Electronic Result Viewing and Quality of Care in Small Group Practices

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BACKGROUND: There is a paucity of data on the effectiveness of commercially available electronic systems for improving health care in office practices, where the majority of health care is delivered. In particular, the effect of electronic laboratory result viewing on quality of care, including preventive care, chronic disease management, and patient satisfaction, is unclear.

OBJECTIVE: To determine whether electronic laboratory result viewing is associated with higher ambulatory care quality.

METHODS: We conducted a cross-sectional study of primary care physicians (PCPs) in the Taconic IPA in New York, all of whom have the opportunity to use a free-standing electronic portal for laboratory result viewing. We analyzed 15 quality measures, reflecting preventive care, chronic disease management, and patient satisfaction, which were collected in 2005. Using generalized estimating equations, we determined associations between portal usage and quality, adjusting for adoption of electronic health records and 10 other physician characteristics, including case mix.

MAIN RESULTS: One-third of physicians (54/168, 32%) used the portal at least once over a 6-month period. Use of the portal was associated with higher quality overall (adjusted odds ratio [OR] 1.25; 95% confidence interval [CI] 1.003, 1.57). In stratified analyses, portal usage was associated with higher quality on those performance measures expected to be impacted by result viewing (adjusted OR 1.34; 95% CI 1.00, 1.81; p=0.05), but not associated with quality for measures not expected to be impacted by result viewing (adjusted OR 1.03; 95% CI 0.72, 1.48; p=0.85).

CONCLUSION: Electronic laboratory result viewing was independently associated with higher ambulatory care quality. Longitudinal studies are needed to confirm this association.

KEY WORDS: health information technology; health information exchange; quality of health care; laboratory results.

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INTRODUCTION

Outpatient medical offices, where the majority of American physicians practice,[1] traditionally use paper-based methods to organize clinical information.[2] Receiving laboratory results by regular mail or fax can cause delays in receipt of results and uncertainty about which tests have been completed and when.[3]

Health information technology (HIT) is widely believed to have the potential to improve receipt of test results and other aspects of health care quality.[4–7] Many states are spending tens of millions of dollars on HIT infrastructure, including promoting adoption of electronic health records (EHRs),[8–10] despite uncertain returns on investments. Nevertheless, small group practices have been relatively slow to adopt HIT.[2] Barriers to adoption include: the large up-front capital costs usually required, skepticism about the clinical utility of these systems, concerns about potential loss of productivity, and lack of computer skills.[11]

Data on the effectiveness of HIT are limited, with the literature being defined by the use of technology to improve care within a few pioneering academic medical centers that have home-grown systems.[12] Relatively little is known about the effectiveness of using HIT (especially commercially available systems) in physician offices. The effectiveness of exchanging health information across health care settings is unknown.

Previous studies, some of which incorporate alerts, found that electronic laboratory result viewing can decrease unnecessary repeat testing and shorten the time to address abnormal results.[13–16] These studies considered the effect of electronic laboratory result viewing within a single setting: the inpatient setting,[13,14] the emergency department,[15] or a hospital-based clinic.[16] The effects of electronic laboratory result viewing on preventive care and management of chronic disease—either in these settings or in practices that would need to exchange data with external, free-standing laboratories—are unclear.

Other electronic interventions have been evaluated for their effects on preventive care and chronic disease management in the ambulatory setting. Computerized alerts and reminders within EHRs have been found to increase adherence to

preventive care guidelines[17–22] and improve management of chronic disease.[23–28] However, these studies took place in academic general Internal Medicine clinics[17–27] or primary care clinics within staff-model health maintenance organizations (HMOs),[28] which may limit generalizability.

We studied a large independent practice association (IPA), mostly comprised of small group practices, which has access to a commercially available internet-based portal for exchange of laboratory data among ambulatory providers, free-standing laboratories, and hospitals. This portal is available through monthly subscription fees and can be used with or without an EHR. We sought to measure any association between use of this portal and higher quality of care, including preventive care, chronic disease management, and patient satisfaction. We specifically sought to determine whether an association exists independently of EHR adoption.

METHODS

Overview

We conducted a cross-sectional study of primary care physicians (PCPs) in the Taconic IPA, located in New York's Hudson Valley. All PCPs had the opportunity to access a free-standing, internet-based portal by MedAllies for viewing laboratory results. Some also adopted EHRs, using vendors of their choice and products with varying decision support capabilities. We used performance data collected in 2005 by MVP Health Care, a regional health plan.

Participants and Setting

The Taconic IPA has 3,000 physicians and strong leadership advocating for both quality improvement and HIT adoption. Most physicians are in solo or small group practices. Many participate in the Taconic Health Information Network and Community (THINC), a regional health information organization that brings together physicians, hospitals, laboratories, and other stakeholders for health information exchange. The Taconic IPA is the exclusive physician network for MVP Health Care in the Hudson Valley.

MVP Health Care, a not-for-profit corporation, provides a variety of health insurance products, including an HMO, to 12,000 employers and >450,000 members throughout New York, Vermont, and New Hampshire. MVP is 1 of the top 20 commercial health plans, according to the 2006 U.S. News and World Report/National Committee for Quality Assurance (NCQA).[29] Since 2001, MVP has been issuing Physician Quality Reports to PCPs (Internists, family practitioners, and pediatricians) with ≥150 MVP patients. Quality measures are based on those contained in NCQA's Health Plan Employer Data and Information Set (HEDIS). Reports are specialty-specific and compare a physician's performance to regional benchmarks. Taconic IPA physicians have received annual financial bonuses since 2002 for exceeding these benchmarks.

MedAllies, a for-profit company founded in 2001, is the exclusive technology service company for THINC. By allowing physicians in small group practices to adopt electronic services through monthly fees, MedAllies enables them to avoid large up-front capital costs. Since 2002, MedAllies has provided access to an internet-based portal that physicians can log into with secure passwords from any computer. This portal integrates laboratory data from hospitals and free-standing laboratories, receiving 10,000 results per week. In addition, results from mammography, Pap smears, and colonoscopies are available if those tests were conducted at sites that participate in data feeds to MedAllies, which constitute about half of the community's volume. The portal includes clinical information for >700,000 patients and is accessed by >1,600 users, including >500 physicians in 175 practices.

Data

Usage of electronic laboratory result viewing was obtained by query of the portal for the second half of 2005. EHR adoption data were obtained from MVP. MVP collected performance data in the summer and fall of 2005 through medical record review, administrative claims, and patient surveys. Quality Reports included 15 measures: rates of 1) mammography; 2) Pap smears; 3) colorectal cancer screening; 4) appropriate asthma medication use; 5) antibiotic use for acute upper respiratory infections; 6–9) documentation of body mass index (BMI), nephropathy screening, lipid and glycemic control for patients with diabetes; 10–13) documentation of BMI and counseling for drug and alcohol use, sexual activity, and tobacco use for adolescents; 14) satisfaction with quality of care; and 15) satisfaction with communication from physicians' offices.

We also obtained data from MVP to control for physicians' characteristics: age, gender, specialty (Internal Medicine, family practice, or general practice), board certification, degree (MD or DO), physician group size, patient panel size, case mix, resource consumption, and use of ePocrates (an electronic drug reference).

Case mix was calculated by MVP using commercially available software that applied the Diagnostic Cost Group (DxCG) All Encounter, Explanation model.[30,31] The case mix for each patient is standardized against the average for MVP's HMO and another MVP product. The case mix for each physician is calculated by averaging the case mix for his or her patients. A value of 1.0 represents average case mix, <1.0 represents healthier than average, and >1.0 sicker than average.

Resource consumption reflects the amount of services a physician's panel utilized, including professional and outpatient services, laboratory tests, pharmacy, radiology, emergency department utilization and hospitalization. The resource consumption index is also standardized, with 1.0 representing average, <1.0 lower than average, and >1.0 higher than average resource consumption.

Statistical Analysis

Usage of the portal for laboratory result viewing was calculated as the average number of days per month a PCP logged in and then converted to a percentage of target usage, defined by MedAllies as 15 days per month. For example, if a PCP logged in an average of 10 days per month, portal usage would be 67%, i.e., $10/15 \times 100$. Usage exceeding 15 days per month was truncated and considered 100% usage. Because usage data were skewed, we classified PCPs into 2 groups, those with any portal usage and those with none.

We used descriptive statistics to characterize our sample overall and stratified by portal usage and—separately—by EHR adoption. We compared portal users to nonusers and EHR adopters to

Table 1. Characteristics of 168 Primary Care Physicians (PCPs), Overall and Stratified by Use of Electronic Laboratory Result Viewing*

		Uses Electronic Laboratory Result Viewing		
	Overall	Yes	No	
Characteristics	*N*=168	*N*=54	*N*=114	*p*
Adopted electronic health record, *N* (%)	17 (10)	6 (11)	11 (10)	.78
Age, mean (SD)†	48.7 (8.9)	46.5 (7.7)	49.7 (9.3)	.03
Gender, *N* (%) male	130 (77)	40 (74)	90 (79)	.48
Specialty, *N* (%)				
Family Practice	83 (49)	29 (54)	54 (47)	.30
General Practice	5 (3)	0 (0)	5 (4)	
Internal Medicine	80 (48)	25 (46)	55 (48)	
Board certified, *N* (%)	152 (90)	51 (94)	101 (89)	.23
MD degree (vs DO), *N* (%)	149 (89)	48 (89)	101 (89)	.96
Number of PCPs in group, mean (SD)	3.8 (4.4)	3.8 (3.3)	3.7 (4.9)	.92
Patient panel size, mean (SD)‡	405 (278)	501 (341)	359 (231)	.007
Case mix index, mean (SD)§	1.07 (0.23)	1.06 (0.19)	1.08 (0.25)	.65
Resource consumption index, mean (SD)‖	0.95 (0.12)	0.97 (0.12)	0.94 (0.12)	.16
Uses ePocrates, *N* (%)	31 (19)	13 (25)	18 (16)	.19

Missing data: Uses EHR Adoption=1, ePocrates=3.
†*As of July 1, 2003.*
‡*Panel size of MVP members only.*
§*A value of 1.0 for the case mix index indicates average disease severity, whereas <1.0 indicates healthier patients than average and >1.0 indicates sicker patients than average.*
‖*A value of 1.0 for the resource consumption index indicates the expected level of consumption, whereas <1.0 indicates lower than expected and >1.0 indicates higher than expected levels of consumption.*

nonadopters, using *t* tests for continuous variables and chi-squared or Fisher's exact tests for dichotomous variables.

We compared the performance of each PCP to the mean performance of MVP's HMO. We assigned each PCP a value of 1 if s/he scored equal to or better than the HMO mean and 0 otherwise. We also calculated the proportion of PCPs whose performance was equal to or better than the HMO mean for each quality measure. In addition, we generated a quality index for each PCP, equal to the number of measures for which s/he performed at or better than the HMO mean divided by the total number of measures for which that PCP was eligible. We summarized the index for the physicians as a group.

We explored associations among portal usage, EHR adoption, physician characteristics, and quality of care overall using generalized estimating equation models to account for multiple quality outcomes per PCP. Not every PCP provided data for every measure, because some measures were specialty-specific and some required having ≥5 patients with the relevant conditions. We fitted bivariate and multivariate stepwise regression models with backward elimination.

We conducted an analysis stratified by whether the performance measures would be expected to be impacted by use of electronic laboratory result viewing, considering the following 8 measures to be potentially impacted: mammography; Pap smears; colorectal cancer screening; nephropathy screening, lipid control and glycemic control for patients with diabetes; satisfaction with quality of care; and satisfaction with communication from physicians' offices. Because not all mammogram, Pap smear, and colonoscopy results were available through the portal, we conducted a second stratified analysis reclassifying these measures as not expected to be impacted by use of electronic laboratory result viewing.

All analyses were performed by using SAS version 9.1 (SAS Institute, Inc., Cary, NC). We considered p values ≤ 0.05 to be significant.

RESULTS

We included all 168 PCPs with ≥150 MVP patients. These PCPs were 48.7 years old on average and 77% were male (Tables 1 and 2). Approximately half were Internists, and almost all were board certified (90%) and held MD degrees (89%). The average practice size was 3.8 physicians (SD 4.4).

One-third (*N*=54, 32%) of PCPs were using the portal for electronic laboratory result viewing. Among users, the average PCP logged in 6.3 days per month or 43% of target usage (SD 5.1 days or 34% of target usage, median 5.1 days or 34% of target usage). Users were younger (46.5 vs 49.7 years, p=0.03) and had larger average panel sizes (501 vs 359, p=0.007) than nonusers. There were no differences between users and nonusers in terms of EHR adoption or any other physician characteristic (Table 1).

Ten percent of PCPs (*N*=17) had adopted EHRs. Adopters were more likely to be family practitioners than nonadopters

Table 2. Characteristics of 168 Primary Care Physicians (PCPs), Overall and Stratified by Adoption of Electronic Health Records*

		Adopted Electronic Health Record		
	Overall	Yes	No	
Characteristics	*N*=168	*N*=17	*N*=150	*p*
Uses electronic laboratory result viewing, *N* (%)	54 (32)	6 (35)	48 (32)	.78
Age, mean (SD)†	48.7 (8.9)	45.4 (8.8)	49.1 (8.8)	.10
Gender, *N* (%) male	130 (77)	14 (82)	115 (77)	.77
Specialty, *N* (%)				
Family Practice	83 (49)	10 (59)	73 (49)	.05
General Practice	5 (3)	2 (12)	3 (2)	
Internal Medicine	80 (48)	5 (29)	74 (49)	
Board certified, *N* (%)	152 (90)	13 (76)	138 (92)	.06
MD degree (vs DO), *N* (%)	149 (89)	17 (100)	132 (88)	.22
Number of PCPs in group, mean (SD)	3.8 (4.4)	6.8 (9.2)	3.4 (3.4)	.15
Patient panel size, mean (SD)‡	405 (278)	355 (241)	412 (283)	.43
Case mix index, mean (SD)§	1.07 (0.23)	1.10 (0.24)	1.07 (0.23)	.60
Resource consumption index, mean (SD)‖	0.95 (0.12)	0.95 (0.11)	0.95 (0.13)	.88
Uses ePocrates, *N* (%)	31 (19)	3 (18)	28 (19)	.90

Missing data: Uses ePocrates=3, EHR Adoption=1. PCP = primary care physician.
†*As of July 1, 2003.*
‡*Panel size of MVP members only.*
§*A value of 1.0 for the case mix index indicates average disease severity, whereas <1.0 indicates healthier patients than average and >1.0 indicates sicker patients than average.*
‖*A value of 1.0 for the resource consumption index indicates the expected level of consumption, whereas <1.0 indicates lower than expected and >1.0 indicates higher than expected levels of consumption.*

(59% vs 49%, p=0.05). There were trends toward adopters being younger (45.4 vs 49.1 years, p=0.10) and less likely to be board certified (76% vs 92%, p=0.06) than nonadopters, although these findings were not statistically significant. There were no differences between adopters and nonadopters in terms of use of electronic laboratory result viewing or any other physician characteristic (Table 2).

In terms of quality, 40–76% of PCPs exceeded the HMO mean for most measures (Table 3). The notable exceptions were documentation of BMI for adolescents and for patients with diabetes, for which only 17–20% of PCPs exceeded the HMO mean. Overall, the average physician exceeded the HMO mean of 52% of the quality measures.

In a bivariate model, portal usage was associated with higher quality (odds ratio [OR] 1.29; 95% confidence interval [CI] 1.02, 1.64). Also in bivariate models, being board certified and having a sicker patient panel were associated with higher quality, whereas older age, male gender, and being a family or general practitioner were associated with lower quality (Table 4). Adoption of an EHR was not associated with quality (Table 4).

In multivariate models, portal usage persisted as a variable associated with higher quality (OR 1.25; 95% CI 1.003, 1.57; p=0.047). Being board certified, having a sicker panel of patients and consuming more resources were also each independently associated with higher quality, and being a family practitioner was associated with lower quality (Table 5).

When we stratified our results by whether the performance measures were expected to be impacted by electronic laboratory result viewing, portal usage persisted as being associated with higher quality for measures expected to be impacted (including mammography, Pap smears, and colonoscopy) (adjusted OR 1.34; 95% CI 1.00, 1.81; p=0.05) but not associated with quality for measures not expected to be impacted (adjusted OR 1.03; 95% CI 0.72, 1.48; p=0.85). When we redid this stratified analysis reclassifying mammography, Pap smears, and colonoscopy as measures not expected to be impacted by result viewing, the results were essentially the same: portal use was associated with higher quality for measures expected to be impacted (adjusted OR 1.42; 95% CI 1.03, 1.98; p=0.03), but not associated with quality for measures not expected to be impacted (adjusted OR 1.09; 95% CI 0.85, 1.41; p=0.49).

Table 3. Average Ambulatory Care Quality for Each of 15 Measures and the Proportion of Primary Care Physicians Exceeding Average Performance

Quality Measure	*N*	MVP HMO Mean	% Taconic IPA PCPs ≥ HMO Mean
Mammography, % female members 52–69 years old who had a mammogram in the reporting year or the previous year	167	76.4	44.9
Pap smear, % of female members 21–64 years old who had a Pap smear in the reporting year or 2 years before	168	81.0	42.9
Colorectal cancer screening, % of members 50–80 years old who had fecal occult blood testing in the reporting year, flexible sigmoidoscopy in the last 5 years, or colonoscopy in the last 10 years	167	52.7	64.1
Asthma medication management, % of members with asthma who filled a prescription for more than 1 short-term beta agonist in a specified 3-month period and were also on a long-term controller medication (credit was also given for members with asthma on a long-term controller medication who did not require frequent short-term beta agonist use)	120	88.8	76.3
Antibiotic use, % of members who were treated with an antibiotic for acute bronchitis, acute sinusitis or acute upper respiratory infection/pharyngitis*	77	47.2	40.3
For patients with diabetes only:			
Body mass index documented, %	148	15.4	16.9
Nephropathy screening, %	148	61.6	58.1
Low-density lipoprotein cholesterol <100 mg/dL in the reporting year or the year before, %	148	45.1	60.1
HbA_{1C} < 7% in the reporting year, %	148	48.9	68.9
For adolescents (ages 14–18 years) only, in the 2 previous years:			
Body mass index documented, %	61	10.3	19.7
Screening or counseling documented for drug and alcohol use, %	62	75.5	60.3
Screening or counseling documented or pregnancy or sexually transmitted diseases, %	63	68.0	44.4
Screening or counseling documented for tobacco use, %	63	75.9	66.7
Member satisfaction score with communication with PCP's office, % (maximum possible score 100%)	165	85.3	57.6
Member satisfaction score with quality of care, out of 100% (maximum possible score 100%)	165	86.9	47.3

MVP=Mohawk Valley Physicians' Health Care; HMO=health maintenance organization; IPA=Independent Practice Association.
**In the case of antibiotic use, the last 2 columns represent the % of PCPs who are at or below the HMO mean, because a lower score is better.*

DISCUSSION

In this study of small group practices, we found that electronic access to laboratory results was associated with higher performance on preventive care, chronic disease management, and patient satisfaction. We found that the association between electronic laboratory result viewing and quality of care was independent of adoption of EHRs. These findings are notable because the study used a commercially available electronic portal that allows viewing of data from geographically separate ambulatory practices, free-standing laboratories, and hospitals. This study is also notable because, in many other settings, electronic laboratory result viewing is a function integrated into EHRs (rather than being a free-standing application), in which case it is difficult to measure the independent effect of laboratory result viewing.

We did not find a statistically significant association between adoption of EHRs and quality of care, although the effect size of EHR adoption (OR 1.29) was actually similar to that of electronic laboratory result viewing (OR 1.22). Only 10% of PCPs had adopted EHRs, compared to 32% using electronic laboratory result viewing. The small sample size of EHR adopters led to wider confidence intervals, reflecting limited power to find a difference in quality between adopters and nonadopters even if a difference existed.

Table 4. Bivariate Associations Between Physician Characteristics and Higher Quality of Care*

Physician Characteristic	Odds Ratio (95% Confidence Interval)	p
Adopted electronic health record (yes vs no)	1.22 (0.84, 1.77)	.30
Uses electronic laboratory result viewing (yes vs no)	1.29 (1.02, 1.64)	.04
Age (per 10-year increase)	0.87 (0.77, 0.98)	.02
Gender (male vs female)	0.63 (0.48, 0.82)	.0005
Specialty		
Family Practice (vs Internal Medicine)	0.78 (0.62, 0.98)	.03
General Practice (vs Internal Medicine)	0.59 (0.42, 0.83)	.003
Board certified (yes vs no)	1.56 (1.15, 2.11)	.004
Degree (MD vs DO)	1.02 (0.70, 1.48)	.91
Number of physicians in group (per physician)	1.002 (0.97, 1.04)	.92
Patient panel size (per 1 log increase)	1.01 (0.83, 1.22)	.94
Case mix index (per unit increase)	1.88 (1.19, 2.97)	.007
Resource consumption index (per unit increase)	1.82 (0.73, 4.54)	.20
Uses ePocrates, an electronic drug reference (yes vs no)	0.90 (0.69, 1.17)	.42

**The dependent variable reflects 15 quality measures, including measures related to preventive care, chronic disease management, and patient satisfaction. Models adjust for clustering of quality indicators within physician by using generalized estimating equations.*

There are 2 possible interpretations of our main findings. Electronic laboratory result viewing could improve quality of care by enabling physicians to identify easily which laboratory data are missing for certain patients (e.g., a mammogram or hemoglobin A_{1c}) and thereby facilitate ordering of the missing test. Alternatively, the association between electronic laboratory result viewing and quality of care could be confounded by unmeasured physician characteristics. Early adopters of new technologies may have different personalities than late adopters[32,33], although there is little empirical evidence about differences in performance between early and late adopters. Although this is a cross-sectional study and we cannot infer causality, the stratified analyses we performed are consistent with the first interpretation, as portal usage (by the same physicians) was not associated with quality for measures not expected to be affected by results viewing.

We also found that being a General Internist, being board certified, having a sicker panel of patients, and consuming more resources were each independently associated with higher quality. The literature comparing quality of care delivered by general interests versus family practitioners is limited, because most studies pool these physician groups and compare them to subspecialists. One study found that family practitioners were more prepared at the end of training to provide ambulatory care than General Internists, which would lead to the opposite of what we found; however, this study was limited by self-assessment of preparedness rather than actual provision of care.[34] Although the literature on board certification is mixed, a majority of studies do suggest an association between board certification and better clinical outcomes[35]; this is consistent with our study. It is counterintuitive to find that having a sicker panel of patients is associated with higher quality of care; this may reflect some self-selection among patients (with patients having chronic disease choosing better physicians) or an unmeasured characteristic of physicians (with physicians having sicker patients also being more motivated to improve their quality of care). The finding that higher resource consumption is associated with higher quality of care is not surprising, as several quality measures are defined by ordering tests.

Previous studies have found specific effects of electronic laboratory result viewing (with or without alerts), such as decreased ordering of unnecessary tests[13,15,16] and improved management of abnormal results.[14] To our knowledge, our study is the first to find an association between electronic laboratory result viewing and quality of care, as defined by preventive care, chronic disease management, and patient satisfaction measures. Our findings were consistent whether we considered 15 quality measures (to capture many potential effects of EHRs) or narrower sets of 5 or 8 quality measures (to capture only those outcomes directly affected by access to laboratory results).

There are several limitations of this study. First, this study is cross-sectional in design and therefore cannot prove causality. Second, our sample size, particularly of physicians using electronic health records, was relatively small. Third, we do not have data on whether physicians accessed laboratory results through their EHRs, instead of or in addition to accessing them through the portal. However, because only 10% of physicians had EHRs, the magnitude of this effect is likely to be small, if any. Finally, our study took place in 1 IPA in the Hudson Valley of New York, which may limit generalizability. The overall quality of care found in this study, regardless of electronic laboratory result viewing, was higher than the national average.[36,37]

In conclusion, this study suggests that electronic laboratory result viewing, which the Institute of Medicine considers to be a core electronic functionality,[38] is associated with providing higher quality ambulatory care. This study is notable because it involves small group practices; a commercially available product; a payment structure for physicians that facilitates adoption and sustainability; and exchange of data across geographically distinct practices, laboratories, and hospitals.

Table 5. Final Multivariate Model with Physician Characteristics Independently Associated with Higher Quality of Care*

Physician Characteristic	Odds Ratio (95% Confidence Interval)	p
Use of electronic laboratory result viewing (yes vs no)	1.25 (1.003, 1.57)	.047
Specialty		
Family Practice (vs Internal Medicine)	0.78 (0.63, 0.96)	.02
General Practice (vs Internal Medicine)	1.09 (0.61, 1.95)	.76
Board certified (yes vs no)	1.82 (1.27, 2.60)	.001
Case mix index (per unit increase)	4.18 (2.44, 7.14)	<0.0001
Resource consumption index (per unit increase)	7.54 (2.53, 22.53)	.0003

** The dependent variable reflects 15 quality measures, including measures related to preventive care, chronic disease management, and patient satisfaction. The model above is derived from generalized estimating equations and adjusts for all variables listed (selected through stepwise regression with backward elimination) plus clustering of quality indicators within physician.*

Future studies should employ longitudinal designs to confirm the association between electronic laboratory result viewing and quality of care. Future studies should also reexplore the relationship in small group practices between adoption of commercially available EHRs and quality of care after adoption is more widespread.

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Conflicts of Interest: *Dr. Blair is the President of the 1 UC1 HS016316 Taconic IPA and the CEO of MedAllies. Dr. Salkowe and Ms. Chambers are employed by MVP Health Care; Dr. Salkowe is Vice President of Clinical Quality Improvement and Ms. Chambers is Director of Quality Improvement.*

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