UK National Screening Committee

UK AAA Screening Programmes: 10 Year Effectiveness Review

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AAA programme implementation

UK National Screening Committee

The UK NSC made a recommendation for a AAA screening programme in 2005 after a review of the evidence from RCTs

- AAA screening could be offered to men aged 65, provided they were given clear information about the risks of elective surgery
- Steps must be taken to create networks of vascular surgical services to allow further specialisation, bigger throughput and therefore lower risk

In 2009 the Vascular Society of Great Britain and Ireland set standards for treatment of AAAs in a quality improvement framework

- Resulted in centralisation of vascular services into a hub and spoke model
- Pre-implementation QA programme set up to check and approve sites
- Men diagnosed with AAA in the screening programmes could only be referred to vascular services formally accredited to these standards

VASCULAR SOCIETY

A phased implementation of the AAA screening programmes began across the UK in 2009. Full coverage of the population was achieved in Northern Ireland in 2012, and in England, Scotland and Wales in 2013.

The AAA screening programmes

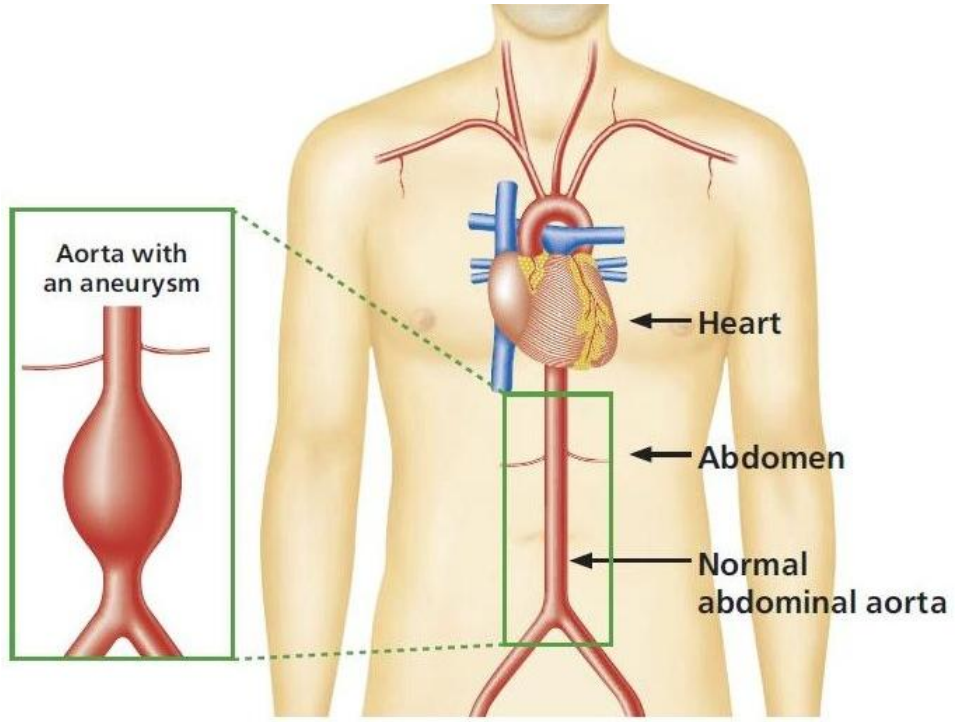
Abdominal Aortic Aneurysm screening is offered to men during the screening year (1 April to 31 March) that they turn 65.

Men over the age of 65 who have not had screening can self-refer into the programme for the one-off screen.

The screening test is an ultrasound of the abdomen, and the result is given to the man straight away.

Four possible results from the scan:

- no aneurysm found
- small AAA (3.0cm to 4.4cm)
- medium AAA (4.5cm to 5.4cm)
- large AAA (over 5.5cm)



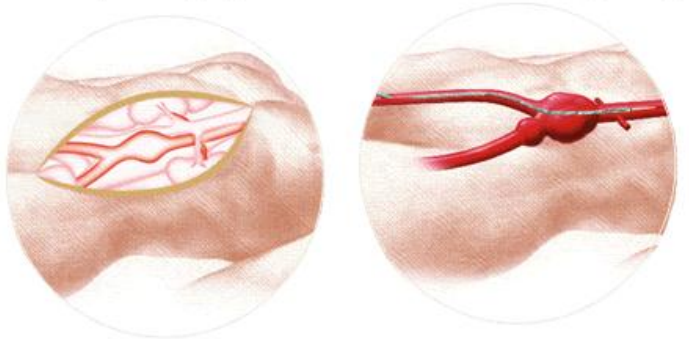
AAA screening pathway

Identify cohort

Test

Open surgery

Endovascular stent grafting



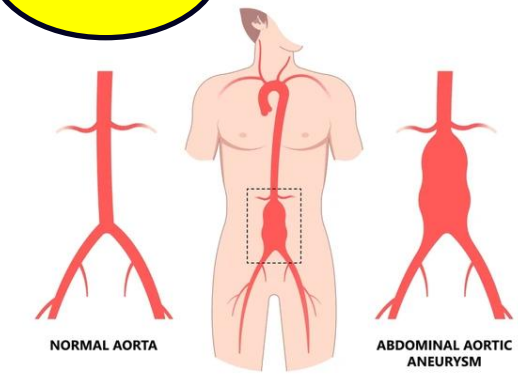
Treatment

Vascular Services 5.5cm+

Invitation

No AAA <3cm

Referral



12m 3-4.4cm

3m 4.5-5.4cm

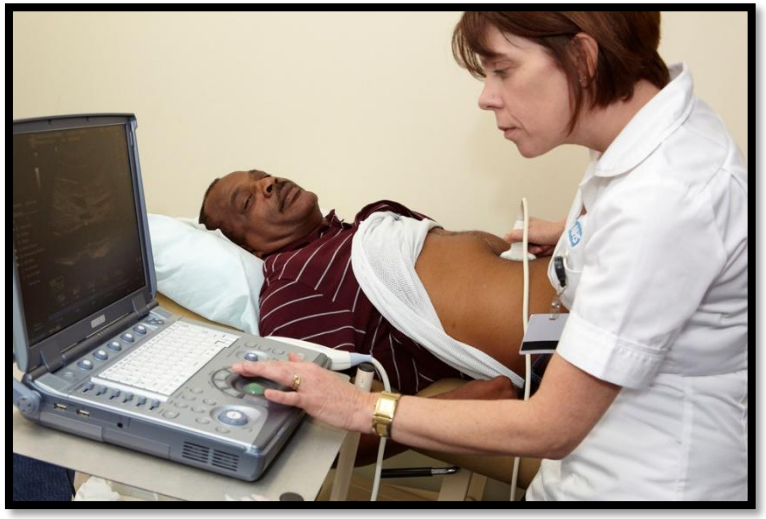
Surveillance

AAA effectiveness review work

Our aim was to review the impact of the programmes over the past decade, since AAA screening was fully rolled out across the 4 nations in 2013.

To assess the effectiveness of the programmes we:

- Determined the key stakeholders relevant to the programmes
- Established an effectiveness review advisory group
- Agreed the elements that determined effectiveness
- Obtained data from all 4 nations
- Produced a report for the UK NSC



Is AAA screening effective?

The aim of AAA screening is to reduce mortality from ruptured AAA in men.

Surgery for rAAA (Vascular Society Registry)

2013
n=975

→

2022
n=445

54% reduction

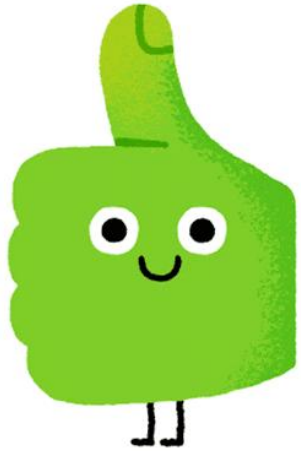
Death from AAA (ONS)

2012
1%

→

2022
0.6%

40% reduction



Data sources

NHS England

Public Health Scotland

Northern Ireland Statistics & Research Agency

GIG CYMRU NHS WALES
Iechyd a Gofal Digidol Cymru
Digital Health and Care Wales

Mortality statistics and hospital admissions

AAA programme data from 4 nations

NHS National Services Scotland

Office for National Statistics

National Records of Scotland

GIG CYMRU NHS WALES
Iechyd Cyhoeddus Cymru
Public Health Wales

VSQIP Vascular Services Quality Improvement Programme

Cost-effectiveness

HSC Public Health Agency

Treatment data

UNIVERSITY OF LEICESTER

Background

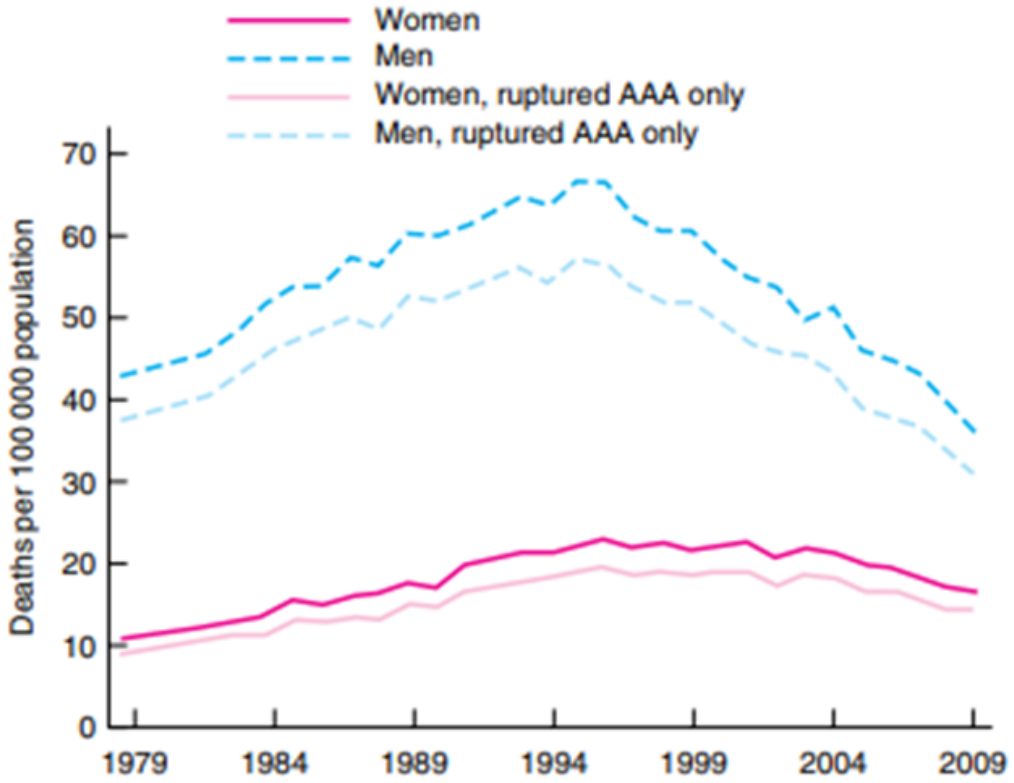
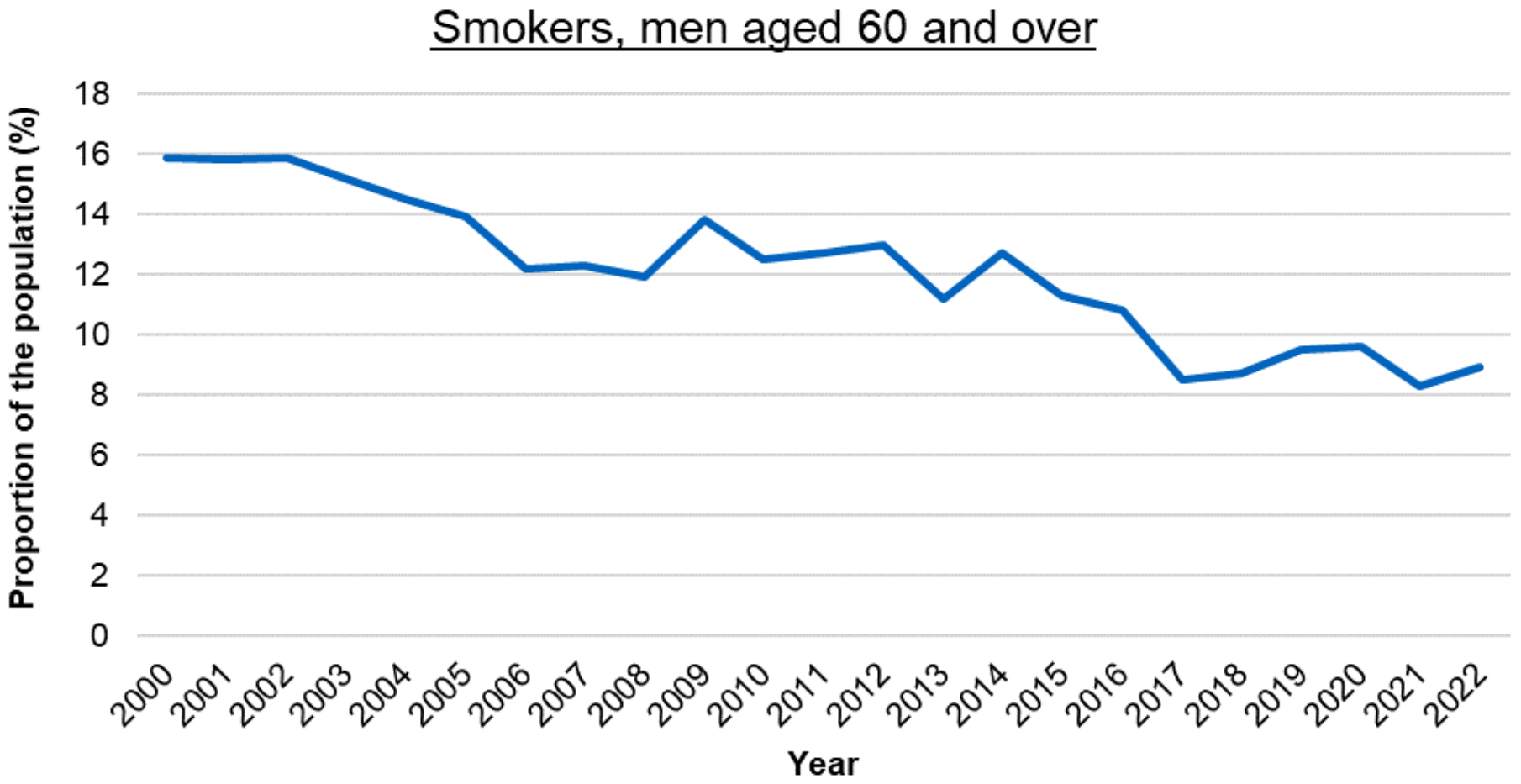


Figure 1: Mortality from all AAA and ruptured AAA, 1979 to 2009 in England and Wales

Background


Smokers, men aged 60 and over
Proportion of the population (%)
18
16
14
12
10
8
6
4
2
0
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Year

Results

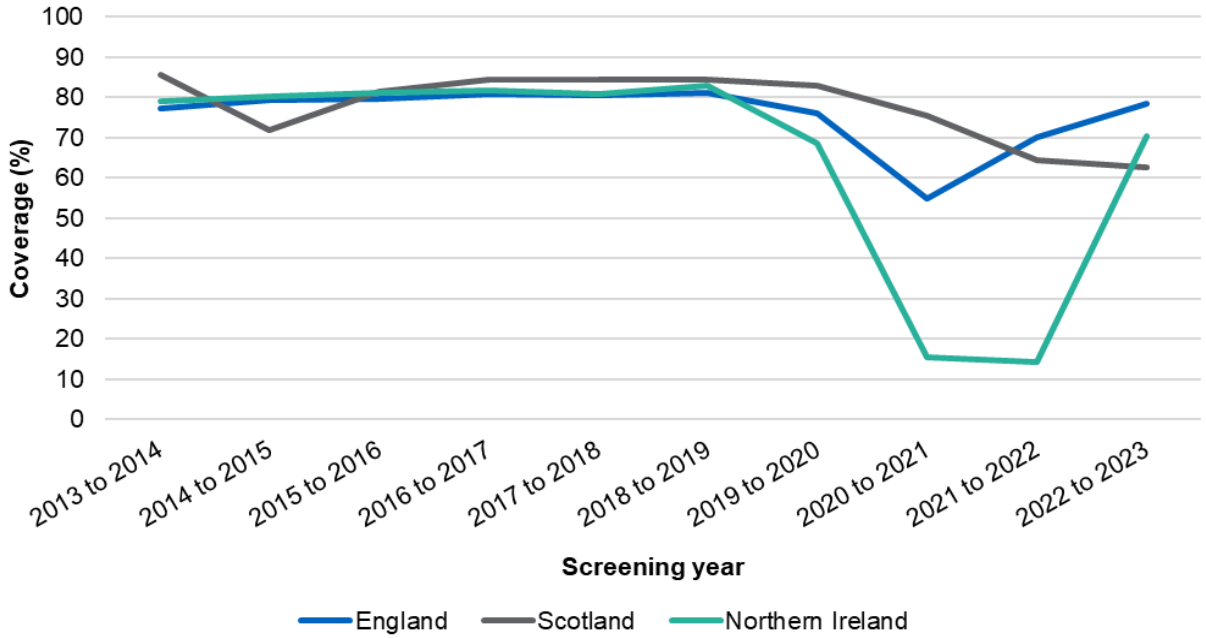
7.1 Cohort offered screening

Table 1: Overview of AAA screening in 10 years (2013/14 to 2022/23) by UK country

	Number eligible	Uptake	Coverage	Non-visualised screens
England	2,968,569	79.6%	75.8%	1.25%
Wales	177,777	77.8%	-	1.16%
Scotland	353,473	84.5%	77.8%	2.36%
Northern Ireland	97,060	82.8%	65.9%	1.77%

Figure A1: Coverage of the initial screen by UK country

Note: Wales do not measure coverage



Coverage is the number of eligible cohort men who had a conclusive screen result within the screening year plus an additional 2 months.

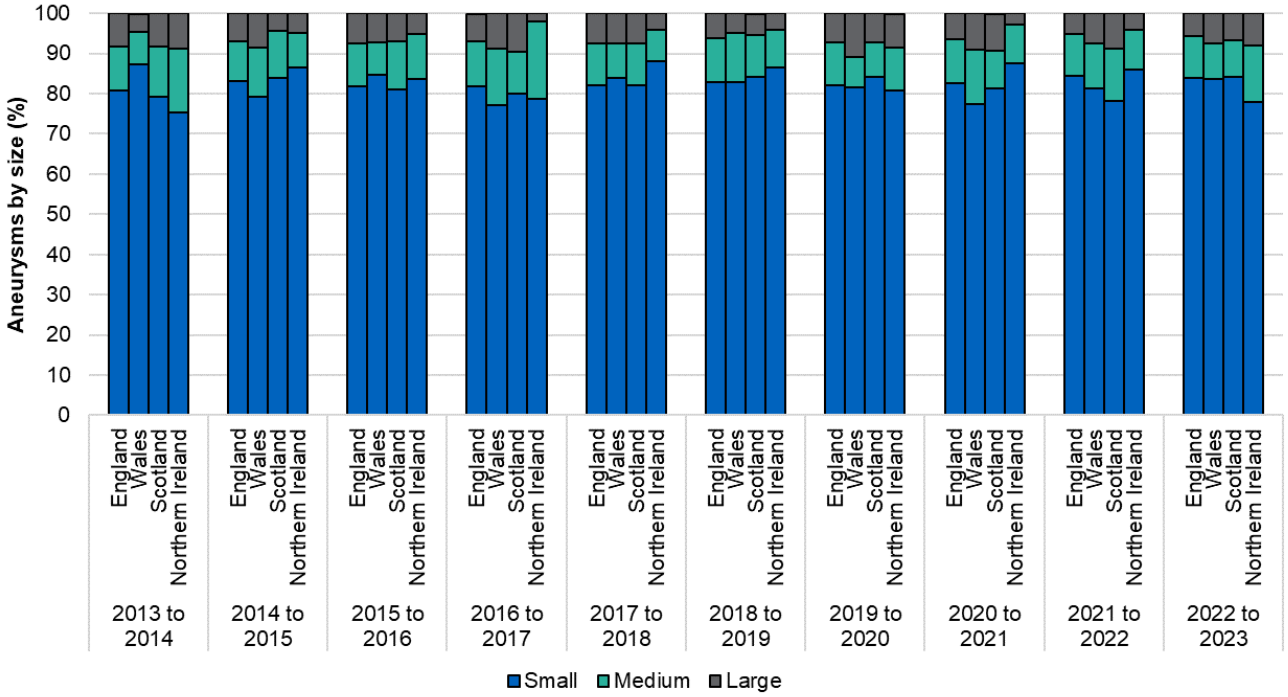
Uptake is the number of eligible cohort men offered screening who had a conclusive screen result within the screening year plus an additional 2 months.

Source: AAA screening programmes

Results

7.2 Detection rate and size

Figure 5: Size of AAA detected on initial screen by UK country, 2013/14 to 2022/23



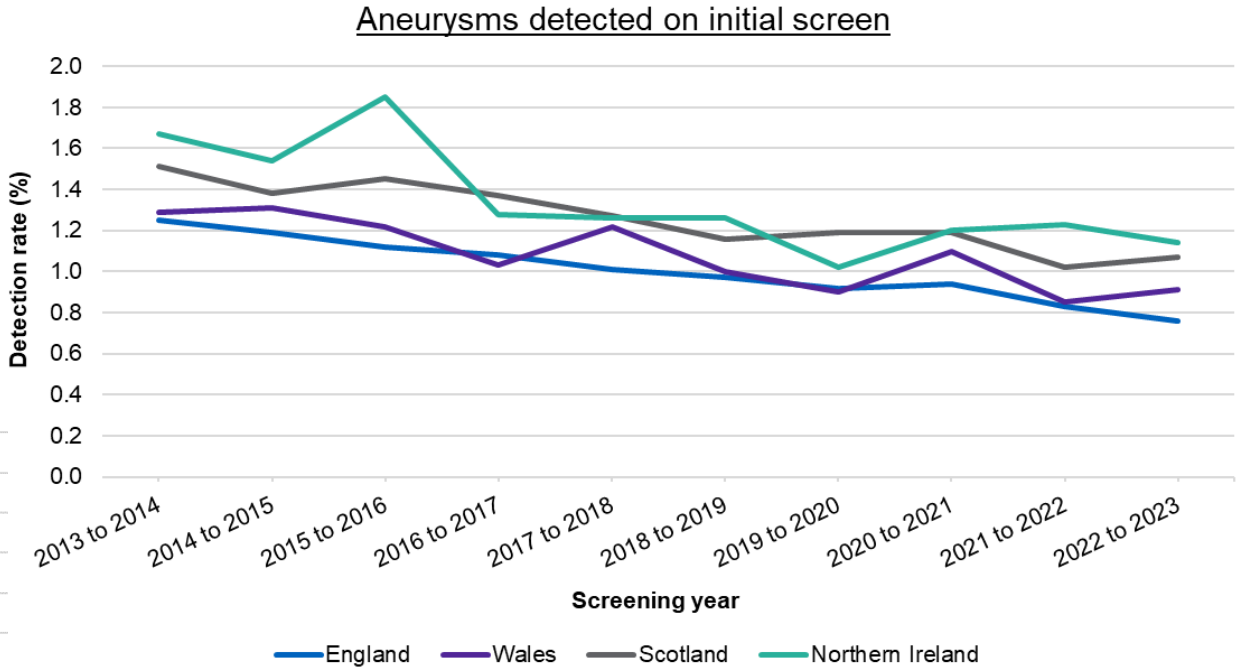


Figure 4: Prevalence of AAA in screened men by UK country, April 2013 to March 2023

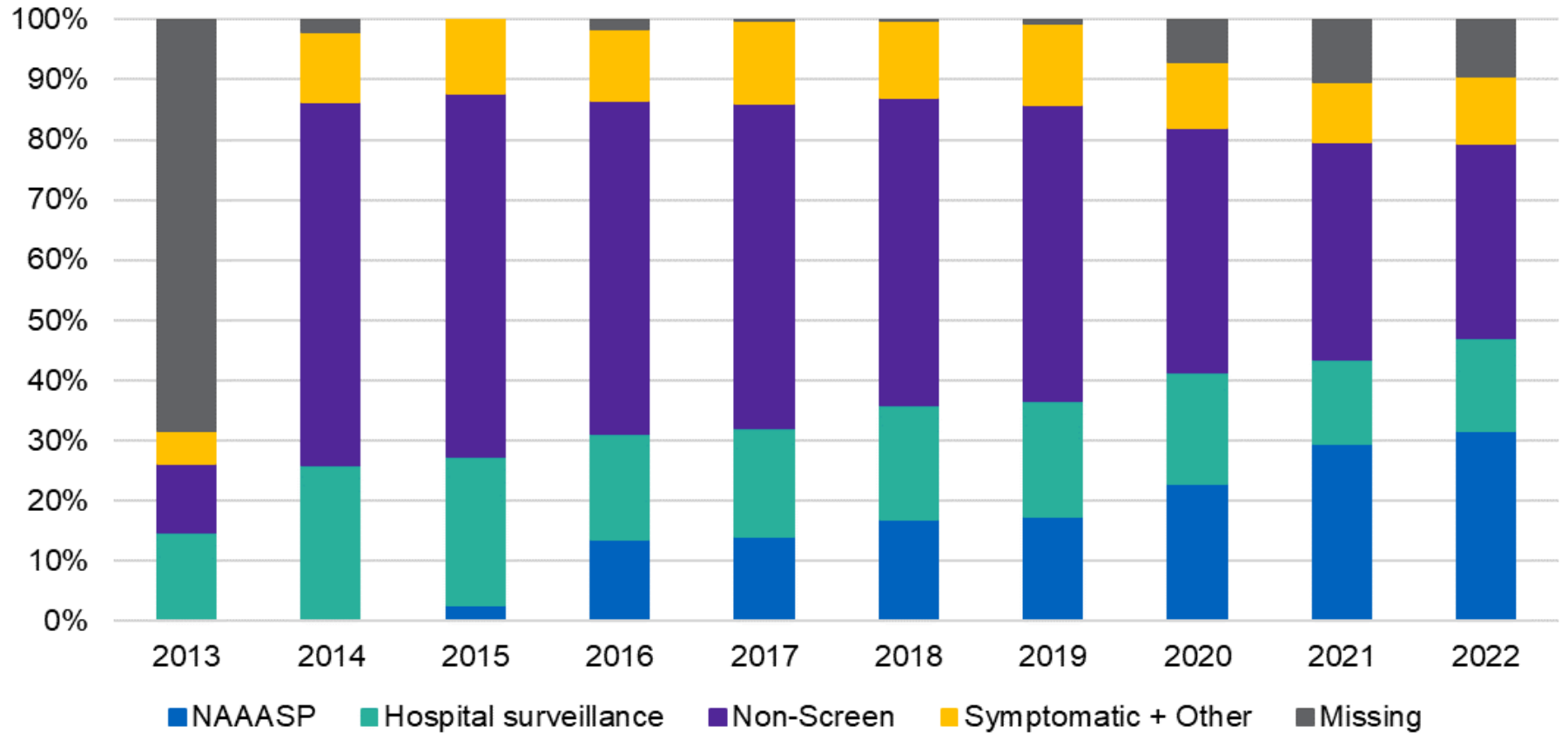
7,777 Men with large AAA referred for vascular intervention

Source: AAA screening programmes

Results

7.4 NVR data

Figure 7: Proportion of elective surgeries by presenting problem, UK (NVR data)



Source: NVR

Results

Repairs

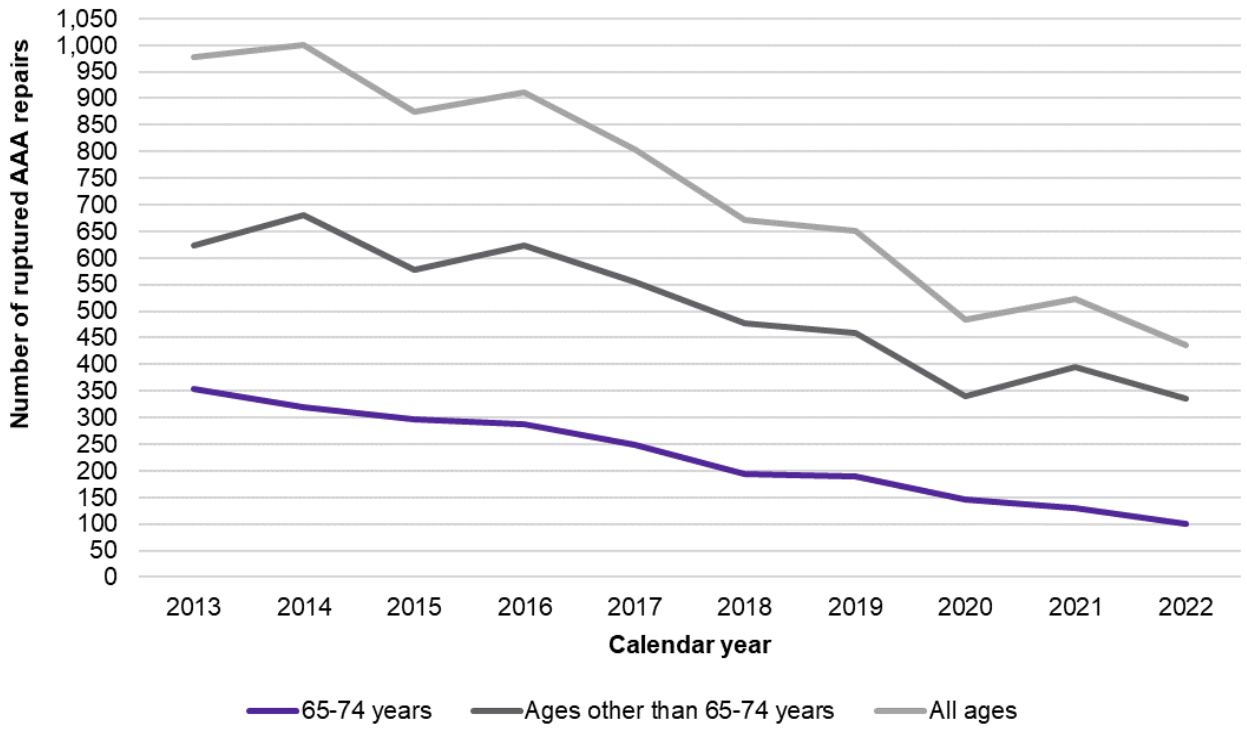


Figure 9: Number of ruptured AAA repairs by age group, UK (NVR data)

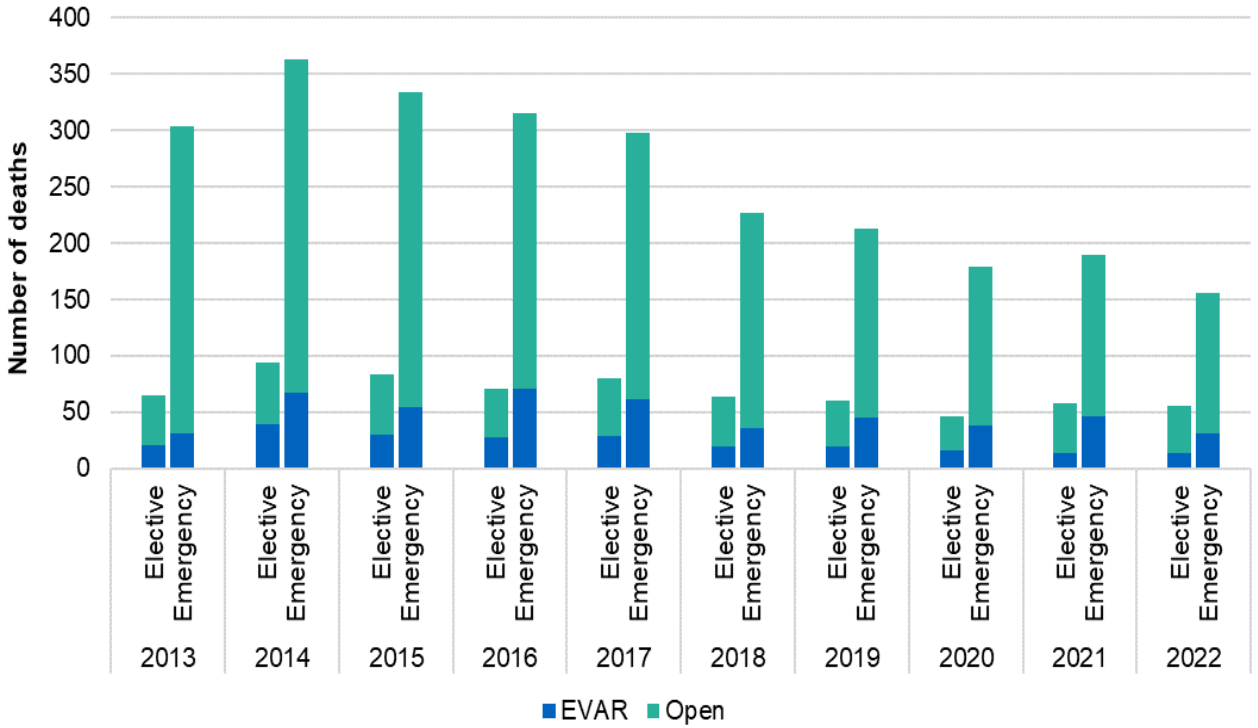


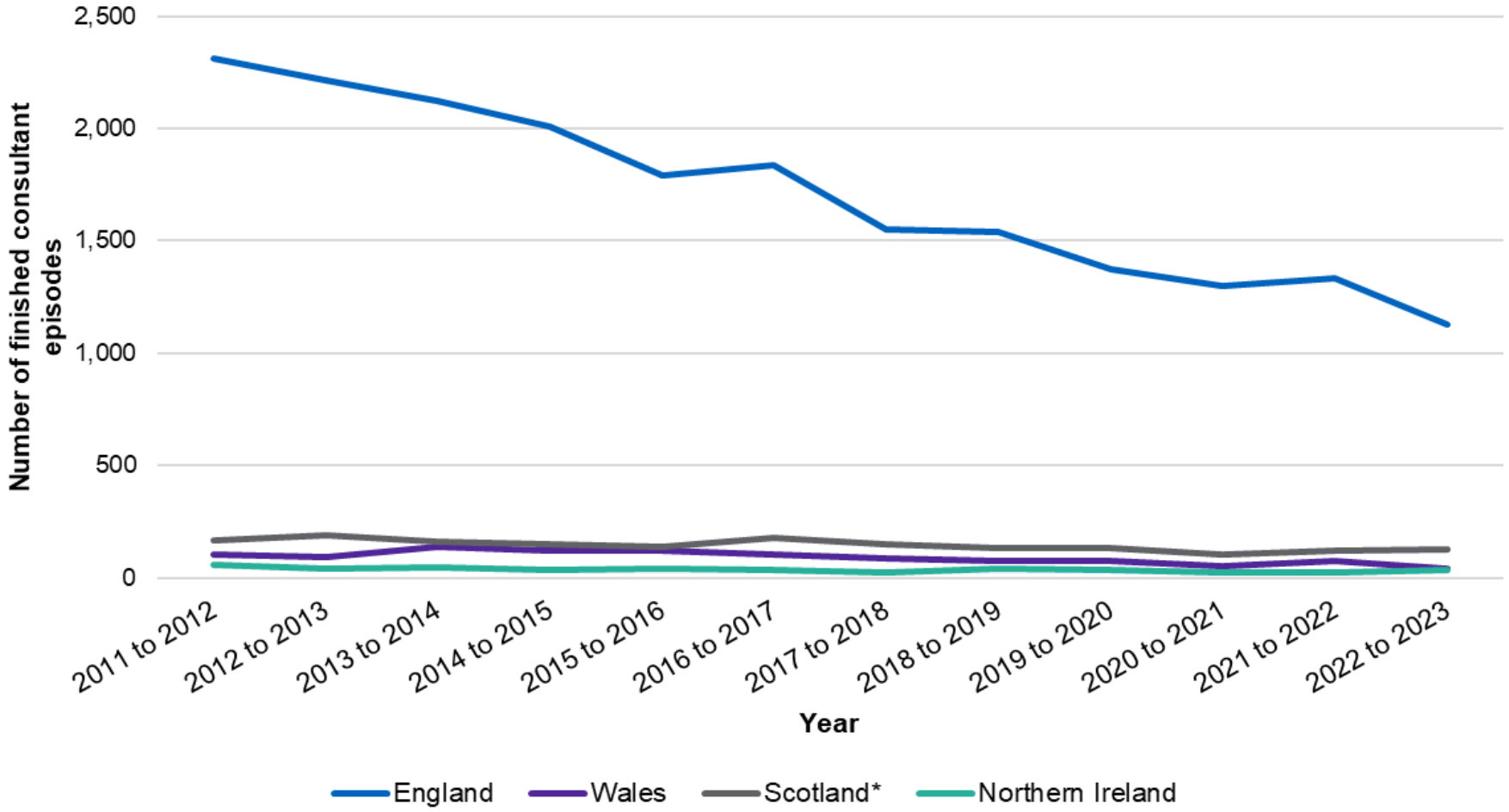
Figure 10: Number of in-hospital deaths in men undergoing non-ruptured (elective) AAA repairs and ruptured (emergency) AAA repairs by type of procedure, UK (NVR data)

Source: NVR

Results

7.5 National data

Figure 11: Finished consultant episodes for ruptured AAA, men all ages, by UK country

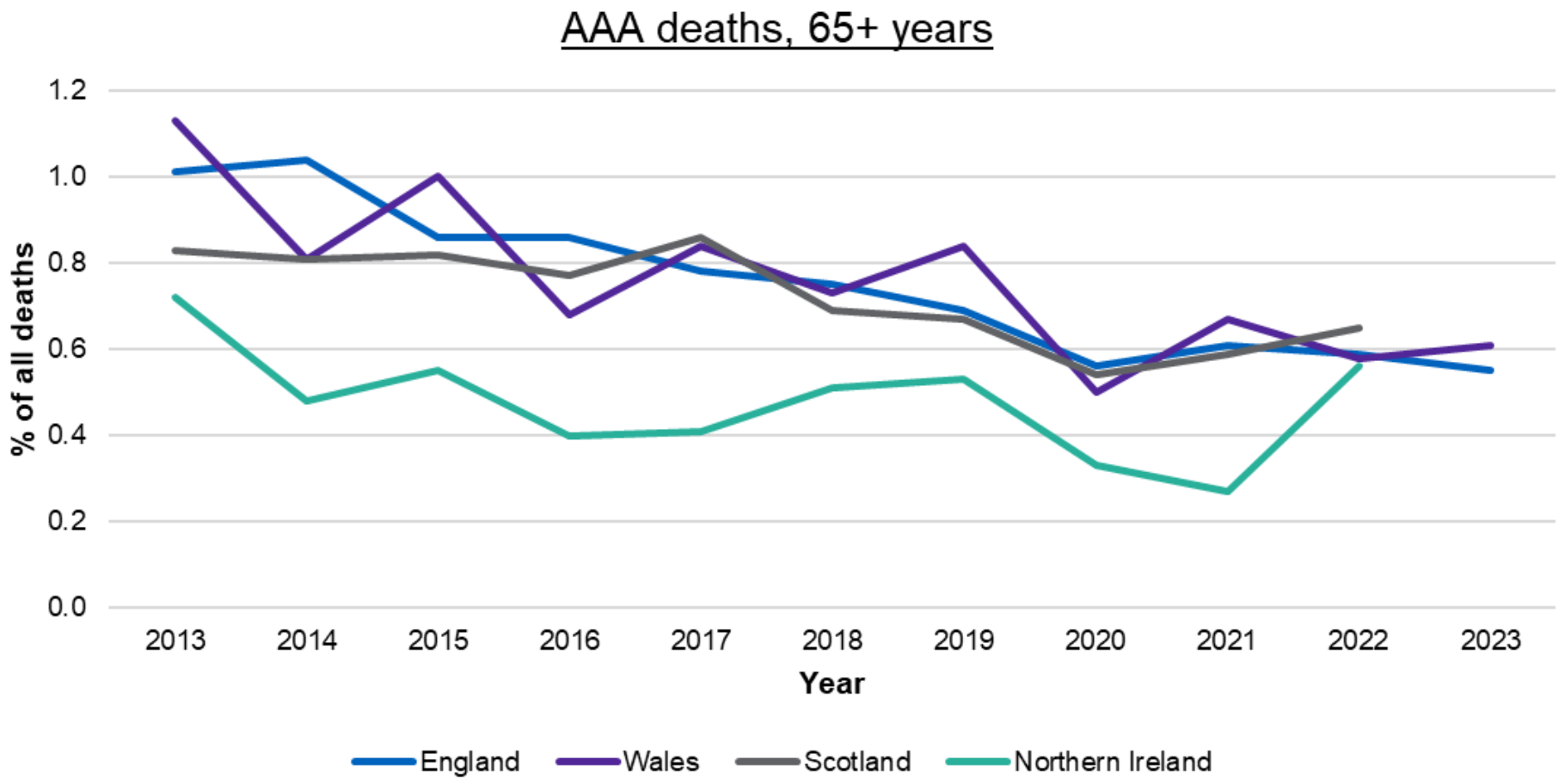


*Scotland data is for men aged 60+ only

Source: AAA screening programmes

Results

Figure 13: Proportion of all deaths in men that are due to ruptured AAA (ICD code I71.3), by UK country

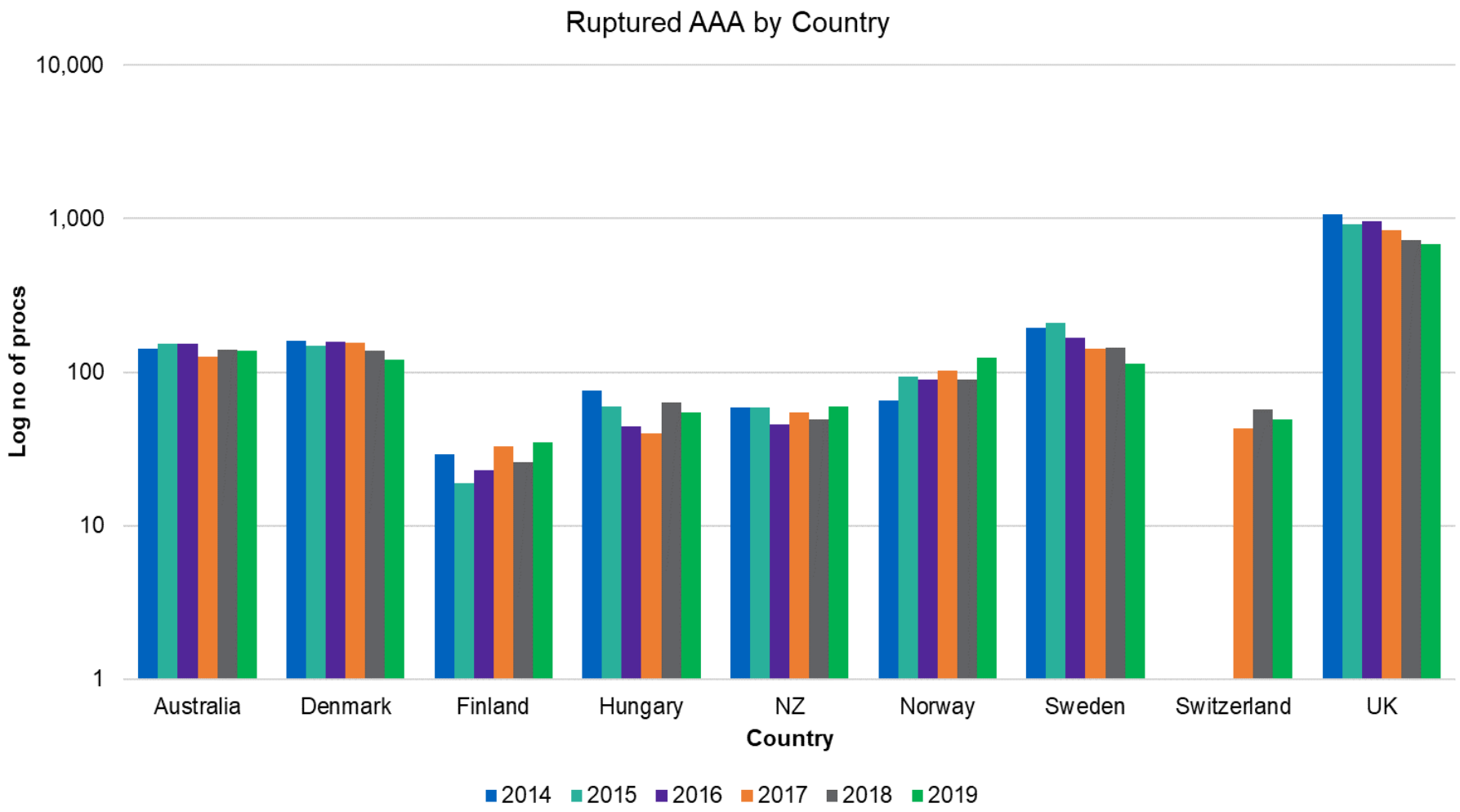


Source: ONS

Results

7.6 International data

Figure 15: International vascular registry on rates of rAAA over five years (2014 – 2019)



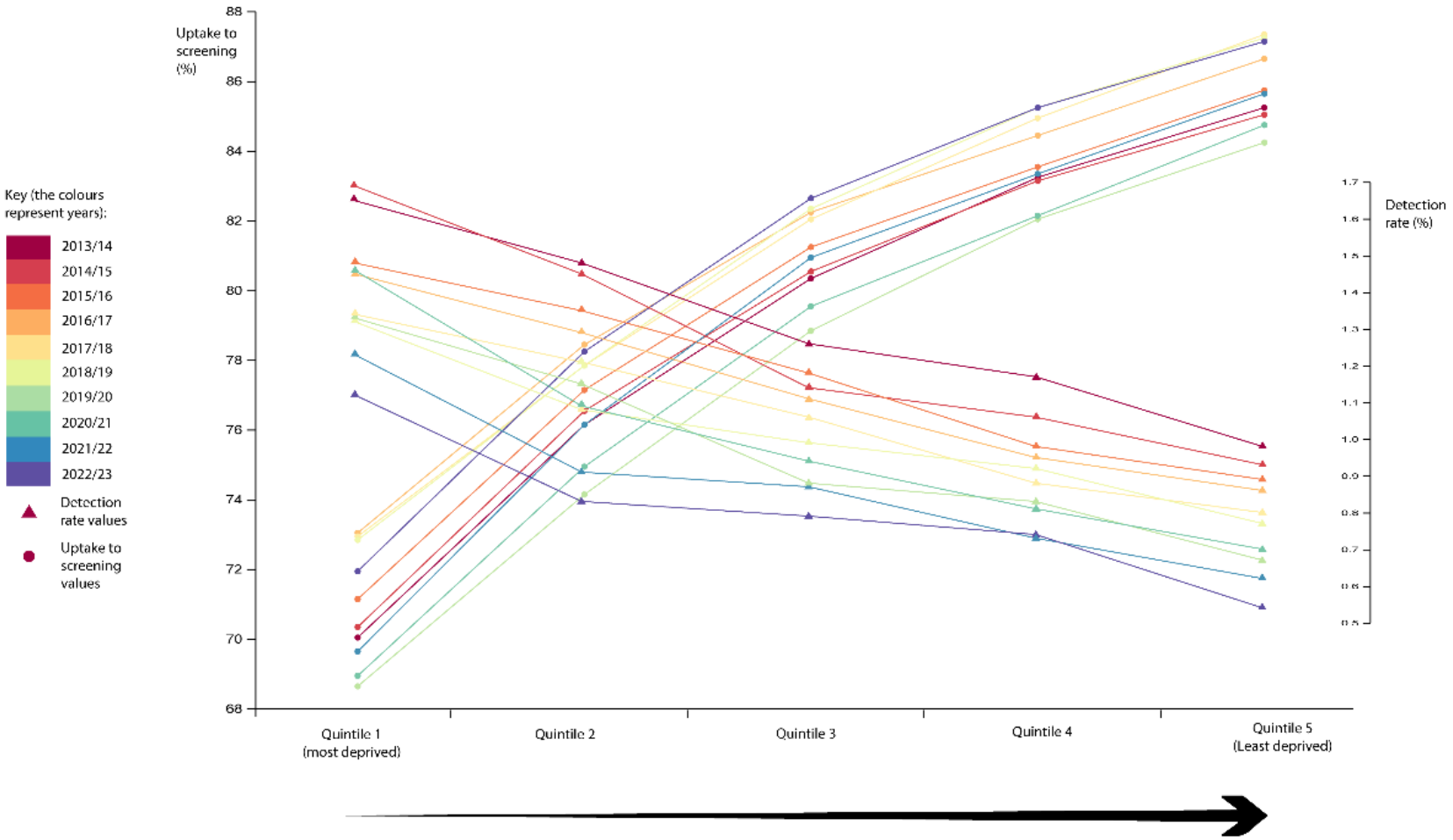
Source: VASCUNET

Results

7.9 Equality

Figure 18: Uptake and detection rate by deprivation quintile, England, 2013 to 2023 inclusive

Uptake to screening and detection rates of AAA by quintile of the index of multiple deprivation within the NHS AAA Screening programme of England between screening years 2013/14 and 2022/2023



Source: AAA screening programme, NHS England

Updated clinical effectiveness

Provided by KL Saxby, PhD student; MJ Bown, BHF Professor of Vascular Surgery – Department of Cardiovascular Sciences, University of Leicester, Leicester, UK.

Predicted number of AAA-related events from computer modelling of 300,000 men invited or not invited for AAA screening in the year of their 65th birthday.

	Screening	No screening	Change in number (%)
Elective AAA repair	3,741	3,231	510 (15.8)
Non-intervention	550	477	73 (15.3)
AAA rupture	2,584	2,974	-390 (-13.1)
Emergency AAA repair	955	1,100	-145 (-13.2)
AAA-related deaths	2,324	2,591	-267 (-10.3)

Non-intervention is the number of men with AAA >5.4cm who do not undergo surgical repair of their AAA when referred to a surgeon at a threshold of 5.5cm+.

Cost-effectiveness

Provided by KL Saxby, PhD student; MJ Bown, BHF Professor of Vascular Surgery – Department of Cardiovascular Sciences, University of Leicester, Leicester, UK.

Findings

Based on the prevalence of AAA and size distribution of aortic diameters observed, the AAA screening programme strategy is cost-effective at a willingness to pay threshold of £20,000 per quality adjusted life year gained.

	Screening	No screening	Difference
Life-years	12.866	12.861	0.005
Quality-adjusted life-years			0.004
Cost	£219.26	£168.11	£51.15

ICER per LY	9,705
ICER per QALY	12,870
Net benefit	28.34

Conclusions

- In the last decade, there has been an approximate halving of the number of men treated in hospital with rAAA, and a similar reduction in the death rate from rAAA in the UK. The rate of rAAA in men aged 65-74 years has fallen by over two thirds.
- NHS AAA screening programmes are effective at identifying men with AAA and referring men for treatment.
- Risks of intervention for screen detected AAA are low, and within the target range (<3.5% elective mortality).
- NHS AAA screening programmes remain cost effective at NICE willingness to pay thresholds, despite falling prevalence in 65 year old men.
- There remain quality of life and inequality issues (small reductions in quality of life, higher prevalence of AAA in lowest socio-economic groups), which are potential targets for improvement.

What does this report mean for the programmes?

If the AAA screening programmes continue there are number of opportunities to improve its effectiveness:

- Increased focus on the 20% of men who do not attend screening who have an increased risk of AAA.
- Increased focus on those in the more socially deprived deciles as they have a higher incidence of AAA and increased vascular risk in general.
- Improve the efficiency of the treatment pathway (number of men operated on within 8 weeks)
- Produce an exit strategy for men in surveillance who are unlikely to benefit from AAA repair as they age or become less fit.

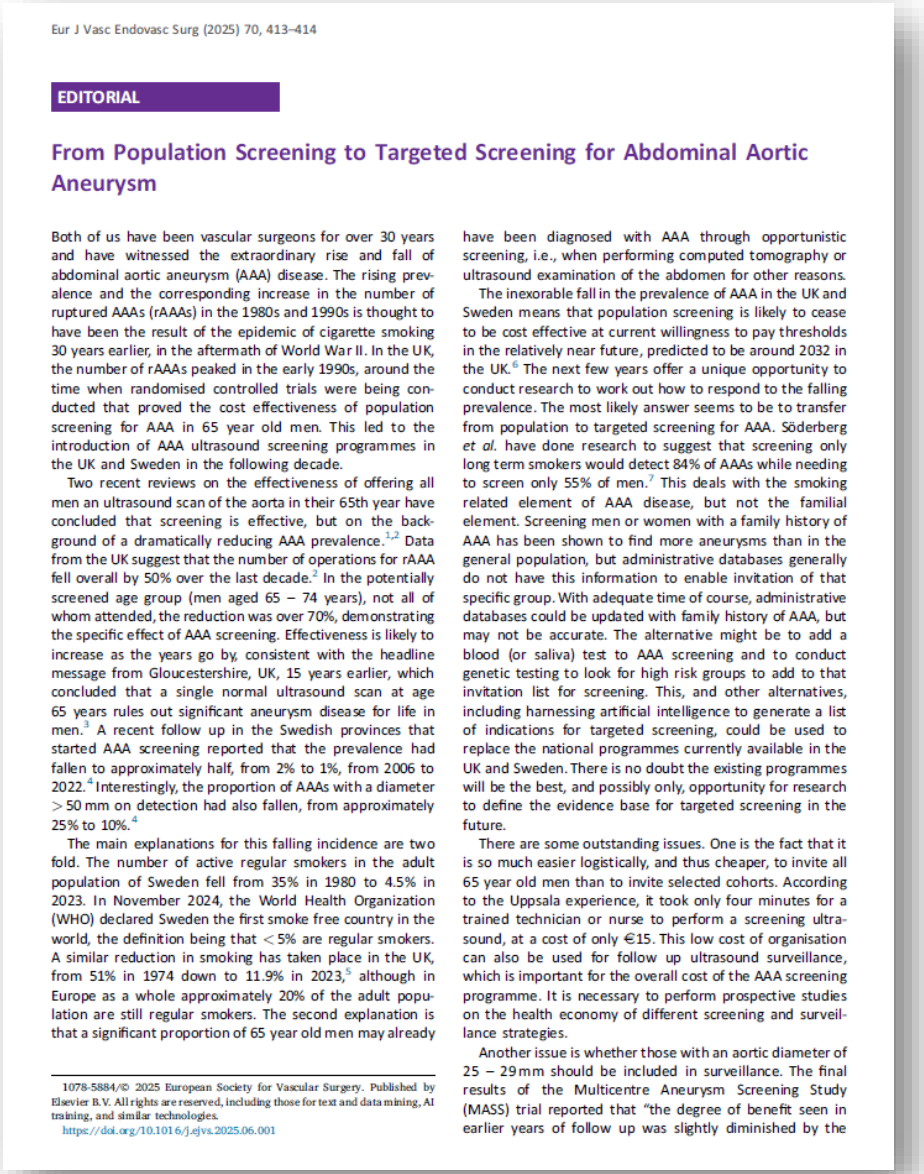
Possible actions by UK NSC

- Stand the programmes down due to falling AAA prevalence
- Continue programmes as they currently stand, with regular effectiveness review every 5-10 years
- Consider modifying existing programmes to improve efficiency and reduce harms
- Expand programmes to consider screening for other vascular conditions, and possibly including screening women

International messages

AAA prevalence > 2%

AAA prevalence around 1% or lower



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EDITORIAL

From Population Screening to Targeted Screening for Abdominal Aortic Aneurysm

Both of us have been vascular surgeons for over 30 years and have witnessed the extraordinary rise and fall of abdominal aortic aneurysm (AAA) disease. The rising prevalence and the corresponding increase in the number of ruptured AAAs (rAAAs) in the 1980s and 1990s is thought to have been the result of the epidemic of cigarette smoking 30 years earlier, in the aftermath of World War II. In the UK, the number of rAAAs peaked in the early 1990s, around the time when randomised controlled trials were being conducted that proved the cost effectiveness of population screening for AAA in 65 year old men. This led to the introduction of AAA ultrasound screening programmes in the UK and Sweden in the following decade.

Two recent reviews on the effectiveness of offering all men an ultrasound scan of the aorta in their 65th year have concluded that screening is effective, but on the background of a dramatically reducing AAA prevalence.[1,2] Data from the UK suggest that the number of operations for rAAA fell overall by 50% over the last decade.[2] In the potentially screened age group (men aged 65 – 74 years), not all of whom attended, the reduction was over 70%, demonstrating the specific effect of AAA screening. Effectiveness is likely to increase as the years go by, consistent with the headline message from Gloucestershire, UK, 15 years earlier, which concluded that a single normal ultrasound scan at age 65 years rules out significant aneurysm disease for life in men.[3] A recent follow up in the Swedish provinces that started AAA screening reported that the prevalence had fallen to approximately half, from 2% to 1%, from 2006 to 2022.[4] Interestingly, the proportion of AAAs with a diameter >50 mm on detection had also fallen, from approximately 25% to 10%.[4]

The main explanations for this falling incidence are two fold. The number of active regular smokers in the adult population of Sweden fell from 35% in 1980 to 4.5% in 2023. In November 2024, the World Health Organization (WHO) declared Sweden the first smoke free country in the world, the definition being that <5% are regular smokers. A similar reduction in smoking has taken place in the UK, from 51% in 1974 down to 11.9% in 2023,[5] although in Europe as a whole approximately 20% of the adult population are still regular smokers. The second explanation is that a significant proportion of 65 year old men may already have been diagnosed with AAA through opportunistic screening, i.e., when performing computed tomography or ultrasound examination of the abdomen for other reasons.

The inexorable fall in the prevalence of AAA in the UK and Sweden means that population screening is likely to cease to be cost effective at current willingness to pay thresholds in the relatively near future, predicted to be around 2032 in the UK.[6] The next few years offer a unique opportunity to conduct research to work out how to respond to the falling prevalence. The most likely answer seems to be to transfer from population to targeted screening for AAA. Söderberg *et al.* have done research to suggest that screening only long term smokers would detect 84% of AAAs while needing to screen only 55% of men.[7] This deals with the smoking related element of AAA disease, but not the familial element. Screening men or women with a family history of AAA has been shown to find more aneurysms than in the general population, but administrative databases generally do not have this information to enable invitation of that specific group. With adequate time of course, administrative databases could be updated with family history of AAA, but may not be accurate. The alternative might be to add a blood (or saliva) test to AAA screening and to conduct genetic testing to look for high risk groups to add to that invitation list for screening. This, and other alternatives, including harnessing artificial intelligence to generate a list of indications for targeted screening, could be used to replace the national programmes currently available in the UK and Sweden. There is no doubt the existing programmes will be the best, and possibly only, opportunity for research to define the evidence base for targeted screening in the future.

There are some outstanding issues. One is the fact that it is so much easier logistically, and thus cheaper, to invite all 65 year old men than to invite selected cohorts. According to the Uppsala experience, it took only four minutes for a trained technician or nurse to perform a screening ultrasound, at a cost of only €15. This low cost of organisation can also be used for follow up ultrasound surveillance, which is important for the overall cost of the AAA screening programme. It is necessary to perform prospective studies on the health economy of different screening and surveillance strategies.

Another issue is whether those with an aortic diameter of 25 – 29 mm should be included in surveillance. The final results of the Multicentre Aneurysm Screening Study (MASS) trial reported that "the degree of benefit seen in earlier years of follow up was slightly diminished by the

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Final thought

NHS Screening Programmes should lead the change, not respond to it