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EMERGING ISSUES BRIEF

Overdiagnosis

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In September, 2013, more than 320 researchers from nearly 30 countries gathered in Hanover, NH, for "Preventing Overdiagnosis: Winding back the harms of too much medicine," a conference addressing the problem of overdiagnosis in medicine. Dartmouth faculty members Drs. Steven Woloshin and Lisa Schwartz, with editors from the *British Medical Journal* and Bond University in Australia, organized the conference.[1] Overdiagnosis was discussed for a wide variety of diseases ranging from psychiatric disorders to musculoskeletal diseases and cancer. Here we address some basic questions related to overdiagnosis as they pertain to cancer screening.

What is overdiagnosis?

Overdiagnosis is defined as the detection of a disease or condition that would not otherwise cause symptoms or death during a person's lifetime.[2] The treatment of disease that would otherwise remain silent is problematic, because treatment side effects may pose more harm than good for the asymptomatic individual patient. Unnecessary treatment is sometimes referred to as "overtreatment."

Concern about overdiagnosis has grown as the use of medical imaging and other technological advances in medicine have improved the ability of healthcare providers to identify potential abnormalities. Another aspect of overdiagnosis is "medicalizing" the range of normal experience by broadening disease definitions.

What is driving overdiagnosis?

Overdiagnosis has become a larger concern in our current health care environment due to a number of driving factors, including:

- *health care industry* – pharmaceutical and technological expansion of products in an environment where greater awareness of disease may lead to greater investment in its prevention and treatment
- *health care systems* – competing for patients with the "latest" devices and services
- *malpractice* – physicians practicing defensive medicine to reduce the risk of litigation
- *media* – direct-to-consumer marketing that heightens patient expectation and demand for services[2, 3]
- *screening enthusiasm* – belief that early diagnosis is inherently beneficial to patients

Screening, with its mission of early detection to reduce mortality, has raised concerns of overdiagnosis for cancer and other diseases. Cancer screening has been a public health success in its adoption at a population level for some cancers—particularly for cervical, breast, and colon cancers. Through successful screening programs, screening detection of cancer has increased, but not all of that detection is providing benefit to patients.

A paradoxical cycle of increasing screening intensity fueled by false feedback was first described by Dartmouth researchers.[4] As depicted by Black and Welch, increased screening leads to a lower threshold of disease detection, which results in more cancers being detected (a higher cancer yield), as well as in a milder spectrum of disease coming to medical attention. The latter results in better outcomes among those screened. The combination of higher screening yield and better outcomes fuels the increase in screening intensity.

Why is there concern about overdiagnosis in breast cancer?

Breast cancer screening has been widely adopted in the U.S. since its inception in the early 1970s. Screening mammography itself is an imperfect test and leads to false-positives approximately 10 to 15 percent of the time[5]– translating into a 50 percent chance of having a false positive mammogram for a woman who screens regularly over 10 years.[6] Further, screening mammography can lead to breast biopsies that are negative for cancer about 65 percent of the time.[7] Nonetheless, invasive breast cancer detection rates through screening mammography are about 5 percent,[8] which provides a real opportunity for mortality reduction among the nearly 40 million women of screening age in the U.S.[9]

Although strong evidence shows that screening mammography reduces death from breast cancer for women ages 50-74, in some cases early detection won't make a difference in a woman's survival because she would not otherwise have died of that cancer. In this scenario, a woman may undergo unnecessary tests, psychological and/or financial stress from an unnecessary diagnosis and treatment, and may even die from treatment complications.

Screen-detection of ductal carcinoma in situ (DCIS) has become increasingly fraught with tension around possible overdiagnosis and controversy about appropriate clinical management. DCIS is not an invasive cancer, but, on average, it advances to an invasive cancer up to almost 20 percent of the time.[8] The inability of modern medicine to distinguish cancers that will progress, from those that will not, poses a dilemma for women and their health care providers. Several treatment options exist, ranging from breast conserving surgery without radiation, to bilateral mastectomy.[10] Patient preferences based on a thorough understanding of risks are critical to elicit and incorporate into management plans. In fact, patient preferences and informed decision making are key to ensuring that women's benefit is maximized and harms are minimized with breast cancer screening. Although informed by an evidence base, "benefits" and "harms" can be in the eye of the beholder. For example, some women may feel reassured by having regular screening, even if a false positive occurs, since detecting a true positive is of utmost concern to them. Others may incur financial or psychological burdens that they would have rather avoided by not screening.

That there are both benefits and harms to breast cancer screening is less of a debate than how to weigh them for screening decisions. Breast cancer screening decisions are personal, and based not only on scientific evidence and a woman's breast cancer risk, but also on their preferences and ability to access care. Because breast screening guidelines are aimed at populations, they are typically not tailored to specific individuals or to other important subgroups, such as young women at high risk of breast cancer, or older women at low risk of death.

What to do about overdiagnosis?

The current debate about overdiagnosis in breast cancer screening should be a call to women and providers to be fully informed about the benefits and harms of screening. From a policy and research perspective, the clinical and scientific community needs to figure out how to define, measure, communicate, and take action to minimize overdiagnosis while maximizing the benefits of screening programs. Overdiagnosis is an active area of study and is considered by the United States Preventive Services Task Force when reviewing population-based evidence in formulating breast cancer screening guidelines.[11]

References:

1. "Preventing Overdiagnosis: Winding back the harms of too much medicine" http://www.preventingoverdiagnosis.net/
2. Welch G, Schwartz L, Woloshin S. Overdiagnosed: Making people sick in the pursuit of health. Beacon Press, 2011.
3. Moynihan R, Doust J, Henry D. Preventing overdiagnosis: how to stop harming the health. BMJ. 2012;344:e3502.
4. Black WC, Welch HG. Screening for disease: AJR 1997;168:3-11.
5. Smith Bindman, et al., JAMA 2003;290:2129-2137.
6. Elmore JG, Barton MB, Moceri VM, Polk S, Arena PJ, Fletcher SW. Ten-year risk of false positive screening mammograms and clinical breast exams. NEJM 1998;338:1089-96.
7. Rosenberg RD, et al. Performance benchmarks for screening mammography. Radiology. 2006;241:55-66.
8. National Cancer Institute, Breast Cancer Surveillance Consortium. http://breastscreening.cancer.gov/data/performance/screening/2009/rate_age.html
9. United States Census, 2010. U.S. Census Bureau, Census 2000 Summary File 1
10. National Cancer Institute. http://www.cancer.gov/cancertopics/pdq/treatment/breast/healthprofessional/page4
11. Mandelblatt JS, et al. Effects of screening mammography under different screening schedules: model estimates of potential benefits and harms. Ann Intern Med. 2009;151:738-747.

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