

How Communities Are Leveraging the Health Information Technology Workforce to Implement Electronic Health Records

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Abstract

Developing a health information technology (HIT) workforce is critical for health care transformation and has taken on added urgency as federal and state governments incentivize providers to implement and adopt electronic health records (EHRs) by 2015. We conducted in-depth interviews with HIT workers in three communities throughout New York State that received state funding to implement EHRs in order to characterize the skilled workforce in each community and compare their roles to the HIT workforce roles recently outlined by the Office of the National Coordinator (ONC). We found that workers were placed within different organizational models, possessed a variety of backgrounds, and carried out implementations by addressing work gaps between technologies, processes, and personnel. Workers' self-described roles fit ONC's defined workforce roles but appeared to differ in how those roles were operationalized. This paper describes how communities are utilizing available workforce that may inform state and federal training programs.

Introduction

The HITECH Act directs \$19 billion dollars of incentives to providers and hospitals that implement and meaningfully use electronic health record (EHR) systems and other forms of health information technology (HIT)¹. Those incentives are likely to reach a large proportion of providers who work in community-based settings, where EHR adoption has lagged^{2,3}. Additional federal funds are being directed toward a number of programs intended to help those providers implement and meaningfully use EHR systems, including \$643 million dollars for the development of support services via regional extension centers (RECs), and \$118 million dollars in workforce development⁴. Meeting HITECH's goals of implementing EHRs in community-based health care settings across the United States will rely in large part on the skills and abilities of those who support EHR implementations and promote the use of EHR systems⁵.

Background

Federal funds are being directed at programs meant to foster an HIT workforce that meets the logistical, operational, and educational needs of providers whose practices undergo EHR implementations⁴. However, effectively supporting EHR implementations in community-based ambulatory settings presents a number of challenges. First, EHR systems represent not just new ways of documenting clinical care but also fundamental changes to how providers manage clinical operations and approach clinical practices⁶⁻⁸. This transformation at the provider as well as at the practice level can be expensive and challenging for all involved. Second, EHR implementations may negatively impact day-to-day operations, affecting provider satisfaction, workflow, and efficiency⁹. Third, providers may have legitimate concerns as to how they can manage the EHR vendor selection process, receive adequate implementation support, and obtain longer term training¹⁰. Overcoming these and other challenges requires people who possess diverse skill sets that address personal, technical, organizational, and even political challenges¹¹⁻¹⁴.

A near-term challenge for health care organizations will be identifying and accessing a qualified workforce to lead, as well as support, EHR implementations¹⁵. Policymakers at both the state^{16,17} and federal levels are working to define the roles, responsibilities, and skill sets for this new workforce. Most notably, the Office of the National Coordinator specified categories of HIT workforce roles as part of its training initiatives¹⁸. How these roles are defined will impact how educational institutions develop curricula to train this workforce, how professional societies design certification for this workforce, and how health care organizations allocate budgets.

Implementers in New York State provide valuable experience in this domain that is likely to be relevant to larger national issues, in light of a 7-year series of state-funded initiatives to promote EHR implementation at the community level. Since 2004, the Health Care Efficiency and Affordability Law for New Yorkers Capital Grant Program (HEAL NY), has funded community-wide efforts to help providers undertake EHR implementations.^{19,20} The second wave of this program, known as HEAL NY Phase 5, awarded funding to several entities known as Community Health Information Technology Adoption Collaboratives (CHITAs). A CHITA is an organization that facilitates EHR implementations within a group of health care organizations (practices, hospitals, clinics, etc) across a community to primarily support primary care and Medicaid providers²¹. New York State CHITAs embarked on EHR implementations for purposes specific to each community. This introduced variability in the ways each CHITA managed its projects and aligned efforts with regional cultures as well as available resources and workforce.

We therefore conducted a qualitative inquiry of key informants within CHITAs to answer the following research questions: what are the skill sets and activities of EHR implementers in CHITAs, and how do CHITAs employ their services? The answer could give policymakers, educators, administrators, and also the workers themselves a better understanding of their roles and responsibilities as they pertain to EHR implementations.

Methods

This analysis is a subset of a larger qualitative study to identify best practices for implementing interoperable EHRs in CHITAs across New York State. The purpose of employing a qualitative approach was multi-fold: 1. examine socio-technical aspects related to EHR implementation and uptake across CHITAs; 2. describe themes common to different CHITAs that may inform future state and national EHR implementation initiatives, and 3. identify workforce characteristics involved in EHR implementations that may provide a basis for future generalizable workforce assessment tools. The Weill Cornell Medical College Institutional Review Board and the New York State Department of Health approved this study, and all participants provided oral informed consent.

In the parent study, we sought to gain an understanding of EHR implementations from the perspectives of three constituencies: 1. CHITA key informants, including administrators and information technology staff; 2. key informants within the New York State government; and 3. healthcare providers. Participants were recruited through self-introductions via an IRB-approved electronic form letter. Interviews for consenting key informants were conducted via telephone. Providers' perspectives were gathered through focus groups.

A research team including one physician investigator, one informaticist, and one masters-level public health researcher conducted semi-structured telephone interviews²² with 30 key informants, and conducted 5 healthcare provider focus groups in five CHITAs across New York State. This report focuses on a subset of seven key informants from three CHITAs whose job activities commonly bridged managerial and end-user functions. We purposefully selected this sample because our internal debriefings often centered around these participants' roles, responsibilities, and backgrounds. This subset was of particular interest to us because they were neither administrators, nor practicing providers, nor strictly information technology staff within any of the health care organizations participating in the CHITAs. Yet these informants described fulfilling important roles that involved facilitating and supporting EHR implementations. We describe their backgrounds, skills and activities in the results section.

The interviews were approximately one hour each and were digitally recorded. The questions were read from a prepared guide but interviewers deviated from the guide when participants offered unexpected information or when further questioning was required for clarification. Each member of the research team conducted the interviews with the others asking follow-up questions at appropriate intervals. Interview notes were compiled for each interview. Interview recordings were transcribed and imported into ATLAS.ti (version 6) qualitative software for analysis.

A key component of qualitative analysis is comparing transcribed textual data to descriptors, commonly referred to as "codes". First, we used codes from an already existing implementation science framework called the Consolidated Framework For Implementation Research (CFIR)²³. CFIR is "meta-theory" that organizes published implementation science theories into one framework with five "domains": 1. intervention, 2. outer organizational setting, 3. inner organizational setting, 4. individuals, and 5. implementation process. We therefore coded our data accordingly: 1) the EHR as the "intervention"; 2) state and federal bodies as the "outer organizational setting"; 3. a CHITA with any affiliated vendors or subcontractors as the "inner organizational setting"; 4. those that implement

the EHRs as the “individuals”; and 5. the processes of implementing EHRs as the “process”. Literature searches in PubMed and OvidSP as well as reviewing the studies listed on the developers’ Wiki²⁴ did not reveal CFIR’s use in any clinical informatics research. Therefore, using the CFIR framework for this study is a novel approach within the field.

Second, we extended the CFIR framework by using the grounded theory²⁵ method to build codes that more aptly described the findings within our data. We engaged in internal dialog to develop consensus around the codes and conferred with qualitative researchers from outside the research team to ensure greater reliability in our approach. The combination of CFIR codes as well as grounded theory codes enabled us to analyze the data deductively and inductively to arrive at our findings.

Pairs of researchers coded seven transcripts, met as a full group to resolve coding discrepancies, and reached consensus on codes necessary to describe concepts found in the data. Codes were then compiled and discussed further to identify patterns, larger themes, and ultimately arrive at our findings. We also went through the transcripts and marked places where interviewees explicitly mentioned if they conducted work that was in line with the six roles of short-term and ongoing roles in the “Community College Consortia to Educate Health Information Technology Professionals” criteria²⁶. Through discussions and a review of the transcripts we determined that the roles not pertaining to the Community College Consortia²⁶ criteria such as data security and data exchange specialists, public health leaders, and research scientists were not applicable to the participants we describe in this paper.

We attained greater trustworthiness by presenting interpretations of our findings to the HITEC investigators and an outside group of advisors responsible to New York State for developing EHR implementation policies. The groups provided comments, feedback, and ultimately approval of our characteristics of this group of workers. We denote study participants’ own words by using quoted italicized text in the results section.

This study was conducted as part of the HEAL 5 evaluation process, led by researchers from the Health Information Technology Evaluation Collaborative (HITEC). HITEC is comprised of four research institutions across New York State (Weill Cornell Medical College, Columbia University, State University of New York at Albany, and University of Rochester) designated to evaluate New York’s HEAL NY-funded efforts.

Results

We organized the results into three domains that describe the workers: 1. *CHITA Organizational Design* illustrates how these workers fit within the CHITAs’ organizational structures to carry out EHR implementations; 2. *skills and qualifications* describes the backgrounds and types of education these people brought to their jobs; and 3. *job activities* highlights the interviewees’ official and unofficial functions in EHR implementations.

CHITA Organizational Designs

The CHITAs represented three distinct study settings that provide necessary context to how organizations used interviewees’ skills and how interviewees carried out their roles. We refer to the commercial ambulatory EHR systems as System 1, System 2, System 3, and System 4. (Table 1)

Table 1: Basic characteristics of each CHITA

CHITA	Locale	Implementation Staffing Model	Ambulatory EHR System
A	Rural	In-house staff, vendor support, and an outside contractor	System 1, System 2
B	Urban	EHR vendor trained in-house staff	System 3
C	Urban	Outside contractor	System 3, System 4

CHITA-A represents a rural area that serves a large Medicaid population with high rates of chronic diseases. It brought on two commercial EHR systems: System 1 that was implemented by its vendor; and System 2 that was implemented by the CHITA-A implementation team. The EHR implementation team was based in a community hospital that provided implementation support across a number of facilities including a skilled nursing facility, a

long-term care home, and participating ambulatory practices. System 2 had difficulties performing required functions that caused project delays.

Those delays made it apparent that additional help was required: *“we underestimated the resource...requirements on our end and...[had] to bring in...help.”* As a result, CHITA-A brought on an outside consultant. That consultant concurred with the need for greater resources: *“[They were] very limited in their resources...They were very understaffed to undertake a project of this size in the timeframe they were given to do it.”* In the end the in-house staff, vendors, and consultants were able to implement System 2, but the process may have revealed gaps between implementers and administrators: *“I don’t know if [administrators] truly understand what it means to host an EMR and be responsible for support...we definitely underestimated our resources from that standpoint.”*

CHITA-B operates in a federally designated Medically Underserved Area (MUA) and represents a half-dozen physician groups and health care centers. It was unique among the three CHITAs in that it had a residency program which meant the implementation and training would have to account for residents’ complex schedules. Unlike CHITAs A and C, CHITA-B chose only one EHR (System 3) and primarily relied on in-house staff to carry out and support the implementation.

Some CHITA-B staff were transferred out of previous roles, such as working in a medical records room, and onto the implementation project. The resident clinic implementation activities were being carried out by a team that included a project administrator, a software specialist, and two trainer-workflow specialists. When necessary, they reached out across the organization and included nurse coordinators, a medical record coordinator, and a staff coordinator to anticipate how the EHR implementation could *“could chang[e] the entire flow of the office.”* The CHITA implementation team used the knowledge they had gained from their experiences to inform their implementations in community practices and inform future system-wide EHR upgrades.

CHITA-C represents 30 community health centers and includes seven federally qualified health centers, federally designated MUAs, and is also in a federally defined Health Professional Shortage Area. It employed a subcontractor that was experienced in EHR implementations and practice transformations, and with the subcontractor’s help, selected the commercial EHR systems 3, and 4.

From its project initiation, CHITA-C engaged the assistance of an outside contractor that had experience working with federally qualified health centers (FQHCs). The contractor facilitated the implementations of two commercial ambulatory EHRs and saw its responsibilities as *“helping to structure the projects, providing project management, coaching, and training...[to] help the [CHITA] develop an HIT program...that is more strategic...”* The contractor defined itself as an advocate for CHITA-C rather than a facilitator between CHITA-C and the commercial EHR vendors: *“we never wanna be seen as the go-between.”* The implementers described their role as maintaining *“different levels of communication”* and *“relationship building.”* From their vantage point, a primary challenge was to align stakeholders and coordinate activities: *“you...have to coordinate the schedule of the Chief Medical Officer...the EHR system representative...the RHIO representative...[it is] a coordinating nightmare...[the] technical part has turned out to be the easy part.”*

Skills and Qualifications

Those that we interviewed had job titles such as *“systems analyst”* and *“project manager”* and had been in their positions from 1 to 5 years. The interviewees comprised a mix of backgrounds including nursing, medical records, management, and a former small business owner. Interviewees made comments that they *“stumbled upon”* or *“worked my way up”* to their current roles. Only one had received any kind of formal informatics training. The participants’ educational backgrounds and life experiences conveyed an impression that they were self-starters, open to new opportunities, and liked working with people.

Some interviewees described relying on their personal relationships with providers to gauge providers’ comfort with EHR systems and to identify proficient versus non-proficient EHR end users. Interpersonal relationships were further used to promote training on EHR systems. For providers who experienced greater difficulty adjusting to the new EHR system, one participant provided a personal cell-phone number so that providers could contact her at any point. However, providing support largely based on interpersonal relationships, however, was proving to be resource

intensive and difficult to maintain given available resources: *“It is amazing how some providers are...They want you to hold their hand because they are too busy.”*

Several participants also shared strong beliefs in the utility of EHR systems’ abilities to improve patient care: *“You’re...flipping through a paper chart...and you can miss something. Whereas in a[n EHR] flow sheet...it’s all...right there in front of you.”* This perspective was important because many found themselves performing the role of EHR advocates, trying to convince skeptical end users of an EHR’s benefits: *“we had to eventually create a provider luncheon to engage their participation and try to help them to overcome some of the hesitation they had with using the EMR...”*

Job Activities

We provide a table to illustrate how participants’ self-described roles fit within ONC’s framework. (Table 2) From left to right, the first column contains the roles and uses one asterisk or two to denote whether or not those are “short-term” roles or “ongoing” roles^{26, pg.43}. The second column describes the roles. The numbered columns across the top represent participants, and going down the table denotes whether that participant described performing that ONC-defined role in his or her job. Going across the table shows that the ONC framework captures many of the interviewees’ self-described activities with most performing the role of “Implementation Support Specialist”, and only one performing the role of “Clinician/Practitioner consultant”. Going down the table shows that interviewees carried out multiple roles to varying degrees. Participants 2 and 7, a systems analyst and project manager, respectively, crossed ONC roles the most whereas participant 5, an EHR systems manager, performed only two ONC roles. Also of note, participants 2, 6, and 7 fulfilled roles that the ONC distinguishes as either short-term roles or “ongoing” roles. The table demonstrates the variety of activities and roles the interviewees played within CHITAs.

Table 2: Interviewees' Self-Described Roles Crossed Multiple ONC-Defined HIT Roles

ONC Category 1 Role ^{18,27}	ONC Category 1 Description ^{18,27}	1	2	3	4	5	6	7
Implementation Support Specialist*	“Workers in this role provide on-site user support for the period of time before and during implementation of health IT systems in clinical and public health settings. These individuals will provide support services, above and beyond what is provided by the vendor, to be sure the technology functions properly and is configured to meet the needs of the redesigned practice workflow.”	X	X	X	X		X	X
Implementation Manager*	“Workers in this role provide on-site management of mobile adoption support teams for the period of time before and during implementation of health IT systems in clinical and public health settings.”	X	X	X	X			
Practice Workflow and Information Management Redesign Specialist*	“Workers in this role assist in reorganizing the work of a provider to take full advantage of the features of health IT in pursuit of meaningful use of health IT to improve health and care.”		X	X	X		X	
Technical/Software Support Staff**	“Workers in this role will support on an ongoing basis the technology deployed in clinical and public health settings. Workers in this role maintain systems in clinical and public health settings, including patching and upgrading of software. They also provide one-on-one support, in a traditional ‘help desk’ model, to individual users with questions or problems.”		X			X		X
Trainer**	“Workers in this role design and deliver training programs, using adult learning principles, to employees in clinical and public health settings.”					X	X	X
Clinician/Practitioner Consultant*	“This role is similar to the “Practice Workflow and Information Management Redesign Specialists” role listed above; in addition to that role’s set of competencies, this role brings to bear the background and experience of a professional licensed to provide clinical care or a public health professional.”							X

* Denotes “Mobile Implementation” roles that are short-term in nature

**Denotes roles that are ongoing in nature

Participants described carrying out numerous activities that fulfilled official and unofficial roles and responsibilities. Some interviewees explained how they carried out a host of activities within their work that included software support and implementation support and training. The ONC framework attributes those activities to three separate roles: Implementation Support Specialist, Technical/Software Support Staff, and Trainer. For example, Participant 7 described performing all three activities and explained:

“I have to work on maintaining things and [keep] everybody going...I am on the ground running. I am putting out the fires for the providers. I am the one that smoothes it all over trying to keep them happy...building their forms and things like that. Why is the screen doing that? Well you got to drag it. It is one of those things you got to show them, the little tips because nobody reads the manual. Nobody remembers anything you taught them.”

Similarly, Participant 6 at times was a Trainer: “My current role is...rolling out and training our clinic areas,” and at other times a Practice Workflow and Information Management Redesign Specialist: “we probably spent almost two months...trying to figure out the whole workflow process...” It is worth noting the participant engaged in both job activities that the ONC separated into “ongoing” roles (Trainer) and “short-term” activities Practice Workflow and Information Management Redesign Specialist)^{18,27}.

A large part of all the interviewees’ work was training; even Participant 5 who was a system technician. Interviewees often described providers as being a challenge to train. Participant 7 explained, “The population is very demanding. They scream and yell,” and Participant 6 noted training could be time consuming, “I was in their clinic

and I would sit there all day and just wait for them to ask me questions or help them or shadow them...” Participant 6 referred to teaching activities, *“I would have to teach [the EHR-based workflow]...from the time the patient walks through the door,”* but neither the participant nor others who trained users explicitly stated whether they relied on pedagogical theories to inform their approaches to teaching.

Discussion

In this study of health information technology professionals working in CHITAs to implement EHRs, we found that the organizations approached their projects using different models. Those models represent approaches to implementations by either relying on in-house staff, a subcontractor, or something between the two. Although the models may have been different, each CHITA relied on particular HIT staff that played multiple roles to, perhaps, fill in gaps between technologies, processes, and personnel. This may explain why these workers fulfilled a number of roles from project managers, to trainers, to workflow designers, all in the course of their daily work.

We describe the interviewees as HIT workers who served as facilitators who communicate explicit and tacit information between end-users, mid-level managers, and EHR vendors. They rely on both technical know-how and interpersonal skills that help facilitate multiple activities required for an EHR system implementation. We have found these professionals play critical roles in their respective CHITAs because they often act as the face between end-users and CHITA-related organizations that have varying levels of resources at their disposal.

The CHITAs leveraged the interviewees’ skills in a variety of ways to work toward their EHR implementation goals. We believe the various approaches demonstrate that there exist viable alternate models that CHITAs in specific, or health care organizations in general, can take to reach EHR implementation goals. It would be of value to compare this and other case studies to one another to understand the number of CHITA-level EHR implementation models and assess, either qualitatively or quantitatively, the models’ comparative effectiveness.

The interviewees employed by the CHITAs were all specialists involved in EHR implementations but generally did not receive formal education in any one predominant field such as information technology, education, management of information systems (MIS), or in health care. The heterogeneity in backgrounds perhaps illustrates the newness of the EHR implementation field, or that EHR implementation specialists possess a nuanced mix of technical and personal skills that are learned on the job rather than in the classroom. Of particular note is that only one participant, albeit in a small sample, possessed formal clinical training. Still, clinician implementers may be able to communicate and address provider concerns in ways that non-clinicians cannot, thereby improving EHR implementations. We therefore suggest further investigation into areas such as how organizational behavior theory may be applied to improve CHITA-led EHR implementations’ efficiency and effectiveness. These findings reveal ample training opportunities for these types of workers.

Our interviews with CHITA key informants suggest potential expansions and refinements to ONC’s HIT workforce framework. The framework does well conveying the kinds of activities study participants performed in their EHR implementations. Interestingly, interviewees’ self-described activities not only cut across ONC’s categories, but also cut across “short-term” (“mobile implementation”) roles and “ongoing” roles. Study participants fell into many of the framework’s boxes rather than any one particular box, thereby demonstrating how participants played a variety of roles in their EHR implementations. This finding supports ongoing efforts to refine the roles and responsibilities of the HIT workforce and speaks to the opportunities for evaluation that inform licensure standards or accreditation requirements.

Interviewees described important aspects of their roles: communicating and coordinating among constituencies as well as advocating EHR adoption to providers. As one participant pointed out, coordinating and “arm twisting” were the unexpectedly difficult aspects of an EHR implementation that moved the process forward, and interviewees addressed resistance among providers who had presumably agreed to embark on EHR implementations.

It is of interest that many of the interviewees’ themselves did not elaborate on any need to formalize their approaches to developing communication plans, incentivizing adoption, or leveraging pedagogical approaches that might enhance implementations. Although our interviews did not fully explore this issue, we believe there is worth in building educational competencies for EHR implementers around methods of communication, team-based learning, and strategies for incentivizing and motivating EHR adoption. For example, these findings have informed

curriculum planning and instructional strategies in our own educational program that trains adult learners to enable implementations, maintenance, and use of HIT. We believe it would be fruitful to further investigate if and how communication, team-based learning, and motivation techniques complement the roles already outlined by ONC.

Strengths and Limitations

A strength of this study is that the CFIR framework, first developed in the field of implementation science, is a novel application to clinical informatics research that we would like to address. CFIR framed our analysis to consider interviewees' individual characteristics that may have impacted their approaches and work activities across different organizational contexts. Likewise, CFIR framed our analysis to explore organizational contexts and consider ways in which interviewees communicated and coordinated across organizational boundaries. The CFIR framework provides a lens that focuses on implementations within one organization. A CHITA, though, is a group of organizations and therefore through discussions and test coding we modified the "inner" and "outer" environments to suit this particular research setting.

A limitation is that these findings are not generalizable, as is the traditional nature of qualitative work. Instead, these exploratory findings are transferable²⁸ in that they provide lessons learned that inform activities in similar settings. Also, we did not conduct observations to see how interviewees went about their work. We accounted for this by including interviewees with similar roles and comparing and contrasting their self-described activities. Furthermore, we compared our interpretation of the work roles by consulting others outside the research team including those with EHR implementation experience. Finally, state-funded CHITAs are particular types of health information organizations yet we have little reason to believe that the challenges associated with EHR implementations in CHITAs are significantly different to other EHR implementations.

Conclusion

Our investigation describes the roles and activities of particular HIT workers who facilitate and support EHR implementations. Although the three CHITAs used different models to carry out their EHR implementations, each relied on the services of these workers who at different times played different roles and performed different activities to advance those EHR implementations. These workers came from a variety of backgrounds with varying levels of training but all relied on their personal and technical skills to relay information between constituencies and enable organizational change such as realigning workflow or incentivizing EHR adoption. Our findings demonstrate that these workers perform ONC-described roles, but how and when those roles are performed may be dependent on the status and immediate goals of the implementation process. This illustrates the complexity of EHR implementations and the skills that workers must possess to carry out those implementations. The interviewees' experiences inform policymakers, educators, employers, and the workers themselves as to how policies, resources, and training may be best tailored to meet the needs of this rapidly developing workforce.

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