand on human readers
- Reassessing core mammography staffing levels available to screening and assessment clinics
- Building on work undertaken in the Scottish Government Access Collaborative programme on advanced practice role development in symptomatic services, by adapting the Advanced Practice framework developed for symptomatic roles to apply to Breast Screening

Development of an overarching Scottish Breast Screening Programme workforce plan:

It is still the case that no overarching workforce plan is in place for the Scottish Breast Screening Service. Elements of this, alongside breast symptomatic services, should be in place in the workforce plans of the six NHS Boards which host breast screening services in Scotland. It is recommended that NHS Boards further develop these, and that NSD and the Breast Screening Programme Board supports overview, and integration of these into a single programme wide plan. To assist, it would be beneficial if comprehensive data on staffing levels were kept up to date and available, to support forward workforce planning.

Developing training capacity – Scottish Mammography Education Centre (SMEC)

The Scottish Mammography Education Centre (SMEC) is commissioned by NSD to provide mammography training primarily for the Scottish Breast Screening Programme.

Activity agreed per year is:-

¹⁷ <https://www.gov.uk/government/publications/breast-screening-remote-radiographic-supervision/breast-screening-implementing-the-practice-of-assistant-practitioners-working-on-mobile-facilities-with-remote-radiographic-supervision>

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- 2 post-graduate mammography courses
- 1 HE Certificate course
- 1 Image Interpretation module
- 1 Breast Biopsy course

Additionally, update training when required by centres is provided to approximately 25 staff members per year. As part of these arrangements at least one national mammography study day should be held.

Training needs associated with the further development of role extension in the SBSP:

Advanced Practice

Advanced practice roles in mammographic image interpretation, x-ray guided interventional procedures & clinical training are well established within breast screening and the training courses provided by SMEC in these areas remain popular.

The breast consultant radiographer (CR) role is less well established in Scotland. This role would generally work in collaboration between the breast screening and symptomatic services. It is a current focus of discussion within the Scottish Access Collaborative and the Scottish Radiology Transformation Programme, primarily with reference to the breast symptomatic service.

The SCoR (2017) document: “Consultant Radiographer – Guidance for the Support of New and Established Roles” states that it is expected that a CR in Breast Imaging will have completed a relevant MSc to include postgraduate modules representing skills in Image Interpretation and Reporting, Ultrasound of the Breast, Clinical Examination and Client Communication, and Interventional Breast Procedures¹⁸.

Training Developments Required:

- To accommodate the requirements for a CR in breast imaging SMEC should add breast ultrasound training to their portfolio of courses. Initial exploratory work has been started on this with Queen Margaret University. The current MSc Mammography is due to be revalidated by September 2021. As part of the revalidation process work should take place to explore the credits allocated to the courses delivered and production of a clear pathway structure related to advanced practice and breast consultant roles.
- Breast Clinical Examination & Client Communication are also mentioned in the SCoR requirements. Communication is covered within current SMEC courses, however the inclusion of named modules should be considered in future planning of the MSc Mammography Programme.

Developing training capacity

Currently, in addition to SBSP trainees, SMEC attracts students from throughout the UK & Ireland. These fee paying students generate significant income for SMEC. The Post Graduate Certificate in Mammography course is particularly popular, this runs twice yearly and has waiting lists. There are two constraints on increasing numbers on courses:-

¹⁸ SCoR (Society & College of Radiographers), 2017, Consultant Radiographer – Guidance for the Support of New and Established Roles. LONDON Society of Radiographers

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1. Physical teaching space for academic input. This has been circumvented to a certain extent recently by the use of online teaching. Longer term consideration should be given to the premises available to SMEC. Income generation may be increased with capacity to accommodate more students.

2. Number of clinical trainers funded for clinical training duties.

Clinical trainers working with SMEC also work as members of staff in their departments. An increase in training duties affects capacity to be part of the workforce that is taken into consideration for workload planning. In addition, three of the seven trainers will be reaching retirement age in the next 5 years. Succession planning is required.

Strategic recommendation – workforce planning

The Review Group recommends the development of an overarching workforce plan for the Scottish Breast Screening Service. Host NHS Boards should further develop their plans, incorporating areas highlighted in the review. NSD should support development and incorporation into a single, Scottish Breast Screening Programme-wide, workforce plan for the commissioned service. The Breast Screening Programme Board should provide support, overview and endorsement of the plan.

Workforce planning and commissioning of Breast Screening Centres by NSD should have regard to projected population changes by Breast Screening centre, as reported.

10. TECHNOLOGY & EQUIPMENT

Breast Screening Digital Strategy

The Review Group discussed and supported the approach outlined in Scotland's Digital Strategy for Screening (see Appendix 9). The digital strategy is focused on the Scottish Screening Committee's strategic objectives set out in the 2018 screening review¹⁹. These are:

- Person centred approach with an increased level of service delivered consistently, putting people at the heart of decision making.
- To make screening more accessible, giving people the capabilities to enable them to have a greater role in managing their own health.
- To break down barriers to participation in the screening programmes and to address inequalities in the service.
- Making better use of data as an evidence base to improve planning as well as operational performance.
- Improve the performance of the screening programmes: better quality assurance; reduced clinical risk, and reduction in process time from screening to treatment.
- Improve outcomes through improved governance, accountability and better coordination of delivery of care.

The digital strategy and roadmap are driven by screening service needs and are designed to support and enable change. A number of key initiatives are being taken forward to support modernisation and development of the breast screening service. These include: cross-health board breast image reading/reporting; a Breast Screening PACS upgrade; current work to

¹⁹ Scottish Screening Committee - Review of Screening Report. Dr Hilary Dobson and Dr Sue Payne 23rd November 2018

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ensure breast screening mobile units are 4G/5G connected to allow online working; the development of a text appointments reminder system; the development of a Screening Intelligence Platform to improve data linkage, visualisation and reporting (further details in section 11 of this report); supporting the development of AI in breast screening mammography; and the Proof of Concept development of a Digital channel (screening App) to support screening interactions – potentially from online booking of appointments, reminders, communication, to health promotion messages.

The Strategic Case for Artificial Intelligence in Breast Screening Mammography

In Scotland, AI in Mammography is currently being tested by the Industrial Centre for Artificial Intelligence Research in Digital Diagnostics (iCAIRD) collaborative project. The mammography AI project within iCAIRD is the primary exemplar project for iCAIRD in Grampian. The project assesses the generalisability, performance, and usability of the Mia algorithm which is the AI software developed by Kheiron Medical Technologies, a collaborative partner within iCAIRD. In screening, the ambition is to utilise AI as an independent image reader, replacement one human reader in our current double-read system.

The outline strategic case for AI in breast screening mammography has been developed by the review team with the support of colleagues from across the service and from within iCAIRD. As part of this, a workshop session was held with the Review Group focussed on building the vision for Artificial Intelligence in screening mammography in NHS Scotland.

The strategic case outlines the development of AI in this field, the evidence and the evaluation work underway in Scotland; outlines the related workforce risk in Scotland; illustrates the potential benefits and the main areas of risk that will be monitored; indicates initial work on the views of women attending screening; describes the Scottish Breast Screening Programme's readiness to potentially adopt AI in screening mammography (subject to UK NSC policy decision); and describes the governance and development route forward and anticipated process to support further business case development. See Appendix 10 - The Strategic Case for Artificial Intelligence in Breast Screening Mammography.

As well as the process and pathway benefits outlined in the case, an estimate of the potential level of human resource (reader time sessions) saved annually is outlined at £527k, associated with the AI replacing one human reader. Within the current image reading resource there is a considerable reliance on a small number of individual readers who each read and report on a disproportionately high number of results. A significant proportion of radiology and advance practitioner staff, including these 'super readers' in the Scottish Breast Screening service, are now near to or at their retirement age, leaving the service vulnerable. The review conducted a survey of image reading undertaken in 2018/19 and 2019/20, showing that a significant proportion of the reader workload was covered either by staff who have now retired from the service, locum staff, or staff who have returned from retirement. This, alongside imaging workforce shortages, suggests an increasingly unsustainable future and reliance on locum cover, with the need to invest in more training for advanced radiographers. If AI is integrated into the reading process as an independent

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reader this will cover *half* of the screening image reading burden of approximately 1.72 million images read each year (4 images per woman screened giving circa 862k images annually in Scotland, each double-read).

Efficiency savings need to be offset against the costs of adopting and integrating AI into the screening pathway, which (given the current development status of research into practice) require to be estimated through the development of a full business case. Not all savings will be immediately cash releasing.

A development route forward has been designed, building on the work completed to date in the iCAIRD partnership, to conduct a POC (Proof of Concept) and real world service evaluation of Mia as an independent reader in the Breast Screening Service. This project will be taken forward by the Breast Screening Programme Board and led by Digital and Security in partnership with the iCAIRD collaborative and other partners.

Strategic recommendation: AI in breast screening mammography

The Review Group recommends that the Scottish Breast Screening Programme should progress to prospective evaluation and proof of concept for Artificial Intelligence in breast screening mammography, with a view to future adoption in the service subject to positive evaluation and formal UK NSC approval that AI can be used in the screening programme.

The Review Group approved the outline strategic case for Artificial Intelligence in breast screening mammography, and supported the further business case development process, to be led by DaS, with advice and support from the Breast Screening Programme Board.

Digital Breast Tomosynthesis (DBT)

Introduction and Background

Digital Breast Tomosynthesis (DBT) is an advanced form of breast imaging, which provides three-dimensional information of the breast (3D mammography). The SBSP currently uses conventional mammograms, in which two X-ray images are taken of the breast (top-to-bottom, and angled side-to-side) while the breast is compressed between a clear plastic paddle and an imaging detector. In DBT, the X-ray tube moves in an arc over the compressed breast, capturing multiple images, which can be synthesised into a set of 3D images by a computer.

DBT has been authorised for use within the English breast screening programme since 2016²⁰. At that time, the NHS Cancer Screening Programmes announced that there was sufficient evidence to justify the use of the Hologic Dimensions DBT system in *assessment* in the NHS BSP. In Scotland, while two centres were involved in tomosynthesis trials, there has been no formal agreement to use DBT within the Scottish Breast Screening Programme. Currently there is very limited, inequitable access to tomosynthesis in the screening assessment service in Scotland, via units that were either research funded or symptomatic service funded. Four units across Glasgow and Tayside are tomosynthesis enabled, and in Grampian access is made to a tomosynthesis enabled unit located in the symptomatic service.

²⁰https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/517840/BSP_position_on_tomosynthesis.pdf

Health technology appraisal

The Scottish Health Technology Group (SHTG) has previously reviewed the use of DBT, at the request of Breast Screening Clinical Directors in Scotland. SHTG was asked to assess the clinical and cost effectiveness of digital breast tomosynthesis (DBT) compared with coned views for women who have been recalled from breast screening. SHTG found that DBT can be used to aid diagnosis for women who have been recalled from initial breast screening for further *assessment*. Most studies reviewed reported that diagnostic accuracy was comparable or superior to supplementary mammographic views (SMVs) which is the current standard of care. SHTG reported that it was not possible to comment on the cost effectiveness of DBT compared to SMV because no economic studies were identified. SHTG concluded that based on evidence that has been included in their rapid review, guidance from Public Health England has listed DBT as an option in women who have been recalled for assessment²¹.

SHTG was also asked to assess the clinical and cost effectiveness of digital breast tomosynthesis (DBT) in addition to full-field digital mammography or synthetic 2D (FFDM or S2D) images, compared to FFDM alone for asymptomatic women attending for breast *screening*. SHTG concluded that while the evidence of diagnostic accuracy suggests that the addition of DBT to FFDM results in improved cancer detection, further information is required before the use of DBT can be justified in the screening population²².

DBT is already available but disabled on most of the mammography machines in screening centres within NHS Scotland (as outlined in the mammography equipment replacement section of this report, below). The Scottish Breast Screening Programme (SBSP) should consider enabling DBT capability on a machine in each of the six breast screening centres in NHS Scotland, for use in women who have been recalled from breast screening for further assessment.

Review of the use of DBT in NHS Grampian

The Review Team asked the North East of Scotland Breast Screening Centre to retrospectively review utilisation of DBT in Grampian during 2018 and 2019 in breast screening patients. The team reviewed use of the Hologic DBT system they have access to, which is located in the breast symptomatic clinic. This is utilised for both symptomatic patients, and for additional assessment review of breast screening patients. Appendix 11 outlines the review findings. Patient outcomes were evaluated and actions proposed for future practice:

Due to limitations of distance to the symptomatic department, only a small proportion of screening assessment patients were referred for DBT (38 referred in 2018, 30 in 2019).

- The results show that there is a significant reduction in the necessity for further invasive tests and/ or MRI imaging.
- Fewer unnecessary tests has positive implications for the patient and is more cost effective for the breast screening centre.

²¹ Healthcare Improvement Scotland – Evidence Note Number 76 April 2018

²² Healthcare Improvement Scotland - Evidence Note Number 77 April 2018

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- This review supports the use of DBT in women who have been recalled from breast screening for further assessment.
- We propose, in-line with Scottish Health Technology Group recommendations, that the Scottish Breast Screening Programme (SBSP) should consider enabling DBT use in the assessment setting in screening centres across NHS Scotland.

Benefits and Efficiencies

A number of benefits/efficiencies could be gained if DBT was introduced; these include:

- Reduction in the number of biopsies performed:
- Reduction in biopsy consumable costs (currently each mammotome stereotactic probe costs £200).
- Improved workflow in radiology and capacity creation in assessment clinics: Over time, all women attending for assessment may receive DBT as standard, thereby, minimising pre-assessment and identification of supplementary mammographic views to perform. This can take up to 1.5 hours per clinic by a Radiologist and would increase capacity for radiologists to read images and perform other duties.
- Improved workflow in radiography: with fewer additional views being required using DBT in both dense and non-dense breasts, workflow for radiographers could also be improved with less alteration of equipment to perform supplementary mammographic views. There is also potential for further role extension for Assistant Practitioners.
- Reduction in Radiation Dose: with reduction of supplementary mammographic views and less repeated images, it is anticipated there would be a reduction in radiation dose for participants.

It seems evident with the implementation of DBT that the assessment workflow would be improved and simplified, with the quality of service to women attending assessment clinics increased through reduced radiation and reduction of time in clinic. The potential cost efficiencies would also have a positive impact on radiologist time, creating radiology capacity to offset workforce risks described earlier in this report. The review attempted to ascertain the total demand for DBT in breast screening, however extrapolation from current use in Grampian would be unreliable given the limitations described in their review. The extent to which efficiency savings described above can support the implementation of DBT would require further analysis and forecasting, and would require to be provided within any agreed business case.

Procurement Considerations

Additional software and biopsy equipment would be required to support DBT implementation in screening centres within NHS Scotland.

The current framework costs are £50,000 per X-ray unit to enable DBT, therefore for an enabled unit in each centre this would give a total of £300K. The service costs for each unit enabled may also increase by approximately £4.5k p.a. A previous estimate considered the need for 5 DBT biopsy devices, currently at circa £20,000 per device.

It would be expected that a significant discount from the above indicative costs for licensing and ongoing maintenance would be achieved should a procurement for all centres together be taken forward. Discussion within the review has also considered the potential to link the enabling of DBT with x-ray unit replacement as part of a managed equipment replacement programme, as this is more cost effective. This should be further considered particularly for

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replacement of units now over 8 years old, and the larger group of units currently 6 – 8 years old.

The additional Picture Archiving and Communication Systems (PACs) image storage requirements associated with DBT will be minimal.

An initial period of training will be required for staff, albeit in some centres limited use is already made of DBT and therefore knowledge and application protocols on the pathway are already in practice. Additional Medical Physics resource has previously been estimated at 12 hours/week in the first year of implementation, reducing to 9 hours/week from year 2.

Strategic Recommendation

The Scottish Breast Screening Programme (SBSP) should consider enabling DBT for use in the assessment setting in screening centres across NHS Scotland. A business case should be developed by NSD, in collaboration with host NHS Boards, to realise the benefits and efficiencies identified. Consideration should be given to linking the enabling of DBT with x-ray unit replacement as part of a national managed equipment replacement programme, should this be agreed, and the route is more cost effective.

Mammography equipment replacement programme

Overview of the current inventory

In total there are 43 X-ray sets in use in the SBSP, including those co-located in joint screening / symptomatic departments. This total is inclusive of the 21x-ray units in the mobile fleet (and inclusive of the unit that covers servicing).

Since re-start of the programme in August 2020 following the Covid-19 related pause, 2 of the mobile units that were scheduled for replacement have remained in service to assist with capacity for recovery. This brings the current operational total to 23 (again, inclusive of the unit that covers servicing).

100% of X-ray sets are digital, providing Full Field Digital Mammography (FFDM).

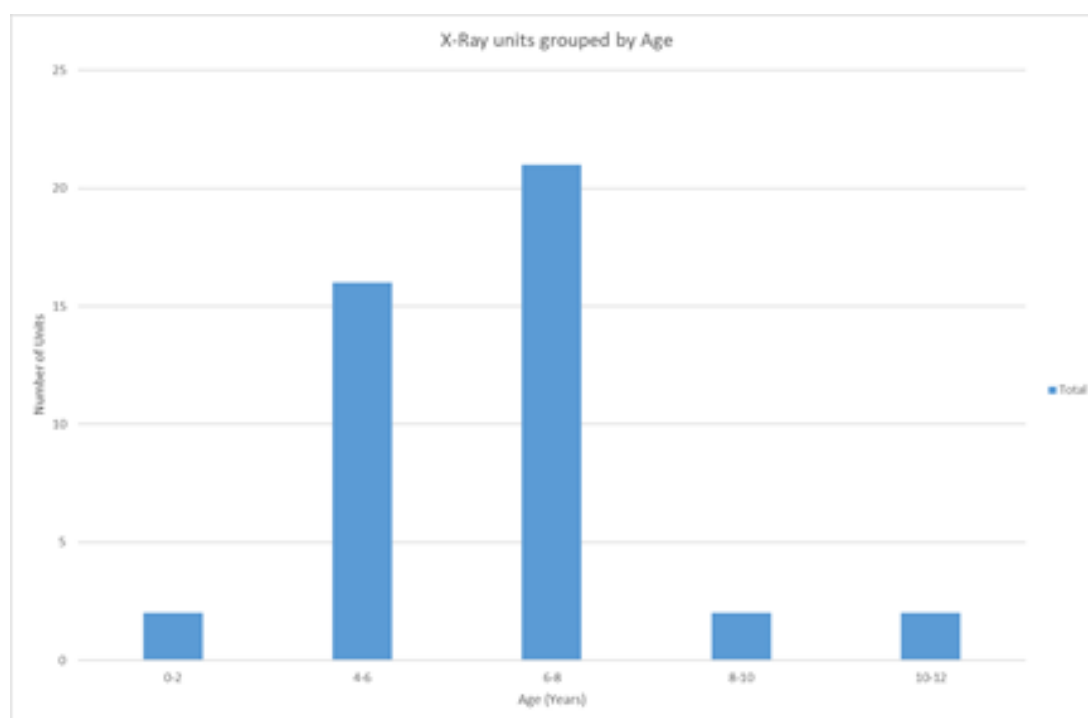
Almost all units are from the same manufacturer, and most are the same model.

Almost half of the x-ray units are 6 – 8 years old, with 9% over 8 years old (Figure 1)²³.

Figure 1 – X-Ray units by age

²³ Survey of mammography equipment - Screening X-Ray Equipment. Medical Physics. Health Facilities Scotland

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Commonly accepted life for a diagnostic x-ray machine is ten years. Due to age, obsolescence and more intensive use, the service life of a mammographic x-ray machine used in the breast screening programme may be less than ten years²⁴.

Forty-two units are tomosynthesis ready but the functionality is *not* currently enabled, and therefore the machines are not used for tomosynthesis exposures. Four units in Glasgow and Tayside are tomosynthesis enabled, and in Aberdeen limited access is made to a tomosynthesis enabled unit located in the symptomatic service. Whilst this allows very limited, inequitable access to tomosynthesis in the screening service, tomosynthesis capability on these units is either research funded or symptomatic service funded.

Planning ahead

Currently the capital replacement of all mammographic x-ray units located in the static screening centres is the responsibility of the NHS Boards which host the screening centre. The capital replacement responsibility for mammographic x-ray units located on the screening mobile vans is the responsibility of National Services Scotland. Medical Physics support is provided from National Services Scotland for all mammographic x-ray units in breast screening.

Within NHS Boards that host breast screening centres, there is variation in where the service sits within lines of operational management. Three centres are managed as part of diagnostic imaging services, two are managed in breast surgical services, and one is managed in Oncology. Discussion within the review has suggested that greater strategic linkage into national imaging strategy, including equipment replacement planning, may be beneficial. Currently, for those centres managed within diagnostic imaging and therefore imaging networks, inclusion in wider diagnostic imaging strategy may be more

²⁴ Guidance notes on mammographic x-ray equipment selection; maintenance; suspension from use; replacement. NHSBSP Publication number 32. January 1995

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straightforward, however all centres need to be aware of, and included in, strategic planning and developments.

National formula capital allocation is granted to individual NHS Boards. A mechanism to support Boards in planning collectively for the replacement of screening mammography x-ray units would be helpful to ensure that there is a national overview and readiness to respond to the availability of capital. A single, co-ordinated capital replacement programme for the Scottish Breast Screening Service could also incorporate NSS plans for units on the mobile fleet. Co-ordination of a national replacement programme could potentially form part of the working of the National Infrastructure Board.

Wider technical benefits, such as advising on the clinical and technical requirement for developments (such as digital breast tomosynthesis, or other screening imaging developments) may also be gained. This would support the ability of the Breast Screening Programme as a whole to move forward as one with technological advancements and new ways of working.

Strategic Recommendation

The review group recommends that a single, co-ordinated capital replacement programme for mammographic x-ray units in the Scottish Breast Screening Service should be developed, to support the prioritisation of capital with host NHS Boards and inform National Infrastructure planning.

11. STANDARDS

Background and governance arrangements

The Breast Screening Standards are a key component in supporting the SBSP approach to quality assurance. Monitoring and improving performance against these standards, at a local and national level, aims to improve the quality of the SBSP.

There are 3 tiers of governance under current arrangements, local, national and UK wide. National Scotland wide arrangements have been the subject of review in 2018 and has resulted in the establishment of the National Screening Oversight Function (NSOF), and National Screening Oversight Board (NSOB), alongside the newly convened National Breast Screening Programme Board.

Locally at centre level QA modality leads continue to monitor and evaluate the programme metrics against National standards. This is currently performed separately for Radiology, Radiographers, and Administration. National Surgical and Pathology QA leads were responsible for monitoring these specialties and organising annual national multimodality QA meetings, however these posts are currently vacant due to recent retirements. As a result of this, and historical lack of data, the previously undertaken annual modality based QA visits have largely been suspended. Concerns have been discussed about the QA process by NSD, CDs' and QA leads over in the last 18 months, mainly around the lack of data since the implementation of SBSS, the lack of external review embedded in the system, and the single modality based visits. As a result, interim arrangements involving these 3 groups had been set up but again were suspended as a result of the Covid pause. This has been

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recently re-instated and recommendations for future arrangements are under development to be submitted to the Programme Board.

Standards and Quality Assurance Reporting Processes

The current reporting processes, used to report against the HIS Breast Screening Standards, are outlined below:

UK Wide:

ASDC: Annual Audit of Screen Detected Cancers. This is an annual meeting to review UK wide data. The data has not been available from Scotland to participate in this process for the last 3 years, and the 2020 meeting was cancelled due to Covid. Scotland has, however, submitted data for the 2021 review.

KC62 publication: Published annually by Public Health Scotland, in line with the same process in the remainder of the UK. Historically this formed the basis of annual QA reports for each centre and the Scottish programme as a whole. The statistics are now reviewed by the newly established Monitoring & Evaluation Group. The group will identify variances in data which require further investigation or management and escalate these to centres and to the Programme Board.

CPG: Clinical and Professional Group: This forum, hosted by Public Health England, is a Radiology advisory group encompassing all of Breast screening England. Representatives from the devolved nations are invited to attend as observers only.

National:

MEG: Monitoring and Evaluation Group: Newly constituted under the redesign of the Breast Screening governance structure, this multimodality committee is supported by Public Health Scotland and NSD. Its role is to monitor all the data generated in relation to the National Screening Programme, to evaluate this in relation to standards, to inform QA activity and provide an early warning system for potential issues within the Programme.

NSD Annual Report: The NSD commissioning model requires that each Breast Screening Centre, and the NSS Physics team, submit an Annual Report (and mid-year report) to NSD. This is then discussed in detail at the centre's Annual Performance Review.

Service Level Agreements: Each Breast Screening Centre, through its host Health Board, has a Service Level Agreement in place with NSD, which spans a 3-year period. This includes a number of performance measures in line with HIS standards, but also incorporates some previous QA standards.

HIS standards: Recently updated in 2019, these sit alongside the QPI's and contain a variety of metrics based on a format adopted by HIS. Some of these are qualitative and general, and some are granular and more related to the QPI's. They also include a number of turnaround time guarantees. In this format they are regarded as unlikely to have an impact on service performance. Although key metrics from the standards are reported in the KC62 report, the standards require to be connected to a wider quality improvement cycle which connects the standards, performance and turnaround times (for example for image reading and access to screening assessment clinics), programme schedule performance, and links

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to wider breast cancer QPI's. An overview of clinical and management performance for the programme arising from this, and locally owned action plan with an escalation process for support where required would assist (similar to the current cancer QPI's reporting and performance management process).

Annual Multidisciplinary QA days: Until 3 years ago, there would be an annual research, audit and QA meeting organised nationally by either the Surgery or Pathology Screening QA lead. This was a 2-day meeting, the 2nd of which dealt with any QA issues raised from the annual visits. These meetings have not been held due in part, to the well-known acknowledged problems with retrieving meaningful data from SSBS until the last financial year, and in part due to changes in personnel within the key leadership roles. This was an excellent forum for all screening staff which enabled the sharing of good practice, networking and exploration of solutions and also some horizon scanning. There is a general consensus amongst all screening staff that this needs to be re-instated.

Breast Cancer QPIs: The QPIs were developed collaboratively with the three Regional Cancer Networks, ISD, and Healthcare Improvement Scotland. There are no screening specific indicators, but there is a recognition that Radiology underpins some of the QPI's. NHS Boards are required to report against QPIs as part of a mandatory national cancer quality programme. Public Health Scotland supports NHS Boards in improving the quality of local data collection and reporting through the production of data validation specifications, and measurability criteria for QPIs.

Local:

Health Board Public Health Reporting: These reports are submitted to every Health Board by the Public Health Screening Programme lead, based on the screened population for that Board and is not limited to host Health Boards or centres. In some cases the NSD Annual Report can be provided as part of this in an effort to prevent duplication. More regular Health Board monitoring may also be in place. Some centres have a close working relationship with their local board Public Health departments and have regular meetings to monitor activity and issues, but this is very variable across Scotland, and job plan time allocated for Board screening co-ordinators is also variable. It is of substantial benefit where a good relationship exists.

Monthly and Annual Performance Reports: monthly and annual performance reports are presented to the NSD SMT. Periodic reports also go to the National Screening Oversight Board for update. If there are any performance issues noted these are raised with the Breast Screening Centre, and an action plan sought.

QA groups: As part of the Breast Screening Programme, there are modality based Quality Assurance Groups that monitor data with a modality QA lead at every centre. Previously these groups have met regularly under the Modality National Lead. Annual modality specific site visits were arranged through this process. Any local issues are raised within these groups and escalated to the CDs/NSD as appropriate.

Rationalising the reporting process and gaining oversight of performance and improvement

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The Review offered an opportunity to re-assess the QA and governance implications for Breast Screening, in the light of new structures and the ability to now get meaningful data from SBSS. It should be noted that the PHE revamp of the English QA processes, with data review sessions, fewer but multidisciplinary site visits and external review, has much to recommend it. One of the key issues the service reports for the whole Governance/QA process for Breast Screening is the number of different reports and formats required for different agencies which all contain essentially the same information and data. The review would recommend that there is streamlining of data reporting where possible, acknowledging that the detail of information required varies significantly between recipients (Public Health, Health Boards, National Services Division, Scottish Screening Committee, National Screening Oversight Function/Board, Scottish Government).

Within the HIS standards, all criteria are considered 'essential' or 'required' in order to demonstrate the standard has been met. NHS boards are responsible for implementing the breast screening standards to assess quality and support improvement in breast screening services. The detailed implementation of these standards is for local determination.

The Review Team discussed the current Breast Screening Standards with Healthcare Improvement Scotland (HIS) and acknowledged that these were recently reviewed in 2019, as part of a regular review cycle. The Review Team discussed the potential to improve the use of the standards to support improvement (i.e. supporting the wider quality improvement cycle referred to above), rather than once again review and seek to change the standards. Subsequently, HIS outlined initial thinking around the applicability of a conceptual Quality Management System framework approach to the breast screening programme and the associated standards. This is shown at appendix 12²⁵. The process for how screening programme standards are developed is being further considered by Healthcare Improvement Scotland (HIS), and will be reported via the National Screening Oversight Function. This new approach to the development of standards will be incorporated into the work being established by the National Screening Oversight Function to develop a national screening quality management system (QMS). The aim of this QMS will be to both support individual screening programmes, and to provide a system-wide approach to quality to enhance cross-programme activities and identify opportunities where a 'Once for Scotland' approach could be adopted.

The further development of breast screening standards will be taken into account when translating the HIS QMS into a national system for screening:

In the context of the breast screening programme, a QMS can provide a roadmap toward better quality. It has the potential to provide a simple framework to guide quality activity including support for self-evaluation and internal assurance. Additionally, where change is required, a QMS is a helpful tool to support services to plot the evolution of different improvement approaches and implement successful change. Continual refinement of the breast screening programme using the QMS would enable the programme to pursue excellence at every level.

²⁵ Further information also at: <https://ihub.scot/media/6824/qms-framework-working-draft-3.pdf>

Strategic Recommendation

4.1 The Review Group recommends that for national and local level reporting, reporting against breast screening standards and performance be streamlined by NSD in liaison with NHS Boards, where possible, taking into account differences in the level of detail required for different stakeholders. Defining this should be supported by the Monitoring and Evaluation Group.

4.2 The Review Group recommends that initial work with HIS to develop a Quality Management System approach to the development and application of standards should be progressed. This should be taken forward through the development of a national screening QMS being led by the National Screening Oversight Function. This work also links to wider related work on screening metrics being taken forward for the National Screening Oversight Board.

12. IMPROVING DATA AND INTELLIGENCE

Data and IT constraints

Review data

Obtaining and using data was a significant constraint for the review. This was unexpected, led to delay in the review work programme, and ultimately forced the review to change its planned approach, priorities and workstream objectives.

The review team obtained analytical support from Public Health Scotland, and discussed analytical requirements. In the context of understanding that only aggregate data from the Breast Screening Programme was available to Public Health Scotland, the review sought to obtain patient level data from SBSS, over a full screening round. This was requested to create a dataset to support review and modelling of call-recall options; specific cohorts within the screening population; variations in access and uptake; demand and capacity via mobile and static screening clinic utilisation and delivery locations, examining catchments and screening centre configuration / boundaries; geospatial modelling of developed options for screening location and delivery; as well as to support other sub-projects within review workstreams.

Initial exploration of the DaS 'Connect' rather than 'Collect' approach was considered, to connect to the full data-set and avoid the need to copy the data. However, this approach proved not to be possible at the time to support the review.

Current SBSS BOXI reports available were also explored to determine whether these could be utilised (however these were deemed to be too limited).

A number of factors contributed to the difficulty in obtaining and using data at this level. These included:

- No clear data definitions and limited awareness of the level of data and data available from SBSS – knowledge of this rested with the external supplier
- A complex and multi-step process to scope, specify, and make the request for data – via the development request process
- A lack of patient level data for the Breast Screening Programme in Public Health Scotland

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- A reliance on working through NSS Digital and Security to explore what data might be available via the 3rd party system, and as above, limitations in data definitions
- Information governance requirements of the 3rd party supplier, appropriately intended to protect and ensure that approval is in place to support release of data previously not requested, however with a complex and uncertain process for approval.
- Initial uncertainty over data controller status within NSS (with complexity added by the migration of analytical resources to Public Health Scotland). The DaS Data Release process was followed, with the required Caldicott Guardian approval obtained.

Whilst the initial specification for analysis was completed and discussed in December 2019, due to the process to specify, request and approve the data, and time for the 3rd party IT system supplier to undertake the development work to deliver the data, the data was not downloaded into NSS until May 2020. Data was supplied in 'XML' format and because of this, and the size of the dataset, expertise in Digital and Security (DAS) was required to format the data and provide Public Health and Intelligence (now part of PHS) with the file format and storage space they required. Digital and Security (DAS) resources at this time were appropriately prioritised to supporting the Covid-19 response, unfortunately entailing a significant delay in handling the data obtained for the review. Following processing, and PHS data quality assurance, a limited review dataset became available for analysis in December 2020.

Development resource

The review has heard from many SBSS system users a frustration over the lack of data to support operational, performance and strategic planning at Breast Screening Centre level. The availability and format of data seems restricted, with consequent limitations to collaborating across centres on performance and planning. The National User Group is seeking to improve this via the further development of BOXI reporting, however it remains an area for improvement.

The SBSS National User Group (NUG) has also raised concerns regarding the process for the prioritisation of the SBSS development resource, with competing demands for IT development coming from Covid recovery work, planned developments to SBSS to support the operational functioning of the service, and strategic exercises such as requests made via this review. Funding allocated for SBSS development in the 'Committed Development Resource' should be examined with a view to increasing resource to support user development requests prioritised, and SBSS data reporting functionality.

This situation will improve with the creation of the new National Screening Digital Service Management Board (NSDSM Board) which will specifically consider change requests for screening IT systems, meaning that they will no longer have to be prioritised alongside non-screening IT developments. This group will report into NSOB as well as into wider SG and NHS Digital governance structures

Additionally, opportunity exists to make significant improvements in data access and reporting, as outlined below.

Screening Intelligence Platform

The Future Data Depository of All Analytical Purposes in Relation to the National Screening Programmes

The objective of the Screening Intelligence Platform (SIP) is to provide an efficient, single point of access to linkable data from all of the National Screening Programmes regardless of where the data are held. It will do this by creating views of the source data which can be more easily used for all types of analysis and to automate update of dashboards and routine reports reliant on these data. The platform will allow NSS and Public Health Scotland (PHS) and other public sector bodies to make better, more efficient use of data, to make better insights, and ultimately to make better informed data driven decisions.

The Screening Intelligence Platform (SIP) builds on the successful implementation of Phase 1 of the Cancer Intelligence Platform (CIP) in late 2019.

What is the Cancer Intelligence Platform (CIP), and why is it important for the Screening Programmes?

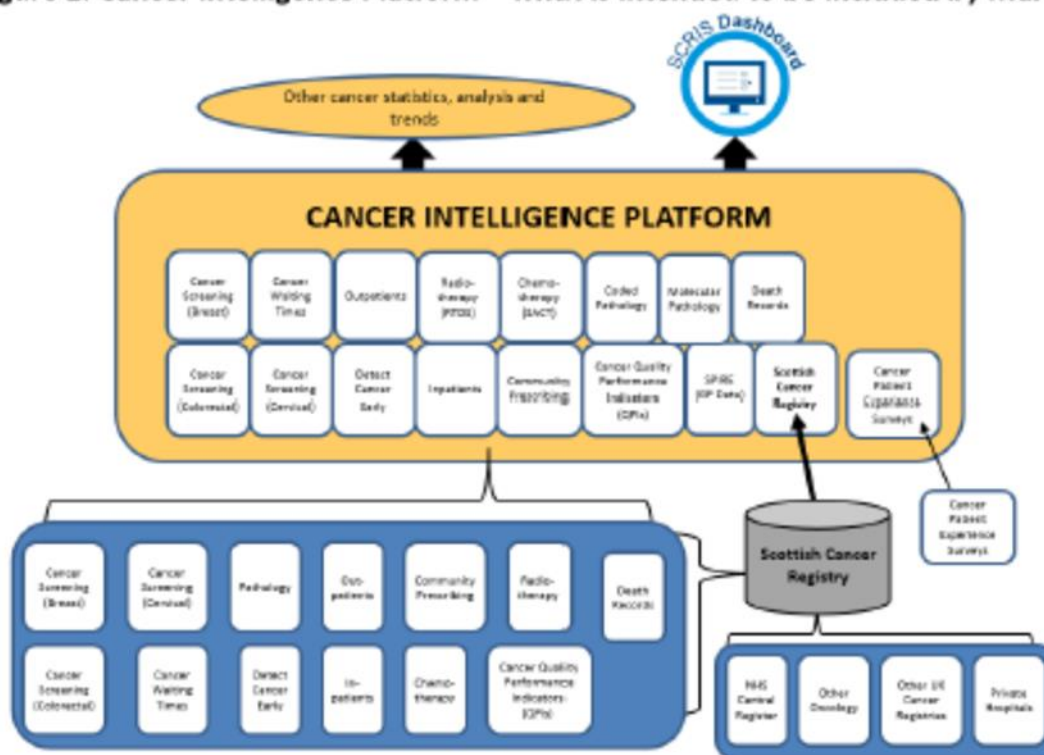
The objective of the CIP is to provide an efficient, single point of access to linkable cancer data regardless of where the data are held by creating views of the source data, covering the whole cancer pathway. The development process will ensure that these data are CHI linkable to describe and understand the whole cancer patient pathway from:

- Prevention
 - Early detection including screening
 - Diagnosis
 - Treatment
 - Cure
 - Recurrence
 - Palliation
 - End of life
 - Death

Cancer screening data will also sit within the CIP. It will be possible to follow the whole screening population through their entire journey, into secondary care, treatment and outcomes.

Figure 1 illustrates the datasets which will be available within CIP, including the SCR and the three National Cancer Screening Programmes.

Figure 1: Cancer Intelligence Platform – what is intended to be included by March 2023



Sources of data accessed by the Cancer Intelligence Platform

Completion of the CIP is now an action within the Recovery and redesign: An action plan for cancer services published by the Scottish Government on 9th December 2020²⁶. This key policy document reinforced the concept of bringing all cancer datasets together, initially for PHS cancer analysts, but in future, for all cancer analysts across NHS Scotland.

What is the Screening Intelligence Platform, and How it will Relate to the CIP?

Data from the breast screening programme (as well as the other 2 national cancer Screening programmes) will be available within both the CIP and the SIP. All of the datasets will draw the data needed directly from the screening IT systems into accessible, linkable views within the platform(s). In addition to cancer screening data, analytical data from the AAA and DES Programmes will be drawn in (into the SIP only), and data from the New-born and Pregnancy Screening Programmes will be added to the SIP as data become more widely accessible.

Data fields from both the live service systems and the reporting tools will be drawn into the SIP to ensure all the analytical reporting is available directly from the SIP. Views of additional datasets, such as acute activity in SMR01, NRS deaths, mapping of SIMD to different geographies for example, will also be drawn into the SIP as views to allow easier linkage and mappings.

Gaining access to all of these CHI linkable datasets is in process, and will be covered by overlapping Information Governance documentation (see below). Initially, access to the SIP

²⁶ <https://www.gov.scot/publications/recovery-redesign-action-plan-cancer-services/>

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will be limited to analysts with PHS and NSS NSD centrally, but once established and fully tested, the intention will be to widen access to other public sector bodies.

What are the benefits of having the SIP?

It will be possible to create and follow the whole screening history of the population through their screening journey, whether the people remain in primary care, or tracking their journey into secondary care, treatment and outcomes. Linkable data may be used:

- to make the reporting of recovery metrics easier and more standardised across the Programmes, with the ultimate aim of having an automated dashboard which can report regularly straight from the SIP;
- to make analyses of inequalities much easier, both within and across Screening Programmes (e.g. identifying small areas where uptake is poor to allow NHS Boards/HSCP/LA/Communities to target interventions more appropriately);
- making examination of full screening histories possible to explore changes in behaviour over time and/or easier assessment of impact of particular intervention;
- in helping to identify and understand patterns of behaviour
- by allowing more efficient and easier access to screening co-ordinators, analysts etc. to understand core health services analyses;
- and allow smoother and more efficient provision of data to researchers (with appropriate ethics and IG).

Information Governance

To fulfil the provision of both the CIP and the SIP, Public Health Scotland (PHS) will be viewed as joint data controllers with NSS and/or the territorial NHS Boards as appropriate. All of the datasets will be shared within the health service under the NHS Data Sharing Accord²⁷, and each dataset will have its own supporting DPIA within PHS covering this.

In addition, a single MOU will cover all of the cancer datasets, including the CIP, and is under consideration by the National NHS Information Governance Leads for approval. With this approval, this will allow CHI linkable data to be sourced from the three cancer screening IT systems to create views within the CIP for all appropriate analyses.

²⁷ <https://www.informationgovernance.scot.nhs.uk/publications-2/>

13. Independent Review Group & Review Team

Independent/ Expert Review Group

Group Represented	Nomination
Board Chief Executive (Chair)	Ms. Heather Knox, Chief Executive, NHS Lanarkshire
Director of Public Health	Dr Joy Tomlinson, Interim DPH (Joint), NHS Ayrshire & Arran
Breast Screening Co-ordinators	Dr Emilia Crighton, NHS Greater Glasgow & Clyde Dr Regina McDevitt, NHS Ayrshire & Arran
UK Breast Screening expertise	Dr Olive Kearins, Head QA, Screening Division Public Health England
Medical Director	Dr Boyd Peters, NHS Highland
Director of Diagnostics	Arwel Williams, NHS Greater Glasgow & Clyde
Director of Planning	Lorraine Scott, Acting Director for Modernisation, NHS Grampian
Director of Finance	Ms Margo McGurk, NHS Fife
Radiologist / Radiology Transformation Programme Director or Clinical Lead	Mr Mike Conroy, NHS Tayside
Scottish Cancer Coalition Nominees	Ms Moira Adams, Breast Cancer Prevention Scotland Ms Melanie Sturtevant, Breast Cancer Now (From November 2020) Mr Tom Beattie, Breast Cancer Now (Until November 2020)
NHS NSS Digital and Security	Mr David Proud, NSS Digital & Security
Healthcare Improvement Scotland	Ms Karen Ritchie (Until December 2020) Ms Donna O'Rourke, Programme Manager (From December 2020)
Public Health and Intelligence	Mr Michael Muirhead, Head of Service (Until December 2020) Ms Catherine Thomson, Service Manager for Population Screening (From December 2020)

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Scottish Primary Care Cancer Group (SPCCG)	Dr Lorna Porteous, SPCCG
Breast Surgeon	Ms Juliette Murray, NHS Forth Valley
Service Radiology*	Dr Marzi Davies, NHS Greater Glasgow & Clyde
National Oversight Function (NOSF)*	Mr Gareth Brown, NSS National Oversight Function (Observer. From December 2020)

*Non-Voting Members.

Review Team Membership

Name	Designation	Organisation
Mr Peter McLoughlin	Programme Director (3 days per week until November 2020, Full time from November 2020)	NSS (NSD)
Ms Karen Roberts	Programme Manager (2.5 days per week, until Oct 2020)	NSS (NSD)
Mr Martin Kennedy	Programme Support Officer	NSS (NSD)
Dr Tasmin Sommerfield	Consultant in Public Health Medicine for National Screening Programmes	NSS (NSD)
Ms Alison Fraser	Strategic Programme Manager, SBSP - subject matter expert (as required)	NSS (NSD)
Mr Bryan Davies (From February 2020 until December 2020) Mr David Steel (From December 2020)	Associate Director – Screening	NSS (NSD)
Dr Marzi Davies	Clinical Director, West of Scotland Breast Screening Centre (Sessional Input)	NHS Greater Glasgow & Clyde
Ms Marion Inglis	Administration Manager, West of Scotland Breast Screening Centre (Sessional Input)	NHS Greater Glasgow & Clyde

14. Acknowledgements

The review group chair and the review team are grateful to the Clinical Directors, Superintendent Radiographers, and Breast Screening Centre Managers from the six breast screening centres in Scotland for their participation and support in this review. This is particularly appreciated given the screening service response to Covid-19 in 2020 and ongoing, and the necessary focus on adaptation and recovery.

The review team also appreciated the support from NHS Board Screening Coordinators, colleagues within NSS who were not on the review group, and from wider colleagues in other services.

Ms Nuala Heely, Organisational Lead – Screening & Immunisation, Public Health Scotland

Mr John Quinn, Senior Information Analyst, Public Health Scotland

Mr Garry Hecht, Principal Information Analyst, Public Health Scotland

Robert Kelly, NSS Digital and Security

Dean Phillips, Head of Programme, Breast Test Wales

Sharon Hillier, Director of Screening Division & Consultant in Public Health, Breast Test Wales

Ms Mandy Ballantyne, Planning and Workforce Manager, Norwich Breast Screening Service

Sheila Stallard, Consultant Breast Surgeon, NHS Greater Glasgow & Clyde

Dr Helen Bailey, Consultant Radiologist, NHS Grampian

Margaret Clark, ATOS

Michael Neilson, Technical Architect – B&PS Tech, ATOS

15. Appendices

- Appendix 1: Uptake overview
- Appendix 2: Breast Screening uptake in Scotland by datazone (GIS Maps)
- Appendix 3: Exploring barriers and facilitators to breast screening uptake among disadvantaged groups and communities in Scotland
- Appendix 4: Utilisation of appointments by breast screening centre and SBSP – 2 year snapshot
- Appendix 5: Breast Screening Centre Satellite models
- Appendix 6: SIMD breakdown for females aged 71yr and over: by NHS Board
- Appendix 7: Scotland population projections women age 50-70 by Breast Screening Centre and age band
- Appendix 8: (a) Scottish Breast Screening Service w.t.e. estimated establishment by professional group across the SBSP

(b) Overview of workforce change and issues for each Breast Screening Centre;

(c) Survey of mammography staffing levels – Scottish Breast Screening Centres at mid 2020
- Appendix 9: Breast Screening Digital Strategy presentation
- Appendix 10: The Strategic Case for Artificial Intelligence in Breast Screening Mammography
- Appendix 11: Utilising Digital Breast Tomosynthesis in Screening Assessment Clinics
- Appendix 12: A Quality Management System (QMS) approach to breast screening and developing breast screening standards



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