

# Five-Year Follow-Up Of A Nurse-Initiated Intervention To Improve Mammography Recommendation

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**Background:** In a previous study we found immediate effectiveness of a nurse-initiated intervention on improving mammography recommendation rates in a family practice residency program. To determine the long-term effectiveness of this ongoing intervention, we performed a chart audit study on two different groups of charts 5 years after the institution of the intervention.

**Methods:** Chart audits for mammogram recommendation and completion rates were conducted on an original cohort group of women aged 40 years and older ( $n=91$ ) and a new 5-year postintervention group of women aged 53 years and older ( $n=189$ ). Preintervention, postintervention, and 5-year postintervention rates were compared within the cohort group. Rates of the new 5-year postintervention group were compared with rates of women 50 years and older from the original preintervention group and postintervention group.

**Results:** For the original cohort group the improvement in "mammograms done at least once in the past 3 years" was maintained 5 years later, and there was a statistically significant increased rate from the postintervention to 5 years later (73.9 percent versus 86.8 percent,  $P<0.02$ ) for "mammograms done or recommended at least once in the past 3 years." This improvement was also noted for the new 5-year postintervention group when their rates were compared with the preintervention and postintervention group rates. For "mammograms done at least once in the past 3 years," the rates were 34.2 percent, 45.5 percent, and 64 percent, respectively. For "mammograms done or recommended at least once in the past 3 years," the rates were 42.6 percent, 72.7 percent, and 90.0 percent, respectively. In a separate analysis, annual mammogram rates in the new 5-year postintervention group for the 3 years preceding this study were 44.8 percent (1990), 36.5 percent (1991), and 36.5 percent (1992). Eleven percent of women had a mammogram done in each of the 3 consecutive years.

**Conclusion:** An ongoing nurse-initiated intervention is a feasible method of improving and maintaining mammogram recommendation and completion rates. Further studies of interventions to improve the rate at which eligible women get consecutive annual mammograms are needed. (J Am Board Fam Pract 1995; 8:452-6.)

Improving physician compliance with various cancer screening guidelines has received considerable attention in the medical literature during the past 10 to 15 years. Studies reporting the effectiveness of various methods, such as computerized reminders,<sup>1-5</sup> checklists,<sup>6-9</sup> educational seminars,<sup>10</sup> and individual feedback of performance,<sup>7, 11-13</sup> continue to be published yearly in the primary care journals. While these studies almost always show statistically significant improvements, these improvements often are not clinically significant. Of equal importance, studies assessing the long-term effects 1 or 2 years beyond

the intervention are rarely reported but are precisely the type of studies needed in the area of improving the clinical practice of preventive medicine. Taplin,<sup>14</sup> in his editorial on an intervention successful in improving mammography use in a health maintenance organization,<sup>15</sup> addressed this concern about interventions by asking who will assume responsibility for maintaining the intervention after the study is finished. It is clear that the success of an intervention should be judged by its long-term effectiveness under working conditions.

In a previous study published in 1990,<sup>16</sup> we reported the short-term effectiveness of a simple nurse-initiated intervention on the recommendation of screening mammography by family practice residents. In this report we present follow-up data on the effects of that intervention after more than 5 years of continuous implementation.

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## Methods

The study was performed in an urban, community-hospital-based family practice residency program. Thirty-six residents (12 in each year of training) see patients at a family health center that serves a predominantly white (94 percent), lower middle-class population. There are approximately 14,000 patient visits a year at the health center.

## Intervention

A detailed description of the design and implementation of the original intervention has been published, but the key points are discussed below. Using information gathered from a questionnaire that assessed residents' knowledge, attitudes, and behavior on cancer screening, we were able to define barriers to their recommending mammography and to design a nurse-initiated intervention to eliminate those barriers. The intervention involved having a nurse ascertain the mammogram status of age-appropriate women patients the evening before their scheduled visit, place a form on the patient's chart with her current mammogram status indicated for the resident to review, and request a mammogram recommendation if the patient was overdue. If the resident did not act on the recommendation, the nurse recommended a mammogram to the patient. All age-eligible patients entered the nurse reminder system regardless of whether the resident or the nurse made the recommendation. A tickler file was used for reminding the patients when they were due for their next mammogram, whether they had an interim office visit, and whether they had a mammogram done. Nurses and providers were aware of the original study but not of the 5-year follow-up study.

With the inception of the intervention, the daily chart review for mammogram status became a required nursing duty shared by all the staff, and the tickler file system was managed by 1 nurse who had been in charge of tracking Papanicolaou smear results for the center. We did not attempt to audit or reinforce nurse performance but chose to let things run as in the "real world."

Four months before the start of our 4-month recruitment period for the new 5-year postintervention group, the family health center moved to a new facility within 1 mile of the original location, the resident reminder sheet was discontinued for logistic reasons, and the mammogram reminders became computerized.

## Chart Audit

The original study included only women who were 40 years of age or older. There were 200 patients in the preintervention chart audit group and 270 patients in the postintervention chart audit group. A cohort of 111 patients was in both the preintervention and postintervention chart audit groups. Of these 111 women, 91 (82 percent) were available for auditing 5 years later. Rates for "mammograms done at least once in the past 3 years" and "mammograms done or recommended at least once in the past 3 years" were calculated for this cohort for each of the three audit periods: preintervention, postintervention, and 5-year postintervention.

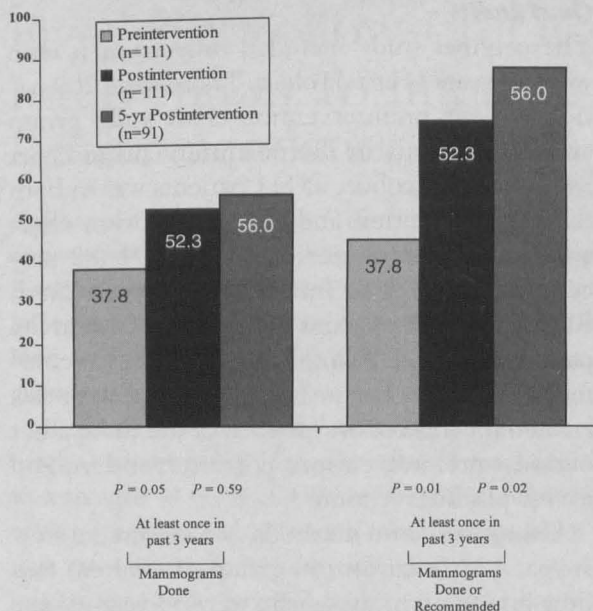
Using the same methods, we selected a new 5-year postintervention group of women, this time limiting it to those who were 53 years of age and older. We chose 53 years as a minimum age because we wanted to study women who were eligible for annual mammograms (50 years and older) and because we wanted to include in the analysis their mammography rates for the 3 years preceding the study. In brief, all age-eligible, established women patients who attended the health center during a 4-month period were included in the group. Rates for "mammograms done at least once in the past 3 years" and for "mammograms done or recommended at least once in the past 3 years" for this new group were compared with rates for the women from the original preintervention and postintervention groups who were 50 years and older and thus eligible for annual mammograms ( $n=155$  and  $n=221$ , respectively). Annual mammography recommendation and completion rates were also calculated in this new 5-year postintervention group for 1990, 1991, and 1992 separately.

## Data Analysis

Tests of significant difference between rates ("mammograms done at least once in the past 3 years" and "mammograms done or recommended at least once in the past 3 years") were performed using chi-square analysis. Exact  $P$  values obtained are reported.

## Results

Figure 1 shows the preintervention, postintervention, and 5-year postintervention rates for the original cohort group. Compared with the



**Figure 1. Preintervention, postintervention, and 5-year postintervention chart audit results of cohort group.**

postintervention cohort group rate, the 5-year postintervention cohort group rate remained stable for "mammograms done at least once in the past 3 years" (52.3 percent and 56 percent, respectively) and increased significantly for "mammograms done or recommended at least once in the past 3 years" (73.9 percent versus 86.8 percent,  $P=0.02$ ).

Slightly better results were found when the new 5-year postintervention group ( $n=189$ ) rates were compared with the preintervention and postintervention group rates for the women eligible for annual mammograms. As shown in Figure 2, statistically significant increases were found for "mammograms done at least once in the past 3 years" (34.2 percent preintervention, 45.5 percent postintervention, and 64 percent new 5-year postintervention) and "mammograms done or recommended at least once in the past 3 years" (42.6 percent preintervention, 72.7 percent postintervention, and 90.0 percent new 5-year postintervention).

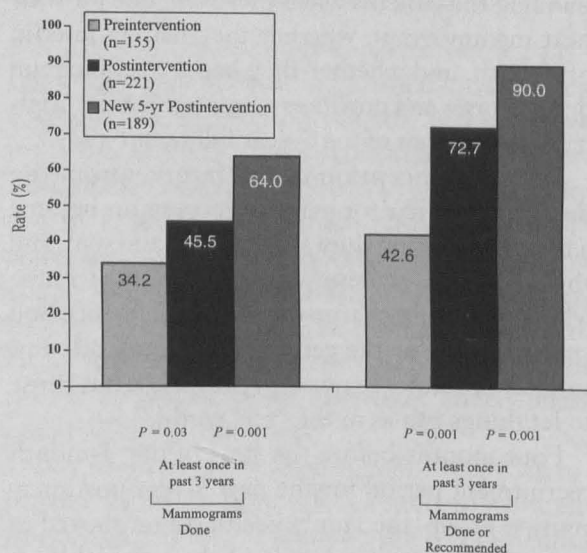
Using just the new 5-year postintervention group data, we calculated the percentage of charts in which mammogram recommendations were recorded for 1990, 1991, and 1992 and found that rates for those years remained stable (54.4 percent, 55.5 percent, and 53.9 percent, respectively,  $P=0.95$ ). The percentage of charts that docu-

mented a mammogram was done in 1990, 1991, and 1992 also remained relatively stable (44.8 percent, 36.5 percent, and 36.5 percent, respectively,  $P=0.47$ ). When we examined the percentage of women who had a mammogram recommended in each of the 3 consecutive years and who had a mammogram done in each of the 3 consecutive years, we found rates of 42 percent and 11 percent, respectively.

## Discussion

Five-year follow-up results from our cohort group and the new 5-year postintervention group show a sustained or improved rate of mammogram recommendation or completion. We attribute our sustained and improved rates to the nurse-initiated intervention, but because this study was uncontrolled, other factors, such as secular trends and matriculation of residents with better preventive medicine skills, could also have influenced our results.

It is difficult to assess how much an influence secular trends have on our results because comparable longitudinal data on mammography utilization rates are unavailable for our geographic area. In one intervention study using similar communities as control and experimental groups, there was an improvement of 10 percent (from 30 percent to 40 percent) in mammograms done in the previous year in the control community during a



**Figure 2. Women aged 50 years and more: preintervention, postintervention and new 5-year postintervention group chart audit results.**

2-year period, while the experimental community experienced a 20 percent improvement.<sup>17</sup>

Influence of the intervention on different preventive medicine skills from resident to resident and from residency year to residency year is extremely complex and difficult to ascertain for several reasons. First, residents enter family practice programs from medical school with widely varying exposure to preventive medicine. Second, residents develop different degrees of interest in preventive medicine as they progress through their residency. Third, every year brings with it a turnover in the makeup of the residency as a whole and the practice of preventive medicine by the residency as a whole. We did not specifically assess differences by individual resident or resident-year group in mammography recommendation rates in this study. In our original study, however, we found no statistical differences when results for individual residents were compared.<sup>16</sup>

The annual recommendation rates during a 3-year period (54.4 percent, 55.5 percent, and 53.9 percent) in our new 5-year postintervention group compare favorably with the results of the only other longitudinal intervention study we found. In the study by Shank, et al.<sup>13</sup> during a 5-year period the percentage of physicians compliant with mammography guidelines (i.e., either recommended or done) improved from 0 percent at base line to 56 percent. Their study was similar to ours in several ways: it was an uncontrolled study of an ongoing intervention and occurred in a family practice residency program. Their intervention, however, involved regular group and individual feedback and included more health maintenance items.

Our figure of 11 percent of charts having a mammogram done in each of the successive years 1990, 1991, and 1992 is not only disappointing but also difficult to place in perspective. We have not come across data that address compliance with annual mammograms in the same women longitudinally. Studies in this area usually measure rates for the preceding year. A study by Selinger, et al.<sup>18</sup> showed a 19 percent rate for mammograms done within the most recent year. Data from 1987 published in *Morbidity and Mortality Weekly Report (MMWR)* as the percentage of women 50 years old or older having had a screening mammogram in the preceding 12 months showed a wide range from 15 percent to 46 per-

cent in the 33 states surveyed.<sup>19</sup> Pennsylvania was not one of the participating states, but figures for some adjacent states were 21 percent (Ohio), 19 percent (West Virginia), and 29 percent (New York). Our data on the percentage of eligible women having a mammogram the preceding year compare very favorably with the 1987 *MMWR* data (41.8 percent for 1990, 36.5 percent for 1991, and 36.5 percent for 1992).

Clearly there are factors, such as cost, convenience, comfort, and fear, that prevent women from getting a mammogram even when recommended on a regular basis. We might never be able to persuade large percentages of women to get annual mammograms year after year. In the Swedish two-county study where mammography was offered at an interval of nearly 3 years, reduction in mortality was similar to that in the Health Insurance Plan study, which used an annual interval.<sup>20</sup> Perhaps we would be more successful focusing our energies by recommending that women 50 years and older have regular mammograms every 2 to 3 years.

We need further studies of longitudinal compliance. On a national level surveillance programs that monitor mammography screening longitudinally would provide a data base of geographic differences, secular trends, and characteristics of compliant women that would be useful for maximizing mammography usage.

Our sustained success in mammography recommendation rates in the 5-year postintervention group is cause for some optimism. It demonstrates that this simple intervention can improve one important cause of low mammography screening rates — failure of physicians to recommend them. A simple, practical, and inexpensive nurse-initiated intervention such as ours could provide the answer to Taplin's question of who will manage the intervention when the study is finished? The nurse(s) will! Our intervention could easily be modified from the residency model to a model for either a health maintenance organization or a large, single primary care specialty group and could function without consuming valuable physician time.

Many types of interventions involving computerized reminders, checklists, educational seminars, and individual feedback have shown short-term success in improving mammography usage. It is important that long-term studies of these in-

terventions be done not only to compare with our findings but also to determine which intervention(s) will produce the maximum mammography utilization possible.

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## References

- McDonald CJ, Hui SL, Smith DM, Tierney WM, Cohen SJ, Weinberger M, et al. Reminders to physicians from an introspective computer medical record. A two-year randomized trial. *Ann Intern Med* 1984; 100:130-8.
- Chambers CV, Balaban DJ, Carlson BL, Ungemack JA, Grasberger DM. Microcomputer-generated reminders. Improving the compliance of primary care physicians with mammography screening guidelines. *J Fam Pract* 1989; 29:273-80.
- Fordham D, McPhee SJ, Bird JA, Rodnick JF, Detmer WM. The Cancer Prevention Reminder System. *MD Comput* 1990; 7:289-95.
- Ornstein SM, Garr DR, Jenkins RG, Rust PE, Arnon A. Computer-generated physician and patient reminders. Tools to improve population adherence to selected preventive services. *J Fam Pract* 1991; 32:82-90.
- Litzelman DK, Dittus RS, Miller ME, Tierney WM. Requiring physicians to respond to computerized reminders improves their compliance with preventive care protocols. *J Gen Intern Med* 1993; 8:311-7.
- Cohen DI, Littenberg B, Wetzel C, Neuhauser D. Improving physician compliance with preventive medicine guidelines. *Med Care* 1982; 20:1040-5.
- Tierney WM, Hui SL, McDonald CJ. Delayed feedback of physician performance versus immediate reminders to perform preventive care. Effects on physician compliance. *Med Care* 1986; 24:659-66.
- Cheney C, Ramsdell JW. Effect of medical records' checklists on implementation of periodic health measures. *Am J Med* 1987; 83:129-36.
- Yarnall KS, Michener JL, Broadhead WE, Tse CK. Increasing compliance with mammography recommendations: health assessment forms. *J Fam Pract* 1993; 36:59-63.
- Fox S, Tsou CV, Klos DS. An intervention to increase mammography screening by residents in family practice. *J Fam Pract* 1985; 20:467-71.
- Wayland MT, Culik D, Goldsby C, Carion W, Orzame N. Screening by family practice and internal medicine residents and the effect of an intervention program. *J Med Educ* 1987; 62:519-22.
- Nattinger AB, Panzer RJ, Janus J. Improving the utilization of screening mammography in primary care practices. *Arch Intern Med* 1989; 149:2087-92.
- Shank JC, Powell T, Llewelyn J. A five-year demonstration project associated with improvement in physician health maintenance behavior. *Fam Med* 1989; 21:273-8.
- Taplin S. Breast cancer cure: a beacon of change? *J Am Board Fam Pract* 1993; 6:513-6.
- Rimer BK, Ross E, Balshem A, Engstrom PF. The effect of a comprehensive breast screening program on self-reported mammography use by primary care physicians and women in a health maintenance organization. *J Am Board Fam Pract* 1993; 6:443-51.
- Foley EC, D'Amico F, Merenstein JH. Improving mammography recommendation: a nurse-initiated intervention. *J Am Board Fam Pract* 1990; 3:87-92.
- Fletcher SW, Harris RP, Gonzalez JJ, Degnan D, Lannin DR, Strecher VJ, et al. Increasing mammography utilization: a controlled study. *J Natl Cancer Inst* 1993; 85:112-20.
- Selinger HA, Goldfarb NI, Perkel RI, Carlson BL. Physician compliance with mammography guidelines: a retrospective chart review. *Fam Med* 1989; 21:56-8.
- State-to-state variation in screening mammograms for women 50 years of age and older — Behavioral Risk Factor Surveillance System, 1987. *MMWR* 1989; 38:157-60.
- Tabar L, Fagerberg CJ, Gad A, Baldetorp L, Holmberg LH, Grontoft O, et al. Reduction in mortality from breast cancer after mass screening with mammography. Randomised trial from the Breast Cancer Screening Working Group of the Swedish National Board of Health and Welfare. *Lancet* 1985; 1:829-32.