
Interventions to promote repeat breast cancer screening with mammography: a systematic review and meta-analysis

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CRD summary

Reminder-only interventions and more intensive strategies of education/motivation or counselling significantly promoted repeat mammography screening for breast cancer. The high level of heterogeneity found for reminder-only studies precluded the conclusion that they were more effective than alternative strategies. Potential limitations to the review process and uncertain study quality make the reliability of the authors' conclusions unclear.

Authors' objectives

To evaluate the efficacy of interventions, particularly reminder-only interventions, to promote repeat breast cancer screening with mammography.

Searching

MEDLINE, CINAHL, PsycINFO and EBSCO were searched to August 2009 for publications in English. Search terms were reported. The Cochrane Library, bibliographies of observational studies of repeat mammography, literature reviews of mammography interventions and each retrieved article were hand-searched.

Study selection

Studies that reported on repeat screening for one or more interventions promoting repeat mammography screening for breast cancer and that included a concurrent comparison group in women at average risk of breast cancer were eligible for inclusion. Interventions could also address other health-related behaviours. Repeat screening was defined as: at least two consecutive on-schedule mammograms during a given period (approximately one to two years apart); a certain number of mammograms over a given period (two or more within the past five years); or at least two mammograms on an age-appropriate schedule (such as biennially for women in their 40s).

The included studies had two types of study design. In most studies, women with a recent mammogram before the intervention were followed long enough to receive one post-intervention mammogram on schedule. In other studies, women patients were followed long enough to receive two post-intervention mammograms on schedule. Two thirds of studies were in health-care settings and one third recruited community residents. Where reported, studies took place during the period from 1992 to 2006. Interventions were classified into reminder, education/motivation and counselling. Interventions were also classified by use or not of barriers-specific telephone counselling and by delivery channel. Participant age ranged from 40 to 80 years. All studies had a minimum age limit and most had a maximum age limit. Most studies were chiefly of white non-Hispanic women (range 23% to 97%), where reported. The screening interval was one year in most studies, two years in one quarter of studies and age dependent in two studies.

Two independent reviewers performed the selection; disagreements were resolved by discussion with all four co-authors.

Assessment of study quality

Methodological quality was assessed for study design (control group type, theoretical framework, study power, intent-to-treat analysis, randomisation and, for group-randomised trials, adjustment for nested data) and for a representative population sample (response rate at baseline and follow-up, comparison of respondents and non-respondents at baseline, drop-outs, differential attrition by study group). Some relevant data were provided in a table.

The authors did not report how many reviewers performed the validity assessment.

Data extraction

Three reviewers performed data extraction using a standardised data extraction form. One reviewer checked 10% of the

studies to assess reliability; disagreements were resolved by discussion and consensus with all four reviewers. The number of events was extracted in order to calculate odds ratio (OR) and 95% confidence intervals (CI). For studies with more than one intervention group, data were extracted for the intervention with the greatest intensity. Authors were not contacted for missing data.

Two reviewers independently extracted specific data used to calculate effect sizes; disagreements were resolved by consensus with all four reviewers.

Methods of synthesis

Odds ratios were pooled using a fixed-effect model where there was no significant heterogeneity and a random-effects model where there was significant heterogeneity. Between-study heterogeneity was determined using Q and I^2 statistics; significant heterogeneity was indicated where $p < 0.05$ and $I^2 \geq 50\%$.

Random-effects meta-regression analyses were performed on 15 potential explanatory variables: age, study setting, screening interval, study design type, data source for repeat mammography outcome, intervention strategy, mode of intervention delivery, number of delivery modes, control group type, use of a theoretical framework, two theoretical constructs (barriers and stage of change) and use of tailoring. Sensitivity tests removed one study at a time from each analysis. Publication bias was assessed using Begg's test, Egger's test and visually using funnel plots.

Results of the review

Twenty-five studies were identified ($n \geq 91,530$): 23 randomised controlled trials (RCTs) ($n \geq 20,173$, range 91 to 1,917) and two comparative studies of other design ($n=961$ and $n=71,357$). Control groups were active in 12 studies, survey only in 11 studies and had no contact in two studies. Most studies tested for equivalence of study groups at baseline and reported response rates after follow-up. Eight studies did not report on differential attrition across study groups. Six studies reported on study power and 11 studies performed an intention-to-treat analysis. The two non-RCTs did not adjust for the effect of nested samples.

The interventions had a significant effect in increasing repeat mammography in only 11 of the 25 individual studies.

There was a significant increase in repeat mammography for all interventions versus controls (OR 1.39, 95% CI 1.27 to 1.52, random-effects model, $I^2=63\%$; 27 interventions). The effect was greatest for reminder-only studies (OR 1.79, 95% CI 1.41 to 2.29, random-effects model, $I^2=83.4\%$; eight studies) and was significantly greater than that for studies that used more intensive strategies of education/motivation or counselling (OR 1.27, 95% CI 1.17 to 1.37, fixed-effect model; 17 studies). Education/motivation strategies (OR 1.25, 95% CI 1.14 to 1.38, fixed-effect model, $I^2=0\%$; seven studies) and counselling (OR 1.28, 95% CI 1.15 to 1.43, fixed-effect model, $I^2=40.9\%$; 12 studies) versus controls significantly increased repeat mammography.

The increase in repeat mammography was not significantly different for the other explanatory variables investigated. These included barriers-specific telephone counselling (present in nine studies; absent in 18 studies), single interventions (14 studies) and multiple interventions (13 studies). There was no significant heterogeneity for the analysis of studies that used education/motivation or counselling. No significant differences were found for the explanatory variables within these studies.

Meta-regression modelling identified only one statistically significant predictor of intervention effect size, which was intervention strategy (reminder-only versus education/motivation or counselling strategies). There was no evidence for publication bias.

Authors' conclusions

Both reminder-only interventions and more intensive strategies of education/motivation or counselling significantly promoted repeat mammography screening for breast cancer. Although the effect was significantly greater for reminder-only interventions, the high level of heterogeneity found for reminder-only studies precluded the conclusion that they were more effective than alternative strategies.

CRD commentary

The review addressed a well-defined question in terms of participants, interventions, study design and relevant outcomes. Relevant databases were searched. Only for publications in English were included and there was no specific attempt to locate unpublished/grey literature, so some relevant studies may have been missed. However, no evidence for publication bias was found. Study quality was assessed mostly using suitable criteria, but some details were not reported. Efforts were made to reduce error and bias in study selection and data extraction; whether this also applied to quality assessment was not reported. Relevant study details were reported. Statistical heterogeneity was assessed and there was evidence for heterogeneity with most outcomes. The statistical method used for the meta-analysis of the RCTs seemed generally appropriate, but perhaps a different breakdown by study intervention type (such as professional versus lay person involvement in intervention) may have produced more useful results. Sensitivity analyses were performed.

In view of some potential limitations arising from the review process and uncertainties about the quality of included studies, the reliability of the authors' conclusions is unclear.

Implications of the review for practice and research

Practice: The authors stated that most of the study participants were non-Hispanic white women and the results may not be generalisable to other ethnic groups.

Research: The authors identified a need for further high-quality studies to identify the most successful methods or strategies to increase repeat mammography and identify explanatory study characteristics. Future studies should investigate the effect of mammography history on intervention effect.

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