The association between physicians' and patients' preventive health practices

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Abstract

Background: Although much has been written about the potential power of the association between physicians' personal health practices and those of their patients, objective studies of this relationship are lacking. We investigated this association using objectively measured health care indicators.

Methods: We assessed 8 indicators of quality of health care (screening and vaccination practices) for primary care physicians (n = 1488) and their adult patients (n = 1 886 791) in Israel's largest health maintenance organization; the physicians were also patients in this health care system.

Results: For all 8 indicators, patients whose physicians were compliant with the preventive practices were more likely ($p < 0.05$) to also have undergone these preventive measures than patients with noncompliant physicians. We also found that more similar preventive practices showed somewhat stronger relations. For example, among patients whose physician had received the influenza vaccine, 49.1% of eligible patients received flu vaccines compared with 43.2% of patients whose physicians did not receive the vaccine (5.9% absolute difference, 13.7% relative difference). This is twice the relative difference (7.2%) shown for pneumococcal vaccine–eligible patients of influenza-vaccinated versus nonvaccinated physicians (60.9% v. 56.8%). When we examined the rates of unrelated practices, we found that, for example, mammography rates were identical for patients whose physicians did and did not receive the influenza vaccine.

Interpretation: We found a consistent, positive relation between physicians' and patients' preventive health practices. Objectively establishing this healthy doctor–healthy patient relation should encourage prevention-oriented health care systems to better support and evaluate the effects on patients of improving the physical health of medical students and physicians.

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Studies have found that physicians and medical students who report healthier personal habits are consistently and significantly more likely to also report more frequently counselling their patients about related habits.[1–6] However, this healthy doctor–healthy patient relation has only been studied via physicians' and patients' self-reported counselling and preventive practices; it has not been assessed through objectively measured clinical preventive experiences. We hypothesized that physicians' preventive health practices would be directly correlated with those of their patients.

Methods

To investigate the relation between physician and patient behaviour, we electronically accessed complete vaccination and screening records for primary care physicians who worked and were patients in Clalit Health Services (CHS), the largest health maintenance organization in Israel, which covers more than 50% of Israel's population. We also accessed data for all of these physicians' adult patients (n = 1 886 791). We examined 8 prevention-related health quality indicators monitored by CHS as part of a national quality indicator program.[7] As part of this program, all primary care physicians are evaluated routinely for their patients' outcomes. Patients insured by CHS are randomly assigned to a primary care physician at the clinic nearest to their home. Essentially all physicians who work in CHS also have a CHS primary care physician. Patients see only the primary care physician to whom they are assigned, unless their physician is on vacation, the patient is out of town, or in an emergent situation during which their assigned physician is not working. Each primary care physician is evaluated using the quality indicator measures of all of his or her patients. All physicians in CHS are independent practitioners, and the primary care

clinics are very small (physicians per practice: median 2, mode 1, range 1–10).

We obtained data from a comprehensive central database in which computerized data for all CHS patients are stored (demographic data, risk factors, disease registry data, pharmacy data, quality indicators and other clinical and administrative data). Data were identified by use of patients' identification numbers and the primary care physician to whom they were assigned. For each primary care physician, we determined the total number of patients and the percentage of men, patients older than 65 years and patients of low socioeconomic status. We included CHS physicians who had worked for at least 1 year in the same practice, who were insured by CHS and whose practice included at least 500 patients. For each quality indicator, we included primary care physicians who had at least 5 patients eligible for that indicator, providing a cross-sectional measure of concordance between physicians' and patients' preventive experiences. This study was approved by the CHS ethics committee.

We included the following 8 prevention-related quality indicators: mammography in women 50–74 years of age; colorectal cancer screening (colonoscopy or fecal occult blood testing) among patents aged 50–74 years; low-density lipoprotein (LDL) measurement every 5 years for patients aged 35–54 and yearly among patients aged 55–74 years; blood pressure measurement every 5 years for patients aged < 40 years, every 2 years for patients 41–54 years, and yearly for patients ≥ 55 years; pneumococcal vaccination among patients with a chronic illness and those aged ≥ 65 years; and annual influenza vaccine among patients with a chronic illness and those aged ≥ 65 years.

For each quality indicator, we identified physicians who had at least 5 patients who met the above criteria, and we compared the percentage of patients who received the preventive intervention for physicians who had or had not received the intervention themselves (compliant v. noncompliant). We used χ^2 tests for comparisons between groups. We considered p values less than 0.05 to be significant. We performed multivariable linear regression analyses for clustered data using generalized estimating equations to estimate the association between physician practice characteristics (total no. of patients within the physician's practice, percentage of male patients, patients > 65 yr, patients of low socioeconomic status). The physician was the unit of analysis, and the practice was the cluster unit. A homogenous correlations matrix was used, because all physicians in each clinic were assumed to be equally correlated on their population properties and compliance with quality indicators. We performed a sensitivity analysis to evaluate the effect of 3 factors in the regression models (no. of patients in the practice, percentage of low socioeconomic status, percentage of patients > 65 yr).

Results

We identified 1488 primary care physicians who met our inclusion criteria. Of these, 771 (51.8%) were women, and the mean age was 51.2 years (range 32–66 yr). In total, 108 (7.8%) physicians were smokers. The mean body mass index was 26.8 (standard deviation ± 4.2).

Table 1 shows the association between physicians' preventive practices and those of their patients (n = 1 886 791). We found that patients whose physicians adhered to the recommended screening or vaccination practices were significantly more likely to also undergo screening or vaccination compared with patients of noncompliant physicians. The difference was clinically significant for many of the interventions, showing as much as a 13.7% relative (although lower absolute) difference between patients of compliant and noncompliant physicians. We also found that although some physicians' preventive habits were better than those of their patients (influenza vaccination, LDL measurement and colorectal cancer screening), some were worse (pneumococcal vaccination and blood pressure monitoring) and one was quite similar (mammography; Table 1).

Appendix 1 (available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.121028/-/DC1) shows the results of multivariable modelling, which included practice size, patient characteristics (age, sex and socioeconomic status) and practice as the cluster unit. In this analysis, 5 of the 8 associations between physician and patient preventive practices remained statistically significant, and all associations remained positive. In our sensitivity analyses (Appendix 2, available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.121028/-/DC1), the relation between physician and patient preventive practices remained consistent with the effects observed in the regression models for the 3 evaluated factors (socioeconomic status, elderly population, no. of patients in the practice). In all but 2 of the 72 comparisons in the 3 sensitivity analyses performed, physicians' compliance with preventive practices was positively associated with patients' compliance.

In our investigation of the potential confounding effect of physician sex on preventive practices, we found that mammogram-eligible patients of noncompliant female physicians were almost exactly as likely as patients of male physicians to

Table 1: Proportion of 1 886 791 patients who received a preventive intervention, according to whether their physician received or did not receive a corresponding preventive intervention

Receipt of intervention by eligible physicians	Mean % of eligible patients who received intervention							
				Blood pressure measurement				
	Mammogram	Colorectal cancer screening	LDL measurement	Every 5 yr if age 20–40 yr	Every 2 yr if age 41–54 yr	Every year if age ≥ 55 yr	Pneumococcal vaccine	Influenza vaccine
Mammogram								
Yes (*n* = 231, 67.0%)	69.5	49.2	83.3	84.3	81.5	77.8	57.3	44.5
No (*n* = 114, 33.0%)	66.7	45.4	82.2	82.9	79.7	76.5	52.9	40.6
p value*	0.002†	< 0.001‡	0.1	0.2	0.1	0.2	0.002‡	0.003‡
Colorectal cancer screening								
Yes (*n* = 502, 60.9%)	68.4	50.0	83.2	82.8	81.7	78.4	59.8	47.6
No (*n* = 322, 39.1%)	66.1	45.6	81.3	82.3	81.2	77.0	58.1	45.0
p value*	< 0.001‡	< 0.001†	< 0.001‡	0.5	0.5	0.06	0.08	0.007‡
LDL measurement								
Yes (n = 602, 88.7%)	67.8	48.1	83.1	82.7	81.4	77.3	59.0	46.3
No (n = 77, 11.3%)	64.9	47.4	81.2	83.4	81.6	77.0	59.3	47.0
p value*	0.01‡	0.6	0.02†	0.6	0.8	0.8	0.8	0.9
Blood pressure measurement every 5 yr if age 20–40 yr								
Yes (n = 118, 60.5%)	66.2	47.1	82.2	83.7	82.2	78.3	59.6	45.4
No (n = 51, 39.5%)	67.5	48.8	83.5	80.9	79.6	73.2	58.0	46.1
p value*	0.4	0.2	0.2	0.04†	0.1	0.004‡	0.4	0.8
Blood pressure measurement every 2 yr if age 41–54 yr								
Yes (n = 371, 73.2%)	67.1	47.7	82.9	83.5	82.6	78.4	59.0	46.4
No (n = 136, 26.8%)	68.6	48.9	82.8	82.7	80.7	76.5	58.8	47.0
p value*	0.07	0.2	0.8	0.4	0.04†	0.03†	0.8	0.7
Blood pressure measurement every year if age ≥ 55 yr								
Yes (n = 194, 66.2%)	67.1	47.3	82.1	83.5	81.9	78.3	59.6	44.6
No (n = 99, 33.8%)	67.1	46.3	82.0	78.5	76.8	73.8	57.7	45.7
p value*	0.9	0.4	0.8	0.003‡	< 0.001‡	< 0.001†	0.2	0.5
Pneumococcal vaccine								
Yes (n = 101, 44.5%)	66.5	48.8	81.6	83.7	84.3	80.4	62.1	49.0
No (n = 126, 55.5%)	66.5	47.1	80.7	81.4	80.3	76.4	56.6	45.1
p value*	0.9	0.2	0.4	0.2	0.01‡	0.005‡	0.004†	0.03‡
Influenza vaccine								
Yes (n = 735, 51.2%)	67.2	48.2	82.8	82.9	82.0	78.0	60.9	49.1
No (n = 701, 48.8%)	67.1	46.1	81.9	82.8	81.0	77.0	56.8	43.2
p value*	0.8	< 0.001‡	0.01‡	0.9	0.07	0.04‡	< 0.001‡	< 0.001†

Note: LDL = low-density lipoprotein.
*Calculated using the χ^2 test.
†*p* value for comparison of identical patient and doctor preventive interventions (e.g., % of eligible patients having a mammogram v. % of their physicians who had a mammogram), indicating a patient's likelihood of receiving the intervention depending on whether or not the patient's doctor had received the same intervention.
‡$p < 0.05$ for comparison of nonidentical patient and doctor preventive interventions (e.g., % of eligible patients having a mammogram v. % of their doctors who underwent colorectal cancer screening), indicating the likelihood of a patient receiving the intervention depending on whether or not the patient's doctor had received the comparison intervention.

undergo mammography (66.7% v. 66.0%), compared with 69.5% of patients of compliant female physicians (data not shown; $p < 0.001$).

We investigated whether closely related preventive practices (cancer prevention, cardiovascular disease prevention, vaccination) would show stronger relations. Among patients whose physician received the influenza vaccine, 49.1% received the influenza vaccine, compared with 43.2% of patients of noncompliant physicians (13.7% relative difference). In contrast, among patients whose physicians received the influenza vaccine, 60.9% of eligible patients received the pneumococcal vaccine, compared with 56.8% of patients whose physician did not receive the influenza vaccine (7.2% relative difference). For a completely unrelated preventive practice, the rates of mammography were very similar among patients whose physician received (67.2%) or did not receive (67.1%) the influenza vaccine.

Interpretation

In this study, we provide a direct positive link between physicians' and patients' preventive practices. There was no obvious source of reporting bias, and we used a very large population across an entire country. For every preventive practice we examined, patients of primary care physicians who complied with the recommended preventive practices were significantly more likely to also have complied with those practices than patients of noncompliant physicians. These differences were always statistically significant, with a relative difference of up to 14% (although typically much smaller absolute differences). In addition to these positive associations between physician and patient behaviour (e.g., between a physician and his or her patient receiving the influenza vaccine), we also observed that other closely related behaviours (e.g., between physicians receiving the influenza vaccine and their patients receiving the pneumococcal vaccine) were somewhat more likely to be associated than were unrelated behaviours (e.g., between a physician receiving the influenza vaccine and his or her patient undergoing mammography).

We also found a preliminary suggestion that physician's compliance with preventive recommendations (screening and vaccination) could significantly interact with physician sex as a predictor of patient screening and vaccination). This finding requires further study because although most previous studies have found that physician sex affects patient experience,[8,9] these studies did not stratify by physician preventive practice.

We found that the personal screening and vaccination practices of the included physicians had considerable room for improvement, and their rates of screening or vaccination were not consistently higher than the rates among their patients; this has been described in other populations[10–13] but via by self-report and in a smaller, objective subset of these data.[13] The physician screening rates for tests other than LDL cholesterol were less than exemplary and are a substantial health promotion opportunity both for physicians and their patients. The unremarkable secondary prevention (screening) rates we observed differ from physicians' primary preventive habits; physicians' self-reported primary preventive habits are considerably better than those self-reported by their patients in both the United States and Canada (2 markedly different health care systems).[11,12]

The healthy doctor–healthy patient relationship has been shown previously for self-reported preventive habits in many populations, including large populations of physicians and medical students in the US, Canada and Colombia,[1–5] and now in Israel via objectively measured indicators. Our data also reinforce previous conclusions based on self-reported data that the more closely related the clinical practices (e.g., cardiovascular disease screening and cancer screening), the more closely related physicians' and patients' preventive practices may be.[5]

This physician–patient relationship is a particularly sturdy and generalizable finding because the CHS system randomly assigns patients to providers (i.e., removing physician-selection bias), and CHS strongly encourages compliance with preventive practices by encouraging physicians to perform patient screening and immunization.[7,14] Because ethics and practicalities prevent randomly assigning anyone, including physicians, to poorer preventive practices to try to provide a more definitive test, our data should provide additional impetus to improve physician health.

Limitations

The greatest strength of this study (its reliance on a large electronic medical record) is also its major limitation, because we have no complementary information about the physicians' beliefs or attitudes; this decision was made because of the abundant existing literature in those realms.[15]

Conclusion

Our findings suggest that there is room for improvement in some physicians' preventive practices (particularly around screening and vaccination) and that improving the health of physicians could improve outcomes for their patients as well. We believe that programs for physician

health promotion should be developed and studied to determine how best to actively encourage the healthy doctor–healthy patient association. We know of no studies that have tested promoting physical health habits among physicians and of only one large intervention study[16,17] that promoted such habits among medical students. This previous study reported that an intervention to improve medical students' self-reported dietary and exercise practices improved their likelihood to counsel patients on diet and exercise.

Objectively establishing this healthy doctor–healthy patient relation should encourage researchers to test various ways to promote physician health as a way to encourage patient health, medical schools to produce more avid preventionists,[18] and health care systems to support physician health. Physician health is rarely systematically promoted anywhere in the world, suggesting that policy-makers believe that physicians are already adequately supported. In the few places where there are such programs, they concentrate heavily on suitability and competence to practice, mental health and illness, and practice-related psychological motivation and physical stamina. But our profession should do more than that, and we can now do so on the most pragmatic grounds: we should improve physicians' preventive practices, because patient health could substantially benefit if we do so.

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