

Screening Mammography: Benefits, Limitations, Potential Harms, and Future Improvements

Although therapy for breast cancer has improved over the years, to date, no way to prevent breast cancer has been discovered and experience has shown that treatments are most effective when a cancer is detected early, while still small and contained, and before it has invaded other tissues. The limited methods for preventing and treating the disease leave early detection as the most promising approach for reducing the toll from breast cancer.

In a report published in 2001, an Institute of Medicine committee examined the array of promising detection and diagnostic technologies then under development, and concluded that mammography, despite its flaws, was still the best choice for screening the general population to detect breast cancer at early and treatable stages. Yet, for a variety of reasons, many women do not undergo regular screening. These reasons include limited availability of screening in some parts of the country, inadequate insurance coverage, and failure to understand the value of screening. Others find the procedure painful.

LIMITATIONS

In addition, mammography is not perfect. Amongst women with undetected breast cancer who are screened, mammography correctly flags those cancers 83 to 95 percent of the time. That means as many as 17 percent of cancers go undetected.

Sometimes, mammograms return false-positive results, or false alarms. The risk of a false-positive result from a screening mammogram is about 1 in 10. Over time, those odds increase: Research suggests that, among women who receive annual mammograms for 10 years, half will have at least one suspicious finding leading to additional tests showing it to be a false alarm.

The fact that mammography does not work equally well for all women, especially those with dense breast tissue, is a further complication.

GOALS AND BENEFITS

It is important to point out that the goal of screening for breast cancer is not to detect all breast abnormalities; the goal is to prevent deaths from breast cancer. Thus the benefits of mammography depend on the availability of effective treatment. Despite the common misconception, screening mammography does not benefit women by reducing their risk of breast cancer, but by reducing mortality through detecting breast cancer at earlier and more treatable stages.

The first screening trial of mammography was started in 1963. Since then, seven trials involving more than half a million women have been conducted in four countries. Most of those studies reported reductions in breast cancer mortality screening. As a result, more than a dozen countries have established breast cancer screening programs.

WHAT DOES THE EVIDENCE SAY?

Screening mammography came under fire in 2001, with the publication of a research review stating that several of the key mammography screening trials were scientifically flawed. The review authors argued that there was no evidence of benefit from mammography. However, this analysis has since been reviewed by a series of expert groups, including the Global Mammography Summit and the World Health Organization, who concluded that many of the criticisms of mammography were unsubstantiated; they pointed out that the critique was based on judgments of the quality of screening studies, but those judgments were based on misreading of the data and the literature.

In addition to the evidence from the first seven clinical screening trials, a series of studies conducted in community settings has supported the conclusion that screening mammography saves lives. Overall, the evidence indicates that the availability of screening mammography reduces mortality from breast cancer by 20 to 30 percent.

Mammography has its limitations. Most notably, it is less sensitive with dense breasts. The more connective and epithelial tissue – as opposed to fatty tissue – in a breast, the more difficult it is to get a clear, detailed X-ray picture of the breast. Many factors influence breast density, such as obesity, ethnicity, age, stage of menstrual cycle, and the number of babies a woman has had. Native-American populations typically have lower density breast tissue, and Asian populations have greater density breast tissue than African American and white populations overall.

WHAT ARE THE DRAWBACKS?

Critics of screening mammography often cite several potential harms:

- *Financial.* The additional costs of evaluating false-positive mammogram results can add up to one-third of the total cost of screening for all women.
- *Pain.* Mammography requires compression of the breast, and is painful for some women.
- *Emotional.* Waiting for results, which may take days or even weeks, causes anxiety in many women. In general, though, this anxiety does not appear to be significant for most women.
- *False alarms.* An abnormal finding on a mammogram is by definition a cause for concern. However, resulting psychological distress tends to pass quickly if a subsequent test indicates that the result was, in fact, a false positive.
- *Biopsies.* Exposure to unnecessary biopsies from a false-positive result is a real concern. Better risk stratification should lower the rate of biopsies for benign conditions because a smaller pool of low-risk women would undergo screening. “Unnecessary” biopsies can also be reduced by using supplemental technologies, such as ultrasound.
- *Radiation risk.* The average amount of radiation absorbed during a mammogram is very small. The radiation dose is about than one-fifth of what was used in the early days of mammography. Radiation sensitivity among women drops precipitously after age 35, and although some caution may be warranted for frequent mammograms of women under age 35, risk calculations indicate the radiation risk is extremely small compared with the benefits of mammography. No large-scale epidemiological studies have found an increase in cancer rate due to exposure to mammography.

Unfortunately, much of the information on screening mammography can appear conflicting for women who are considering getting a mammogram. Today, most screening guidelines recommend mammograms every one to two years for women 40 and older. Despite its limitations and its drawbacks, for the immediate future, broader and better use of mammography holds the greatest potential to save lives over other new screening and detection technologies. This conclusion anticipates the quality of mammography services will continue to improve.

What To Do About DCIS?

Ductal carcinoma *in situ* (DCIS) occurs when malignant cells spread within the breast ducts, but remain confined there. Although DCIS is not life threatening per se, it is a significant risk factor for invasive – and life-threatening – cancer.

Diagnosis of DCIS has increased tenfold since the advent of screening mammography. Among screen-detected breast cancers, 20 percent are DCIS, and 1 in every 1,300 screening mammograms leads to a diagnosis of DCIS. Clearly, before the widespread use of screening mammography, many cases of DCIS went unrecognized; the increased numbers and proportion of DCIS cases that are now recognized does not necessarily mean that more women are developing DCIS.

Some women with DCIS will not develop invasive breast cancer, yet others with the same diagnosis will develop the deadly form of this disease. The most important issue for DCIS is not however the increased detection, but rather the information, which mammography cannot provide that would permit optimally individualized treatments. The solution lies in tailoring treatment to the biological characteristics of individual cases.