Personalized targeted mailing increases mammograms among long-term noncompliant Medicare beneficiaries: a randomized trial


Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
The use of a personalised targeted mailing programme to increase mammograms among long-term noncompliant Medicare beneficiaries. The intervention was a personally addressed letter from the Medical Director of Michigan Medicare, mailed with informational materials on 7 November 1997. The materials included with the letter were a brochure emphasising the importance of mammograms in maintaining health, and an information sheet explaining how to arrange a mammogram.

Type of intervention
Secondary prevention.

Economic study type
Cost-effectiveness analysis.

Study population
The study population comprised female Medicare beneficiaries without a recent mammography. To be eligible for inclusion, the women had to be aged 65 years or over in 1993, and be a Medicare beneficiary living continuously in Michigan from 1993 to 1997. They also had to have had no claims for a mammography and no claims for diagnoses or procedures associated with medical conditions that may affect screening. Finally, the women were not to be enrolled in managed care during the study period.

Setting
The setting was the community. The economic analysis was undertaken in Michigan, USA.

Dates to which data relate
The effectiveness and resource data were gathered between November 1997 and December 1998. The price year was not reported.

Source of effectiveness data
The effectiveness data were derived from a single study.

Link between effectiveness and cost data
The costing was undertaken prospectively on the same patient sample as that used in the effectiveness study.

Study sample
The sample size was determined in the planning phase of the study to assure a certain power. For a control reference
rate of 5% obtaining mammography, 1,200 individuals per treatment group would yield more than 90% power to detect a rate of 8.3% (3.3% point difference) as significant (p>0.05). For sub-group analyses of race and urbanicity, 280 individuals per treatment group would yield more than 90% power to detect a rate of 13% (8% point difference) as significant (p>0.05).

Annual HCFA beneficiary files for Michigan for the years 1993 through to 1997 were used to identify an initial sample frame of 40,000 randomly chosen women. Of the 40,000 women, 34% had no mammography claim and no claim for a medical condition likely to make screening less clinically appropriate. These women were then classified into four groups based on race (black or not) and on residence location (urban or rural) using zip codes. A random number was assigned to each woman. The women were then sorted within the four groups by zip code and random number. Within a zip code, the first woman was paired with the second, the third with the fourth, and so on, dropping the last woman if the number was not even. The first woman in each pair was then assigned to the intervention group and the second to the control group. The final eligible study sample consisted of 2,458 women (1,249 pairs) who were aged 70 or more in 1997, paired both on zip code and status as urban non-black persons (664 pairs), urban black persons (283 pairs), and rural non-black persons (282 pairs). As only 18 pairs of rural black women were identified, this sub-group was not studied. The mean age of the participants was 78.8 (+/- 6.8) years in the intervention group and 79.0 (+/- 7.1) years in the control group.

Study design
The study utilised a randomised design of paired intervention and control women matched on zip code and race (black or non-black) to over sample rural women and black women. The groups were followed for 14 months. After the materials were mailed, less than 1% of letters were returned to Medicare as undeliverable.

Analysis of effectiveness
The analysis of the clinical study was conducted using an intention to treat approach. The primary health outcome used was the mammography rates in the two groups. The number of screening or diagnostic mammograms was obtained from the HCFA’s Michigan claim files. A McNemar test for paired data was used to test for differences between the groups in the probability of a mammography during follow-up. Multiple variable logistic regression was used to examine relationships between the intervention group or other factors (such as race/urban group and age) and the probability of obtaining a mammography during the follow-up period. Proportional hazard regression models were used to examine similar relationships with the mammography rates during follow-up. No significant differences were found between the groups on unmatched variables.

Effectiveness results
Women who received the mailing were 60% more likely to have a subsequent mammography than those who did not receive the mailing (8.1% versus 5.2%, odds ratio, OR=1.6; p<0.005). The absolute increase was greatest for women aged 70 to 79, 10.6% in the intervention group versus 6.5% for controls, (OR 1.7; p<0.02). Increases were seen in each of the three race/urban groups, although it only reached statistical significance for the urban black group, (p=0.05).

Most of the effect of the intervention occurred among women aged 70 to 79 years, with rates for the intervention group increasing by 4.1% (OR 1.71; p=0.006).

The greatest increase was observed in diagnostic mammography, with an increase of 2.2% (1.7% for controls and 3.9% for the intervention group; p=0.001). Screening mammography increased by only 0.7% (3.7% for controls and 4.5% for the intervention group; p=0.31).

The authors found that the time effect in the logistic regression was significant for the intervention group, (p=0.02), (i.e. the intervention had greatest impact shortly after women received their letters), but not for the control group, (p=0.51). Most of the effect of the intervention occurred within 6 months.

No significant interactions were found with other factors such as mean education or the mean number of inpatient administrations.
Clinical conclusions
The study found that the personalised targeted mailing intervention increased mammograms among long-term noncompliant older women, in particular diagnostic mammograms.

Measure of benefits used in the economic analysis
The measure of health benefit used was the number of additional mammograms.

Direct costs
Resource use and the costs were not reported separately. The direct costs included were those to Medicare of running the intervention. These covered the acquisition of HCFA data and computers to process the data, identification of the recipients, and the development, printing and mailing of the materials. To measure the cost of the intervention, the resources to perform each task were recorded and the costs estimated. Labour expenses were derived from staff reports of the amount of time devoted to various tasks. The costs associated with that time were estimated using staff salary and fringe benefit rates. The costs were classified as fixed (e.g. purchasing data files) and variable (e.g. postage for each additional letter mailed). Even though discounting was not relevant for certain costs (e.g. variable costs) since they were incurred during a short period of time, discounting would have been relevant for other costs (e.g. fixed costs), as these costs are an investment for the long term. Hence, such costs should have been discounted over the lifetime of the investment. The study reported the total costs. The price year was not reported.

Statistical analysis of costs
The costs were treated as point estimates (i.e. the data were deterministic).

Indirect Costs
The indirect costs were not included in the study.

Currency
US dollars ($).

Sensitivity analysis
The authors projected the costs of a statewide intervention for eligible Medicare recipients in Michigan, with a programme targeted at women aged 70 to 79 and another targeted at women aged 70 or over, under two scenarios. One scenario considered replication of the data available, while the other considered replication of the study but with new data and modifications.

Estimated benefits used in the economic analysis
See the 'Effectiveness Results' section.

The effect of a statewide intervention in Michigan would be a mammography rate increased by 4.0% (3,542 additional mammograms) if the intervention was targeted at women aged 70 to 79, and 2.8% (4,360 additional mammograms) if the intervention was targeted at women aged 70 or over.

Cost results
The total cost of the intervention in the study was $105,000.

The total cost of a statewide intervention in Michigan targeted at women aged 70 to 79 (70 or over) would be $108,322 ($176,459) if the study was replicated using the data available, or $170,322 ($238,459) if the study was replicated with new data and modifications.
Synthesis of costs and benefits
The costs and benefits were combined as the cost per additional mammogram. The cost per additional mammogram in a statewide intervention in Michigan targeted at women aged 70 to 79 (70 or over) would be $31 ($41) if the study was replicated using the data available, or $48 ($55) if the study was replicated with new data and modifications.

Authors' conclusions
The authors did not report a summary conclusion for either the effectiveness or costs. They concluded that the personalised targeted mailing intervention increased mammograms among long-term noncompliant older women.

CRD COMMENTARY - Selection of comparators
A justification was given for the comparator used. It represented current practice in the authors' settings. You should decide if this is a widely used health technology in your own setting.

Validity of estimate of measure of effectiveness
The study utilised a randomised design of paired intervention and control women matched on zip code and race. This study design was appropriate as well-performed randomised controlled trials are considered the 'gold' standard when evaluating health interventions. By pairing intervention and control women, the groups were shown to be comparable in all baseline characteristics. Further, the authors managed to over sample black and rural women, two groups of women normally associated with lower screening rates. The study sample was also representative of the study population. Appropriate power calculations were performed in the planning stage of the study, with the authors managing to recruit more patients than those needed to power the study. The authors only failed to recruit sufficient rural black women. Hence the authors did not perform a sub-group analysis in this group of women. The authors conducted appropriate statistical analyses to test for any significant difference between the two groups.

Validity of estimate of measure of benefit
The estimation of benefits was obtained directly from the effectiveness analysis. The choice of estimate was justified, as the main aim of the study was to find the additional number of mammograms the intervention could achieve.

Validity of estimate of costs
The authors only considered the short-term direct costs of the programme in the economic analysis. They did not consider, for example, savings accrued due to the early detection of breast cancer achieved through the intervention (in terms of disease management care). Resource use and the costs were not reported separately, which will limit the generalisability of the authors' results. The costs were obtained from the authors' settings. The authors investigated the costs of this intervention under several different scenarios (i.e. interventions targeted to women in different age groups, and the costs of the intervention statewide if the same data were used or were varied). Discounting would have been relevant for fixed costs, as these were long-term investments, but the authors did not discount them. The price year was not reported, which will hamper any possible inflation exercises.

Other issues
The authors reported that other studies had used Medicare claims to identify mammography screening rates among older women. Their study, however, was unique in identifying and focusing on the 34% of women aged over 70 who had not undergone a mammography for at least 5 years. The authors also reported that no published study addressed the effect on mammography of personally addressed letters sent to a broad range of older women. The issue of generalisability to other settings was partially addressed by the authors studying the effects of carrying a statewide intervention under different scenarios. The authors do not appear to have presented their results selectively and their conclusions reflected the scope of the analysis. They reported a number of further limitations to their study. For example, their study contained the limitations of the Medicare database it utilised, which included errors in coding and not accounting for the fact that other sources may pay for individual services. Other limitations included the fact that
the most recent claims were not available when the letters were sent. Hence, a woman may have had a mammogram or changed status during the time.

**Implications of the study**
The authors reported that further research was needed, for example investigating the effect of a second reminder letter. In addition, the differential impact in increasing diagnostic mammograms needed to be explored and the underlying mechanisms understood. The authors concluded that the intervention could be directly implemented in other states or nationally.

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