Screening programmes in the UK

What is screening?

The UK National Screening Committee defines screening as: "A process of identifying apparently healthy people who may be at increased risk of a disease or condition. They can then be offered information, further tests and appropriate treatment to reduce their risk and/or any complications arising from the disease or condition."[1]

Criteria for appraising the viability, effectiveness and appropriateness of a screening programme were first described by Wilson and Jungner for the World Health Organization (WHO) in 1968, but are still applicable today. The UK National Screening Committee criteria are based on those original ten principles laid down in 1968.

Wilson and Jungner criteria for screening[2]

- Knowledge of disease:
    - The condition should be important.
    - There must be a recognisable latent or early symptomatic stage.
    - The natural course of the condition, including development from latent to declared disease, should be adequately understood.
- Knowledge of test:
    - Suitable test or examination.
    - Test acceptable to population.
    - Case finding should be continuous (not just a 'once and for all' project).

- Treatment for disease:
    - Accepted treatment for patients with recognised disease.
    - Facilities for diagnosis and treatment available.
    - Agreed policy concerning whom to treat as patients.
- Cost considerations:
    - Costs of case finding (including diagnosis and treatment of patients diagnosed) economically balanced in relation to possible expenditures on medical care as a whole.

Current UK screening criteria[1]

The condition

- The condition should be an important health problem.
- The epidemiology and natural history of the condition, including development from latent to declared disease, should be adequately understood and there should be a detectable risk factor, disease marker, latent period or early symptomatic stage.
- All the cost-effective primary prevention interventions should have been implemented as far as practicable.
- 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

- There should be a simple, safe, precise and validated screening test.
- The distribution of test values in the target population should be known and a suitable cut-off level defined and agreed.
- The test should be acceptable to the population.
- 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.

- If the test is for mutations, the criteria used to select the subset of mutations to be covered by screening, if all possible mutations are not being tested, should be clearly set out.

The treatment

- There should be an effective treatment or intervention for patients identified through early detection, with evidence of early treatment leading to better outcomes than late treatment.
- There should be agreed evidence-based policies covering which individuals should be offered treatment and the appropriate treatment to be offered.
- Clinical management of the condition and patient outcomes should be optimised in all healthcare providers prior to participation in a screening programme.

The screening programme

- There should be evidence from high-quality randomised controlled trials that the screening programme is effective in reducing mortality or morbidity. Where screening is aimed solely at providing information to allow the person being screened to make an informed choice (eg, Down's syndrome, cystic fibrosis carrier screening), there must be evidence from high-quality trials that the test accurately measures risk. The information that is provided about the test and its outcome must be of value and readily understood by the individual being screened.
- There should be evidence that the complete screening programme (test, diagnostic procedures, treatment/intervention) is clinically, socially and ethically acceptable to health professionals and the public.
- The benefit from the screening programme should outweigh the physical and psychological harm (caused by the test, diagnostic procedures and treatment).

- The opportunity cost of the screening programme (including testing, diagnosis and treatment, administration, training and quality assurance) should be economically balanced in relation to expenditure on medical care as a whole (ie value for money). Assessment against this criteria should have regard to evidence from cost benefit and/or cost-effectiveness analyses and have regard to the effective use of available resource.
- All other options for managing the condition should have been considered (eg, improving treatment, providing other services), to ensure that no more cost-effective intervention could be introduced or current interventions increased within the resources available.
- There should be a plan for managing and monitoring the screening programme and an agreed set of quality assurance standards.
- Adequate staffing and facilities for testing, diagnosis, treatment and programme management should be available prior to the commencement of the screening programme.
- Evidence-based information, explaining the consequences of testing, investigation and treatment, should be made available to potential participants to assist them in making an informed choice.
- Public pressure for widening the eligibility criteria for reducing the screening interval, and for increasing the sensitivity of the testing process, should be anticipated. Decisions about these parameters should be scientifically justifiable to the public.
- If screening is for a mutation, the programme should be acceptable to people identified as carriers and to other family members.

Limitations of screening

- Screening can reduce the risk of developing a condition or its complications but it cannot offer a guarantee of protection.
- In any screening programme, there is an irreducible minimum of false positive and false negative results.
- Screening is therefore increasingly presented as risk reduction.

- Many conditions which potentially could be screened, such as prostate cancer, do not fit the criteria for widespread public screening. These are reviewed on a regular basis by the National Screening Committee with the latest information being available on their website.

Potential dangers of screening

Although screening programmes may benefit populations, not all participants will benefit and some will even be harmed by participation. Breast cancer screening is an example of this, a well established screening programme, yet with ongoing debate about its benefit.

A 2021 systematic review for the European Cancer Initiative on breast cancer looked at 10 randomised controlled trials involving 616,641 women. [3] They found mammography for women aged 50-69 years reduced breast cancer mortality (also for those aged 70-74); reduced the likelihood of stage IIA+ cancer and gave a likelihood of overdiagnosis of 17% (23% when under 50 years). Mammography was also associated with a 2.9% risk of an invasive procedure with a benign result. Benefits reduced and likelihood of harms increased outside those age ranges.

- Personal costs include problems with false positive results, which can lead to distress and possible unnecessary treatment.
- Individuals who choose not to participate in screening may be disadvantaged - for example, being labelled as from a 'positive family' with regard to genetic susceptibility, when other family members have chosen to be screened and have been found to be positive.
- False negative tests. No test is 100% sensitive, which can then lead to false reassurance by both patients and doctors. This may even dissuade patients from returning for future screening tests.
- False positive tests. No test is 100% specific, which leads to further (invasive) testing which may prove to be unnecessary.
- Misinterpretation of results can lead to a false sense of security - eg, patients with normal cholesterol or normal blood pressure may continue to smoke.

- Costs to society: actual costs of equipment, services, treatment, etc; also, the time taken off work for people to attend the screening test and for the treatment.
- Prophylactic mastectomy, although perhaps an effective intervention in BRCA mutation, requires evidence on psychological and social impact.
- Some people have different health beliefs and cultures and object to being screened. This needs to be appreciated when considering individual autonomy.
- Implementing screening tests may mean that funds are diverted away from other services - eg, cancer treatments.

Screening programmes in the UK

The UK National Screening Committee makes UK-wide recommendations, but there are some variations between the implementation of these between countries.The UK Screening Portal is the best source for details on the UK screening programmes. It has up-to-date details on screening for the following conditions (including evaluations for those conditions where screening is not currently recommended).

Currently the following screening programmes are running in the UK:

England

- Abdominal Aortic Aneurysm Screening Programme.
- Bowel Cancer Screening Programme.
- Breast Screening Programme.
- Cervical Screening Programme.
- Diabetic Eye Screening Programme.
- Fetal Anomaly Screening Programme.
- Infectious Diseases in Pregnancy Screening Programme.
- Newborn and Infant Physical Examination Screening Programme.
- Newborn Blood Spot Screening Programme.

- Newborn Hearing Screening Programme.
- Sickle Cell and Thalassaemia Screening Programme.

Northern Ireland

- Abdominal Aortic Aneurysm Screening.
- Breast Screening.
- Bowel Cancer Screening.
- Cervical Cancer Screening.
- Diabetic Eye Screening Programme.
- Antenatal Screening.
- Newborn Screening, which includes:
    - Newborn Hearing Screening.
    - Newborn Bloodspot Screening.
- Farm Families Health Checks Programme.

Scotland

- Abdominal Aortic Aneurysm (AAA) Screening.
- Bowel Screening.
- Breast Screening.
- Cervical Screening.
- Diabetic Retinopathy Screening (DRS).

- Pregnancy Screening and Newborn Screening, which include:
  - Blood Tests.
  - Screening for Sickle Cell and Thalassaemia Disorders.
  - Mid Pregnancy Scans.
  - Newborn Blood Spot Test.
  - Newborn Physical Examination Screening.
  - Newborn Hearing Test.

Wales

- Wales Abdominal Aortic Aneurysm Screening Programme.
- Bowel Screening Wales.
- Breast Test Wales.
- Cervical Screening Wales.
- Diabetic Eye Screening Wales.
- Antenatal Screening Wales, which includes:
  - Fetal Anomaly.
  - Infectious Diseases in Pregnancy.
  - Sickle Cell and Thalassaemia.
- Newborn Bloodspot.
- Newborn Hearing Screening Wales.

References

1. NHS population screening explained; Public Health England
2. JMG Wilson and G Jungner; Principles and Practice of Screening for Disease, World Health Organization, 1968

3. Canelo-Aybar C, Ferreira DS, Ballesteros M, et al; Benefits and harms of breast cancer mammography screening for women at average risk of breast cancer: A systematic review for the European Commission Initiative on Breast Cancer. J Med Screen. 2021 Dec;28(4):389-404. doi: 10.1177/0969141321993866. Epub 2021 Feb 25.

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