Overdiagnosis—when finding cancer can do more harm than good

March 7 2018, by Jasmine Just

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Not all cancers are equal.

Some grow fast and spread quickly, while others grow so slowly (or even not at all) that if they went undetected they wouldn't cause any problems. Even if left untreated, a person wouldn't be harmed by their cancer.

When these harmless cancers are found they're said to be 'overdiagnosed'. This happens more often with certain types of cancer, and is usually tied to particular types of cancer screening that test people without symptoms, such as breast screening.

The problem is that when these types of cancer are diagnosed early it's impossible to tell the potentially harmful ones from the harmless ones. Everyone is then usually offered treatment. And this means that some will be exposed to the potential side effects of treatment, and worry of a cancer diagnosis, when they didn't need to be. This is called overtreatment.

Overdiagnosis is one of the key things to consider when working out the balance of possible benefits and harms of cancer screening. Keep in mind, overdiagnosed cancers aren't the same as when a test finds something abnormal that turns out not to be cancer (so-called false positive test results), another risk of screening and many other types of test. An overdiagnosed cancer is a true cancer, but it's one that wouldn't have caused harm in that person's lifetime.

So the challenge then becomes shifting our thinking of cancer as always needing urgent treatment to a disease that sometimes we can live with, or be unaware of and unaffected by.

Over the last few decades overdiagnosis has been receiving more attention. And with new cancer detection technology on the horizon, ranging from blood tests to wristbands, it's important that we learn more about it and work out how to minimise it.

What's the evidence?

Some of the earliest evidence around overdiagnosis came from autopsy studies. Experts found undiagnosed cancers in people who had died from

a cause other than cancer. This showed in some cases people can live out their life without ever knowing a cancer is there, or being harmed by it.

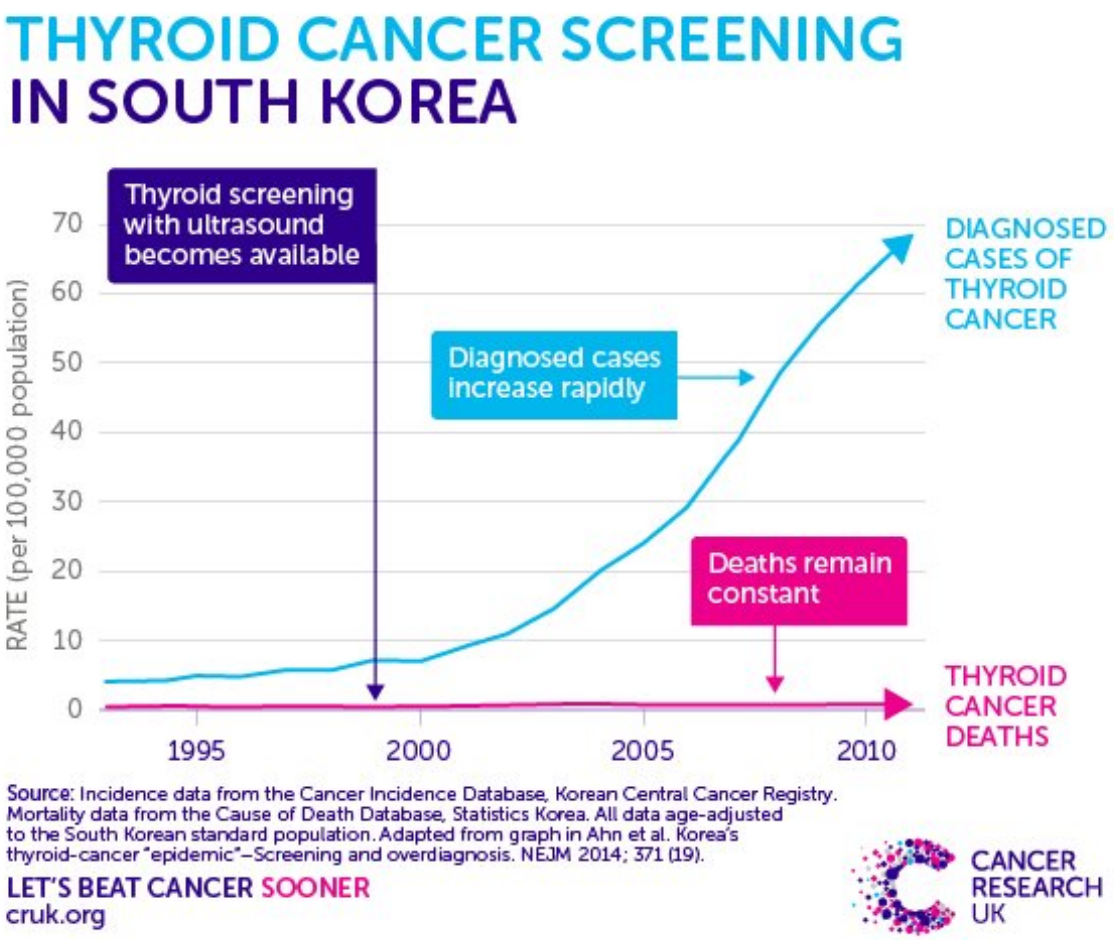
Professor Gilbert Welch, from the Dartmouth Institute for Health Policy and Clinical Practice in the US, is a pioneer in raising awareness of the challenge of overdiagnosis. And he says that overdiagnosis isn't something that doctors or researchers usually directly observe. "The occasional exception is when we do nothing for a diagnosed cancer and the patient goes on to die of something else," he says.

Other evidence for the phenomenon has come from digging into cancer statistics, particularly when comparing the number of people diagnosed with a cancer (incidence) with those that die from it (mortality).

"The easiest evidence to understand is when incidence shoots up following early diagnosis and mortality stays the same," says Welch. "Here South Korea serves as the poster child."

Thyroid cancer in South Korea – a true epidemic?

South Korea introduced free screening programmes for a range of cancers in 1999, with thyroid cancer screening also available for a small fee. A decade later, the incidence of thyroid cancer in South Korea had increased dramatically.



Credit: Cancer Research UK

If the number of cases of thyroid cancer were really increasing, and if we assume they're all cancers that needed to be found and treated, we'd also expect an increase in the number of people dying from thyroid cancer.

That didn't happen.

There are two possible explanations for this:

1. Thyroid cancer treatment improved dramatically at the same time as more people were being diagnosed, so lots more people were surviving the disease.
2. The cancers that were being picked up through screening were overdiagnosed.

The second explanation is far more likely. In other words, simply scanning more thyroids picked up more of the slow-growing, harmless cancers that didn't need to be found and treated in the first place.

Importantly, overdiagnosis can mean cancer survival statistics don't always accurately represent the progress we're making. For example, if more harmless cancers are found and treated, many more people will survive the disease they've been diagnosed with. So it can be tricky to untangle the true impact of things like better treatments.

But some cancers are much more prone to overdiagnosis than others, such as breast and prostate cancers.

Breast screening: saving lives and balancing harms

Breast screening picks up early stage cancers that are more likely to be treated successfully. But it also comes with potential harms, including overdiagnosis, because many of those early invasive breast cancers wouldn't have gone on to cause trouble. Women need this information so they can make a fully informed decision about whether or not to go for screening.

Research has shown that for each woman whose life is saved through breast cancer screening, around three will be diagnosed with a breast cancer that would have never caused harm or death.

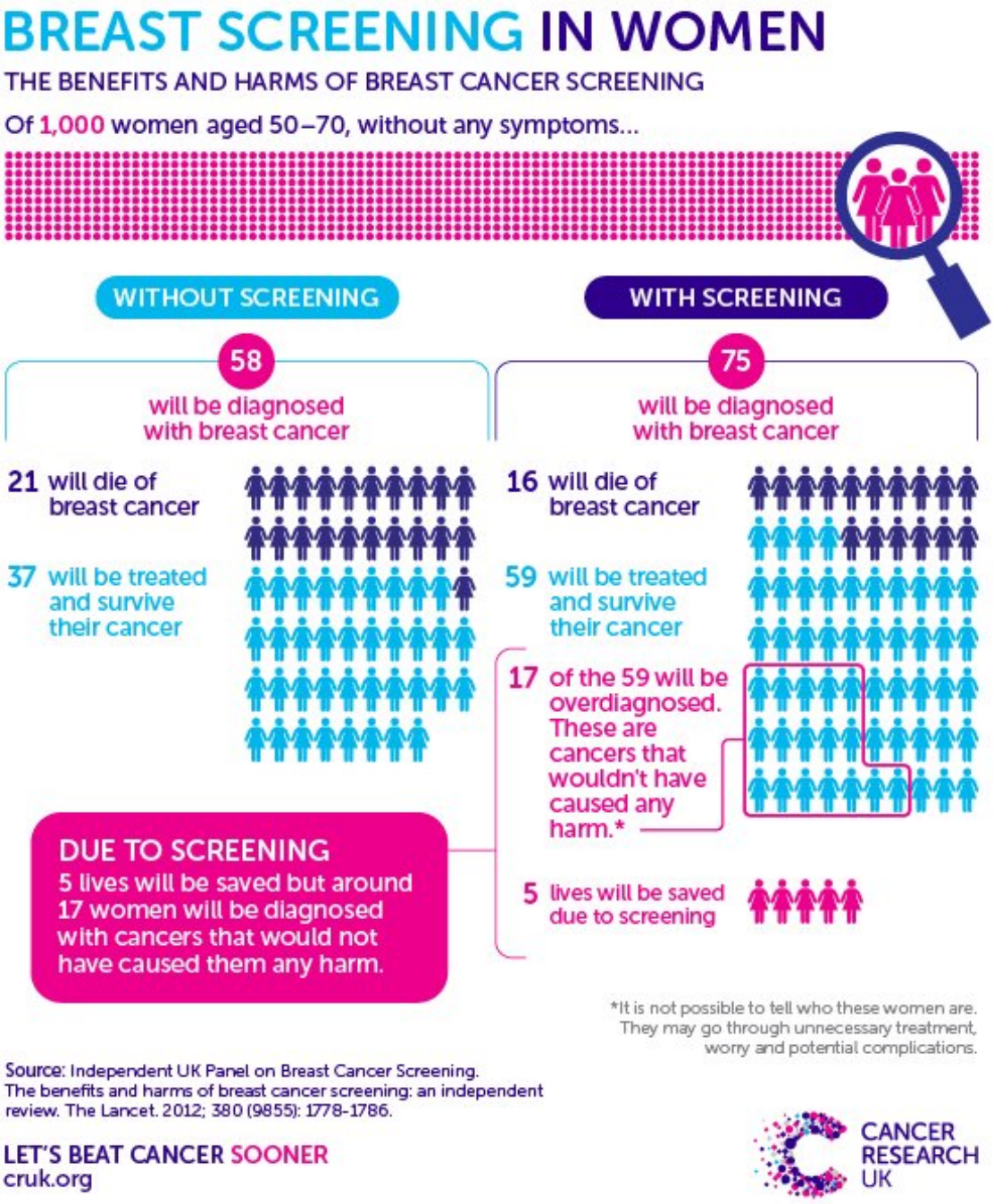
A cancer diagnosis causes distress. And because breast screening and

diagnostic tests can't yet tell the dangerous cancers that need treating from the harmless ones that don't, some people will experience that distress unnecessarily. So to be on the safe side, treatment will be recommended to all patients, which can also lead to unnecessary side effects.

"For every woman who is prevented from dying from breast cancer, three others will be diagnosed that wouldn't have otherwise if they didn't participate in breast screening," explains Professor Peter Sasieni, Cancer Research UK's expert in cancer screening and epidemiology from King's College London.

"Those three will be treated and will probably have surgery, radiotherapy and possibly hormonal therapy."

"I think the language we use to talk about cancer is a big problem in society," he adds. "I think most people still think of a cancer diagnosis as a death sentence."



Credit: Cancer Research UK

"The Holy Grail is finding something that tells us which cancers are harmless and which aren't, and then we can distinguish between them and ignore the harmless ones."

Screening can save lives by diagnosing cancer at an earlier stage and, in some cases, preventing it from developing in the first place. But the decision to introduce new screening programmes has to be carefully thought through.

Prostate cancer: why there's no UK screening programme

Prostate specific antigen (PSA) is a molecule made by the prostate and detected in blood samples. A man's PSA level can be raised for many reasons, including an enlarged prostate, infection and prostate cancer.

Clinical guidelines recommend PSA testing in men with prostate cancer to monitor if their disease gets worse. And men with low-risk prostate cancer that hasn't spread can be monitored with regular PSA testing as an alternative to surgery or radiotherapy.

But there are longstanding debates around if the PSA test should be used for screening to look for prostate cancer in men with no symptoms.

There's no national prostate cancer screening programme in the UK, because the PSA test isn't reliable enough. A large study from 2013 looked at the results of different trials comparing men who had prostate screening and those who didn't. The study showed that screening didn't save any lives, and the men who took part in screening were more likely to be overdiagnosed.

The latest findings from a major Cancer Research UK-funded PSA trial

included over 400,000 men and has backed up that a one-off PSA test doesn't save lives.

Seek and you shall find

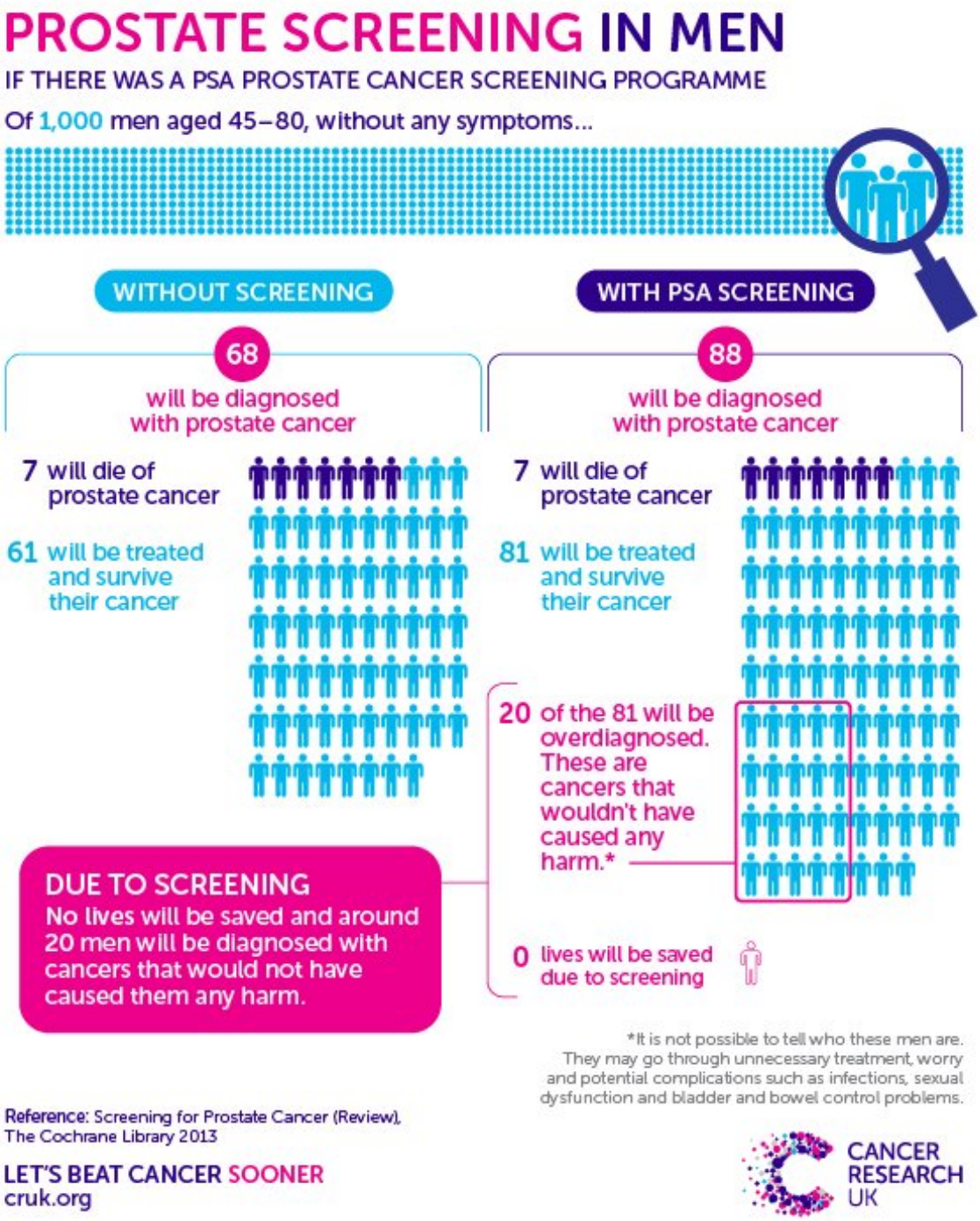
No screening test is perfect and there's always a trade-off between lives saved and the harms of overdiagnosis and overtreatment. It's up to researchers to improve tests and tip the balance.

We're in exciting times when it comes to the potential for technology and innovation to diagnose cancer earlier. We need to be able to find and diagnose cancers early because when cancer is found at an earlier stage it's easier to treat.

But the flip side is that new tests and more sensitive tech can come with a higher risk of picking up cancers that would never have gone on to cause harm. So it's vital that researchers consider not only how to find cancer earlier, but also how to reduce overdiagnosis and ensure we're picking up the cancers that need treating.

Lung cancer screening is an example of where this can happen.

Most lung cancers are diagnosed at a late stage (stage 4), and this is largely to blame for lung cancer survival being so poor. Diagnosing more cancers early (stage 1 and 2) is crucial to save lives. And screening might be a way of doing this.



Credit: Cancer Research UK

The US National Lung Screening Trial compared chest x-rays with low dose CT scans to pick up lung cancers. In other words, whether CT as a more advanced imaging technology has greater potential than standard chest x-rays to diagnose lung cancer in people without symptoms and stop people dying from the disease.

The researchers looked at over 53,000 people aged between 55 and 74 at high risk of lung cancer based on their smoking history. Half were screened with chest x-rays and the others had CT scans.

The group that had CT scans were 20% less likely to die of lung cancer than those who had chest x-rays, suggesting CTs can save more lives. But compared with the x-ray group, the risk of having a lung cancer overdiagnosed in the CT group was around 18%. That's nearly 1 in 5 people who were diagnosed with a lung cancer that wouldn't have gone on to cause any harm at all in their lifetime. Researchers working on lung screening know this is something to be addressed as they test what might balance the harms and benefits of lung screening.

"It's important to emphasize that harms of overdiagnosis can coexist with the benefit of a mortality reduction – they aren't mutually exclusive," says Welch.

There isn't a national lung cancer screening programme in the UK because it's not clear if the potential benefits would outweigh the potential harms. The largest European trial investigating lung cancer screening is still underway. The latest results, expected out in the next year, will hopefully shed more light on these issues.

What next?

Screening can help spot cancer early and save lives.

And the UK's national screening programmes exist because research has shown that the benefits outweigh the harms for the population at large.

But for an individual person, the decision to be screened or not should be an informed choice.

"Currently, in order to have the benefits of screening, there has to be some overdiagnosis," says Sasieni.

If you're unsure about what to do if you get an invitation for screening, visit our website or speak to your doctor.

Research into better tests and improved technology will help pick up cancers earlier.

The challenge then is finding out how to tell the dangerous cancers from the harmless ones. But with overdiagnosis moving further in to the spotlight, and with our strong commitment to diagnosing cancers earlier, researchers are better placed than ever to tackle this.

Provided by Cancer Research UK

Citation: Overdiagnosis—when finding cancer can do more harm than good (2018, March 7) retrieved 20 April 2024 from https://medicalxpress.com/news/2018-03-overdiagnosiswhen-cancer-good.html