

Computerized Reminders to Encourage Cervical Screening in Family Practice

Ian McDowell, PhD, Claire Newell, MA, and Walter Rosser, MD
Ottawa, Ontario

In a randomized trial three ways of increasing rates of cervical screening were compared for women attending a family medicine center. Working from computerized medical records, 1,587 women aged 18 to 35 years who were overdue for a screening test were included in the study. In a control group, no formal method was used to encourage patients to attend for screening, and 13.7 percent obtained a test within the trial year. In one intervention group the physician was issued a message identifying those women visiting the center for a routine appointment who were due for screening; 16.1 percent were screened. Sending a letter to patients in a second group yielded a 25.9 percent compliance rate. In a third group the practice nurse called patients on the telephone to advise them to obtain the test, and 20.0 percent complied. Reminders issued to the physician provide a low-cost, opportunistic approach to reach women who happen to visit the practice, but this approach should be supplemented by telephoning or sending a letter to those women who do not attend regularly.

In many areas of prevention there exists an inverse screening law whereby those at highest risk of a disease are the least likely to attend for screening. This law holds true for cervical carcinoma. Data from national surveys,¹ screening programs,² and the conclusions of expert groups³ confirm that women at the highest risk of cervical cancer are also the least likely to obtain Papanicolaou smears.

Because the majority of women in the child-bearing years visit their primary care physician each year, it has been recommended that primary care physicians should take a more active role in extending cervical screening coverage.^{1,3-5} Although the physician has a potential role in cervical cancer detection, screening may not be implemented unless actively promoted.⁶⁻⁹ Several consistent findings emerge from the literature. Reminders appear, for example, to be more successful in smaller practices⁶ and when nonresponders are followed actively, especially with a combination of different techniques, such as postcards and telephone calls.^{6,7,9,10}

Several types of reminders can be used to encourage screening. Physicians can be reminded to screen women

due for a test when they attend for a consultation, as done by McDonald et al.⁸ This approach may be termed *passive*, as a reminder is issued only if a patient attends the practice. Alternatively, *active* reminders may be directed by mail or telephone to all eligible women. Where medical records are computerized, the clerical task of issuing reminders can be handled automatically. The present trial compared the effectiveness of three types of reminder for cervical screening, all generated by computer.

Following the recommendations of the Canadian Task Force on Cervical Cancer Screening,⁴ the study considered women aged 18 to 35 years who had not been screened during the previous year. The study formed one component of a larger randomized controlled trial of compliance with reminders for influenza immunization,¹¹ tetanus boosters, blood pressure screening, and checking smoking habits.

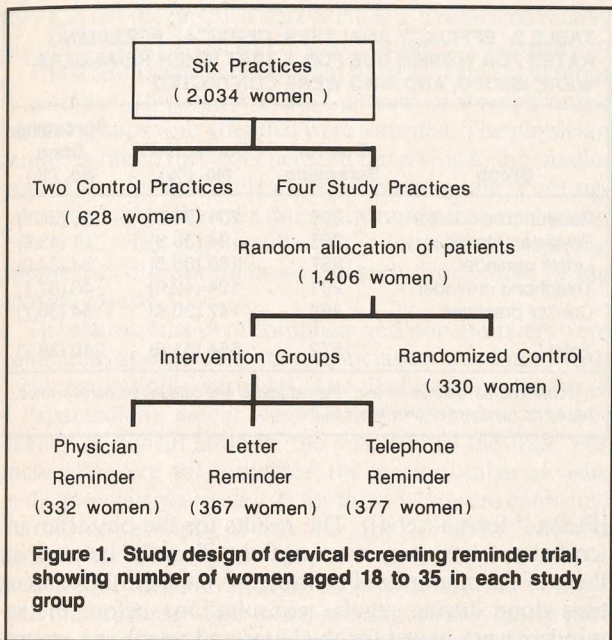
METHODS

Study Design

Data were collected at the Family Medicine Centre of the Ottawa Civic Hospital; this center contains six medical practices, each with a staff physician, a nurse, and from three to five residents. The center uses a computerized

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From the Departments of Epidemiology and Family Medicine, University of Ottawa, Ontario. Requests for reprints should be addressed to Ian McDowell, Department of Epidemiology, University of Ottawa, 451 Smyth Rd, Ottawa, Ontario, Canada K1H 8M5.



system that records visits, diagnoses, treatments, preventive procedures, and information required for billing purposes.¹² All 2,034 women aged 18 through 35 years were entered in the trial, which began in 1985 and ran for one year.

Patients registered with four of the practices were randomly allocated to a control group or to one of three experimental groups to receive reminders from the physician, from the nurse, or by letter (Figure 1). In the two remaining practices, no reminders were issued, and the physicians did not change their usual approach to cervical screening. Comparison between the control practices and the randomized control group was used to determine whether contamination took place in the randomized control group as a result of the possibility that physicians in the experimental arm of the trial might remind all patients, not only those in the physician reminder group.

Experimental Procedures

Patients in the letter and telephone groups were randomly allocated to 24 equally sized "reminder week" groups, one of which was contacted every two weeks to spread the work of issuing reminders over the year. Women who had not obtained a Papanicolaou smear during the year preceding their reminder week were considered eligible for a reminder.

Women in the letter group were sent a confidential letter encouraging them to attend for cervical screening.

The letter referred to the risk of cervical carcinoma, indicated that the physicians recommended the screening test, and noted that the woman was apparently overdue for a Papanicolaou smear. It then outlined how she could obtain the test. The letter thus covered several of the factors anticipated in the Health Belief Model as influencing health behavior: importance of the condition, susceptibility, and practical action to take.¹³ A second letter was sent to those not responding within 21 days. Letters were printed and addressed by the computer and signed by the patient's physician and the practice nurse.

In the telephone group, the practice nurses called the patients using a computer-generated list; the nurses made up to five attempts to contact each woman at home or at work during the daytime. During the call the nurse gave the same information as contained in the letter; potential advantages of the telephone approach were that the nurse could answer any questions the patient might have, and that a screening appointment could be booked for the patient.

In the physician group, the computer printed a message to the physician to recommend cervical screening; repeat reminders were generated for subsequent visits until a test was done. The physician reminder had the advantage that the screening test could, in many instances, be performed immediately. No reminders were generated for randomized control patients or for those in the control practices.

Analyses

Screening tests done at the Family Medicine Centre and entered in the computer formed the outcomes; tests done elsewhere were included if confirmation was provided. The first analysis compared the numbers of tests done during the year for each intervention group. For the nurse and letter groups, however, the effect of the reminder may be confounded by serendipitous visits to the physician before a reminder was issued during the reminder week. To correct for this co-intervention, a second analysis considered only tests done after the study week.

In comparing the cost effectiveness of the reminders, the effectiveness of each intervention was assessed as the number of women screened beyond the number that would be predicted from the rate in the randomized control group. The costing included staff and material costs involved in reminding the patient. It did not consider the computer costs, which were equivalent for all types of reminder, the cost of doing the test, or of the patient's time. As salaries for nurses and physicians vary, results compare the nurse and physician approaches with the letter reminder at different salary levels. Costs for the nurse reminder included clerical time to distribute reminders to the nurses, and the nurses' time to call patients. No telephone charges were included for local calls. Costs for

TABLE 1. CERVICAL SCREENING RATES, IN STUDY YEAR, BY INTERVENTION GROUP

Group	Number Allocated	Not Screened in Previous Year	Screened During Study Year No. (%)
Randomized control	330	255	35 (13.7)
Physician reminder	332	255	41 (16.1)
Letter reminder	367	293	76 (25.9)
Telephone reminder	377	300	60 (20.0)
Control practices	628	484	54 (11.2)
Total	2034	1587 (78%)	266 (16.8)

the letter included the commercial mailing costs and the cost of obtaining the patients' replies (stationery, stamps, prepaid return postage, and clerical time to process the replies and mail the follow-up letters). The physician reminders involved no additional clerical time, as the message was printed automatically on a routinely used form. Minimal time was required for the physician to discuss cervical screening with a patient, less than that for the nurse, as the physician was already talking to the patient.

RESULTS

To check on their equivalence, the study groups were compared in terms of family size, marital status, and age of patients in each group. There were no significant differences among the four random groups. Even when the control practices (which were not randomly assigned) were included, there were no significant differences among the five study groups, with one exception: the control practices differed on family size ($\chi^2 = 29.5, 16 df, P = .02$).

Outcomes

The numbers of Papanicolaou smears carried out during the course of the year for the 78 percent of women who had not obtained one in the previous year are displayed in Table 1. Of those due for a screening test in the randomized control group, 13.7 percent were screened, compared with 11.2 percent in the control practices. This difference is not significant ($z < 1.0$), suggesting no systematic contamination in the randomized control group.

Issuing reminders to the physician added only 2.4 percent to the screening rate in the randomized control group. The telephone reminder added 6.3 percent, whereas the letter was the most effective, increasing the screening rate by 12.2 percent. The differences among the four random groups are statistically significant ($\chi^2 = 15.1, 3 df, P < .005$).

TABLE 2. EFFICACY ANALYSES: CERVICAL SCREENING RATES FOR WOMEN DUE FOR A TEST WHEN REMINDERS WERE ISSUED, AND WHO WERE CONTACTED

Group	Due for Screening	Contacted* No. (%)	Screening Done No. (%)
Randomized control	255	101 (39.6)	35 (34.7)
Physician reminder	255	94 (36.9)	41 (43.6)
Letter reminder	287	188 (65.5)	64 (34.0)
Telephone reminder	291	124 (42.6)	46 (37.1)
Control practices	484	147 (30.4)	54 (36.7)
Total	1572	654 (41.6)	240 (36.7)

* Contacted as defined in text. Percentages are calculated across rows, based on numbers in previous column

[Fleiss,¹⁴ formula 9.4]). The results for the physician intervention, however, were not significantly better than those of the randomized control ($z = 0.62, NS$). Excluding tests done during regular consultations before the reminders were issued for the letter and telephone groups, screening rates were reduced to 22.3 percent and 15.8 percent, respectively; the significance of the overall difference is reduced ($\chi^2 = 8.06, 3 df, P < .05$). The only significant difference lay between the letter reminder and the other approaches.

For the telephone group, 41 percent of the women screened received their test within 30 days of the call. In the letter group, 33 percent received the test within 30 days of the mailing. In most cases the women came specifically to obtain the test.

Efficacy

The effectiveness of the reminders, considering all patients allocated to the study groups, is shown in Table 1. Not all patients received reminders, however; not all patients in the physician reminder group visited the Family Medicine Centre, and the telephone calls and letters failed to reach some patients. The efficacy of each reminder (that is, its impact on those exposed to it) is displayed in Table 2. In the first column are the numbers of patients due for a test at the beginning of the study or at the time the reminders were issued for the letter and telephone groups. (Note that for these groups the table omits a few patients who were screened before their reminder week.) In the second column are the numbers of patients contacted. For the physician and control groups, "contacted" was defined as including patients who visited the practice. For the telephone group, only patients who were reached by telephone were included. For the letter group, patients whose letters were returned unopened or who indicated

they had left the practice were excluded. Those who merely did not respond to the letters were retained in this analysis.

The screening rates differ from those in Table 1: without a reminder, 35 percent and 37 percent of women in the control groups who attended were screened. The physician reminder raised this to 44 percent, but owing to the smaller sample size for this analysis, this screening rate is not significantly higher than the rate in the random control group ($z = 1.12$, NS). The results of the letter and telephone approaches did not differ significantly from those of the control groups.

The characteristics of compliers and noncompliers were compared, and no consistent association was found with sociodemographic variables. The likelihood of obtaining a Papanicolaou smear was, however, linked to the frequency of consultation in the year before the trial. For those who were not contacted, the mean number of visits in the previous year was 1.1; for those who were contacted but did not comply, it was 3.6; and for those who did comply, it was 4.1 ($F = 108$, $df = 2$, 2029, $P < .0001$). Referring to the overall trial, those who did not comply with this reminder were overdue for more preventive procedures than were those who did comply: 3.6 vs 2.9 ($F = 235$, $df = 1$, 2032, $P < .0001$). Routine screening is normally obtained by frequent visitors, and the active reminders made only a very slight impact on this.

Cost Effectiveness

If the expected screening rate is taken as that obtained in the random control group, the physicians achieved six screenings more than would have been expected. The letters gave 36 additional screenings, and the nurses' telephone calls gave 19.

The cost of the letter reminder, including stationery, stamps, prepaid replies, 158 follow-up letters, and clerical time to assemble the letters, was \$444.06. The letter reminder yielded 36 additional screenings, at a cost of \$12.34 each. This cost is increased if the physician's time to sign the letter is included, which took an average of ten seconds. At an hourly salary of \$60 for the physician, the total cost becomes \$512.23, or \$14.23 per screening gained. Figure 2 displays the impact of varying the salary level of the physician on the cost effectiveness of the letter reminder.

The nurses took an average of 2.8 minutes to call and remind each woman. Of the 291 who were to be telephoned, no attempt was made to call 11 patients. At a salary of \$15 an hour, the cost was \$196 to call the remaining 280 women. Clerical time to distribute lists of patients to be called (at \$10 per hour) cost \$18, for a total of \$214. The cost per screening gained is therefore \$11.26. At a salary of \$5 per hour, the cost would be \$4.38 per screening. The physicians required an estimated 45 sec-

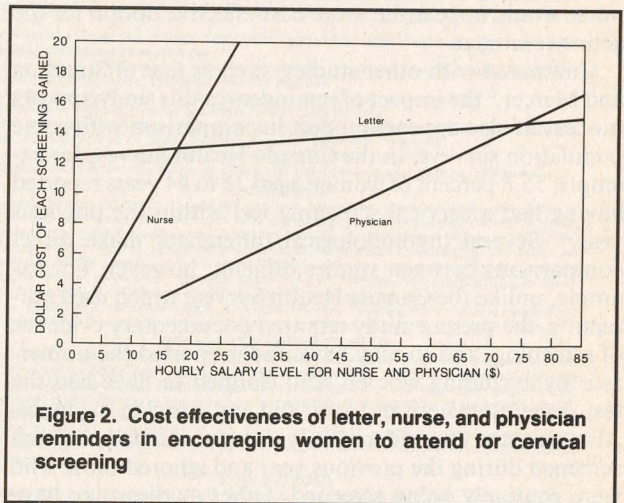


Figure 2. Cost effectiveness of letter, nurse, and physician reminders in encouraging women to attend for cervical screening

onds to explain cervical screening to each woman: a total of 70.5 minutes for the 94 women who needed screening and who visited the practice. At a salary of \$60 per hour, the cost per screening gained is therefore \$11.75; at \$30 per hour the cost would be \$5.88.

DISCUSSION

This study was undertaken to find a feasible way to simplify the task of encouraging patients to attend for cervical screening in a busy, urban practice. The trial concentrated on noncompliant women, that is, those who had not obtained a Papanicolaou smear within the recommended annual interval. Given that a computer system can readily identify such women, what is the most effective method for encouraging them to obtain a test? The passive reminder approach of having the physician remind women who attend is very cost effective for those who do visit. The physician option is cost effective because of the brief time required per patient and also because the cost of contacting the patient is eliminated. Routine reminders to physicians may also serve to maintain physician motivation—a problem identified by Frame.¹⁵ For this population, however, in which the visit rate was low, the physician approach proved less effective overall than a mailed reminder. Active reminders may be required with noncompliant populations, who are also at higher risk. A combined approach, offering routine reminders to the physician as every woman due for a test attends, and then using an active reminder for those who fail to comply within a given time, may prove the optimal strategy. Combined approaches were used in previous studies,^{6,7,10} although none compared a combined reminder with a single one. From these results, a telephone call from the

nurse would appear the more cost-effective option for the active reminder.

Compared with other studies, such as that of Standing and Mercer,⁶ the impact of reminders in this study appears modest. It also appears modest in comparison with some population surveys. In the Canada Health Survey, for example, 55.8 percent of women aged 25 to 44 years reported having had a cervical screening test within the previous year.¹⁶ Several methodological differences make direct comparisons between studies difficult, however. For example, unlike the Canada Health Survey, which used self-reports, the present study required documentary evidence of screening, and so may have underreported the numerator by excluding women who claimed to have had the test done elsewhere but who did not provide evidence. Also, this study considered only women who had not been screened during the previous year and ignored those who were routinely being screened. Other studies may have included such women in their results. Finally, the denominator in this study may have been inflated by the retention of some women in the study who had in reality left the practice. The study denominator had been checked in 1984 by sending letters to all patients who had not contacted the center in the previous 30 months, asking whether they still considered themselves members of the practice. Those who responded affirmatively were retained; all others were excluded from the trial. Nevertheless, some patients may have left the practice in the interim. Although these factors may have depressed reported compliance levels, they will not have affected the validity of comparisons between the intervention groups.

As well as comparing active and passive reminders, an important contribution of this study was to illustrate the practicality of using a computer-based system to issue reminders. The topic of issuing reminders to patients raises the broader question of who should assume responsibility for initiating contacts for preventive measures: physician or patient? Is reliance on an automated computer system appropriate in an age when people are being encouraged to take active responsibility for their own health?

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