Evaluation of the State Health Information Exchange Cooperative Agreement Program:

Physician Experiences and Perceptions of Health Information Exchange

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Prepared for:
The Office of the National Coordinator for Health Information Technology
U.S. Department of Health and Human Services
Washington, D.C.

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Abstract

NORC at the University of Chicago interviewed physicians from small and larger practices in five states to assess the state of health information exchange (HIE) among ambulatory care providers. We found that physician perceptions, experiences, and HIE priorities vary substantially between small and larger practices. Physicians use a variety of strategies to exchange data electronically, both for meaningful use (MU) and more advanced forms of exchange in order to best serve their patients. Physicians in small practices experience greater challenges in engaging in HIE. Stage 2 MU places greater emphasis on HIE that will likely generate greater demand. These findings may be of particular interest to states and regional extension centers (RECs) who may take note of challenges, use patterns unique to small practices, and consider ways to guide them towards more targeted uses of HIE.

Introduction

The 2009 American Recovery and Reinvestment Act (ARRA) and the associated Health Information Technology for Economic and Clinical Health Act (HITECH) have created unprecedented funding opportunities to enable widespread use of electronic health records (EHRs) and HIE. HIE is defined as "the electronic movement of health information across organizations;"[1] adoption of EHRs is essential to enabling this exchange. Several important programs are supporting HIE, including the Centers for Medicare & Medicaid Services (CMS) EHR Incentive Programs and MU. MU establishes guidelines for ways in which certified EHR technologies must be implemented and utilized for a provider to qualify for CMS incentive payments.[2] In further support of HIE, the Office of the National Coordinator for Health Information Technology (ONC)[a] initiated the State HIE Cooperative Agreement Program, which provides $560 million to the 56 states and territories for the advancement of secure health information exchange.[3] The State HIE Program supports state efforts to enable statewide HIE and ensure all providers have options to meet MU requirements.[4]

There is clear evidence that physicians working in smaller practices have lower levels of EHR adoption in comparison to larger practices.[5] The implications are considerable, given that millions of patients are treated in small practice settings each year. Approximately 40 percent of physicians practice in settings of five or fewer physicians.[6] However, little information exists in the literature on practice size and HIE

[a] The role of the Office of the National Coordinator for Health Information Technology (ONC), an office under the U.S. Department of Health and Human Services (HHS), is to "coordinate a variety of programs to implement HITECH" and "support the efforts of several related initiatives to facilitate nationwide adoption of health IT." Source: http://healthit.hhs.gov/portal/server.pt/community/healthit_hhs_gov__onc/1200.

use among practices that have adopted EHRs. A systematic review of HIE in primary care practices found few studies have investigated the factors that motivate ambulatory primary care practices, particularly small practices, to participate in HIE.[7] More recently, a few studies of primary care practices have assessed facilitators and challenges to HIE participation.[8,9,10,11] None of these studies focus specifically on how providers are trying to meet exchange requirements for Stage 1 or 2 MU under the CMS EHR Incentive Programs (see Appendix Table A for the complete set of HIE requirements for MU Stage 1 and 2).[12] Furthermore, few qualitative studies have compared provider experiences with HIE across different states and varying practice sizes.

To address this gap in the HIE literature, NORC at the University of Chicago (NORC), under contract with ONC, conducted focus groups in five states with small and larger practice providers who have adopted EHRs. Specifically, we sought to characterize providers' perceptions, experiences, and priorities for HIE, and to determine the extent to which practice size plays a role. This qualitative study is part of a multi-year, mixed-method evaluation of the State HIE Program being led by NORC.[13]

Methods

NORC conducted focus groups in five states: Maine, Nebraska, Texas, Washington, and Wisconsin. We selected these states to include geographic diversity, different population sizes, evidence of significant implementation progress in enabling HIE, and different strategic models to enable statewide exchange.[14] Maine uses the public utility model; Nebraska is an orchestrator and public utility; Texas is a capacity builder and orchestrator; Washington is an orchestrator and public utility; and Wisconsin is an elevator and orchestrator.[b]

Physicians were eligible to participate in the focus groups if they were currently practicing in a primary care setting and using an EHR. Practices of 20 or more physicians were considered large, practices of 6 to 19 physicians were considered medium-sized, and practices of five or fewer physicians were considered small.[15] Wisconsin was the only state in which we met with physicians from medium size practices. As a result, we refer to medium and large practices collectively as "larger practices."

NORC convened the focus groups between November 2011 and March 2012. In total, we held nine physician focus groups: five with physicians in small practices (one in each state) and four with physicians in larger group practices (in all states but Maine). Local research organizations recruited participants by contacting and screening physicians, organizing logistics, and hosting the interviews. In Maine, it was not possible to contract with a research organization to recruit and convene focus groups because of time constraints. Instead, a local medical association assisted in convening a small practice

[b] Strategic approach refers to the ONC strategic model classification scheme, which is comprised of four models: the elevator, capacity-builder, orchestrator, and public utility models. The elevator model involves a "rapid facilitation of directed exchange capabilities to support Stage 1 meaningful use." The capacity-builder model features "bolstering of sub-state exchanges through financial and technical support, tied to performance goals." The orchestrator model is a "thin-layer state-level network to connect existing sub-state exchanges." Finally, states using the public utility model "are providing a wide spectrum of HIE services directly to end-users and to sub-state exchanges where they exist." Source: ONC.

focus group, but we did not hold a larger practice focus group. Each focus group lasted one hour and a half and contained between four and ten participants.

Results

Here we present the results of the focus groups, collectively and by practice size. There were no notable state-level differences in findings across focus groups.

Participant Demographics

In total, 68 physicians participated in the focus groups: 36 physicians from larger practices (53 percent), 32 physicians from small practices (47 percent). By state, 4 physicians participated in Maine; 17 in Nebraska; 17 in Texas; 16 in Washington; and 14 in Wisconsin. Appendix Table B presents demographic information and data by practice size, state, and ownership/affiliation. The sample size is limited and therefore does not permit definitive conclusions on trends in the data.

Based on responses from 55 out of 68 physicians, the average age of focus group participants was 53, with 46 percent of small practice physicians and 55 percent of larger practice physicians falling in the 50 to 59 age range. Out of 68 total respondents, both groups had the same proportion of male to female participants: 68 percent of the physicians were male and 32 percent were female. On average, participating physicians have been in practice for 23 years.

Regardless of practice size and state, most physicians have been using EHRs for more than 12 months (70 percent of small group physicians and 92 percent of larger group physicians). A minority of physicians have been using EHRs for less than 6 months (11 percent of small practices and 3 percent of larger practices).

The majority of small practices are owned by a physician or physician group (74 percent), while the majority of larger practice groups are owned by either a physician or physician group (30 percent), or a medical or academic health centers (27 percent).

Awareness and Perceptions of EHRs and the EHR Incentive Programs

Physician perceptions of EHRs are generally positive and similar across practice sizes. Physicians in both small and larger practices see EHRs as enabling convenient retrieval of patient records from within their own practice and when physicians are working after hours or on call. They also find that EHRs improve communication between doctors and nursing staff, and reduce duplicate testing for patients referred from other settings. In addition, physicians who work in larger practices praise the ability to track and manage patients proactively, and report that EHRs enable them to communicate between different practice locations and improve their ability to care for patients.

Awareness of the CMS EHR Incentive Programs and Stage 1 MU Requirements. Almost all of the focus group participants (98 percent) report awareness of the CMS Medicare & Medicaid EHR Incentive Programs (see Table 1).[16] Physicians in small practices demonstrate more detailed knowledge of Stage 1 MU requirements compared to physicians in larger practices. Small practice physicians report being

more involved in the EHR selection and implementation process, whereas larger practices may have one or two clinical champions or health IT specialists making the decisions for the entire group. Physicians in practices owned by health systems report their organizations are pursuing Stage 1 MU and they have no choice in whether to participate.

A majority of physicians, regardless of practice size, are collecting incentive payments (64 percent). Thirty-four percent are aware of the program but are not currently receiving payments (see Table 1). Many anecdotally report that they are preparing to collect incentive payments; however, some physicians feel the incentives are not enough to offset the costs of implementation and maintenance of an EHR system, particularly for solo practitioners and small practices.

Only a few physicians, in larger group practices affiliated with hospitals, report awareness of Stage 2 MU requirements for HIE activities.

Table 1. Physician Knowledge and Awareness of the CMS EHR Incentive Program

Familiarity with the CMS Incentive Program			
	Small Practices	**Larger Practices**	**Total**
No, I am not familiar with the CMS programs	0 (0%)	1 (3%)	1 (1%)
Yes, I am aware but do not participate	13 (43%)	10 (27%)	23 (34%)
Yes, my practice receives incentive payments	17 (57%)	26 (70%)	43(64%)
Total	**30* (42%)**	**37 (58%)**	**67 (100%)**

*One physician did not provide this information.

Health Information Exchange Activities

Physician familiarity with electronic exchange of health information varies between small and larger practices. Seventy-six percent of large practice physicians report some experience with exchanging clinical data electronically, compared to 55 percent of small practice physicians (Table 2).

Perceived Value of HIE. Physicians in both small and larger practices recognize different potential benefits of electronic exchange of clinical information. Small practices report a focus on using EHRs within their practices for improving efficiency and report limited use of their EHRs for the exchange of clinical information. Physicians in small practices identify the following as their most immediate HIE uses for EHRs: exchange of clinical care summary information with local hospitals; and exchange of referrals and consults with specialists.

> "If we wanted to be able to data mine or if we wanted to do studies, [exchange] would allow us to grab the data and have better access to it." *–Member of larger practice group in Texas*

Larger physician practices are more engaged in HIE and express a greater desire for electronic exchange than small practices. Larger practice physicians cite a variety of beneficial use cases, such as data

analytics, exchange between unaffiliated practices, patient tracking, identification of drug-seeking patients, medication recall data, and performance data for Accountable Care Organizations (ACOs). Additionally, physicians with more experience with electronic exchange express a desire to use EHRs to exchange information electronically with other organizations, such as nursing homes.

Table 2. Physician Knowledge and Awareness of the Electronic Exchange of Health Information, by Practice Size

Familiarity with Electronic Health Information Exchange	Practice Size		
Minimal Experience with Electronic Exchange	**Small**	**Larger**	**Total**
No, I have not heard of HIE	7 (23%)	3 (8%)	10 (15%)
I have heard of HIE	7 (23%)	6 (16%)	13 (19%)
Subtotal	**14 (45%)**	**9 (24%)**	**23 (34%)**
Some Experience with Electronic Exchange			
Yes, but I am not currently engaged in electronic information exchange	5 (29%)	3 (8%)	8 (12%)
Yes, I am currently planning or engaged in electronic information exchange	12 (39%)	25 (68%)	37 (54%)
Subtotal	**17 (55%)**	**28 (76%)**	**45 (66%)**
Overall Total	**31 (100%)**	**37 (100%)**	**68 (100%)**

Physicians have four major uses of exchange: e-Prescribing, lab exchange, clinical care summary exchange, and public health reporting, all of which are included in Stage 1 MU requirements.

E-Prescribing. Most physicians, in both small and larger practices, e-prescribe and do so through the Surescripts network. Some small practice physicians report experimenting with e-prescribing before undertaking full EHR implementation. Overwhelmingly, physicians find e-prescribing useful and easy, and believe it leads to fewer prescribing errors and calls with pharmacists. They also consider it the least problematic aspect of using EHRs. Physicians' main complaint about e-prescribing is that the Drug Enforcement Agency (DEA) protocol for controlled substances requires they support a separate, paper-based, workflow, which is time consuming and costly. In most cases, physicians order controlled substances using special prescription pads. These orders are not routinely re-entered into the EHR. In very few cases, physicians report using their EHRs to order a controlled substance, which is then printed onto non-copyable paper using a dedicated printer. Practices do not routinely implement this method as it tends to be an expensive option for many practices.

> E-prescribing has "been a great improvement. It brings up drug interactions and side effects, which can be a pain sometimes. All in all it's been very helpful." –*Wisconsin physician in a larger practice*

Lab Exchange. Approximately half of small practice physicians receive lab results directly into their EHRs. The others use vendor-supported web portals to retrieve results but express frustration that lab results do not automatically flow into a patient's chart. In some cases, staff members print results from the lab portal and then scan them into EHRs. This scanned information is not integrated into the patient chart, meaning it is harder to find, not searchable, and cannot be used for trending patient results. All of the larger group practice physicians report having unidirectional exchange of lab results flowing directly into their EHRs, eliminating these difficulties.

> "When you have that interface directly from a lab right to your EHR, you value that relationship. I am not really hot on my patients using outside labs because I'll eventually get the data but it will be in a paper format that gets scanned; then I have to look in at a different area of the EMR to incorporate that data. Whereas, if it comes over the interface, I can put all the values side-by-side and look for trends." –*Washington physician in a small practice*

A few physicians from larger practices report they have bi-directional electronic exchange capabilities where lab orders are sent electronically from their EHR to the lab, and results are sent from the lab directly to the EHR. Some physicians think bi-directional exchange might result in better matching of patient results.

Most small practice physicians report that establishing any type of interface (i.e., results or orders) with labs is challenging because interfaces are costly, IT resources are scarce, and labs do not prioritize small practice needs due to limited volume. Physicians often work with multiple labs; depending on the volume of lab orders, some labs deliver results electronically and others by paper/fax, requiring dual workflows.

Clinical Care Summary Exchange. Most physicians, regardless of practice size, report very limited electronic exchange of clinical care summaries. Physicians say they typically receive EHR-generated care summaries by fax from hospitals after a patient discharge. Physicians complain these EHR-generated care summaries contain unnecessary details (e.g., every instance a nurse takes a patient's temperature, documentation that staff ordered a lab rather than solely the lab result) that obscure key information. Furthermore, many physicians report that it is typical for organizations to print EHR summary records and fax them to receiving physicians; in some cases, the receiving organizations scan the records back into their EHRs. This process means that data is not being integrated into the clinical record uniformly, which adversely affects workflow (e.g., physicians must click through many files to locate the relevant one) and reduces its availability and therefore clinical utility. Physicians are not able to use the data exchanged through the summary record to trend patient data or apply clinical decision support rules to support clinical care.

Public Health Reporting. Most physicians, regardless of practice size, send immunization data electronically to their state or local public health departments. In most cases, providers send immunization information through separate websites provided by the state health department, rather than directly from EHRs to state registries. However, in Nebraska, Washington State, and Wisconsin, a few physicians report submitting information directly from their EHR to the state immunization registry. Small and larger physician practices in all five states indicate that it would be beneficial to have

bi-directional data exchange between their EHR and the state immunization registries. A few larger practice physicians in Washington and Nebraska report receiving data into their EHR from the state health department's immunization registry. However, physicians caution that more needs to be done to ensure their respective state immunization registries are up-to-date so they can rely on the information they receive. For example, physicians note that immunizations delivered by Walgreens are not included in the state immunization registry, and reporting from hospitals and ambulatory providers to the state immunization registry is inconsistent and delayed. Most physicians, regardless of practice size, report that medical assistants and nurse practitioners typically perform the task of uploading information into the state immunization registry. Hence, most physicians lack detailed knowledge on the data submission process.

Many physicians are using diverse approaches to meet their information exchange needs. Some physicians are establishing point-to-point interfaces with radiology centers or labs, especially in cases where they do most of their business with a single lab. Others are leveraging the infrastructure of independent physician associations, local hospitals, and integrated delivery networks that offer hosted EHR solutions to affiliated and, in some cases, unaffiliated providers. Physicians in small practices tend to take an incremental approach to HIE by adding components of HIE and interfaces one by one as convenient, necessary, and/or affordable (e.g., e-prescribing and lab exchange).

Physicians, regardless of practice size, have limited awareness of state level efforts to enable HIE, including the existence and functions of the RECs serving their states. Of the physicians aware of their state's HIE efforts or program, few are attuned to its functions or activities. Two physicians in Nebraska who belong to the same small practice have used state-led services and educated other focus group members about the state's offerings. In Maine, two small practice physicians report awareness of HealthInfoNet (HIN), the lead HIE operator in the state. One of these physicians reports using HIN's services to share information with other hospitals and specialists in the community.

None of the physicians interviewed report awareness of the Direct Project, and only one reports familiarity with secure email communication. Even in states where the approach is to promote information exchange using Direct, physicians are not aware of this option for information exchange. Once informed, physicians recognize potential value for Direct in communicating with providers (e.g., nursing homes) without EHRs, providing electronic referrals, and exchanging behavioral health information.

RECs are entities funded through ONC to assist small providers and hospitals in adopting health IT, exchanging information, and meeting MU requirements.[17] Of all 68 physicians in the focus groups, only two report awareness of their state REC programs and they belong to small practices. Few physicians report using services enabled by their respective states, or connecting to a local or regional health information organization (HIO). The small sample makes it difficult to draw definitive conclusions about physician awareness of state REC programs. Furthermore, many RECs are working with healthcare partners in the community, such as quality improvement organizations or medical service organizations. It is possible that physicians may not be aware of the REC itself but are aware of the REC's partner organizations that are supporting providers with EHR adoption.

Notably, once physicians are informed about RECs and state-level efforts to enable HIE, they recognize a number of potential benefits. These benefits include accessing data for quality measures; improving access to patient data and information for new patients, particularly for critical access hospitals and rural clinics that treat transient patients; improving access to patient data from other hospitals; and sending information to state immunization registries.

Reported Challenges and Concerns

Most physicians who use EHRs and are engaged in exchange experience specific challenges to HIE, regardless of practice size. However, small practices face additional challenges.

Workflow Issues. Physicians comment at length on the difficulty of integrating information received from outside their practices into clinical workflows (e.g., logging into multiple portals; lack of interoperability between different EHR systems; dual electronic-paper workflows). Physicians often work with multiple labs, some of which deliver results electronically and others by paper/fax, which requires dual workflows. Given the challenges they experience, some physicians question whether using EHRs to exchange information will reduce cost or improve quality in the long term. In order for HIE to provide value, most physicians want more seamless transfer of information from other systems into their own and easier access at the point of care.

> "Every practice I practiced in had a different EHR… and none of them communicated well with other EHRs. So often you end up with a piece of paper, which is then converted into an electronic document, which ultimately lands in front of me, the provider, to electronically do something with." – *Maine small practice provider*

Cost of Interfaces. All physicians report that cost is a significant challenge, especially those necessary to establish interfaces for lab exchange. In addition, physicians have to pay ongoing maintenance costs for these interfaces. Physicians in small practices worry about whether they will see any return on their large investments in EHR systems and interfaces. This is especially true of physicians who are nearing the end of their careers.

Perceived Lack of Need for HIE. Physicians in small practices face certain additional challenges related to their practice size. Some physicians in small practices express a lack of interest in widespread information exchange because they rarely interact or need to exchange with a large net of providers and hospitals. These physicians tend to prioritize and/or limit exchange with specialists for referrals and consults, emergency departments and local hospitals for care summary information, and independent laboratories for lab results.

Accuracy and Completeness of Exchanged Data. Some small practice physicians note their distrust of the completeness and quality of electronic records other providers send as a challenge to their participation in exchange. Physicians also express concerns about relying on information from the state immunization registry as the information may be neither complete nor current.

Need for Willing and Able Exchange Partners. Physicians who express interest in exchanging with a wide net of providers are hesitant to engage in HIE until they can be assured other providers and potential trading partners will also sign up.

Concerns about Stage 2 MU. Those that are aware of Stage 2 report concerns with two requirements in particular. First, they are concerned with the practicality of the requirement to exchange data with an EHR system on a different platform.[18] This is because they typically only exchange electronic data with affiliated providers who share the same system. Requiring exchange among different EHR systems may require an investment in technology that physicians, especially small practices, cannot afford. It would also require an interoperability of systems that is outside of their control. The decision to purchase a particular EHR may be made by a corporate entity, and affiliated physicians may have little influence regarding which system is ultimately purchased. Physicians also feel that the responsibility of building interoperable systems largely rests with the vendors. Secondly, providers may be required to ensure that 5 percent of unique patients use the patient portal. Physicians note that they can make a patient portal available, but have little control over whether patients access their information online or not.

Discussion

As provisions of the HITECH Act and Stages 1 and 2 of MU continue to reshape the health care landscape, EHRs and HIE are becoming central to the practice of medicine. In the five diverse states (Maine, Nebraska, Texas, Washington, and Wisconsin), physicians from larger and small practices are increasingly interested in and using EHR and HIE solutions but there is room for awareness building and providing solutions to a variety of concerns. It is essential that all those who provide care are able to maximize the benefits of health IT on the practice of medicine.

Regarding EHRs and the CMS EHR Incentive Programs, most physicians regardless of practice size are aware of and planning to attest to Stage 1 MU requirements. These physicians belong to states with EHR adoption rates of between 68 and 83 percent compared to the national rate (72 percent).[19] Small and solo physician practices plan to meet Stage 1 MU by demonstrating use of EHRs. While speaking of the benefits of EHRs, small practice physicians report their primary motivations for adopting EHRs are cost-related: they would like to receive government incentives to defray the cost of investment and avoid penalties in the future. Most physicians working in larger practices report that, prior to the initiation of the Incentive Programs, they were already engaged in activities required under MU, such as use of EHRs. Therefore, although they plan to attest to Stage 1 MU, the MU requirements are not the primary motivator of their EHR use.

On the whole, physicians are aware of and interested in HIE, but awareness and adoption varies by practice size. HIE awareness and adoption is higher among larger practices than smaller practices. Factors such as practice characteristics, organizational needs (administrative, data analysis, support for health care delivery), care setting, and integration into workflow are key considerations for organizations and practices to maximize use of their HIE solutions.[20,21] Larger physician groups and groups owned by health systems use EHRs and are now looking for ways to leverage them to provide better patient care. In contrast, many small practices report being focused on the process of

implementing and adopting EHRs and are therefore less focused on HIE at present. States and RECs, in particular, may want to address small practice patterns of use and consider ways to guide them towards more targeted uses of HIE. Special initiatives focused on promoting HIE, including public trainings, partnerships with entities like quality improvement organizations, and incentives patterned after similar EHR adoption initiatives, are examples of strategies to achieve broader HIE use. HIE is an important component of HITECH, and the extent to which physicians use their HIE capabilities and overcome challenges to doing so is centrally important to realizing the vision of nationwide information exchange.

Physicians in this study report being motivated to adopt HIE to serve their current needs for certain, specific use cases (e.g., receiving lab results) as a first step. This has led to component-by-component adoption patterns and awareness of specific HIE use cases, rather than a broader awareness of HIE. In the future, use cases may expand to include population health and quality improvement as physicians have their more immediate needs met and they begin to focus on Stage 2 MU.

Health care delivery reform may also provide incentives for physicians to engage in HIE. For example, practices in Minnesota are already using HIE for quality reporting as all major payers offer performance incentives based on quality data in that state.[22] As more states advance in their exchange efforts and gain visibility, there is likely to be more interest in these use cases. In addition, Stage 2 MU and increasing interest in the ACO model are likely to highlight HIE as a means to manage population health and achieve the necessary level of patient-centered coordination of care. There may be a need for coordinated policy efforts that ensure the availability of incentives that encourage both exchange and use of exchanged data.

Most focus group physicians are unaware of HIE efforts at the state and federal level, including Direct. When we informed physicians about Direct and other State HIE Program efforts during the focus groups, they saw value in having it as an option for exchanging information with other providers. Therefore, a lack of awareness does not indicate a lack of enthusiasm and suggests that, while state programs may have tremendous value, states may need to do more to ensure providers are aware of the options, services, and support available to them.

Looking to a future of increased adoption, physicians across states and practice sizes frequently cite ensuring HIE fitting into workflow as one of the key issues. There are a variety of organization-level, individual, and contextual factors, not to mention technical concerns, that contribute to workflow patterns.[23] Given the complexity of identifying and managing the component factors that determine efficient HIE workflow, it is not surprising that physicians in the focus groups report workflow disruption. Regardless of practice size, physicians experience difficulty integrating information received from outside their practice into clinical workflow (e.g., navigating new requirements; logging into multiple portals; circumnavigating the lack of interoperability between different EHR systems; dual electronic-paper workflows).

Although physicians recognize the potential of HIE, usability is a significant issue. Physician participation in and satisfaction with HIE depends on HIE solutions that are adaptable, beneficial to their workflows, and useful in the information they provide. Organization-level efforts could do much to improve staff

familiarity with electronic systems. Stage 2 certification criteria include usability requirements for EHR vendors; these criteria, in combination with similar policy efforts focused on persuading vendors to adhere to certain usability guidelines, will go a long way toward improving the usability of exchanged data at the point of care.[24]

It is essential that all those who provide care are able to maximize the benefits of health IT on the practice of medicine. Physicians, regardless of practice size, are pursuing strategies to meet their immediate and specific technology needs. For many, this means adopting EHRs and exchange capabilities in accordance with MU requirements. For others, this means adopting components selectively and on an as-needed basis in order to best serve their patients. On the whole, small practice physicians experience more challenges, have lower awareness of HIE, and have lower adoption of EHRs and HIE than physicians in larger practices. As EHR and HIE adoption increases, it is important to ensure physicians working in smaller practices do not lag behind.

Appendix: Additional Data Tables

Table A. HIE Requirements for MU Stage 1 and 2

	Stage 1		Stage 2	
Objective	**Type of Objective**	**Measure**	**Type of Objective**	**Measure**
Generate and transmit permissible prescriptions electronically (does not apply to hospitals)	Core	More than 40% of all permissible prescriptions are transmitted electronically using certified EHR technology	Core	More than 50% of all permissible prescriptions are compared to at least one drug formulary and transmitted electronically using certified EHRs
Provide clinical summaries for patients for each office visit	Core	Clinical summaries provided to patients within 3 business days for more than 50% of all office visits	Core	Clinical summaries provided to patients within one business day for more than 50% of office visits
Incorporate clinical laboratory test results into EHRs as structured data	Menu	More than 40% of clinical laboratory test results whose results are in positive/negative or numerical format are incorporated into EHRs as structured data	Core	More than 55% of all clinical lab tests results whose results are either in a positive/negative or numerical format are incorporated into Certified EHRs as structured data
Submit electronic immunization data to immunization registries or immunization information systems(IIS)	Menu	Perform at least one test of data submission and follow-up submission (where registries can accept electronic submissions)	Core	Successful ongoing submission of electronic immunization data from Certified EHRs to an immunization registry or IIS for the entire EHR reporting period
Submit electronic syndromic surveillance data to public health agencies	Menu	Perform at least one test of data submission and follow-up submission (where public health agencies can accept electronic data)	Core	Successful ongoing submission of electronic syndromic surveillance data from Certified EHRs to a public health agency for the entire EHR reporting period
Submit electronic data on reportable laboratory results to public health agencies (choice for hospitals only)	Menu	Perform at least one test of data submission and follow-up submission (where public health agencies can accept electronic data)	Core	Successful ongoing submission of electronic reportable laboratory results from Certified EHRs to public health agencies for the entire EHR reporting period, and in accordance with State law and practice

	Stage 1		Stage 2	
Objective	**Type of Objective**	**Measure**	**Type of Objective**	**Measure**
Use of electronic messaging to communicate with patients		N/A	Core	Use of secure electronic messaging to communicate with patients on relevant health information
Provide patients the ability to view online, download and transmit their health information		N/A	Core	More than 5% of patients seen by an EP or admitted to an inpatient or emergency department view, download or transmit to a third party their health information

Table B. Physician Demographic Information

Physician Demographics			
Age	**Small Practices**	**Larger Practices**	**Total**
40-49	7 (29%)	10 (32%)	17 (31%)
50-59	11 (46%)	17 (55%)	28 (51%)
60-69	6 (25%)	3 (10%)	9 (16%)
70-79	0 (0%)	1 (3%)	1 (2%)
Total	24* (44%)	31* (56%)	55 (100%)*
Gender			
Male	21 (68%)	25 (68%)	46 (68%)
Female	10 (32%)	12 (32%)	22 (32%)
Total	31 (46%)	37 (54%)	68 (100%)
Practice Ownership			
Physician or physician group	20 (74%)	11 (30%)	31 (48%)
Medical/academic health center	4 (15%)	10 (27%)	14 (22%)
Hospital	0 (0%)	7 (19%)	7 (11%)
HMO	1 (4%)	5 (14%)	6 (9%)
Other	2 (7%)	4 (11%)	6 (9%)
Total	27* (42%)	37 (58%)	64 (100%)
Length of EHR Use			
<6 months	3 (11%)	1 (3%)	4 (6%)
6-12 months	5 (19%)	2 (5%)	7 (11%)
>12 months	19 (70%)	34 (92%)	53 (83%)
Total	27* (42%)	37 (58%)	64 (100%)

*Not all physicians provided complete demographic information.

Table C. Number of Participating Physicians by Practice Size and State

Practice Size	Participating Physicians
Large (20 or more)	
Nebraska	9
Texas	9
Washington	9
Wisconsin	4
Total	**31**
Medium (6 to 19)	
Wisconsin	5
Total	**5**
Small (5 or less)	
Maine	1
Nebraska	8
Texas	8
Washington	7
Wisconsin	5
Total	**29**
Small/Unreported	
Maine	3
Total	**3**
Grand Total	**68**

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