UK National Screening Committee

Assessing the Effectiveness of Screening Programmes

Phil Gardner & Harriet Strachan

An effective screening programme

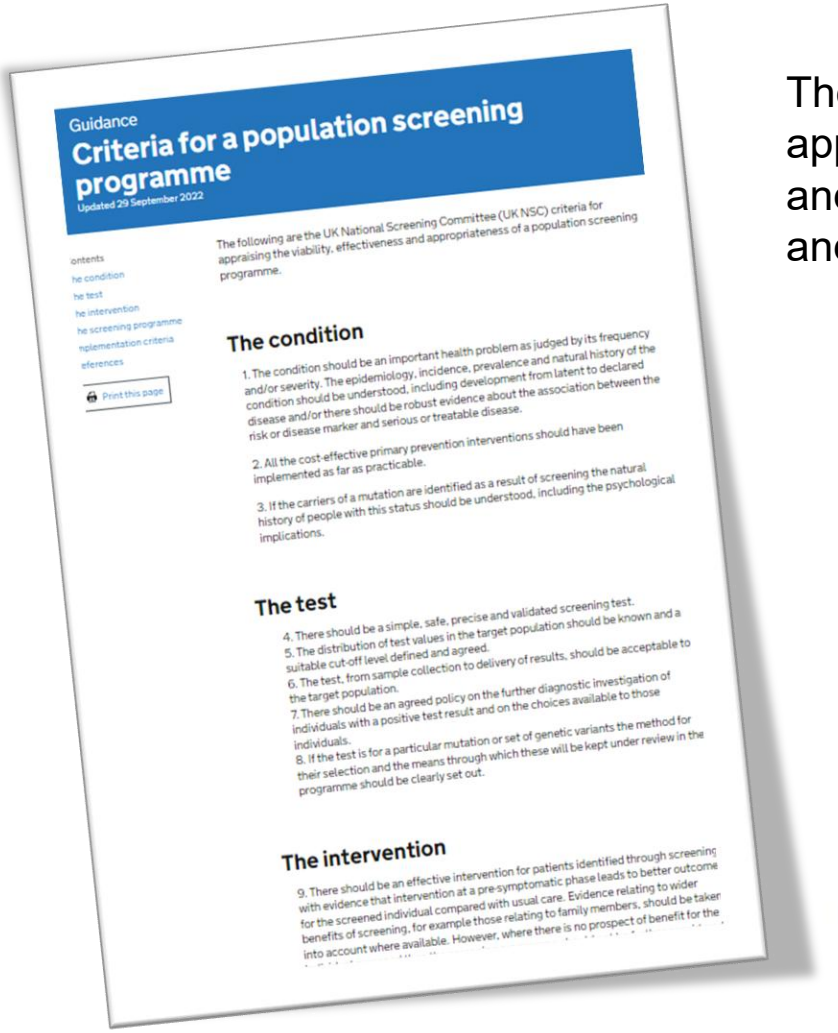
Screening is the process of identifying apparently healthy people who may have an increased chance of a disease or condition.

Screening can do harm as well as good.

The UK NSC will only recommend a screening programme if evidence shows that the planned pathway will do more good than harm at a reasonable cost.

Effective ☐

Evaluating effectiveness



Guidance

Criteria for a population screening programme

Updated 29 September 2022

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The following are the UK National Screening Committee (UK NSC) criteria for appraising the viability, effectiveness and appropriateness of a population screening programme.

The condition

1. The condition should be an important health problem as judged by its frequency and/or severity. The epidemiology, incidence, prevalence and natural history of the condition should be understood, including development from latent to declared disease and/or there should be robust evidence about the association between the risk or disease marker and serious or treatable disease.

2. All the cost-effective primary prevention interventions should have been implemented as far as practicable.

3. If the carriers of a mutation are identified as a result of screening the natural history of people with this status should be understood, including the psychological implications.

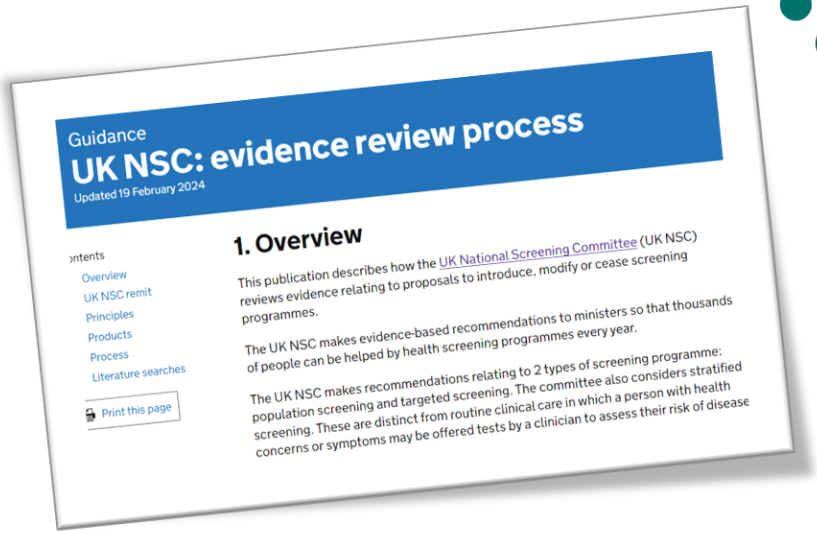
The test

4. There should be a simple, safe, precise and validated screening test.
5. The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.
6. The test, from sample collection to delivery of results, should be acceptable to the target population.
7. There should be an agreed policy on the further diagnostic investigation of individuals with a positive test result and on the choices available to those individuals.
8. If the test is for a particular mutation or set of genetic variants the method for their selection and the means through which these will be kept under review in the programme should be clearly set out.

The intervention

9. There should be an effective intervention for patients identified through screening with evidence that intervention at a pre-symptomatic phase leads to better outcome for the screened individual compared with usual care. Evidence relating to wider benefits of screening, for example those relating to family members, should be taken into account where available. However, where there is no prospect of benefit for the

The UK NSC has [a set of criteria] for appraising the viability, effectiveness and appropriateness of both population and targeted screening programmes…



Guidance

UK NSC: evidence review process

Updated 19 February 2024

ontents
Overview
UK NSC remit
Principles
Products
Process
Literature searches

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1. Overview

This publication describes how the UK National Screening Committee (UK NSC) reviews evidence relating to proposals to introduce, modify or cease screening programmes.

The UK NSC makes evidence-based recommendations to ministers so that thousands of people can be helped by health screening programmes every year.

The UK NSC makes recommendations relating to 2 types of screening programme: population screening and targeted screening. The committee also considers stratified screening. These are distinct from routine clinical care in which a person with health concerns or symptoms may be offered tests by a clinician to assess their risk of disease

… plus an [evidence review process] which includes regular, scheduled reviews of existing recommendations.

Evaluating effectiveness

ANALYSIS

Check for updates

For numbered affiliations see end of article.
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Health screening needs independent regular re-evaluation

Changing circumstances may alter the benefit and risk profile of screening programmes. Fabienne G Ropers and colleagues propose a framework for re-evaluation to ensure continued public benefit

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From tentative beginnings over 70 years ago,[1] screening to detect disease or risk factors before symptoms appear has become a familiar feature of modern healthcare. Screening delivers a mix of health benefits, harms, and costs.[2 3] Importantly, these outcomes are not constants: they change with new evidence, vary between contexts, and over time.

Screening practices (whether organised as programmes or not) tend to be slow to react to these changes; alterations are often resisted and controversial.[4 5] The reasons include financial interests, attention to sunk costs, lack of high certainty evidence or proper evaluation of existing evidence, a problematic belief that earlier detection is always better, or simple inertia or preference for the status quo.[6 7]

Screening programmes are often financed within finite collective healthcare budgets. They target asymptomatic people, most of whom are not those who need healthcare most. Continuing screening in the face of changing circumstances therefore deserves careful consideration, as it potentially leads to harm to healthy citizens and waste of scarce resources.

While there are well established principles for starting screening,[1] none exist for stopping it.[8] As experts who have worked on screening over many years, we see an urgent need for clear, agreed methods for actively re-evaluating existing practices that address inherent biases towards maintaining the status quo.

Why screening practices need re-evaluation

The value of screening may be changed by several factors, including changes in disease incidence, advances in diagnosis and treatment, evidence from ongoing programmes, and preventive possibilities.

Change in incidence

Primary prevention may decrease disease incidence and thus the absolute benefit from screening. For instance, the incidence of abdominal aortic aneurysm fell by 70% in the UK and Sweden, probably because of reduced smoking,[9] and the human papillomavirus

improve the net benefit of screening—for example, in obesity related conditions.

Advances in diagnosis and treatment

Improvements to outcomes at later disease stages or across stages—because of improved treatment—also tend to decrease screening benefits, whereas improvements to outcomes mainly at earlier disease stages may increase screening benefits. Since the introduction of systemic therapy and with more centralised care, breast cancer mortality has reduced substantially at all stages,[10] with the greatest reductions (50% in many countries) in women below the typical age for screening.[11] Similarly, improvements in conventional tests or development of new ones may affect performance and change screening benefits, harms, or costs.

Inadequate estimates of benefits, harms, or cost

Screening has sometimes been based on low quality evidence. New reviews that include only high quality evidence may show the benefits are small or even absent. For example, neuroblastoma screening in children was implemented in Japan based on a theoretical benefit and evidence from observational studies. Studies in Canada and Germany, and resynthesis of data that took the observed incidence increases into account, showed no mortality benefit but considerable overdiagnosis, and screening was subsequently stopped in Japan.[2]

Even when implementation is based on randomised trials, it can be difficult to achieve similar performance in the real world for reasons such as uptake or quality of testing. This can be monitored with performance indicators: monitoring of early cervical screening programmes showed high overdetection rates and a moderate mortality benefit, prompting important service changes.[2]

Monitoring attendance rates and behaviour (eg, regular, incidental, or structural non-participation) may identify substantial differences from that expected. This may mean cost effectiveness is lower

- The health benefits, harms and costs of a screening programme are not constants
- Various factors can impact the value of screening
  - Changes in disease incidence
  - Advances in diagnosis and treatment
  - How the screening programme operates
- Maintaining the status quo may lead to harm over time

We can't assume that a screening programme which was effective when implemented will continue to be effective years later.

What do we mean by effectiveness?

What do we mean by effectiveness?

Each screening programme has a primary aim or objective:

Reduce morbidity and/or mortality of the condition

Cancer programmes

Provide the screened cohort with more information to make informed decisions

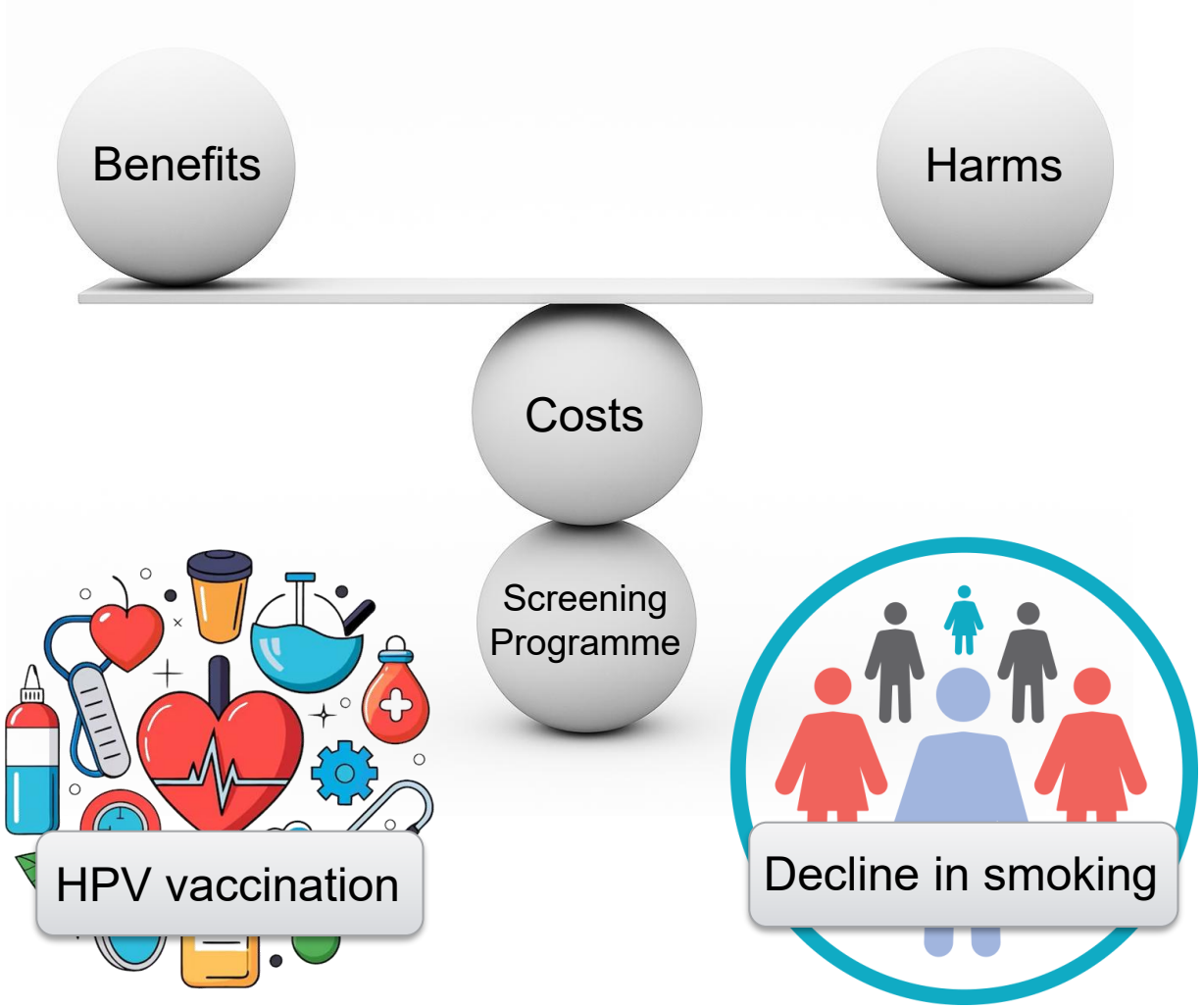
Fetal anomaly screening

Reduce the transmission of a disease

Infectious diseases in pregnancy

Effectiveness can be defined as a measure of how successful the screening programme is at achieving its stated objective.

Importance of assessing effectiveness

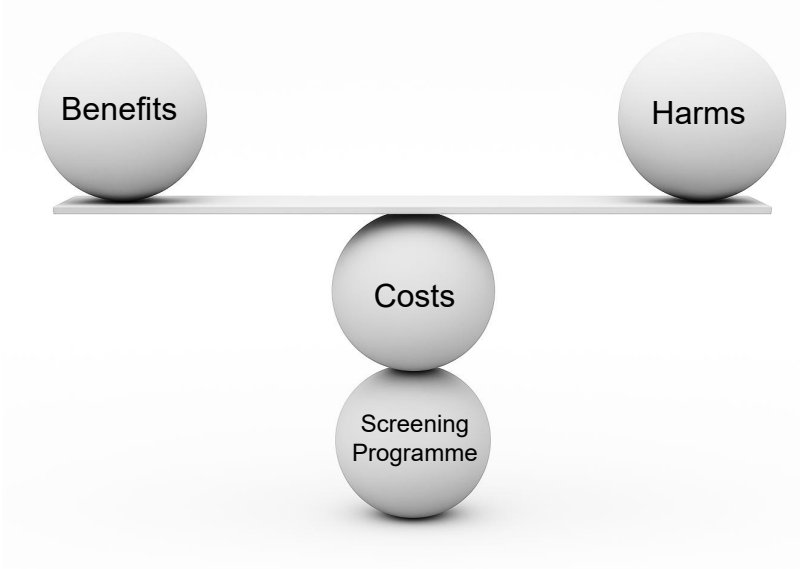


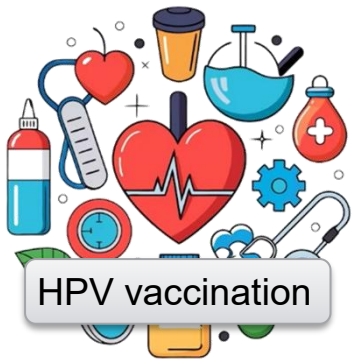
Over time, changes may be required to maintain the screening programme's effectiveness

- Redefining the cohort
- Introducing a new test
- Updating the screening pathway

Inaction may = ineffectiveness

Importance of assessing effectiveness





- Public confidence
- Transparency
- Reputation
- Engagement

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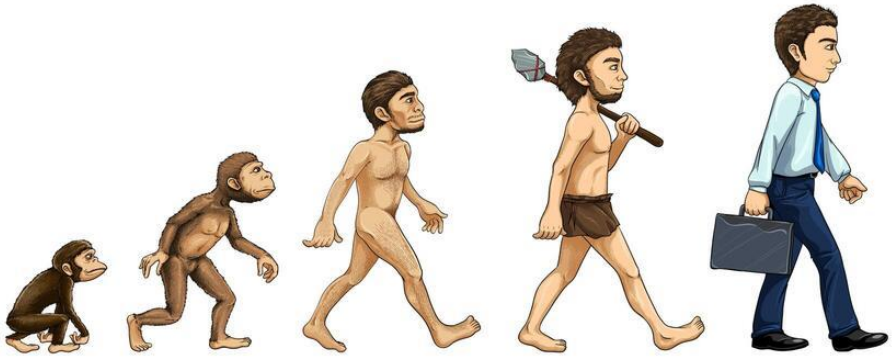
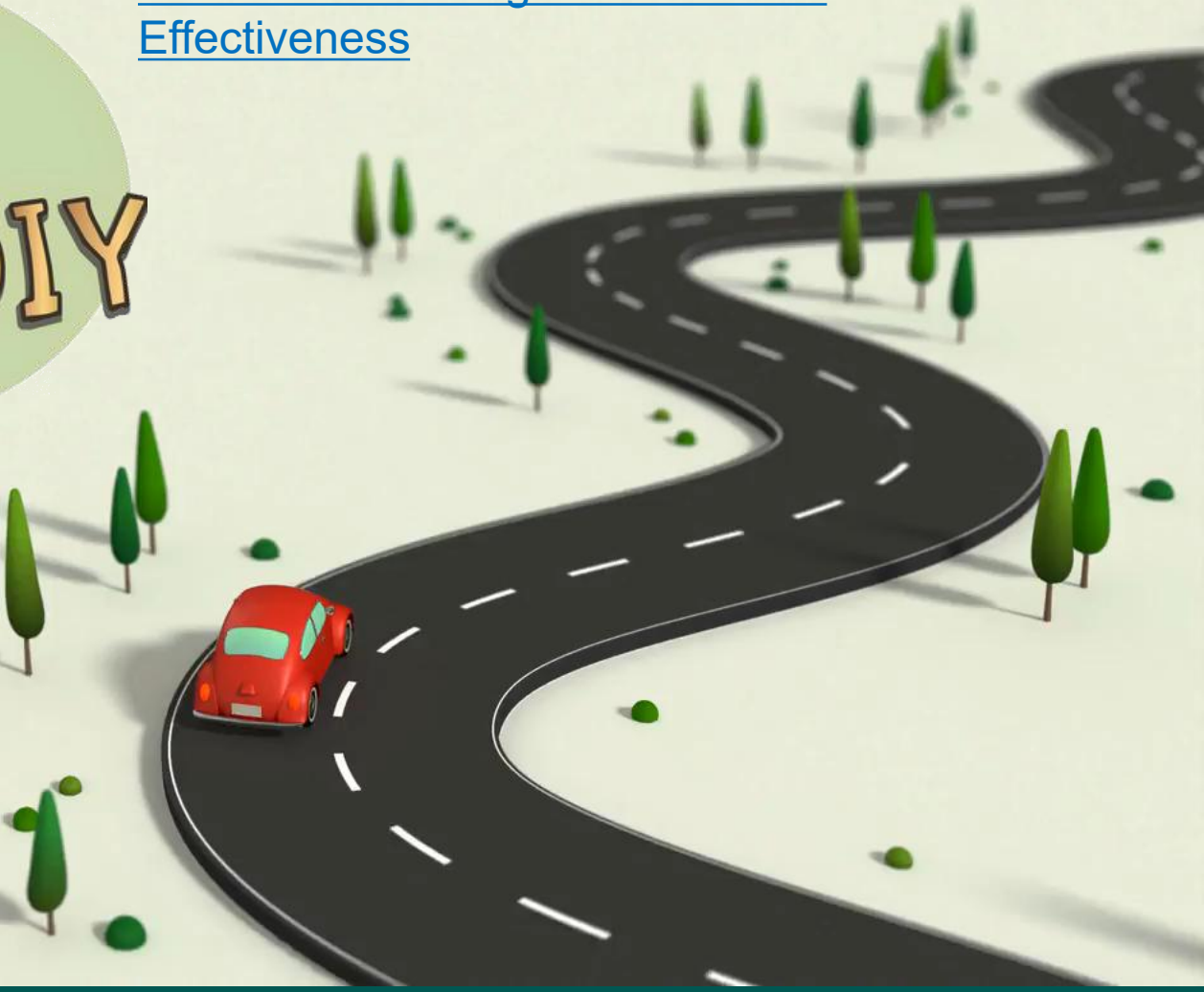
- Updating the screening pathway



Process for assessing effectiveness

Have the national screening programmes been as effective as anticipated, and do they continue to be effective?

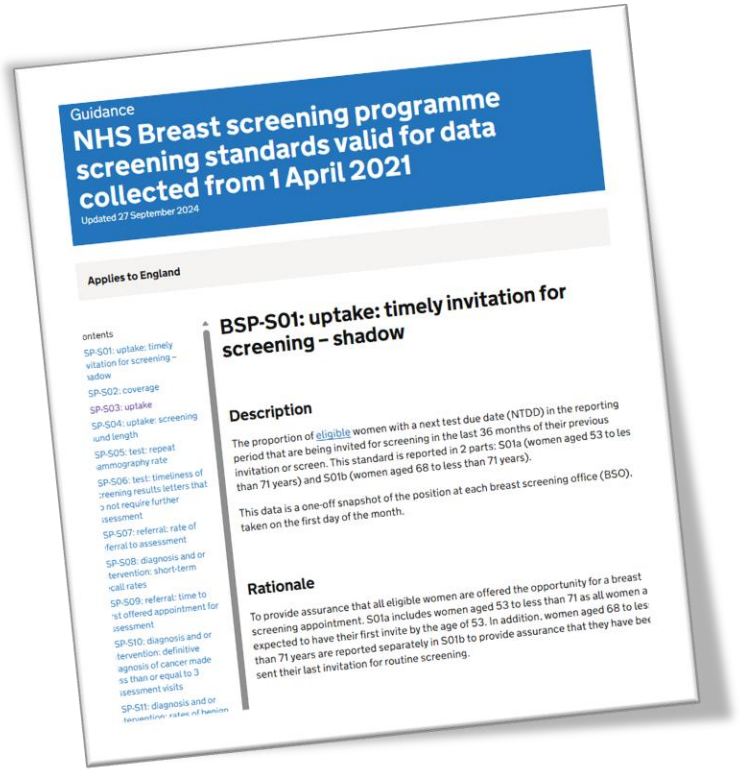
UK NSC Screening in Healthcare: Effectiveness



- Identify areas for improvement
- Ensure processes remain valid
- Confirm positive impact of screening

Elements to review

Screening programme data


Guidance

NHS Breast screening programme screening standards valid for data collected from 1 April 2021

Updated 27 September 2024

Applies to England

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SP-S01: uptake: timely vitation for screening – adow

SP-S02: coverage

SP-S03: uptake

SP-S04: uptake: screening und length

SP-S05: test: repeat ammography rate

SP-S06: test: timeliness of reening results letters that not require further sessment

SP-S07: referral: rate of ferral to assessment

SP-S08: diagnosis and or tervention: short-term call rates

SP-S09: referral: time to st offered appointment for sessment

SP-S10: diagnosis and or tervention: definitive agnosis of cancer made ss than or equal to 3 sessment visits

SP-S11: diagnosis and or

BSP-S01: uptake: timely invitation for screening – shadow

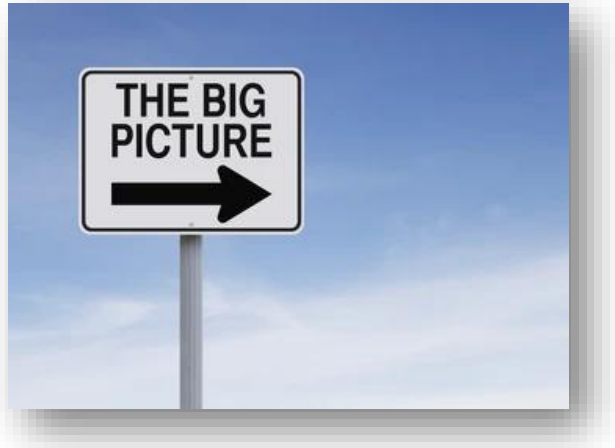
Description

The proportion of eligible women with a next test due date (NTDD) in the reporting period that are being invited for screening in the last 36 months of their previous invitation or screen. This standard is reported in 2 parts: S01a (women aged 53 to les than 71 years) and S01b (women aged 68 to less than 71 years).

This data is a one-off snapshot of the position at each breast screening office (BSO), taken on the first day of the month.

Rationale

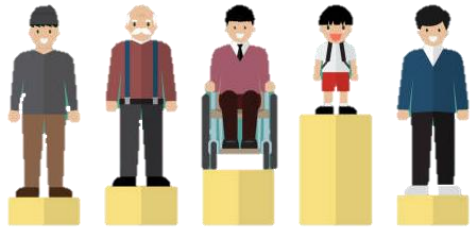
To provide assurance that all eligible women are offered the opportunity for a breast screening appointment. S01a includes women aged 53 to less than 71 as all women a expected to have their first invite by the age of 53. In addition, women aged 68 to les than 71 years are reported separately in S01b to provide assurance that they have bee sent their last invitation for routine screening.



Wider landscape

- Disease prevalence
- Treatment outcomes

Acceptability & Equity



Elements to review

Referral time to treatment

Coverage/uptake of the screening test

Treatment outcomes

Number and proportion of people who screen positive

Mortality/morbidity due to the condition

Rate of overdiagnosis

Prevalence of the condition

Number of false positive and false negative results

Cost-effectiveness of screening

Data sources

Performance data

Audits

NHS SCREENING

Incident reports

Service evaluations

WHO international data

Hospital admissions

Diagnostic data

Outcomes data

Cost-effectiveness data

Mortality statistics

Qualitative data

Birth statistics

Effectiveness review advisory group

Advise on how best to measure effectiveness

Agree the scope of the review

Help identify data sources

Support data collection

Provide ongoing feedback

Contribute to final report

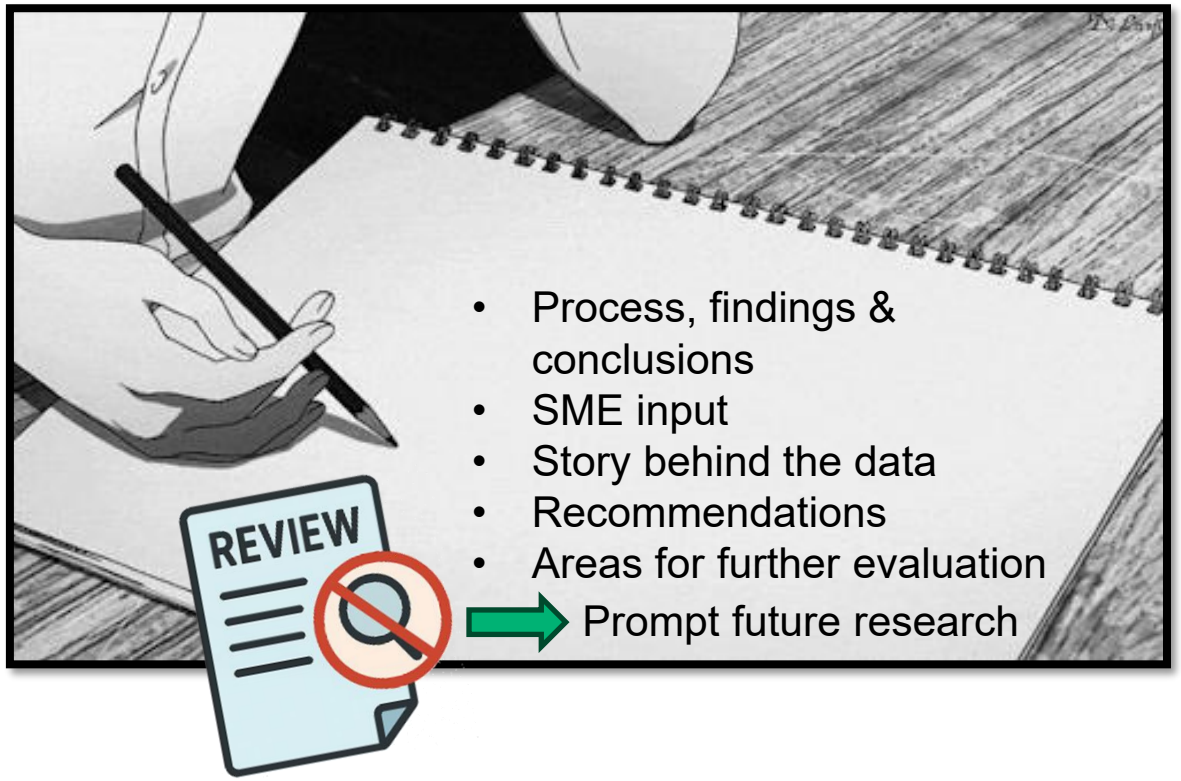
Data collection and analysis

- May require formal data requests from multiple organisations
- Can be time consuming!

- Context of the data
- Trends and gaps
- Interpretation and analysis

- Differences in data collected
- Differences in definitions
- Historical data quality

Written report



- Process, findings & conclusions
- SME input
- Story behind the data
- Recommendations
- Areas for further evaluation

→ Prompt future research

Research and analysis

UK AAA screening programmes: 10-year effectiveness review

Published 6 May 2025

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The aim of this report was to assess the effectiveness of population screening for AAA in men aged 65, by reviewing the AAA screening programmes across the UK between 2013 and 2023.

Executive summary

In 2005, the UK National Screening Committee (UK NSC) recommended screening for abdominal aortic aneurysm (AAA) in men aged 65. Although death rates had been reducing, there were still as many as 3,000 deaths each year from ruptured AAA (rAAA) in men aged over 65. The NHS AAA screening programmes in the UK were designed to reduce AAA-related deaths in men. Population-based ultrasound screening of men aged 65 commenced in 2009, and by 2013 was fully operational across the UK. This review considers whether the programmes have been effective in their first decade: April 2013 to March 2023.

The aim was to review the data collected by the 4 UK programmes in England, Scotland, Wales and Northern Ireland. Additionally, national statistics were obtained from the 4 nations on admissions to hospital for rAAA and deaths recorded with an underlying cause of rAAA. This was supplemented with activity data from the National Vascular Registry (NVR), the database of the Vascular Society of Great Britain and Ireland (VSGBI), and other international registry data. An updated cost-effectiveness analysis, qualitative quality of life research, and quantitative analysis of inequality were also