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Introduction

A screening programme for Abdominal Aortic Aneurysms (AAA) for men aged 65 was implemented in Scotland in line with the advice from the UK National Screening Committee (NSC). There was a phased roll-out of the programme from June 2012. NHS Highland and NHS Western Isles were the first NHS Boards to implement the screening programme and by November 2013 all NHS Boards were participating.

An AAA is a swelling of the aorta, the main artery in the body, as it passes through the abdomen. As some people get older, the wall of the aorta in the abdomen can become weak and balloon out to form an aneurysm. The condition is most common in men aged 65 and over and usually there are no symptoms.

Large aneurysms are uncommon but can be very serious. As the wall of the aorta stretches, it becomes weaker, and it can rupture (burst). If the aneurysm ruptures, this leads to life-threatening internal bleeding and, in 8 out of 10 cases, death [1].

The Scottish AAA screening programme aims to reduce deaths associated with the risk of aneurysm rupture in men aged 65 and over by identifying aneurysms early so that they can be monitored or treated. The screening test is a simple ultrasound scan of the abdomen which takes around 10 minutes. Men aged 65 are sent an invitation to attend AAA screening. Men over 65 years of age, who have not been screened previously, can self-refer into the screening programme. Most men have a normal result and are discharged from the screening programme. Men with detected small or medium aneurysms are invited for regular surveillance screening to check the size of the aneurysm. Men with large aneurysms are referred to vascular specialist services. Further information on the AAA screening programme in Scotland can be found on the NHS Inform website.

This publication provides an update to the annual AAA screening programme data to include the year ending 31 March 2017. The report covers key performance indicators on invitation and attendance at screening, the quality of screening, and vascular referrals. Information on screening results and self-referrals is also provided. The data includes trends and are presented by NHS Board and deprivation category (using Scottish Index of Multiple Deprivation (SIMD)).
AAA screening programme

The screening test is an ultrasound scan of the abdomen and there are five possible results:

<table>
<thead>
<tr>
<th>Result</th>
<th>Aortic diameter</th>
<th>Pathway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal (negative)</td>
<td>Less than 3.0cm</td>
<td>Discharged from screening programme</td>
</tr>
<tr>
<td>Small AAA (positive)</td>
<td>Between 3.0 and 4.4cm</td>
<td>Annual surveillance scans</td>
</tr>
<tr>
<td>Medium AAA (positive)</td>
<td>Between 4.5 and 5.4cm</td>
<td>Surveillance scans every 3 months</td>
</tr>
<tr>
<td>Large AAA (positive)</td>
<td>5.5cm or over</td>
<td>Referred to vascular specialist services</td>
</tr>
<tr>
<td>Non-visualisation</td>
<td>Aorta cannot be fully visualised</td>
<td>If an aorta cannot be fully visualised at the first scan, an invitation for a further scan is sent</td>
</tr>
</tbody>
</table>

Most men have a normal result and are discharged from the screening programme.

Men with a small or medium-sized aneurysm are invited to attend surveillance appointments to check the size of the aneurysm regularly to monitor any growth. Men with small aneurysms are invited for annual surveillance scans. Men with medium aneurysms are invited for surveillance scans every three months. Most aneurysms grow very slowly, and many men with a small or medium aneurysm never need treatment.

Men with a large aneurysm are referred to vascular specialist services for further investigation and to discuss treatment options.

If an aorta cannot be fully visualised at the first scan, an invitation for a further scan is sent. Men with a second non-visualisation scan are discharged from the screening programme and their GP is informed.
Main Points

Key Performance Indicator results for the year ending 31 March 2017

- 99.9% of men in Scotland who turned 66 in the year ending 31 March 2017 were invited for screening before their 66th birthday, exceeding the essential threshold of 90%.

- Uptake of AAA screening was high with 84.4% of men in Scotland tested before age 66 and 3 months, well above the essential threshold of 70%. All NHS Boards achieved high uptake, with a rate of 80% or higher.

- Although the essential threshold of 70% uptake was met in all deprivation quintiles, uptake of screening was lower in the most deprived areas.

- 74.2% of men referred to vascular specialist services for assessment were seen within two weeks of screening, slightly below the essential threshold of 75%.

- 33.3% of men deemed appropriate for aneurysm repair surgery were operated on by a vascular specialist within eight weeks of screening. This was substantially below the essential threshold of 60%.

- Since the programme began, the 30-day mortality rate following planned open surgery for aneurysm repair was 2.1%, which meets the desirable threshold of below 3.5%.

- The 30-day mortality rate following Endovascular Aneurysm Repair (EVAR) was 0.8%, which meets the desirable threshold of below 2%.

- The AAA screening programme in Scotland met or exceeded the essential threshold in 10 of the 12 performance indicators.

Screening tests and results

- Among men routinely eligible for screening in the latest year, over 25,500 were tested and 350 (1.4%) had a positive result.

- In the most recent year, there were also nearly 750 men who self-referred for screening and were tested. 26 men (3.5%) had a positive result.

- Since the screening programme began in 2012, over 113,000 men routinely eligible for screening in Scotland have been tested and 1,662 had a positive result. The aneurysm detection rate has stayed constant since the programme began at around 1.5%.

- In total, just over 4,900 men have self-referred for screening and been tested in the cumulative period from implementation. 144 men (2.9%) had a positive result.
Results and Commentary

Key Performance Indicators (KPIs)
The Key Performance Indicators for the Scottish AAA screening programme are intended to offer a focus on aspects of the patient journey from invitation, through the delivery of the scan, to referral for clinical assessment, to outcome of surgical intervention if this is required.

The KPIs are not intended to cover all aspects of the AAA Screening programme nor the detail of any subsequent surgical intervention. They are designed to assess critical achievement of aspects of the screening pathway: Invitation; Attendance; Quality of screening, Referral; Clinical Intervention; and Outcomes.

The purpose of reporting achievement of the KPIs is to give a high level view of the performance of the AAA screening programme, act as a driver for continuous improvement, and to direct specific review of any areas that (from the KPIs) appear to be underperforming.

Each KPI has two thresholds:

- **Essential**: the minimum level of performance which the screening programme is expected to attain.
- **Desirable**: the screening programme should aspire towards attaining and maintaining performance at this level.

Following the implementation phase of the programme, NHS Boards are expected as a minimum to meet the essential thresholds for these performance indicators. KPI data are available from the year ending 31 March 2015, although there are three indicators which did not take full effect until the year ending 31 March 2017.

In some NHS Boards, particularly the island Boards (NHS Orkney, NHS Shetland and NHS Western Isles), some of the KPIs are based on small underlying numbers and so the rates may be subject to larger year-to-year fluctuations.
## AAA Screening Programme Key Performance Indicators: Scotland

<table>
<thead>
<tr>
<th>Key Performance Indicator</th>
<th>Essential Threshold</th>
<th>Desirable Threshold</th>
<th>Results for year ending 31 March 2016 Scotland</th>
<th>Results for year ending 31 March 2017 Scotland</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invitation and attendance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of eligible population who are sent an initial offer to screening before reaching age 66</td>
<td>≥ 90%</td>
<td>100%</td>
<td>97.0%</td>
<td>99.9%</td>
</tr>
<tr>
<td>Percentage of men offered screening who are tested before reaching age 66 and 3 months</td>
<td>≥ 70%</td>
<td>≥ 85%</td>
<td>84.0%</td>
<td>84.4%</td>
</tr>
<tr>
<td>Percentage of men offered screening who are tested before reaching age 66 and 3 months by Scottish Index of Multiple Deprivation (SIMD) quintile</td>
<td>≥ 70%</td>
<td>≥ 85%</td>
<td>76.0% Quintile 1 (most deprived)</td>
<td>76.0% Quintile 1 (most deprived)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>81.7% Quintile 2</td>
<td>82.2% Quintile 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>84.3% Quintile 3</td>
<td>85.7% Quintile 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>87.4% Quintile 4</td>
<td>87.6% Quintile 4</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>88.8% Quintile 5 (least deprived)</td>
<td>89.0% Quintile 5 (least deprived)</td>
</tr>
<tr>
<td>Percentage of annual surveillance appointments due where men are tested within 6 weeks of due date</td>
<td>≥ 90%</td>
<td>100%</td>
<td>96.3%</td>
<td>96.0%</td>
</tr>
<tr>
<td>Percentage of quarterly surveillance appointments due where men are tested within 4 weeks of due date</td>
<td></td>
<td></td>
<td>96.7%</td>
<td>95.5%</td>
</tr>
</tbody>
</table>

### Quality of screening

| Percentage of screening encounters where the aorta could not be visualised | < 3% | < 1% | 1.5% | 2.0% |
| Percentage of men screened where the aorta could not be visualised | < 3% | < 1% | 1.3% | 1.6% |
| Percentage of screened images that failed the quality assurance audit and required immediate recall | < 4% | < 1% | 0.4% | 1.9% |

### Referral, clinical intervention and outcomes

| Percentage of men with AAA>5.5cm seen by vascular specialist within two weeks of screening | ≥ 75% | ≥ 90% | 72.3%<sup>2</sup> | 74.2% |
| Percentage of men with AAA>5.5cm deemed appropriate for intervention who were operated on by vascular specialist within eight weeks of screening | ≥ 60% | ≥ 80% | 26.0%<sup>2</sup> | 33.3% |
| 30-day mortality rate following open elective AAA surgery<sup>1</sup> | < 5% | < 3.5% | n/a | n/a |
| 30-day mortality rate following EVAR intervention<sup>1</sup> | < 4% | < 2% | n/a | 0.8% |

**Key**

<table>
<thead>
<tr>
<th>Essential threshold not met</th>
<th>Essential threshold met</th>
<th>Desirable threshold met</th>
</tr>
</thead>
</table>

1. Due to small numbers, the mortality data are presented for the cumulative period from the start of the national screening programme, which began a phased implementation on 29 June 2012, to 31 March 2017.

2. Data are revised since first published on 7 March 2017. The data recorded on vascular referrals screened in the year ending 31 March 2016 has been updated to reflect the latest available information on these referrals.

n/a: not applicable. The figure for the cumulative period from the start of the programme to 31 March 2016, is not presented as the data are included in the figure for the cumulative period ending 31 March 2017.
Invitation to screening
Men become eligible for AAA screening when they reach 65 years of age and should be invited for screening before their 66th birthday. **KPI 1.1** measures the percentage of men eligible for screening who are sent an initial offer of screening before their 66th birthday.

NHS Boards were not expected to meet the essential threshold for this KPI during the implementation phase of the programme. NHS Boards were first expected to meet the essential criteria for this KPI for the latest year, which relates to the cohort of men turning age 66 in the year ending 31 March 2017. These men first became eligible for screening when they reached age 65 in the period from 1 April 2015 to 31 March 2016.

- Overall 99.9% of men in Scotland who turned 66 in the year ending 31 March 2017 were invited before their 66th birthday, exceeding the essential threshold of 90%. This was a slight increase on last year’s rate of 97.0%

- All NHS Boards had rates above 99% and achieved the essential threshold. Nine NHS Boards also achieved the desirable threshold, inviting 100% of eligible men before age 66 (Figure 1).

**Figure 1: KPI 1.1: Percentage of eligible population who are sent an initial offer to screening before age 66 by NHS Board of residence; men who turned 66 in year ending 31 March 2017**
### Attendance at screening

**KPI 1.2** measures the percentage of men offered screening who are tested (screened) before age 66 and 3 months. Although men should be invited for screening before their 66th birthday, some men may reschedule their appointment or not attend their first screening appointment. Therefore the uptake of screening is measured at age 66 and 3 months, giving men a further 3 months to attend following their 66th birthday.

- Uptake of the AAA screening programme was high with 84.4% of men in Scotland tested before age 66 and 3 months for the year ending 31 March 2017. This has remained constant for the past three years, just below the desirable threshold of 85%.
- All NHS Boards achieved an uptake rate of 80% or higher, and were therefore well above the essential threshold of 70%. Eight NHS Boards also met the desirable threshold of 85% (Figure 2).

**Figure 2: KPI 1.2: Percentage of men offered screening who are tested before age 66 and 3 months by NHS Board of residence; men who turned 66 in year ending 31 March 2017**

Five of the six NHS Boards which did not meet the desirable threshold all lie in the central belt of Scotland (Figure 3). The next section discusses how uptake of screening is lower in the most deprived areas and this partly explains why uptake rates were slightly lower in some of these NHS Board areas. For example, NHS Greater Glasgow & Clyde has a higher proportion of its eligible population living in the most deprived areas and this partly explains the slightly lower uptake rate in this NHS Board area. However the uptake of screening in NHS Greater Glasgow & Clyde was still high at 80.5%.

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**Information Services Division**
Figure 3: KPI 1.2: Percentage of men offered screening who are tested before age 66 and 3 months; men who turned 66 in year ending 31 March 2017

Essential ≥ 70%
Desirable ≥ 85%
Attendance at screening by deprivation

KPI 1.3 measures the percentage of men offered screening who are tested before age 66 and 3 months in each Scottish Index of Multiple Deprivation (SIMD) quintile.

- Uptake of screening was lower in the most deprived areas. For men in the most deprived areas (SIMD quintile 1), 76.0% of men were tested before 66 and 3 months. This rises to 89.0% for men in the least deprived areas (SIMD quintile 5).
- At Scotland level uptake rates were above the desirable threshold of 85% except in the two most deprived quintiles (SIMD quintiles 4 and 5). The essential threshold of 70% uptake was met in all deprivation quintiles (Figure 4).

Figure 4: KPI 1.3: Percentage of men offered screening who are tested before age 66 and 3 months by deprivation\(^1\), Scotland; men who turned 66 in year ending 31 March 2017

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1. Deprivation categories are Scottish Index of Multiple Deprivation (SIMD) 2016 Scotland level population-weighted quintiles.
Surveillance screens attendance

Men with a small or medium-sized aneurysm are invited to attend surveillance appointments to check the size of the aneurysm regularly to monitor any growth.

- Men with small aneurysms are invited to attend annual surveillance scans.
- Men with medium aneurysms are invited to attend quarterly surveillance scans (every three months).

Most aneurysms grow very slowly, and many men with a small or medium aneurysm never need treatment.

Annual surveillance scans due in the year ending 31 March 2017

**KPI 1.4a** measures the percentage of annual surveillance scans that were due where men are tested within 6 weeks of the due date.

- 96.0% of men were tested within six weeks of their annual surveillance appointment due date, which met the essential threshold of 90%.
- As the national programme has been running for several years, the cumulative number of men who have been identified as having a small aneurysm and included in annual surveillance has increased over this period. Although the number of annual surveillance appointments due has doubled since the year ending 31 March 2015, the percentage of men being seen within 6 weeks of their due date has remained constant at around 96%.
- Twelve NHS Boards met the essential threshold (Figure 5). The two NHS Boards that did not meet the essential target are island boards and have very low numbers of men in surveillance, which means their rates are prone to larger year-to-year fluctuations. In each of these island boards, there was only one man who was not tested within 6 weeks of the due date.

Quarterly surveillance scans due in the year ending 31 March 2017

**KPI 1.4b** measures the percentage of quarterly surveillance scans that were due where men are tested within 4 weeks of the due date.

- 95.5% of men were tested within four weeks of their quarterly surveillance appointment due date, which met the essential threshold of 90%. This is similar to rates in previous years, which were in the range 94 to 97%.
- Eleven NHS Boards met the essential threshold. Of these, three NHS Boards also met the desirable threshold of 100% (Figure 6). The three NHS Boards that did not meet the essential target are all island boards and have small numbers of men on quarterly surveillance, which means their rates are more prone to fluctuation.
Figure 5: KPI 1.4a: Percentage of annual surveillance appointments due where men are tested within 6 weeks of due date by NHS Board of residence\(^1\); year ending 31 March 2017

NHS Board of residence

1. The number of annual surveillance appointments due is small in some NHS Boards and therefore the rates are prone to larger year-to-year fluctuations.

Figure 6: KPI 1.4b: Percentage of quarterly surveillance appointments due where men are tested within 4 weeks of due date by NHS Board of residence\(^1\); year ending 31 March 2017

NHS Board of residence

* Indicates there were no men tested within 4 weeks of the due date of their quarterly surveillance.

1. The number of quarterly surveillance appointments due is small in some NHS Boards and therefore the rates are prone to larger year-to-year fluctuations.
Quality of screening
Sometimes it is not possible to clearly visualise a man’s aorta on ultrasound. Reasons can include high body mass index or excessive bowel gas. If an aorta cannot be fully visualised at the first scan, an invitation for a further scan is sent. Men with a second non-visualisation scan are discharged from the screening programme and their GP is informed.

KPI 2.1a measures the percentage of screening encounters where the aorta could not be visualised.

- There were over 29,500 initial and surveillance screens in the year ending 31 March 2017 and the non-visualisation rate was 2.0%, meeting the essential threshold of below 3%.
- Twelve NHS Boards met the essential threshold, of which six NHS Boards also met the desirable threshold of below 1%. Two NHS Boards did not meet the essential threshold, with rates of around 4%.
- There has been a slight rise in the number of screens where the aorta was not visualised between the years ending 31 March 2015 and 31 March 2017, from 1.1% to 2.0%. There could be a number of reasons for this including more men with a high body mass index being screened.

KPI 2.1b measures the percentage of men screened where the aorta could not be visualised. It should be noted that this KPI is monitoring the percentage of men who had one or more screen where a result could not be obtained because the aorta could not be visualised. If an aorta cannot be fully visualised at the first scan, men are offered a second scan, so some of the men included in this KPI will have had a definitive negative or positive screening result at their second scan.

The rates are similar to KPI 2.1a.

- Over 28,000 men had initial and/or surveillance screens in the year ending 31 March 2017 and the non-visualisation rate was 1.6%, meeting the essential threshold of below 3%.
- Twelve NHS Boards met the essential threshold, of which seven NHS Boards also met the desirable threshold of below 1%. Two NHS Boards did not meet the essential threshold, with rates just over 3% (Figure 7).
Figure 7: KPI 2.1b: Percentage of men screened where the aorta could not be visualised by NHS Board of screening; year ending 31 March 2017

† There were no men screened in NHS Shetland where the aorta could not be visualised. This met the essential and desirable targets.

1. The number of men screened is small in the island Boards (NHS Orkney, Shetland and Western Isles) and therefore the rates are prone to larger year-to-year fluctuations.

Every three months a sample of approximately 10% of scan images are randomly selected for review as part of a quality assurance audit. The lead screener for each NHS Board retrospectively reviews each of the images that were been taken during screening. Where a scan image fails the audit, lead screeners assess whether the man needs to be recalled for a repeat scan. In some instances, the scan image may be of adequate quality to obtain an accurate measurement and so no repeat scan is required, or for men on surveillance it may be sufficient for them to attend on their scheduled routine surveillance due date, if they have not already been routinely scanned again. In some cases the lead screener may decide the participant should be immediately recalled for a repeat scan. Immediate recall is used by lead screeners where there is a potential clinical risk associated with not repeating the scan through an immediate recall scan appointment.

KPI 2.2 measures the percentage of screened images that failed the quality assurance audit and required immediate recall.

- Of the 3,292 scans audited in Scotland for the year ending 31 March 2017, 61 scans (1.9%) failed the audit and required immediate recall. This meets the essential target of below 4%. Four NHS Boards did not meet the essential target.
There has been an increase in the percentage of images that failed the audit and required immediate recall since last year, from 0.4% to 1.9%.

The figures for KPI 2.2 should be interpreted with some caution due to data quality issues. The accuracy and comparability of the data on the quality assurance audit is dependent on the implementation of standardised approach to quality assurance. Some work has been undertaken by the screening programme to implement a standardised approach, though further work is required to review this and establish guidelines that will provide more robust quality assurance data. This may lead to a revision of the definition of this KPI. A targeted review of the consistency of application of the quality assurance audit guidance in NHS Boards is one of the reasons for the increase since last year in the number and percentage of scans which failed the quality assurance audit and classified as immediate recall.
Referral, clinical intervention and outcomes

Men with a large aneurysm (i.e. diameter of 5.5cm or greater) are referred to vascular specialist services for assessment and to discuss treatment options. Since the programme began there have been over 350 referrals from the screening programme to vascular specialist services up to 31 March 2017. Just over half of these men (56%) were referred to vascular services from surveillance, 38% of referrals were through initial screening of men in the routine eligible cohort, and 6% were through initial screening of men who self-referred into the programme. For further information see Table 5.

KPI 3.1 measures the percentage of men with an aneurysm measuring 5.5cm or greater who were seen by a vascular specialist within two weeks of screening.

- In the year ending 31 March 2017, 74.2% of men referred were seen within two weeks. This was a slight increase on the previous year (72.3%). These are both slightly below the essential threshold of 75% (Figure 8).
- In the most recent year seven NHS Boards met the essential threshold. Of these, five NHS Boards also met the desirable threshold of 95%. Five NHS Boards did not meet the essential threshold. NHS Orkney and NHS Forth Valley had no referrals in this period.

Figure 8: KPI 3.1: Percentage of men seen by vascular specialist within two weeks of screening by NHS Board of residence; years ending 31 March 2016 and 31 March 2017

* Indicates that among the men referred to vascular services, there were no men seen by a vascular specialist within two weeks of screening in the time period.

1. The number of vascular referrals is very small in some NHS Boards and therefore the rates are prone to larger year-to-year fluctuations.
Following referral and assessment by vascular specialist services, and where it is clinically appropriate, men are offered surgery for repair of the aneurysm.

**KPI 3.2** measures the percentage of men with an aneurysm measuring 5.5cm or greater deemed appropriate for intervention who were operated on by a vascular specialist within eight weeks of screening. Some cases will be complex as men may have other health conditions which need investigation and/or treatment by other specialists before surgery can proceed. This will mean that not every man deemed appropriate for surgery will be operated on within eight weeks and this is why the essential threshold is 60%.

- In the year ending 31 March 2017, only 33.3% of the 72 men deemed appropriate for surgery were operated on by a vascular specialist within eight weeks. This was substantially below the essential threshold of 60% (Figure 9).
- This is a small increase on the percentage of men operated on within 8 weeks of referral in the year ending 31 March 2016 (26.0%).
- Three NHS Boards met the essential threshold in the most recent year. Nine NHS Boards did not meet the essential threshold. NHS Orkney and NHS Forth Valley had no referrals in this time period.

Figure 9: KPI 3.2: Percentage of men deemed appropriate for surgery who were operated on by vascular specialist within eight weeks of screening by NHS Board of residence\(^1\); years ending 31 March 2016 and 31 March 2017

\* Indicates that among the men deemed appropriate for surgery, there were no men operated on by a vascular specialist within eight weeks of screening in the time period.

\(^1\) The number of vascular referrals is very small in some NHS Boards and therefore the rates are prone to larger year-to-year fluctuations.
For men who have surgery there are two methods of aneurysm repair. Open AAA surgery is an operation involving cutting open the abdomen to replace the swollen section of the aorta with an artificial piece of artery (graft). Endovascular Aneurysm Repair (EVAR) is a method of AAA repair by placing a graft within the aneurysm from a small cut in the groin.

KPI 4.1 and KPI 4.2 measure the 30-day mortality rate following elective surgery. Elective surgery is non-emergency surgery which has been planned in advance. Due to small numbers, data for these KPIs are presented for the cumulative period from implementation to 31 March 2017 and at Scotland level only.

- Since the programme began the 30-day mortality rate following elective open surgery was 2.1%. This meets the desirable threshold of below 3.5%.
- The 30-day mortality rate following EVAR was 0.8%, which meets the desirable threshold of below 2%.

A minor amendment to the definition of KPIs 4.1 and 4.2 has been implemented in this publication. Data are now collated and reported by year of surgery rather than year of screening. The impact of this change on the figures reported is negligible. Further details can be found in Appendix A1.

For further information on the KPIs see the downloadable data tables.
Results from initial screening for eligible cohort

There are five possible results from AAA screening:

- Normal (negative): Aortic diameter less than 3.0cm
- Small AAA (positive): Aortic diameter between 3.0 and 4.4cm
- Medium AAA (positive): Aortic diameter between 4.5 and 5.4cm
- Large AAA (positive): Aortic diameter of 5.5cm or greater
- Non-visualisation: Aorta cannot be fully visualised

Among the men in the routine eligible cohort who turned 66 in the year ending 31 March 2017:

- Over 25,500 men were tested and 350 (1.4%) had a positive result (an aneurysm of 3.0cm or greater). This figure includes men who were tested after 66 years and 3 months. The aneurysm detection rate has stayed constant since the programme began (Table 1).
- 80.0% of men who had a positive result were found to have a small aneurysm, 10.3% medium and 9.7% large. This is similar to previous years, although there has been a slight increase in the number of men with a large aneurysm (Table 3).

Since the programme began in 2012:

- Over 113,000 men in Scotland have been tested and 1,662 (1.5%) had a positive result (Table 1).
- 80.7% of men who were diagnosed with an AAA were found to have a small aneurysm, 11.9% medium and 7.5% large (Table 2).
- The rate of positive results in men from the most deprived areas (1.9%) is almost double that compared to men in the least deprived areas (1.0%) (Figure 10) (Table 3).

Figure 10: Percentage of positive screen results among eligible population initially screened by deprivation¹, Scotland; cumulative total to 31 March 2017

1. Deprivation categories are Scottish Index of Multiple Deprivation (SIMD) 2016 Scotland level population-weighted quintiles.
Results from initial screening for self-referrals

A self-referral to the AAA screening programme is a man over the age of 65 who has not been screened previously, who contacts their local AAA screening centre directly to request screening.

In the year ending 31 March 2017:

- 739 men who had self-referred were tested.
- 26 men (3.5%) had a positive result (an aneurysm of 3.0cm or greater).
- There has been a decrease in the number of men self-referring into the programme, almost halving since the year ending 31 March 2015. One of the reasons for this is that the screening programme has now been running for several years and so many men over 65 have already been screened as part of the routine programme. This means the number of men aged over 65 who have not been screened previously, and who may wish to self-refer, has decreased. The number of men in the cohort of potential self-referrals will continue to decrease each year.

Since the programme began in 2012:

- Just over 4,900 men have self-referred and been tested, of whom 144 men (2.9%) had a positive result.
- The positive result rate is higher among men who self-referred compared to the 1.5% positive result rate observed for men in the cumulative routine eligible cohort who turned 66. This is expected as men in the self-referral cohort are older and previous research [2] shows the prevalence of AAAs increases with age.

See Table 6 for further information on results from screening for self-referrals.
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Abdominal Aortic Aneurysm (AAA)</strong></td>
<td>An abnormal expansion of the aorta, which if untreated it may enlarge further and rupture.</td>
</tr>
<tr>
<td><strong>Collaborative</strong></td>
<td>NHS Boards in different areas working together to provide health services.</td>
</tr>
<tr>
<td><strong>Elective (surgery)</strong></td>
<td>Elective surgery is non-emergency surgery which has been planned in advance.</td>
</tr>
<tr>
<td><strong>Eligible</strong></td>
<td>The population that is entitled to an offer of screening.</td>
</tr>
<tr>
<td></td>
<td>Men living in Scotland become eligible for screening when they reach age 65 and should be invited for screening before their 66th birthday.</td>
</tr>
<tr>
<td></td>
<td>The eligible population does not include men who are excluded from screening in accordance with national guidance, such as men who have already had an aneurysm repair.</td>
</tr>
<tr>
<td></td>
<td>Note that men on surveillance and men who self-referred fall outside this definition of eligible.</td>
</tr>
<tr>
<td><strong>Endovascular Aneurysm Repair (EVAR)</strong></td>
<td>A method of AAA repair by placing a graft within the aneurysm from a small cut in the groin.</td>
</tr>
<tr>
<td><strong>Financial year</strong></td>
<td>The year from 1 April to 31 March.</td>
</tr>
<tr>
<td><strong>Initial screen</strong></td>
<td>The first screening(s) to detect an aneurysm.</td>
</tr>
<tr>
<td><strong>Island Boards</strong></td>
<td>NHS Orkney, NHS Shetland and NHS Western Isles.</td>
</tr>
<tr>
<td><strong>Lead screener (for AAA)</strong></td>
<td>The professional lead for the screening workforce in an NHS Board and responsible for the ongoing quality assurance of the local AAA screening programme, including the quality assurance of images and the workforce.</td>
</tr>
<tr>
<td><strong>Negative result (from screening)</strong></td>
<td>An indication following a test that the condition being screened for is low-risk / not suspected in a subject.</td>
</tr>
<tr>
<td><strong>Offer</strong></td>
<td>A formal communication made by the screening service, giving a specific subject an opportunity to be tested.</td>
</tr>
<tr>
<td><strong>Open AAA surgery</strong></td>
<td>An AAA repair operation involving cutting open the abdomen to replace the swollen section of the aorta with an artificial piece of artery (graft).</td>
</tr>
<tr>
<td><strong>Population</strong></td>
<td>The overall population for which a screening service is responsible.</td>
</tr>
<tr>
<td><strong>Positive result (from screening)</strong></td>
<td>An indication following a test that the condition being screened is high-risk / suspected in a subject. A screen positive in AAA screening is a maximum anterior-posterior aortic diameter of greater than or equal to 3.0cm, measured across the interior lumen.</td>
</tr>
<tr>
<td><strong>Refer</strong></td>
<td>The process of securing further diagnosis / specialist assessment following a screen positive test.</td>
</tr>
</tbody>
</table>
| **Result** | A formal and completed assessment of the risk of a condition being screened for in a subject, following a screening encounter. 
There are five possible results from AAA screening: 
- Normal (negative): Aortic diameter less than 3.0cm 
- Small AAA (positive): Aortic diameter between 3.0 and 4.4cm 
- Medium AAA (positive): Aortic diameter between 4.5 and 5.4cm 
- Large AAA (positive): Aortic diameter of 5.5cm or greater 
- Non-visualisation: Aorta cannot be fully visualised |
| **Scan or screen (for AAA)** | A screening encounter where the subject is tested for AAA (ultrasound scan of abdomen). |
| **Screener** | A healthcare professional responsible for administering screening tests. |
| **Screening** | Testing people who do not have or have not recognised the signs or symptoms of the condition being tested for, either with the aim of reducing risk of an adverse outcome, or with the aim of giving information about risk. |
| **Screening encounter (for AAA)** | The provision of AAA screening to a man by a healthcare professional through the process of a scan. |
| **Self-referral** | Man over the age of 65 who has not been screened previously, who contacts their local AAA screening centre directly to request screening. |
| **SIMD** | The Scottish Index of Multiple Deprivation (SIMD) is the Scottish Government's official tool for identifying small area concentrations of multiple deprivation across Scotland in a consistent way. The index is a means of identifying where Scotland’s most deprived areas are. It incorporates several different aspects of deprivation (for example income, access to services, health) and combines them into a single index. It is used for a wide range of purposes including as a statistical classification for measuring and monitoring inequalities in health and healthcare activity. 
The deprivation categories used in this publication are the Scottish Index of Multiple Deprivation (SIMD) 2016 Scotland level population-weighted quintiles. |
Population-weighted deprivation quintiles each contain approximately 20% of the total population in Scotland. Deprivation quintile 1 contains the 20% of the population living in the most deprived datazones (small geographical areas); while quintile 5 contains the 20% of the population living in the least deprived datazones.

### Surveillance screen
Screens for men who have a detected small or medium aneurysm, to check the size of the aneurysm to monitor any growth. Men with small aneurysms are invited for annual surveillance screening. Men with medium aneurysms are invited for surveillance screening every three months (quarterly).

### Uptake
The proportion of those offered screening who are tested. Uptake is a measure of the delivery of screening in the population to which it is offered. Low uptake might indicate that:
- those offered screening are not accepting the test; and/or
- those accepting the test are not being tested

### Bibliography

List of Tables

<table>
<thead>
<tr>
<th>File name</th>
<th>File and size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Key Performance Indicator tables</td>
<td>Excel 134 Kb</td>
</tr>
<tr>
<td>Supplementary tables on screen results, self-referrals and sources of referral to vascular services</td>
<td>Excel 76 Kb</td>
</tr>
</tbody>
</table>

Contact

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Further Information

Further Information can be found on the ISD website.
For more information on the Scottish Abdominal Aortic Aneurysm Screening Programme Statistics see the AAA Screening section of our website.

The next release of this publication will be in March 2019.

Rate this publication

Please provide feedback on this publication to help us improve our services.
Appendices

Appendix 1 – Background information

Data collection and analysis

Data for the screening programme are derived from the Scottish AAA Call Recall System. This system facilitates the invitation of men for screening and records the results. It is used by all NHS Boards in Scotland. Some NHS Boards run the programme on a collaborative basis, for example NHS Fife and NHS Tayside operationally run the national programme as a collaborative.

Information Services Division (ISD) receives data extracts from the system for the purpose of producing and publishing statistics on the AAA screening programme in Scotland. Data for this report were extracted on 7 September 2017.

Definitions

Eligible cohort

The data relates to men in the relevant age range who are registered with a Community Health Index (CHI) number.

Men become eligible for screening when they reach age 65 and should be invited for screening before their 66th birthday. The eligible population does not include men who are excluded from screening in accordance with national guidance, such as men who have already had an aneurysm repair. The date of birth ranges of the cohorts eligible for initial screening included in this report are provided in the downloadable data tables.

Key Performance Indicators

For details of the definitions used for the calculation of each of the key performance indicators see Guidance and information on the key performance indicators (KPI) for the Abdominal Aortic Aneurysm screening programme.

Revisions

Planned revisions

The figures in some tables are subject to planned revisions to reflect updated data. The changes are expected to be minor.

- KPIs 3.1, 4.1 and 4.2 are subject to planned revisions where data were incomplete or amendments to the data recorded were made by NHS Boards following extraction of the data for publication. ISD conduct data quality assurance checks with NHS Boards to help ensure vascular referral data are complete and accurate, however in occasional instances NHS Boards may not have recorded all the required data on vascular referrals by the date of the ISD data extract from the IT system.
- KPI 3.2 is subject to planned revisions as the status of a man screened and referred to vascular services in a particular screening year may change following extraction of the
data. Updated data for men referred in a previous screening year who were deemed appropriate for surgery after the data extract date will be included in the calculation of KPI 3.2 in the following annual publication, leading to a planned revision. In addition, planned revisions of this KPI will also be made where data were incomplete or amendments to the data recorded were made by NHS Boards following extraction of the data for publication.

- Supplementary tables 1, 3 and 6 are subject to planned revisions due to updates in the latest initial screening tests and results for men. For example, these updates include results for a small number of men tested later than when they were first eligible for screening.

**Minor amendment to definition of KPIs 4.1 and 4.2**

KPIs 4.1 and 4.2 measure the 30-day mortality rates following elective open AAA surgery and EVAR intervention respectively. A minor amendment to the definition of KPIs 4.1 and 4.2 has been implemented in this publication. Data are now collated and reported by year of surgery rather than year of screening. The reason underlying this change is to avoid data revisions for previous screening years which are due to updated outcomes for vascular referrals. For example, under the previous definition an update to the data for a previous screening year would be necessary if a man was under ongoing assessment by vascular services at the time of publication and was later deemed appropriate for surgery and had surgery.

Under the new definition, the KPI 4.1 and 4.2 data for previous years would only require revision if the vascular referral data was incomplete at the time of the ISD data extract, or a recording error in the data was identified. To minimise the likelihood of this happening, ISD conduct data quality assurance checks with NHS Boards to help ensure the accuracy and completeness of vascular referral data.

Changing the definition to collate the data by year of surgery has a negligible impact on the reported statistics for the cumulative period to 31 March 2017:

- The 30-day mortality rate following elective open surgery increases marginally from 2.0% to 2.1% under the new definition.
- There is no change in 30-day mortality rate (expressed to 1 decimal point) following EVAR.
NHS Board implementation

The introduction of the AAA screening programme in Scotland was phased from June 2012. NHS Highland and NHS Western Isles had a local AAA screening programme in operation for several years prior to the introduction of the national screening programme, and were the first NHS Boards to implement the national programme.

Details of the start dates of the programme in each NHS Board are provided in the following table. It is important to consider these dates when interpreting the statistics.

<table>
<thead>
<tr>
<th>NHS Board</th>
<th>Programme start date for invitations and/or clinics</th>
</tr>
</thead>
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<tr>
<td>Ayrshire &amp; Arran</td>
<td>26 Jun 2013</td>
</tr>
<tr>
<td>Borders</td>
<td>30 Aug 2012</td>
</tr>
<tr>
<td>Dumfries &amp; Galloway</td>
<td>05 Aug 2013</td>
</tr>
<tr>
<td>Fife</td>
<td>28 Jan 2013</td>
</tr>
<tr>
<td>Forth Valley</td>
<td>21 Oct 2013</td>
</tr>
<tr>
<td>Grampian</td>
<td>25 Oct 2012</td>
</tr>
<tr>
<td>Greater Glasgow &amp; Clyde</td>
<td>25 Feb 2013</td>
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<tr>
<td>Highland</td>
<td>29 Jun 2012</td>
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<tr>
<td>Lanarkshire</td>
<td>25 Apr 2013</td>
</tr>
<tr>
<td>Lothian</td>
<td>30 Aug 2012</td>
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<tr>
<td>Orkney</td>
<td>25 Oct 2012</td>
</tr>
<tr>
<td>Shetland</td>
<td>25 Oct 2012</td>
</tr>
<tr>
<td>Tayside</td>
<td>28 Jan 2013</td>
</tr>
<tr>
<td>Western Isles</td>
<td>29 Jun 2012</td>
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## Appendix 2 – Publication Metadata

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<tr>
<th>Metadata Indicator</th>
<th>Description</th>
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<td>Publication title</td>
<td>Scottish Abdominal Aortic Aneurysm (AAA) Screening Programme Statistics</td>
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<tr>
<td>Description</td>
<td>Key Performance Indicators (KPIs) on invitation and attendance at screening, the quality of screening, and vascular referrals. The report also includes data on screening results and self-referrals.</td>
</tr>
<tr>
<td>Theme</td>
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<td>Topic</td>
<td>Public Health</td>
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<tr>
<td>Format</td>
<td>Excel workbooks, PDF</td>
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<tr>
<td>Data source(s)</td>
<td>Scottish AAA Call Recall System</td>
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<tr>
<td>Date that data are acquired</td>
<td>7 September 2017</td>
</tr>
<tr>
<td>Release date</td>
<td>6 March 2018</td>
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<tr>
<td>Frequency</td>
<td>Annual</td>
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<tr>
<td>Timeframe of data and timeliness</td>
<td>Eligible cohort data for men turning 66 up to 31 March 2017. The publication also includes data on vascular referrals, self-referrals, the quality of scans and surveillance screens for screens up to 31 March 2017. Follow-up information on vascular referrals that were screened to 31 March 2017 reflects the data recorded at 7 September 2017.</td>
</tr>
<tr>
<td>Continuity of data</td>
<td>KPI data are available from the year ending 31 March 2015. Data on screening results are available from the year ending 31 March 2013. The programme began a phased implementation in June 2012 and NHS Board implementation dates should be considered when interpreting the statistics.</td>
</tr>
<tr>
<td>Revisions statement</td>
<td>Some of the figures in this publication are subject to planned revisions to reflect updated data. See Appendix A1 for further details. For general information see the ISD Revisions Policy.</td>
</tr>
<tr>
<td>Revisions relevant to this publication</td>
<td>A minor amendment to the definition of KPIs 4.1 and 4.2 (30-day mortality rates) has been implemented in this publication. Data are now collated and reported by year of surgery rather than year of screening. The impact of this change on the figures reported is negligible. Further details can be found in Appendix A1.</td>
</tr>
<tr>
<td>Concepts and definitions</td>
<td>Further information on the AAA screening programme in Scotland can be found on the NHS Inform website.</td>
</tr>
<tr>
<td>Relevance and key uses of the statistics</td>
<td>The data are used to monitor and evaluate the Scottish AAA screening programme. The purpose of reporting achievement of the key performance indicators is to give a high level view of the performance of the AAA screening programme, act as a driver for continuous improvement, and to direct specific review of any areas that (from the KPIs) appear to be underperforming.</td>
</tr>
<tr>
<td>Accuracy</td>
<td>The data extract from the Scottish AAA Call Recall System is subject to validation and quality assurance procedures in ISD, with the assistance of NHS Boards and the system suppliers in investigating data quality queries. A few small data quality issues with the data extract have been identified, however these are not expected to have materially affected the reported results and findings.</td>
</tr>
<tr>
<td>Completeness</td>
<td>The data relates to men registered with a Community Health Index (CHI) number. The data are not a sample.</td>
</tr>
<tr>
<td>Comparability</td>
<td>Data are broadly comparable with other countries in the UK though there are some small differences in the organisation and delivery of the programme across countries. AAA screening data are available for <a href="https://www.nhsinform.scot">England</a>, <a href="https://www.ha.scot.nhs.uk">Wales</a>, and <a href="https://www.ha.scot.nhs.uk">Northern Ireland</a>.</td>
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</tbody>
</table>

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29
<table>
<thead>
<tr>
<th><strong>Accessibility</strong></th>
<th>It is the policy of ISD Scotland to make its web sites and products accessible according to published guidelines.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Coherence and clarity</strong></td>
<td>Data are available as a PDF and tables on the AAA Screening area of the ISD website.</td>
</tr>
<tr>
<td><strong>Value type and unit of measurement</strong></td>
<td>Numbers and percentages.</td>
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<tr>
<td><strong>Disclosure</strong></td>
<td>The ISD protocol on Statistical Disclosure Protocol is followed.</td>
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<tr>
<td><strong>Official Statistics designation</strong></td>
<td>Official statistics</td>
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<tr>
<td><strong>UK Statistics Authority Assessment</strong></td>
<td>These are official statistics which have not been submitted for assessment by the UK Statistics Authority</td>
</tr>
<tr>
<td><strong>Last published</strong></td>
<td>7 March 2017</td>
</tr>
<tr>
<td><strong>Next published</strong></td>
<td>March 2019</td>
</tr>
<tr>
<td><strong>Date of first publication</strong></td>
<td>1 March 2016</td>
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<td><strong>Help email</strong></td>
<td><a href="mailto:nss.isdaaascreen@nhs.net">nss.isdaaascreen@nhs.net</a></td>
</tr>
<tr>
<td><strong>Date form completed</strong></td>
<td>13 February 2018</td>
</tr>
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</table>
Appendix 3 – Early access details

Pre-Release Access

Under terms of the "Pre-Release Access to Official Statistics (Scotland) Order 2008", ISD is obliged to publish information on those receiving Pre-Release Access ("Pre-Release Access" refers to statistics in their final form prior to publication). The standard maximum Pre-Release Access is five working days. Shown below are details of those receiving standard Pre-Release Access.

Standard Pre-Release Access:
Scottish Government Health and Social Care Directorate
NHS Board Chief Executives
NHS Board Communication leads

Early Access for Quality Assurance
These statistics will also have been made available to those who needed access to help quality assure the publication:
AAA Screening Governance Quality Assurance Reference Group
AAA Screening NHS Board Clinical Leads
AAA Screening NHS Board Co-ordinators
AAA Screening NHS Board Lead Screeners
AAA Screening NHS Board Call Recall Managers
National Specialist and Screening Services Directorate (NSD)
Appendix 4 – ISD and Official Statistics

About ISD

Scotland has some of the best health service data in the world combining high quality, consistency, national coverage and the ability to link data to allow patient based analysis and follow up.

Information Services Division (ISD) is a business operating unit of NHS National Services Scotland and has been in existence for over 40 years. We are an essential support service to NHSScotland and the Scottish Government and others, responsive to the needs of NHSScotland as the delivery of health and social care evolves.

Purpose: To deliver effective national and specialist intelligence services to improve the health and wellbeing of people in Scotland.

Mission: Better Information, Better Decisions, Better Health

Vision: To be a valued partner in improving health and wellbeing in Scotland by providing a world class intelligence service.

Official Statistics

Information Services Division (ISD) is the principal and authoritative source of statistics on health and care services in Scotland. ISD is designated by legislation as a producer of ‘Official Statistics’. Our official statistics publications are produced to a high professional standard and comply with the Code of Practice for Official Statistics. The Code of Practice is produced and monitored by the UK Statistics Authority which is independent of Government. Under the Code of Practice, the format, content and timing of statistics publications are the responsibility of professional staff working within ISD.

ISD’s statistical publications are currently classified as one of the following:

- National Statistics (ie assessed by the UK Statistics Authority as complying with the Code of Practice)
- National Statistics (ie legacy, still to be assessed by the UK Statistics Authority)
- Official Statistics (ie still to be assessed by the UK Statistics Authority)
- other (not Official Statistics)

Further information on ISD’s statistics, including compliance with the Code of Practice for Official Statistics, and on the UK Statistics Authority, is available on the ISD website.