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Review Article

Breast screening for survivors of breast cancer: A systematic review

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ABSTRACT

There is a large and growing population of women who have a personal history of breast cancer (PHBC). This systematic review was undertaken to explore the outcomes of surveillance mammography in breast cancer survivors, and to examine the evidence for screening these women within an organized population-based screening program. We searched Cochrane Central Register of Controlled Trials (CENTRAL Issue 6, 2015), OVID MEDLINE and EMBASE (January 2012 to June 22, 2015) for English-language studies of surveillance of the target population. A study author extracted study outcomes, which were audited by a research assistant. One systematic review and 5 primary studies were included. These showed that surveillance mammography may reduce breast cancer-specific mortality through early/asymptomatic detection (Hazard Ratio for those without compared to with symptoms:HR: 0.64, 95% CI 0.55 - 0.74). Three studies showed that semi-annual mammography is likely not of greater benefit than annual mammography. No evidence was found to suggest that surveillance mammography for women with a PHBC should not be conducted within an organized screening program. The small evidence-base had a high level of heterogeneity in populations, interventions and outcomes. Based on this review, organized screening programs should reassess their guidelines on surveillance mammography and consider including women with a PHBC.

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1. Introduction

The chance of developing breast cancer over a woman's lifetime is approximately one in nine (Canadian Cancer Society's Steering Committee on Cancer Statistics, 2015). With a five-year relative survival rate of approximately 88%, this translates to a large and growing population of women living with cancer that have been diagnosed within the preceding 10 years (Canadian Cancer Society's Steering Committee on Cancer Statistics, 2015). In the overall population of women with a personal history of breast cancer (PHBC), the risk of local recurrence or a new primary breast cancer in the ipsilateral breast is 3% to 9% at five years and 14% to 20% at 20 years following breast-conserving surgery plus breast radiotherapy (Gunia et al., 2012). The annual hazard of recurrence peaks in the second year after diagnosis but remains at 2% to 5% in years 5 to 20 (Senkus et al., 2013). This translates to a combined risk of new or recurrent breast cancer that is constant over time (Bucchi, 2011). PHBC women have increased underlying risk for breast cancer compared with women without PHBC (Houssami et al., 2011); for women older than 50 years of age, a personal history of breast cancer is associated with a risk of a second contralateral invasive cancer of 1.5 to 1.75 relative to women with a negative history. In one study, the risk of contralateral breast cancer in women with PHBC was higher than the familial risk of primary breast cancer, and the interaction between the two was found to be multiplicative (Hemminki et al., 2007).

Specific guidance for PHBC women is necessary because they have increased underlying risk for breast cancer compared with women without PHBC, and observational data show potential benefit from early detection of second breast cancers in PHBC women (Houssami et al., 2011). Theoretically, the intervention might detect ipsilateral recurrences or new ipsilateral or contralateral incidence of breast cancer at an earlier stage when treatment is more likely to be effective. Most guidelines recommend annual mammography screening for survivors of breast cancer who have undergone breast-conserving surgery (Senkus et al., 2013; Khatcheressian et al., 2013; National Institute for Health and Care Excellence, 2015; Grunfeld et al., 2005). However, many survivors are currently not receiving the guideline-recommended frequency of mammograms (Cancer Care Ontario, 2015a).

An organized screening program is one that offers a standardized system of care and is defined by the International Agency for Research on Cancer as one that has an explicit policy with specified age categories, method and interval for screening, a defined target population, a management team for implementation, a health care team for decisions, a quality assurance structure and a method for identifying cancer occurrence in the population (International Agency for Research on Cancer, 2016). Unlike organized screening, opportunistic screening, or "usual care", is conducted at the request of the individual or recommendation of screening by their physician, does not involve a formal decision regarding screening eligibility or interval and may have a variable quality assurance system as well as less opportunity to monitor individual outcomes. Overall, organized screening has a greater potential to reduce cancer-related mortality compared to opportunistic screening. Despite the increased risk of breast cancer in PHBC women, many organized screening programs deem them ineligible due to their history of breast cancer (International Agency for Research on Cancer, 2016; Miles et al., 2004). This systematic review was undertaken to explore the outcomes of surveillance mammography in breast cancer survivors, and to examine the evidence for screening these women within an organized population-based screening program.

2. Methods

2.1. Data sources and searches

The Cochrane Central Register of Controlled Trials (CENTRAL Issue 6, 2015), OVID MEDLINE (January 2004 to June 11, 2015), and EMBASE (January 2004 to June 22, 2015) were searched for systematic reviews first and then primary studies of surveillance mammography (including within organized screening programs) in women who have previously received curative treatment for breast cancer.

2.2. Study selection

This review concerns surveillance mammography and does not include studies of diagnostic mammography performed when recurrence is suspected. We included studies of asymptomatic women with a PHBC (i.e. breast cancer survivors) or history of ductal carcinoma in situ (DCIS) who had completed treatment for breast cancer.

Studies of age of initiation or cessation of regular surveillance for recurrence or new cancers, comparisons of different surveillance modalities, including mammography, MRI or ultrasound, or comparisons of different screening intervals and outcomes with organized compared with opportunistic screening were eligible. English-language systematic reviews, randomized controlled trials (RCTs), and other prospective or retrospective studies with a comparative design with at least 100 patients were eligible. Due to lack of studies the inclusion criteria were broadened to include case series with no minimum number of patients for breast reconstruction. Primary outcomes of interest included breast cancer (invasive cancer and DCIS) incidence/detection rate, mortality, morbidity, and recall rates. Secondary outcomes included number needed to screen, any other benefits or harms (e.g., false positives and unnecessary treatment), or change in stage of disease, change in treatment, or number of reoperations.

2.3. Data extraction and quality assessment

Systematic reviews were assessed using the Assessment of Multiple SysTematic Reviews (AMSTAR) tool (Shea et al., 2007). Data contained in the systematic reviews was extracted and described.

A review of the titles, abstracts, and full text for English-language articles that potentially met the inclusion criteria was conducted by EK and reviewed by DM and AC. Data were abstracted by EK and audited by a research assistant. The authors have no conflicts of interest.

Quality of individual primary studies was assessed based on study size, study design (randomized versus non-randomized), presence of comparison groups, generalizability of the results to our target population, and consistency of findings.

2.4. Data synthesis and analysis

If the study outcomes were sufficiently homogeneous, then a random-effects meta-analysis would be performed, however if there was significant heterogeneity across outcomes, then the data would be summarized using a descriptive synthesis.

2.5. Role of the funding source

The Program in Evidence-based Care of Cancer Care Ontario is funded by, but editorially independent of the Ontario Ministry of Health and Long-term Care (MOHLTC). No external funding or support was received.

3. Results

The search identified 5409 unique references. Sixty abstracts were assessed for eligibility, and of these, twenty-six full-text articles were retrieved. One systematic review that addressed follow-up and management after primary treatment for breast cancer was eligible for inclusion (Khatcheressian et al., 2013), and this review included four systematic reviews with relevant information about the effectiveness of surveillance mammography for detection of ipsilateral breast cancer recurrence or new contralateral breast cancer (Lu et al., 2009; Robertson et al., 2011; Montgomery et al., 2007; Houssami and Ciatto,