COMMENTARY

Evidence for U.S. Preventive Services Task Force (USPSTF) Recommendations Against Routine Mammography for Females between 40-49 Years of Age

Parisa Karimi[1]*, Armin Shahrokni[2], Sedighe Moradi[3]

Abstract

Breast cancer is the most common cancer among females, worldwide, accounting for 22.9% of all cancers (excluding non-melanoma skin cancer) in females. Mammography is a sensitive (77-95%) and specific (94-97%) screening method for breast cancer. Previously, females between the 40-50 years old were recommended to have mammograms every one to two years. However, based on current evidence, in 2009, USPSTF recommended that the decision to start regular, biennial screening mammography for females younger than 50 years should be an individual decision and take patient context into account, including the patient's values regarding specific benefits and harms. This decision was based on findings regarding radiation exposure, false-positive and false-negative rates, over-diagnosis, and pain and psychological responses. The goal of this paper is to focus on evidence for updating the U.S. Preventive Services Task Force (USPSTF) recommendation against routine mammography for females between 40-49 years of age.

Keywords: U.S. preventive services task force - breast cancer - mammography

Asian Pacific J Cancer Prev, **14 (3)**, 2137-2139

Introduction

Breast cancer (BC) is the most common cancer among females, worldwide (DeSantis et al., 2011). It accounts for 22.9% of all cancers (excluding non-melanoma skin cancer) in females (Elmore et al., 2005). In 2008, it caused 458,503 deaths, worldwide (13.7% of cancer deaths in females and 6.0% of all cancer deaths for both males and females) (Garfinkel et al., 2009). Since 1970s, the number of cases worldwide has significantly increased that is partly attributed to the modern lifestyles (DeSantis et al., 2011). Based on current incidence rates, 12.4 percent of females born in the United States, today, will develop BC at some time during their live (Elmore et al., 2005).

Recently, the World Cancer Research Fund (WCRF) indicated that females could reduce the risk of BC by a healthy weight, drinking less alcohol, being physically active and breastfeeding their children (Food). Studies suggest that these modifications might prevent 38% of BCs in the US, 42% in the UK, 28% in Brazil and 20% in China (Food). The most common early symptom of BC is typically a lump that feels different from the rest of the breast tissue (Amir et al., 2010). More than 80% of BC cases are discovered when the woman feels a lump (Skaane, 2011). This asymptomatic phase can be detected by screening methods (Lee et al., 2010). Mammography is a sensitive (77-95%) and specific (94-97%) screening method that is performed by using either plain film or digital technologies, although the shift to digital is ongoing (Hirsch and Lyman, 2011). However, while mammography screening is the only method presently considered appropriate for mass screening of asymptomatic female (Smith et al., 2012), there are suggested potential side effects and harms, including radiation exposure, false-positive, false-negative, over-diagnosed, pain and psychological responses (Kolb et al., 2002).

In 2002, based on evidences, the U.S. Preventive Services Task Force (USPSTF) recommended mammography screening, with or without clinical breast examination, every 1-2 years for females age 40 years and older (Nelson et al., 2009). They concluded that the evidence was insufficient to recommend mammography screening for or against routine clinical breast exam alone, and insufficient to recommend for or against performing routine breast self-examination (Nelson et al., 2005). However, in 2009, the USPSTF reversed a previous recommendation that suggests females between the ages of 40 and 50 have mammograms every one to two years (Woolf, 2010). The USPSTF current recommendation states that the decision to start regular, biennial screening mammography for females younger than 50 years should be an individual decision and take patient context into account, including the patient's values regarding specific

*[1]Johns Hopkins University Bloomberg School of Public Health, Baltimore, [2]Oncology Division, UCLA David Geffen School of Medicine, Los Angeles, CA, USA, [3]Tehran University of Medical Sciences, Tehran, Iran *For correspondence: pkarimi@jhsph.edu*

benefits and harms (Woolf, 2010).

With their grade C rating, the USPSTF recommends against routinely screening mammograms (Hendrick and Helvie, 2011). The USPSTF suggests that the net benefits of screening females between 40-49 years old are likely to be small and may be outweighed by harms such as overtreatment (DeAngelis and Fontanarosa, 2010). This decision was based on the evidence, as follows.

Radiation Exposure

Most mammographies are considered low-dose, low-energy radiation, with the mean glandular dose of bilateral, 2-view averaging 7 mGy (Spelic, 2010). For females aged 40-49 years, yearly mammography screening for 10 years with potential additional imaging would expose an individual to approximately 60 mGy, although these levels vary (Armstrong et al., 2007). Systematic reviews that evaluate the effect of high-dose exposure of radiation exposure of radiation therapy and diagnostic radiation on BC, indicated that Relative Risks (RRs) ranged from 1.33-11.39 for exposures of 0.3-43.4 Gy and were worse with higher doses of exposure, younger age at exposure, and longer follow-up (Armstrong et al., 2007).

However, 10 years radiation exposure due to screening mammography and potential additional imaging much less than this amount (Armstrong et al., 2007). A recent case-control study found that females exposed to diagnostic x-rays for screening or monitoring tuberculosis or pneumonia, or therapeutic radiation for a prior cancer, had increased risks for BC (Ravdin et al., 2007). Nevertheless, no published studies have directly measured the association between radiation exposure from mammography screening and BC risk and this clearly remains a concern.

False-positives

In a meta-analysis of clinical trials, the probability of a false-positive screening mammography result was ranged 0.9-6.5% (Qaseem et al., 2007). Another systematic review reported 56% cumulative risk for false-positive mammography results after 10 mammography examinations for females aged 40-49 years old (Hofvind et al., 2004). The Breast Cancer Surveillance Consortium (BCSC) reports indicate that for every case of invasive BC detected by mammography screening in females aged 40-49 years, 556 females have mammography, 47 have additional imaging, and 5 undergo biopsies (Nelson et al., 2009).

False-negatives

There are only few studies that evaluated the effect of negative mammography results (Drossaert et al., 2001). False-negative mammography results occur least among females 40-49 years old (1.0 per 1000 females per screening round) (Drossaert et al., 2001). However, additional studies seem necessary to understand the rate and burden of false-negative mammography findings in these females.

Over-diagnosis

False-positive results in mammography cause over-diagnosed cases that lead to additional imaging or histopathological assessment, mainly percutaneous breast biopsy (Kolb et al., 2002). It is reported that only in 2006, one-eighth of all invasive cancers detected by mammography were found over-diagnosed (Michell, 2012). About 8.7% of females attending their first screen and 3.4% of females attending for subsequent screens are recalled for further assessment, including clinical examination, imaging and in some cases needle biopsy (Elmore et al., 2005). During 2008 and 2009, 2,078,195 females were screened, 91,395 (4.4%) were recalled and 16,535 (0.8%) were diagnosed with cancer (Elmore et al., 2005). A review of several randomized controlled trials show that the absolute excess cumulative incidence of over-diagnosed BC ranged from 0.07-0.73 per 1000 woman-years (Moss, 2005). In these studies, total of 120,352 females, aged 40-49 years, randomly assigned to intervention (received screening mammography) and controls (did not received screening mammography) (Moss, 2005). However, a potential bias in these studies is the imbalance in socio-economic status, reflected in all-cause mortality, which is likely to have resulted in an increased risk of BC in the intervention group. Another meta-analysis of several randomized controlled trial studies suggest that rates of over-diagnosis vary from less than 1-30%, with most from 1-10% (Nelson et al., 2009). Estimates differ by outcome (invasive vs. in situ BC) and age (Nelson et al., 2009). However, this meta-analysis does not mention any statistically result since the studies were too heterogeneous to combine statistically.

Pain and Psychological Response

Pain and psychological response: To have a clear image at mammography, it is needed to compress and reduce breast thickness during imaging (Spelic, 2010). A recent systematic review of 22 surveys indicated that many females experience pain during the procedure (range, 1-77%), and 12% would consider this a deterrent from future screening (Armstrong et al., 2007). However, the scaling for measuring pain was not the same in theses studies and considered a potential bias. Also, pain could be associated with the stage of the menstrual cycle, anxiety, and the anticipation of pain that were not considered in most of theses studies.

Furthermore, the psychological responses (e.g. anxiety and distress) of females undergoing mammography were evaluated in many studies but the results were conflicting. Systematic review of cohort studies indicated that females who received clear communication of their negative mammography results had minimal anxiety (Brett et al., 2005). However, several studies reported that females had persistent anxiety, despite eventual negative results, whereas some showed only transient anxiety (Brewer et al., 2007). Further studies with more power seem necessary to evaluate pain and psychological response in these female.

In addition, the difficulties of mammography

interpretation and the subtle signs of many small BCs require specialist training and double reading to increase cancer detection (Elmore et al., 2005).

Conclusions

Based on USPSTF reports, mammography screening for females between 40-49 years old is a tradeoff of a continuum of benefits and harms. The situation at which this tradeoff becomes acceptable to individuals and society are not clearly resolved by available evidences. Moreover, due to ethical consideration, designing random controlled trials are so difficult. However, although mammography is the recommended screening method for females between 40-49 years old, current practice guidelines on mammography screening differ in their recommendations for these females (Autier et al., 2011). Based on the benefits and side effects of mammography, recently the USPSTF recommends individualized, informed decision making about when to start mammography screening based on a woman's values about benefits and harms (Nelson et al., 2009).

References

Amir E, Freedman OC, Seruga B, Evans DG (2010). Assessing women at high risk of breast cancer: a review of risk assessment models. *J Natl Cancer Inst*, **102**, 680-91.

Armstrong K, Moye E, Williams S, Berlin JA, Reynolds EE (2007). Screening mammography in women 40 to 49 years of age: a systematic review for the American College of Physicians. *Ann Intern Med*, **146**, 516.

Autier P, Boniol M, Gavin A, Vatten LJ (2011). Breast cancer mortality in neighbouring European countries with different levels of screening but similar access to treatment: trend analysis of WHO mortality database. Bri Med J, **10**, 343.

Brett J, Bankhead C, Henderson B, Watson E, Austoker J (2005). The psychological impact of mammographic screening. A systematic review. Psychooncology, **14**, 917-38.

Brewer NT, Salz T, Lillie SE (2007). Systematic review: the long-term effects of false-positive mammograms. *Ann Intern Med*, **146**, 502-10.

DeAngelis CD, Fontanarosa PB (2010). US Preventive Services Task Force and breast cancer screening. *J Am Med Assoc*, **303**, 172-3.

DeSantis C, Siegel R, Bandi P, Jemal A (2011). Breast cancer statistics, 2011. *CA Cancer J Clin*, **61**, 409-18.

Drossaert CH, Boer H, Seydel ER (2001). Does mammographic screening and a negative result affect attitudes towards future breast screening? *J Med Screen*, **8**, 204-12.

Elmore JG, Armstrong K (2005). Screening for breast cancer. *J Am Med Assoc*, **293**, 1245-56.

Food N, Physical Activity and the Prevention of Cancer: a Global Perspective; American Institute for Cancer Research/ World Cancer Research Fund, http://www.dietandcancerreport.org.

Garfinkel L, Boring CC, Heath CW Jr (2009). Changing trends: an overview of breast cancer incidence and mortality. *Cancer*, **74**, 222-7.

Hendrick RE, Helvie MA (2011). United States preventive services task force screening mammography recommendations: science ignored. *Am J Roentgenol*, **196**, 112-6.

Hirsch BR, Lyman GH (2011). Breast cancer screening with mammography. *Curr Oncol Rep*, **13**, 63-70.

Hofvind S, Thoresen S, Tretli S (2004). The cumulative risk of a false-positive recall in the Norwegian breast cancer screening program. *Cancer*, **101**, 1501-7.

Kolb TM, Lichy J, Newhouse JH (2002). Comparison of the performance of screening mammography, physical examination, and breast us and evaluation of factors that influence them: an analysis of 27,825 patient evaluations1. *Radiology*, **225**, 165-75.

Lee CH, Dershaw DD, Kopans D, et al (2010). Breast cancer screening with imaging: recommendations from the Society of Breast Imaging and the ACR on the use of mammography, breast MRI, breast ultrasound, and other technologies for the detection of clinically occult breast cancer. *J Am Coll Radiol*, **7**, 18.

Michell M (2012). Breast screening review—a radiologist's perspective. *Bri J Radiology*, **85**, 845-7.

Moss S (2005). Overdiagnosis in randomised controlled trials of breast cancer screening. *Breast Cancer Res*, **7**, 230.

Nelson HD, Huffman LH, Fu R, Harris EL (2005). Genetic risk assessment and BRCA mutation testing for breast and ovarian cancer susceptibility: systematic evidence review for the US Preventive Services Task Force. *Ann Intern Medicine*, **143**, 362.

Nelson HD, Tyne K, Naik A, et al (2009). Screening for breast cancer: an update for the U.S. Preventive Services Task Force. *Ann Intern Med*, **151**, 727-37.

Nelson HD, Tyne K, Naik A, et al (2009). Screening for breast cancer: systematic evidence review update for the US Preventive Services Task Force. *Ann Intern Med*, **151**, 727.

Qaseem A, Snow V, Sherif K, et al (2007). Screening mammography for women 40 to 49 years of age: a clinical practice guideline from the American College of Physicians. *Ann Intern Med*, **146**, 511-5.

Ravdin PM, Cronin KA, Howlader N, et al (2007). The decrease in breast-cancer incidence in 2003 in the United States. *N Eng J Med*, **356**, 1670-4.

Skaane P (2011). Screening of Breast Cancer. Breast Cancer, a Heterogeneous Disease Entity: 23-44.

Smith RA, Duffy SW (2012). Breast cancer screening: the evolving evidence. *Oncology*, **26**, 471-5.

Spelic D (2010). Dose and image quality in mammography: trends during the first decade of MQSA. US Food and Drug Administration, 2003.

Woolf SH (2010). The 2009 breast cancer screening recommendations of the US preventive services task force. *J Am Med Assoc*, **303**, 162-3.