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EHR adopters vs. non-adopters: Impacts of, barriers to, and federal initiatives for EHR adoption

Eric W. Jamoom[a,*], **Vaishali Patel**[b], **Michael F. Furukawa**[b], and **Jennifer King**[b]

[a]National Center for Health Statistics, Centers for Disease Control and Prevention, U.S. Department of Health and Human Services, 3311 Toledo Road, Rm 3304, Hyattsville, MD 20782, USA

[b]Office of the National Coordinator for Health Information Technology, U.S. Department of Health and Human Services, USA

Abstract

While adoption of electronic health record (EHR) systems has grown rapidly, little is known about physicians' perspectives on its adoption and use. Nationally representative survey data from 2011 are used to compare the perspectives of physicians who have adopted EHRs with those that have yet to do so across three key areas: the impact of EHRs on clinical care, practice efficiency and operations; barriers to EHR adoption; and factors that influence physicians to adopt EHRs. Despite significant differences in perspectives between adopters and non-adopters, the majority of physicians perceive that EHR use yields overall clinical benefits, more efficient practices and financial benefits. Purchase cost and productivity loss are the greatest barriers to EHR adoption among both adopters and non-adopters; although non-adopters have significantly higher rates of reporting these as barriers. Financial incentives and penalties, technical assistance, and the capability for electronic health information exchange are factors with the greatest influence on EHR adoption among all physicians. However, a substantially higher proportion of non-adopters regard various national health IT policies, and in particular, financial incentives or penalties as a major influence in their decision to adopt an EHR system. Contrasting these perspectives provides a window into how national policies have shaped adoption thus far; and how these policies may shape adoption in the near future.

Keywords

Health information technology; Electronic health records; Physician workflow; Health policy; National Ambulatory Medical Care Survey

1. Introduction

In 2008, about 40% of US physicians used some type of electronic health record (EHR) system, but fewer than 20% had an EHR with a basic set of computerized features, including the ability to record information on patient demographics, view laboratory and imaging

*Corresponding author. Tel.: +1 301 458 4798; fax: +1 301 458 4032. ; Email: Ejamoom@cdc.gov (E.W. Jamoom)

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results, maintain problem lists, compile clinical notes, and manage computerized prescription ordering.[1,2] These early adopters reported that EHRs improved timely access to medical record, quality of communication with other providers and tasks such as prescription refills. Physicians who had not adopted EHRs reported major barriers to doing so, including capital costs, finding a system that meets practice needs, uncertainty about return on investment, and concerns that the EHR system would become obsolete.[3]

National policies and programs that are now in place through the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 seek to address many of these barriers and encourage physicians to adopt and meaningfully use EHRs in order to experience their potential benefits.[4,5] The Medicare and Medicaid EHR Incentive Program provides physicians financial incentives for the adoption and meaningful use of EHRs and penalties for non-adoption. A certification program seeks to ensure that EHRs meet meaningful use requirement standards. The Regional Extension Center Program assists physicians with key steps of the adoption process including selecting an EHR and providing technical assistance with EHR implementation.[6] State-level initiatives and federal projects in partnership with the private sector have been funded to enable the electronic exchange of clinical information amongst providers.[7]

In 2012, over three quarters of physicians had adopted some type of EHR.[8] Physician adoption of EHRs with at least “basic” computerized functionality has grown since the passage of the HITECH Act, reaching 40% in 2012.[8]

In this new environment where EHR adoption has spread beyond the earliest adopters to over half of all physicians little is known about physicians’ perspectives on EHR adoption and use. Recent surveys of physicians’ attitudes and experiences with EHR adoption have been conducted within states such as Massachusetts, Texas and Florida, but these studies do not provide a national level physician perspective.[9–11] One national study, found physicians with systems that met meaningful use in late 2011/early 2012 were more likely to rate panel management as easy compared to those not meeting the standard.[12] Further understanding of the national experiences of physicians who have adopted EHRs to date and the perceptions of physicians who have yet to do so post-HITECH can inform ongoing policies and programs designed to support continued EHR adoption and to ensure that physicians are informed of the potential benefits of EHRs once they begin using them.

This study compares the perspectives of physicians who have and have not adopted EHRs in three key areas: the experienced or expected impact of EHRs on clinical care, practice efficiency and operations; barriers to EHR adoption; and the influence of major policy initiatives that seek to increase EHR adoption. Contrasting these perspectives provides a window into how national policies have shaped adoption thus far; and how these policies may shape adoption in the near future.

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2. Material and methods

2.1. Data sources

Data from two nationally representative surveys of non-federal office-based physicians in the United States were used: (1) the 2011 National Ambulatory Medical Care Survey (NAMCS) Electronic Medical Records (EMR) mail survey from which we obtained physicians' office characteristics and whether or not they used an EHR, and (2) the 2011 NAMCS Physician Workflow Survey (PWS), a follow-up mail survey to the 2011 NAMCS EMR survey that asked physician respondents about their attitudes and experiences with EHR adoption and use. The unweighted response rate was 64% for the EMR survey. The NAMCS PWS survey had an overall, unweighted response rate of 48%, which is conditioned on being able to determine eligibility among 79% of the EMR mail sample (n = 10,302) for which 61% office-based physicians responded (n = 3180). The NAMCS PWS sample is described elsewhere.[13] Based on the 2011 surveys, 54% of physicians had adopted an EHR, with adopters being significantly more likely to be younger than 50 year old; work in larger practices and in non-physician owned practice settings (i.e., HMO, community health center, academic health center), and be primary care physicians compared to non-adopters ($p < 0.05$).[13]

2.2. Independent and dependent measures

The key independent variable was EHR adoption. A broad, inclusive definition of EHR adoption was used and was defined by whether the physician's practice used an EHR. We contrast adopters' perceptions regarding how their EHR actually impacted their practice with non-adopters' perceptions about how using an EHR may affect their practice. We separately calculated the proportion of EHR adopters and non-adopters that "strongly agreed" or "somewhat agreed" with positively and negatively phrased statements pertaining to both overall and specific perceptions regarding the impact of using EHRs on clinical care, practice efficiency and operational workflows. See appendix Table 1 for the definitions of different perceptions of EHR use evaluated, including the survey items.

We evaluated physicians' perceptions regarding barriers to EHR adoption by contrasting perceptions between EHR adopters and non-adopters. EHR adopters and non-adopters alike rated their experiences with EHR adoption using a list of twelve barriers on a scale of "major barrier", "minor barrier", or "not a barrier". We separately calculated the proportion of EHR adopters and non-adopters that indicated the barrier as a "major" barrier versus all other response categories.

EHR adopters and non-adopters also rated the influence that several health IT policies had or would have on their decision to adopt an EHR. Each policy was rated by adopters and non-adopters alike on a scale of "major influence", "minor influence", and "not an influence" on their decision to adopt an EHR. We separately calculated the proportion of EHR adopters and non-adopters who indicated the policy as a "major" influence on their decision to adopt an EHR versus other response categories. See appendix Tables 2 and 3 for the complete list of barriers and health IT policies.

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2.3. Analyses

Multivariable logistic regression models predicted three main outcomes related to physician perceptions: agreement with EHR impacts, major barriers, or policies that had a major influence on EHR adoption. These outcomes were examined as a function of the physician's EHR adoption status (non-adopters or adopters) while controlling for physician and practice characteristics associated with EHR adoption.[1,13] Control variables for this model include medical specialty (primary care vs. not primary care), age (under 50 vs. 50 years or older), the number of physicians in the practice (1–2, 3–10, 11+, missing), practice ownership (physician/physician group owned, other/missing), region (Northeast, Midwest, South, West), and whether the practice was located in a metropolitan statistical area (Yes, No).

All adjusted percentages were reported using marginal effects from this model. All analyses used sample weights. A p-value of < 0.01 indicated statistical significance. Analyses were conducted using Stata version 12 software (College Station, TX), using weights to account for non-response and adjusting standard errors for the complex survey design of the data.

2.3.1. Limitations—Although the 2011 Workflow Supplement had an overall 48% response rate, respondents and non-respondents may differ by unobserved selection effects. Physicians' perspectives are self-reported data and may include office-staff participation as a proxy for sampled physicians. We did not empirically examine the effects of EHR adoption by using claims data, EHR data or some other clinical data source.

3. Results

3.1. Impacts of EHRs

After controlling for physician and practice characteristics, a large proportion of physicians regardless of their EHR adoption status agreed that the use of EHRs led to positive impacts on clinical care, practice efficiency and finances (Fig. 1). Specifically, significantly more EHR adopters compared to non-adopters perceive that EHR use produces clinical benefits (84% vs. 69%), more efficiencies (76% vs. 65%), and financial benefits (61% vs. 52%) for the practice. Although non-adopters were significantly less likely than adopters to agree that EHR use would have these positive impacts, more than half of non-adopters agreed that EHRs would produce clinical benefits, lead to practice efficiency, and produce financial benefits.

With regards to the specific clinical impacts of EHRs, the majority of EHR adopters agreed that EHR use made records more readily available at the point-of-care (91%), and compared to non-adopters, significantly more EHR adopters agreed that EHR use allows them to deliver better patient care (71% vs. 54%). While non-adopters were less likely to report that EHR use would lead to positive clinical benefits (84% vs. 69%), the majority of non-adopters agreed that EHRs would make records more available and allow them to deliver better patient care. However, non-adopters were also significantly more likely than adopters to perceive that EHRs would disrupt the way they interact with patients (65% vs. 52%). (See appendix for table of specific clinical, practice efficiency and financial impacts of EHRs.) Over three-quarters of physicians agreed that the amount of time to plan, review, order, and

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document care increases as a result of EHR use. However, about three-quarters reported that e-prescribing saves physician time; over 60% of physicians agreed that EHRs leads to lab results being sent faster; and only about 30% of physicians thought that the amount of time to respond to pharmacy calls increases as a result of EHR use.

Regarding specific financial benefits, about 70% of physicians, regardless of EHR adoption status, agreed that EHR use leads to cost savings associated with managing and storing paper. However, just under half of EHR non-adopters (48%) perceived their EHR use would enhance data confidentiality, while significantly more adopters (67%) agreed that EHR use enhanced their data confidentiality. Very few physicians agreed that EHR use leads to an increase in the volume of office visits. (See appendix for table of specific clinical, practice efficiency and financial impacts of EHRs.)

3.2. Barriers to EHR adoption

After controlling for physician and practice characteristics, physicians were most likely to cite the cost of purchasing a system followed by productivity loss as major barriers regardless of their EHR adoption status (see Fig. 2). Almost three-quarters of non-adopters (73%) considered purchase cost as a major barrier, while about half (52%) of adopters indicated purchase cost as a major barrier. About three-fifths of non-adopters (59%) considered loss of productivity as a major barrier compared to just 37% of adopters.

Over 40% of non-adopters and about 25% of adopters perceived annual maintenance costs, finding an EHR that meets the needs of their practice, adequacy of training and adequacy of technical support as major barriers to EHR adoption. Although the top major barriers to EHR adoption were similar for both adopters and non-adopters, after controlling for physician and practice characteristics, we found that for 11 out of 12 barriers, a significantly higher proportion of non-adopters than adopters perceived these as major barriers to EHR adoption. Access to high speed Internet was the least cited major barrier to EHR adoption and was the only one that did not differ significantly between adopters and non-adopters (see appendix Table 2).

3.3. Factors that had a major influence on EHR adoption

After controlling for physician and practice characteristics, both EHR adopters and non-adopters had cited proposed financial penalties and the capability to exchange health information electronically within their referral networks (health information exchange (HIE)) as the top two factors that have a major influence on the decision to adopt an EHR (Fig. 3). Half or more of non-adopters (56% and 50% respectively) perceived financial penalties and HIE as having a major influence on their decision to adopt an EHR; whereas, one-third (33%) of EHR adopters considered these factors to be a major influence on their adoption decisions. Following financial penalties and HIE capability, half of EHR non-adopters and a quarter of adopters considered technical assistance with EHR implementation and meaningful use incentives as factors having a major influence on their decision to adopt an EHR Fewer physicians—only about a quarter of non-adopters and less than 10% of adopters—considered the availability of government-certified products and assistance with selecting an EHR system as major influences on their decision to adopt an EHR About 70%

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of non-adopters perceived MU incentives or financial penalties would have a major influence in their decision to adopt an EHR system.

After controlling for physician and practice characteristics, both EHR adopters and non-adopters were in agreement on the most influential factors affecting their potential or actual adoption decisions. However, significantly more non-adopters indicated that federal health IT policies would have a major influence on their decision to adopt compared to EHR adopters. For example, almost twice as many non-adopters than adopters perceived technical assistance with EHR implementation and meaningful use incentives as factors having major influences on their decision (48% vs. 25% and 47% vs. 24%, respectively). Also, significantly more non-adopters reported financial penalties (33% and 56%, respectively) rather than incentive payments (24% and 47%, respectively) as having a major influence on deciding to adopt EHRs ($p < 0.01$).

In sub-analyses that focused only on EHR adopters, we found that about two-thirds (65%) of physicians who began using EHRs since HITECH ("new EHR users") indicated that either proposed financial penalties (56%) or MU incentive payments (42%) had a major influence on their decision to adopt an EHR. These policies were significantly more likely to have a major influence on new EHR users compared to physicians who adopted EHRs prior to HITECH ("experienced EHR users"). See appendix Fig. 4. About one in three EHR adopters reported that electronically exchanging information and technical assistance with EHR implementation were major influences, regardless of whether they used EHRs before or after HITECH.

4. Discussion

This study provides a national portrait of physicians' perspectives and experiences using and adopting EHRs. The majority of physicians, regardless of EHR adoption status, agree that EHR use results in overall clinical benefits, more efficient practices, and financial benefits. Among non-adopters, purchase cost and productivity loss are major barriers to EHR adoption; and MU financial incentives and penalties, technical assistance, and the capability for electronic health information exchange are factors with the greatest influence on EHR adoption.

A significantly lower proportion of EHR non-adopters agreed that EHR use will lead to the positive impacts experienced by EHR adopters; significantly fewer EHR adopters experienced barriers to adoption in comparison to non-adopters, and a much higher proportion of non-adopters indicated that federal health IT policies were influential. Additionally, among non-adopters, the combined effect of MU incentives and proposed financial penalties together represent major influences in their decision to adopt EHRs.

The most striking gap between EHR adopters' experiences and non-adopters' expectations regarding impacts of EHRs relates to clinical care and patient data confidentiality. Some of this gap may relate to their different perspectives; early adopters may be more positively inclined compared to non-adopters.[14,15] Non-adopters may be less aware of policies and procedures used to ensure the privacy and security of electronic health information such as

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the HIPAA security rule which covers electronic health information and the meaningful use requirement to conduct a security risk analysis as part of the EHR implementation process.

Although physicians are largely positive about the overall impact of EHRs on clinical care and practice efficiency, their perspectives and experiences are more mixed and nuanced regarding the specific benefits in these areas. Prior to HITECH, physicians reported that EHRs had a positive impact on prescription refills and enhanced communication with other providers.[3] With regard to practice efficiency, while in this study many EHR adopters experience and non-adopters perceive that EHR use leads to increased time documenting care, they also experience or recognize the potential time-savings associated with electronic health information exchange, including e-prescribing and lab result delivery. Our findings regarding physicians' perspectives are consistent with other empirical studies finding that while EHRs reduced some clinical work burdens (i.e., prescribing, some lab tasks, and office communication), it increased others (i.e., charting, chronic/preventive care tasks, some lab tasks).[16] Documenting care may lead to improved quality of care or may highlight EHR usability issues and workflow problems.[16,17] Most physicians note the positive impact of EHRs on improving access to medical records, which has been reported in empirical studies examining the benefits of off-site and 24-h access to patient medical data.[17] While a substantial portion of physicians also experienced or perceived that EHR use disrupts interactions with patients, empirical studies examining the impact of EHRs on patient–provider interactions have been mixed.[17–19]

We observed several persistent barriers, regardless of adoption status, affecting the adoption of EHRs. Cost and productivity loss continue to present challenges as they did before the enactment of HITECH.[3,19,20] In 2008, the top barriers to EHR adoption were very similar among adopters and non-adopters alike, which included capital costs, loss of productivity, and finding a system to meet their needs. Significantly fewer EHR adopters than non-adopters experienced barriers to adoption perhaps because "early adopters" may have had additional resources and interest in adopting EHRs.[1,14]

We observed that 71% of non-adopting office-based physicians are influenced by either penalties or incentive payments. The "stick" approach to meaningful use penalties has greater influence over both EHR adopters and non-adopters decisions to adopt EHRs compared to the "carrot" approach of meaningful use incentives. Somewhat surprisingly, more physicians reported the benefits of HIE as being a major influence on EHR adoption, followed by technical assistance, which is the goal of the REC program, which offers technical assistance for EHR selection and implementation. The emphasis that stage 2 of meaningful use places on HIE, and the technical assistance that the REC program provides physicians may help spur EHR adoption. Although a lower proportion of EHR adopters reported these factors as having influenced their adoption decision, this may be because a proportion of these providers were "early adopters," who had been using EHRs prior to the HITECH Act of 2009. A variety of current Federal policies, including CMS penalties, MU incentives, HIE initiatives and the REC program may influence non-adopters to adopt EHRs. While a high proportion of non-adopters consider several challenges to EHR adoption (e.g., cost and productivity loss) to be major barriers, a high proportion of non-adopters also considered health IT policies that target these challenges to be major influences in their

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decision to adopt EHRs. As federal policies related to EHR adoption continue to be implemented, it will be important to examine how non-adopters move forward with their decision to adopt EHRs and to examine how perceptions regarding EHR impacts evolve among EHR adopters and non-adopters alike.

Appendix

See Tables 1–4 and Fig. 4.

References

1. Decker SL, Jamoom EW, Sisk JE. Physicians in nonprimary care and small practices and those age 55 and older lag in adopting electronic health record systems. Health Aff. 2012; 31(5):1108–1114.
2. Hsiao CJ, Hing E, Socey TC, Cai B. Electronic health record systems and intent to apply for meaningful use incentives among office-based physician practices: United States, 2001–2011. NCHS Data Brief. 2011; 79:1–8. [PubMed: 22617322]
3. DesRoches CM, Campbell EG, Rao SR, et al. Electronic health records in ambulatory care—a national survey of physicians. N Engl J Med. 2008; 359(1):50–60. [PubMed: 18565855]
4. Blumenthal D. Launching HITECH. N Engl J Med. 2010; 362(5):382–385. [PubMed: 20042745]
5. Blumenthal D. Implementation of the federal health information technology initiative. N Engl J Med. 2011; 365(25):2426–2431. [PubMed: 22187990]
6. Maxson E, Jain S, Kendall M, Mostashari F, Blumenthal D. The regional extension center program: helping physicians meaningfully use health information technology. Ann Intern Med. 2010; 153(10):666–670. [PubMed: 21079224]
7. Williams C, Mostashari F, Mertz K, Hogin E, Atwal P. From the Office of the National Coordinator: the strategy for advancing the exchange of health information. Health Aff. 2012; 31(3):527–536.
8. Hsiao CJ, Hing E. Use and characteristics of electronic health record systems among office-based physician practices: United States, 2001–2012. NCHS Data Brief. 2012; 111:1–8. [PubMed: 23384787]
9. Menachemi N, Powers TL, Brooks RG. Physician and practice characteristics associated with longitudinal increases in electronic health records adoption. J Healthcare Manag/Am Coll Healthcare Exec. 2011; 56(3):183–197. (discussion 197–188).
10. Peterson LT, Ford EW, Eberhardt J, Huerta TR, Menachemi N. Assessing differences between physicians′ realized and anticipated gains from electronic health record adoption. J Med Syst. 2011; 35(2):151–161. [PubMed: 20703574]
11. Simon SR, Kaushal R, Cleary PD, et al. Physicians and electronic health records: a statewide survey. Arch Intern Med. 2007; 167(5):507–512. [PubMed: 17353500]
12. DesRoches CM, Audet A-M, Painter M, Donelan K. Meeting meaningful use criteria and managing patient populations. A national survey of practicing physicians. Ann Intern Med. 2013; 158(11):791–799. [PubMed: 23732712]
13. Jamoom E, Beatty P, Bercovitz A, Woodwell D, Palso K, Rechtsteiner E. Physician adoption of electronic health record systems: United States, 2011. NCHS Data Brief. 2012; 98:1–8. [PubMed: 23050588]
14. Kaushal R, Bates DW, Jenter CA, et al. Imminent adopters of electronic health records in ambulatory care. Inform Prim Care. 2009; 17(1):7–15. [PubMed: 19490768]
15. Rogers, EM. Diffusion of Innovations. 5th. New York, NY: Free Press; 2003.
16. Howard J, Clark EC, Friedman A, et al. Electronic health record impact on work burden in small, unaffiliated, community-based primary care practices. J Gen Intern Med. 2013; 28(1):107–113. [PubMed: 22926633]
17. Kissam, SMBA.; Dimitropoulos, LL.; Thompson, CR. Barriers to Meaningful Use in Medicaid: Analysis and Recommendations. Rockville, MD: Agency for Healthcare Research and Quality; 2012.

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18. Doyle RJ, Wang N, Anthony D, Borkan J, Shield RR, Goldman RE. Computers in the examination room and the electronic health record: physicians′ perceived impact on clinical encounters before and after full installation and implementation. Fam Pract. 2012; 29(5):601–608. [PubMed: 22379185]
19. Yan H, Gardner R, Baier R. Beyond the focus group: understanding physicians′ barriers to electronic medical records. Jt Comm J Qual Patient Saf. 2012; 38(4):184–191. [PubMed: 22533131]
20. Rao SR, Desroches CM, Donelan K, Campbell EG, Miralles PD, Jha AK. Electronic health records in small physician practices: availability use and perceived benefits. J Am Med Inform Assoc: JAMIA. 2011; 18(3):271–275. [PubMed: 21486885]

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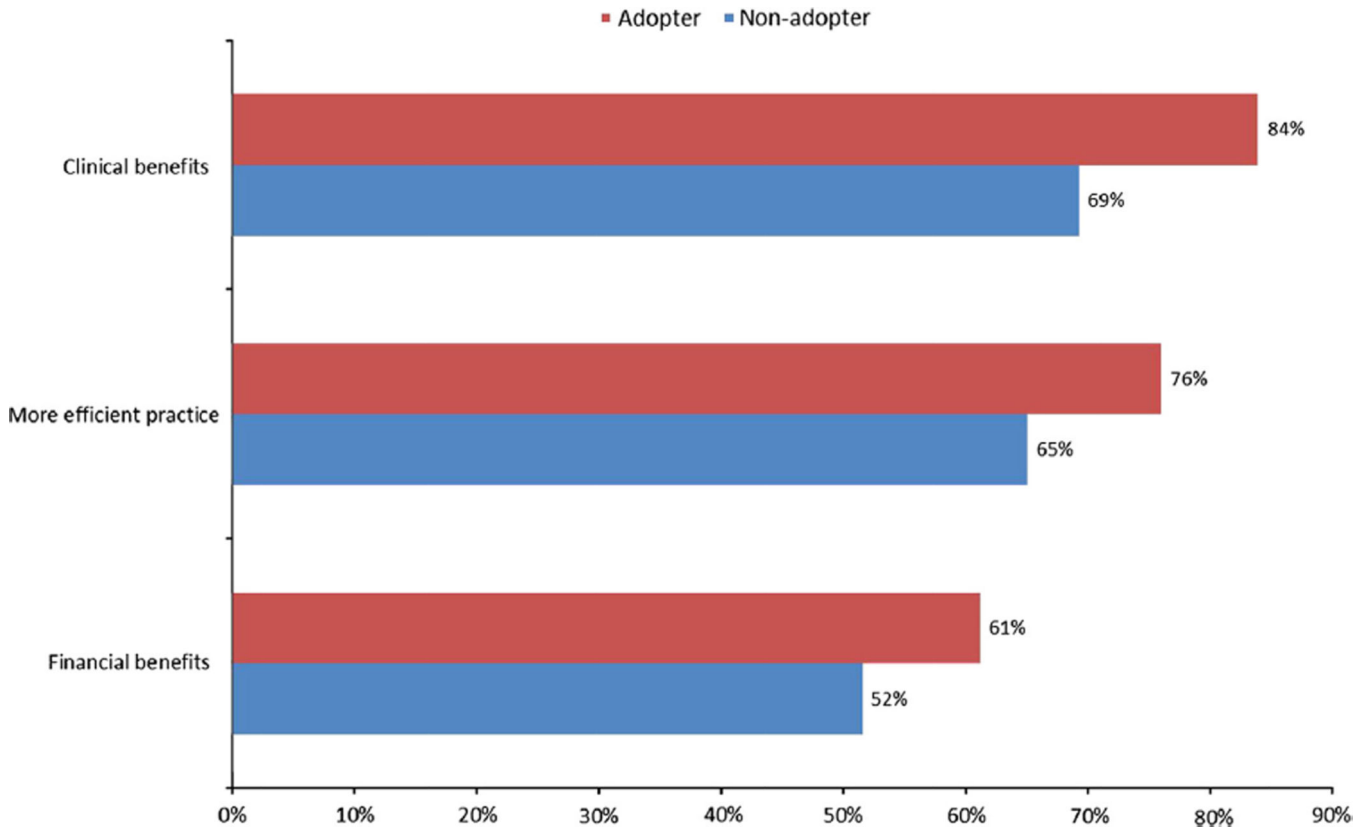

Fig. 1.

Adjusted percent of physicians' agreement about overall EHR impacts by adoption status.

Notes: All differences between adopters and non-adopters were significant ($p < 0.01$). Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other/missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$).

Source: Authors' analysis of the Physician Workflow study, 2011 (numbers are adjusted).

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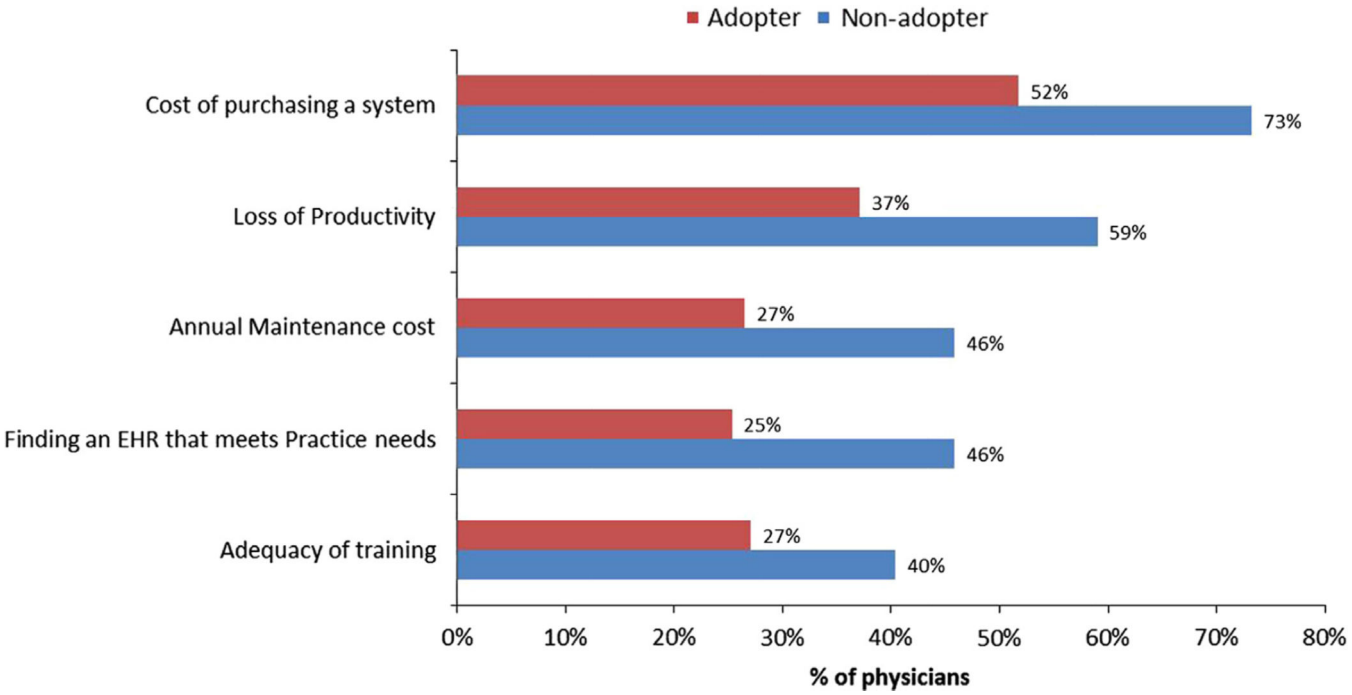

Fig. 2.

Adjusted percent of physicians reporting major barriers to adopting an EHR by adoption status. *Notes*: All differences between adopters and non-adopters were significant ($p < 0.01$). Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other/missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$).

Source: Authors' analysis of the Physician Workflow study, 2011 (numbers are adjusted).

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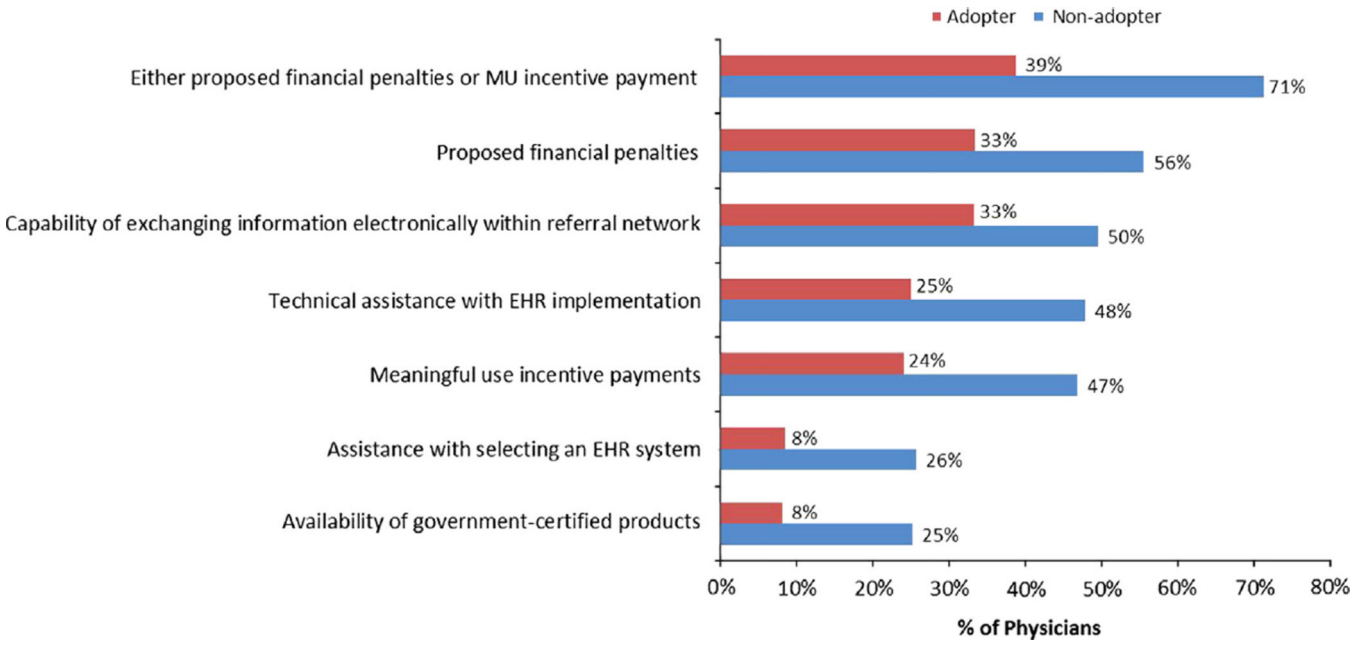

Fig. 3.

Adjusted percent of physicians reporting health IT policies as a major influence on EHR adoption by adoption status. *Notes*: All differences between adopters and non-adopters were significant ($p < 0.01$). Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other/missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$).

Source: Authors' analysis of the Physician Workflow study, 2011 (numbers are adjusted).

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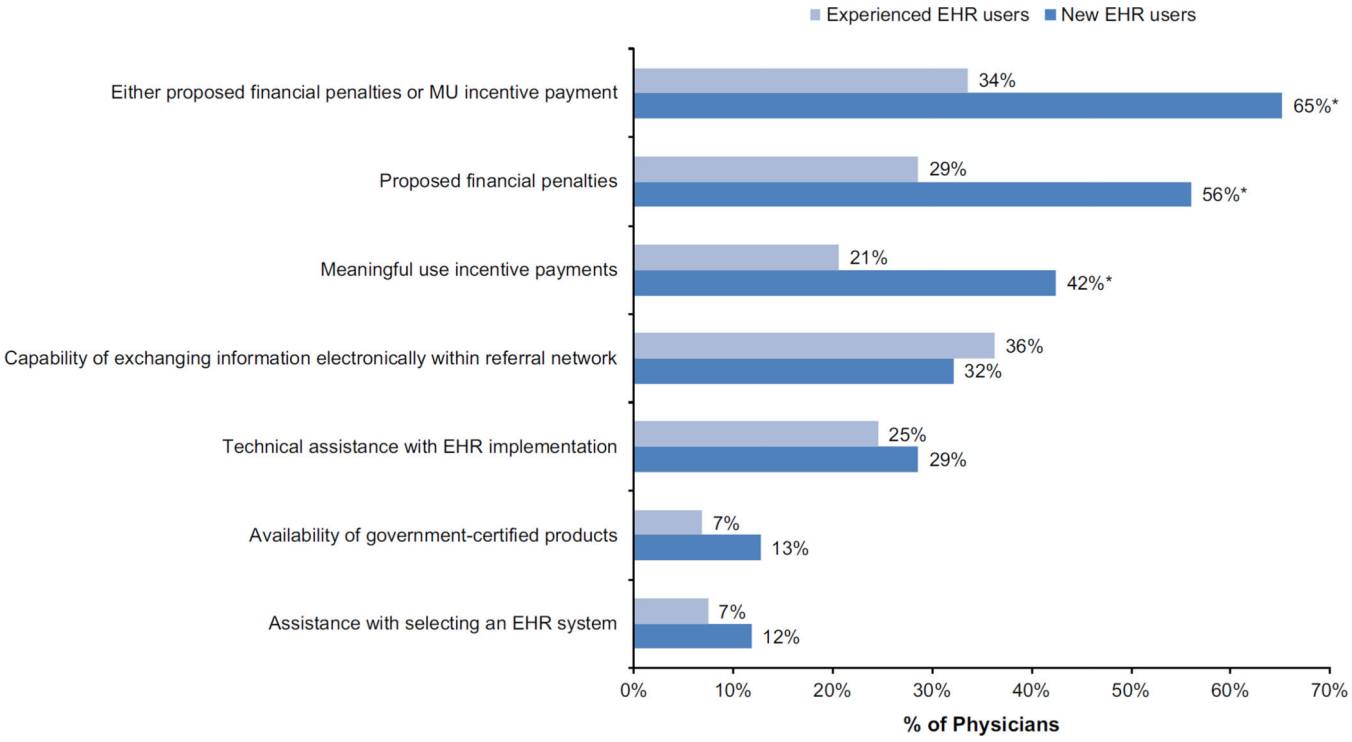

Fig. 4.

Adjusted percent of new and experienced EHR users reporting federal policies as a major influence in their decision to adopt an EHR system. ** Differences by experience with any EHR use was significant ($p < 0.01$) between new (1 year or less) and experienced (2 years or more) EHR users. Percentages were calculated with the use of multivariable logistic regression model on physicians who adopted an EHR system. Variables included in the model were medical specialty (primary care vs. not primary care), age (Under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other, missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 1783$).

Source: NAMCS Physician Workflow Survey, 2011.

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Table 1

Characteristics of physician cohort by Adoption status, 2011.

	Adopter		Non-adopter		Overall	
	Percent	**SE**	**Percent**	**SE**	**Percent**	**SE**
Medical specialty[a]						
Primary care	51.9	2.0	44.7	2.2	48.6	1.5
Other	48.1	2.0	55.3	2.2	51.4	1.5
Age[a]						
< 50	43.3	1.9	29.2	2.0	36.9	1.4
≥ 50	56.7	1.9	70.8	2.0	63.1	1.4
Number of physicians in practice[a]						
1–2	23.9	1.7	46.5	2.2	34.2	1.4
3–10	45.0	2.0	33.6	2.1	39.8	1.4
≥ 11	20.8	1.7	4.1	0.8	13.1	1.0
missing	10.4	1.2	15.9	1.7	12.9	1.0
Ownership[a]						
Physician/physician group owned	50.1	1.9	62.3	2.2	55.6	1.5
Other	40.5	1.9	20.6	1.6	31.4	1.4
Missing	9.5	1.1	17.1	1.8	13.0	1.0
Region[b]						
Northeast	19.1	1.1	22.9	1.4	20.8	0.4
Midwest	22.6	1.1	18.8	1.2	20.9	0.5
South	34.2	1.4	38.7	1.6	36.2	0.5
West	24.2	1.4	19.6	1.8	22.1	0.4
In metropolitan status area?						
Yes	87.0	1.0	88.4	1.1	87.6	0.7
No	13.0	1.0	11.7	1.1	12.4	0.7

Source: National Ambulatory Medical Care Survey Physician Workflow Study, 2011.

Difference between adopter and nonadopter is significant:

[a] $p < 0.01$ and

[b] $p < 0.05$ for all characteristics except MSA ($n = 3180$; 54.4% were EHR adopters).

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Table 2

Adjusted percent of physicians reporting agreement about the following EHR impacts by adoption status.

	Adopter (%)	Nonadopter (%)	Difference (%)
My EHR makes records more readily available at the point-of-care	91	86	6**
Amount of time to plan review order and document care has increased	76	77	−1
My practice saves on costs associated with managing and storing paper	70	74	−4
Sending Rx electronically saves the physician time	77	73	3
My EHR produces clinical benefits for my practice	84	69	15**
My EHR disrupts the way I interact with patients	52	65	−13**
Overall, my practice functions more efficiently	76	65	11**
My EHR is an asset when recruiting physicians to join the practice	63	65	−1
My practice receives lab results faster	68	63	5
My EHR allows me to deliver better patient care	71	54	17**
My EHR produces financial benefits for my practice	61	52	10**
My EHR enhances data confidentiality	67	48	18**
Amount of time to respond to pharmacy calls increased	30	32	−1
Billing for services is less complete	22	20	2
Number of office visits increased	25	20	5

** All differences between adopters and non-adopters were significant ($p < 0.01$).

Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10,11 +, missing), ownership (physician/physician group owned, other, missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$). Survey items presented above differed for non-adopters, such that "my EHR" was substituted for "an EHR" and "would" was added to statements to obtain agreement about using an EHR system. Please see 2011 Physician workflow surveys for more information at http://www.cdc.gov/nchs/ahcd/ahcd_survey_instruments.htm.

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Table 3

Adjusted percents of physicians' top five major barriers to adopting an EHR by adoption status.

	Adopter (%)	Non-adopter (%)	Difference (%)
Cost of purchasing a system	52	73	21**
Loss of productivity	37	59	22**
Finding an EHR that meets practice needs	25	46	21**
Annual maintenance cost	27	46	19**
Adequacy of training	27	40	13**
Reliability of the system	15	40	25**
Adequacy of technical support	25	40	15**
Effort needed to select a system	27	39	12**
Resistance of practice to change work habits	22	39	17**
Ability to secure financing	14	29	15**
Reaching consensus within the practice	9	18	9**
Access to high speed Internet	8	7	−1

** All differences between adopters and non-adopters were significant ($p < 0.01$).

Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other, missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$). Survey items presented above were asked to both EHR adopters and non-adopters. However, items instructions differed for each group of respondents. For EHR adopters, "Please indicate to what extent you experienced the following as a barrier to implementing an EHR system." For non-adopters, the question stem was "Regardless of your plans, to what extent do you view the following as a barrier to adopting an EHR system?" Please see 2011 Physician workflow surveys for more information at http://www.cdc.gov/nchs/ahcd/ahcd_survey_instruments.htm.

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Table 4

Adjusted percent of physicians reporting federal policies as a major influence in their decision to adopt an EHR system by adoption status.

	Non-adopter (%)	Adopter (%)	Difference (%)	Adopter	
				New users (within 2 years) (%)	Experienced users (2 years and over) (%)
Either proposed financial penalties or MU incentive payment	71	39	32.5 **	65	34
Proposed financial penalties	56	33	22.2 **	56	29
Capability of exchanging information electronically within referral network	50	33	16.2 **	32	36
Technical assistance with EHR implementation	48	25	22.9 **	29	25
Meaningful use incentive payments	47	24	22.8 **	42	21
Assistance with selecting an EHR system	26	8	17.2 **	12	7
Availability of government-certified products	25	8	17.1 **	13	7

Source: NAMCS Physician Workflow Survey, 2011.

** All differences between adopters and non-adopters were significant ($p < 0.01$).

Percentages were calculated with the use of multivariable logistic regression model. Variables included in the model were medical specialty (primary care vs. not primary care), age (under 50 and 50 years or older), the number of physicians in the practice (1–2, 3–10, 11 +, missing), ownership (physician/physician group owned, other, missing), region (Northeast, Midwest, South, West), and whether in a metropolitan statistical area (Yes, No). Missing was excluded (overall sample size $n = 3180$). Survey items presented above were asked to both EHR adopters and non-adopters. However, item instructions differed for each group of respondents. For EHR adopters, "How much of an influence did the following have on your decision to adopt an EHR system?" For nonadopters, the question stem was "How much of an influence do you think the following would have on your decision to adopt an EHR system?" Please see 2011 Physician workflow surveys for more information at http://www.cdc.gov/nchs/ahcd/ahcd_survey_instruments.htm.