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The Role of Health IT and Delivery System Reform in Facilitating Advanced Care Delivery

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Abstract

Objectives—To examine whether physicians using health information technology and participating in new models of payment and delivery were more likely to perform care processes associated with improved care delivery.

Study Design—Nationally representative, cross-sectional data on US office-based physicians from the 2012 National Ambulatory Medical Care Survey Physician Workflow Survey.

Methods—Multivariate regression analysis of whether physicians routinely performed 14 specific care processes in 4 categories: population management, quality measurement, patient communication, and care coordination. Key independent measures were electronic health record (EHR) use and accountable care organization (ACO) or patient-centered medical home (PCMH) participation.

Results—A majority of physicians reported routinely conduct at least 1 care process related to care coordination (89%), patient communication (69%), and population management (67%); less than half reported performing at least 1 quality measurement process routinely (44%). EHR use and ACO or PCMH participation were independently associated with a higher likelihood of performing care processes. Physicians who were using EHRs in combination with participation in ACO or PCMH initiatives had the highest likelihood of routinely performing the care processes: physicians who used an EHR and participated in ACO or PCMH initiatives were between 6 and 22

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percentage points more likely to routinely perform the care processes than physicians with EHRs alone.

Conclusions—In 2012, physicians using EHRs and participating in ACO or PCMH initiatives were more likely than other physicians to be routinely engaging in care processes expected to improve healthcare outcomes. Yet, many US physicians were not performing these processes routinely. This analysis highlights several specific areas where more work is necessary to facilitate wider adoption of these activities.

There is wide consensus that changes are necessary in the way healthcare is delivered in the United States in order to realize reductions in healthcare spending and improvements in population health outcomes.[1,2] National policies currently support 2 programs that may substantially change the way care is delivered; one related to health information technology (IT) adoption and the other related to payment reform and the use of new care delivery models.[3]

The Health Information Technology Act (HITECH) Act of 2009 was designed to provide the infrastructure necessary for improvements in care delivery by supporting greater adoption of IT tools, including electronic health records (EHRs), which can facilitate high-quality care.[4] The HITECH Act authorized the Medicare and Medicaid EHR Incentive Programs, which provide financial assistance to eligible professionals for the “meaningful use” (MU) of certified EHRs with functionalities associated with enhanced quality of care, such as electronic prescribing and medication alerts.[5]

Concurrently, the 2010 Affordable Care Act (ACA) is supporting the development and implementation of new delivery and payment models, such as patient-centered medical homes (PCMHs) and shared savings arrangements like accountable care organizations (ACOs). Although EHRs are not required for participation in all types of PCMH or ACO programs, it is widely believed that providers need a robust health IT infrastructure to be fully successful in these payment and delivery arrangements.[6–7]

Early indicators suggest strong physician participation in initiatives to support health IT adoption and to reform healthcare payment and delivery.[8–12] However, evidence on whether provider participation in these initiatives has translated to better care delivery is just beginning to emerge.[13–15] Areas identified as priorities for improvement include care processes, such as population management and prevention, quality measurement and reporting, care coordination, and patient engagement.2 Although studies prior to HITECH and the ACA found health IT and external reporting or payment incentives to be associated with a higher likelihood of performing these care processes, they are performed at low rates even when these factors are in place.[16–20] At least 1 study of primary care physicians found evidence that those in PCMH practices using EHRs had greater quality improvements and changes in utilization over time on some measures than those in non-PCMH practices with or without EHRs.[21,22]

We examined 4 main questions about the relationship between EHR use, participation in new payment and delivery models, and the extent to which physicians perform care processes that may lead to improved outcomes. First, how routinely did US physicians

perform population management, quality measurement, patient communication, and care coordination processes? Second, were physicians using EHRs and participating in ACO or PCMH initiatives more likely than other physicians to perform these 4 types of care processes? Third, given that health IT and new payment models often are envisioned to work symbiotically to improve care,[23,24] were physicians using EHRs and participating in ACO or PCMH initiatives more likely to routinely perform these types of care processes than those using EHRs alone? Finally, since previous studies have shown room for improvement in the extent to which EHR adopters use their EHRs to engage in these care processes,[25] were certain EHR-related factors associated with use of computerized tools to routinely perform these processes? The results of this study may be useful to policy makers and researchers concerned with the level of adoption of these advanced care processes and the potential policies and tools to support their greater diffusion.

METHODS

Data Source and Analysis Sample

We used data from the 2012 National Ambulatory Medical Care Survey (NAMCS) Physician Workflow Survey, the second wave of a panel survey conducted by the National Center for Health Statistics to collect nationally representative information on physicians' attitudes toward and experiences with EHRs.[26] The first wave of the Physician Workflow Survey was conducted in 2011 as a follow-up to the 2011 NAMCS Electronic Health Records Survey.[27]

The sample for the 2012 NAMCS Physician Workflow Survey came from the 2011 NAMCS Electronic Health Records Survey (ie, nonfederal office-based physicians, excluding radiologists, anesthesiologists, and pathologists). Eligibility status was determined for 8198 of the 10,302 physicians sampled, and those deemed eligible were mailed the Physician Workflow questionnaire. In 2012, 2567 physicians responded for an unweighted response rate of 45%. There were no significant differences in characteristics between responders and nonresponders.

Measuring Care Processes

The 2012 NAMCS survey included 14 separate items that queried physicians on 14 specific care processes in 4 categories: population management, quality measurement, patient communication, and care coordination. For each care process, the survey asked "Is this done routinely?" (yes/no) and then "Is this process computerized?" (yes, usually/yes, sometimes/no).

Dependent Variables

Use of care processes—In the multivariate analyses described below, we used 2 sets of dependent variables. First, to examine factors associated with routinely performing the care processes overall, we assigned the dependent variables a value of 1 if the physician reported routinely performing each process, and 0 otherwise. Second, to examine EHR-related factors associated with routinely performing the care processes using computerized tools, we assigned the dependent variables a value of 1 if the physician reported the process was

performed routinely and the process was computerized (either usually or sometimes), and 0 otherwise. Missing responses, which ranged from 2% to 11% across the items, were assigned the value of 0.

For ease of communicating results across the 14 processes queried in the survey, we also created 1 measure for each of the 4 categories indicating whether at least 1 of the processes in the category was performed routinely. We reported multivariate results for these category-level measures in the main text and reported multivariate results for all 14 individual processes in the eAppendix [eAppendices available at www.ajmc.com]). The results for the category-level measures were substantively similar to the results for the individual process measures.

Independent Variables

EHR use and characteristics—We measured EHR use based on the question, "Which of the following best describes [your primary practice] location's current EHR adoption status?" with response options: 1) "We do not have an EHR system," 2) "We are not actively using an EHR system but have one installed," and 3) "We are actively using an EHR system." Our main measure of EHR use assessed whether or not the physician reported their primary practice location was actively using an EHR. We also reported the percent of physicians who responded, "We are not actively using an EHR system but have one installed" or answered yes to another question, "At the reporting location, are there plans for installing a new EHR system within the next 12 months?"

We examined 3 EHR-related characteristics among physicians using EHRs: whether the EHR met MU criteria, the length of EHR experience, and the receipt of technical assistance for initial EHR implementation. Physicians who answered "yes" to the question, "Does your current system meet meaningful use criteria as defined by the Centers for Medicare & Medicaid Services (CMS)?" were considered to have EHRs that met MU criteria. Length of EHR experience was calculated based on the difference between year of the survey (ie, 2012) and year reported in response to the item: "In which year did you install your EHR system?" Receipt of technical assistance was based on questions about whether the physician's primary practice location received assistance "in implementing an EHR system" (yes/no/uncertain) and "with training staff in using your EHR system" (yes/ no/uncertain).

ACO or PCMH participation—We measured participation in ACO or PCMH arrangements based on responses to 2 questions: 1) "Does [your primary practice location] participate in an *Accountable Care Organization* or similar arrangement by which you may share savings with insurers (including private insurance, Medicare, Medicaid, and other public options)?" and 2) "Does [your primary practice location] receive any additional compensation beyond routine visit fees for offering *Patient-Centered Medical Home* (PCMH)-type services or does [the location] participate in a certified PCMH arrangement?"

In multivariate analyses (described below), we used a measure of whether or not the physician reported participating in either an ACO or PCMH arrangement. Results of sensitivity analyses examining ACO and PCMH participation as separate variables were

similar to results from the combined variable (results not shown but are available on request).

Analyses

We first conducted univariate and bivariate descriptive statistics of the key independent and dependent variables. We then performed multivariate logistic regression to examine the relationship between EHR use, ACO or PCMH participation, and routinely performing the care processes while controlling for other physician and office characteristics. We estimated 18 logistic regression models (1 for each of the 14 individual process measures and the 4 category-level measures), regressing the dependent variable (whether or not the physician routinely performed the process of interest) on whether the physician used any EHR, whether the physician participated in an ACO or PCMH, and an interaction between the EHR use and ACO/PCMH participation variables. The models also included physician and practice characteristics as control variables: physician age, physician specialty, practice size, practice ownership, practice specialty, county metropolitan status, and region (eAppendix Table 1).

To assess whether EHR use and ACO or PCMH participation were independently associated with routinely performing the care processes, we used the logistic regression results to calculate the average incremental effects of EHR use and ACO or PCMH participation. To assess whether physicians using EHRs and participating in ACO or PCMH initiatives are more likely to routinely perform these care processes than those using EHRs alone, we used the regression results to calculate predicted probabilities for combinations of the interaction.

Finally, we conducted multivariate logistic regression to assess whether, among EHR adopters, certain EHR-related factors were associated with a higher likelihood that EHR users routinely perform the care processes using computerized tools. The analysis sample for these regressions was the subset of office-based physicians who were using an EHR. We estimated 18 logistic regression models (1 for each of the 14 individual process measures and the 4 summary measures), regressing the dependent variable (whether or not the physician routinely performed the process of interest using computerized tools) on the 3 EHR-related characteristics: met MU criteria, EHR installation year, and staff received EHR training. The models also included the same control variables as above and the ACO or PCMH participation variable. We used the regression results to calculate the average incremental effects of the EHR related factors.

All analyses were conducted using Stata 11.2 (Stata-Corp LP, College Station Texas), using weights to account for nonresponse and adjusting standard errors for the complex survey design. We used a regression model that predicts the likelihood of responding to the survey, to develop weights to ensure that our survey was nationally representative.

RESULTS

EHR Use and Participation in ACO or PCMH Initiatives

In 2012, a majority of office-based physicians were using an EHR (62%), with about half of all physicians using an EHR that was certified to meet MU criteria (48%) (Figure 1). Over 1

in 5 physicians (22%) were participating in either an ACO (16%) or PCMH (9%) (Figure 1)—4% reported participating in both models, 13% in ACO only, and 6% in PCMH only (data not shown). A majority of physicians participating in these models used an EHR certified for MU (Figure 1). Overall, 18% of physicians reported using an EHR and participating in an ACO or PCMH. Additionally, 44% of physicians reported using an EHR but not participating in one of these care delivery models, and the remaining 38% of physicians did not use an EHR.

Physician Performance of Care Processes

The majority of physicians reported performing at least 1 care process routinely in the categories of care coordination (89%), patient communication (69%), and population management (67%) (Figure 2). Less than half (44%) reported performing quality measurement processes routinely. There was variation in the extent to which physicians routinely performed specific processes within each category (eg, the population management processes ranged from 13% for creating lists of patients by lab results to 58% for providing patients with reminders for followup or preventive care). Among physicians who routinely performed a given process, the majority reported that the process was computerized.

Relationship Between EHR Use, Participation in ACO or PCMH Initiatives, and Performance of Care Processes

Physicians using EHRs were significantly more likely to perform care processes across all 4 categories (Table 1). For example, physicians using EHRs were 15 percentage points more likely than physicians without EHRs to routinely perform at least 1 population management process. Similarly, physicians participating in new delivery models were significantly more likely to routinely perform these processes. The magnitude of the incremental effects for EHR use and ACO or PCMH participation were similar (ie, there were no statistically significant differences between the incremental effects [test not shown]).

Physicians who were using EHRs in combination with participation in ACO or PCMH initiatives had the highest likelihood of routinely performing the care processes (Figure 3). Among physicians not participating in either type of initiative, using an EHR was associated with a 14 to 27 percentage point greater likelihood of routinely performing at least 1 care processes in 3 of the 4 categories (not care coordination). However, across all categories, physicians who had an EHR and participated in ACO or PCMH initiatives were between 6 and 22 percentage points more likely to routinely perform the care processes than physicians with EHRs alone. The same results were found in analyses of the individual care processes in each category (eAppendix Table 3).

Relationship Between EHR-Related Factors and Performance of Care Processes Among Physicians Using EHRs

Among the 62% of physicians using an EHR in 2012, those with EHRs certified to meet MU criteria were significantly more likely to routinely perform at least 1 care process in a computerized manner across all 4 categories (Table 2). For example, physicians using EHRs certified to meet MU criteria were 15 percentage points more likely than physicians using other EHRs to routinely perform at least 1 population management process in a

computerized manner. The same results were found in analyses of the individual care processes in each category (eAppendix Table 4).

Physicians at practices with longer experience with their current EHR were more likely to routinely perform 1 or more processes in a computerized manner across all categories. Assistance with initial EHR implementation and assistance with training staff to use the EHR were not significantly associated with the likelihood of routinely performing any care process in a computerized manner in the categories.

DISCUSSION

The National Quality Strategy has prioritized several areas for improvement, including population management and prevention, quality measurement and reporting, care coordination, and patient engagement.[2] This study finds that US physicians' rates of performing these care processes varied; although a majority reported routinely conducting at least 1 care process related to care coordination, patient communication, and population management, less than half reported performing at least 1 quality measurement process routinely.

Potential mechanisms to enable more widespread adoption of these care processes include use of health IT and payment and delivery reform.[6] Across 4 categories of care processes examined in this analysis, physicians who used EHRs were significantly more likely to routinely engage in these processes. With the exception of care coordination activities—where fewer than half of all physicians reported routinely using computerized tools to engage in certain patient communication activities or conduct care coordination activities—these processes were usually performed with computerized tools, especially by physicians with EHRs that met MU criteria compared with those using other EHRs. Moreover, EHR users who participated in shared savings or medical home delivery models had the highest likelihood of performing these care processes routinely. Given the cross-sectional nature of this study, these results do not establish a causal relationship between payment reform, EHR use, and these care processes. Nonetheless, this finding is consistent with other research that shows that healthcare providers are most likely to perform these care processes when practicing in a payment environment that incentivizes and supports such care.[6,23]

Although physicians using robust EHRs and participating in new models of healthcare payment and delivery were more likely to perform care processes expected to lead to improved healthcare outcomes, most US physicians were not routinely performing specific population management and quality measurement processes that require the aggregation and analysis of individual patient data, such as creating patient lists or reports on quality measures. Quality measurement processes were not performed uniformly even among the one-fifth of physicians who were using EHRs and participating in novel payment and delivery models.

Several of the care processes that physicians were less likely to engage in as of 2012 are targeted in Stage 2 of the Medicare and Medicaid EHR Incentive Program (ie, "Meaningful Use"). For example, to qualify for incentive payments and avoid Medicare payment

adjustments, providers will be required to meet several population management, patient communication, and care coordination objectives, including: generating lists of patients by specific conditions for use in quality improvement, disparities reduction, or outreach activities; providing patients with the ability to view online, download, and transmit their health information; and providing summary of care records in a standardized electronic format during transitions across settings of care.[28]

Limitations

This analysis is subject to limitations of self-reported survey data, including the potential for measurement error from recall and nonresponse bias. For example, nonresponse bias could affect the analysis if physicians engaging in certain care processes were more likely to respond to the survey. In such a case, our estimates of the percent of physicians engaging in these processes may be biased upwards. The survey was weighted based on characteristics of responders and nonresponders to minimize potential for this bias.

Our measures of ACO or PCMH participation are based on single survey items and may capture participation in arrangements with varying levels of intensity. For example, the group of physicians reporting PCMH participation may include physicians in practices with formal PCMH certification from an accrediting body, as well as physicians participating in other medical home initiatives with less rigorous requirements. Length of time in the ACO or PCMH arrangement, or level of implementation, was not captured; length and level of implementation likely varies within the group of physicians reporting participation in these initiatives.

Finally, the cross-sectional study design precludes the possibility of drawing causal conclusions about the relationship between EHR use, participation in new delivery models, and routinely performing the care processes. For example, it is possible that physicians using EHRs and participating in ACO or PCMH initiatives in 2012 were more likely to perform these care processes due to other unobserved factors. We cannot definitively conclude that relationships observed in this analysis will generalize to later adopters as they begin to use EHRs or participate in new delivery or payment models.

CONCLUSIONS

In 2012, EHR use and participation in ACO or PCMH initiatives were associated with increased likelihood that physicians were engaging routinely in processes related to population management, quality measurement, patient communication, and care coordination processes. Yet, many US physicians were not performing these processes routinely. Our analysis highlights several specific areas—including population management processes that require the aggregation and analysis of individual patient data and communication with patients and other care team members—where additional technology and policy supports may be important to facilitate wider adoption of these activities.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Take-Away Points

National policies are supporting the use of health information technology (IT) and testing new models of payment and delivery, such as accountable care organizations (ACO) and patient-centered medical homes (PCMH). This study examined whether use of health IT and participation in new models of care are associated with improved care delivery.

- In 2012, physicians using electronic health records (EHRs) and participating in ACO or PCMH initiatives were more likely to routinely perform population management, quality measurement, patient communication, and care coordination processes; yet, many physicians were not performing these processes routinely.
- There are several areas where EHRs may be important to facilitate wider adoption of these activities.

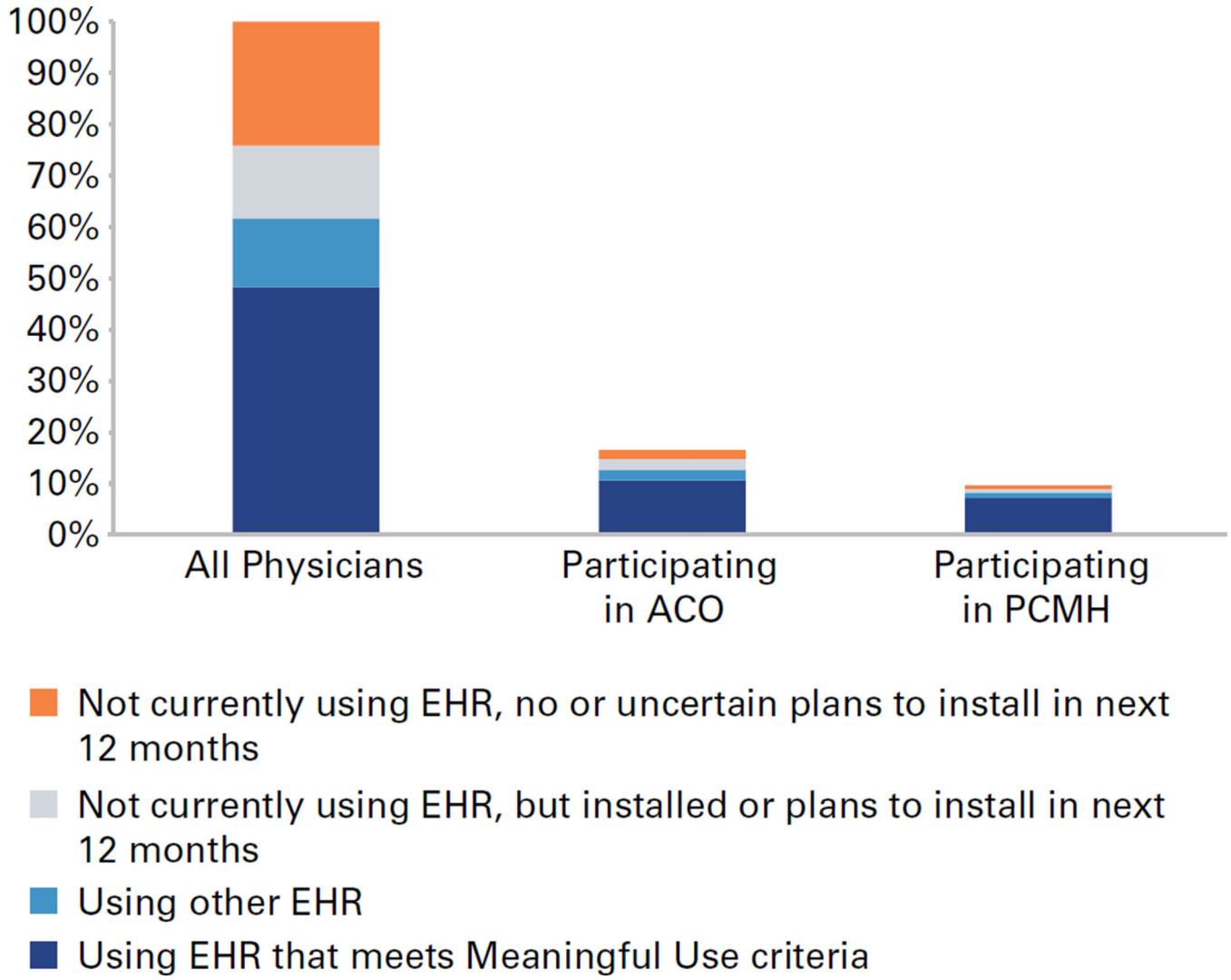

Figure 1.

Physician Adoption and Participation in ACO or PCMHa

ACO indicates accountable care organization; EHR, electronic health record; PCMH patient centered-medical home.

[a]Estimates are unadjusted.

Source: CDC/NCHS Physician Workflow Survey, 2012.

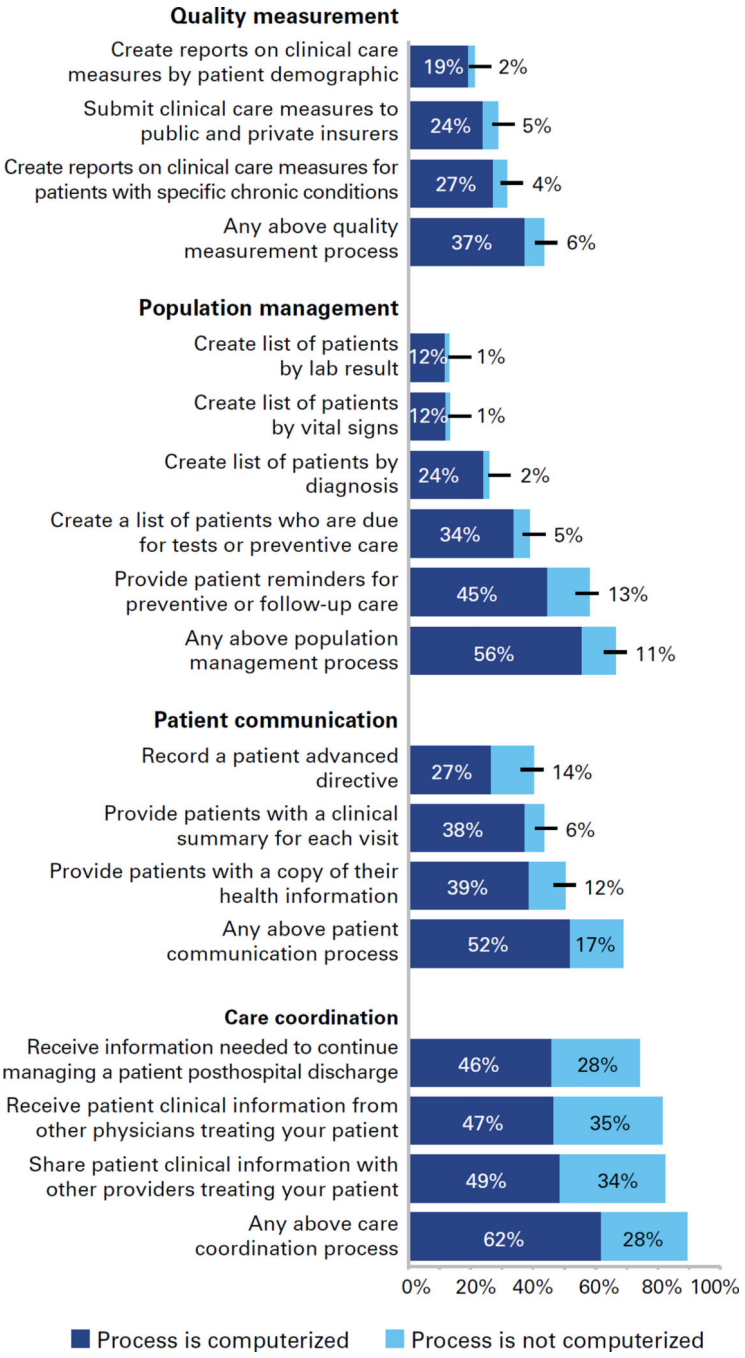

Figure 2.

Percent of Physicians Who Routinely Perform Care Processesa

[a]Estimates are unadjusted.

Source: CDC/NCHS Physician Workflow Survey, 2012.

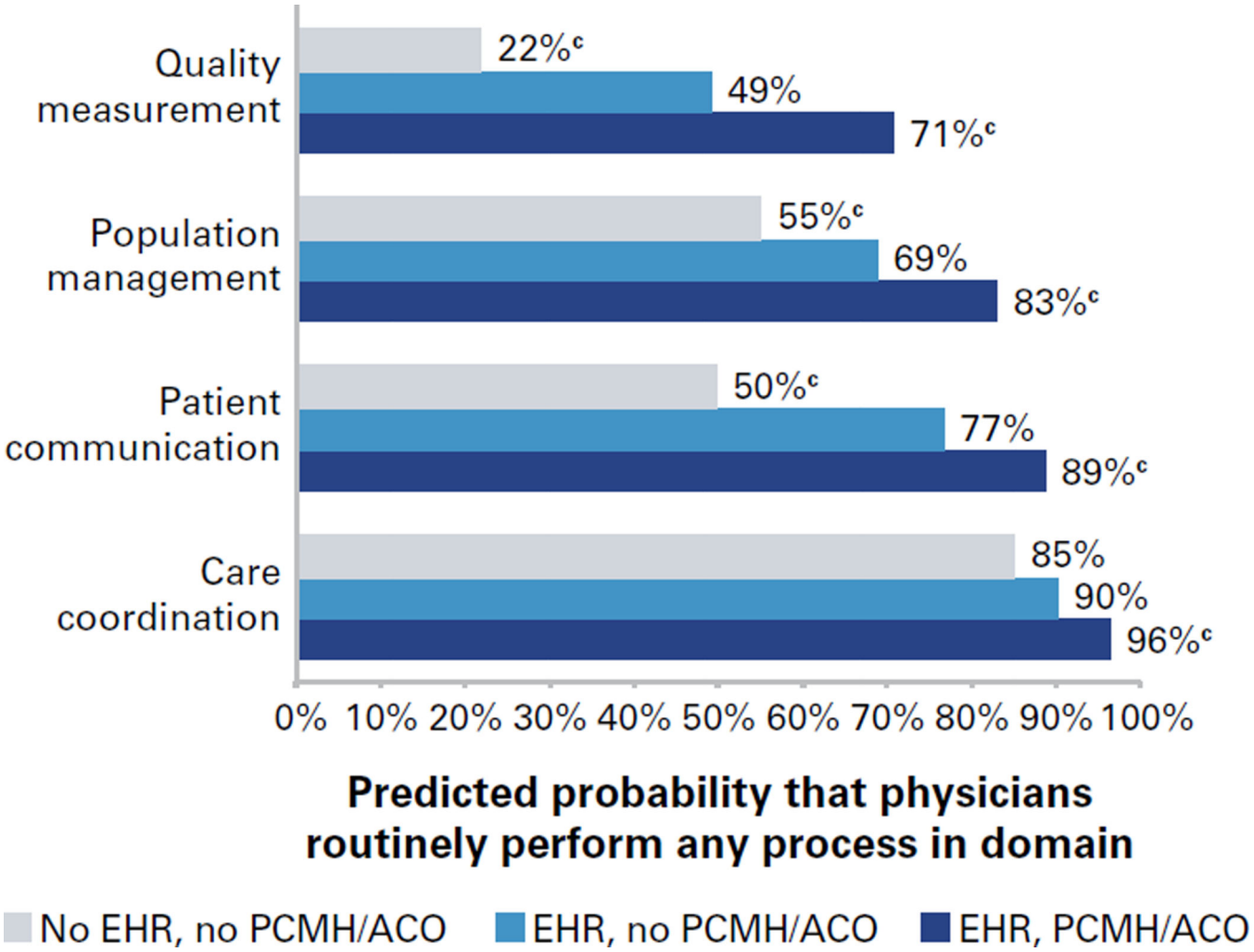

Figure 3.

Predicted Probabilities That Physicians Routinely Perform Care Processes by Health IT and Payment/Delivery System Characteristicsa,b

ACO indicates accountable care organization; EHR, electronic health record; PCMH, patient-centered medical home.

[a]Estimates adjusted for physician and office characteristics.

[b]Full regression results and predicted probabilities for each process within category are available in the eAppendix.

[c]$P < .01$; significantly different from reference category.

Source: CDC/NCHS Physician Workflow Survey, 2012.

Table 1

Logistic Regression of Health IT and Payment/Delivery Model on Probability That Physician Performs Care Processes Routinely (N = 2567)

	Incremental effects (percentage points) on probability that the physician routinely performs any process in category			
	Population Management	**Quality Measurement**	**Patient Communication**	**Care Coordination**
Health IT and payment/delivery model				
Any EHR (ref = no EHR)	15.1**	26.1**	25.3**	5.3*
Participating in ACO or PCMH (ref = not)	12.0**	22.6**	14.8**	5.8*
Other factors				
Aged <50 years (ref = 50 or older)	−3.5	1.3	3.9	−0.4
Primary care specialty (ref = other specialty)	5.2	13.3**	8.2**	1.3
Practice size (ref = 1 physician)				
2	10.5*	6.7	4.9	3.1
3–5	0.3	0.0	−3.4	−0.4
6–10	−0.7	−2.9	−3.4	0.9
11+	−1.0	5.0	1.9	−2.1
Ownership (ref = physician or physician group)				
Hospital/academic medical center	−14.4**	−5.2	5.8	2.1
HMO/insurance plan/other healthcare corporation	3.8	13.2**	15.3**	6.9**
Community health center	−14.2	23.3**	−31.2**	4.2
Other/unknown	−13.6*	−8.9	−4.6	−11.8
Multispecialty group (ref = single specialty)				
Multispecialty	−5.4	−8.1*	−1.5	0.2
Unknown	−7.3	5.1	8.5	7.0*
Non-MSA (ref = MSA)	−1.1	1.8	−1.1	−2.3
Region (ref = Northeast)				
Midwest	−4.2	−1.6	−3.2	4.1
South	−1.4	1.0	−1.4	3.3
West	−2.0	−0.3	−1.5	2.8

ACO indicates accountable care organization; EHR, electronic health record; HMO, health maintenance organization; IT, information technology; MSA, metropolitan statistical area; PCMH, patient-centered medical home; ref, reference.

Asterisks indicate significantly different from reference category; "*" = $P < .05$ and "**" = $P < .01$.

Full regression results for each process within category available in the eAppendix.

Source: CDC/NCHS Physician Workflow Survey, 2012.

Table 2

Logistic Regression[a] of Health IT Factors on Probability That EHR Adopters Perform Care Processes Routinely in Computerized Manner (N = 1678)

	Incremental effects (percentage points) on probability that physician routinely performs any process in category in computerized manner			
	Population Management	**Quality Measurement**	**Patient Communication**	**Care Coordination**
MU-certified EHR (ref = other EHR)	14.7**	17.6**	21.6**	12.2**
Year current system installed (ref = 2011–2012)				
2009–2010	9.8*	−1.2	14.0**	8.9*
2008 or earlier	10.3*	8.7*	10.8**	7.4*
Unknown	−3.5	0.6	5.1	8.1
Received assistance with training staff to use EHR (ref = not)	3.6	−4.4	3.3	0.7
Received assistance with EHR implementation (ref = not)	−6.5	3.1	−1.9	4.5

EHR indicates electronic health record; IT, information technology; MU, Meaningful Use; ref, reference.

[a]Regressions included other physician and office characteristics. Full regression results for each process within category available in the eAppendix.

Asterisks indicate significantly different from reference category; "*" = $P < .05$ and "**" = $P < .01$.

Source: CDC/NCHS Physician Workflow Survey, 2012.