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Office-Based Physicians Are Responding To Incentives And Assistance By Adopting And Using Electronic Health Records

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ABSTRACT Expanding the use of interoperable electronic health record (EHR) systems to improve health care delivery is a national policy priority. We used the 2010–12 National Ambulatory Medical Care Survey—Electronic Health Records Survey to examine which physicians in what types of practices are implementing the systems, and how they are using them. We found that 72 percent of physicians had adopted some type of system and that 40 percent had adopted capabilities required for a basic EHR system. The highest relative increases in adoption were among physicians with historically low adoption levels, including older physicians and those working in solo practices or community health centers. As of 2012, physicians in rural areas had higher rates of adoption than those in large urban areas, and physicians in counties with high rates of poverty had rates of adoption comparable to those in areas with less poverty. However, small practices continued to lag behind larger practices. Finally, the majority of physicians who adopted the EHR capabilities required to obtain federal financial incentives used the capabilities routinely, with few differences across physician groups.

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The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 authorized nearly \$30 billion dollars to support the increased adoption and use of health information technology (IT) throughout the US health care delivery system. In 2011 the Medicare Electronic Health Records (EHR) Incentive Program of the Centers for Medicare and Medicaid Services began providing incentive payments to eligible professionals who adopt and “meaningfully” use specific EHR capabilities.^{1,2} These specific meaningful-use capabilities—such as computerized physician order entry, e-prescribing, and reminders to providers to follow guidelines—have been shown to be associated with efficient and high-quality patient care as well as clinical benefits.³ Substantial resources made available through HITECH have also been devoted to helping providers achieve

meaningful use of EHR systems, including programs that offer providers technical assistance with EHR adoption, implementation, and use.⁴

Early indications are that these investments are playing a role in supporting increased EHR adoption by US physicians. Between 2008 and 2010, prior to the onset of incentive payments from Medicare and Medicaid, EHR adoption grew an average of four percentage points per year. During the first year that the incentive program was in effect, EHR adoption among office-based physicians grew quickly: The share of physicians with at least a basic EHR system jumped from 24.9 percent to 33.9 percent.⁵ The data from 2011, however, suggest that EHR adoption lagged among non–primary care physicians, older physicians, and physicians in small practices.^{6,7} Whether the increases in adoption seen in 2011 were sustained in 2012, during the second year of the incentive program, and the de-

gree to which physicians routinely use EHR technology once they have adopted it remain unclear.

Given the strategic role of health IT in health reform and its potential benefits,³ examining trends in the adoption and use of EHR systems since the passage of HITECH has important policy implications. We explored several questions about who is using the systems, how their adoption has evolved since the start of the incentives, and the adoption and use of specific capabilities associated with the meaningful-use incentive programs.

This study sought to address a series of research questions. First, how have rates of EHR adoption changed among office-based physicians between 2010 (the year prior to the incentives) and 2012 (the second year of the incentive program)? Second, to what extent have gaps in EHR adoption narrowed or widened according to selected characteristics, such as physician specialty and practice size? Third, how did the rates of adoption of a basic EHR system and of specific capabilities related to the meaningful-use criteria change between 2010 and 2012? Fourth, what were the rates of adoption and routine use of those capabilities in 2012? And fifth, to what extent does the routine use of specific capabilities related to meaningful use vary by physician and practice characteristics?

Our findings have important policy implications in monitoring progress toward HITECH's goals of improved health and health care through the greater use of health IT. Understanding whether gaps in EHR adoption exist across different physician and practice characteristics is important for the reduction of any "digital divide" and the assessment of current national policies' impact, in addition to the identification of potential future policy initiatives.

Study Data And Methods

DATA We used data from the 2010–12 Electronic Health Records Survey, a mail survey that was designed as a supplement to the National Ambulatory Medical Care Survey (NAMCS).⁸ The NAMCS and the supplemental survey included similar questions on physician and practice characteristics and on capabilities of sampled physicians' EHR systems. Starting in 2010, the sample size of the EHR mail supplement increased substantially, which allowed the survey to produce stand-alone estimates on EHR adoption without needing to be combined with the NAMCS, a survey conducted in person. Since 2010 the NAMCS EHR mail survey has been an annual, nationally representative survey of office-based physicians that collects information on their EHR systems and other physician and

practice characteristics. Nonrespondents to the mail survey receive follow-up telephone calls.

The survey is conducted by the Centers for Disease Control and Prevention's National Center for Health Statistics and is sponsored by the Office of the National Coordinator for Health Information Technology (ONC). The survey samples office-based physicians providing direct patient care, excluding radiologists, anesthesiologists, and pathologists. In addition to collecting data on the adoption of computerized capabilities in 2010, 2011, and 2012, the survey first collected information on whether computerized capabilities were used routinely in 2012. The 2010, 2011, and 2012 surveys collected data on eight, ten, and thirteen of the fifteen stage 1 core criteria for meaningful use, respectively.⁹

A sample of 10,302 physicians was selected each survey year from all fifty states and the District of Columbia, to allow for state-level estimates. EHR adoption estimates by state during this time frame have been published elsewhere.^{5,10,11} Prior estimates have included data from both the mail survey and the in-person NAMCS.¹⁰ For this article we analyzed only data collected in the NAMCS EHR survey, so all of the data for this study were collected using the same approach. The 2010–12 weighted response rates that were adjusted for nonresponse were 61–66 percent; the unweighted response rates were 64–68 percent.

MEASURING EHR ADOPTION In this study we used the following three measures of EHR adoption: use of any type of EHR system, adoption of a basic EHR system, and adoption of a series of computerized capabilities associated with the stage 1 core criteria for meaningful use. The term *adoption* in this study includes purchasing, installing, and using an EHR system. Use of any type of EHR system is a broad measure of adoption that indicates a physician's decision to move from a paper-based to an electronic record system.

The adoption of a basic system has been used to monitor EHR adoption since 2006.^{5,6,10–12} Systems that meet stage 1 core criteria for meaningful use include capabilities that have been selected for their potential to improve patient care and care coordination and to engage patients in their care.¹³ Some of these capabilities overlap with those of a basic EHR system. Because of the timing of the core criteria's development, the 2010 and 2012 NAMCS EHR surveys did not include all capabilities associated with the fifteen stage 1 core criteria (eight criteria were included in the 2010 survey and thirteen in the 2012 survey). See the online Appendix for the full list of EHR capabilities associated with basic EHR systems and with the stage 1 mean-

ingful-use criteria that we examined.¹⁴

We examined how EHR adoption rates have changed among office-based physicians during the three survey years with two separate measures: the use of any type of EHR system and the adoption of a basic EHR system. We determined that a physician was using any type of EHR system by a “yes” response to the question: “Does this practice use electronic medical records or electronic health records (not including billing records)?” We determined that a physician had adopted a basic system by the availability of the following seven capabilities: recording patient history and demographic information; maintaining patient problem lists; recording clinical notes; recording medication and allergy lists; viewing laboratory results; viewing imaging reports; and using computerized prescription ordering.¹²

We also examined physician and practice characteristics associated with the adoption of a basic EHR system—specifically, those that were previously identified as empirically associated with EHR adoption using earlier NAMCS data (Exhibit 1).^{6,15} We chose 15 percent as the cutoff for county poverty status based on a previous study,¹⁶ so that 25–30 percent of the population was in a county with a “high” poverty rate.

To analyze change over the two years, we used multivariate logistic regression to examine factors associated with basic EHR adoption in 2010 and 2012. Using the logistic regression estimates, we calculated predicted EHR adoption rates for each physician and practice characteristic that varied only by each characteristic, and we adjusted for all other characteristics.

We next assessed trends in physician adoption of computerized capabilities required for a basic EHR system and selected stage 1 core criteria for meaningful use (the criteria a physician must meet to qualify for incentive payments) for which trend data were available in 2010 and 2012. In all, we examined ten computerized capabilities that could be grouped into three categories: Three capabilities were only part of the definition of a basic EHR system, another three were only stage 1 core criteria for meaningful use, and the remaining four were in both the definition of a basic system and the core criteria. The capabilities that were only stage 1 core criteria were sending prescriptions electronically to a pharmacy, providing warnings of drug interactions or contraindications, and providing reminders of guideline-based interventions or screening tests.

MEASURING ROUTINE USE With data available on routine use starting in 2012, we examined whether physicians routinely used computerized capabilities related to stage 1 core criteria for

EXHIBIT 1

Office-Based Physicians’ Adoption Of Electronic Health Record (EHR) Systems, By Physician Characteristics, 2010 And 2012

Characteristic	Basic EHR adoption rate (adjusted %) ^a			
	2010	2012 ^b	Absolute change (percentage points)	Relative change
All physicians	25.8	38.2	12.4	48.1
SPECIALTY				
Primary care	29.8	42.5	12.7	42.8
Other	22.0***	34.0***	12.1	55.0
AGE (YEARS)				
<45	29.5	40.0	10.5	35.6
45–54	26.4	41.3	14.9	56.4
55–64	25.1	35.4	10.3	41.1
≥65	16.5***	33.3	16.8	101.8
PRACTICE SIZE (NUMBER OF PHYSICIANS)				
1	11.3	25.6	14.3	127.2
2–5	26.0***	36.6***	10.6	40.6
6–10	29.7***	44.0***	14.3	48.1
≥11	45.0***	57.7***	12.6	28.1
PRACTICE OWNERSHIP				
Physician or physician group	23.5	34.3	10.8	45.9
Hospital or academic medical center	28.4	47.5***	19.1	67.3
HMO or other health care organization	39.8***	58.4***	18.6	46.8
Community health center	13.5***	32.3	18.8	139.6
Other or unknown	28.6	31.2	2.7	9.4
REGION				
Northeast	25.5	41.7	16.2	63.6
Midwest	24.7	39.2	14.5	58.6
South	24.2	36.2	12.0	49.8
West	29.7	36.9	7.3	24.5
METROPOLITAN STATUS				
Large central metropolitan	23.4	36.0	12.6	54.0
Large fringe metropolitan	26.0	35.8	9.8	37.8
Medium metropolitan	25.0	39.7	14.7	58.8
Small metropolitan or nonmetropolitan	30.8***	43.5***	12.7	41.1
COUNTY POPULATION IN POVERTY (%)				
≥15	24.9	39.8	15.0	60.2
<15	26.4	37.2	10.8	41.0

SOURCE National Ambulatory Medical Care Survey—Electronic Health Records Survey, 2010 and 2012. **NOTES** N = 9,211. Significance is compared to the reference category, which is the first category listed for each characteristic. Practice size was associated with the location where the physician saw the most ambulatory care patients and may be underestimated. HMO is health maintenance organization. ^aBasic EHR adoption rates are adjusted percentages based on multivariate logistic regression including all characteristics listed. Means of independent variables are in the online Appendix (see Note 14 in text). ^bThe basic EHR adoption rate in 2012 was significantly different from the rate in 2010 for each subgroup examined except “other or unknown” practice ownership ($p < 0.05$). *** $p < 0.01$

meaningful use and the basic EHR system that they had adopted at the time of the survey. We also assessed whether certain capabilities were adopted but not used routinely. Routine use of a given capability was measured by the response category “used routinely.” The self-reported routine use rate for a given capability was calculated

by taking the number of physicians routinely using the capability divided by the number of physicians who had adopted the capability.

In addition to the ten capabilities used in the trend analysis described above, we included another five capabilities that were assessed only in the 2012 survey. These five were recording patients' smoking status and vital signs, providing patients with clinical summaries and electronic copies of their health information, and viewing data on quality-of-care measures.

To qualify for Medicare and Medicaid EHR incentive payments, eligible physicians must routinely use their system's capabilities. Therefore, we conducted a multivariate logistic regression analysis to examine the physician and practice characteristics associated with routine use of all adopted EHR capabilities. Because of power, stability, and homogeneity considerations, we restricted the analysis to physicians whose systems had at least eight stage 1 core criteria for meaningful use. In the regression, we controlled for the number of capabilities adopted, to adjust for the variation in that number.

All analyses used weights accounting for non-response. Standard errors accounted for the sample design.

LIMITATIONS The analysis had limitations. First, our findings were based on self-reported survey data. Physicians and physician groups who have adopted EHR systems may be more likely to respond to the NAMCS EHR survey, potentially leading to overestimates of EHR adoption and use. In addition, the survey did not include questions to assess all of the meaningful-use criteria, nor did all of the questions

perfectly match the criteria. Therefore, we could not report whether a respondent met all criteria for meaningful use or qualified for an incentive payment.

Although we were able to report on a broader set of measures in 2012, our trend analysis was limited to selected computerized capabilities captured by the survey starting in 2010. We also did not report on whether a respondent was eligible for incentive payments.

Furthermore, the NAMCS EHR survey does not collect information on issues surrounding the use of EHR systems such as workflow, usability, and satisfaction. Exploring these factors could further our understanding about what can affect physicians' routine use of the systems.

Lastly, we defined *practice size* as the number of physicians at the location where most ambulatory care patients were seen. As a result, practice size might be underestimated when a practice included different physicians at other locations.

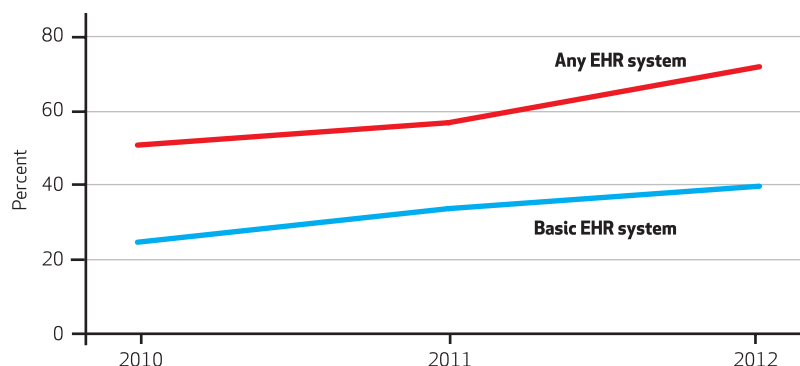
Study Results

We found that the proportion of office-based physicians using any type of EHR system increased from 51 percent in 2010 to 72 percent in 2012—a 41 percent relative increase (Exhibit 2). In 2012, 40 percent of physicians reported having capabilities that met the criteria for a basic system—a relative increase of 60 percent from 2010. Physician and practice characteristics in 2010 and 2012 and significant changes between 2010 and 2012 are shown in the online Appendix.¹⁴ Indicators showing significant increases in this period include the percentage of physicians in practices with eleven or more physicians, in practices owned by a hospital or an academic medical center, and in counties where at least 15 percent of the population was in poverty. Those showing significant decreases include the percentage of physicians who practiced alone, in practices owned by a physician or physician group, and in counties where less than 15 percent of the population was in poverty.

Multivariate regression analysis, adjusted for the characteristics listed in Exhibit 1, showed that increases in and levels of EHR adoption varied among different groups of physicians. For example, in 2012 more primary care physicians than other physicians had adopted a basic EHR system, after we adjusted for other characteristics. Only 26 percent of solo practitioners had a basic system, compared to 58 percent of those in practices of eleven or more physicians. EHR adoption rates were higher in rural locations than in large urban areas. However, there were no significant differences in adoption rates

EXHIBIT 2

Office-Based Physicians' Adoption Of Electronic Health Record (EHR) Systems, By Level Of Capability, 2010-12



SOURCE National Ambulatory Medical Care Survey—Electronic Health Records Survey, 2010-12.

NOTES Numbers are unadjusted. "Any EHR system" is a health record system that is all or partially electronic. A "basic EHR system" has the following capabilities: recording patient demographic information, clinical notes, patient problem lists, and medication or allergy lists; viewing laboratory results; viewing imaging results; and using computerized prescription ordering.

between rural and urban areas when we aggregated data across the metropolitan types (results not reported). Nor did we find a significant relationship between basic EHR adoption and a physician's age or region of the country, or the level of poverty in the county where a practice was located.

Basic EHR adoption increased substantially in both relative and absolute terms in just two years. Relative increases closely approached or exceeded 50 percent among more than half of all groups of physicians examined (Exhibit 1). Adoption rates for basic EHR systems more than doubled for solo practitioners, physicians age sixty-five or older, and those practicing in community health centers.

There were also significant increases in physicians' adoption of computerized capabilities related to a basic EHR system and selected stage 1 core criteria for meaningful use that were asked about in the 2010 and 2012 surveys (Exhibit 3). In 2012 the capability of ordering prescriptions electronically had the highest adoption rate, and that of providing reminders for guideline-based interventions or screening tests had the lowest.

The absolute increases ranged from ten to twenty-nine percentage points (the capabilities to view lab results and to send prescriptions to the pharmacy electronically, respectively). Capabilities that were part of stage 1 core criteria but not part of a basic EHR system had the largest increases in adoption rates between 2010 and 2012, while the capabilities that were only part of a basic system had the smallest increases.

All computerized capabilities related to stage 1 core criteria for meaningful use and a basic EHR system, except for the capability to view data on

quality-of-care measures, had adoption rates of at least 50 percent in 2012 (see the online Appendix).¹⁴ At least 84 percent of providers routinely used eleven of the fifteen capabilities examined after adoption. Recording medication and allergy lists had the highest rate of use, while providing patients with a copy of their health information had the lowest.

Exhibit 4 shows rates of both adoption and routine use for computerized capabilities. Half or more of physicians adopted and routinely used nearly all of the capabilities. Among physicians who had adopted at least eight stage 1 core criteria for meaningful use, we found little variation in routine use by physician or practice characteristics (see the online Appendix).¹⁴ Physicians in larger practices (those with at least six physicians) had a higher level of routine use for all of the capabilities they had adopted than did solo practitioners. Similarly, routine use was more common among physicians in practices owned by health maintenance organizations or other health care organizations than among those who worked in physician-owned practices.

Discussion

We found substantial growth in EHR adoption among office-based physicians as the HITECH incentives went into effect. By 2012, 72 percent of physicians had adopted some type of EHR system, and 40 percent had capabilities required for a basic system. More important, physicians' adoption of key capabilities required for stage 1 core criteria for meaningful use, such as electronic prescribing and warnings for drug interactions, has increased rapidly, and the rate of

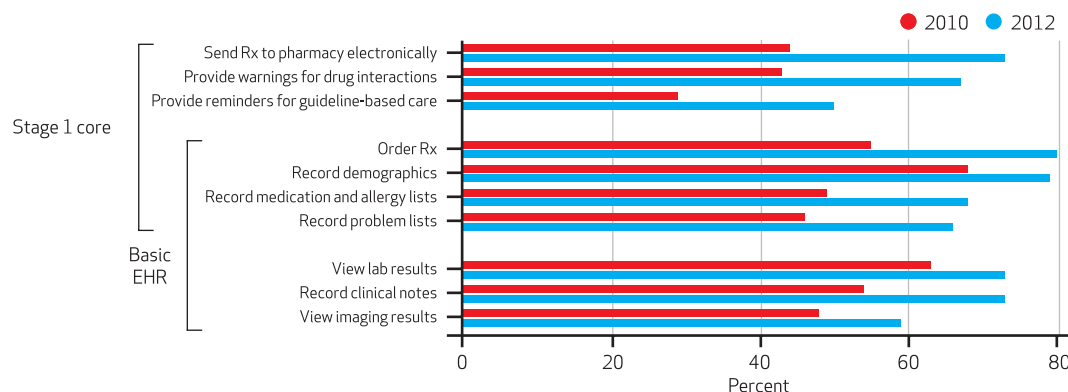
72%

Use an EHR

In 2012, 72 percent of office-based physicians used an electronic health record—up from 51 percent in 2010.

EXHIBIT 3

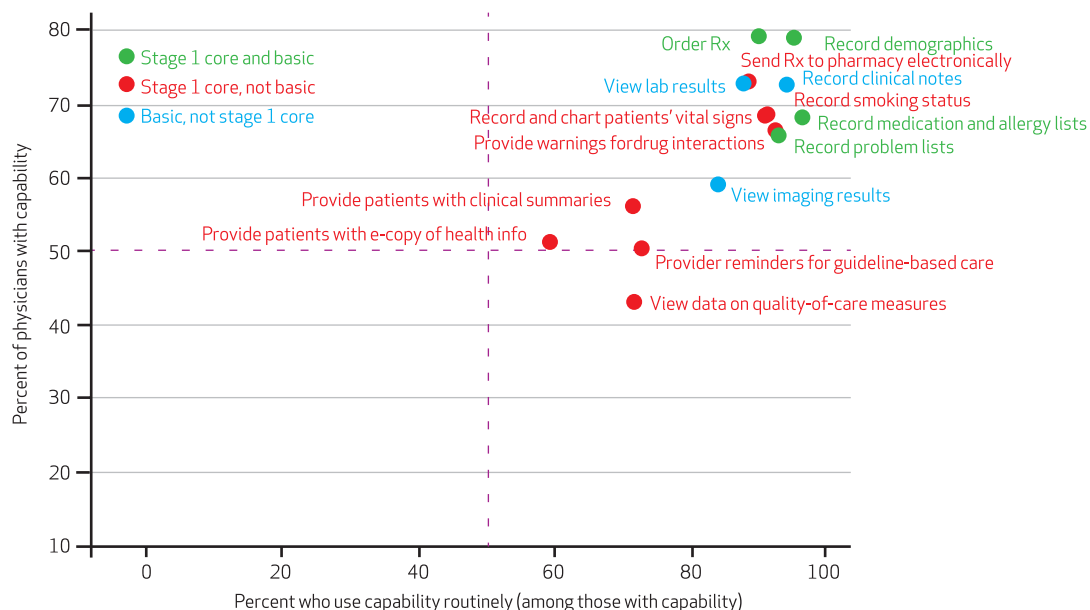
Office-Based Physicians' Adoption Of Computerized Capabilities Related To Selected Stage 1 Core Criteria For Meaningful Use And Basic Electronic Health Record (EHR) Systems, 2010 And 2012



SOURCE National Ambulatory Medical Care Survey—Electronic Health Records Survey, 2010 and 2012. **NOTES** Numbers are unadjusted. "Stage 1 core" is selected stage 1 core criteria for meaningful use.

EXHIBIT 4

Office-Based Physicians' Adoption And Routine Use Of Computerized Capabilities Related To Selected Stage 1 Core Criteria For Meaningful Use And Basic Electronic Health Record (EHR) Systems, 2012



SOURCE National Ambulatory Medical Care Survey—Electronic Health Records Survey, 2012. **NOTES** Numbers are unadjusted. "Stage 1 core" is selected stage 1 core criteria for meaningful use.

routine use of those capabilities was high.

Absolute increases in EHR adoption appeared relatively uniform across most physician groups between 2010 and 2012, at 10–19 percent for the most part. After adjusting for other characteristics, we found that the highest relative increases in EHR adoption occurred among physicians who traditionally had had lower levels of adoption, including those age sixty-five or older and those practicing alone or in community health centers (Exhibit 1). Primary care physicians continued to have significantly higher adoption rates than other physicians—results that are consistent with those of recent studies.^{6,7} Physicians practicing in rural areas had significantly higher rates of adoption than those practicing in large central metropolitan areas.

By 2012 physicians practicing in community health centers had comparable adoption rates to those in physician-owned practices. Finally, we found no differences in adoption by the poverty status of a practice's county. In contrast to prior studies of EHR adoption that identified disparities in adoption by physician and practice characteristics, the recent national-level data we used indicated that these gaps in adoption are narrowing or have closed altogether.^{17,18}

Prior surveys have suggested that financial incentives might increase the rate of physicians' adoption of EHR systems.¹⁹ The surge in the

adoption and use of these systems since 2010 may have been spurred at least in part by the availability of financial incentives. As of April 2013 more than seven in ten eligible professionals were registered to participate in the Medicare or Medicaid EHR incentive programs, and more than half of eligible professionals had received incentive payments (based on the denominator of 527,000 eligible professionals).²⁰ Physicians not eligible for the incentive programs were less likely to adopt an EHR system than those who were eligible (results not reported), which offers further evidence that HITECH is playing a role in spurring greater adoption.

ROLE OF REGIONAL EXTENSION CENTERS The federal Regional Extension Center program has provided technical assistance to approximately four in ten primary care providers, including more than half of primary care providers in rural areas, and to more than eight in ten federally qualified health centers.²¹ Growth in rates of EHR adoption among specific groups of physicians that may be served by the centers—particularly physicians practicing in rural areas, in areas with high levels of poverty, and at community health centers—suggests that policies and technical assistance may be addressing potential disparities in EHR adoption among primary care providers in underserved settings.

However, our findings also show that EHR adoption rates for small practices continue to lag behind those for larger practices. For example, although solo practitioners' adoption rate grew by 127.2 percent between 2010 and 2012, at the end of that period their adoption rate was still less than half that of physicians working in practices with eleven or more physicians (Exhibit 1). Regional Extension Center assistance targets solo practitioners and those in practices with fewer than ten physicians. Monitoring whether the Regional Extension Center program and related initiatives are able to assist solo and small practices in overcoming challenges and avoiding a "digital divide" is an important policy focus for the future.

PROVIDERS IN TRANSITION Physicians are now adopting capabilities associated with stage 1 criteria for meaningful use, which include capabilities designed to improve the delivery of patient care.²² Physicians' rate of adoption of specific EHR capabilities increased significantly since 2010. Not surprisingly, the increase was especially great for capabilities associated with the stage 1 criteria. Between 2010 and 2012 the adoption of all meaningful-use capabilities that the NAMCS EHR survey tracks increased significantly, and adoption rates for these capabilities were at least 50 percent in 2012.

Barriers remain in transitioning from paper-based records to electronic record systems, including finding an EHR system that meets a practice's needs and the loss of productivity during the implementation of the new system.²³ Given these challenges, before our study it remained to be seen whether physicians would routinely use EHR capabilities after adopting them. In contrast with a study conducted prior to the implementation of the EHR incentive program,²⁴ we found that the vast majority of physicians did routinely use given key EHR capabilities after adoption. High rates of use may be driven in part by the fact that physicians (and other providers) must demonstrate that they are actively using EHR systems in their provision of care to comply with meaningful-use criteria.

REMAINING CHALLENGES Our findings suggest that important challenges remain. Physicians' adoption and use of capabilities that enable them to view data on quality measures and to provide patients with an electronic copy of their health information merit further policy attention. Understanding why these capabilities have lower rates of adoption and use compared to others will

provide important insights as accountable care mechanisms are developed and efforts are made to engage patients in managing their own care.²⁵

Physicians may be reluctant to engage patients electronically because of concerns that doing so would increase their workload and potential patient confusion about electronic health information. However, recent studies indicate that these concerns may be unfounded.^{26,27} Early evidence suggests that consumers might be willing to switch to a health care provider who has an EHR system from one who does not.²⁸ Therefore, engaged consumers may become an important lever to increase physicians' adoption and use of some EHR capabilities.

Conclusion

Two years after the implementation of HITECH, we found continuing growth in rates of adoption of EHR systems and of use of their key capabilities. The rate of routine use of these capabilities after adoption was high. Although important challenges remain, our findings on increased adoption and the narrowing of gaps between certain physician groups are consistent with the proposed effect of incentives and technical assistance on physicians' adoption and use of health IT.

Our findings highlight key areas for continued policy focus, particularly in monitoring whether gaps between physicians based on practice size and specialty (primary care or other specialty) persist. Policy makers seeking to improve the health care delivery system should closely follow trends in physicians' use of IT. For instance, having programs such as those supporting the formation of accountable care organizations closely align their quality metrics with meaningful-use criteria would help ensure that these efforts are synergistic and more likely to succeed.

As providers become increasingly accountable for both costs and quality of care, having robust information systems that allow them to manage care more effectively and share information with their patients will be critical. Bundled payments will require that providers track their patients over time, increasing their need to engage in health information exchanges and related efforts. Our findings suggest that although the US health care system still faces important challenges, the rapid growth in the IT infrastructure can create a platform for delivery of high-quality, efficient care. ■

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Technology. [Published online July 9, 2013.]

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Hsiao C-J, Jha AK, King J, Patel V, Furukawa MF, Mostashari F. Office-based physicians are responding to incentives and assistance by adopting and using electronic health records. Health Aff (Millwood). 2013;32(8). Published online July 9, 2013.

Appendix 1. Survey questions for computerized capabilities associated with Meaningful Use Stage 1 Core Objectives and Basic EHR

Survey question - Does the reporting location have computerized capability for:	Included in Basic EHR?	Included in Meaningful Use Stage 1 Core?	Corresponding Meaningful Use Stage 1 Core Objective
Ordering prescriptions	Yes	Yes	Use computerized provider order entry for medication orders
Recording patient history and demographic information	Yes	Yes	Record patient demographics
Recording a list of the patient's medications and allergies	Yes	Yes	Maintain active medication list Maintain active medication allergy list
Recording patient problem lists	Yes	Yes	Maintain up-to-date problem list of current and active diagnoses
Sending prescription electronically to the pharmacy	No	Yes	Generate and transmit permissible prescriptions electronically
Recording patient smoking status	No	Yes	Record smoking status
Recording and charting vital signs	No	Yes	Record and chart vital signs
Providing warnings of drug interactions or contraindications	No	Yes	Implement drug-drug and drug-allergy interaction checks
Providing patients with clinical summaries for each visit	No	Yes	Provide patients with clinical summaries for each office visit
Providing patients with an electronic copy of their health information	No	Yes	Provide patients with an electronic copy of their health information
Providing reminders for guideline-based interventions and/or screening tests	No	Yes	Implement one clinical decision support rule
Viewing data on quality of care measures	No	Yes	Report clinical quality measures to the Centers for Medicare & Medicaid Services or the states
Recording clinical notes	Yes	No	None
Viewing lab results	Yes	No	None
Viewing imaging results	Yes	No	None

Notes: Recording a list of the patient's medications and allergies was asked as separate questions in 2010 and as one combined question in 2011 and 2012.

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Appendix 2. Physician characteristics, 2010 and 2012

	Percent of physicians	
	2010	2012
Specialty		
Primary care	49.3	48.5
Non primary care specialty	50.7	51.5
Age		
Under 45	25.3	25.2
45-54 years	31.4	31.5
55-64 years	30.7	30.1
65 years and over	12.7	13.3
Practice size (number of physicians)		
Solo	32.2	28.8 *
2-5	36.9	34.0
6-10	17.6	17.7
11+	13.3	19.5 **
Practice ownership		
Physician/physician group	71.7	63.1 **
Hospital/academic medical center	12.9	18.3 **
HMO/other health care organization	7.5	8.7
Community health center	2.9	3.4
Other/unknown	5.0	6.6 *
Region		
Northeast	21.5	22.2 *
Midwest	21.3	21.2
South	34.6	34.2
West	22.7	22.5
Metropolitan status		
Large central metropolitan	34.8	35.2
Large fringe metropolitan	24.4	24.3
Medium metropolitan	21.5	20.6
Small metropolitan or non-metropolitan	19.3	19.9
County poverty status		
15% or more of population in poverty	32.3	45.1 **
Less than 15% of population in poverty	67.7	54.9 **

Source: Electronic Health Records mail survey to the National Ambulatory Medical Care Survey, 2010 and 2012

Notes: n=9211. Practice size was associated with the location where the physician saw most ambulatory care patients. Practice size may be under-estimated.

**(*) Significantly different from 2010 at p<0.01(0.05).

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Appendix 3. Adoption and routine use of computerized capabilities related to Meaningful Use Stage 1 Core objectives and Basic EHR, 2012

	Percent with capability	Percent who use capability routinely (among those with capability)
Order prescriptions	80%	90%
Record demographics	79%	95%
Send prescriptions to pharmacy electronically	73%	89%
View lab results	73%	88%
Record clinical notes	73%	94%
Record smoking status	69%	91%
Record and chart vital signs	69%	91%
Record medication and allergy lists	68%	96%
Provide warnings for drug interactions	67%	92%
Record problem lists	66%	93%
View imaging results	59%	84%
Provide patients with clinical summaries for each visit	56%	71%
Provide patients with electronic copy of their health information	51%	59%
Provide reminders for guideline-based care	50%	73%
View data on quality of care measures	43%	72%

Source: Electronic Health Records mail survey to the National Ambulatory Medical Care Survey, 2012

Notes: Numbers are unadjusted.

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Appendix 4. Routine use of Meaningful Use Stage 1 Core capabilities, among physicians with at least 8 capabilities, 2012

Adjusted percent of physicians who routinely used all Meaningful Use Stage 1 Core capabilities they had adopted	
All	41.9
Specialty	
Primary care	44.2
Non primary care specialty	39.3
Age	
Under 45	43.8
45-54 years	41.9
55-64 years	40.7
65 years and over	40.0
Practice size (number of physicians)	
Solo	35.1
2-5	38.6
6-10	45.8 *
11+	49.4 **
Practice ownership	
Physician/physician group	38.7
Hospital/academic medical center	42.0
HMO/other health care organization	56.6 **
Community health center	33.6
Other/unknown	54.1
Region	
Northeast	42.4
Midwest	40.7
South	41.8
West	42.7
Metropolitan status	
Large central metropolitan	42.2
Large fringe metropolitan	43.8
Medium metropolitan	39.3
Small metropolitan or non-metropolitan	41.9
County poverty status	
Less than 15% of population in poverty	41.5
15% or more of population in poverty	42.5

Source: Electronic Health Records mail survey to the National Ambulatory Medical Care Survey, 2012.

Notes:

**(*) Significantly different from reference category at $p < 0.01(0.05)$. Reference category is the first listed category for each characteristic.

Analysis limited to physicians with at least 8 Meaningful Use Stage 1 Core capabilities (62.7 percent of all office-based physicians) (n=2874). Percent of physicians who routinely used all capabilities by physician characteristic are adjusted percents based on multivariate logistic regression including all characteristics listed and a control for number of capabilities adopted. Practice size was associated with the location where the physician saw most ambulatory care patients. Practice size may be under-estimated.