

Implementation of a Systematic Health Maintenance Protocol in a Private Practice

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The impact of a policy to introduce a simple health maintenance protocol systematically to all patients belonging to a private practice is reported. Results after 18 months' experience in over 1400 patients indicate that (1) physician compliance was excellent (97% of eligible patients were included, and physician time taken to introduce the protocol at the index visit took less than 4 minutes), and (2) patient acceptance (which varied from procedure to procedure) was good to excellent (minimum acceptance: 77% for sigmoidoscopy; maximum acceptance: 97% for cholesterol screening). For patients seen once, acceptance rates for procedures were generally comparable to prior published performance rates for highly selected patient populations. Integration of a simple health maintenance protocol into routine office care of unselected primary care patients was feasible, effective, and acceptable to patients. Patient refusal was a minor barrier to performance of health maintenance.

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In recent years there has been a growing consensus among practicing physicians,^{1,2} national organizations of health professionals,³ medical educators,^{4,5} government agencies,⁶ and the public supporting the expansion of the physician's traditional role to include delivery of preventive care services. Longitudinal adult health maintenance guidelines have been developed and tested.⁷⁻¹³ Unfortunately, most descriptive studies have shown that implementation of health maintenance has been inadequate, and most intervention studies designed to increase performance have resulted in delivery of preventive services to only approximately 50% of eligible adults (Table 1). In addition, these results usually apply to highly selected patient populations, not to all patients seen (Table 1).

Descriptive studies indicate three categories of factors that influence the delivery of preventive services: physician factors, patient factors, and system factors. Important physician barriers to implementation include (1) lack of consensus about appropriate testing,¹⁵ (2) negative phy-

sician attitudes and beliefs,^{14,21,41} (3) unfavorable logistics (time taken, inconvenience, forgetfulness),^{14,18,28,29,43} and (4) lack of compensation.⁴⁴ Patient factors include (1) insurance status,^{36,39,41} (2) visit frequency,^{16,41} (3) whether seen for a general physical examination,^{16,21,29} (4) presence of risk factors for disease,^{29,37} (5) patient acceptance.^{14,24,45} and (6) age, race, and sex.^{16,41} System barriers include (1) absence of paramedical assistance,^{14,16} (2) disorganized medical records,^{44,46,47} (3) fragmentation of primary care,^{14,44} and (4) lack of a formal or "systematic" screening program.^{16,32,34} Intervention studies designed to improve the delivery of preventive services have to date exclusively focused on (1) physician education,^{17,23,27} (2) physician feedback (either immediate reminders^{17,19,22,27,42,48} or delayed audit^{20,23}), (3) patient reminders,⁴² (4) patient insurance assignment,³⁵ (5) use of a prevention flow sheet,^{17,20} and (6) use of paramedical assistance.^{17,19,27}

Physicians do a better than average job of delivering preventive services to patients who schedule a general medical examination,^{16,21,29} but most patients do not schedule such examinations. It appears, therefore, that the only realistic way to provide preventive services to all eligible adults is to integrate preventive medicine into all visits, particularly all illness visits.^{9,49} This report documents the development of such a protocol, called the *systematic health maintenance* (SHM) protocol. The sys-

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TABLE 1. RESULTS OF STUDIES OF HEALTH MAINTENANCE PERFORMANCE IN PRIMARY CARE

Author, Year	Design	Setting	Patient Eligibility Criteria	Cigarette Use	Weight	Blood Pressure	Breast Examination	Tetanus	Cholesterol	Papanicolaou Smear	Mammography	Occult Blood	Sigmoidoscopy
Frame, 1979 ¹⁴	D	PP/FP	Sel 1/Reg	90		99				75		61	
Romm et al, 1981 ¹⁵	D	PP/IM	Sel 2/CPX	63		98	80		84	64			
Mandel et al, 1982 ¹⁶	D	UB/FP	"Active patients"	63	90	88	65			70		45	0
Cohen et al, 1982 ¹⁷	I	UB/IM	?All								32		
Frame and Kowulich, 1982 ¹⁸	I	PP/FP	Sel 1							26		77	
Davidson et al, 1984 ¹⁹	I	UB/IM	Sel 2/VIS				45					52	
Frame et al, 1984 ²⁰	I	PP/FP	Sel/VIS	74		99	70			85		51	
Dietrich and Goldberg, 1984 ²¹	D	PP/IM	Sel 2/Reg, VIS			77	82	22			16	52	
McDonald et al, 1984 ²²	I	UB/IM	All							38	10	55	
Wnickoff et al, 1984 ²³	I	PP/IM	Sel 2/CPX				34	1	13	44	1	80	
Romm, 1984 ²⁴	D	UB/FP	Sel 2/CPX, VIS, Reg	22		81						17	
Fox et al, 1985 ²⁵	I	UB/FP	All								11		
Otravdec et al, 1985 ²⁶	D	UB/FP, IM	All	29	99	99			13				
Mandel et al, 1985 ²⁷	I	?UB/FP	All					56		80		61	
Woo et al, 1985 ²⁸	D	UB/IM	Sel 2/VIS, Reg				76		100	100	5	48	14
McPhee et al, 1986 ²⁹	D	UB/IM	All							67	13	28	0
Prislin et al, 1986 ³⁰	I	UB/FP	Sel 2/CPX				72					54	
Tierney et al, 1986 ³¹	I	UB/IM	?All							31	22	58	
Lynch and Prout, 1986 ³²	D	UB/IM	Sel/Reg	46			33			29	0	55	
Davis et al, 1987 ³³	D	PP/FP	Sel/VIS	65			70			77	41	34	8
Madlon-Kay, 1987 ³⁴	I	PP/FP	Sel 2/CPX			82		8		98	71	25	26
Lurie et al, 1987 ³⁵	I	PP	All					1		62	2	42	1
Burack and Liang, 1987 ³⁶	I	UB/IM	Sel 2							69	61		47
Bourquet et al, 1988 ³⁷	D	UA/FP	All								16		
Chambers et al, 1989 ³⁸	I	UB/FP	Sel/VIS								27		
Elisbury et al, 1989 ³⁹	D	UB/FP, IM	Sel 2/CPX				93	46		88	83	80	
Hahn, 1989 ⁴⁰	D	PP/FP	Sel 2/CPX									89	72
Ornstein et al, 1989 ⁴¹	D	UB/FP	All					19	20	41	16	13	
McDowell et al, 1989 ⁴²	I	UB/FP	Not stated							26			
Average for above				57	95	92	61	22	46	62	25	51	21
Hahn and Berger (current study)	I	PP/FP	All	95	99	100	95	88	95	89	78	74	71

Selected methodology and results of previously published studies of adult health maintenance discovered by MEDLINE searching, review of bibliographies, and personal correspondence. Studies reporting only physician estimates of performance or audit results for non-health-maintenance procedures (illness care) are excluded. Reported outcomes are either the measured proportion of eligible patients with the procedure, or a calculation of observed or expected proportion (methodologies varied for calculations of these proportions). Design: D—descriptive (audit) study, I—intervention study (postintervention or best results given). Setting: UB—university- or hospital-based teaching practice, UA—university-affiliated community-based teaching practice, PP—private practice or other nonteaching setting, IM—internal medicine physicians, FP—family physicians. Patient eligibility criteria: All—all eligible by appropriate age-sex screening criteria, Sel 1—moderately selected patient population (approximately 25% or less of age-sex eligible patients excluded), Sel 2—highly selected (more than 25% excluded), Sel—selected but unable to quantify. Reasons for exclusion: CPX—only patients seen for a "complete physical" were studied, Reg—only "regular patients" were studied, VIS—only patients seen multiple times were studied. Other exclusions given in quotes.

tematic health maintenance protocol was developed in a private practice setting and tested in over 1400 patients over an 18-month period. The effectiveness, patient acceptance, and office logistics of the systematic health maintenance protocol are reported here.

METHODS

Practice Demographics

The study physician (who was also the investigator) was one of four family physicians whose office was affiliated with a multispecialty, multisite group practice in a mid-sized midwestern city. The patients were predominantly white, lower middle class, and blue collar. The physician encountered the usual range of problems seen in family practice, including surgical assisting but excluding obstetrics, saw between 20 and 25 patients a day in the office, and hospitalized and cared for between 80 to 100 inpatients a year. During the 18-month study reported here, the study physician had over 6200 patient visits. The study physician was residency trained, board certified in family practice, and had 10 years of practice experience at the time of the study. The medical records of all patients for whom the study physician provided primary care were based at the practice site and contained records of any visits to other practice sites within the affiliated medical group.

Until the beginning of the study period, the study physician had followed the guidelines of Frame and Carlson,⁵⁰ but only for patients who scheduled a health maintenance visit. A health maintenance flow sheet was not used prior to the study period, at which time two changes were introduced to the practice simultaneously: (1) introduction of a health maintenance flow sheet modeled after that of Frame,⁵¹ but including a recommendation for periodic sigmoidoscopy (Figure 1), and (2) the systematic offer of health maintenance to all patients, referred to as systematic health maintenance. Systematic health maintenance was offered to established patients, new patients wishing to establish care, and to all others who did not have an identified physician. Excluded were patients who identified another practitioner as their primary physician.

A standardized method was developed empirically over the first several months of the experiment: After dealing with the patient's complaint(s) and before leaving the office, the physician placed a copy of the health maintenance flow sheet in a prominent location in the medical record and reviewed it with the patient to determine whether indicated procedures had been performed, and if so, whether they had been normal. Patients were given a copy of the flow sheet and encouraged to review it as the protocol was performed. Procedure status was recorded

on the health maintenance flow sheet as the protocol was performed, as detailed below. As part of the protocol, the physician offered indicated procedures that had not been done and gave a brief explanation of each. When recommended and accepted, tetanus boosters, cholesterol testing, slides for fecal occult blood, and occasionally breast examinations and Papanicolaou smears were dispensed or performed at this visit (index visit). Most breast examinations, Papanicolaou smears, and all sigmoidoscopies were scheduled at a later date. The appendix contains the systematic health maintenance protocol in its final form.

Approximately 6 months after introduction of the protocol, the study physician used a wristwatch chronometer to record unobtrusively the time taken to perform the protocol at the end of the office visit (98 consecutive performances). Patient age, sex, and time taken were documented immediately after the encounter.

Medical Record Audit

Systematic health maintenance was initiated during September 1987, and its effectiveness was examined for the study period (October 1987 to March 1989) by means of a medical record audit, which was performed in June 1989. This study reports data abstracted from a stratified random sample of medical records (125 of patients aged 20 to 49 years, and 125 of patients aged ≥ 50 years, as of October 1, 1987), which represents 13.4% of the 1862 patients who (1) were ≥ 20 years of age, (2) had records based at the study site, and (3) were seen by the study physician one or more times during the study period. The stratified random sample was obtained from a computerized patient list using a random selection algorithm (Data Desk Professional, Odesta Corporation, Northbrook, Ill). Because of unavailability of 4 records and ineligibility of 1 record (patient never seen by the study physician), results from 245 (98%) of 250 records from this sample are reported.

The sample contained patients of the other three family physicians who practiced at the same location if the study physician had seen one of them when a partner was unavailable or busy. The study physician did not add a health maintenance flow sheet to the medical record of any of these patients, as they were not offered the systematic health maintenance protocol. Results for other physicians' patients, therefore, are reported separately as a "usual care" comparison group. Patients whose medical records did not contain the health maintenance flow sheet were classified as usual care patients only if (1) there was a statement in the medical record that they were followed by another primary physician or (2) the record showed multiple continuing visits to another primary physician. If there was doubt about patient status, results from records without a flow sheet were included in the systematic health maintenance group, not the usual care

ADULT HEALTH MAINTENANCE FLOW SHEET
AGES 18-49 YEARS

DATE / /

AGE	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49			
Blood Pressure	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		
Serum Cholesterol	•				•				•				•				•				•				•					•				•	
Hx of Tobacco Use	•		•										•										•												
Weight	•				•				•				•				•				•				•					•				•	
Td Booster							•										•																		
Fecal Occult Blood																																			
Pap Smear		•	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•
Breast Examination	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•
Eval. Osteoporosis Risk																																			

EDUCATION

Use of Seat Belts	•				•				•				•				•				•				•					•				•	
Self Examination of Skin, Oral Cavity, Testes	•				•				•				•				•				•				•					•				•	
Breast Self Exam.	•				•				•				•				•				•				•					•				•	
Teach to Report Post Menopausal Bleeding																																			

AGES 50-81

DATE / /

AGE	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81			
Blood Pressure	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		
Serum Cholesterol	•				•				•				•				•				•				•					•				•	
Weight	•				•				•				•				•				•				•					•				•	
Td Booster					•											•																			
Fecal Occult Blood	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Pap Smear	•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•		•
Breast Examination	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Mammogram	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	
Eval. Osteoporosis Risk	•				•																														
Sigmoidoscopy	•				•				•				•				•				•				•					•					•

EDUCATION

Use of Seat Belts	•				•				•				•				•				•				•					•				•
Self Examination of Skin, Oral Cavity, Testes	•				•				•				•				•				•				•					•				•
Breast Self Exam.	•				•				•				•				•				•				•					•				•
Teach to Report Post Menopausal Bleeding	•				•				•				•				•				•				•					•				•

Figure 1. Facsimile of the health maintenance flow sheet. Dots indicate recommended screening intervals for specified age groups. Flow sheet is adapted from that of Frame PS: A critical review of adult health maintenance: Part 4. Prevention of metabolic, behavioral and miscellaneous conditions. J Fam Pract 1986; 23:29. Reprinted by permission of Appleton & Lange, Inc.

group. Of the 245 records, 53 (21.6%) were usual care patients (23 men, 30 women). Of the 192 systematic health maintenance eligible patients (93 men, 99 women), the health maintenance flow sheet was utilized in 186 (96.9%). On the basis of the audit findings, it is estimated that the systematic health maintenance protocol was performed for 1413 patients (95% confidence interval 1315 to 1512 patients) during the 18-month study period ($75.9\% \pm 5.3\%$ of the 1862 patients 20 years of age or older seen during the study period).

The following data were abstracted: age, sex, systematic health maintenance eligibility status (not eligible and therefore a usual care patient, eligible and offered the systematic health maintenance protocol, eligible but not offered), insurance status (health maintenance organization [HMO], non-HMO), number of visits to the study physician for the 18-month period before and the 18-month period after introduction of the systematic health maintenance protocol, and the status of all indicated health maintenance procedures (not offered, offered and refused, performed and normal, performed and abnormal, or performed elsewhere). Presence of the health maintenance flow sheet in the medical record indicated that systematic health maintenance had been offered, in which case data were abstracted directly from it. Procedures performed and normal were indicated by a "/", performed but abnormal by an "X", and offered but refused by an "R." The medical record containing a health maintenance flow sheet was fully audited only when the flow sheet was incomplete. It is worthwhile to note that the study physician usually updated the flow sheet with procedures performed before initiation of the systematic health maintenance protocol, which greatly facilitated audit of these records. Medical records without the health maintenance flow sheet were fully audited. For all records an indicated procedure was coded as "not offered" if no relevant information could be found. If a patient had a procedure done for symptoms, that test was eliminated from analysis.

A definition of procedures performed within the appropriate screening interval was devised to allow for some flexibility as follows: (1) done within the 2 years before the audit, or (2) done within 1.5 screening intervals for those procedures with recommended frequency of performance of 2 or more years (eg, within 3 years for a Papanicolaou test, which was recommended every 2 years). Procedures that had been performed, but fell outside these boundaries, were recorded as performed outside the recommended screening interval.

The audit was performed by a nonpractitioner (M.G. B.), and 30 (12%) of 245 records were reaudited by the study physician. Reaudit indicated that audit was correct for 27 (90%) of 30 records, and for 536 (99.3%) of 540 items reviewed. Data entry to a computerized data-

base was also systematically reviewed (12% sample), and no errors were found. The means for age, sex, and insurance status for all patients from the computerized patient list agreed closely with the random sample means, suggesting that the random sample was likely to be representative of the study population.

Statistics

Fisher's exact test and Yates' corrected chi-square were used to analyze categories, and Student's *t* test was used to compare means. Chi-square test of trend was used to analyze visit frequency. Results are considered statistically significant if $P \leq .05$ (two-tailed) unless otherwise stated.

RESULTS

There were no significant differences between the systematic health maintenance and usual care groups for age, sex, insurance status, percentage smokers, percentage overweight, percentage with cholesterol at ≥ 5.20 mmol/L (≥ 200 mg/dL) level, or percentage who were new patients to the practice. As expected, the study physician saw usual care patients much less frequently than patients eligible for systematic health maintenance, both during the study period (3.1 visits for systematic health maintenance patients, 1.2 visits for usual care patients, $P < .01$) and during the 18 months before the study period (2.2 vs 0.2, $P < .01$).

Table 2 presents data comparing the offer and performance of eight health maintenance procedures. For six procedures (tetanus immunization, cholesterol screening, physician breast examination, mammography, test for occult blood, and sigmoidoscopy) performance was highest for the group offered systematic health maintenance (all $P < .001$, Fisher's exact test). For these procedures, performance was lower for the usual care group and for those eligible for systematic health maintenance but not offered it. Papanicolaou smears and blood pressure recordings were comparable for all groups.

Table 3 shows comparable data for seven health maintenance education items. For seven of eight items, performance was significantly higher for the systematic health maintenance group (all $P < .01$, Fisher's exact test). For the eighth item (osteoporosis evaluation) performance was also higher in the systematic health maintenance group but was not statistically significant ($P = .28$).

Although the systematic health maintenance group was offered and completed more health maintenance procedures than the usual care group, these data do not indicate

TABLE 2. OFFER AND PERFORMANCE OF HEALTH MAINTENANCE PROCEDURES

Procedure	Patients Offered Test No. (%)	Patients Having Test Performed, No. (%)
Blood pressure		
SHM* patients	192/192 (100)	192/192 (100)
Usual care patients	53/53 (100)	53/53 (100)
Tetanus immunization		
SHM patients	178/188 (95)	165/188 (88)
Usual care patients	24/53 (45)	24/53 (45)
Cholesterol screening		
SHM patients	186/191 (95)	181/191 (95)
Usual care patients	40/53 (75)	40/53 (75)
MD breast examination		
SHM patients	94/98 (96)	93/98 (95)
Usual care patients	21/31 (68)	21/31 (68)
Papanicolaou smear		
SHM patients	71/73 (97)	66/74 (89)
Usual care patients	19/25 (76)	19/25 (76)
Mammography		
SHM patients	53/54 (98)	42/54 (78)
Usual care patients	3/12 (25)	3/12 (25)
Fecal occult blood test		
SHM patients	99/106 (93)	78/106 (74)
Usual care patients	6/31 (19)	6/31 (19)
Sigmoidoscopy		
SHM patients	87/95 (92)	67/95 (71)
Usual care patients	1/27 (4)	1/27 (4)

*SHM—all patients eligible for systematic health maintenance (includes those who were not offered some procedures).

whether the differences are temporally associated with the introduction of the systematic health maintenance protocol or antedated its introduction. A computer audit of procedure codes used for billing showed significant increases in the rates of delivery for four of six procedures after introduction of the systematic health maintenance protocol ($P < .0001$ for tetanus immunization, cholesterol screening, and mammography, $P < .01$ for fecal occult blood testing). There was a slight increase in the rate for sigmoidoscopy (not statistically significant, $P = .44$), and no change in the rate for Papanicolaou smear testing (Figure 2). Immediate increases in the delivery of tetanus immunizations and cholesterol screening tests were noted after introduction of the systematic health maintenance protocol (2 tetanus immunizations and 11 cholesterol tests delivered the month before introduction, 32 tetanus immunizations and 50 cholesterol tests delivered the month after introduction). The small increases in rates for fecal occult blood testing and sigmoidoscopy can be explained by the study physician's preexisting interest in recommending these procedures.⁴⁰ Computer audit rates reported here are of lesser magnitude than rates reported for the manual medical record audit because the computer could neither distinguish patients eligible for systematic health maintenance nor count procedures that were recorded in the medical record but billed outside the affiliated medical group. Changes in rates from one period to

another, however, are accurately reflected by this computer audit. Comparable data are not available for health maintenance education items because no computerized records exist for them.

Data on patient acceptance of health maintenance procedures are presented in Table 4. Acceptance was strictly defined as the number of patients who completed a procedure divided by the number of patients offered the procedure. Patient acceptance rates for six procedures ranged from a low of 77% for sigmoidoscopy to a high of 97% for cholesterol screening. Increasing number of patient visits to the study physician during the study period was significantly associated with increasing patient acceptance for four of the six procedures (cholesterol screening, $P < .02$; mammography, $P < .01$; fecal occult blood testing, $P < .001$; and sigmoidoscopy, $P < .001$, [chi-square tests of trend]). A nonsignificant trend was noted for Papanicolaou smear testing ($P = .054$), and there was no trend for tetanus immunization ($P = .63$).

Sigmoidoscopy acceptance was 48% for patients seen once during the study period. For new and episodic patients (those not seen in the 18 months before the study period), the acceptance rate was 9 (50%) of 18.

The study physician averaged 364 outpatient encounters per month for the 18-month period before introduction of the systematic health maintenance protocol and 351 encounters per month for an equal period of time after

TABLE 3. OFFER AND PERFORMANCE OF HEALTH MAINTENANCE EDUCATION

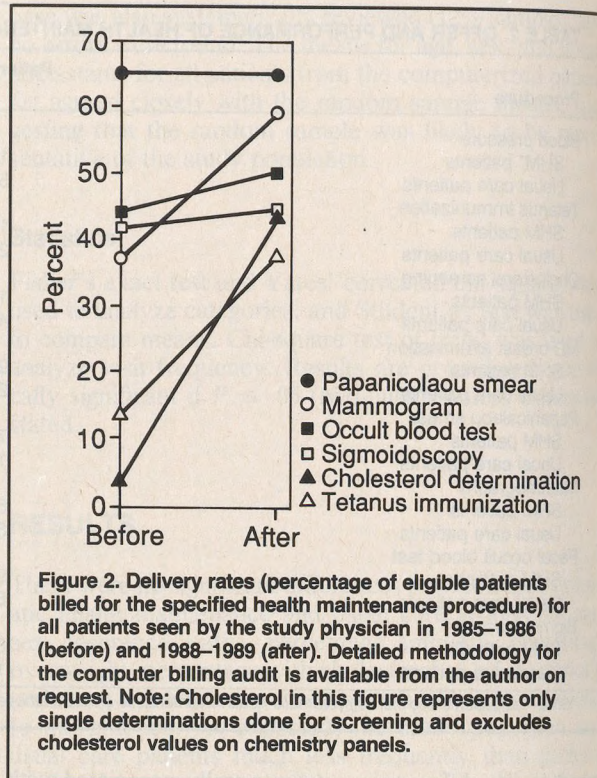
Evaluation	Patients Receiving Education or Item Recorded, No. (%)
History of cigarette use	
SHM* patients	182/192 (95)
Usual care patients	32/53 (60)
Weight	
SHM patients	190/192 (99)
Usual care patients	48/53 (91)
Breast self-examination	
SHM patients	94/98 (96)
Usual care patients	2/31 (6)
Seat belt use	
SHM patients	183/192 (95)
Usual care patients	1/53 (1)
Skin self-examination, etc.	
SHM patients	182/191 (95)
Usual care patients	2/53 (4)
Postmenopausal bleeding	
SHM patients	29/37 (78)
Usual care patients	1/13 (8)
Osteoporosis evaluation	
SHM patients	7/11 (64)
Usual care patients	1/4 (25)

*SHM—all patients eligible for systematic health maintenance (includes those who were not offered some education items).

introduction ($P > 0.5$, by t test). Average time taken to fill out the health maintenance flow sheet at the index visit was 2.1 minutes and never exceeded 4 minutes. With increasing patient age there was an increase in average time taken (1.8 minutes for ages 18 to 39 years, 3.8 minutes for ages 40 to 49 years, and 3.9 minutes for age 50 or more years), which is not surprising, as more procedures are discussed for older age groups. It is important to note that the times recorded here reflect only time for initial evaluation and do not include time taken at a later date to perform some of the procedures (such as sigmoidoscopy) or to deal with the results of screening examinations.

DISCUSSION

Significant increases in preventive activities occurred following the implementation of a policy of systematic health maintenance to all patients in a private practice. Systematic health maintenance resulted in increased prevention when compared with (1) results of previous studies (historical controls, Table 1), (2) previous experience in the study practice (comparison with baseline, Figure 2), and (3) usual care (prior audits from this office showed that the amount of prevention for the usual care patients was comparable to that for the practices from which they were



drawn). Since the study physician did not routinely ask about or record most health education items during the baseline period, increased performance of these items can also be attributed to systematic health maintenance.

The most crucial and important points of this report are (1) a specific protocol was followed for every patient, and (2) the provider developed the habit of incorporating this protocol into routine office care much as he had been trained to incorporate a review of systems into the routine history and physical examination. The results of this report strongly support the hypothesis that health mainte-

TABLE 4. PATIENT ACCEPTANCE OF HEALTH MAINTENANCE PROCEDURES

Procedure	Patients Accepting/Patients Offered*, No. (%)
Tetanus immunization	163/176 (93)
Cholesterol screening	178/183 (97)
Papanicolaou test	65/70 (93)
Mammography screening	42/52 (81)
Fecal occult blood test	77/97 (79)
Sigmoidoscopy	67/87 (77)

*Results are for patients who were offered the systematic health maintenance protocol.

nance activities can be increased to an unprecedented degree when the primary physician has a specific action plan for the provision of selected health maintenance items.

Two important limitations of this study must be emphasized. First, the investigator was the provider. To minimize bias in data collection, therefore, audit was performed by a nonprovider (M.G.B.) who followed predetermined protocols for patient classification and health maintenance procedure recording (as described in Methods). Second, study results from a single practice are reported; therefore, the generalizability of these results to other physicians, to other practice settings, and to other patient populations is uncertain. Further studies of systematic health maintenance in other settings will be required to evaluate general effectiveness. Such studies are necessary and important.

Sigmoidoscopy results raise a relevant question, namely: What proportion of unselected patients who are new to the practice will accept sigmoidoscopy? The data from this study indicate an acceptance rate of 50% for new patients, but the numbers on which this estimate is based are too small to form valid conclusions. Further study of a larger sample over a longer period of time will be necessary to provide stable estimates for acceptance rates of sigmoidoscopy for this class of patients.

In this study no patient refused to participate in the systematic health maintenance discussion. Many patients seemed pleased to have health maintenance offered, although they had not brought up the subject themselves. The overall impression was that the time spent discussing health topics was a positive experience for both patient and physician. The discussion communicated the physician's willingness to deal with ongoing health maintenance and was a signal to the patient that he or she was welcome back for ongoing care. Although no quantitative information is available to support this impression, the study physician feels that patients who otherwise would have remained unattached now identify the physician as their physician based on the time spent in performing the systematic health maintenance protocol.

Lack of continuity of care has been cited as a major barrier to the delivery of preventive services.^{14,44} There is evidence that episodic or infrequent care-seekers receive less prevention,^{16,41} and that these patients are often eliminated from consideration when audits of preventive performance was undertaken (Table 1). Systematic health maintenance includes all patients, and evidence from this study suggests that many patients seen infrequently will also accept preventive procedures. The offer of preventive health services indicates physician interest in assuming responsibility for ongoing primary patient care for this group of new or episodic patients. Therefore, physician-initiated systematic health maintenance may lead to en-

hanced continuity of care. In addition, for those physicians establishing a new practice, systematic health maintenance may be a good practice builder.

Disorganized medical records have been cited as one barrier to performing adequate preventive medicine.^{44,46,47} It became evident during the audit for this study that one benefit of systematic health maintenance was the ease of data retrieval from medical records. When the health maintenance flow sheet was present, the auditor could tell at a glance whether recommended procedures had been documented. Otherwise, this information was often hard to find, or in many cases, not found. In cases where information was not found, it was impossible to determine whether recommended procedures had been offered and refused, not offered, or done elsewhere and not recorded. Since a careful chart review was unable to determine the screening status of those patients, it is likely that a treating physician (during a brief office visit) would be at a disadvantage when trying to determine health maintenance status. Previous studies have found that a flow sheet was helpful^{17,30} but not necessary²⁰ in improving preventive performance. It is noteworthy, however, that in the latter study the greatest individual increase in performance of health maintenance was associated with the greatest increase in utilization of the flow sheet. A flow sheet was essential for adequate performance of systematic health maintenance in this practice. A key point, however, is not that a flow sheet is present on the medical record, but how it is used. Flow sheets are often used only when patients are seen for complete physical examinations. It is important, therefore, to emphasize that the presence of a health maintenance flow sheet on a medical record is not synonymous with the practice of systematic health maintenance.

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APPENDIX

Systematic Health Maintenance Protocol

For patients scheduling a health maintenance visit, the protocol was introduced during the initial history, preceding any physical examination. For the majority of patients, however, the protocol was introduced at the end of the index visit.

Introduction

"Before you leave, I'd like to review a brief list of health tests that are recommended for all adults to see whether you are up to date." (Hand a copy of the flow sheet to the patient.)

Blood Pressure (always recorded by a nurse as systematic clinic policy)

"Your blood pressure is (normal, abnormal)." (Discussion if abnormal.)

Weight (sometimes recorded by nurse)

(Recorded, but not mentioned unless judged to be overweight by visual inspection, with discussion if abnormal.)

Smoking

"Do you smoke?" (If yes) "How much?" "I'd like you to think about quitting."

Cholesterol

"Do you know what cholesterol is and why it is important?"

(If yes) "Do you know what your level is?" (If yes) "I'd recommend that you have a blood sample taken before you leave to check it."

(If no) "Cholesterol is a fat in the blood. Everyone has some, but some people have a very high level, which can increase their chances of getting heart disease when they're older. I recommend that you have a blood sample taken today to find out what your level is. If it's too high, it can be treated to lower it, usually with diet."

Tetanus Booster

"Have you had a tetanus booster within the last 10 years?" (If no) "I recommend a booster every 10 years. I suggest we give you a booster today unless you're allergic."

Papanicolaou Smear and Breast Examination

"Have you had a Pap smear or breast examination within the last 2 years?" (If no) "I'd recommend you schedule an exam soon."

Mammography

"I recommend yearly mammography for women over 50 years old to detect small breast cancers that can't be felt. Would you be interested in having a mammogram scheduled?" (Discussion of American Cancer Society guidelines if indicated by patient response.)

Fecal Occult Blood

"Have you ever seen this before?" (Show the stool sample kit to the patient.) (If no) "This is a test to detect hidden blood in the bowels, which is a screening test for colon cancer. I'd like to give these to you to take home. You're supposed to place a thin smear of bowel movement on these squares according to the directions here. There

are three cards for three separate movements, and all the instructions are in the envelope. You can mail it back to us at your convenience." (Further explanation about stool sampling techniques by nurse.)

Sigmoidoscopy

"Another test for colon cancer is called sigmoidoscopy. Have you ever heard of it?" (If no) "Sigmoidoscopy is a test to look directly at the lower bowel by inserting a flexible rubber tube with a light on the end of it to look for polyps and cancer." (Point out details on a wall poster present in each office.) "For some reason, the fecal occult blood test can miss almost 50% of cancer in this region. I recommend sigmoidoscopy about once every 5 years, and I do it right here in the office. It requires an enema beforehand and takes less than a half hour. You may schedule one at your convenience at the front desk. Would you like more information about the test?" (If yes, nurse provides verbal information, a written handout, and enema kit.)

Seat Belt Use

"Do you always put on a seat belt when you get in a car?" (If no) "It's a good practice to prevent injuries."

Self-examination

"Be sure to check your mouth and skin for sores that don't heal (and your testicles for lumps) once a month. If you find any, let me check them right away."

Breast Self-examination

"Do you check your breasts for lumps once a month?" (If no) "It's a good idea to do that." (Individual and written instructions were provided during visits for a Papanicolaou smear and breast examination.)

Osteoporosis Evaluation

(Risk factors, exercise, and calcium and possible hormone replacement were discussed at the time of the Papanicolaou smear and breast examination. Handout provided.)

Commentary

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The above paper¹ is a very interesting report of how much preventive services can be accomplished by one physician in a private practice setting. The authors have been careful to develop a strong assessment of the effects the implementation of a systematic health maintenance protocol has had on the care provided by one physician in a four-man private group practice. Although largely a descriptive study, and one that may be difficult to replicate, it is an excellent example of what one family physician can do.

In addition to the laudable accomplishments in offering and performing targeted preventive maneuvers, the paper has several other noteworthy features: first, it summarizes well most other previously reported studies on performance of health maintenance procedures in primary care; second, the authors advocate integration of preventive maneuvers into all visits, whether for well or sickness care. Furthermore, although this application of the periodic health examination was advocated by the Canadian Task Force² as early as 1979, this paper is one

of the most convincing examples that this strategy can work.

The chief deficiency of this report is that only one highly committed physician's practice is studied. Although data are drawn from nearly 1500 patients seen in a practice over an 18-month study period, the unit of analysis here is most appropriately the physician; hence, the sample has a size of only a single individual. Although the physician was careful in having a second investigator conduct the chart audits, it is difficult to assess the degree of preventive activities that would normally occur in the practice without the intervention of the "systematic health maintenance protocol." The author cleverly used "a usual care" group to compare the effectiveness of the protocol, keeping all other factors supposedly equal. Although the demographics of the intervention group and the usual care group are similar, and the same physician provided care to both groups, there is always the potential of provider bias where, perhaps even subconsciously, the provider may have held back offering preventive services to the "usual care group" that would normally have been offered even without the health maintenance flow sheet.

Patients offered health maintenance usually accept it, although it is often difficult—and perhaps moot—to determine whether it is the provider or patient who first "offers" the opportunity for health maintenance procedures. Certainly we have all had patients who in the course of their visit may, oftentimes tangentially to their chief reason for the encounter, request a cholesterol check or a mammogram. Accordingly, in this study it is difficult to ascertain who may have brought up the subject of health maintenance procedures, and whether this phenomenon was solely responsible for those services actually delivered in the usual care group.

The chart audit may also have been subject to reporting bias, as those in the group eligible for systematic health maintenance had more complete records to document offering and acceptance of preventive services than did the charts of the usual care group. In part this was because the physician updated flow sheets to reflect more completely prior preventive services only in the systematic health maintenance group—which may have counted toward compliance in the study—while in the usual care group such prior services may have been documented in a variety of difficult-to-access areas in the record or may have been performed but were not documented. This bias would tend to lead to an overestimation of how effective the protocol was.

Nevertheless, it is unlikely that these biases are severe enough to detract from the conclusions that preventive services can be offered to, accepted by, and delivered to virtually everyone in an individual physician's practice. This success is likely to be the result of having a systematic method (an office protocol) of defining which services

to offer and when, a physician cuing system (such as a flow sheet) that reminds the physician to offer relevant services, and a single, prominent place in the medical record to organize and document which services have been offered, accepted, and delivered. Hahn and Berger's system is probably one of the most cost-effective methods of performing a systematized periodic health protocol in a practice setting because this system required no additional personnel or computer support, did not detract from other office management, and with only 1 to 4 minutes per encounter, added no expense.

A much tighter research design would have included a preintervention and postintervention audit of several different physicians in various practices, perhaps randomized to using the systematic health maintenance protocol. Solomon's four-group crossover design would have been superior in looking at changes in preventive services performed with and without the protocol. Nevertheless, within the limits of the setting and the descriptive design reported here, these authors did a marvelous job of dealing with the data they had.

There are some other important points that undoubtedly lead to the excellent results. Consideration of these points will be essential for the many other family physicians who will want to attempt to replicate this system. One must have a protocol upon which to base routine recommendations; most office encounters are predominantly curative in nature, and the sense of urgency for treatment can interfere with the consideration of offering preventive services. Hence, routinization of the offering and documentation of health maintenance recommendations is essential. Perhaps unified preventive protocols across primary care specialties may drive service reimbursement in favor of providing the services. These points need further elaboration.

First, it is crucial that the physician come to grips with the confusing myriad of recommendations and timing intervals for periodic examinations. Although not well documented, one of the hindrances to physicians offering preventive services more often is the confusion faced in reconciling in their own minds and practices the many different recommendations from so many sources: Frame and Carlson, Breslow and Sommers, American Cancer Society, American Heart Association, American College of Obstetricians and Gynecologists, the Canadian Task Force, and now the US Preventive Services Task Force. This author based much of his protocol on that recommended by Paul Frame,³ with some modifications of the American Cancer Society. Whatever the protocol used—one pulled from the shelf and adopted unchanged from other agencies, or one adapted from a variety of sources to fit the special needs of a practice population and community—the important features are that the protocol

makes sense to the physician and is one that can be comfortably defended and remembered in daily practice.

The report of the US Preventive Services Task Force (USPSTF)⁴ *Guide to Clinical Preventive Services*, published in 1989, is rapidly gaining acceptance in primary care. Its acceptance and the following factors will likely facilitate its adoption as the new standard for preventive care services. First, the recommendations have been developed through a rigorous process with strict epidemiologic methods; second, these health maintenance recommendations are the first espoused by the federal government, and although based on the most up-to-date information, they are likely to carry more authority by virtue of their being promulgated by a federal agency (Office of Health Promotion and Disease Prevention of the Public Health Service); third, the federal government is interested in the widespread dissemination and adoption of these recommendations, so much so that extensive marketing of the recommendations is planned in conjunction with release of the Public Health Service *Healthy People, Objectives for the Nation, Year 2000* to be officially unveiled in September 1990; and fourth, as federal recommendations, they are likely to influence changes in Medicare (and then subsequently Medicaid) levels for reimbursement of preventive health maneuvers. This action will in turn strongly influence other third-party insurers to better reimburse preventive services, especially those that follow the USPSTF guidelines.

The authors of this study did not have available the USPSTF recommendations when their work was conducted. If they had, they would have faced another challenge, as we all do now. The USPSTF guidelines do not easily fit into a flow sheet as stylized by Frame and others, and as used in this study. In many instances the interval between repeating a preventive service is left to the discretion of the clinician and, more appropriately, should be set by the natural history (in the clinician's practice community) of the disease being prevented. Such customization calls the physician to consider perhaps two less familiar activities, monitoring the changing epidemiology of illnesses in his or her practice, and assessing the risk status of the individual for future disease. At first these challenges from the USPSTF seem overwhelming to busy providers, but in simplest terms they ask clinicians to reevaluate the etiology of and risk factors for preventable illnesses within the context of their practices. From this review and in conjunction with the guidelines from an authority such as the USPSTF, one can develop a specific health maintenance protocol that makes the best sense for the unique characteristics of an individual's practice. This protocol can then be summarized into a flow sheet, or

even a computer algorithm for those practices so equipped, that can form the basis for the systematized health maintenance program described in this paper.

Family physicians recognize the difficulty of thinking through a complicated algorithm of the many preventive recommendations and strategies for a person in one room, when in another room is a crying toddler with painful acute otitis media, and in still another room is an elderly person with chest pain. It is during these frequent times of balancing conflict between providing preventive, wellness, health maintenance care, and curative, therapeutic, often semi-emergent care that decisions and recommendations for curative maneuvers will predominate unless attention to preventive services becomes as automatic as is possible. This is not to minimize the importance of obtaining a preventive history and establishing the special risk status of patients who may require maneuvers additional to those offered for all patients, but it does ensure that a minimum set of recommendations be provided to help prevent at least certain specific conditions targeted for all patients.

All considered, the preceding paper is important, for it not only documents what one committed family physician in private practice can do, but challenges the rest of us to realize that there is little excuse for preventive services not being offered and provided more often and more completely than the current usual standard of care. Needed are determination, a systematic approach based on some protocol, and an aid, such as a flow sheet, to document service offered and delivered in such a way as to facilitate office flow and become routine for every single patient encounter.

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