

Health Promotion and Screening Services Reported by Older Adult Patients of Urban Primary Care Physicians

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BACKGROUND. Adult preventive services provided at intervals recommended by expert panel guidelines may reduce morbidity and mortality. As part of an intervention trial to increase primary preventive services in urban primary care practices, baseline data were collected on primary prevention and screening test rates in older adults and on patient characteristics associated with provision of these services.

METHODS. A questionnaire on preventive services offered or provided over the past 2 years was completed by patients aged 52 to 77 years and another by their 42 participating physicians. Logistic regression was used to identify patient characteristics associated with increased provision of these services.

RESULTS. Usable questionnaires were completed by 1457 (80.9%) patients. Patient age and sex were not associated with the provision of primary preventive and counseling services. The presence of two or more chronic diseases was predictive of primary preventive services ($P < .02$), but was not associated with an increase in screening tests or procedures. Age was positively associated with delivery of prostate-specific antigen blood tests ($P < .001$) and rectal examinations ($P < .001$) in men, but was negatively associated with mammography ($P < .001$) and Papanicolaou (Pap) tests ($P = .02$) in women. The negative trend in screening mammography was evident even for women aged 50 to 65 years despite the national consensus regarding the benefits of screening for this age group. Patients with health management organization insurance reported significantly more mammography ($P = .002$), cervical Pap tests ($P = .050$), sigmoidoscopies ($P = .002$), and fecal occult blood tests ($P = .035$).

CONCLUSIONS. In our study patients, the provision of primary preventive and screening services was closer to consensus guidelines than is typically reported in the literature. The data suggest that future investigations and interventions to improve primary prevention and screening services in older adults who have access to primary care do not need to be directed at fundamental changes in the way preventive services are delivered, but rather should target procedures of proven benefit, such as mammography, where rates remain below recommended guidelines.

KEY WORDS. Preventive health services; quality of health care; primary prevention. (*J Fam Pract* 1997; 45:142-150)

Based on increasing knowledge about the causes of common serious diseases in adults and on evidence from studies that suggests that early or preclinical detection of some diseases, eg, certain cancers, can result in lower morbidity and mortality, greater emphasis is being placed on providing health promotion and disease prevention services.

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Guidelines for preventive services by expert panels have come from a number of sources, including the American Cancer Society, the US Preventive Services Task Force, the Canadian Task Force on the Periodic Health Examination, and Frame,¹⁻⁴ but there is a general perception from published data that primary preventive and screening services are provided at frequencies lower than those suggested by the guidelines.⁵⁻⁷ Investigations of various designs have suggested that opportunities for health promotion and disease prevention are regularly missed by primary care physicians.⁸⁻¹⁰ Reasons for these missed opportunities are numerous. Barriers to the

provision of primary preventive and screening services have been extensively studied, and include physician and patient determinants, office system and structural issues, and broader concerns such as access to health care.¹¹⁻²¹

Selecting assessment methods for measuring the provision of preventive services is challenging for several reasons. Previous studies have used physician and patient self-reports from either questionnaires or telephone surveys, and abstraction of billing or medical record data. Unfortunately, each commonly used method has some liabilities. For example, questionnaire assessments by physicians and patients provide only estimates, perhaps reflective more of interest and personal standards of what should be done than of what is being done, whereas audits of medical records may underestimate the provision of services provided but not documented.¹¹ Billing and medical record data are more likely to capture screening tests and procedures performed, but are less useful for documenting primary preventive services or tests offered but not completed.²²⁻²⁷ On the basis of these studies and our own data on the comparative accuracy of several of these methods, we selected patient and physician questionnaires for the current study to permit assessment of the provision of both primary preventive and screening tests.²²⁻²⁷

Because preventable diseases are more prevalent in adults over age 50 years and there is more congruence among expert panel guidelines for this population, we designed an intervention study to improve the delivery of preventive services to adult patients aged 50 to 75 years provided by urban primary care physicians. This paper describes the health promotion and screening services offered or provided to 1457 older adult patients over the preceding 2 years as reported by the patients.

METHODS

We sought the participation of primary care physicians associated with urban hospitals in the upper Midwest and their older adult patients. Since the target of our intervention was hospital primary care departments, inclusion in the study required that eligibility requirements be met at the hospital, physician, and patient levels. For the hospital to be eligible, a minimum of two consenting primary care physicians was required, each of whom completed a

physician questionnaire and from whose practices five or more usable patient questionnaires were obtained. Eligibility criteria for patients included age 52 to 77 years, as identified by their date of birth, and enrollment for 2 or more years in the practice of the participating primary care physician.

Hospital recruitment took place between January 1, 1994, and February 1, 1995. After a presentation at a clinical department meeting, eligible physicians were asked to participate in the study and to complete and return the physician questionnaire. An office nurse was then identified by each consenting physician as the contact person for training in subject eligibility and procedures for distribution of patient questionnaires. Under a protocol approved by the University of Wisconsin Committee for the Protection of Human Subjects, and following written informed consent by individual physicians, patient recruitment procedures consistent with the study protocol were developed for each office. Office staff were trained to screen for study eligibility a consecutive series of older adults scheduled for a clinic appointment.

On arrival at the clinic, eligible patients were asked to participate in the study and to complete a study questionnaire. Completed questionnaires were placed in a box located in the clinic waiting room area and retrieved at regular intervals by a member of the study team. As a means of quality control, the study team used patient responses to questions on age and duration in the practice to confirm patient eligibility for inclusion in the study. Data collection was accomplished between August 1, 1994, and May 1, 1995.

Physician Questionnaire. The physician questionnaire was designed for family physicians, internal medicine specialists, and other physicians who might be credentialed and be representative of physicians in departments of medicine, family medicine, or general internal medicine in the study hospitals. The 26-item questionnaire, modeled after an instrument previously developed by the investigators, included demographic questions and took approximately 10 minutes to complete.

Patient Questionnaire. Patient questionnaires were developed to query adult patients aged 52 to 77 years regarding specific health promotion, counseling, and preventive screening services recommended for this age group by expert panel guidelines. The questionnaire, with 126 items for women and 84

items for men, sought demographic data including age, sex, insurance status, self-rating of overall health, presence of chronic diseases, and family history of preventable diseases, as well as information regarding other available sources of preventive health services within the community. In addition, patients were asked what health promotion and screening services were offered or provided within the past 2 years and where these services were provided. This instrument, prepared in both English and Spanish versions (the primary language for all study participants), took approximately 25 minutes to complete. Readability was at the 6th grade level, and the questionnaire had been extensively piloted in a previous study.²⁸

STATISTICAL ANALYSIS

For each patient, an overall primary prevention score was computed based on the number of primary prevention activities the patient reported receiving from the physician or clinic in the past 2 years. The six types of primary preventive services included were: (1) asking about smoking status; (2) asking about family history of heart disease; (3) discussion of a healthy diet; (4) discussion of the importance of regular exercise; (5) recommendation of a regular periodic health examination; and (6) recommendation of a flu shot. We selected representative prevention activities to construct a scale score that (1) would identify patients receiving more or fewer primary care services and (2) would not be skewed by a few respondents who reported none or all of the prevention activities. Logistic regression analysis was used to identify patient characteristics associated with this primary prevention score.

For analysis of secondary prevention measures, patients were asked whether their physician offered or performed the following cancer screening tests during the past 2 years: mammography, clinical breast examinations, cervical Pap tests, prostate specific antigen (PSA) blood tests, digital rectal prostate examinations, sigmoidoscopy, and fecal occult blood screening tests. Responses were considered individually using logistic regression to identify patient characteristics associated with provision of each of these services. All the analyses were performed using PROC LOGISTIC (SAS Institute, Cary, NC).²⁹

RESULTS

STUDY SAMPLES

Of 102 urban hospital primary care departments (internal medicine and family practice) contacted in Wisconsin and Illinois regarding their interest in participation in the study, 21 scheduled study recruitment presentations by the investigators. Of these, 11 hospitals were recruited and ultimately eligible.

Physicians. Of 46 consenting physicians at these institutions, 42 were eligible for study participation; absence of completed physician questionnaires ($n=2$), and participation of fewer than five eligible patients ($n=2$) accounted for the four ineligible physicians. Consecutive patients presenting for appointments at each eligible physician's clinic site between August 1, 1994, and May 1, 1995, were screened for eligibility, and 1800 patients were given questionnaires; 1457 (80.9%) of the returned questionnaires provided usable information and demographic data that confirmed eligibility for inclusion in the study. The four major reasons for ineligibility included patient uncertainty about numbers of years enrolled in the practice ($n=110$), the patient admitting to be enrolled in the practice for less than 2 years ($n=94$), patient age greater than 77 years at the time of questionnaire distribution ($n=88$), and patient age less than 52 years at the time of questionnaire distribution ($n=28$). This report is thus for 1457 patients of 42 physicians associated with 11 hospitals.

Study physicians had been in their office practices a mean of 13 years (range 3 to 50 years), were primarily family or general practice physicians (61%), general internists (34%), or other (one osteopathic physician and one general internist with some subspecialty training), predominantly male (78%), with a mean age of 45 years (range 32 to 76 years); 95% were white. All study physicians were board eligible or board certified. Twenty-nine percent described their patient workload as heavy; an additional 10% described their work load as very heavy.

Patients. The 1457 patients were mostly female (59%), white (87%), had completed a high school education or more (78%), and had an annual household income of \$40,000 or less (75%). Ninety-eight percent of the patients reported having some form of medical insurance, with 51% identifying their insurance type as Medicare and 20% reporting coverage through an HMO. Of those patients reporting

TABLE 1

Demographic Characteristics of Study Patients (N=1457)

Characteristics	Variable
Age, y	
Median	66
Range	52-77
Sex, (n) %	
Male	(596) 41
Female	(861) 59
Race, %	
White	87
African-American	10
Other	3
Duration of care with this clinic/physician (y)	
Range	2-60
Median	8
Smokers, %	
Yes	16
No	84
Education, %	
Primary school	7
Some high school	15
High school graduate	33
Some higher education	29
College graduate	16
Health insurance, %	
None	2
Private	27
Employer paid	36
Medicaid	10
Medicare	51
HMO	20
Total annual household income, %	
Don't know	5
<\$10,000	12
\$10,000 - \$20,000	25
\$20,001 - \$30,000	19
\$30,001 - \$40,000	14
\$40,001 - \$50,000	10
\$50,001 - \$60,000	5
>\$60,000	10
Medical conditions reported by patients, %	
Hypertension	60
Arthritis	52
High cholesterol	46
Heart disease	24
Diabetes	20

Medicare insurance coverage, 678 (94.4%) were aged 65 years or older. The demographic characteristics and medical conditions reported by the patient sample are shown in Table 1.

PATIENT REPORTS OF PRIMARY PREVENTIVE SERVICES AND SCREENING TESTS

A majority of the 1457 respondents reported receiving many recommended primary preventive services and general health counseling during the past 2 years, although discussions of alcohol and seat belt use were reported infrequently by most patients (Table 2). Of the 215 respondents who reported being smokers, 93% reported that their physician had discussed the health risk of smoking, and 89% reported that within the past 2 years their physician had recommended that they quit. An additional 66% reported that they had been counseled on smoking cessation, and 36% reported referral to a smoking cessation program. For recommended screening tests and procedures, rates of reported performance ranged from a low of 51% for sigmoidoscopy to a

TABLE 2

Patient-Reported Primary Prevention and General Health Promotion Counseling

Physician Activity	Patient Report of Activity in Last 2 Years, %
Asked about smoking status	68
Recommended regular checkup examination	79
Asked about family history of heart disease, age <60 y	56
Discussed eating a healthy diet	72
Asked about regular exercise	73
Recommended flu shot	67
Discussed and asked about alcohol use	15
Advised seat belt use	17
Asked about family history of colon cancer	46
Asked about family history of breast cancer	53
Discussed screening for colon cancer	36
With patients who smoke (n=215)	
Discussed health risks	93
Advised cessation	89
Counseled on cessation	66
Referred to cessation program	36

TABLE 3

Patient Report of Screening Test Rates, by Sex and Age Group

Screening Test	All Ages (N = 1457)	Age (y), %						P Value
		50-54 (n=121)	55-59 (n = 232)	60-64 (n=254)	65-69 (n= 326)	70-74 (n=341)	75-79 (n= 183)	
Women								
Mammogram	78	85	84	81	78	75	68	<.001*
Clinical breast examination	84	81	86	87	82	83	86	.991
Papanicolaou test	71	69	80	78	71	65	66	.02*
Men								
Prostate-specific antigen test	67	37	54	71	66	82	70	<.001†
Digital rectal prostate examination	74	59	68	69	70	90	82	<.001†
Both sexes								
Sigmoidoscopy	51	33	43	46	54	63	61	<.001†
Fecal occult blood test	69	62	66	63	70	76	75	.002†

*P value is significant for negative linear association between age and patient reports of provision of screening test.

†P value is significant for positive linear association between age and patient reports of provision of screening test.

high of 84% for clinical breast examinations (Table 3). Of interest, no procedure was reported to have been performed or offered to fewer than 50% of the respondents within the past 2 years, whether the test was recommended annually (eg, mammogram) by expert panel guidelines or at less frequent or unspecified intervals (eg, sigmoidoscopy).

PREDICTORS OF RECEIVING PREVENTIVE SERVICES

While patient age and sex were not associated with provision of six primary preventive services, patient reports of presence of any of two or more chronic diseases was associated with provision of these services ($P < .02$). Age was significantly associated with the likelihood of receiving screening tests and procedures. Moreover, when patients were clustered into 5-year age intervals, significant linear associations between age, sex, and rates of providing screening tests were evident. Increasing age was

associated with an increasing likelihood of having been offered or provided sigmoidoscopy ($P < .001$) and fecal occult blood tests ($P = .002$), with both of these tests significantly more likely to have been provided to patients aged 70 to 75 years than during any prior 5-year age interval of study patients. With advancing age, older men in the study also received more screening tests for prostate cancer, with men between the ages of 70 and 75 years more likely to have been offered or provided digital rectal examinations and PSA blood tests than men in other 5-year age clusters ($P < .001$). Conversely, increasing age in women was associated with decreased likelihood of having received most screening tests, particularly mammograms ($P < .001$) and Pap tests ($P = .02$) (Table 3).

Of patients completing the survey, 10% reported having a primary relative with colorectal cancer, and of the women in the study, 8% reported that a mother or sister had developed breast cancer while under

the age of 50. Patients reporting a positive family history were no more likely to report receiving preventive or screening services than lower risk patients, with the exception that patients reporting a family history of colorectal cancer also reported more sigmoidoscopies and primary preventive services (Table 4).

Insurance type was another factor significantly associated with provision of screening tests and procedures (Table 5). There was a trend toward uninsured patients receiving fewer screening tests and procedures than those with insurance; however, only fecal occult blood testing was statistically less likely to have been provided to uninsured than insured patients ($P=.017$). Patients with Medicaid insurance were next most likely to receive significantly fewer services, most notably mammography ($P=.038$) and clinical breast examinations ($P=.005$). HMO insurance was the insurance type most strongly associated with increased provision of screening services. Significantly more mammograms ($P=.002$), cervical Pap tests ($P=.050$), sigmoidoscopies ($P=.002$), and fecal occult blood tests ($P=.035$) were reported by patients with this type of insurance.

Provision of the recommended screening tests and procedures was not associated with the age or

specialty of the physician, with the exception that patients seeing a family physician reported significantly more cervical Pap tests than those seeing an internist ($P < .001$). There were significant differences in patient reports of screening based on the sex of the physician, with patients of female physicians reporting significantly higher rates of mammography ($P=.03$), clinical breast examinations ($P < .01$), and cervical Pap tests ($P < .01$).

DISCUSSION

Two broad issues are critical to a useful interpretation of data reported on health promotion services. The first concerns the way in which the study population was developed, and the second concerns the manner of obtaining data.

The patients studied here were selected, ie, hospital administrations and primary care departments had to express interest, physicians had to express interest and willingness to have their patients given questionnaires, and available, willing, and interested patients had to consent and complete the questionnaire. Clearly, in multiple ways, the samples reported here were selected, which may have influenced the results.

There may be, however, essentially two kinds of selection. First, the patient sample is not a population-based sample but a sample of patients continuously enrolled for at least 2 years with a particular primary care physician. Second, the sample is not a random sample of older adult patients seeing random primary care physicians, but rather a consecutive series of consenting, literate, interested patients of consenting physicians who are likely interested in health promotion. This second kind of selection bias is the usual focus of concern with studies such as the one reported here. While clearly this second selection bias may be present and important in influencing

TABLE 4

Patient Characteristics Associated with Increased Provision of Preventive Care

Preventive Care	Associated Characteristics
Primary preventive services*	Patient self-rating of general health (worsening), family history of colon cancer, presence of 2 or more chronic diseases
Mammography†	Increasing age (negative association), HMO member, higher income, nonsmoker
Clinical breast examination†	Higher income, nonsmoker
Papanicolaou test†	Patient self-rating of weight (greater), nonsmoker, fewer than 2 chronic diseases
Prostate-specific antigen test†	Increasing age, duration of care at clinic
Digital rectal prostate examination†	Increasing age, higher level of education
Sigmoidoscopy†	Increasing age, sex (male), HMO member, family history of colon cancer
Fecal occult blood test†	Increasing age, insurance (any)

*Primary preventive services included the following: (1) asking about smoking status; (2) asking about family history of heart disease; (3) discussion of a healthy diet; (4) discussion of the importance of regular exercise; (5) recommendation of a regular periodic health examination; and (6) recommendation of a flu shot.

†Cancer screening preventive measures.

the results, it is difficult to describe characteristics of the studied population that specifically show it to be markedly unrepresentative of populations with regular primary care providers. Demographically, our patient population is similar to that reported in the National Ambulatory Medical Care Survey³⁰ and Behavioral Risk Factor Survey.³¹

It is important to note several characteristics of our physician and patient population. Our physician mean age, sex distribution, and race are consistent with those described in other studies of primary care physicians in the upper Midwest.³⁰ Urban patients in our study were predominately white, with a female-to-male ratio consistent with other reported studies but with significantly more access to health care insurance (98%).^{9,13} The existence of available insurance is likely due to selection factors, since we chose to study patients who had a primary care physician and who had been a patient of the practice for a minimum of 2 years. Thus, while these findings may not be generalizable to all urban patients, many of whom may not have access to a primary care physician or who may lack adequate insurance, they may be representative of findings for insured urban patients who have a regular physician.

Another potential limitation of this study is

reliance on patient self-reports of prevention activities offered or provided during the preceding 2 years. While the medical record is often cited as the gold standard source for assessing quality of care, we and others have examined the validity of the medical record compared with patient reports. The medical record provides less documentation of primary prevention activities and physicians' recommendations for screening tests and procedures than patient reports provide. Furthermore, patient self-reports have acceptable validity for tests and procedures, and they document primary prevention activities at rates similar to physician self-reports of these activities. The precise wording of questions is an important variable and was tested in the extensive piloting of the study instrument.

We and others have examined the accuracy of patient recall of screening tests and procedures over longer periods, and have not found that longer time frames for recall are associated with overestimates by patients of receipt of particular prevention procedures.²³ One additional advantage of patient self-reports is the opportunity to obtain information regarding prevention activities offered or provided outside the purview of the primary physician's office practice. Here again, for examination of primary pre-

TABLE 5

Screening Rates by Insurance Status

Screening Test	Overall, % (N=1457)	Insurance, %					HMO (n=281)
		None (n=31)	Private (n=380)	Employer (n=501)	Medicaid (n=143)	Medicare (n=718)	
Women							
Mammogram	78	74	76	83	67*	73	89†
Clinical breast examination	84	78	83	89+	72*	83	86
Papanicolaou test	71	63	67	73	64	68	79†
Men							
Prostate-specific antigen test	67	20	77	62	64	75	63
Digital rectal prostate examination	74	43	73	73	68	83	75
Both sexes							
Sigmoidoscopy	51	32	52	48	50	60	60†
Fecal occult blood test	69	37*	67	66	71	72	74†

*Screening test rate significantly lower ($P<.05$) than overall rate, after adjusting for age and sex.

†Screening test rate significantly higher ($P<.05$) than overall rate, after adjusting for age and sex.

vention and screening test activities in primary care practice, patient self-reports may portray a more comprehensive picture of preventive services offered or provided than reliance on the medical record.

Despite these limitations, several findings of this study are noteworthy. First, patients with two or more chronic diseases were significantly more likely to receive primary preventive services. These patients were no more likely, however, to receive screening tests and procedures than patients not reporting chronic disease. This finding, while counterintuitive, has been reported by us in a previous study.²⁸ Also, existence of a positive family history of known preventable diseases did not predict greater provision of preventive services with the exception of a family history of colorectal cancer. A significant predictor of the provision of preventive screening services was HMO-type insurance, which held true for four screening procedures. Of note, Medicare insurance was not a significant predictor of increased or decreased provision of preventive health services, despite a substantial portion of our study population being Medicare eligible and Medicare insured.

Another possibly noteworthy finding of this study is the significant influence of age on the likelihood of receiving screening tests and procedures. Although mammography is considered beneficial by most expert panels in patients over the age of 50, advancing age was *inversely* related to the provision of mammography services to our study patients. A partial explanation for this finding may be that some authors recommend discontinuing screening for patients older than 65 years; the trend in our study patients, however, is established before this cutoff (Table 3). A significant negative trend was also noted for performance of Pap tests but not for clinical breast examinations.

On the other hand, male patients were significantly more likely to receive both digital rectal examinations and PSA blood tests with advancing age, despite significant discordance among expert panels regarding the merits of these two screening procedures. The steady increase with age in reported provision of these tests in male patients might be explained on the basis of case finding, or by physician response to patient-reported symptoms suggesting prostate disease. In female patients, however, this reasoning would not explain the diminished

frequency of mammography testing with advancing age. Although our questionnaire asked about tests offered or provided by our study physicians, we did not probe, nor could we expect patients to be aware of, the clinical reasons for the tests being offered or provided. The rate of PSA blood tests and digital prostate examinations in all age groups is in conflict with current recommendations about the appropriate use of these screening examinations and may indicate the need for future research to clarify the reasons for their use.

The most noteworthy findings in this study may be those suggesting that high levels of health promotion and screening services are offered and provided to regular older-adult patients in primary care practices. If the data reported are representative of what is currently being provided in primary care practice, why are they at odds with other reports suggesting less than optimal preventive care?

One reasonable explanation is that several pressures have been acting to encourage more health promotion activities: for example, health care reform discussions, publicity about early detection of breast cancer, and the proliferation of managed care organizations. These pressures and others may have been instrumental in increasing the provision of health promotion services such that the comparatively recent data reported here are actually reflective of current practice.

A second possible explanation relates to the study methodology. In the past, the focus often has been on services provided during the 1 year immediately preceding the study, although some services and schedules are for longer periods. A limitation of using a 1-year time interval for assessing provision of prevention services is the risk of underreporting services recommended annually but completed at less than this recommended interval. Delays in the annual provision of preventive services may be due to a number of factors, including patient and physician schedules and skepticism about rigid interpretations of recommended frequency of screening tests. More important than a narrowly defined time frame is evidence that primary preventive and screening services have been offered or provided at intervals and that this activity is sustained longitudinally. A 2-year time frame, as was used in this study, permits ample opportunity to detect whether any preventive services have been offered or provided to the population under study. The use of a 2-year time frame,

however, may result in rates of performance that are higher and therefore not comparable to data reported in studies using more narrowly defined time frames.

The major findings of this study suggest that when older American adults with adequate insurance have a regular primary physician, they also receive high levels of preventive health services. If other current data support this general conclusion, these results suggest that less emphasis be placed on overall change of physician practice behavior and more on interventions specifically targeted to areas such as mammography in older women, access to primary care, and adequate insurance, where opportunities for improvement are most evident.

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REFERENCES

- American Cancer Society. Summary of cancer and guidelines for the cancer related checkup. Recommendations. New York, NY: American Cancer Society, 1988.
- US Preventive Services Task Force. Guide to clinical preventive services. 2nd ed. Baltimore, Md: Williams & Wilkins, 1996.
- Canadian Task Force on the Periodic Health Examination. The periodic health examination. *Can Med Assoc J* 1989; 141:205.
- Frame PS. A critical review of adult health maintenance. Part 3. Prevention of cancer. *J Fam Pract* 1986; 22:511.
- Bergner M, Allison CJ, Diehr P, Ford LG, Feigl P. Early detection and control of cancer in clinical practice. *Arch Intern Med* 1990; 150:431-6.
- McPhee SJ, Richard RJ, Solkowitz SN. Performance of cancer screening in a university general internal medicine practice. Comparison with the 1980 American Cancer Society guidelines. *J Gen Intern Med* 1986; 1:275.
- Woo B, Woo B, Cook EF, et al. Screening procedures in the asymptomatic adult: comparison of physicians' recommendations, patients' desires, published guidelines, and actual practice. *JAMA* 1985; 254:1480.
- American Cancer Society. Survey of physicians' attitudes and practices in early cancer detection. *CA Cancer J Clin* 1985; 35:197.
- Bostick RM, Sprafka JM, Virnig BA, Potter JD. Predictors of cancer prevention attitudes and participation in cancer screening examinations. *Prev Med* 1994; 23:816-26.
- Dietrich AJ, O'Connor GT, Keller A, et al. Cancer: improving early detection and prevention. A community practice randomized trial. *BMJ* 1992; 304:687-91.
- Battista RN, Williams JI, MacFarlane LA. Determinants of primary medical practice in adult cancer prevention. *Med Care* 1986; 24:216.
- Bernstein AB, Thompson GB, Harlan LC. Differences in rates of cancer screening by usual source of medical care. *Med Care* 1991; 29:196.
- Burack RC, Gimotty P, Stengle W. Patterns of use of mammography among inner-city Detroit women. Contrasts between a health department, HMO, and private hospital. *Med Care* 1993; 31:322-34.
- Costanza ME, Zapka JG, Harris DR, et al. Impact of a physician intervention program to increase breast cancer screening. *Cancer Epidemiol Biomarkers Prev* 1992; 1:581-9.
- Dietrich AJ, Goldberg H. Preventive content of adult primary care: do generalists and subspecialists differ? *Am J Public Health* 1984; 74:223.
- Lambrew JM, DeFriese GH, Carey TS, Ricketts TC, Biddle AK. The effects of having a regular doctor on access to primary care. *Med Care* 1996; 34:138-51.
- Makuc D, Freid V, Kleinman J. National trends in the use of preventive health care by women. *Am J Public Health* 1989; 79:21-6.
- McPhee SJ, Bird JA, Fordham D, Rodnick JE, Osborn EH. Promoting cancer prevention activities by primary care physicians: results of a randomized, controlled trial. *JAMA* 1991; 266:538-44.
- Meyer DL, Davis JE, Love RR. Cancer prevention activities in primary care group practice: physician estimates, physician performance, and practice structure. *Prev Med* 1987; 16:277.
- Dietrich AJ, Woodruff CB, Carney PA. Changing office routines to enhance preventive care. The preventive GAPS approach. *Arch Fam Med* 1994; 3:176-83.
- Calle EE, Flanders WD, Thun MJ, Martin LM. Demographic predictors of mammography and Pap smear screening in US women. *Am J Public Health* 1993; 83:53-60.
- Harlow SD, Linet MS. Agreement between questionnaire data and medical records: the evidence for accuracy of recall. *Am J Epidemiol* 1989; 129:233.
- Sawyer JA, Earp JA, Fletcher RH, Daye FF, Wynn TM. Accuracy of women's self-report of their last Pap smear. *Am J Public Health* 1989; 79:1036.
- Gerbert B, Hargreaves WA. Measuring physician behavior. *Med Care* 1986; 24:838.
- Koseoff J, Fink A, Brook RH, Chassin MR. The appropriateness of using a medical procedure. Is information in the medical record valid? *Med Care* 1987; 25:196-201.
- Montano DE, Phillips WR. Cancer screening by primary care physicians. A comparison of rates obtained from physician self-report, patient survey, and chart audit. *Am J Public Health* 1995; 85:795-800.
- Lyons TF, Payne BC. Interdiagnosis relationships of physician performance measures in hospitals. *Med Care* 1977; 15:475.
- Fontana SA, Baumann LC, Helberg C, Davis JE, Love RR. Delivery of preventive services in primary care practices according to chronic disease status. *Am J Public Health* 1997; 87:7.
- SAS Institute Inc. SAS Version 6.07. Cary, NC: SAS Institute Inc, 1989.
- DeLozier JE, Gagnon RO. National Ambulatory Medical Care Survey: 1989 summary. Advance data from Vital and Health Statistics. Hyattsville, Md: National Center for Health Statistics, 1991; 203:1-11.
- Center for Health Statistics, Division of Health and Social Services, Wisconsin Department of Health and Social Services. Wisconsin Behavioral Risk Factor Survey. Madison, WI: Center for Health Statistics, 1993.