Review content summary

This meta-analysis of 8 mammography trials and an influential Swedish meta-analysis (500,000 participants) aimed to determine the effectiveness of standard mammography screening. The purpose was to revisit the findings of a 1999 Swedish epidemiological study which found no decrease in breast-cancer mortality with the use of standard mammography screening. Participants studied were: describe study population. Inclusion criteria were not clearly stated. Interventions described in this review included: standard mammography screening. Outcomes measured include: diagnosis of deaths from breast cancer, all-cause mortality, mortality from breast cancer, and morbidity. Authors report that screening with mammography is unjustifiable.

Comments on this review’s methodology

This is a methodologically moderate meta-analysis. A focused clinical question was clearly identified. Appropriate inclusion criteria were not used to guide the search. A comprehensive search was not employed using only The Cochrane Library for article retrieval and not covering an adequate number of years. The search was not limited by language. Primary studies were assessed for methodological quality using research design, sources of bias, attrition rates, and data analysis. The methods were described in sufficient detail so as to allow replication and it is unclear if two reviewers were involved in quality appraisal. Any discrepancies in appraisal results were not indicated in the review. The results of this review were not transparent. Results were clearly presented in narrative form so as to allow for comparisons across studies. Heterogeneity was assessed. Appropriate analytical methods (fixed effects, random effects) were employed to enable the synthesis of study results. Add other findings of the critical appraisal as appropriate (based on the methodological requirements for systematic review or meta-analyses). Also mention inconsistencies among studies in terms of design, interventions, outcomes and populations. Some authors may set out some of these shortcomings, but do not rely solely on their narrative.

Why this issue is of interest to public health

Breast cancer is the most common cancer diagnosed among Canadian women, and the second leading cancer cause of death in women\(^1,2\). Despite a recent decline in mortality rates, 1 in 9 Canadian women will develop breast cancer in her lifetime, while 1 in 25 Canadian women will die from this disease\(^3,4\). An estimated 22,400 women will be diagnosed with breast cancer and 5,300 women will die from the disease in 2008\(^5\). The Canadian Breast Cancer Initiative launched in 1993 to support research, care and treatment, professional education, programs for early detection, and access to information for women became the responsibility of the Public Health Agency of Canada (PHAC) in 2004\(^1,2,3\). Organized breast cancer screening programs now exist in all provinces, and the Northwest and Yukon Territories for women between 50 and 69 years of age, without a previous breast cancer diagnosis\(^2\). Mammography is considered the optimal screening tool for breast cancer, given that early detection allows for better and broader treatment options and, ultimately, a greater chance for a successful recovery\(^2,4\). Moreover, mammography is an effective means of determining that women do not have breast cancer\(^6\). Mammography is the only technique proven to be safe and effective in screening for breast cancer, and mammography equipment is the only imaging technique licensed by Health Canada for breast cancer screening\(^4\). Although the numbers appear high, the targeted program participation rate of 70% among women 50 to 69 years for biennial screening is far from being reached through organized programs. In 2003 and 2004, only 36.5% of the target population received a screening mammogram through an organized program\(^2\). A 2003-2004 report of organized mammography screening programs authored by PHAC noted that a total of, 6,900 cancers (invasive, in situ and unclassified types combined) were detected among women aged 50 to 69 during 2003 and 2004 by organized screening programs\(^2\). This is significant, particularly given that efforts aimed at the primary prevention of breast cancer have been limited\(^2\). Until modifiable risk factors are addressed more rigorously, screening appears to be the best tool for the reduction of breast cancer-related morbidity and mortality.
Evidence and implications

Evidence points are not in order of the strength of evidence

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<thead>
<tr>
<th>What's the evidence?</th>
<th>Implications for practice and policy:</th>
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| 1. Mammography and death from all causes (8 studies; 2 adequately randomized)  
  1.1. In 2 high quality, adequately randomized controlled trials, participants who had mammography screening were no less likely to die from any cause compared to non-screened participants (RR 0.99, 95% CI 0.94-1.05)  
  1.2. In 6 studies without adequate randomization participants who had mammography screening were 6% more likely to die from any cause compared to controls.  
  1.2.1. The true risk ranged from 4% to 8% more likely to die from any cause (RR 1.06, 95% CI 1.04-1.08).  
  1.2.2. These results must be interpreted with caution as inadequate randomization may over estimate the effect. | 1. Mammography and death from all causes  
  1.1. Mammography is not recommended to reduce death from all causes in women. |
| 2. Mammography and death from breast cancer (8 studies; 2 adequately randomized)  
  2.1. In 2 high quality, adequately randomized controlled studies, participants who had mammography screening were no less likely to die from breast cancer compared to non-screened participants (RR 1.04, 95% CI 0.84-1.27).  
  2.2. In 6 studies without adequate randomization participants who had mammography screening were 25% less likely to die from breast cancer compared to controls. The true effect ranged from 33% less likely to 17% less likely to die from breast cancer (RR 0.75, 95% CI 0.67-0.83).  
  2.3. These results must be taken with caution as inadequate randomization may over estimate the effect | 2. Mammography and death from breast cancer  
  2.1. Mammography screening is not recommended to reduce breast cancer deaths in women, despite some evidence of a protective effect (due to the lower methodological quality of some studies). |
| 3. Mammography and potential harms (3 studies)  
  3.1. Participants who had mammography screening were more likely to undergo surgery compared to non-screened participants.  
  3.1.1. Participants who had mammography screening were 23% more likely to undergo radical mastectomy or lumpectomy compared to non-screened participants  
  3.1.1.1. The true effect ranged from 8% to 40% more likely to undergo surgery (RR 1.23, 95% CI 1.08-1.40).  
  3.1.2. Participants who had mammography screening were 35% more likely to undergo mastectomy or lumpectomy compared to non-screened participants  
  3.1.2.1. The true effect ranged from 20% to 52% more likely to undergo surgery (RR 1.35, 95% CI 1.20-1.52).  
  3.1.3. Participants who had mammography screening were 25% more likely to undergo radiotherapy compared to non-screened participants  
  3.1.3.1. The true effect ranged from 4% to 50% more likely to undergo surgery (RR 1.25, 95% CI 1.04-1.50)  
  3.1.4. In 1 study, participants who had mammography screening were 2 to 4 times more likely to have biopsies with benign results compared to non-screened participants. The 95% CI was not reported for this finding. | 3. Mammography and potential harms  
  3.1. Women who have mammography screening should be advised of the increased risk of benign biopsies. In addition, women who have mammography are more likely to receive radiotherapy, mastectomy or lumpectomy or radical mastectomy. |
| 4. Methodological Issues with the Primary Studies in the Review  
  4.1. In 6 of the 8 included studies, randomization was inadequate and age was not adequately adjusted for. | 4. Implications for Future Research  
  4.1. Future research should assess long term effects, including breast cancer mortality and all cause mortality, of women who receive mammography.  
  4.2. Rigorous research should assess the psychological and adverse outcomes related to mammography screening. |
| 5. Cost Benefit or Cost-effectiveness Information | 5. Cost Benefit or Cost-effectiveness Information |
5.1. No cost related information was included in the review

5.1. Future research should assess cost benefit or cost-efficiency of the interventions

### General Implications
- Mammography screening is not recommended to reduce breast cancer deaths in women.
- Rigorous program evaluations and high quality research studies should be conducted to determine the effectiveness of mammography screening on morbidity and mortality as well as adverse outcomes such as overtreatment.

**Legend:** CI – Confidence Interval; OR – Odds Ratio; RR – Relative Risk

**For definitions see the healthevidence.org glossary** [http://www.healthevidence.org/glossary.aspx](http://www.healthevidence.org/glossary.aspx)

### References used to outline issue


### Other quality reviews on this topic


### Related links

- Canadian Breast Cancer Research Alliance [www.breast.cancer.ca](http://www.breast.cancer.ca)
- Canadian Cancer Society Research Institute [http://www.cancer.ca/research/](http://www.cancer.ca/research/)

### Suggested citation


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