Cancer Screening by Primary Care Physicians: A Comparison of Rates Obtained from Physician Self-Report, Patient Survey, and Chart Audit

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Introduction

Primary care physicians are in a unique position to decrease cancer morbidity and mortality by providing preventive services, including screening and counseling. In recent years many studies have investigated physician practices and found that not all patients are being screened at intervals recommended by organizations such as the National Cancer Institute, the American Cancer Society, and the US Preventive Services Task Force. Most of these studies relied upon physicians’ self-report of whether they agreed with or followed certain screening guidelines, rather than measuring the rates at which they performed the services in actual practice.1-7

Only a few studies have measured the rates at which physicians provide cancer screening tests.8-12 Four of these studies measured cancer screening rates by physicians in community-based primary care practices.10-13 Three studies used claims data or chart audits rather than physician self-reports to measure physician screening rates.10-12 Only one study used patient surveys and chart audits to measure physician screening rates.13

No research has been done to compare physician screening rates obtained from physician self-reports, chart audits, and patient surveys. Physician self-report is probably the easiest measure to obtain, but it is potentially unreliable because physicians may not have accurate perceptions of their own rates of providing services. There is evidence that physicians may overestimate their rates of providing preventive services.8 Patient survey is an alternative method for assessment of physician behavior. It avoids the problem of physician response bias. Patient surveys can also include events where the patient received the screening test from other providers. However, the reliability of patient survey results is dependent on the accuracy of the patient’s understanding and recollection of the services provided. Chart audit is a third method for measuring physician behavior. Its reliability is dependent on the clarity, accuracy, and completeness of patient care records. Chart audits may be less useful for measuring the use of preventive services, such as smoking cessation advice or recommending mammograms, since these services are not charged and therefore may not be recorded on the patient’s chart. However, chart records of procedures such as Pap smears and fecal occult blood testing may be more accurate. Physician self-report has been the method used most often in assessing physician behavior, probably because it is the least costly of the three alternatives.

In this paper we report the rates of provision of seven cancer screening services by community-based family physicians in Washington State. We compare rates derived from three methods of measurement: physician self-report, patient survey, and chart audit. Table 1 lists the services that were studied, along with the recommended screening interval and patient age and sex groups appropriate for each. Digital rectal examination was investigated separately for male and fe-
male patients because many physicians conduct a rectal examination for female patients in conjunction with a pelvic exam and Pap smear. Chest x-ray was included because, although this test is not recommended for cancer screening, some physicians continue to order screening chest x-rays. This test was studied separately for smokers and nonsmokers because the reasons for ordering chest x-rays are likely to differ by patient smoking status.

Methods

Physician's rates of providing the cancer screening services listed in Table 1 were obtained as part of a study to identify factors influencing provision of these services. Determinants of screening rates will be presented in other papers. Measurement of physicians' rates of providing these services followed three steps: (1) physician surveys from a random sample of family physicians in Washington State to obtain self-reported rates; (2) patient surveys from the practices of a subsample of these physicians, and (3) chart audits of a subsample of the patients surveyed. Figure 1 illustrates the data collection procedures described below.

Physician Surveys

A random sample of 450 practicing family physicians was selected from the membership of the Washington Academy of Family Physicians. Physicians practicing in academic settings and those in administrative positions were excluded from selection. This sample represents approximately 50% of the academy's membership. Physician survey mailings were staggered across 10 months, between December 1988 and September 1989, to allow us to conduct patient surveys and chart audits within 3 months after receiving each physician's survey. Each month 45 physicians were each sent a questionnaire. Three weeks later a second mailing was made to nonrespondents, followed 2 weeks later by a telephone reminder if needed.

The physician questionnaire included extensive questions about beliefs and practices with regard to each of the cancer control services. A complete description of the development of the questionnaire has been reported elsewhere.10 Physician self-report of behavior was measured in two steps. Physicians were asked to consider patients within three age categories: ages 20 through 40 years, 41 through 50 years, and older than 50 years. They were asked about these age groups separately because guidelines and practices for certain procedures vary by patient age. They were asked to indicate their own screening interval policy for each procedure (every 6 months, once a year, once every 2 years, once every 3 to 5 years, or not routinely) for each age category and for appropriate sex groups. Each physician was then asked to estimate his or her completion rate, that is, the percentage of visiting patients of appropriate age and sex categories who were screened according to the physician's own policy.

Seven of the 450 physician surveys were eliminated because the physician had retired, was in administration, or had moved. A total of 326 physician surveys were returned completed, for an adjusted response rate of 74%. Physicians who were practicing at least 60% of full-time and had been in their current practice for at least 2 years were identified from those who responded to the physician survey. Group Health Cooperative physicians were then excluded because this is a staff model health maintenance organization (HMO; the staff model is less common than other HMO models) with screening policies and programs including a breast cancer screening program that operates independently from the primary care provider. Thus screening rates obtained through patient survey and chart review in Group Health Cooperative practices may not reflect provider behavior or policy. The sample of physicians remaining after the above exclusions made up the pool (n = 247) from which physicians were selected for the patient survey and chart audit phases of the study. A total of 67 physicians were randomly selected from this pool and contacted to recruit 60 (about 6 per month) who participated in both the patient surveys and the chart audits.

Patient Surveys

A research assistant visited each physician's office to obtain names and addresses of 350 established patients between the ages of 19 and 75 years who had visited the physician within the 4 months prior to the physician survey. New patients were excluded from these lists. In a few practices, patients' date of birth and new patient status were not readily available to allow us to exclude ineligible patients at the sample selection stage. In those practices approximately 400 patients were selected, to adjust for a larger number of participants who would be excluded at the data analysis stage. Patients were selected from those who had seen the physician immediately prior to the physician survey and going back in the practice log until the desired sample size was obtained. The patients selected from each practice were sent a one-page questionnaire with a cover letter over the physician's signature. The survey asked patients, about each of the cancer prevention services studied, (1) whether they had ever received the service, (2) when they had most recently received it, and (3) who ordered or performed it. A second mailing was sent 3 weeks later to nonrespondents.

Patient surveys were reviewed to identify patients who, according to their responses, (1) were between 19 and 75 years of age; (2) had been seen at least two times by the participating physician, with the first time at least 6 months prior to the patient survey; and (3) received most of their care from the participating physician. Patients not meeting these criteria were excluded from the database and all analyses. The second criterion was used to ensure that the study examined

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**TABLE 1—Cancer Screening Services Studied**

<table>
<thead>
<tr>
<th>Service</th>
<th>Recommended Interval</th>
<th>Patient Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Mammography</td>
<td>Every year</td>
<td>Women over age 50</td>
</tr>
<tr>
<td>2. Clinical breast examination</td>
<td>Every year</td>
<td>All women</td>
</tr>
<tr>
<td>3. Pap smear</td>
<td>Every year</td>
<td>All women</td>
</tr>
<tr>
<td>4. Digital rectal examination</td>
<td>Every year</td>
<td>Women over age 40</td>
</tr>
<tr>
<td>5. Fecal occult blood test</td>
<td>Every year</td>
<td>Men over age 40</td>
</tr>
<tr>
<td>6. Sigmoidoscopy</td>
<td>Every 4 to 5 years</td>
<td>All patients over age 50</td>
</tr>
<tr>
<td>7. Chest x-ray</td>
<td>Every 3 years</td>
<td>All smokers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>All nonsmokers</td>
</tr>
</tbody>
</table>

*Note. Services, intervals, and targeted patient groups were identified from National Cancer Institute and American Cancer Society guidelines.* 

14, 15
only established patients of the participating physician, for whom the physician had had a reasonable opportunity to provide cancer prevention services.

The patient survey response rate, by physician's practice, ranged from a low of 50% to a high of 93%, with an overall response rate across practices of 71% (adjusted for 606 surveys returned undeliverable). After ineligible patients were excluded on the basis of the three criteria above, the total patient survey data set consisted of 11,005 patients. The number of patients in each physician's practice included in this data set ranged from 87 to 268, with a mean of 183 patients.

**Chart Audits**

Between 100 and 140 patients were randomly selected from those who returned a patient survey and met the above eligibility criteria in each physician's practice. These samples were stratified by sex to include 50% to 60% women and by age to include about 20% younger than 40 years, 20% aged 40 to 49 years, and 60% aged 50 years or older. These patients were sent a letter requesting permission to audit their medical charts for cancer screening tests. (Consent was not requested earlier, with the patient survey, so as not to burden patients who would not be selected for the chart audit portion of the study.) A postcard-paid envelope and response form were included with this letter. The patient response rate to the chart audit consent form, by practice, ranged from a low of 47% to a high of 81%, with a mean across physicians of 65%.

A sample of 50 to 60 patients (stratified as above by sex and age) were randomly selected from those who agreed to have their charts audited in each practice. An alternate sample of 10 patients was also selected in case any of the initial sample of charts were not readily available in the practice. A research assistant then spent 2 to 3 days in each physician's practice auditing the selected charts. The number of charts audited per physician ranged from 46 to 60, with a total across physicians of 3,281 patient charts audited.

Audit data were entered on-site on a laptop computer with SPSSX data entry screens. The auditor first identified an index visit date (the most recent visit to the physician prior to the physician survey). Charts were then audited for different procedures depending on the age and sex of the patient. Charts of female patients aged 19 to 49 years were audited for each occurrence of the following procedures during the 3-year period prior to the date of their index visit: clinical breast examination, mammography, Pap smear, digital rectal examination, fecal occult blood test, and chest x-ray. Charts of male patients aged 19 to 49 years were audited for each occurrence of the following procedures during the 3-year period prior to the date of their index visit: digital rectal examination, fecal occult blood test, and chest x-ray. Charts of patients aged 50 to 75 years were audited by the same procedures as used for the 19- to 49-year-old age groups, but they were also audited for each occurrence of sigmoidoscopy during the 5-year period prior to their index visit.

Each time the auditor encountered any of the targeted procedures, the following information was recorded: (1) the date on which the procedure was ordered, recommended, or performed; (2) whether the procedure was ordered by the patient's physician, another provider in the practice, or a provider outside the practice; and (3) whether the procedure was ordered for diagnostic, screening, or unknown purposes.

**Results**

**Characteristics of Physicians Surveyed**

Practice and background characteristics of the physicians surveyed are summarized in Table 2. Summary statistics are presented separately for the overall physician survey sample and for the subsample of physicians who agreed to participate in the patient survey and chart audit phase. Most of the total sample (83%) were male. At least three quarters were residency trained (75%) and certified by the American Board of Family Practice (88%). More than one third practiced in communities of less than 25,000 people.

Physicians in the subsample were on average 1 year older than those in the total sample and had 1 more year of practice experience. Subsample physicians had slightly more patient contact time and saw more patients per week than physicians in the total sample, which was expected since they were selected from physicians who practiced at least 60% of full-time. The largest differences between the subsample and the total physician sample were in sex and practice type. Higher percentages of the subsample were male and practiced in a solo or single-specialty group setting.

<table>
<thead>
<tr>
<th>Physician Survey 50% Sample of WAFP (n = 450 physicians)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician Survey Respondents (n = 326 physicians) 74% Participation</td>
</tr>
<tr>
<td>Physician Sample for Patient Survey and Audit Phase (n = 67 physicians)</td>
</tr>
<tr>
<td>Physicians Agreeing to Patient Survey and Chart Audit (n = 60 physicians) 90% Physician Participation</td>
</tr>
<tr>
<td>Patient Survey: Approx. 350 Patients per Physician × 60 Physicians (n = 21,876 patients)</td>
</tr>
<tr>
<td>Patient Survey Respondents (n = 15,016 patients) 71% Adjusted Patient Participation</td>
</tr>
<tr>
<td>Patient Surveys Meeting Inclusion Criteria (n = 11,005 patients)</td>
</tr>
<tr>
<td>Chart Audit: Approx. 50–60 Patients per Physician × 60 Physicians (Total n = 3,281 patient charts)</td>
</tr>
</tbody>
</table>

**FIGURE 1—Sampling procedure for physicians, patients, and medical records.**

**Physician Screening Rates**

Screening rates from physician self-report, patient survey, and chart audit were calculated for each physician as described below. Table 3 displays the mean rates of performance of each of the cancer control services obtained by the three assessment methods.

**Physician self-report.** The physician survey data were used to compute rates of
TABLE 2—Physician and Practice Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Total Sample (n = 326)</th>
<th>Subsample (n = 60)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician’s sex, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>83</td>
<td>93</td>
</tr>
<tr>
<td>Female</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>Mean age, y (SD)</td>
<td>43.8 (10.4)</td>
<td>45.3 (10.5)</td>
</tr>
<tr>
<td>Residency trained, %</td>
<td>75</td>
<td>72</td>
</tr>
<tr>
<td>Board certified, %</td>
<td>88</td>
<td>95</td>
</tr>
<tr>
<td>Mean years practicing (SD)</td>
<td>14.2 (10.9)</td>
<td>15.8 (10.6)</td>
</tr>
<tr>
<td>Mean years in current practice (SD)</td>
<td>10.9 (10.1)</td>
<td>12.9 (9.9)</td>
</tr>
<tr>
<td>Practice type, %</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo</td>
<td>25</td>
<td>33</td>
</tr>
<tr>
<td>Partnership</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Single-specialty group</td>
<td>28</td>
<td>42</td>
</tr>
<tr>
<td>Multispecialty group</td>
<td>21</td>
<td>17</td>
</tr>
<tr>
<td>Other</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>Community population &lt; 25,000, %</td>
<td>34</td>
<td>42</td>
</tr>
<tr>
<td>Mean no. of patients/week, (SD)</td>
<td>98.3 (34.4)</td>
<td>103.6 (23.7)</td>
</tr>
<tr>
<td>Mean patient care hours/week (SD)</td>
<td>33.1 (9.5)</td>
<td>34.8 (6.9)</td>
</tr>
</tbody>
</table>

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providing each screening test at the intervals and for the patient groups listed in Table 1. Physicians’ self-reported screening rates for each test were adjusted by an appropriate multiplier if their screening interval policy did not match the interval in Table 1. For example, the rates for all annual screening tests (e.g., mammography) were adjusted as follows: If the physician’s policy was every 6 months, the reported rate was multiplied by 2; if the policy was every 2 years, the reported rate was divided by 2; if the policy was every 3 to 5 years, the reported rate was divided by 4; if the policy was not routinely test patients, the rate was recorded as 0. Chest x-ray rates were similarly adjusted to an interval of 3 years, whereas rates for sigmoidoscopy were not adjusted, because nearly all physicians indicated a policy of every 3 to 5 years or no routine. Finally, since physicians were asked to report their screening rates for three patient age groups, the mean of appropriate screening rates was calculated for tests that target more than one age group. For example, the rate of providing digital rectal examination for patients older than 40 years was calculated as the mean of the reported rate for patients aged 40 to 50 years and the rate for patients older than 50 years.

The leftmost columns of Table 3 present the mean self-reported rates for each of the screening services studied. These are presented separately for the overall sample of physicians and the subsample for whom patient surveys and chart audits were conducted. The mean rates in Table 3 represent the average proportion of patients for whom physicians reported ordering the test at the specified interval. For example, the total sample of physicians reported that they had ordered mammograms within the previous year for an average of 49% of their patients who were women older than 50 years of age.

Patient survey. Patient survey data were used to obtain each physician’s rate of providing each of the screening tests at the intervals and for the patient groups listed in Table 1. First, patients in each practice who did not meet the criteria listed in the Methods section were excluded from all analyses. Each physician’s patient survey–based rate of providing a given screening test was calculated as follows: All patients from the screening test target group listed in Table 1 were first identified as the denominator (e.g., all women older than 50 years for mammography). All patients from this target group who reported that they had had the screening test at the specified interval were then counted as the numerator. Thus, screening rates were calculated for each physician with that physician’s patient data, rather than for the overall patient sample.

The center columns of Table 3 present the mean rates of providing each service at the specified interval as reported on the patient survey. The table also lists the mean number of patient surveys per physician upon which these rates are based. For example, the average proportion per practice of women older than 50 years who had received a mammogram in the past year was 46%. This is the mean rate obtained from an average of 49 patient surveys per physician of women older than 50 years.

Chart audit. Chart audit data were used to compute each physician’s rate of providing each of the screening tests at the intervals and for the patient groups listed in Table 1. Each physician’s chart audit–based rate of providing a given screening test was calculated as follows: All patients who met the specified age and sex criteria were first identified as eligible for each service and counted as the denominator. All patients among those eligible who had had the service performed or recommended by the physician at the specified interval were counted as the numerator. Rates were calculated for each physician from his or her own chart data, rather than for the overall sample of charts.

The rightmost columns of Table 3 present the mean rates of providing each service as determined by chart audit. The table also lists the mean number of patient charts per physician used in calculating these rates. For example, the mean proportion per practice of women older than 50 years who had received a mammogram in the past year was 51%. This is the mean obtained from an average of 16.9 charts per physician of women older than 50 years.

Correspondence between Measures of Screening Rates

Table 4 presents the correlations between rates obtained by different measures. Three correlations are presented for each screening procedure: The first column lists the correlation between the rate based on chart audits and that based on patient surveys. The second column lists the correlation between the rate based on chart audits and that based on physician self-reports. The third column lists the correlation between the rate based on patient surveys and that based on physician self-reports.

The correlations between chart audit rates and patient survey rates are all highly significant (P < .001) and nearly all are quite high. These correlations were higher than .70 for all procedures with the exception of chest x-ray for smokers.

The correlations between rates based on physician self-reports and rates based on chart audits and patient surveys are nearly all significant at P < .05, with the exception of three correlations. However, the magnitudes of these correlations are all relatively small; all but one correlation is less than .40. With the exception of chest x-ray for smokers, these correlations
are all significantly smaller than the corresponding correlation between chart audit and patient survey, indicating a relatively low correspondence between physician self-report and either chart audits or patient surveys.

**Discussion**

This study obtained quite high rates of participation by both physicians and patients. Physicians who participated may be more concerned about cancer screening and their data may overestimate screening rates; however, such bias does not affect the comparisons we made between the three measures of screening rates. Thus, we are quite confident in the generalizability of these findings to Washington State family physicians and their patients. The mean screening rates for most procedures were low compared with published recommendations but were similar to those reported in other studies. For example, on average only 51% (from chart audit) of female patients older than 50 years had had a mammogram within the previous year, and 57% of women had had a clinical breast exam in the past year. On average, one third of nonsmokers had had a chest x-ray, a screening test no longer recommended, within the previous 3 years. Rates varied by screening test, and the reasons for this variation should be the subject of further research. Factors explaining this variation may include efficacy of the tests, barriers to physicians and patients such as time demands or discomfort, and whether the test requires referral or can be done in the physician’s office.

Mean rates of service provision were quite similar across the three measurement methods (physician survey, patient survey, and chart audit) for mammography and digital rectal exam for male patients. Larger discrepancies were found between the three measures for all of the other procedures. Physicians tended to overestimate their performance of clinical breast examination, Pap smear, digital rectal examination for female patients, and fecal occult blood testing. Physicians underestimated their performance of sigmoidoscopy and their ordering of chest x-rays, especially for nonsmokers. These are all tests that are likely to be documented in patient charts. Patients tended to underestimate fecal testing for occult blood, suggesting that they may not understand or remember that test.

Correlations between rates based on chart audits and rates based on patient surveys were quite high (> .70) for all but one procedure, chest x-ray for smokers (.53). By contrast, the correlations between physicians’ self-reported rates and rates based on chart audits and patient

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**TABLE 3—Physicians’ Rates of Providing Cancer Screening Services**

<table>
<thead>
<tr>
<th>Service</th>
<th>Physician Self-Report</th>
<th>Patient Survey</th>
<th>Chart Audit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Sample (n = 326)</td>
<td>Subsample (n = 60)</td>
<td>Subsample (n = 60)</td>
</tr>
<tr>
<td>Mammography (past year, women aged 50+)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
<td>Mean (95% CI)</td>
</tr>
<tr>
<td></td>
<td>.49 (.45, .52)</td>
<td>.51 (.45, .57)</td>
<td>.46 (.42, .50)</td>
</tr>
<tr>
<td>Clinical breast exam (past year, all women)</td>
<td>.70 (.68, .73)</td>
<td>.67 (.61, .73)</td>
<td>.63 (.60, .66)</td>
</tr>
<tr>
<td>Pap smear (past year, all women)</td>
<td>.65 (.62, .68)</td>
<td>.63 (.57, .70)</td>
<td>.60 (.57, .64)</td>
</tr>
<tr>
<td>Digital rectal exam (past year)</td>
<td>Women aged 40+</td>
<td>.58 (.55, .61)</td>
<td>.55 (.47, .63)</td>
</tr>
<tr>
<td></td>
<td>Men aged 40+</td>
<td>.48 (.45, .51)</td>
<td>.45 (.37, .52)</td>
</tr>
<tr>
<td></td>
<td>Fecal occult blood test (past year, all patients aged 50+)</td>
<td>.59 (.56, .62)</td>
<td>.57 (.50, .64)</td>
</tr>
<tr>
<td></td>
<td>Sigmoidoscopy (past 5 years, all patients aged 50+)</td>
<td>.20 (.17, .23)</td>
<td>.23 (.15, .30)</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray (past 3 years)</td>
<td>.33 (.27, .39)</td>
<td>.23 (.11, .34)</td>
</tr>
<tr>
<td></td>
<td>Smokers</td>
<td>.10 (.07, .13)</td>
<td>.05 (.02, .09)</td>
</tr>
<tr>
<td></td>
<td>Nonsmokers</td>
<td>.33 (.27, .39)</td>
<td>.23 (.11, .34)</td>
</tr>
</tbody>
</table>

*Mean number of patient surveys per physician upon which the rate is based.

**TABLE 4—Correlations between Rates Measured by Different Methods**

<table>
<thead>
<tr>
<th>Service</th>
<th>Chart Audit–Patient Survey Correlation (95% CI)</th>
<th>Chart Audit–Physician Survey Correlation (95% CI)</th>
<th>Patient Survey–Physician Survey Correlation (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mammography</td>
<td>.74*** (.60, .84)</td>
<td>.31** (.06, .52)</td>
<td>.36** (.12, .56)</td>
</tr>
<tr>
<td>Clinical breast exam</td>
<td>.75*** (.61, .84)</td>
<td>.18 (.08, .41)</td>
<td>.22* (.03, .45)</td>
</tr>
<tr>
<td>Pap smear</td>
<td>.79*** (.67, .87)</td>
<td>.37** (.13, .57)</td>
<td>.29* (.04, .51)</td>
</tr>
<tr>
<td>Digital rectal exam</td>
<td>Female patients</td>
<td>.84*** (.74, .90)</td>
<td>.33** (.08, .54)</td>
</tr>
<tr>
<td></td>
<td>Male patients</td>
<td>.71*** (.56, .82)</td>
<td>.15 (.11, .39)</td>
</tr>
<tr>
<td></td>
<td>Fecal occult blood test</td>
<td>.78*** (.68, .86)</td>
<td>.29* (.04, .51)</td>
</tr>
<tr>
<td></td>
<td>Sigmoidoscopy</td>
<td>.90*** (.84, .94)</td>
<td>.23* (.03, .46)</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray</td>
<td>.53*** (.32, .69)</td>
<td>.31** (.06, .52)</td>
</tr>
<tr>
<td></td>
<td>Smokers</td>
<td>.79*** (.67, .87)</td>
<td>.32** (.07, .53)</td>
</tr>
</tbody>
</table>

*Note. CI = confidence interval.

*P < .05; **P < .01; ***P < .001.
surveys were all quite low, indicating low reliability of physician self-report. Physicians overestimate their provision of several of these screening services.

Other explanations for the low correlations between physician self-report and chart audit and patient survey may involve possible inaccuracies in the technique of calculating rates from physicians’ self-reports. Self-reported rates were calculated by averaging the rates physicians reported for three patient age groups. However, there was no relationship between the degree of averaging used in calculating a rate and the strength of its correlation. Correlations were similarly low for the three procedures that required no averaging (mammography, sigmoidoscopy, and fecal occult blood test), the two procedures that required averaging across two age groups (digital rectal examination for male patients and for female patients), and the remaining procedures, which required averaging across three age groups.

Another source of possible inaccuracy of physicians’ self-reported rates could be the way these rates were adjusted if the physician’s testing policy did not match the recommended interval. To eliminate this concern we conducted all of the above analyses with subsets of physicians whose interval policies did match those recommended and thus required no adjustment, and we found virtually identical results. Thus, we feel it is unlikely that our findings are a result of error caused by our method of calculating rates based on physician self-reports.

There is clearly inaccuracy in each of the three measurement methods, and the source of bias is likely to vary depending on the particular test. A limitation of this study is that we did not directly assess bias in each of the measures, and this should be the focus of further research. However, our findings do suggest that research involving measurement of the rates at which physicians provide cancer screening services should not rely on physician self-report. The high correlations between chart audit and patient survey measures for most services indicate that both methods are equally preferable over physician self-report. Patient surveys are likely to be the least expensive method and would be less inconvenient to the physician, so long as patient names and addresses can be easily obtained from practice records.

Acknowledgments
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References