The Effectiveness of Postgraduate Education on the Clinical Breast Examination Skills of Primary Care Physicians

Robin L. Smith, MD; Nicholas A. Hanchak, MD; Hester Bloom, MS; David Leibfreid; Sherry Xuan, MS; and Neil Schlackman, MD

Abstract

This study examined the effect of a continuing medical education, office-based, clinical breast examination training program for primary care physicians. Nine hundred eighty-five physicians participated in a 1-hour clinical breast examination training program that included (1) a pretest examination using a silicone breast model with abnormalities; (2) a didactic session reviewing the American Cancer Society's recommendations for breast screening; (3) a teaching session on the clinical breast examination, based on the MammaCare® method; and (4) a posttest examination using the same silicone model as in the pretest examination, but with a different lump orientation, to avoid retest bias. A pretest and posttest design was used, comparing results of precourse, postcourse, and 6-month follow-up tests for mean percentage of lumps detected, mean examination duration, and mean false-positive rate of lump detection. The proficiency of lump detection improved from 24% (precourse) to 83% (postcourse). The 210 physicians who were retested at the 6-month follow-up had retained their skills, with proficiencies ranging from 74.6% to 84.2%. When surveyed at 6 months, 49.5% of the physicians had much more confidence in their abilities to perform clinical breast examinations, and 46.3% percent were somewhat more confident. Of those surveyed, 93.9% had taught their patients the examination method. A retrospective analysis was performed to determine the number of mammograms ordered, number of specialist visits, and breast biopsy rates. Treatment and control groups were matched at the office level. From 1991 to 1993, annual mammography rates improved 24% for patients of participating physicians, and the screening compliance rate in the study group offices significantly improved. More specialist referrals for breast lumps were observed in the study group. The breast biopsy rates in the two groups did not differ. This study illustrates the positive effects that continuing medical education programs offered by managed care companies can have on the early detection of breast lumps, as well as on adherence to the American Cancer Society's recommendations for obtaining mammograms.

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Breast cancer is the most prevalent cancer in women. During 1996, an estimated 184,300 new cases of breast cancer will be diagnosed.[1] In the United States, breast cancer is the leading cause of death among women between 40 and 55 years of age.[2] The incidence of the disease increases from the fourth decade of life through the menopausal and postmenopausal years. However, early detection drastically reduces the morbidity and mortality of breast cancer; women older than age 50 who follow recommendations for routine screening examinations are 30% less likely than those who do not do so to die from breast cancer.[3]

Mammography screening, clinical breast examination, and breast self-examination (BSE) are the methods for early detection of breast cancer, and their benefits have been well documented.[4-7] The U.S. Healthcare Check® Program, established in 1987 and now consisting of several components (shown in Figure 1), demonstrated that women who participated in this mammography screening program between 1989 and 1990 were diagnosed with breast cancer at an earlier stage than were those who did not participate.[8] Only 1% of the breast cancers detected in the screened women were found at clinical stages III or IV, as opposed to 18% among unscreened women. This downstaging had an impact on the eligibility of breast-conserving surgery in screened versus unscreened women (88% versus 60%). As a result, more

From the Department of Health Policy, Jefferson Medical College, Philadelphia, PA (R.L.S.); and U.S. Quality Algorithms, U.S. Healthcare (N.A.H., D.L., and S.X.); Health Education Department (H.B.); and Corporate Quality Improvement, U.S. Healthcare, Blue Bell, PA.

Address correspondence to: Robin L. Smith, MD, Associate Medical Director, U.S. Healthcare, 980 Jolly Road, Box 1210, Blue Bell, PA 19422.

Figure 1. U.S. Healthcare Check® Program Components

- Fully covered mammography screening for all age-eligible members
- Risk assessment of all female members of U.S. Healthcare 40 of age or older
- Certification program for participating radiologists to perform mammography (American College of Radiology accreditation and Food and Drug Administration certification)
- Educational material for members
- Educational materials for U.S. Healthcare primary care physicians, including a continuing education course developed jointly with Fox Chase Cancer Center (Philadelphia, PA)
- Instructional course on clinical breast examination in which silicone breast models are used
- Tracking and follow-up of abnormal mammograms
- Prompt notification of results to physicians
- Case management of members with newly diagnosed breast cancer

women who had participated in the screening underwent breast-conserving surgery and definitive irradiation (44%, versus 37% in nonparticipating women).

Mammography is the method that detects the highest percentage of breast cancers, but the test lacks 100% sensitivity.[9] Breast examination detects 9% of all breast cancers in asymptomatic women.[10] The American Cancer Society recommends that women between 20 and 40 years of age receive clinical breast examinations every 3 years, and that women older than age 40 have examinations annually. With annual breast examinations, cancers are diagnosed at a lower stage; involve fewer metastatic axillary lymph nodes; and have better 5-, 10-, and 15-year survival rates.[11]

Studies have shown that the quality of physicians' clinical breast examinations could be improved.[12-16] In 1991, Campbell et al[17] investigated the effects of a training program, emphasizing tactile skills and a systematic examination, on 60 internal medicine residents and 32 graduate nurses enrolled in a master's degree program. Students practiced with silicone breast models and live volunteers. After taking the course, their physical examination skills improved and their sensitivity increased, from 57% to 65%, but their specificity decreased, from 52% to 33%. Chart review showed that the decreased specificity did not correlate with an increase in abnormal findings, mammograms, or surgical consultations.

U.S. Healthcare® instituted an office-based Clinical Breast Examination Training Program (CBETP) for primary care physicians (PCPs) in southeastern Pennsylvania, southern New Jersey, and Delaware to improve the physicians' proficiency and confidence in detecting breast lumps. The CBETP is part of the U.S. Healthcare Check Program. This study evaluates the effectiveness of the CBETP in (1) improving the clinical breast examination skills of PCPs, and (2) increasing the physicians' confidence in their ability to perform the examinations adequately. It also assesses whether the program affected referral rates to surgeons for evaluation of breast lumps. Because the CBETP included an educational component that reinforced the guidelines for mammography screening and that studied the program's effect on compliance with other routine screening recommendations, such as for mammography, this study also investigated its success in those areas.

··· METHODS ···

In 1992, U.S. Healthcare began an office-based CBETP for PCPs in its southeastern Pennsylvania, southern New Jersey, and Delaware regions. An educator from U.S. Healthcare's Health Education Department visited physicians in their offices to conduct the program. No more than two physicians were instructed at one time. The course, which lasted 1 hour, was divided into three parts (1) a hands-on evaluation; (2) a 30-minute training session; and (3) didactic teaching. The educator for the program remained the same throughout the duration of the program.

In the evaluation component, physicians used a smooth, anodular, silicone breast model containing five simulated breast lesions to perform a breast examination. Lesions were 0.7 cm in diameter or smaller, and of variable hardness and fixation. The physicians received a score, ranging from zero points (no lesions found) to five points (all lesions found), based on the number and location of lumps detected.

The training session covered the correct performance of a clinical breast examination. This session adopted a variation of the MammaCare® (Mammatech Corp., Gainesville, FL) method of clinical breast examination, which uses lump-bearing, noncystic silicone breast models as demonstration and instructional tools. Three silicone models were used for this training session. On the models, the physicians were instructed to move in a linear fashion, transversely from the axillary plane to the sternum, and

from the clavicle down to the fifth rib. They were shown how to make three dime-sized circles over each area of the breast, increasing the pressure with each circle, in order to palpate all planes of the breast tissue. This approach has been shown to improve the ability of physicians to detect breast lumps, which, in most cases, results in diagnosis of cancerous lesions at an earlier stage.[17,18]

During the 15-minute, didactic teaching component, the educator reviewed the following American Cancer Society screening recommendations with the physicians:

- Monthly BSE by women 20 years of age or older
- Clinical breast examination by a physician at least every 3 years for women aged 20 to 39 years, and annually for women older than age 40
- Mammograms every 1 to 2 years for women aged 40 to 49 years, and annually for women older than age 50 and for those at increased risk

After completing the didactic teaching component, physicians were retested on their abilities to detect abnormalities in a breast model. The model was the same as that used in the pretest, but the orientation of the breast lumps was altered, to avoid retest bias. Pre- and posttest results were reviewed with the physicians at the end of the session.

Participation in the CBETP earned PCPs one category I continuing medical education (CME) credit. Participants also earned additional quality-factor points, which enhance their capitation payment through U.S. Healthcare's Primary Care Quality Care Compensation System.[19]

Approximately 10% of participating physicians were randomly chosen for a follow-up proficiency test, which was conducted 6 months after completion of the initial training. The silicone model used in the posttest also was used during this visit, but the orientation of the lumps differed.

Study Design and Statistical Analysis

To evaluate the program's effectiveness in improving a PCP's ability to detect breast lumps, we compared the results of the precourse test with those of the postcourse test, and, if conducted, with those of the 6-month follow-up test. In this comparison, the same breast model was used for all phases of testing, but with different placement of lumps. A matched paired *t*-test was used to test for the statistical significance of the change from the pre- to postperiods.

In order to determine whether physicians who participated in the CBETP and those who did not participate conducted mammography screening at different rates, a retrospective analysis was performed in which every office that had completed the program was matched with a control group office that did not receive the training. All physicians in an office had to have successfully completed the program for an office to be included in the study and receive the CME credit discussed above. The level of comparison was the physician office, rather than the individual physician, because U.S. Healthcare's databases do not allow for identification of individual physicians. The analysis included only offices that had participated with U.S. Healthcare for a full year before the first physician in an office had taken the CBETP, and for a full year after the last physician in the office had done so. The interim period, during which only some of the physicians had participated, was excluded from the analysis. Offices that completed the program were matched with offices in southeastern Pennsylvania and southern New Jersey. Other criteria included:

- Total number of members
- Average age of female members
- Percentage of female members >49 years of age
- Same type of office (family practice or internal medicine)
- Time periods for the control offices based on the matched study offices' entry and completion dates

Offices were matched by computing the difference between a treatment office and the pool of potential control offices on selected criteria. The results were ranked, and the individual ranks were averaged to obtain an overall rank, which was used to select one control office as the best match for a treatment office. The ranks were weighted differentially, from 0% to 100%, on the basis of the importance assigned to them through consensus of three clinical investigators. The three weighted criteria were: (1) total membership—weight, 42%; (2) average age of female members—weight, 33%; and (3) percentage of women 49 years of age or older—weight, 25%.

The overall rank was used to determine the closest matching control office for a treatment office. Using the nonparametric sign test, relative pre- and post-comparisons were made between the treatment and control offices on the equivalent pre-CBETP and postcompletion-CBETP time points to eliminate potential time-lag bias. The outcome measures analyzed were the mean percentage of lumps detected, mean examination duration, mean false-positive rate, number of mammography tests ordered, number of referrals for biopsy, and biopsy rate.

··· RESULTS ···

The CBETP gave participating physicians feedback on pre- and posttraining proficiency measures. The main outcome measures included the mean percentage of lumps discovered, mean examination duration, and mean false-positive rate of lump detection. Figure 2 displays the mean percentage of lumps detected, before and after training, for physicians participating in the program in 1992 (n = 465), 1993 (n = 322), and 1994 (n = 198). As shown, performance improved markedly, from an average detection rate of 24% to 83%. These results are reproducible and have remained consistent from year to year.

Figure 3 presents the results of the 6-month follow-up test, along with the pre- and posttest results, for the physicians who took part in the follow-up phase. Considering the pretraining ability level, little degradation in the physicians' improved ability to detect breast lumps occurred (posttest, 84.2%; 6-month follow-up, 74.6%), suggesting that the physicians retained and remembered the skills learned during the training.

Six months after completing the program, all participating physicians were mailed a follow-up survey of open-ended questions to determine whether their confidence in their breast examination skills had increased. Of the 40% who responded, 49.5% of responding physicians reported feeling much more confident about their skills, and 46.3% felt somewhat more confident. Furthermore, 93.9% of those who responded stated that they taught their patients the method of breast examination for self-examination purposes.

Figure 4 presents the improvement in annual mammography screening rates for patients 50 years of age or older whose physicians had participated in the program. Between 1991 and 1993, a 24% improvement in the rate of mammograms was observed (36.4% versus 45.2%). These results represent annual rates, rather than biennial rates used in other performance reports, and are therefore lower than the biennial rates. Moreover, because they are derived from claims, encounter, and other administrative data (ie, no medical record review was conducted), it is likely that they underestimate actual performance.

Figure 5 shows the mammography screening compliance rates for the study and control group offices for the periods preceding and following CBETP participation. Although the rates during the baseline period were similar and not statistically different (36.3% and 36.9% in the study and control offices, respectively), the rate of screening compliance in study offices im-

Figure 2. Physician Performance in Detection of Breast Lesions

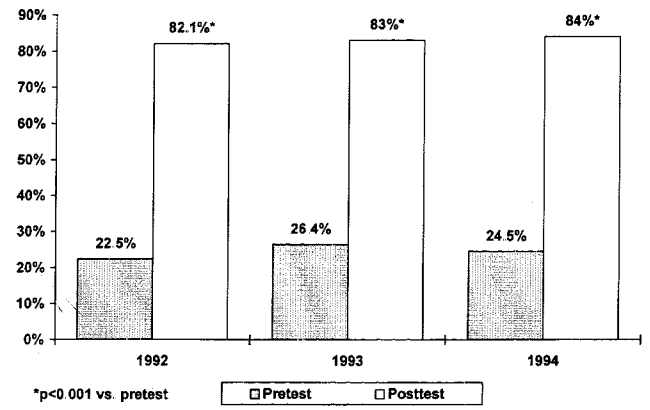
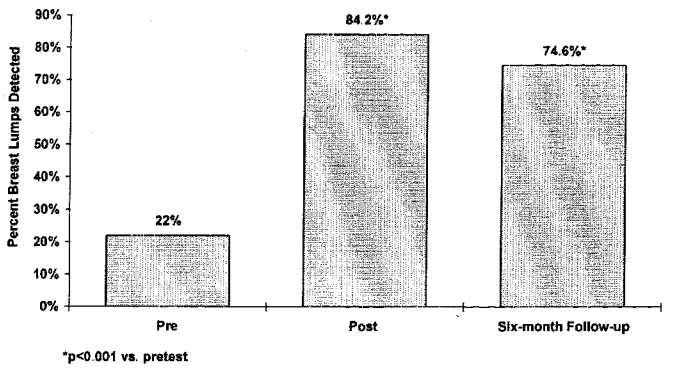


Figure 3. Six-month Follow-Up of Physician Performance in Detection of Breast Lesions



proved after participation (44.6%, versus 42.5% in the control offices; $P < 0.001$).

Physicians in the study group made more referrals, defined as surgical or gynecology visits, than did those in the control group (2.2% versus 1.9%). These results suggest either that PCPs who took part in the program had an increased sensitivity for detecting breast lumps or that the false-positive rate was higher in the participant group. The finding that biopsy rates did not increase, despite a postprogram difference in referrals for breast lumps between study and control offices, supports the latter possibility (Figure 6).

··· DISCUSSION AND CONCLUSION ···

Breast cancer is on the rise, particularly among postmenopausal women. Therefore, greater attention must be given to early-detection modalities.[20] Most of the literature focusing on physician examination skills has shown that the quality of physicians' clinical breast examinations could be improved.[17,21,22] The variation in skill level and technique stems from difficulties in palpating women who have large or fibrocystic breasts, patient discomfort with and nervousness about having a breast examination, and inadequate medical school training in conducting physical examinations.[21-23] Despite these problems, physicians are interested in improving their physical examination skills,[21,24] and office-based teaching is an effective means of enhancing physicians' abilities in this area.[16,24-34]

The U.S. Healthcare CBETP was designed to help physicians to refine their clinical breast examination skills and in turn improve the medical delivery system. Physicians are hardly afforded the opportunity to receive payment and CME credit for instruction in the physical examination beyond their training.

This study demonstrates the program's effectiveness in improving the proficiency and confidence of PCPs in detecting breast lumps. In addition, the retest of 210 physicians showed that the skills learned were retained. Moreover, this program resulted in greater physician compliance with other routine screening recommendations, such as for

Figure 4. Mammography Rates at U.S. Healthcare

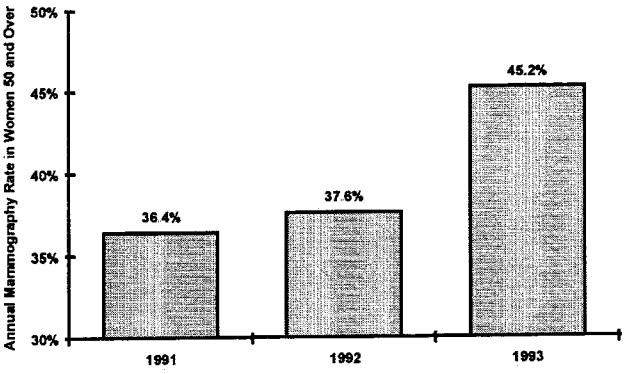


Figure 5. Mammography Screening Rates Before and After the Clinical Breast Examination Training Program

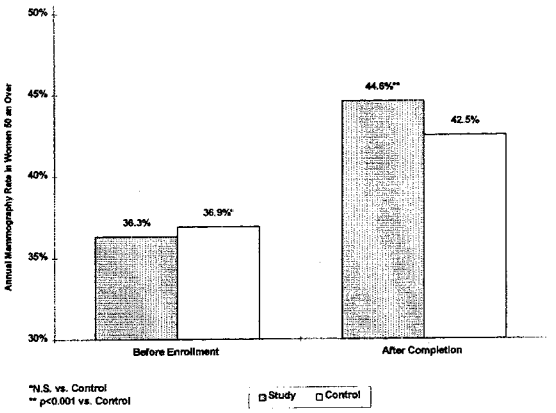
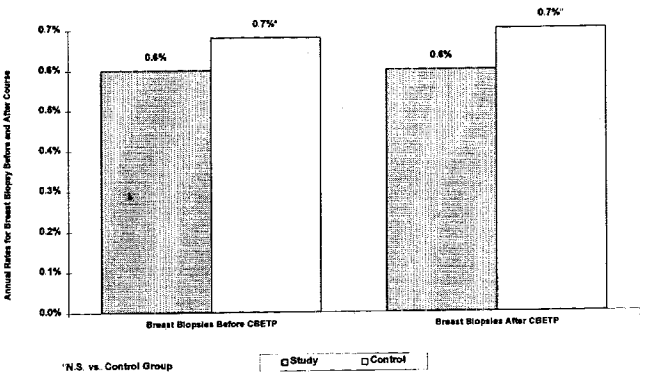


Figure 6. Breast Biopsy Rates



mammograms, and rates of referrals for possible biopsy increased.

The mammography results are somewhat limited by the study design, as the CBETP participants were used as their own controls. Perhaps further study, in controlled trials, will provide stronger evidence that this type of clinical breast examination training improves physician compliance with routine screening recommendations, such as for mammography.

Almost 94% of the physicians taught the breast examination technique that they had learned to their patients. The rate of referral to a specialist for evaluation of breast lumps and the rate of actual breast biopsies performed were analyzed using administrative data in U.S. Healthcare-Southeastern Pennsylvania's claims and referral databases. Although study group offices made an increased numbers of referrals to specialists, no difference in breast-biopsy rates was observed between the study and control offices. We cannot determine whether the increase in referrals to surgeons and gynecologists was the result of increased sensitivity or decreased specificity in the detection of breast lumps.

Although the CBETP would not be expected to affect the rate of breast cancer detection, it may contribute to a downstaging of breast cancer at the time of initial diagnosis. This important issue must be examined in future studies. Given that detecting and diagnosing cancers earlier leads to improved survival rates, the CBETP may enable physicians who have completed the course to detect more early-stage cancers. Thus, patients with breast cancer who see a PCP who participated in this type of course may ultimately have a better chance of surviving the disease.

The CBETP is an example of how a managed care plan can identify particular issues related to quality of care and, through an innovative education program, can improve physician performance. Life-long education of physician providers is necessary to the delivery of quality, up-to-date care. U.S. Healthcare's CBETP shows how the concept of continuing education can be applied to maintain and improve the physical examination skills of physicians.

··· REFERENCES ···

1. American Cancer Society. *Breast Cancer Facts and Figures*. ACS; 1996.
2. *National Mortality, Part A*. Washington, DC: Government Printing Office; 1990. DHHS publication no (PHS) 90-101.
3. Elmwood JM, Cox B, Richardson AK. The effectiveness of breast cancer screening by mammography in younger women. *Online J Curr Clin Trials* Feb 25, 1993:doc no 32.
4. Solin LJ, Legorreta A, Schultz DJ, et al. The importance of mammographic screening relative to the treatment of women with carcinoma of the breast. *Arch Intern Med* 1994;154:745-752.
5. Bassett LW, Gold RH, eds. *Breast Cancer Detection: Mammography and Other Methods in Breast Imaging*. 2nd ed. Orlando, FL: Grune and Stratton; 1987.
6. Eddy D. Guidelines for the cancer-related checkup: Recommendations and rationale. *Cancer* 1980;30:194-240.
7. Mahoney LH, Bird BL, Cooke GM. The best available screening test for breast cancer. *N Engl J Med* 1979; 301:315-316.
8. Solin LJ, Schultz DJ, Legorreta AP, Goodman RL. Downstaging of breast carcinomas associated with mammographic screening. *Breast Dis* 1995;8:45-46.
9. Winchester D. Physical examination of the breast. *Cancer* 1992;69:1947-1949.
10. Seidman H, Gelb SK, Silberberg E, et al. Survival experience in the Breast Cancer Detection Demonstration Project. *Cancer* 1987;37:258-290.
11. Baker L. Breast cancer detection demonstration project: Five-year summary report. *Cancer* 1982;32:194-225.
12. Gilbersen VA. Detection of breast cancer in a specialized cancer detection center. *Cancer* 1969;24:1192-1195.
13. Kahn KL. Screening for breast cancer in the ambulatory setting. *Clin Res* 1984;32:649a. Abstract.
14. Admas CK, Hall DC, Pennypacker HS, et al. Lump detection in a simulated human breast. *Perception Psychophysics* 1976;201:163-167.
15. Hall DC, Goldstein MK, Stein GH. Progress in manual breast examination. *Cancer* 1977;40:364-370.
16. Pennypacker HS, Bloom HS, Criswell EI, et al. Toward an effective technology of instruction in breast self-examination. *Int J Ment Health* 1982;11:98-116.
17. Campbell HS, Fletcher SW, Lin S, et al. Improving physicians' and nurses' clinical breast examination: A randomized controlled trial. *Am J Prev Med* 1991;7:1-8.
18. Fletcher SW, O'Malley MS, Earp JL, et al. How best to teach women breast self-examination. *Ann Intern Med* 1990:112;772-779.
19. Schlackman N. Evolution of a quality-based model: The third generation. *Am J Med Qual* 1993;8:103-110.
20. Harris JR, Lippman ME, Verones U, Willett W. Breast cancer. *N Engl J Med* 1992;327:319-328.
21. Fletcher SW, O'Malley MS, Brynce LA. Physicians' abilities to detect lumps in silicone breast models. *JAMA* 1985;253:2224-2228.
22. Nyirjesy I, Billingsley FS. Detection of breast carcinoma in gynecologic practice. *Obstet Gynecol* 1984; 64:747-775.
23. Rimer BK, Trock B, Balshem A, et al. Breast screening practices among primary physicians: Reality and potential. *J Am Bd Fam Pract* 1990;3:26-34.
24. Warner SL, Worden JK, Solomon LJ, Wadland WC. Physician interest in breast cancer screening education. *J Family Pract* 1989;29:281-285.
25. Warner S, Solomon L, Foster RS, et al. Continuing education in the physician's office: A pilot study for breast exams. *Fam Pract Res J* 1993;13:179-183.
26. Costanza ME, Green HL, McManus D, et al. Can practicing physicians improve their counseling and physical examination skills in breast cancer screening? A feasibility study. *J Cancer Educ* 1995;10:14-21.

27. Lane DS, Burg MA. Promoting physician preventive practices: Needs assessment for CME in breast cancer detection. *J Cont Ed Health Prof* 1989;29:281-285.
28. Costanza ME, Hoople NE, Gaw VP, et al. Cancer prevention practices and continuing education needs of primary care physicians. *Am J Prev Med* 1993;9:107-112.
29. Felch WC. Continuing medical education in the United States. An enterprise in transition. *JAMA* 1987;25:1355-1357.
30. Manning PR, Petet DW. The past, present, and future of continuing medical education. Achievement and opportunities, computers and recertification. *JAMA* 1987;258: 3542-3556.
31. Wilbur RS. Continuing medical education. Past, present and future. *JAMA* 1987:258:3555-3556.
32. Daly MB, Baalshem M, Sand C, et al. Academic detailing. A model for in-office CME. *J Cancer Educ* 1993;8:273-280.
33. Williams PT, Eckert G, Epstein A, et al. In-office cancer screening education of primary care physicians. *J Cancer Educ* 1994;9:90-95.
34. Avorn J, Soumerai SB. Improving drug therapy decisions through educational outreach: A randomized controlled trial of academically based 'detailing.' *N Engl J Med* 1983;208:1457-1463.