The use of SCREENING TESTS

Key messages:

- It is important for health professionals to understand and provide advice for patients on the role of individual screening tests
- Although screening has the potential to improve quality of life, it also has the potential to cause harm
- Screening should be based on good quality evidence that can demonstrate more good than harm

GPs frequently perform tests for screening purposes, whether for formal screening programmes, such as cervical screening, or less formalised opportunistic screening such as cardiovascular risk assessment. Table 1 shows the organised and opportunistic screening currently occurring in New Zealand.[1]

GPs may be aware of the potential benefits of screening (usually perceived as the earlier detection of a pathological process whilst still treatable), however it is also important to consider the limitations of screening tests and the potential for harm associated with these tests.

Recommended criteria for screening

Although, intuitively it may appear to be a good idea to identify people early in the course of a potential disease process, screening is in fact a complex process, which requires careful consideration of a number of issues.

Formal screening programmes involve planning and co-ordination of all activities along the screening pathway, with funding to allow this to occur. Formal screening programmes involve screening entire populations, or a large easily identifiable group within the population. This is usually achieved by systematically identifying (for example, through a population register) and inviting the target population to undertake screening.

Recommended criteria for the assessment of a screening programme:[1]

- The condition is a suitable candidate for screening
- There is a suitable test available
- There is an effective and accessible treatment or intervention for the condition identified through early detection
- There is high quality evidence that a screening programme is effective in reducing mortality or morbidity
- The potential benefit of the screening test should outweigh potential harm
- The health sector should be capable of supporting diagnosis, follow-up and programme evaluation
- There is consideration of social and ethical issues
- There is consideration of cost-benefit issues

Table 1: Organised and opportunistic screening in New Zealand[1]

Type of Screening	Current Examples
Screening programmes	▪ Breast cancer screening (BreastScreen Aotearoa/BSA) ▪ Cervical screening (National Cervical Screening Programme/NCSP) ▪ Newborn baby metabolic screening for phenylketonuria, maple syrup urine disease, galactosaemia, biotinidase deficiency, congenital adrenal hyperplasia, congenital hypothyroidism, cystic fibrosis ▪ Adult Hepatitis B screening

Opportunistic screening	▪ Screening for hearing impairment at school entry
	▪ Antenatal screening:
	  ▪ anaemia
	  ▪ rhesus incompatibility (to avoid newborn haemolytic disease)
	  ▪ gestational diabetes
	  ▪ serology for syphilis, rubella, hepatitis B
	  ▪ ultrasound screening for anatomical abnormalities e.g., neural tube defects
	  ▪ risk factors for HIV
	  ▪ chromosomal abnormalities e.g., Down syndrome (nuchal translucency +/- maternal serum screening)
	▪ Newborn physical examination to screen for congenital hip dislocation, undescended testes, cardiac abnormalities, etc
	▪ Well Child screening for developmental delays
	▪ Screening for complications of diabetes (retinal, foot and kidney)
	▪ Screening for breast cancer with clinical breast examination
	▪ Mammographic breast screening outside of BSA
	▪ Diabetes screening
	▪ Colorectal cancer screening
	▪ Prostate cancer screening
	▪ Cardiovascular disease risk factor screening (smoking, serum cholesterol, hypertension)
	▪ Screening for alcohol and drug misuse among adolescents and adults
	▪ Osteoporosis risk factor screening (which may include bone mineral density scanning)
	▪ Screening for congenital hearing impairment
	▪ Chlamydia screening in young adults

Opportunistic screening has generally evolved over time in response to emerging evidence, but generally with no formal assessment, monitoring or evaluation of quality processes. Opportunistic screening may be organised to a greater or lesser degree, for example: hearing testing at school entry, and performing cardiovascular risk assessment in general practice.

Opportunistic screening is undertaken with varying evidence to support it. In some cases there may be conclusive evidence from randomised controlled trials, while some screening may be done despite inconclusive evidence of benefit. In some cases there may be practical reasons why a programme is not implemented.

Screening defined

Screening is defined by the National Health Committee (NHC) as "A health service in which members of a defined population, who do not necessarily perceive they are at risk of, or are not affected by a disease or its complications, are asked a question or offered a test in the hope of identifying those individuals who are more likely to be helped than harmed by further tests or treatments to reduce the risk of disease or its complications."[1]

Table 2: Benefits and disadvantages of screening[1]

Benefits	Disadvantages
Improved prognosis for some cases detected by screening	Longer morbidity for cases whose prognosis is unaltered
Earlier treatment (cheaper, less radical, cures some early cases with improved quality of life)	Over-treatment of questionable abnormalities
Potential resource savings Reassurance for those with true negative test results	Resource costs False reassurance for those with false-negative results and possibility of later treatment with worse prognosis May legitimise "unhealthy lifestyle"
Wider "public good" benefits in the case of infectious diseases, due to reduced transmission Knowledge of their situation for people with true positive test results Opportunity for counselling on lifestyle	Anxiety, lingering doubts and sometimes morbidity for those with false-positive results Screening procedures are often accompanied by some discomfort, anxiety, and inconvenience for asymptomatic individuals Anxiety and risks associated with further investigations, which may be unnecessary for those with false-positive results Exacerbation of inequalities if there is unequal access to screening Costs and inconvenience incurred during investigations and treatment Hazards due to screening test, e.g. radiation

Informed consent

"There is a responsibility to ensure that those who accept (an invitation to screening) do so on the basis of informed choice, and appreciate that in accepting an invitation or participating in a programme to reduce their risk of a disease, there is a risk of an adverse outcome."[1]

In practice, it is not always easy to achieve the standard required for informed consent. The provision of information, discussion and reflection, may take considerable effort, time and skill, and many GPs are not able to easily fit this into the usual 15 minute consultation. This is where the provision of written information about testing in the form of patient information leaflets can be invaluable (e.g. pamphlets discussing the benefits and harms of PSA testing).

"For health care professionals to merely encourage patients to decide for themselves about screening tests is abjuring their duty. "[2]

Benefits and harms of screening

Although screening has the potential to improve quality of life, it also has the potential to cause harm. For this reason screening should be based on sufficient evidence that the test demonstrates more good than harm.

It is important that all people in the target population have equal access to a screening programme so that health inequalities are not exacerbated by being less accessible to groups with poorer health status. Screening providers should ensure all barriers to participation are minimised.

Limitations when interpreting screening tests

When using screening tests that are not part of formal screening programmes, it is important to consider the following concepts that may influence interpretation and subsequent treatment.

Does everyone with the disease need to be detected?

Any screening programme has the potential for over-detection and over-treatment,[3] because there is a risk that screening will detect clinically irrelevant disease e.g. many older men are shown to have low grade prostate cancer on autopsy but are unlikely to have ever been affected by it. Generally, the harder you look, the more you find.

Does screening benefit the whole population?

Screening is often more biased towards individuals who are frequently more health conscious, have less co-morbidities and comply with follow-up. As a result of this screening bias, apparent improved outcomes from screening programmes may not necessarily reflect the efficacy of screening and early treatment, but rather a healthier subset of the population.[2]

Does screening mean people live longer?

Screening may be able to detect a condition at an earlier stage than had they not been screened. Therefore a person has a longer time living with the condition. Due to this studies may report longer survival times as a result of the screening, also known as lead time bias. In reality the patient may not have an extended life, but rather their survival time was measured from an earlier starting point.[2]

What is the screening test actually detecting?

Length bias occurs because of the varying nature of diseases. For example, an indolent case of a cancer has a longer asymptomatic period than an aggressive case. Therefore, the indolent case is more susceptible to detection by screening whereas aggressive malignancies are more likely to progress from asymptomatic to being clinically symptomatic during the interval between screening tests and are therefore diagnosed upon presentation. For this reason malignancies identified during screening are less likely to be aggressive with a better prognosis.

Other screening terms

- **Prevalence:** the number of individuals in a population with the target condition
- **Sensitivity:** The sensitivity of a test is a measure of how good it is at correctly identifying people who actually have the disease
- **Specificity:** The specificity of a test is a measure of how good it is at correctly identifying people who do not have the disease
- **False positive:** Refers to a positive result in an individual who does not have the condition that the test is for
- **False negative:** Refers to a negative result in an individual who does have the condition that the test is for

References

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3. Barratt A. Cancer Screening-benefits, harms and making an informed choice. Aust Fam Physcian 2006: 35(1-2);39-42