Influence of Financial Productivity Incentives on the Use of Preventive Care

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PURPOSE: We examined whether physician factors, particularly financial productivity incentives, affect the provision of preventive care.

SUBJECTS AND METHODS: We surveyed and reviewed the charts of 4,473 patients who saw 1 of 169 internists from 11 academically affiliated primary care practices in Boston. We abstracted cancer risk factors, comorbid conditions, and the dates of the last Papanicolaou (Pap) smear, mammogram, cholesterol screening, and influenza vaccination. We obtained physician information including the method of financial compensation through a mailed physician survey. We used multivariable logistic regression to examine the association between physician factors and four outcomes based on Health Plan Employer Data and Information Set (HEDIS) measures: (1) Pap smear within the prior 3 years among women 20 to 75 years old; (2) mammogram in the prior 2 years among women 52 to 69 years old; (3) cholesterol screening within the prior 5 years among patients 40 to 64 years old; and (4) influenza vaccination among patients 65 years old and older. All analyses accounted for clustering by provider and site and were converted into adjusted rates.

RESULTS: After adjustment for practice site, clinical, and physician factors, patients cared for by physicians with financial productivity incentives were significantly less likely than those cared for by physicians without this incentive to receive Pap smears (rate difference, 12%; 95% confidence interval [CI]: 5% to 18%) and cholesterol screening (rate difference, 4%; 95% CI: 0% to 8%). Financial incentives were not significantly associated with rates of mammography (rate difference, −3%; 95% CI: −15% to 10%) or influenza vaccination (rate difference, −13%; 95% CI: −28% to 2%).

CONCLUSIONS: Our findings suggest that some financial productivity incentives may discourage the performance of certain forms of preventive care, specifically Pap smears and cholesterol screening. More studies are needed to examine the effects of financial incentives on the quality of care, and to examine whether quality improvement interventions or incentives based on quality improve the performance of preventive care.


M any factors affect rates of preventive care, including patient sociodemographic characteristics, illness burden, compliance with medical recommendations, and beliefs about disease (1–6). Structural factors, such as health insurance coverage, and physician characteristics, such as sex and subspecialty training, are also associated with the provision of preventive care, particularly for women (1–12).

The advent of managed care and efforts to contain health care costs have resulted in the use of several strategies to influence the practice styles of primary care physicians (13–16). One of the most common and controversial strategies is the use of financial incentives to increase physician productivity (13,15,16). A recent survey of primary care physicians practicing in California revealed that those who had incentives based on productivity felt greater pressure to see more patients. Physicians also believed that the pressure to see more patients compromised care (16). Studies examining the effect of these incentives on utilization and cost of care have shown conflicting results (17,18).

To address concerns about the quality of care, the National Committee for Quality Assurance developed the Health Plan Employer Data and Information Set (HEDIS) in the early 1990s as a set of standardized performance measures to compare different health plans, including several indicators for the quality of preventive care. The HEDIS system forms the foundation of most health plan report cards (19–21). Moreover, HEDIS measures are required to achieve accreditation, and many employers also require health plans to report HEDIS measures. Our objective in this study was to examine whether financial incentives for physicians influence the quality of four types of preventive care.
METHODS

Study Setting
The Ambulatory Medicine Quality Improvement Project was designed to examine factors associated with variation in the quality of care at 11 academically affiliated internal medicine primary care practices in the Boston metropolitan area. These sites all received malpractice insurance from the Harvard-affiliated insurance program, but were diverse in location, structure, and degree of academic affiliation, and represented different systems of care. The sites included six hospital-based practices, a university health center structured similarly to a staff-model health maintenance organization (HMO), a large group-model commercial HMO, two neighborhood health centers in low-income communities, and a suburban group practice. The study was approved by the Institutional Review Board of each participating institution.

Patients
Patients 20 to 75 years of age who had at least one visit to an attending-level primary care physician during the preceding year were eligible for the study. Six hundred patients meeting these criteria were randomly selected at 10 of the 11 practice sites; 250 patients were selected at the 11th site. We sent patients an informational letter describing the study. Patients were told that the primary study objective was to measure and improve patient satisfaction and quality of care. They were not made aware of specific hypotheses. We asked patients to return an “opt-out” postcard if they did not wish to participate. Of 6,250 eligible patients, 1,503 (24%) opted out. Trained research nurses reviewed up to 500 medical records of patients who did not opt out from each site. Abstracted data included age, sex, common comorbid conditions, and risk factors for cervical cancer, breast cancer, and cardiovascular disease. Information on use of preventive tests, length of time observed at the practice, and the identity of the primary care provider were also obtained.

We then attempted to contact patients by telephone to complete a telephone survey. We excluded from the survey (but not from the overall study) patients who did not speak either English or Spanish, who were hard of hearing, who had died before the survey, or for whom we did not have an accurate telephone number. We recruited patients sequentially at the participating sites, and completed all interviews between August 1996 and October 1997. Information elicited from respondents included sociodemographic data such as race, education, and insurance status.

Physicians
We mailed a confidential self-administered survey to all full- and part-time primary care physicians who were practicing at one of the 11 study sites in February 1996. We excluded physicians-in-training (ie, residents and fellows). We asked physicians about their age, sex, and whether they were board-certified and practiced in an internal medicine subspecialty. We also asked how many hours they worked each week, what percentage of that time they spent caring for patients, how they were financially compensated, and whether they had financial incentives based on productivity.

We also surveyed the medical director and practice administrator of each site about the structure of the practice and financial incentives for physicians. Although all sites had some form of financial incentive, not all providers within a given site were eligible for these incentives; moreover, the amount of incentive varied between providers. Hence, within a given site, physicians had different forms of compensation. Because we were unable to obtain method of compensation specific to the providers from the medical directors, we used physician responses to characterize method of financial compensation.

Outcome Measures
We defined our four outcomes based on HEDIS 3.0 criteria for preventive measures, which was the standard when these data were collected (22). Outcomes included the use of Pap smears, mammography, cholesterol screening, and influenza immunization.

For Pap smears, we examined use by women patients 20 to 64 years old. Women were considered to have the desired outcome if they were documented as having been screened within 3 years from the date of chart review. To maintain a uniform screening interval, we altered the outcome criteria slightly from HEDIS criteria, which include Pap smears performed within the 3 years preceding the year of chart review (22). Women with a hysterectomy were excluded because of a lack of consensus regarding appropriate screening in these women (23).

We also examined the use of mammography among women 52 to 69 years old within the 2 years preceding the date of chart review. Women were eligible at age 52 years because screening should begin at 50 years of age according to HEDIS criteria (22).

For cholesterol screening, we included patients 40 to 64 years old. We regarded patients as having the outcome if they had a documented cholesterol level within the preceding 5 years from the date of chart review, as HEDIS criteria recommend that cholesterol screening begin at age 35 years (22).

For influenza vaccine administration, patients aged 65 years and older who had a documented influenza vaccine within the preceding 12 months were considered to have the outcome (22). Those who did not have a documented vaccination in the preceding 12 months and who were followed up at the practice for less than 1 year were excluded because we could not be sure that they had been enrolled in the practice during the preceding influenza season.
For all outcomes, patients who received screening from another provider (eg, Pap smear performed by a gynecologist) or at a different site (eg, influenza vaccination at their workplace) were considered to have the desired outcome as long as the screening was documented in the medical record.

**Independent Variables and Potential Confounders**

We were principally interested in whether financial productivity incentives were associated with the use of preventive testing after adjusting for clinical and other physician characteristics. We hypothesized that financial incentives for productivity would be associated with less use of certain preventive tests, particularly time-consuming care that might reduce overall physician productivity. Physicians were asked to describe their principal mode of payment as either salary, salary plus incentives based on productivity, salary plus incentives based on productivity plus other factors (eg, patient satisfaction), or hourly wage. Because the last two groups contained so few respondents (n = 17), they were combined into one separate category (“other”). For all analyses, we adjusted for several other physician characteristics, including age, sex, subspecialty training, hours worked per week (four categories), and percent of professional time spent on direct patient care (three categories). Physicians who responded that they were board-certified in an internal medicine subspecialty and practiced some portion of time each week in that subspecialty were defined as subspecialists. Physicians who were board-certified in a subspecialty but were not practicing in that subspecialty were treated as generalists.

In addition to physician factors and practice site, we also adjusted for potential clinical confounders as appropriate. For Pap smear, we adjusted for patient age, the number of common medical conditions (see footnote to Table 1), prior abnormal Pap smear, and any other cervical cancer risk factors (ie, multiple sex partners, history of sexually transmitted diseases, prior papillomavirus infection, human immunodeficiency virus [HIV] infection, prior cervical cancer, and family history of cervical cancer). For mammography, we adjusted for patient age, number of common medical diagnoses, prior breast cancer, and family history of breast cancer. For cholesterol screening, we included patient age, sex, presence of coronary artery disease, smoking status, and number of other cardiovascular risk factors (ie, hypertension, diabetes, and family history). For influenza vaccination, we adjusted for patient age above 65 years, patient sex, and the presence of coronary artery disease, diabetes, and chronic pulmonary disease.

**Data Analysis**

Multivariable logistic regression models were used to examine the association between physician factors and each of the four outcomes. We accounted for clustering of patients by physician and site (24) using SUDAAN software (version 7.5.2, Research Triangle Institute, Research Triangle Park, North Carolina). We converted odds ratios into corresponding standardized rates and rate differences (25). We excluded one site from the cholesterol screening analysis (49 patients) and another from the mammography analysis (21 patients) because of 100% screening rates at those sites. Missing data were not imputed. For outcomes in which financial incentives and physician sex were significant predictors, we performed post hoc analyses to examine the interaction between physician sex and financial productivity incentives. For the Pap smear, mammography and cholesterol screening outcomes, we also performed subanalyses with patient race (white, black, other), insurance status, and educational level (four levels).

**RESULTS**

**Patient Characteristics**

We reviewed the charts of 4,857 patients. Of 200 physicians surveyed at these sites, 169 (85%) responded. We matched physician and patient chart review data for 4,473 patients. Of the 4,167 patients eligible for the survey, 68.6% (n = 2,858) responded. The variation in response rate by site ranged from 60.2% to 83.2% (P = 0.001). Compared with survey nonrespondents, respondents were more likely to be women (71.7% versus 63.7%, P = 0.001) and were slightly older (mean [± SD] age, 45.1 ± 13.6 years versus 43.8 ± 14.4 years, P = 0.004). The physicians of respondents, compared with nonrespondents, were similar in sex and in having a financial incentive but were slightly younger (mean age 42.2 ± 8.2 years versus 43.2 ± 9.1 years, P = 0.002).

The majority of patients were women, white, college educated and had at least one chronic condition (Table 1). Only 5% of participants were uninsured. Among those with insurance, managed care plans were the most common type of insurance.

**Overall Physician Characteristics**

The mean age of the 169 physicians was 45 ± 10 years (Table 2). Physicians cared for a median of 18 patients in our sample (range 1 to 132). Physicians with subspecialty training spent a small fraction of their time functioning as subspecialists (median 10% of their time; range 1% to 95%). Male physicians and generalists cared for the majority of patients, and physicians with financial incentives cared for fewer than half the patients.

**Unadjusted Rates of Preventive Care**

Of the 1,840 women who were eligible for cervical cancer screening and had matched chart review and physician survey data, 1,493 (81%) had at least one Pap smear documented in the last 3 years. The rate of breast cancer
Financial Incentives and Rates of Preventive Care

Compared with patients cared for by physicians who were compensated with a base salary only, patients whose physicians had incentives for productivity only were significantly less likely to receive Pap smears and cholesterol screening (Table 3). The rates of mammography and influenza vaccination were higher among patients whose physicians had financial productivity incentives, although these differences did not reach statistical significance. We found no significant interaction between physician sex and incentives on the rate of preventive care. Adjusting for patient race, education, and insurance status did not substantially alter our results.

Other Physician Factors and Preventive Care

Compared with patients whose physicians were men, patients whose physicians were women had significantly higher rates of Pap smears, mammograms, and cholesterol screening (Table 3). These results persisted after additional adjustment for patient sociodemographic factors. Patients whose primary care physicians were practicing subspecialists had significantly lower rates of Pap smear, cholesterol screening, and influenza vaccination when compared with patients of generalists (Table 3). The rate of mammograms was also lower among patients of subspecialists, although this rate difference was not statistically significant. The results were similar after adjustment for patient sociodemographic factors.

DISCUSSION

Our study suggests an association between several physician factors and the rate of some forms of preventive care. Patients whose physicians had financial incentives pri-
Table 3. Adjusted Rates of Receiving Preventive Care by Physician Characteristics

<table>
<thead>
<tr>
<th>Physician Characteristic</th>
<th>Pap Smear* (n = 1,840)</th>
<th>Mammogram† (n = 520)</th>
<th>Cholesterol Screening‡ (n = 1,664)</th>
<th>Influenza Vaccine§ (n = 374)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial incentive for productivity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td>86.3%</td>
<td>73.2%</td>
<td>90.3%</td>
<td>33.1%</td>
</tr>
<tr>
<td>Some</td>
<td>74.6%</td>
<td>75.7%</td>
<td>86.3%</td>
<td>46.1%</td>
</tr>
<tr>
<td>Rate difference (95% confidence interval)</td>
<td>11.7% (5.4, 18.1)</td>
<td>2.5% (–14.6, 9.6)</td>
<td>4.0% (0.2, 7.7)</td>
<td>–13.0% (–28.0, 2.0)</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>85.4%</td>
<td>81.2%</td>
<td>90.7%</td>
<td>38.2%</td>
</tr>
<tr>
<td>Male</td>
<td>73.2%</td>
<td>64.2%</td>
<td>86.6%</td>
<td>39.4%</td>
</tr>
<tr>
<td>Rate difference (95% confidence interval)</td>
<td>12.2% (7.7, 16.6)</td>
<td>17.0% (8.0, 26.1)</td>
<td>4.1% (0.6, 7.7)</td>
<td>–1.2% (–14.9, 12.6)</td>
</tr>
<tr>
<td>Type of internist</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalists</td>
<td>82.0%</td>
<td>75.0%</td>
<td>88.8%</td>
<td>41.4%</td>
</tr>
<tr>
<td>Subspecialists</td>
<td>75.1%</td>
<td>66.4%</td>
<td>85.9%</td>
<td>25.8%</td>
</tr>
<tr>
<td>Rate difference (95% confidence interval)</td>
<td>6.9% (1.2, 12.4)</td>
<td>8.6% (–6.0, 23.1)</td>
<td>2.9% (0.4, 6.2)</td>
<td>15.6% (5.7, 25.5)</td>
</tr>
</tbody>
</table>

* Analysis adjusted for physician age, number of hours worked, time spent on patient care, patient age, number of common medical problems, prior abnormal Pap smear, number of other cervical cancer risk factors, and practice site.
† Analysis adjusted for physician age, number of hours worked, time spent on patient care, patient age, number of common medical problems, prior breast cancer, family history of breast cancer, and practice site.
‡ Analysis adjusted for physician age, number of hours worked, time spent on patient care, patient age, sex, coronary artery disease history, smoking status, number of other cardiovascular risk factors, and practice site.
§ Analysis adjusted for physician age, number of hours worked, time spent on patient care, patient age, sex, coronary artery disease history, diabetes mellitus, chronic pulmonary disease, and practice site.

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Our finding that financial productivity incentives reduced the use of Pap smears and cholesterol screening was consistent with previous studies, our findings confirm the association between physician sex and provision of preventive care.

Our finding that financial productivity incentives reduced the use of Pap smears and cholesterol screening is of particular concern, given the increasing use of such incentives. We speculate that productivity incentives may lead physicians to see more patients and therefore spend less time on some forms of prevention, particularly time-consuming procedures such as Pap smears. Even when these procedures are referred to other providers (eg, gynecologists), primary care providers with productivity incentives may be less vigilant about following up and documenting adherence to screening recommendations. Productivity incentives were associated with cholesterol screening, but not with mammography use. One explanation is that women may take a proactive role in breast cancer screening, making physician incentives less important. Alternatively, cholesterol screening may impose a greater burden for follow-up counseling and care compared with mammography. Productivity incentives were also not associated with the use of influenza vaccines. In fact, influenza vaccination rates were slightly greater among patients whose physicians had incentives. Perhaps some financial incentives for productivity reward physicians for scheduling additional brief patient visits for influenza vaccine administration during the influenza season. Moreover, vaccinations are frequently administered by medical support staff and do not necessarily reduce physician productivity.

Our finding that patients whose primary care provider was a practicing medical subspecialist were less likely to receive preventive care such as Pap smears, cholesterol screening, and influenza vaccination was not explained by the presence of more comorbid illnesses. This underscreening is of concern, especially as medical subspecialists assume the role of primary care provider and have the responsibility of ensuring that their patients receive preventive care (26). Given the small numbers of subspecialists in our study, however, this finding should be confirmed in other settings.

Consistent with previous studies, we found that patients of female physicians were more likely to receive preventive care (8,11), including cholesterol screening. Physician sex was not an important factor in influenza vaccinations. This finding is inconsistent with results from one large study on preventive care in older adults that found that women physicians were more likely to give influenza vaccines to their older patients (27). Perhaps this discrepancy is related to the small number of patients in this sample who were eligible for vaccination.

Our study has several limitations. Our data were col-
lected from academically affiliated practices in the greater Boston area, and practice patterns in that region may not be generalizable. Second, only 9% of the patients in the sample were cared for primarily by medical subspecialists; thus, we were unable to differentiate among different subspecialties. Similarly, because fewer than 10% of patients were cared for by physicians with financial incentives for both productivity and some other measure (eg, quality), we were not able to examine the effect of dual financial incentives. We also did not have information on patient preferences. Some patients who were interested in prevention may have sought the care of women generalists, which may account for some of the differences observed by physician sex. However, this selection bias is unlikely to explain differences associated with productivity incentives as few patients are aware of their physicians’ method of compensation. There may also be “documentation bias:” financial productivity incentives may reduce documentation but not necessarily the delivery of care. Nevertheless, appropriate documentation is a vital component of quality health care and these documentation criteria are used by HEDIS. Finally, the outcome measures we chose are applicable primarily to women and older patients, as we did not have data on outcomes more relevant to younger men, such as testicular examination or counseling on safer sexual practices.

Our findings raise serious questions about the effects that rewarding physicians financially for productivity may have on the provision of some preventive services. Our findings also suggest that shifting the responsibility of preventive care to medical subspecialists, whose training and emphasis traditionally have not focused on prevention, may compromise the quality of some aspects of preventive care. Additional studies are needed to confirm our findings in other clinical and geographic settings, to examine whether combining financial productivity incentives with financial incentives for quality improves use of Pap smears and cholesterol screening, and to determine whether interventions to improve preventive care can improve the use of these screening tests by men and subspecialist physicians.

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