# Belief that early detection is better

**From:** Key Concepts for assessing claims about treatment effects and making well-informed treatment choices (Version 2022)

## 1.3e Do not assume that earlier detection of 'disease' is better.

### Explanation

People often assume that early detection of disease and 'treating' people who are at statistical risk of disease lead to better outcomes. However, screening people to detect disease or treating people at statistical risk of disease is only helpful if two conditions are met. First, there must be an effective treatment. Second, people who are treated before the disease becomes apparent must do better than people who are treated after the disease becomes apparent. Screening and treating people at statistical risk of a disease can lead to overdiagnosis and overtreatment. Screening tests can be inaccurate (e.g., misclassifying people who do not have a disease as if they do have the disease). Screening or treating a statistical risk factor as if it is a 'disease' can also cause harm by labelling people as being sick when they are not, and because of side effects of the tests and treatments.

Screening for phenylketonuria (PKU) is an example of early detection of disease that is better than late detection. PKU is a rare inherited disorder. People with PKU cannot metabolise phenylalanine. Untreated, PKU results in severe intellectual disability, epilepsy, and behavioural problems. PKU can be detected in newborn babies with a drop of blood. Treatment includes a special diet and regular blood tests. With early diagnosis and treatment, most children with PKU can live healthy lives *[van Wegberg 2017 (SR)]*.

Screening women without symptoms for ovarian cancer is an example of early detection that does more harm than good. In randomized trials with nearly 300,000 women, there was not an important difference in similar numbers of women who died from ovarian cancer as women who were screened and those who were not *[Henderson 2018 (SR)]*. Harms of screening included surgery (with major surgical complications) in women found to not have cancer.

### Basis for this concept

Screening to detect disease earlier can harm people in several different ways, including:

- Undesirable effects of the screening tests
  Screening tests can be bothersome and may occasionally cause harm. For example, screening mammography for breast cancer can cause discomfort or pain, and some women decide not to have mammograms because they can be painful *[Nelson 2016 (SR)]*. Screening for breast cancer also can cause anxiety, distress, and other psychological responses. More invasive tests can sometimes cause more serious harm. For example, screening colonoscopy for colon cancer is estimated to cause three perforations and 15 major bleeds for every 10,000 patients screened *[Lin 2021 (SR)]*.

- False-positive and false-negative test results
  Tests that are positive, indicating disease, when in fact the individual does not have disease can result in adverse psychological effects. For example, 42% of women screened for breast cancer every other year for 10 years have at least one false-positive mammography, and 6% receive a biopsy because of a false-positive test *[Nelson 2016 (SR)]*. Compared to women with normal results, women with false-positive results are more likely to experience breast

cancer specific worry, worries that affected their mood or daily activities, and lower mental functioning and vitality. False-negative test results can result in a delay in recognising and treating breast cancer.

- Undesirable effects of the treatment
  Surgery, radiation, and chemotherapy, which are used to treat cancer, all have serious adverse effects. For example, men with prostate cancer detected by screening can be treated with surgery and radiotherapy, which can cause impotence and urinary incontinence *[Michaelson 2008 (OR)]*.

- Overdiagnosis, overtreatment, and overmedicalisation
  Overdiagnosis means the detection of a condition or problem that would never cause a person harm during their lifetime. Overtreatment means that people receive more extensive or invasive treatment than is required to improve health outcomes. For example, men with prostate cancer detected by screening can be treated with surgery and radiotherapy. These can cause impotence and urinary incontinence when the cancer may not have caused them any harm in their lifetime.

  Overmedicalisation is wrongly defining and treating human conditions and problems as medical conditions. This can result in both overdiagnosis and overtreatment. For example, lowering the threshold for a risk factor such as high blood pressure or gestational diabetes can result in many people who may never experience any harm caused by the condition being diagnosed as being "at risk" and treated unnecessarily. The lower the baseline risk is, say for having a stroke or heart attack, the lower the absolute effect will be, assuming the relative effect is the same. So, with lower thresholds, the likelihood of desirable effects decreases, while the likelihood of undesirable effects stays the same *[Doust 2020]*. For example, there is evidence that attention-deficit/hyperactivity disorder (ADHD) is being diagnosed more frequently and that the increase is due to milder cases being diagnosed and treated with drugs *[Kazda 2021 (SR)]*. The benefits of pharmacological treatment for youth with milder symptoms are uncertain and may be outweighed by the harms.

- Labelling
  People who are labelled as having a condition or a disease may experience adverse effects simply from being labelled. For example, a study with 33,000 adults found that individuals who were aware that they had hypertension had more psychological distress than individuals who were unaware that they had hypertension *[Hamer 2010 (RS)]*. Other studies have found increased absenteeism and decreased psychological well-being associated with labelling, although the results are not consistent *[Guirguis-Blake 2021 (SR), Macdonald 1984 (OR)]*.

The evidence for and against screening varies. Out of 87 recommendations (for 64 topics) made by the U.S. Preventive Services Taskforce last updated between 2011 and 2021, there was high certainty that the benefits substantially outweigh the harms for eight *[U.S. Preventive Services Task Force 2021 (SR)]*. There was high-certainty evidence of a moderate net benefit or moderate certainty of a moderate to substantial net benefit for another 23 recommendations. There was at least moderate certainty that the net benefit is small for four recommendations. For 14 recommendations, there was moderate or high certainty that there is no net benefit or that the harms outweigh the benefits, and for 38 statements there was insufficient evidence to assess the balance of the benefits and harms of screening.

## Implications

Do not assume that early detection of disease is worthwhile if it has not been assessed in systematic reviews of fair comparisons between people who were screened and people who were not screened.

## References


### Systematic reviews

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