
Impact of Environmental Patient Education on Preventive Medicine Practices

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Background. Studies show that provider-oriented reminders alone are less effective at increasing physician compliance with prevention guidelines than are combinations of patient- and provider-oriented physician reminders. The effectiveness of environmental patient education (ie, office-based videos, pamphlets, and posters) without individual staff or educator involvement has not been well established. The objective of this study was to evaluate the effectiveness of environmental patient education in increasing the amount of preventive services patients receive.

Methods. A nonrandomized controlled trial using historical controls was conducted in a model family practice clinic at the University of New Mexico School of Medicine in Albuquerque. The study group (n=389) included adult women who had been seen at the clinic at a time when educational materials were present in the waiting area. The control group (n=381) were similarly selected patients seen during the same period of the previous year, when no such materials were available. During the intervention, patients in the waiting area were exposed to educational materials that encouraged them

to ask their physicians about cholesterol testing, Papanicolaou (Pap) smears, tetanus boosters, and mammograms. For both the control and study groups, physician orders for preventive services were monitored over a 4-month follow-up period by reviewing medical records.

Results. There were no statistically significant changes in the number of cholesterol tests, Pap smears, tetanus boosters, or mammograms ordered after the environmental patient education intervention, despite adequate statistical power.

Conclusions. Environmental patient education materials were not effective in increasing the amount of preventive services performed by physicians in this study. Although such interventions are inexpensive, easily comprehended, and well intended, they may be ineffective in increasing the performance of patient preventive services.

Key words. Patient education; physician compliance; primary prevention; intervention studies. (*J Fam Pract* 1995; 40:363-369)

Physicians fail to comply with guideline-recommended levels of prevention services¹⁻⁵ despite physician knowledge of guidelines^{1,6} and the availability of numerous provider-oriented reminder systems.⁷⁻¹¹ Stimulating patients themselves to ask for preventive services may be an

effective strategy that could improve physician compliance.

Patients are interested in prevention¹² and are taking a more active role in their health care.^{13,14} Patient requests and signs of patient interest improve provider knowledge and practices.^{13,14} Interventions focusing on reminding patients and physicians together have been more effective in increasing physician compliance with prevention guidelines than physician reminders alone.¹⁵ Studies also have shown that patient-oriented reminders, such as active patient education, increase the number of preventive services provided.¹⁵⁻¹⁷

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Active patient education occurs when a professional becomes either directly involved in patient education, eg, one-on-one teaching, or indirectly involved, eg, personalized mailing. Active patient education can effect behavior change,¹⁸⁻²¹ increase the number of direct questions patients ask of the physician,²² and increase the number of preventive services patients receive.^{14,23-24} Distribution of minirecords to patients has also improved physician compliance with guidelines for preventive services.^{14,17,23}

Environmental patient education differs from the active form in that a patient is exposed to educational materials without personal intervention from staff or educators. It is the kind of patient education that occurs in most waiting areas and examination rooms where handouts are available for the patient. Although environmental patient education is easy to provide, does not require ongoing time and involvement of clinic staff, and is used much more frequently in all types of health care settings than other methods of patient education, it has received little study.⁵

Posters,^{25,26} brochures,²⁶ and the patient-held minirecords^{14,17,23} have been shown to enhance patient requests for preventive care activities.¹³ The hypothesis in this study was that environmental patient education is effective in modifying physician behavior, and thus the number of preventive procedures ordered for patients. Our study evaluated whether patients received more preventive services from their physicians after being exposed to environmental patient education materials than did a control group.

Methods

Setting

Approximately 2000 patients are seen each month at the model family practice clinic at the University of New Mexico School of Medicine in Albuquerque. Before being taken to an examination room, patients have vital signs recorded and undergo a brief interview by a clinic nurse, then wait in a small room adjoining a reception area. Informal patient time-motion studies have shown that approximately 80% of patients stay in this waiting area instead of returning to the larger reception area, remaining there for an average of 15 minutes before being called to an examination room.

Study Design

This was a nonrandomized controlled trial using historical controls. The intervention group was composed of women aged 21 years or older who met inclusion criteria

and who were seen in the family practice clinic during the first 4 weeks of the study period (February 1993) when intervention materials were present in the small waiting area. The control group consisted of similarly selected patients seen during the same period of the previous year (February 1992) when intervention materials were not available.

Billing sheets were reviewed to identify all women over the age of 21 years who were seen in the course of the two study periods. Patient selection was achieved using a 100% sequential sample of visits in the study period. Using this process achieved a sample size in each group capable of detecting an increase of 10% in the proportion of patients receiving preventive services with 80% power. Records were reviewed for evidence that preventive services were ordered during the initial clinic visit or in the ensuing 4 months. Chi-square analysis was performed using SAS statistical software.

Outcome Measures

The outcome measures for preventive services were tetanus boosters, cholesterol screens, Papanicolaou (Pap) smears, and mammograms. These four screening procedures were chosen because they were among the least controversial and were suggested in the guidelines of the US Preventive Services Task Force.²⁷ The preventive services were considered performed if they were ordered by a physician at any time up to the end of the 4-month study period, except for the tetanus booster, which was noted as ordered only if the patient received it as primary prevention, not as a procedure associated with wound care. It is possible that patients had tetanus boosters or other procedures at other sites; but immunization records and preventive services flow sheets at the university family practice center are regularly updated regardless of where patients receive their care. In this study, we assumed that the immunization records were current and that the rates of unrecorded procedures were similar in both patient groups. Bias would be introduced only if there were different rates of unrecorded procedures between the control and intervention groups.

The four outcome measures used in this study are less sensitive than, for instance, measures of knowledge or measures of whether or not patients discussed the issues with their physician. They do, however, effectively measure behavior, which is the intended effect of the intervention. Outcomes depend on a complicated series of events during which environmental education has the initial effect of stimulating patient awareness. The patient then takes action by initiating a discussion with the physician. The physician is thus reminded to perform a recommended preventive procedure and orders that procedure.

With this in mind, the investigators selected this type of measure because it is the primary behavioral outcome most environmental patient education systems are attempting to effect. Knowledge of preventive practices by the patient or physician is not effective without corresponding behavioral action.

Subjects

Women whose charts could be reviewed for all four outcome measures were selected for this study. Patient age of at least 21 years was selected because this is the age at which cholesterol screening tests are first recommended. A patient was included if she was eligible for any of the study measures; ie, if at the time of her first clinic visit during the study period, she had not received one of the preventive services within the specified period: 10 years for tetanus booster, 5 years for cholesterol testing, and 1 year for Pap smear and mammogram. Women who were less than 50 years of age and those who had had a mastectomy were not considered eligible for mammography. Patients were excluded if they were currently pregnant or had been pregnant during the previous 12 months, because immunizations are usually not indicated during pregnancy, and Pap smears are routinely performed at the initial prenatal visit. Patients were also excluded if they had been seen by any of the three physician investigators involved in the study during the intervention year.

The inclusion of women who had had hysterectomies is a potential source of bias in this study. The need for yearly Pap smears is controversial, particularly in those who have had a hysterectomy for benign conditions. The US Preventive Services Task Force recommends that Pap smears be performed at intervals of 1 to 3 years based on the physician's recommendation but does not address the issue of Pap smears in women who have had a hysterectomy.²⁷ Many women are accustomed to an annual visit for a pelvic and breast examination even if they have had hysterectomies, and many of these patients continue to have Pap smears. If the patient or physician considered a Pap smear and decided against the procedure because of a history of hysterectomy, the results could be biased only if this occurred more often in one study group than in the other. The investigators assumed that practice patterns and the proportion of women having had a hysterectomy did not change from the control to the test period and thus that no bias would be introduced.

Medical Record Review

Four ancillary staff members were trained as chart reviewers. Once a chart met inclusion criteria, data were ab-

Table 1. Characteristics of Patients in the Control and Intervention Groups in a Study of the Impact of Environmental Patient Education Materials on the Provision of Four Preventive Services

Patient Characteristics	Percentage of Patients	
	Control Group* (n=381)	Intervention Group* (n=389)
Age, y		
21-40	46	47
41-60	38	38
>60	15	14
Unknown	1	0
Financial status		
Indigent	50	51
Medicaid	10	11
Medicare	12	12
Private insurance	15	16
Self-pay	10	10
Unknown	3	<1
Visit type		
Walk-in (acute)†	4	15
Scheduled	93	84
Unknown	2	<1
Patient status		
New	18	14
Established	80	86
Unknown	2	<1
Number of visits during 4-month study period		
1†	33	46
2	27	29
≥3	38	24
Unknown	2	<1

*Includes all patients who were eligible for one or more procedures.

†Statistically significant ($P<.05$) difference between control and intervention groups.

NOTE: Percentages may not add to 100 because of rounding.

stracted from the physician-order section of the chart, progress notes, and laboratory results. Accuracy of judging inclusion criteria was validated using replicate review procedures on 35% (272) of the charts. This review revealed that charts were incorrectly included or excluded from the study 4% of the time for cholesterol, 5% for mammogram, 9% for Pap smear, and 7% for tetanus. Chart reviewers were given feedback during the study, and all errors were corrected. Charts were spot-checked throughout the study to ensure that all the data were being abstracted correctly. Data abstracted from the chart included the outcome measures, whether the procedure had been ordered during the 4-month follow-up period, and patient characteristics (Table 1). Financial status was determined using income criteria for a means analysis, a method by which all patients at the University of New Mexico Health Sciences Center are classified. For example, a single person is classified as indigent if his or her

monthly income is less than \$1324, and as self-pay if his or her income is \$1325 or more.

Intervention

Before the intervention, there were no written materials, educational posters, or videos promoting preventive care services in the clinic. The intervention involved a combination of educational formats, including posters, a video, pamphlets, and a patient-held minirecord, since this combination has been shown to be more effective than using only one format.²⁸

Materials were designed to maximize patient comprehension by following guidelines for low literacy because more than one half of the US population has difficulty understanding materials written above the 5th-grade reading level.^{29,30} The patient-held minirecord, as well as the posters and video, met criteria for a 5th-grade reading level or below, using a formula developed for assessing the degree of difficulty in reading materials.²⁹ In addition, the language employed was nonmedical,³¹ simple illustrations were used,^{29,32} and clinic staff members were featured in video messages.³³

Educational strategies and materials were developed to conform with the Health Belief Model, formulated by Hachbaum, Becker, and Rosenstock for the purpose of maximizing patient interest, comprehension, and motivation to seek care.^{24,34,35} The Health Belief Model is a social-psychological model of health behavior based on the theory that patients are more likely to seek care and change behavior if they are provided with certain information.

Two focus group meetings composed of five clinic patients were used to guide the initial stages of creating the educational materials.³⁶ Patients for the focus groups were selected from the investigators' panel of patients, since these patients were not eligible for the study. Approximately 25 patients were asked to participate in order to identify 5 patients who were willing to attend a focus group meeting. The focus groups were used to determine the best location for patient education materials, the content and general appearance of the pamphlets, poster designs, and types of drawings thought to be most effective in delivering the intended messages. They also helped determine the size and appearance of the patient-held minirecord that they thought would be most likely to prompt a patient to pick it up or use it. Patients liked the idea of a poster with a picture of their physician recommending "Ask your doctor," stating that it provided a personal touch. Before the materials were printed, a sample of patients and nonmedical people were asked for their opinions, and the materials were modified accordingly.

A variety of educational materials were used in an

effort to maximize the chances that each patient would be exposed to the environmental intervention. The materials developed for this study were the only materials available in the common waiting area where all patients went before being placed in an examination room. Since there was no active intervention, we could not be absolutely sure that all patients were exposed to the materials, but it is likely that they would have seen at least one of the intervention materials: either the video, the posters, the pamphlets, or the minirecords.

Three posters and the one video described all four preventive services, and four pamphlets described one of the outcome measures each. A total of 500 pamphlets on each measure were printed, and all were taken by patients during the intervention period. The minirecord was a pocket-sized card patterned after one that has already been described in the literature.^{2,14} The minirecord listed commonly recommended preventive services by age and sex. Approximately 1500 minirecords were printed, all of which were taken by patients during the intervention period.

The message "Ask your doctor" was stressed in all educational materials. The minirecord included a recommendation that patients carry it with them at all times and bring it to every clinic visit. The video consisted of four vignettes corresponding to the four outcome variables. The total duration of the video was approximately 20 minutes.

The patient education materials were placed in the small area where patients spend a minimum of 5 to 10 minutes and an average of 15 minutes at each clinic visit. They were present for the first 2 months of the intervention period. With the exception of the nurse recording vital signs, physicians, staff, and other nurses rarely went into that waiting area. The existence of the patient education materials was not publicized so that patient response to the materials could be evaluated strictly on the basis of environmental exposure to them. No active interventions by staff were performed to promote the educational materials, and no one was instructed to encourage patients to pick up information or use the minirecord.

Results

A total of 23,337 patients was seen in 1992, and 24,063 in 1993. There were 381 female patients aged 21 years or older who met inclusion criteria for at least one of the outcome measures during the study period in 1992, and 389 who met the criteria in 1993 (Table 1). More than 50% of patients whose charts were reviewed were indigent, and approximately 30% were either self-pay or receiving Medicaid or Medicare.

Table 2. Preventive Services Ordered for Eligible Patients in the Control and Intervention Groups in a Study of the Impact of Environmental Patient Education Materials on the Provision of Four Preventive Services

Variables	Tetanus Booster		Mammogram		Pap Smear		Cholesterol	
	1992*	1993†	1992*	1993†	1992*	1993†	1992*	1993†
Patients included, no.	381	389	112 ‡	140 ‡	381	389	381	389
Eligible patients, no. (%)	312 (82)	293 (75)	75 (67)	62 (44)	199 (52)	227 (58)	205 (54)	211 (54)
Procedure ordered, no. (% of eligible)	16 (5)	12 (4)	17 (23)	22 (35)	67 (34)	75 (33)	32 (16)	29 (14)

*Control group.

†Intervention group.

‡Includes only patients aged 50 years or more.

The numbers of patients in both study groups were similar in age and financial status but differed in the types of clinic visits made (Table 1). More patients were seen in 1993 for only one visit and for walk-in acute-care visits. In both groups, more than 50% of patients whose charts were reviewed made two or more clinic visits during the study period. The number and percentage of patients eligible for each preventive service were similar for both groups (Table 2); 82% of patients in the control group in 1992 and 75% of patients in the intervention group in 1993 were eligible for a tetanus booster; 52% in 1992 and 58% in 1993 were eligible for a Pap smear; and 54% in both groups, ie, in 1992 and 1993, were eligible for cholesterol testing. There was a difference in the percentages of patients eligible for mammogram: 67% in 1992; 44% in 1993. None of the differences between the percentages of eligible patients for whom preventive services were ordered in 1992 and 1993 were statistically significant for any of the measures (Table 2). Stratified comparisons based on provider status, patient financial status, and patient age were performed but did not affect the results. Controlling for patient demographics and type of visits also did not affect results.

The sample size of patients eligible for tetanus immunizations was large enough to detect an increase from 5% during the baseline period to 12% during the intervention period, with 80% statistical power. Increases yielding 80% statistical power for the other procedures were from 34% to 48% for a Pap smear, 23% to 48% for a mammogram, and 16% to 28% for a cholesterol screening test. The study, therefore, had the power to detect increases in these outcome measures that, while modest, would have been clinically significant.

Discussion

This study suggests that even well-designed environmental patient education may not change the number of preventive services provided to patients. The environmental

intervention in our study resulted in no change in physician behavior, despite the provision of patient education materials using content and techniques that have been shown to be effective when *actively* used. Every effort was made to develop patient education materials that were appropriate for the patient population served. The materials were developed according to strict guidelines, and patient focus groups were included in the design process. The video, which showed models who spoke directly to the audience, was similar to active patient education in which a person is directly involved in educating the patient. Patient education materials were aimed at an appropriate literacy level, and inability to read or comprehend materials was unlikely to have accounted for the observed results. The education materials were likely more appropriate than most environmental education materials used in general practice. As such, if these materials were ineffective, it is likely that other materials also would be ineffective in promoting behavior change.

The indigent or low-literacy level of the majority of our patients may have influenced the assimilation of the patient education information in our setting²⁹ and affected behavior to the extent that patients were afraid to ask questions or make requests of their physicians. Doak²⁹ states that "Poor readers . . . usually do not ask questions to obtain information." Results reported by David and Boldt³⁷ from a patient questionnaire suggest that persons in lower social-position groups may perceive the preventive function of the physician to be less important than patients in a high social-position group perceive it to be, and therefore may be less likely to ask the physician for preventive health care.³⁷

The collection of data through medical record review may have introduced biases.³⁸⁻⁴⁰ Shortcomings of this process include abstracting errors on the part of the reviewers and incomplete documentation of patient encounters on the part of physicians. For example, in reviewing patient charts 10 years in the past to determine tetanus immunization status, the abstractor could have missed

brief notations documenting updated status. Since the potential for this type of bias probably was similar in both groups, it is unlikely that the observed outcome was substantially altered.

The short follow-up period is probably not responsible for the lack of increase in physician orders for preventive services. If ordered, tetanus boosters and cholesterol screening tests could easily have been performed on the day of the patient visit, but even if they were not, the follow-up period was long enough to allow patients to return for the preventive services.

The study did not evaluate the degree of patient exposure to the educational materials. The waiting area was small enough so that it was difficult for patients to avoid seeing one or more of the educational materials that had been placed there. It is possible, however, that many patients did not see all four of the vignettes on the video, since the video lasted 20 minutes and the average waiting time was 15 minutes. Some patients, especially those with small children, chose to wait in the reception area rather than the waiting area because it was more spacious and more toys were available. It is probable, however, that most subjects chosen for the intervention group were exposed to the educational materials. More than 80% of patients wait in the waiting area where the materials were located, and more than 50% of patients made two or more clinic visits, thus increasing the likelihood of exposure.

The measures chosen for this study required physician orders. Therefore, physician behavior had to be affected in order to show any change in the number of preventive services provided. According to Belcher et al,⁴¹ physicians do not always respond well to assertive patients who want to play an active role in their health care; however, it seems unlikely that physicians refused direct patient requests for preventive services for which they were eligible, especially since these preventive services are considered to be standards of care. It seems more likely that the interventions did not stimulate patients to ask or discuss these procedures with their physicians.

Studies have shown that patients will comply with most recommended services,^{1,42,43} and that cost is not a barrier to obtaining preventive services when they are recommended by a physician.^{42,43} One survey of patients and physicians found that many patients desire more frequent testing than is recommended.¹² In some cases, there may be barriers preventing patients from making requests of their physicians. Two studies have shown that when patients are uncertain about their physician's interest in their care, they are less likely to get involved.^{13,24} In the same two studies, the minirecord was found to be effective in modifying behavior only if the patients knew that their physician would be favorably disposed.

Providing educational materials in waiting areas to

promote patient interest in preventive services is inexpensive and easy to do, but it may have limited impact as a strategy to promote increased rates of clinical preventive services ordered by physicians. Given the considerations and limitations of this study, it is probable that environmental patient education alone is not sufficient to stimulate patients to ask their physicians to provide preventive services.

Many preventive medicine educational techniques depend on interventions that involve complicated decision-making on the part of the patient or physician and are thus limited in their ability to affect behavior related to the provision of preventive health care services. We must consider the possibility that these techniques, even if they offer the advantages of being low-cost and easily understood, may not be capable of achieving the desired outcomes.

Since preventive medicine physicians rely on published studies to determine both what does and what does not work, it is important that negative as well as positive trials be published. However, a publication bias exists in the medical literature that has interfered with the publication of negative results, regardless of study quality.^{44,45}

Stimulating physicians to provide higher levels of preventive care is the goal, but there remains the question of how best to achieve this goal. This negative trial is an important finding, but it requires confirmation by other well-designed trials that have adequate statistical power and measure behavioral outcomes. Studies are also needed to evaluate the role of the patient and of patient education in stimulating physicians to change their preventive practice habits.

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