MAKING SENSE OF SCREENING

A guide to weighing up the benefits and harms of health screening programmes

Assembled by Chun-Yin San, Sense About Science intern
Sense About Science is a charity that helps people to make sense of science and evidence in public debate.
Screening – a complex topic
Public expectations about screening still don’t match what screening programmes can deliver.

The diagnosis of a disease, such as prostate cancer, for which no treatment has been shown to increase life expectancy, may result in treatments that impair the quality of life (causing impotence and incontinence) without extending its duration.
What is screening?

Screening programmes are public health programmes designed to reduce the harm caused by disease in a defined population.
What’s the aim of screening?

Screening programmes aim to detect signs that a disease might develop in people who otherwise feel entirely well.

The idea is that the disease can be prevented from progressing to a further stage when treatment is more unpleasant or less likely to succeed, when damage may be permanent or symptoms distressing.
Screening aims to detect signs (risk markers) before symptoms of an illness appear.

If a screening test is positive, further (diagnostic) tests can then take place to see whether the disease is actually present, so treatment can start as early as possible.

Screening doesn’t always prevent disease or inform treatment; it only detects early signs which the person would otherwise not have known about.
Screening tests versus diagnostic tests

**DIAGNOSTIC TESTS**
For people showing symptoms of a disease, to assess whether they have it or to follow its progress.

**SCREENING**
For people showing no symptoms, to identify those with a risk marker for the condition and to divide them into high and low risk.
What are the outcomes of screening?

- **Screening Test**
  - **TEST POSITIVE (SHOWS RISK MARKER)**
  - **TEST NEGATIVE/CLEAR (DOESN'T SHOW RISK MARKER)**

- **Further Diagnostic Tests**
  - **TEST POSITIVE (SHOWS DISEASE)**
  - **TEST NEGATIVE/CLEAR (DOESN'T SHOW DISEASE)**

- **Long term health outcome (compared to no screening)**
  - **TREATMENT SUCCESSFUL**
    - Interrupts progress of disease before symptoms
  - **TREATMENT SUCCESSFUL**
    - But would also have worked if waited for symptoms
  - **TREATMENT UNSUCCESSFUL**
    - And wouldn’t have worked if waited for symptoms
  - **TREATMENT UNNECESSARY**
    - Condition would not have progressed or was harmless (false positive)

N.B. This diagram does not include false negative results.
It’s complicated – screening doesn’t give you a ‘yes’ or ‘no’ answer. Each person is slightly different, and this is the same with risk markers. To deal with this, some tests compare a person’s results to a range of ‘normal’ results, or a reference range. However, some healthy people’s results will fall outside this reference range (and vice versa). This may be because the test isn’t accurate enough or because of natural differences from one person to another.
Will a ‘positive’ screening result always require treatment?

NO.

People who have a ‘positive’ screening result (i.e. shows a risk marker) are then offered further (diagnostic) tests. Some of these will get negative diagnostic test results (i.e. don’t show the disease) and will not be offered treatment. These are known as false alarms.

Other people will have a ‘positive’ diagnostic test result (i.e. shows disease) and will be offered treatment. However some of these people will not go on to develop the disease despite a ‘positive’ result. For example, detectable tumors can be benign in nature and unlikely to develop into cancer or cause symptoms. These people wouldn’t have required treatment, so are referred to as ‘false positives’ or ‘overdiagnosis’.

As doctors are unable to know which individuals are over-diagnosed, some people will undergo treatment which may have been unnecessary.
Screening tests are not 100% accurate; people may be missed or wrongly identified.
Who should be screened?

Screening should be for those who are most likely to benefit, taking into account a number of factors, such as:

**AGE**
Some conditions are more likely to affect particular age groups, e.g. bowel cancer (over 60’s)

**EXPOSURES**
Some conditions are likely to affect groups with certain exposures, e.g. tuberculosis (travel to high-risk areas)

**GENDER**
Some conditions are gender-specific, e.g. cervical cancer (women)
It might seem sensible that we should screen as many people and diseases as we can. However, only certain diseases are suitable to be screened for. Increasing the number of people screened can end up causing more harm than good.

Before any screening programme is implemented, the UK National Screening Committee has to evaluate it thoroughly, taking into account many factors.
Sometimes a screening programme might not be implemented because the nature of the condition makes it unsuitable for screening tests.

**Why not screen everyone for everything?**

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Making Sense of Screening

Why not screen everyone for everything?
The screening test itself might be unsuitable and could do more harm than good.
Should changes be made to a screening programme, such as who is invited for screening or the test that is used, the overall calculation of the benefits compared to the risks has to be made again.

A change in one part of the programme can affect the balance between those who benefit and those who don’t.
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Is it fair to leave out some groups from screening?

If screening is made available to everyone (including those at low risk), it reduces its accuracy and dilutes its benefits. In some cases, it may cause more harm than good, so the risks should always be weighed against the benefits.

FALSE ALARMs & POSITIVE RESULTS
There’s potential for psychological harm from worry following a positive screening result. The harm from anxiety is often underestimated. It can have a profound impact on people’s life choices and relationships, or itself lead to being ill.

FALSE POSITIVES & OVERDIAGNOSIS
People with abnormal results that will never develop into the disease are likely to still undergo treatment which may be unnecessary. This can pose risks, for example infections from surgery.

FALSE NEGATIVES & FALSE REASSURANCE
Negative results can lead to false reassurance. An apparently ‘clean bill of health’ can discourage people from seeking advice about symptoms they experience.

HARMS FROM SCREENING TESTS
A screening test itself may carry a small risk of harm. For example, repeated exposure to X-rays is known to cause cancer in rare cases.

HARMS FROM FURTHER TESTS
Further investigations can cause harm. For example, a colonoscopy used in diagnosis of colon cancer causes a perforated bowel in 1 in every 1000 tests.
• Screening rarely benefits all sections of the population.

• Screening can have negative effects, so it needs to be targeted at those most likely to benefit.

• Screening can identify some of the people who have a disease but it cannot prevent disease.

• Screening cannot give you a ‘yes’ or ‘no’ answer and an ‘all clear’ does not mean you will not go on to develop the disease.

• Screening tests differ from diagnostic tests.
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