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John A. Gale MS
University of Southern Maine, Maine Rural Health Research Center

Zachariah T. Croll MPH
University of Southern Maine, Maine Rural Health Research Center

David Hartley PhD, MHA
University of Southern Maine, Muskie School of Public Service, Maine Rural Health Research Center

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Adoption and Use of Electronic Health Records by Rural Health Clinics: Results of a National Survey

John Gale, MS; Zach Croll, BA; David Hartley, PhD

INTRODUCTION

Electronic health records (EHRs) are a critical tool for managing and documenting the quality of care provided to patients and coping with the demands of health reform and practice transformation. The Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009 committed $30 billion to support the meaningful use[i] of EHRs and provided financial incentives to encourage the phased implementation of EHRs by qualified health care providers.[1] To encourage hospitals and eligible providers (EPs) to invest in EHR technology and apply this technology to improving patient care, the HITECH Act established meaningful use incentive programs for Medicare and Medicaid.[2]

Rural Health Clinics (RHCs) are a vital source of primary care services with more than 4,000 clinics serving rural communities.[3] Relatively little is known about the extent to which RHCs have adopted and are using EHRs to support clinical services. Because EHR adoption is an essential element for inclusion in accountable care organizations, patient centered medical homes, and health plan provider networks offered on state and national health insurance marketplaces,[4-6] EHR implementation will be increasingly important to RHCs if they are to remain competitive participants in the evolving healthcare market. Further supporting the importance of EHR adoption by RHCs was the release of final rules allowing RHCs to be recognized as Essential Community Providers (ECPs) for purposes of contracting with Qualified Health Plans (QHPs) sold in Federally Facilitated Marketplaces in 2016.[ii,7]

To gain a better understanding of EHR adoption and use by RHCs, we undertook a web-based national survey of 1,479 clinics in 2013. Key findings from this survey are summarized in this policy brief. For further background on EHR implementation in the primary care setting, as well as a more detailed discussion of our survey findings, see the full study, Maine Rural Health Research Center Working Paper number 58.

STUDY METHODOLOGY

We drew an initial random sample of 1,600 clinics from the Second Quarter 2010 CMS Provider of Services file, which provides address, telephone number, and basic organizational data for each RHC. With extensive follow-up by the study team and staff from the National Rural Health Resource Center in Duluth, MN, we obtained current contact information for all but 41 clinics in our sample. These 41

Key Findings

• Nearly 72 percent of Rural Health Clinics (RHCs) have an operational electronic health record (EHR), with 63 percent indicating use by 90 percent or more of their staff.

• Slightly over 17 percent of RHCs without an EHR plan to implement one within six months, and 27 percent plan to do so within seven to twelve months.

• Common barriers to EHR implementation include acquisition and maintenance costs (72 percent), lack of capital (51 percent), and concerns about productivity and income loss during implementation (45 percent).

• RHCs continue to lag on some meaningful use measures, but perform well on measures related to clinical care and patient management.

• With Regional Extension Centers facing the loss of federal funding it is important to identify additional resources to assist RHCs in maximizing EHR adoption and use.

For more information about this study, contact John Gale at jgale@usm.maine.edu

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RHCs were omitted as we determined they were no longer active clinics, leaving an initial sample of 1,559 clinics. An additional 80 clinics were subsequently excluded because they had either closed, had a phone number that was no longer in service, or had terminated participation in the RHC program. This left us with a usable sample of 1,479 clinics.

To optimize our response rate, we developed a survey instrument that could be completed in 15 minutes or less by RHCs with an EHR, and six minutes or less by RHCs without an EHR. The instrument was pre-tested with a small set of clinics to confirm estimated completion time and validate the questions. Prior to entering the field, a description of the survey was sent to each State Office of Rural Health, state RHC/primary care association, and the National Association of Rural Health Clinics. Each organization was asked to share information on the survey and encourage participation by their constituents that were selected as part of our sample.

Data collection for the survey took place from February 2013 through November 2013. We obtained 875 completed surveys for a response rate of 59.2 percent. As some clinics did not respond to every question, the reported "n" varies across questions. For clarity, we report the actual number of clinics responding to each question.

As the goal of this study was to assess the status of EHR adoption and use by RHCs (and not to assess the extent to which RHCs achieved Stage One meaningful use), we aligned the instrument with the core meaningful use functions but did not mirror the Stage One meaningful use measure set. This was done in order to simplify the survey instrument to boost response rate. Based on the meaningful use characteristic captured by each survey question, we grouped the 20 measures of EHR use into three categories: 1) improving quality, safety, and efficiency and reducing health disparities; 2) engaging patients and families in their health care; and 3) improving care coordination. As such, the results of the study cannot be used to determine the extent to which RHCs are likely to achieve Stage One meaningful use status or qualify for Medicare or Medicaid meaningful use incentive payments.

Survey Respondent Characteristics

The characteristics of survey respondents were generally similar to the overall population of RHCs based on key characteristics found in the CMS Provider of Services file (Table 1). While provider-based, government-owned, and non-profit clinics were slightly overrepresented in our sample, the only statistically significant difference was in the geographic distribution of survey respondents, with more respondent clinics located in the Northeast and Midwest and fewer located in the South compared to the overall population of RHCs. Although these differences are unlikely to impact the overall results of the study as it applies to the full population of RHCs, they may limit the potential use of this study to estimate regional differences in EHR adoption and use.

FINDINGS

Adoption of Electronic Health Records (EHRs) by RHCs

Nearly 72 (71.6) percent of clinics reported having an operational EHR with 63.2 percent indicating use by 90 percent or more of their practice staff (Table 2). Independent RHCs were more likely than provider-based RHCs to have an EHR in use (77.8 vs. 65.1 percent). This gap appears to have narrowed since an earlier survey conducted in 2011-2012 (68.6 vs. 46.9 percent).[5] Almost 11 (10.7) percent of respondents had purchased but not yet implemented an EHR with provider-based RHCs more likely than independents to report this status (14.4 and 7.0 percent respectively). Almost 18 (17.8) percent of responding clinics (15.2 percent of independent and 20.5 percent of provider-based RHCs) reported having no EHR in place compared to approximately 24.9 percent in our earlier study.

Technical Assistance and Support

The HITECH Act appropriated funding for the Office of the National Coordinator (ONC) for Health Information Technology to establish the Regional Extension Center (REC) program to provide technical assistance (TA) and support to providers to hasten their adoption and implementation of EHRs and to assist them in achieving meaningful use.[8] REC services are available to all providers, including those that either have or have not yet adopted an EHR. For those providers without an EHR, primary services include needs assessment, product selection, and assistance with installation. For those providers with an EHR, REC services focus on providing assistance to manage the internal practice and business changes necessary to optimize their use.[9]

Almost one third (32.5 percent) of clinics with an EHR and 37.0 percent of those without an EHR reported using their area REC for TA related to either the identification and purchase of an EHR and/or implementation of an EHR after acquisition (data not shown). A number of clinics (30.5 percent with and 22.7 percent without an EHR) were either unsure or unaware of the REC program. Among

Table 1. Comparison of Survey Respondents to Overall Population of RHCs

	Survey Respondents	All RHCs
Overall Number of RHCs	875	3,798
% Independent RHCs	50.6%	54.3%
% Provider-Based RHCs	49.4%	45.7%
Location in Census Region*		
Northeast	4.3%	3.6%
Midwest	46.1%	39.1%
South	32.1%	39.5%
West	17.5%	17.9%
Ownership Type		
Government Owned	18.3%	16.7%
For Profit	42.2%	45.5%
Non-profit	39.5%	37.8%

*Differences significant at p ≤ .001

Table 2. Implementation of Electronic Health Records*

	All RHCs (n=871)	Independent RHCs (n=441)	Provider-Based RHCs (n=430)
EHR in use	71.6%	77.8%	65.1%
For more than 90 percent of Practice	63.2%	69.6%	56.5%
For some providers and staff	8.4%	8.2%	8.6%
Purchased but not in use yet	10.7%	7.0%	14.4%
No EHR	17.8%	15.2%	20.5%

*Independent, provider-based, and total differences significant at p≤.001

clinics with EHRs, independent RHCs (36.5 percent) were more likely than provider-based clinics (28.1 percent) to have received TA from their REC (data not shown). The opposite was true for RHCs without an EHR, with provider-based clinics more likely to have received TA or support from their REC (39.8 vs. 33.3 percent, respectively). These patterns of REC use are consistent with findings from our earlier survey.

It was not uncommon for RHCs to access multiple additional sources of TA to support EHR adoption and implementation (data not shown). The most common sources included EHR vendors (45.1 percent), in-house staff (29.9 percent), and parent hospitals/systems (27.4 percent). Use of these different sources of support varied by clinic type, with independent RHCs relying more heavily than provider-based RHCs on EHR vendor support (49.5 vs. 40.6 percent) and provider-based RHCs relying more than independent RHC on their parent hospitals/systems (36.2 vs. 18.8 percent) and in-house staff (33.7 vs. 26.2 percent).

Other important sources of TA included hospital or provider networks (15.3 percent), private TA contracts (12.5 percent), state/local HIT organizations (11.9 percent), and Quality Improvement Organizations (QIOs) (5.1 percent). Among these latter sources of TA, independent RHCs relied more heavily than provider-based RHCs on private TA contracts (17.8 vs. 7.1 percent) and state/local HIT organizations (12.7 vs. 11.1 percent) while provider based RHCs relied more heavily than independent RHCs on hospital/provider networks (19.2 vs. 11.5 percent) and QIOs (5.7 vs. 4.6 percent). With minor exceptions, these patterns of TA and support received were consistent across RHCs with and without an EHR (results not reported).

Patterns of EHR Use by RHCs

As discussed earlier, we grouped the measures of EHR use into the following categories:

- Category 1 - Improving quality, safety, and efficiency and reducing health disparities;

- Category 2 - Engaging patients and families in their health care; and

- Category 3 - Improving care coordination.

Within Category 1, RHCs reported use of their EHRs to incorporate clinical lab test results as structured data (81.7 percent), conduct drug-drug interactions and drug-allergy checks (84.0 percent), order laboratory and radiology studies (88.5 percent), transmit prescriptions electronically (93.6 percent), maintain up to date problem lists (94.0 percent), record smoking status (95.5 percent), maintain active medication lists (95.8 percent), complete medication orders (95.9 percent), maintain medication allergy lists (96.5 percent), record and chart vital signs (97.4 percent), and capture patient demographic information (98.2 percent) (Appendix). Clinics did less well on reporting ambulatory clinical quality measures (57.7 percent), implementing clinical decision support rules (61.0 percent), conducting drug formulary checks (61.1 percent), transmitting laboratory orders (66.0 percent), and generating patient registries (69.0 percent).

Within Category 2, 46.3 percent of RHCs reported use of their EHRs to send appropriate patient reminders for preventive and follow-up care, and 81.9 percent used their EHRs to provide patients with clinical summaries for each office visit. Under Category 3, 81.9 percent of RHCs provide summary care records for patients transitioned to another setting, but only 64.0 percent test or use their EHRs' capability to exchange clinical data with other providers.

Although independent and provider-based RHCs performed similarly on a number of meaningful use measures, there were some differences. Independent RHCs performed better than provider-based clinics on conducting drug formulary checks (65.4 vs. 55.9 percent); incorporating lab results as structured data (84.2 vs. 78.6 percent); reporting clinical quality measures (60.6 vs. 54.1 percent); implementing clinical decision support rules (65.4 vs. 55.7 percent); providing clinical summaries (88.3 vs. 74.3 percent); providing summary care records (85.0 vs. 78.2 percent); and exchanging key clinical information (68.3 vs. 58.8 percent). Provider-based RHCs only exceeded the performance of independent clinics on one measure: transmitting laboratory test orders electronically at 70.8 vs. 62.1 percent, respectively.

Barriers/Challenges to EHR Acquisition and Implementation

The most commonly reported barriers to acquisition and implementation among RHCs without an EHR were the cost to acquire and maintain an EHR (71.9 percent), lack of capital to purchase (50.7 percent), and concerns about productivity and income loss during the implementation phase (44.5 percent) (Table 3). Lack of physician/provider support, lack of resources for staff education and training, and lack of internal knowledge were barriers for 25.3, 21.2, and 19.9 percent of all clinics, respectively. The cost to acquire and maintain a system, lack of capital, lack of resources for staff education and training, and lack of internal knowledge and technical resources were greater barriers for provider-based than for independent RHCs.

Adoption Plans of RHCs without an EHR

RHCs without an EHR (n=155) were asked about their plans and timelines for EHR adoption. Overall, 17.4 percent plan to adopt and implement an EHR within the next six months and 26.5 percent plan to do so within seven to twelve months (Table 4). Over 28 (28.4) percent reported an adoption time horizon of more than 12 months. Finally, 12.9 percent have no plans to adopt an EHR and 14.8 percent do not know their clinic's adoption plans. Provider-based RHCs were much more likely than independent RHCs to report an adoption plan (84.1 vs. 56.7 percent), while independent RHCs were more likely to report having no plan (23.9 vs. 4.6 percent).

Based on our original sampling frame of 3,799 clinics, an estimated 676 RHCs at the time of our survey either did not have an EHR in place or were not in the process of implementing an EHR. Of this group, an estimated 379 had no or uncertain plans to implement an EHR or did not have plans to implement an EHR in the immediate future (less than one year). An estimated 297 had plans to implement an EHR within the coming year (data not shown).

CONCLUSIONS

The results of this study reflect growing use of EHR technology by RHCs. The finding that close to 72 percent of RHCs have adopted and implemented an EHR is consistent with recent studies of office-based physicians that show adoption rates ranging from 69 to 72 percent for all physicians and up to 75 percent for primary care physicians.[10,11] Although RHC EHR adoption rates are in line with those of other primary care practices, there are some areas of concern. For example, provider-based RHCs

Table 3. Barriers to EHR Acquisition and Implementation*

	All RHCs (n=146)	Independent RHCs (n=65)	Provider-Based RHCs (n=81)
Cost to acquire and maintain	71.9%	69.2%	74.1%
Lack of capital to invest in an EHR	50.7%	47.7%	53.1%
Lack of physician/provider support	25.3%	24.6%	25.9%
Lack of resources for staff education and training	21.2%	16.9%	24.7%
Concerns about security/privacy	11.0%	13.9%	8.6%
Concerns about productivity or income loss during transition	44.5%	46.2%	43.2%
Lack of internal knowledge and technical resources	19.9%	16.9%	22.2%

Column percentages total more than 100 percent because clinics were asked to "check all that apply"
*Differences not significant

Table 4. Plans to Acquire and Implement an EHR*

	All RHCs (n=155)	Independent RHCs (n=67)	Provider-Based RHCs (n=88)
Yes, within next 6 months	17.4%	16.4%	18.2%
Yes, within 7-12 months	26.5%	20.9%	30.7%
Yes, in more than 12 months	28.4%	19.4%	35.2%
No	12.9%	23.9%	4.6%
Not sure	14.8%	19.4%	11.4%

*Independent, provider-based, and total differences significant at p ≤ .01

report a lower EHR adoption rate than independent clinics (65.1 vs. 77.8 percent), and 17.8 percent of all clinics report having no EHR in place. Within this group (n=155), 12.9 percent had no plans to adopt an EHR, and 28.4 percent reported an adoption time horizon of more than 12 months. RHCs that have not adopted an EHR are at risk of being left behind in terms of EHR meaningful use and their ability to participate in evolving pay for performance and practice transformation initiatives. The reasons behind the first group's lack of plans to adopt an EHR and the second group's relatively long term adoption plans also warrant further exploration.

In terms of using their EHRs to improve quality, safety, and efficiency, as well as to reduce health disparities, RHCs performed best on measures related to clinical care and patient management. They did less well on conducting drug formulary checks; transmitting laboratory orders electronically; reporting ambulatory clinical quality measures; implementing clinical decision support rules; and generating patient registries. In terms of engaging patients in their care and improving care coordination, RHCs did well on providing clinical summaries for each office visit and summary care records for patients transmitted to other settings of care, but less well on sending patient reminders for follow up and preventive care and exchanging clinical information with other providers. Independent RHCs performed better than provider-based clinics on conducting drug formulary checks, incorporating lab results as structured data, reporting clinical quality measures, implementing clinical decision support rules, providing clinical summaries, providing summary care records, and exchanging key clinical information. Provider-based clinics only exceeded the performance of independent RHCs on the electronic transmission of laboratory test orders.

Given provider-based clinics' presumed access to the resources of their parent hospitals, our findings of lower EHR adoption and use among provider-based clinics are somewhat

counterintuitive. Although our study does not allow us to explain these findings, we suggest two possible reasons for the differences in the rates of EHR adoption. One is that parent hospitals may have adopted EHRs that are better suited to the needs of the inpatient setting than their provider-based RHCs. Under this scenario, hospitals may need to invest in a second EHR or modify their existing EHR to support their clinics but have yet to do so. Another possible explanation is that hospitals may have developed a phased implementation strategy, with EHR implementation in their provider-based clinics scheduled to take place after implementation is completed in the inpatient setting. Based on the results of our two RHC surveys, this pattern of lower EHR adoption in provider-based RHCs deserves further study.

This study demonstrates that RHCs are approaching parity with other physician practices in terms of EHR adoption and use. However, some RHCs, such as provider-based clinics that report lower rates of EHR adoption, are likely to require continued TA and support. At the same time, RHCs are not exhibiting consistently high performance on all Stage 1 meaningful use measures. Although REC funding has ended, some have found sources of external support and will likely continue to play an important role in supporting EHR adoption and meaningful use among RHCs.[12] Nonetheless, it is important to identify and provide additional resources to assist all RHCs in adopting and maximizing the use of EHR technology to improve clinical care and efficiency.

As expectations for meaningful use evolve, RHCs will be expected to demonstrate expanded use of their EHRs for clinically important functions. As such, it is important that RHCs improve their performance on all Stage 1 meaningful use measures as a foundation for meeting the more rigorous Stage 2 and Stage 3 standards. Maximizing EHR use will also be vital to the ongoing participation of RHCs in the evolving healthcare market.

ENDNOTES

i. The HITECH Act established the following requirements for meaningful use of certified EHR technology: (1) use of EHR technology in a meaningful manner; (2) electronic exchange of information to improve quality and coordination of care; and (3) submission of clinical quality measures and other measures as identified by the Secretary. These requirements were supplemented by a meaningful use framework adapted from the national priorities established by the National Priorities Partnership: (1) improving quality, safety, efficiency, and reducing health disparities; (2) engaging patients and families in their health care; (3) improving care coordination; (4) improving population and public health; and (5) ensuring adequate privacy and security protections for personal health information.[13]

ii. QHPs sold in Federally-facilitated Marketplaces must contract with at least 30 percent of the ECPs in their service areas. To comply with this minimum threshold, QHPs must contract with at least one ECP in each of six categories (i.e., Federally Qualified Health Centers, family planning providers, hospitals, Indian health care providers, Ryan White providers, and "other" ECP providers). Effective January 1, 2016, RHCs may qualify as other ECPs provided that they meet the following requirements: 1) based on attestation, the RHC accepts patients regardless of ability to pay and offers a sliding fee schedule; or is located in a primary care Health Professional Shortage Area; and 2) accepts patients regardless of coverage/payer source. The "other" category of ECP providers includes entities that serve predominantly low-income, medically underserved individuals.

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Appendix. Meaningful Use of Electronic Health Records by Rural Health Clinics

Goal(s)	Objective	Measure Specifications	All RHCs	Independent RHCs	Provider-Based RHCs
	CPOE (n=468)	Completes medication orders and/or prescriptions (for patients with at least one medication in their medication list) using EHR's CPOE functions	95.9%	97.6%	94.1%
	CPOE (n=469)	Uses CPOE function in EHR to order laboratory and/or radiology tests	88.5%	86.4%	90.9%
	Drug-drug and drug-allergy interactions (n=612)***	Implemented EHR functions to conduct drug-drug interactions and drug-allergy checks	84.0%	86.4%	81.1%
	Up to date problem list (n=616)	Maintains up-to-date problem list of current/active diagnoses recorded as structured data	94.0%	95.3%	92.5%
	ePrescribing (n=620)*	Transmits prescriptions electronically using e-prescribing functions in EHR	93.6%	94.7%	92.1%
Category 1: Improving quality, safety, efficiency, and reducing health disparities	Drug formulary checks (n=614)*	Conducts drug formulary checks with access to at least one internal or external drug formulary	61.1%	65.4%	55.9%
	Lab tests (n=621)	Transmits orders for laboratory tests electronically using EHR	66.0%	62.1%	70.8%
	Lab test results (n=611)	Incorporates clinical lab test results (whose results are in a positive/negative or numerical format) ordered by clinic providers into EHR as structured data	81.7%	84.2%	78.6%
	Active medication list (n=621)**	Maintains active medication list for patients seen with at least on entry (or an indication that the patient is not currently prescribed any medication) recorded as structured data	95.8%	96.2%	95.4%
	Active medication allergy list (n=622)*	Maintains an active medication allergy list for patients seen with at least one entry (or an indication that the patient has no known medication allergies) recorded as structured data	96.5%	97.7%	95.0%
	Demographic information (n=621)	Captures patient demographic information (preferred language, gender, race, ethnicity, date of birth, etc.) as structured data t	98.2%	98.2%	98.2%
	Vital signs (n=619)*	Records and charts vital signs (i.e. height, weight, blood pressure, calculate and display body mass index, plot and display growth charts for children 2-20 years, including BMI, etc.) for patients age 2 and older as structured data	97.4%	98.5%	96.1%
	Smoking status (n=621)	Records smoking status for patients age 13 and older as structured data	95.5%	96.2%	94.6%

Appendix. (continued)

Goal(s)	Objective	Measure Specifications	All RHCs	Independent RHCs	Provider-Based RHCs
	Quality measures (n=619)	Reports ambulatory clinical quality measure to CMS, state, or other quality measurement and reporting system	57.7%	60.6%	54.1%
	Clinical decision support (n=615)**	Implemented at least one clinical decision support rule along with the ability to track compliance with that rule (Drug-drug and drug-allergy interaction alerts cannot be used to meet this meaningful use objective)	61.0%	65.4%	55.7%
	Patient lists/registries (n=612)	Generate condition-specific lists of patients to use for quality improvement, reduction of disparities, and/or outreach (or at least generate one report listing patients with a specific condition)	69.0%	70.3%	67.3%
Category 2: Engaging patients and families in their health care	Patient reminders (n=613)	Send appropriate reminders to patients (age 65 or older and/or age 5 or younger) for preventive and/or follow-up care	46.3%	47.9%	44.4%
	Clinical summaries (n=614)****	Provides clinical summaries for patients for each office visit	81.9%	88.3%	74.3%
Category 3: Improving care coordination	Summary care record (n=609)	Provide summary care record (either electronically or in paper format) for patients transitioned or referred to another setting or provider of care	81.9%	85.0%	78.2%
	Information exchange (n=613)	Exchanges key clinical information (e.g., problem list, medication list, medication allergies, and diagnostic test results) among providers of care and external patient-authorized entities (or has at least performed one test of its ability to do so)	64.0%	68.3%	58.8%

Independent, provider-based, and total differences significant at * $p \leq .05$, ** $p \leq .01$, and *** $p \leq .001$
This study assessed the status of survey participants on EHR adoption and use. As such, the survey instrument did not attempt to replicate the Stage One meaningful use measure questions.