Assessment of Health IT and Data Exchange in Safety Net Providers

Final Report

NORC at the University of Chicago

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U.S. Department of Health and Human Services
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Executive Summary

The National Opinion Research Center at the University of Chicago (NORC) is pleased to present this Executive Summary summarizing findings for the *Assessment of Health Information Technology (health IT) and Data Exchange in Safety Net Providers*, a project sponsored by the Office of the Assistant Secretary for Planning and Evaluation (ASPE) at the United States Department of Health and Human Services (HHS). The Health Resources and Services Administration (HRSA) worked in conjunction with ASPE to conduct this project.

Introduction and Purpose

This report reviews important lessons learned from the experience of network-enabled health IT adoption among federally funded health centers. We review challenges and opportunities associated with adoption of health IT, perceived costs and benefits and the experiences of providers working to leverage health IT to improve quality and efficiency of care. We also address the nature of support and technical assistance required at various stages of health IT adoption and the role networks have played in addressing those needs among federally funded health centers.

We focus on areas that represent challenges and opportunities for officials responsible for implementing the Health Information Technology for Economic and Clinical Health Act (HITECH) provisions designed to provide additional reimbursement and technical assistance resources to motivate meaningful use of health IT among all providers in the United States. To inform the report we conducted several site visits between August 2008 and April 2009. The site visits included discussions with leadership and staff from nine health center networks, over 30 federally funded health centers and over 100 individuals across all organizations. The networks visited as part of study are listed in Exhibit ES-1.

Exhibit ES-1. Site Visit Information

Network/ consortium name (Abbreviation)	***Location***	***Discussants***	
		Network	***Health centers***
Alliance of Chicago (Alliance Chicago)	Chicago, IL	4	9
Access Community Health Network* (Access Chicago)	Chicago, IL	3	8
Community Partners HealthNet (North Carolina)	Eastern North Carolina	2	10
Health Choice Network-New Mexico (HCN New Mexico)	Southern New Mexico	1	11
Health Choice Network-Utah (HCN Utah)	Eastern Utah	2	7
Council of Community Clinics (San Diego Council)	San Diego, CA	3	13
District of Columbia Primary Care Association (DCPCA)	Washington, DC	1	8
San Francisco Community Clinic Consortium (SFCCC)	San Francisco, CA	6	14
Community Health Center Network (Alameda County)	Alameda County, CA	5	13
Boston HealthNet (Boston HealthNet)	Boston, MA	6	13
TOTAL		**33**	**106**

*Access Chicago is a single health center, but is grouped with networks and consortia here as it has 50 health center sites.

Background on Health Centers and Networks

Since the late 1960's federally funded health centers have represented an indispensable source of primary medical care for underserved and uninsured populations within the United States. Since the inception of federally funded safety net providers as part of President Lyndon Johnson's war on poverty initiatives, these programs have consistently grown in their funding, number of sites and number of patients served. The latest data available from HRSA shows federally funded health centers treat more than 17.1 million Americans each year in facilities operated by over 1,100 distinct health center grantees and over 7,000 health care delivery locations around the nation.[1]

For the purpose of this study we apply a broad definition of health IT that encompasses computerized applications used for clinical and administrative purposes that are specific to the health care sector. In the past two decades, administrative IT applications such as practice management systems (PMSs) and automated billing systems have been adopted by most health care providers. While we do include administrative systems in our assessments, our focus for this report is the increasing adoption of clinical IT applications such as electronic health records (EHRs) as well as automated electronic patient registries or chronic disease management systems and applications that are typically used in exchange of patient level data between different types of providers (e-Prescribing, laboratory interfaces and e-Referrals).

Our findings focus on the efforts of health centers that are part of a network or consortia. Health center networks began to take shape in the 1990's as health centers struggled to adapt to the emergence of managed care. Over time, networks began to forge business partnerships to pursue specific grant opportunities, joint purchasing of equipment and supplies and managed care contracting. In some cases, these organizations formed their own health maintenance organizations (HMOs). As health centers began moving to electronic billing to third party payers, financial and IT systems became a focus for many networks. The need to electronically manage patient registration, services, costs and reimbursement led almost all health centers to pursue PMSs by the late 1990's. For these reasons networks were well positioned to negotiate with and manage vendors on behalf of their health centers.

Over the last decade HHS grants funded through HRSA, among other Agencies, increasingly focused on networks as a means to assist in the implementation of clinical health IT applications including EHRs among safety net providers. In 2005, HRSA formalized "health center controlled networks" (HCCNs) as entities recognized by HRSA that could directly receive grant awards. Since their initial efforts with PMSs, networks have provided health centers with a wide range of services related to support EHR adoption including vendor selection, training, managing data and maximizing efficiencies. Health centers benefit from the increased economies of scale offered by networks and the collaborative working environment of several health centers working together.

Experience with Health IT Adoption: The Health Center Perspective

Most health centers we spoke with were enthusiastic about adoption of EHRs. They did not anticipate a positive return on investment (ROI), but felt that EHR adoption was the "right thing to do" to improve quality and efficiency and that use of EHRs would represent a cost of doing business in the future. As would be expected, enthusiasm for EHR adoption increased and worries regarding costs and challenges decreased following the passage of HITECH, as health centers came to expect that Medicaid "meaningful use" incentives would result in financial benefits from EHR adoption and that future penalties could make non-adoption more expensive than adoption.

Implementation support. Despite their enthusiasm, health centers described the process of adopting health IT applications such as EHRs as costly, time consuming and difficult even when pursued in the context of a network. Health centers emphasized both the importance of planning, assessing needs and conducting a thorough and thoughtful review of vendors, but also noted that the process takes a long time and that even after thorough planning unanticipated challenges will arise. In most cases, health centers adopting EHRs noted a very significant decrease in productivity and patients receiving care during the initial months of implementation. In some cases health centers struggle to return to a pre-EHR rate of

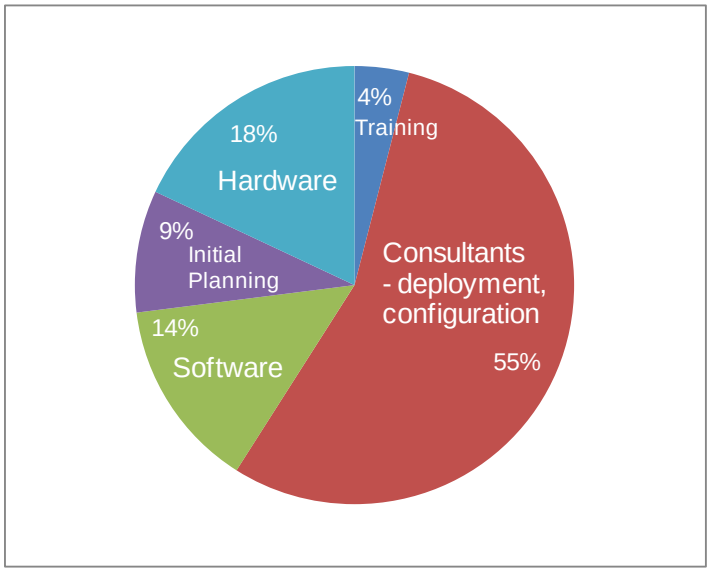
productivity even one year following implementation. Health centers also noted that they do not have the in-house expertise necessary to facilitate health IT adoption and therefore have to rely significantly on expertise and support from networks and outside consultants.

Training. Discussants put a great deal of importance on adequate training, especially in-person training conducted by someone familiar with the health center setting prior to implementation and then on-site training and user support during the first several weeks of implementation. They also noted the importance of providing special training to the most enthusiastic providers to serve as "super users" to support training and retraining that stretches far beyond the initial implementation. Ongoing training is necessary to meet training needs for new providers and improve on staff ability to use the EHR over time.

Connectivity. Health centers using EHRs or other applications hosted externally by a network noted unexpected problems related to connectivity and poor infrastructure within their facilities that either delayed adoption or reduced the reliability and availability of systems. Health centers that had not been able to invest in dedicated network infrastructure to support EHRs faced significant problems with Internet service and connectivity that hampered their ability to rely on network-hosted applications. This was particularly true in rural areas, but some urban safety net providers faced similar issues, particularly those located in the inner city and in aging buildings with poor electrical infrastructure.

Costs and benefits. When asked to provide details on costs, most health centers said they have a good sense of the hardware, software and external consulting costs associated with adoption, but that some "soft" costs were substantial and difficult to quantify. These costs could include the use of consultants or outside experts as part of planning, training and implementation but typically went far beyond consultant fees or specific services and included difficult to capture costs such as lost productivity. A rough breakdown of the categories of known initial costs associated with EHR implementation as described by some discussants is depicted in Exhibit ES-2 below.

Exhibit ES-2. Estimated Breakdown of Initial EHR Implementation Costs



Discussants also noted that some benefits are difficult to quantify at the health center level. These include benefits for health centers themselves such as an enhanced ability to recruit new clinicians that have been trained using EHRs. Because of their high mix of uninsured patients and special reimbursement rules under Medicaid, health centers do not benefit from use of EHRs in the same way other providers do. This is because federally funded health centers do not benefit improved documentation and coding that can result in higher reimbursement. In addition, cost savings from improved quality of care by ambulatory care and primary care providers very often accrue to other stakeholders such as payers or acute care providers that have to bear less of the burden of hospital admissions and complications from ambulatory care sensitive conditions. Finally, some of the most obvious benefits of EHRs, such as the ability to access records from remote locations have not been studied closely enough to be quantified.

Exploring the Role of Networks

Health centers uniformly praised the network model as the key enabler for the adoption of advanced information technology. With the exception of a few very large health centers, most individual providers did not believe they had the resources and access to expertise necessary to effectively adopt EHRs and, in many cases, PMS applications on their own. Networks assist both by helping achieve economies of scale that reduce the cost of implementation, but also by helping health centers access talent and leadership that very few are able to attract and retain on their own. We found that health center networks have evolved over time to fulfill a number of roles in supporting health IT adoption among health centers. These supporting roles are summarized in the paragraphs below.

Achieving economies of scale. Networks offer health centers an opportunity to leverage economies of scale in pursuing health IT, handling administrative functions and purchasing supplies in volume. Networks often provide servers and maintenance resources to centrally host applications, significantly reducing the need for onsite IT expertise and hardware upgrades at the provider level. In addition, networks are better able to negotiate contracts and service requests with vendors than individual health centers because of the leverage that comes from being a high volume purchaser.

Promoting collaboration. Networks bring health centers together, and can promote collaboration particularly in the area of QI and best practices. For example, networks may convene medical directors to develop a common set of protocols and forms for use in the treatment of individuals with chronic illnesses or achieve agreements to use common reports to benchmark performance in priority areas.

Care coordination across providers. Some networks assist in the coordination of care by supporting e-Referral software between health centers, specialists and hospital providers. By implementing shared records with inpatient health care providers and aggregating data from various provider sources in order to support advanced case management.

Quality reporting. Some of the networks we visited had established data warehouses to facilitate reporting and analysis using EHR data. These warehouses allow health centers greater flexibility in using EHR data to track performance and quality metrics on a health center, provider and network level. Some networks are also using automated disease registry software to support quality reporting and panel management.

Interfaces and data exchange. The networks that supported EHR adoption also assisted health centers to establish some limited form of data exchange with ancillary care providers such as pharmacists and clinical laboratories. This usually involved helping health centers make use of the e-Prescribing functionality native to the EHR being implemented or in setting up interfaces with key clinical laboratories to allow for electronic ordering of labs and or receipt of lab results directly from the EHR.

Access to hospital data. A limited number of networks we visited were able to successfully broker arrangements where health centers were able to access data from inpatient providers. Typically these efforts allowed providers in health centers to access in-patient or emergency department records for their patients that had recently been treated by the hospital or gave them the ability to refer patients electronically to specialists.

With few exceptions, the networks we visited have not progressed far along the path of creating a safety net health information exchange following the health information organization (HIO) model. However, several networks did indicate a potential interest in moving in that direction if they could get the support and cooperation from a critical mass of health care providers and funding dedicated to such an effort. In many cases health center networks were looking forward to engaging directly with the State on HIE planning and implementation activities funded under HITECH.

Health Center Networks, Future Directions

As would be expected, maintaining a steady source of financing to support their efforts represents a major challenge for network leadership. Most of the health centers and networks we spoke with were able to move forward with health IT projects as a result of significant public investment through grants and

cooperative agreements administered primarily by HRSA, but also by other Agencies such as the Agency for Healthcare Research and Quality (AHRQ). Some health centers and networks, particularly those in California had access to significant grants from Foundations to support specific health IT projects. Discussants were skeptical concerning networks' ability to sustain their activities in support of health IT once grant funding ran out.

Many health center networks were looking at growth and increased economies of scale as a vehicle for staying solvent using membership dues and user fees without external funding. Many health center networks in search of new members have branched out significantly beyond their state and region and have achieved a national presence as suppliers of hosting, support and maintenance services related to health IT adoption.

The HITECH portion of ARRA of 2009 altered the conversation on sustainability and motivations for health IT adoption and will continue to shape health centers' involvement with health IT in the coming years. Because of the increased Medicare and Medicaid payments included in HITECH (and the prospect of penalties in future years for health centers not engaged in meaningful use), health centers were willing to reconsider the financial calculus of EHR adoption. In addition, some networks considered and are pursuing a role as technical assistance suppliers for providers outside of the health center community funded as part of the Regional Centers program.

Using Health IT to Improve Quality

All health centers and networks noted quality and efficiency improvements as the main motivation for pursuing health IT projects. In almost every case, health centers noted that using health IT for QI is a long process and that the initial stages of adoption are focused on the challenge of implementation rather than effective use of the system for QI. In the bullets below we highlight key challenges noted by discussants.

Difficulty using clinical decisions support functionality. Health IT can be improved by generating reminders, forms and access to clinical practice guidelines at the point of care. Many health centers "turned off" reminders or other clinical decision support functions during the initial stages of implementation because they wanted to know more about how to use those tools most effectively and because they felt that the move to an electronic environment on its own would represent a significant burden for their providers without the introduction of clinical decision support.

QI reporting. Health IT can support QI by facilitating the design and use of reports documenting trends on clinical practice over a period of time. Reports can be used to initiate new clinical programs, motivate change in clinician behavior or motivate enhanced outreach and case management to improve compliance among patients. However, health centers noted that most EHRs do not have "out of the box" functionality that allows them to generate reports on a panel of patients and track their health care experience over time. Generating these types of reports very often requires the use of additional applications such as registries or data warehouses.

Establishing a baseline. Discussants noted that establishing a baseline set of measures based on EHR data for a panel of chronically ill patients takes approximately one year. While health centers took a variety of approaches to incorporating historical data into their EHR prior to implementation, almost no implementations involved extensive data entry of historical records to allow for baseline measures that could be tracked prospectively from the point of implementation.

Assuring data integrity. When quality improvement reports are designed, health centers encountered substantial problems with data integrity that hampered the effort to translate the analytic findings of the reports into action. Data integrity issues could arise from various sources including inconsistent and in-sufficient documentation of patients by clinicians or reliance on billing data criteria to identify a panel of patients requiring a specific intervention. Most health centers lacked the resources to address complex data integrity problems and some networks were not in a position to dictate policies at the health center level necessary for achieving significant improvements in their data.

Discussants noted some key enablers in using health IT to promote QI. We summarize these observations below.

Health center commitment to QI. Health centers with robust QI functions prior to health IT implementation were best positioned to take advantage of QI technology. Typically, these health centers had employed dedicated QI staff that focused on the data rather than patient care. These health centers did not believe that health IT would eliminate the challenges associated with QI, but they did see health IT as an enabler that would help them perform QI tasks more efficiently.

Using automated disease registries. Some discussants felt that QI initiatives were better supported by automated disease registries compared to EHRs. These registries or "chronic disease management systems" such as i2i Tracks do not rely on electronic documentation by clinicians at the point of care. Instead, their approach is to establish electronic interfaces between PMSs, clinical laboratories and other system to generate a patient level database relevant to quality improvement for specific patient types. Potential benefits of this approach over EHRs include better reporting and lower cost of implementation.

Conclusions

We end with a series of conclusions grounded in findings from across discussants and site visits.

Networks have been key to supporting adoption of IT among federally funded health centers. Health centers uniformly praised the network model as the key enabler for the adoption of advanced information technology. Networks assist adoption of both technologies by helping achieve economies of scale that reduce the cost of implementation and also by helping health centers access talent and leadership that very few are able to attract and retain on their own

However, even with networks health IT adoption is far from easy. Health centers also uniformly described the process of adopting health IT applications such as EHRs as costly, time consuming and difficult even when pursued in the context of a network. Health centers emphasized both the importance of planning, assessing needs and conducting a thorough and thoughtful review of vendors and also noted that this process takes a long time and that even after thorough planning unanticipated challenges will arise. Discussants could not overemphasize the importance of adequate and ongoing training, especially in-person and onsite training conducted by someone familiar with the health center settings.

Using health IT for quality improvement takes time. QI motivated health centers and networks to pursue health IT projects, however these networks and health centers found that the steps undergone to have health IT achieve QI result in a lengthy process. While this process is helped along through extensive planning and needs assessment, in almost every case, health centers that have adopted EHRs indicated that the stage of implementation itself was overwhelming in terms of the time and resources required for re-working operational processes, training and assuring that providers have a basic level of comfort with the system.

We found that enthusiasm for use of health IT for QI among those health centers that had already implemented a robust QI function and were dealing with the issue of data integrity and understanding how to interpret their data and take appropriate action. Typically, these health centers had employed dedicated QI staff that focused on the data rather than patient care. These health centers did not believe that health IT would eliminate the challenges associated with QI, but they did see health IT as an enabler that would help them do what they already do more efficiently.

Interestingly, some health centers with robust existing QI functions made the decision to work with automated disease registries as a primary tool for supporting QI rather than an EHR. These registries or "chronic disease management systems" such as i2i Tracks forgo complete reliance on electronic documentation by clinicians at the point of care. Instead, their approach is to establish electronic interfaces between PMS, clinical laboratories and other systems to generate a patient level database of data relevant to quality improvement for specific types of patients.

Some (but not all) network functions can be provided nationally. There was significant variation in the role that the network played with respect to health IT adoption and usage. Almost all networks were able to use economies of scale, coordination and grant funding to reduce the cost of health IT implementation at the individual health center level. Very often networks hosted health IT applications accessed by their health center members and provided ongoing maintenance and technical support in conjunction with relevant software vendors. We found that in addressing these functions, networks did not have to be in the same geographic areas as member health centers.

Most networks also looked to provide some path for using EHRs or other applications to achieve QI. This proved to be a challenging task for most networks. Health centers reported some difficulty in coordination with respect to customized forms and fields that were appropriated across all settings and reported there was competition in terms of demand for network resources to generate reports and analyses to meet the QI needs of each member. In instances where the network was effective in facilitating a common approach to QI, this was almost always done at the local level, by regularly convening QI directors and medical directors in person and talking through needs and priorities of each health center and how they could be best addressed.

Networks are involved in data exchange and integration, but not as HIOs. Another network function that required significant engagement at the local level was facilitating data exchange and data integration to promote efficiency and effectiveness of care. In the context of EHR adoption, several networks have facilitated adoption of point-to-point exchange applications such as e-Prescribing and laboratory interfaces. Some networks have been able to work effectively with their local safety net hospitals and specialty care providers to set up systems for e-Referrals that are highly valued by their health center members. While networks did indicate an interest and initial plans for pursuing regional health information exchange, at the time of our discussions, these efforts were still usually in very early planning and coordination stages. The most advanced safety net HIO project we encountered may be the clinical information exchange set up in Boston that uses a common master patient index and clinical data repository updated from multiple sources to give safety net providers a comprehensive view of inpatient and outpatient data on an individual patient.

Technical support needed to achieve meaningful use will be substantial and vary by stage of implementation. Although the definition of meaningful use has not been finalized, it is clear that health centers have grappled with many of the issues that will be included in that definition. As an unprecedented number of health care providers in the United States are moving rapidly towards adoption of EHRs, resources have been set aside to provide technical assistance and other forms of support. In the bullets below we outline some types of support that may be important at different stages of EHR adoption.

- **Planning.** In the earliest planning and orientation phases, providers need access to resources that can help them take stock of their needs and workflow and plan an implementation that will help address problems they would like to see fixed rather than implement new software simply for the sake of implementation. While it is beneficial to access consultants or individual experts that can help health centers navigate these questions, there may be some opportunities to encourage providers to ask the right questions on their own by providing access to online resources, toolkits and case studies outlining where other efforts have succeeded or failed.
- **Vendor selection.** During vendor selection, providers need good templates and rubrics for use in analyzing options. Resources provided at this stage should allow providers to capture the full range of issues associated with adoption of one vendor or another, including costs, the likely ongoing needs for support and the vendors willingness and track record providing it, the level of customization that the vendor is willing to provide to meet the needs of their health center, approaches to conducting due diligence reviews of vendors and the relative change from existing practices that will be required to implement the new system.

Resources should challenge health centers to look beyond the most obvious criteria of cost and functionality and look at the practical realities of choosing one system over another in terms of training burden, difficulty in achieving buy-in and cost of ongoing support and maintenance. These considerations are important in assuring that providers arrive at decisions that make sense in the interim and in the long term. In all activities involving engagement with vendors, individual providers can benefit from economies of scale associated with pooling resources and decision making across a larger set of providers and encounters.

- **Pre-implementation and implementation.** Pre-implementation activities need to include a detailed breakdown of workflow and how it will change as part of a comprehensive approach to change management. Most providers are not in a good position to document their own workflow and may not be familiar with the tools that are typically used in this process. Change management activities for pre-implementation and implementation stages, will benefit from employing an outside expert to work with providers directly. Providers also need to understand and expect that implementation will be iterative and that new requirements or needs will emerge at every stage of implementation and that they need a mechanisms and often an outside resource to help document the evolution of those needs to assure they are addressed as rapidly and efficiently as possible.
- **Training.** Training is perhaps the single most challenging aspect of pre-implementation and the most effective practices seem to make use of both experienced outside trainers and super users from among the health center providers and employees. It is important that the training go beyond basic orientation of individuals to the software, and actually work to teach users the intended use of software as an enabler to their jobs. Furthermore, to the extent that the EHR will facilitate reporting intended to improve operations and quality, staff must be trained in the specific ways in which to enter data, use the forms they will be expected to work with and identify appropriate and inappropriate customizations.
- **Post-implementation.** In the post implementation period, providers will likely require many of the same resources they needed during implementation and pre-implementation. Most health centers noted that they continued to refine their needs and identify newly required customizations over time and that this continued years into their use of EHRs. In addition, a focus on maintaining a continued training function is necessary to support the needs of staff that come on board after the initial implementation. Finally, in the post-implementation period when provider leaders are expecting some returns or benefits from adoption of an EHR, a great deal of assistance will be required in helping health centers understand what is possible in terms of reporting out of the EHR and then design and run reports that best address their needs.

Many of the findings and conclusions described above are generally applicable to the challenges and potential pitfalls associated with widespread adoption of health IT as a means to achieving quality and efficiency improvements. They also point to the considerable accomplishments of some federally funded health centers and their networks in navigating these challenges and promoting effective adoption.

Depending on the mechanisms ultimately established to define and monitor "meaningful use," it is likely that technical assistance providers, vendors and consultants will evolve to establish resources and product lines that support more seamless adoption of health IT and that draw a clearer path from adoption of technology to real improvements in clinical outcomes and cost effectiveness of care. In addition to the provisions included in the HITECH Act, further legislation that leads to changes in payment for health care services may lead to more insight into how best to use IT to improve health care delivery. In any scenario, the experience of early adopter health centers and networks represents a powerful set of experiences that policy makers and other stakeholders should draw from over time.

Introduction

The National Opinion Research Center at the University of Chicago (NORC) is pleased to present this Final Report for our project, *Assessment of Health Information Technology (health IT) and Data Exchange in Safety Net Providers*. This project was conducted for the Office of the Assistant Secretary for Planning and Evaluation (ASPE) at the United States Department of Health and Human Services (HHS). The Health Resources and Services Administration (HRSA) worked with ASPE in the conduct of this project. In this report, we present findings from discussions with nine health center networks consisting of over 30 federally funded health centers. Overall, we spoke with over 100 individuals from these organizations. These discussions took place between August 2008 and April 2009.

This project assesses the current state of health IT among leading health centers and identifies opportunities and challenges inherent in leveraging health IT for quality improvement (QI). We focus on health IT adoption among health centers taking part in consortia or networks to work collaboratively on health IT issues. In some cases, these networks constituted formal Health Center Controlled Networks or HCCNs as defined by HRSA. Much of this report focuses on the experience of networks and health centers on adoption of Electronic Health Records (EHRs) specifically. However, we also cover broader topics associated with health IT including adoption of practice management systems (PMSs), chronic disease management software (CDMS) and health information exchange (HIE).

We focus on findings that are relevant to the challenges and opportunities associated with adoption of health IT among safety net providers, perceived costs and benefits associated with health IT adoption, and lessons learned from providers who are working to leverage health IT adoption to achieve quality and efficiency. We also address the nature of support and technical assistance required at various stages of health IT adoption and use as well as the role that networks have played in addressing those needs among federally funded health centers.

While the project and report focus on findings from a specific group of safety net providers and their networks, the experience of these organizations in adopting and using health IT to support quality improvement and care coordination can inform wider efforts to implement IT in the broader health care sector. This is particularly important in the wake of the American Recovery and Reinvestment Act of 2009 (ARRA) and provisions under its Health Information Technology for Economic and Clinical Health (HITECH) Act that are meant to provide additional reimbursement and technical assistance resources to motivate meaningful use of health IT among all providers in the United States.

Project Overview and Approach

This project involved a series of site visits to large health center networks around the country. Each site visit involved anywhere between 5 and 15 meetings carried out in person or over the telephone. Prior to selecting and conducting the site visits, we completed an environmental scan (included as Appendix A). The environmental scan synthesizes existing relevant materials and reflects discussions with a selected group of thought leaders. As part of the environmental scan, we sought to frame research questions and identify parameters for selecting sites. Following each site visit, we developed a site visit report detailing our findings. This final report represents a summary of those findings as well as a synthesis of broader themes that emerged over the course of the site visits. Each individual site visit report is provided as Appendix F to this final report.

Sites visit locations were identified based on criteria derived from the environmental scan and agreed upon by ASPE and HRSA. First, we established a list of metropolitan areas or regions as site visit candidates based on the presence of a health center network or consortia with active projects in health IT. Site visits were selected from this list depending on the center's extent of health IT adoption, experience with HIE, geographic diversity, participation in a similar assessment conducted by NORC for ASPE in

2005, proximity to other health center networks and consortia and the presence of rural and frontier health center sites.

After sites were proposed, discussed and approved, we conducted meetings with network and provider leadership and staff in eight different locations around the country: Chicago, IL; Eastern North Carolina; Washington, DC; Boston, MA; San Diego, CA; the Bay Area in California; Southern New Mexico and Eastern Utah. Exhibit 1 below presents the names of the networks we visited, their location and the number of individuals that served as discussants for each site visit from both health centers and networks. We also provide an abbreviated form of the network names that we will use to refer to the networks throughout the report.

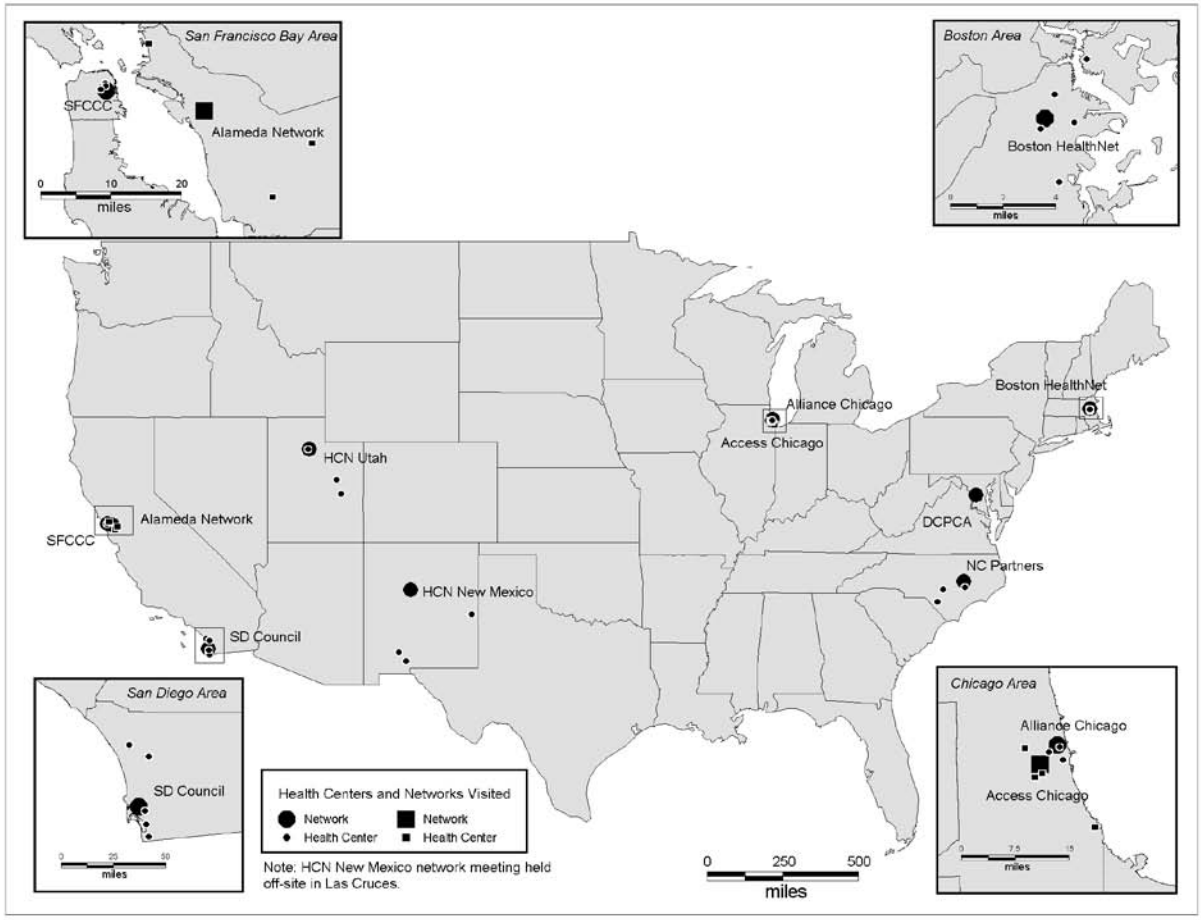
Exhibit 2. Site Visit Information

Network/ consortium name (Abbreviation)	*Location*	*Number of Discussants*	
		Network	*Health centers*
Alliance of Chicago (Alliance Chicago)	Chicago, IL	4	9
Access Community Health Network (Access Chicago)	Chicago, IL	3	8
Community Partners HealthNet (North Carolina)	Eastern North Carolina	2	10
Health Choice Network-New Mexico (HCN New Mexico)	Southern New Mexico	1	11
Health Choice Network-Utah (HCN Utah)	Eastern Utah	2	7
Council of Community Clinics (San Diego Council)	San Diego, CA	3	13
District of Columbia Primary Care Association (DCPCA)	Washington, DC	1	8
San Francisco Community Clinic Consortium (SFCCC)	San Francisco, CA	6	14
Community Health Center Network (Alameda County)	Alameda County, CA	5	13
Boston HealthNet (Boston HealthNet)	Boston, MA	6	13
TOTAL		33	106

In setting up each site visit, we reached out to the relevant network leadership using a letter summarizing the project and the importance of their participation. Following the initial contact, we sent network and consortia representatives a list of topics that would be covered during the site visit. We then requested existing background information materials from the network representative and discussed assembling the relevant stakeholders for the visit. Discussants on the site visit included network leadership responsible for coordinating efforts across a series of health centers as well as health center staff themselves. Most often, meetings with the health centers themselves included participation by the CEO, CIO, Medical Director, QI specialist and leadership from individual health center sites. In some cases, network leaders

scheduled meetings on behalf of the NORC team, although NORC scheduled meetings for most of the site visits. Exhibit 2, below depicts the geographic areas and networks visited.

Exhibit 3. Site Visit Locations



Before the site visits began, we developed two master site visit agendas for network-level meetings and health center-level meetings (included as Appendices B and C, respectively). These agendas focused on the set of topics shared with the networks originally, but were also tailored and targeted to specific initiatives occurring within the network or health center being visited. The general focus of these higher-level topic areas included: organization background information; network services; applications and technical assistance; general finances (IT and non-IT related) and data exchange: input and storage. High-level agenda topics for health centers included: center/systems background information; organization operations and processes; general finance (IT and non-IT related); applications and technology; data usage and collection; and environment influences such as state and federal regulatory influences.

While on site, we split into teams of two, with one project lead driving the discussion and an additional team member taking detailed notes and assuring that all the key topics in the agenda were covered. In some cases, discussants were able to provide a short demonstration of the EHR interface being supported by the network or reports that were produced to support quality improvement. Site visits lasted one to two and a half days, with additional time for travel. In some cases, NORC met with other groups during site visits. These groups included a gathering of health center medical directors at the network level and regional exchange partners in one area visited. These additional meetings added richness to our findings by offering discussants an opportunity to hear and react to each others' comments. For a detailed account of methods used for this project and discussion guides, see Appendices B, C and D. A glossary of terms

has been included as Appendix E and Appendix F provides the full reports drafted after each site visit for this project.

Background

We start with a brief background section to provide context for this project. Some of this material was originally gathered as part of our environmental scan, but the information has been updated for this report in a number of ways. Most notably, we have added a discussion of ARRA and the HITECH Act that has changed the landscape for health IT adoption in the United States through allocation of billions of dollars in incentives to promote meaningful use of EHRs among Medicare and Medicaid providers. HITECH also dedicates significant resources to support HIE and health IT through planning and implementation assistance to States, technical assistance, workforce development and other mechanisms.

Health IT and HIE, Overview

For the purpose of this study, we apply a broad definition of health IT that encompasses computerized applications used for clinical and administrative applications that are specific to the health care sector. In the past two decades, administrative IT applications such as practice management systems and automated billing systems have been adopted by most health care providers. Specific applications included in our definition are described as part of Exhibit 3 below.

Exhibit 3. Key Health IT Applications

Application	Description
Electronic health record (EHR)	An electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization[4]
Practice management system (PMS)	Software systems that support administrative workflow[5]
Lab exchange	Interoperability between laboratory information systems and EHRs to bi-directionally exchange laboratory test data
e-Prescribing	The use of computing devices to enter, modify, review and output or communicate drug prescriptions[6]
Clinical decision support (CDS)	Applications that provide evidence-based knowledge alongside patient-level data to better inform physician decisions[7]
Chronic disease management systems (CDMS)	Applications (often referred to as registries) used to track and present data for large patient groups suffering from individual chronic diseases such as asthma and diabetes
Telehealth	The delivery of health-related services and information via telecommunications technologies in the support of patient care, administrative activities and health education[8]

These IT solutions offer efficiencies in billing and record keeping and have helped bring the health care sector into line with other sectors of the economy.[2] During the period from 2002 to 2005, when NORC conducted an assessment similar to this one, we found that safety net health care providers such as federally funded health centers increasingly came to view adoption of PMS as a necessary cost of doing business and an essential factor in ensuring efficient billing and steady revenue. In the private sector, physicians who treat Medicare patients, with the exception of very small single-physician practices, have implemented electronic billing systems over the last 10 years.

Despite widespread adoption of IT among health care providers for billing and practice management, clinicians have been slower to adopt IT to support activities related to direct provision of health care in the exam room. Use of applications such as Electronic Health Records (EHRs) and computerized provider order entry (CPOE) systems have recently been introduced throughout the health care

sector, but overall adoption rates remain low. Practices that have adopted EHRs tend to use them for limited purposes. The 2008 National Ambulatory Medical Care Survey indicated that only four percent of practices are using an EHR to support functions such as e-Prescribing and guidelines-based clinical decision support. The same survey showed that only 17 percent of practices have a "basic" EHR defined as an electronic medical record that is interoperable with other systems and only 38 percent of providers conducted any sort of clinical documentation electronically at the point of care .[3]

Despite continued low adoption in 2008, there has been an upward trend in the adoption of EHRs which is likely to increase dramatically as HITECH incentives are better defined and come closer to implementation. Other forms of clinical health IT have also spread throughout the health care sector. Chronic disease registry systems offer users significant clinical decision support capabilities for panels of patients with specific chronic diseases. Some safety net providers use computerized applications such as i2i Tracks to develop registries for patients with asthma, diabetes, chronic pain and a number of other chronic diseases. Using these systems, providers can examine aggregate data for a panel of patients and compare individuals to benchmarks. This type of population health management functionality is something that EHR vendors are increasingly focused on but is not currently a core "out of the box" feature of most EHRs. Customizing and building on EHR functionality to pursue population health objectives has been an important focus of health center networks.

Data Integration and Health Information Exchange (HIE)

In addition to examining the adoption and use of health IT at individual provider organizations, we sought to examine adoption of health IT to promote coordination of care and sharing of information across providers. In examining IT in this context, we differentiate between tasks related to data integration and those that are related to health information exchange (HIE). Data integration is a broad concept that refers to efforts to compile data into a single repository from multiple sources. In the context of this project, data integration often takes the form of data warehouses that are used to populate reports. Other data integration efforts have brought together clinical and billing data to integrate medical care and social services to facilitate case management.

HIE refers to the "electronic movement of health-related information among organizations according to nationally recognized standards."[4] As providers have adopted health IT applications such as EHRs, exchange between provider-based applications has grown increasingly important. Just as health care providers must cooperate across the continuum of care to meet patient needs, information applications across provider settings must be able to exchange information to ensure ready and reliable access to patient health records. Differences between health IT applications in the manner in which data are entered, stored and categorized have contributed to a fragmented health IT landscape.

In recent years, health IT leaders have looked to health information organizations (HIOs) to convene relevant parties to negotiate rules for standardized information exchange. Some HIOs are regional in nature and known as RHIOs. A RHIO is defined as "a health information organization that brings together health care stakeholders within a defined geographic area and governs health information exchange among them for the purpose of improving health and care in that community."[4] Key issues and barriers to HIE fall into many categories including: data use limitations, data ownership, compliance with privacy guidelines, governance, liability, anti-trust and the roles and responsibilities of individuals and organizations.[9] While many of these issues are not resolved, efforts led by the federal government and industry have contributed to new standards for data exchange and application certification criteria. These efforts include certification conducted by the Certification Commission for Healthcare Information Technology (CCHIT), work towards identification of common standards through the Health IT Standards Panel (HITSP) and the work of the Health IT Policy Committee to help define requirements outlined in HITECH. In addition, health IT vendors have developed applications and interfaces to bring disparate systems together. These IT solutions give users the ability to bring together databases and repositories of

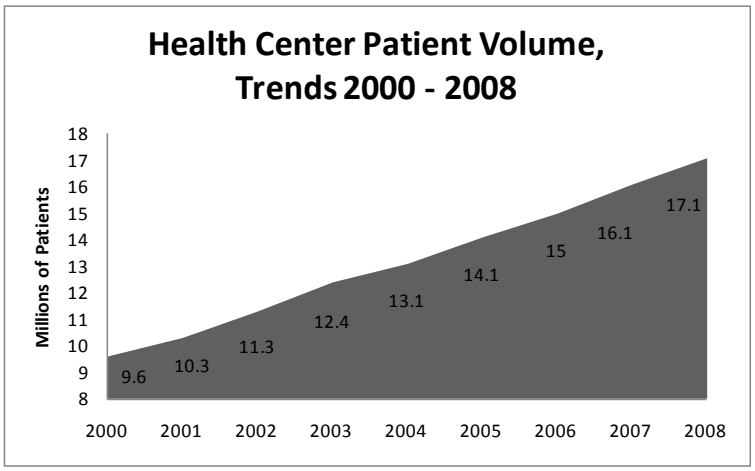
patient data from individual provider settings, read and write in patient records across EHR platforms and communicate and schedule across provider settings.

Federally Funded Health Centers, Overview

Federally funded health centers form a key part of the nation's health care safety net, delivering primary care medical services and other related services such as dental care, behavioral health care and case management to a wide array of vulnerable populations. Currently providing care to over 17 million Americans, health centers represent a critical public resource for individuals and families who have limited financial resources or face other barriers to seeking care through private providers. For those patients for whom income information is known, over 91 percent of health center patients have incomes at or below 200 percent of the Federal poverty level. Thirty-nine percent are uninsured.[10]

The health center program originated as a part of the Johnson administration's War on Poverty in 1965, under the "neighborhood health center" moniker. Congress renamed neighborhood health centers "community and migrant health centers" in its 1975 reauthorization and the Health Centers Consolidation Act of 1996 codified the community, migrant, homeless and public housing health center programs under Section 330 of the Public Health Service Act.[11] In 2002, Congress reauthorized the health center program, dedicating an additional $114 million to the expansion of new and existing health center access points. This funding resulted in the addition of 514 sites and expanded services in an additional 385 centers.[12] Appropriations for health centers increased substantially during this decade. The program was reauthorized in 2008, through fiscal year 2012.[13]

Exhibit 4: Patients Served by Health Centers



In 2009, ARRA further expanded the health center program by allocating $500 million to health center operations, $1.5 billion for health center modernization, expansion and renovation and $300 million for the National Health Service Corps, about half of whose members work in Health Centers.[14] Of particular relevance to this paper, ARRA's HITECH Act provides for increased reimbursement under Medicare and Medicaid for meaningful use of EHR technology. Safety net providers that have successfully implemented EHRs stand to gain substantially under this new arrangement. Currently, there are roughly 1,200 health centers, including more than 1,100 federally funded health centers and about 100 health center lookalikes.[1] Federally funded health centers operate roughly 7,500 health center sites across the country.[15,16,17] Federally funded health centers and their lookalikes must meet a number of requirements: they must be located in high-need areas, governed by a community board and provide comprehensive primary care to all on a sliding fee scale.[18] Health center lookalikes have been recognized by HRSA's Bureau of Primary Health Care (BPHC) as meeting some of the requirements for Section 330 funding, but do not currently receive federal grant funding under this provision.[18] Look-alikes are eligible for enhanced Medicaid reimbursement available to federally funded health centers.

The health center program has grown substantially in recent years. The number of patients, patient visits and health center locations have all increased dramatically. Health centers have seen a surge in individual patients, growing from 9.1 million patients in 2000 to 17.1 million in 2008 (see Exhibit 4). The number of patient visits has increased by a similar percentage, from 38.3 million in 2000 to over 67 million in

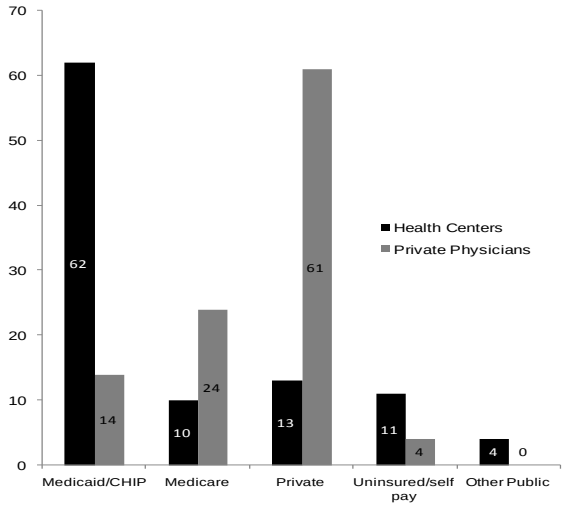
2007. Finally, the number of federally-funded health centers grantees (excluding lookalikes) has increased dramatically in recent years, from roughly 725 in 2000 to more than 1100 in 2008.[10, 19]

Special Features of Health Centers Relative to Other Providers

Health centers differ from private practitioners in important ways. Health centers' payer mixes rely heavily on Medicaid and other forms of public coverage. Medicaid and the Children's Health Insurance Program (CHIP) cover roughly 62 percent of their patient visits, while private insurers cover about 13 percent. This distribution is reversed for private physicians, with 61 percent of their patient visits being covered by private insurance and 14 percent relying on Medicaid and CHIP. In addition, health centers serve a disproportionate number of uninsured patients.[10] The percentages of patient visits by payer type are presented in Exhibit 5 below.[10]

Health centers also face a number of unique reporting requirements. In addition to information they must provide third-party payers for payment, they are required to submit annual Uniform Data System (UDS) reports to HRSA's Bureau of Primary Care providing aggregate data on patient demographics, patient visits, payer mix, revenue, quality of care, health outcomes and other key measures. Some UDS requirements require very specific data tracking capabilities, such as the ability to report encounters by specific diagnosis and procedure.[20] Other Federal funding programs require reports describing utilization of services provided to special populations – such as pediatric immunizations or pregnancy counseling for teenagers. In addition, many health centers are actively engaged in government and foundation initiatives, ranging from providing social services to various quality improvement initiatives. As a part of these initiatives, health centers could take on tasks such as updating state immunization registries and enrolling patients in public benefit programs, each with their own information systems and reporting requirements. Efforts such as these can affect staffing levels, health center layouts, computer configurations and overall workflows in ways not seen among other categories of health care providers.

Exhibit 5. Health Centers v. Private Physicians, Payer Mix



Adapted from *A Sketch of Community Health Centers: Chart Book 2009*: National Association of Community Health Centers: 2009.

Health centers offer a window into health care experiences of priority populations. In studying health centers, we can gain insight about use of services by racial and ethnic minorities, low-income populations, rural areas and many other key population groups. These groups often suffer from disparities in health status, quality of care received, access to health insurance, and access to critical health care services such as primary care, home and specialty care.[21] In addition, studying underserved populations is particularly relevant in assessing IT use, as underserved populations have exhibited lower rates of IT use, amounting to what researchers call a "digital divide."[22, 23] Health centers offer an exceptional opportunity to identify barriers to effective health IT use among the underserved and the providers that care for them.

At the same time, health centers offer a good opportunity to predict other health care providers' experiences with health IT, especially small and medium-sized ambulatory care practices. The reporting requirements and focus on population health at health centers could resemble some of the meaningful use

criteria for health IT funding under ARRA. Additionally, the size and staffing arrangements at health centers mirror those of small and medium-size private practices in many cases and many health centers (especially in rural areas) are the only health care provider for local residents, regardless of their insurance or socioeconomic status. Understanding health centers' experiences, thus, could help inform wider health IT adoption efforts.

Health Centers and Health IT, Setting the Stage

Health centers present a mixed picture of health IT use. Adoption rates vary significantly depending on the level of functionality used to define EHR adoption. Adoption rates range from 13 percent for EHRs designated as fully functional by a Robert Wood Johnson Foundation (RWJF) expert panel to 38 percent for any type of electronic record.[2, 24] For the purposes of this study, we will use the 13 percent fully functional adoption figure. While overall EHR adoption rates for fully functional EHRs are similar for health centers and office-based physicians (13 percent and 12.4 percent respectively), when compared by practice size, health center adoption rates trail their office-based counterparts in every size group.[24]

Additionally, health centers vary in EHR adoption by patient coverage and payer mixes, with lower levels of adoption among those serving greater numbers of uninsured and poor patients. It is also important to note that functionality of EHRs and actual usage by providers may not be reflected in overall adoption rate figures. Some providers may only use the most basic functions of even the most sophisticated EHR systems. Despite this lag, health center funders, including HRSA, have made important strides towards supporting adoption of EHRs among these providers. Figures provided by HRSA show that the Agency has supported EHR adoption among 260 individual health centers, the majority of which have adopted these applications since the completion of the most recent health center surveys.

Furthermore, a high percentage of health centers have adopted some form of electronic disease registry. To date, roughly 90 percent of health centers have some sort of disease-specific registry and approximately 80 percent use electronic patient registries as a part of HRSA's Health Disparities Collaboratives.[24] These registries have provided health centers with useful experience bringing IT applications into their facilities and incorporating wider use of computers into day to day activities.

The potential benefits and challenges to health IT adoption for health centers mirror other provider groups in many ways. Improvements in quality of care through clinical decision support and increased patient safety through e-Prescribing present the same benefits that other providers would experience. The challenges health centers face are also similar to those that would be encountered by other provider groups. They include reduced productivity during training and implementation, change management issues and a lack of IT infrastructure and expertise. At the same time, the small operating margins and patients with complex needs that characterize health centers make health IT an even more difficult endeavor for these providers. Health centers cannot close for an extended period of time and do not have the resources to shift patient care to a separate facility during the course of an implementation.

Health centers stand to benefit from the implementation of health IT systems in ways specific to their circumstances. Health IT can enable better and more efficient reporting to funding sources. Additionally, the centers' relationships with specialty providers and hospitals stand to benefit greatly from the increased access to shared records and streamlined referral processes enabled through health IT and HIE. While health center adoption rates for EHRs remain low and health centers face myriad challenges in pursuing health IT and HIE, a number of centers (often through networks and consortia) have proven to be effective users and leaders in this realm. Some of the networks participating in this study have seized funding opportunities to offer health IT support for health centers. These leading edge networks and consortia, stand out as effective health IT users and supporters with lessons to share.

The Role of Health Center Networks and Consortia

Health center controlled networks (HCCNs) are groups of health centers that have banded together to pursue mutual goals in a number of key areas. HCCN is used by HRSA to designate a type of grantee

that "improves operational effectiveness and clinical quality in health centers by providing management, financial, technology and clinical support services. The networks are controlled by and operate on behalf of HRSA-supported health centers. Each network comprises at least three collaborating organizations."[25] A central objective of the HCCN program has been to provide health centers access to resources and expertise that they would not be able to afford without collaboration with others to achieve economies of scale. Non-HCCN consortia that are included in this report share some of the basic characteristics of HCCNs, but have not pursued specific funding as HCCNs. In this report, we do not typically differentiate between HCCNs and consortia referring to either generically as "networks."

Health center networks began to take shape in the 1990's as health centers struggled to adapt to the emergence of managed care. Looking for economies of scale and support in interacting with managed care companies and handling billing issues, health centers began to work together more closely. Many times, networks emerged from the work of primary care associations (PCAs), associations that typically conduct advocacy and foster collaboration among safety net providers. In the late 1990's and early in this decade, networks began to forge business relationships across health centers including partnerships to pursue specific grant opportunities, joint purchasing of equipment and supplies and managed care contracting. In some cases, these organizations formed their own health maintenance organizations (HMOs). As health centers began moving to electronic billing to third party payers, financial and IT systems became a focus for many networks. The need to electronically manage patient registration, services, costs and reimbursement led most health centers to pursue electronic practice management systems (PMS) by the late 1990's. Networks were well positioned to negotiate with PMS vendors and pursue applications on behalf of their health centers.

Over the last decade, HHS grants funded through HRSA or other Agencies, increasingly focused on networks as a means to assist in the implementation of health IT among safety net providers. In 2005, HRSA created the OHIT and effectively formalized "health center controlled networks" (HCCNs) as entities recognized by HRSA that could directly receive grant awards. Since their initial efforts with practice management systems, networks have provided health centers with a wide range of services related to health IT, including vendor selection, training, managing data and maximizing efficiencies.[1] Health centers benefit from the increased economies of scale offered by networks and the collaborative working environment of several health centers working together.

The American Recovery and Reinvestment Act of 2009 (ARRA)

The American Recovery and Reinvestment Act of 2009 (ARRA), enacted in February 2009, has bolstered the health center program. ARRA has provided $2 billion in direct funding for Health Centers, including $125 million for the funding of health information technology systems. In addition, the ARRA's HITECH Act provisions designed to spur a rapid commitment to health IT across American health care are expected to have important ramifications for the safety net. In total, ARRA's HITECH Act provisions are estimated to provide $36 billion for health information technology over a six year period.[26] These provisions include:[26]

- *Medicare/Medicaid incentive payments*: Health care providers will be reimbursed at higher rates under Medicare and Medicaid when they meet "meaningful use" criteria with respect to EHR usage. Over time these increased reimbursement rates will be phased out and will be replaced by penalties for providers not demonstrating meaningful use.
- *HIE planning and implementation grants*: Funded through the Office of the National Coordinator for Health IT (ONC), these grants will support new HIE initiatives where they have not yet begun and ongoing activities among existing HIEs.
- *EHR loan fund*: Funded through ONC, these loans will support EHR acquisition for health care providers.

- *Health IT regional extension centers*: Funded through ONC, these extensions centers will disseminate research, provide technical assistance and assist with EHR implementation at the local level.
- *Workforce training grants*: Funded through HHS and the National Science Foundation, these grants will integrate medical informatics and EHRs into the curricula of colleges, medical schools and other institutions of higher education.
- *New technology research and development grants*: Funded through the National Institute of Standards and Technology (NIST)/NSF, these grants will propel innovation in areas focused on enterprise integration.
- *Broadband Opportunity Program:* Funded by ARRA, these grants provide broadband access to underserved communities and may directly benefit health centers located in rural areas.

These provisions had not yet been enacted during the majority of NORC's site visits but became an underlying context for this report.[1] ARRA will fuel a period of tremendous HIT growth among health centers. It remains to be seen how the role of health center networks evolves under ARRA. Some networks could qualify as regional extension sites funded under ARRA to provide IT technical assistance to all types of providers in a given geographic area. Other provisions, such as workforce training grants, may directly benefit health centers located in rural areas.

While ARRA was not a primary focus area for NORC's site visits, our visits to San Francisco, Alameda County and Boston occurred after its passage. Health center participants in these areas offered their thoughts on ARRA and its implications for health centers. The legislation also played a role in these health centers' discussions of motivations for pursuing EHRs. While many health centers in California had not considered EHRs absolutely necessary a few months before, many health center and network leaders in San Francisco in particular began to think of EHRs as necessary tools for the future following the passage of ARRA. Previously, they had looked to i2i Tracks to provide chronic disease management capabilities and clinical decision support. Health center leaders had felt that using such a system was a more cost effective way to achieve the IT-enabled Quality Improvement (QI) that many EHR users were struggling to attain. The Medicare and Medicaid incentives and penalties related to the meaningful use of EHRs changed the conversation for these individuals. Additional information on health centers, health IT and ARRA will be provided in later sections of this report.

In the remainder of this report, we will detail findings from the site visits conducted for this assessment. We begin with a section on network-level findings where we describe health center networks' and consortia's experiences with EHRs, other health IT applications and data management and exchange. Following that, we describe health centers' experiences with implementing EHRs and other health IT applications in a section on health center-level findings. We then provide a discussion of key, cross-cutting themes related to project objectives that emerge from discussions with both networks and health centers. These themes include findings on costs and returns from EHR adoption, models for network interactions with health centers and the state of HIE among health centers and networks. A final conclusions section will put the assessment's findings into a broader context and describe implications for health centers and networks, programmatic support and public policy.

Network/Consortia-Level Findings

This section reports our findings on network level activities (both HCCNs and other consortia) and is divided into two subsections. The first, discusses the background and history, governance and staffing models, geographic reach as well as funding models for the networks described in this project. The second subsection examines network functions and activities and reviews the role networks play in

[1] ARRA was implemented during site visits to Boston, San Francisco and Alameda County, CA.

supporting health IT adoption and QI. Because of the cost of health IT adoption, some funders view networks and consortia as the most viable path for health IT adoption among a wide range of providers. We note that the findings presented here reflect our qualitative assessments of the experiences of leading edge health center networks that have had some measure of success in health IT adoption. Our findings are not meant to represent the "typical" experience with health IT among federally funded health centers.

Summary of Networks Visited

A diverse range of networks were selected for this project, reflecting variation in geography, size, membership, services provided and overall approach to health IT. We begin our discussion of network findings with a brief summary of each of the networks visited as part of this project.

Alliance of Chicago

The Alliance of Chicago (Alliance Chicago) is a health center controlled network, representing four primary health center members in Chicago. Founded in 1997 as a collaboration to improve quality, lower costs and meet common goals, the four Alliance Chicago members formed a non-profit limited liability corporation in 2002 to focus on issues relating to health IT. Annually, Alliance Chicago's core health centers serve 100,000 clients, making over 340,000 service encounters across 32 different service delivery sites. Since its restructuring in 2002, the network has focused intensively on health IT. Alliance Chicago hosts and supports a central EHR for its four core members. Additionally, the network supports some QI activities, enabled by the EHR. Having developed a strong relationship with its EHR vendor, the network has expanded to provide services to nearly a dozen health centers around the country. In addition, health centers seeking to contract with Alliance Chicago's EHR vendor have looked to the Alliance Chicago to help shepherd their centers through the implementation process.

Access Community Health Network

Access Community Health Network (Access Chicago) has 51 health center sites, 217,000 individual patients, 600,000 patient visits and several hundred providers, including 230 board certified and board eligible physicians and midlevel providers as well as 300 registered nurses. The organization also employees licensed clinical social workers, medical assistants, case managers and outreach workers. Access Chicago is unique in this assessment because it is a single health center entity. Access Chicago originally formed as Sinai Family Health Centers, out of the outpatient health centers run by a safety net hospital in the near west side of Chicago in the 1990s.

Geographically, Access Chicago's service area covers 1,700 square miles, from the northwest Chicago suburbs towards the eastern Illinois border with Indiana. As a single health center, Access Chicago wields significant influence over the provision of care at its many health center sites. All IT and quality improvement is under the direction of Access Chicago's leadership team. During the course of our project, Access led a selection process for a single vendor for all of its health center sites and will implement an EHR/PMS across all sites in a centrally-managed process.

Community Partners HealthNet

Formed in 1999, Community Partners HealthNet (NC Partners) is a non-profit organization that provides information technology and administrative services to seven ambulatory care safety net health centers in eastern North Carolina. The network is based in Snow Hill, North Carolina approximately 80 miles southeast of the Raleigh-Durham area. The majority of its members are located in the area between Snow Hill and the South Carolina border in the eastern part of the state. Today, the network supports use of a centralized EHR and PMS and maintains a data warehouse of health centers' EHR data. Additionally, the network runs reports for health center members and performs limited quality improvement functions.

Health Choice Network

Health Choice Network (HCN) was founded in 1994, by a group of four health centers in South Florida. The founding health centers are all based in Miami-Dade County and a fifth health center based in Fort Meyers joined the network in 1996. These health centers came together to look for opportunities for achieving administrative efficiencies and economies of scale through collaboration and joint purchasing. Since the network's founding, HCN has developed expertise in EHRs and health IT-enabled quality improvement. Today, the network operates a number of regional networks that rely on the HCN for health IT implementation and support services. NORC visited two affiliated networks.

New Mexico Health Choice Network. New Mexico Health Choice Network (HCN New Mexico) began discussions with the New Mexico Primary Care Association and a pre-existing state-wide network called Integrated Services Network (ISN) in 2000. Members of the pre-existing ISN organization created HCN New Mexico as a means to leverage the existing HCN infrastructure and provide the practice management and EMR applications to their six member health centers across the state of New Mexico. Today, HCN New Mexico has been a part of HCN for approximately four years, enjoys a seat on the HCN Board of Directors and is considered a "fully integrated" partner with HCN.

Utah Health Choice Network. In 2002, HCN established a similar relationship with a Utah-based association of health centers known as the Association for Utah Community Health (AUCH). A subset of AUCH member centers formed Utah Health Choice Network (HCN Utah) which also is considered a "fully integrated" member with a seat on the board. HCN Utah includes seven health center members across the state of Utah.

Council of Community Clinics

The Council of Community Clinics (San Diego Council) was founded in 1977 by local community health centers in San Diego to take advantage of economies of scale and to advocate for the interests of their patient base. Since that time, SD Council has expanded to offer its members a variety of services through three organizational units all operating under the SD Council umbrella. Of particular interest to this assessment is the Community Clinics Health Network, a subsidiary charged with providing health IT application support, managed care contracting and quality improvement services for over 30 participating health centers.

District of Columbia Primary Care Association

The District of Columbia Primary Care Association (DCPCA) was founded in 1996, in an effort to promote primary care and support community health centers (CHCs) in the community. DCPCA currently has 14 health center members and a number of organizational member partners. While the Association focuses on health center operations, its members vary greatly in the services they provide, with some focusing almost exclusively on health care and others that specialize in securing food and other social services. In 2005, DCPCA secured a $5 million grant from the DC government to implement a combined practice management system (PMS) and EHR. Six DCPCA health centers decided to participate in the initiative. Today, DCPCA provides some basic support to health center members on their EHR/PM system, having relied on their vendor and an outside consulting group in earlier stages of implementation. DCPCA continues to provide traditional PCA services such as advocacy and program support as well. While we did not conduct a formal site visit to DCPCA as part of this project, we did meet with consortia leads involved in the EHR project and convened a half day meeting to discuss themes related to the project with staff from various DCPCA clinics that took part in the EHR roll-out.

San Francisco Community Clinic Consortium

Eight San Francisco community health centers founded the San Francisco Clinic Consortium (SFCCC) as a non-profit 501(c)(3) organization in 1987 to pursue a dual mission: to advocate for local community

health center patients and reduce operating costs for centers through group purchasing. SFCCC works as a loose consortium, serving as an advocate and convener for its ten current member health centers and supporting specific initiatives such as Healthy San Francisco (a local health care access expansion program). Three members are Section 330 Health Centers, four are Federally Qualified Health Center (FQHC) lookalikes, two are free clinics and one is an Indian Health Service Urban Indian Clinic. Although it does not host or support EHRs or practice management systems, SFCCC supports use of i2i Tracks, an electronic chronic disease registry system, for many of its members and brokers their use of the San Francisco Department of Health's Lifetime Clinical Record (LCR).

Community Health Center Network

The Community Health Center Network (Alameda Network) of Alameda County, CA was formed in 1996, largely in response to rapid expansion of managed care in California. The Alameda Network was established out of the Alameda Health Consortium (AHC), an entity that serves as a primary care association for Alameda County. The Alameda Network began operations as a managed care management services organization or MSO establishing "at risk" contracts on behalf of member health centers with three MediCal health maintenance organizations (HMOs). The network still maintains these contracts and offers managed care services. After building capacity to operate functions associated with a typical MSO, the Alameda Network began offering practice management, business operations, quality improvement and information systems in response to the needs of network members. Primary health IT applications supported by the Alameda Network include i2i Tracks (a disease registry system) and Altruista (a case management system and data warehouse).

Boston HealthNet

Boston HealthNet was formed out of a collaboration between two of Boston's major hospitals, Boston City Hospital and Boston University Medical Center. These two entities came together to form Boston Medical Center (BMC), now the seat of Boston HealthNet's operations. Boston HealthNet has historically focused on IT issues, supporting a centrally hosted EHR and planning around a broader health information exchange (HIE) to connect BMC with health center providers. Boston HealthNet led implementation efforts of a foundation-supported EHR across eight of its ten health center members between 2002 and 2004. In addition to the IT function, Boston HealthNet facilitates consultation between its members and Boston HealthNet leadership on HR and finance issues and provides an opportunity for health centers to achieve Joint Commission on Accreditation of Healthcare Organizations (JCAHO) ambulatory care certification using the same mechanism employed by BMC outpatient clinics.

Network History and Characteristics

Health center networks and consortia have historically played major roles in the spread and implementation of health IT across the health center community. Networks have successfully provided health centers with services related to health IT vendor selection, training, managing data and maximizing efficiencies. In many cases, these organizations started as a means to help health centers address changes in reimbursement brought about by Medicaid managed care, including provision of managed care reporting and billing services. Over time, they have evolved to help achieve economies of scale in other ways including group purchasing, centralized billing and joint procurement of IT applications and services. More recently, due to the availability of grant funding and the broader push towards health IT adoption, several networks, including the ones we visited for this project have shifted their focus towards support for clinical health IT applications such as EHRs.

History and Background

Health centers have an established history of coming together locally, regionally and nationally to share ideas and overcome joint challenges. Many networks studied as part of this project emerged from local and regional primary care associations (PCAs) with long standing relationships fostered among clinics

providing care to underserved populations. PCAs brought health centers together for the purposes of sharing trade information, joint training as well as federal, state and local advocacy campaigns. In some cases, the relationships cultivated within these PCAs provided the basis for the emergence of the networks and consortia as they are known today.

The formation of health center networks as formal business arrangements began largely in the early 1990's as a means to leverage joint resources and achieve economies of scale to reduce the cost of goods and services. As noted above, many of the networks formed in the 1990's in response to the rise of managed care. At that time networks envisioned offering documentation, coordination and surveillance of costs associated with Medicaid managed patients and, in some cases, even served as distinct Medicaid managed care organizations contracting with the State.

While some networks developed services to support managed care (and some, such as HCN and Alameda Network, continue to provide these services), for others, the focus shifted to joint purchasing, central billing, major IT projects and serving as a platform for collaboration among health center leadership. The focus on health IT emerged, in part, as a response to HRSA grants such as the Integrated Services Development Initiative (ISDI), Information and Clinical Technology (ICT), Shared Integrated Management Information Systems (SIMIS), and the Healthy Communities Access Program (HCAP). More recently, networks have evolved in two ways. First, they have increasingly served as venues for clinical and QI leadership from different health centers to collaborate, leading to increased focus on support for clinical IT applications. Second, networks are increasingly reaching outside their regions of origin and offering services to providers across the nation.

Region and Geographic Reach

One area of wide variation among the networks visited by NORC was geographic reach. In the previous study NORC conducted, most health center networks visited were defined by geography. That landscape has changed since 2005. While geography continues to play a key role in health centers' decisions to join one network over another, it may not be the principal criterion in many cases. As health center networks, consortia, application service providers and other organizations specialize and develop a reputation for certain types of services and expertise or become increasingly associated with specific types of EHR vendors, health centers have begun to gravitate toward networks they perceive as expert in their area of need. For instance, if a San Diego health center member of SD Council intends to implement Epic, it may look to an entirely different network such as OCHIN based in Oregon to lead them through training and rollout. The fact that OCHIN is not geographically close would be one consideration for the health center, but the network's experience with Epic might outweigh that concern.

Networks expand using different models. For instance, HCN Utah was established when a group of health centers in the state came together and examined their options (i.e. forming their own network, each center acting individually or joining an already established network). The centers in Utah decided that they were attracted to the experience that HCN had established in both providing health IT services and expanding into new regions. HCN currently maintains 13 statewide networks in Florida, Arkansas, Iowa, Kansas, Missouri, Nebraska, New York, New Mexico, Utah, Hawaii, Maryland and West Virginia. HCN considers each state to have its own network with an umbrella organization that is headquartered in the organization's native state of Florida.

Alliance Chicago has grown through individual consideration of each potential new site. That is, Alliance Chicago is concerned with whether a center will be a "good fit" and that has led them to expand to individual centers in North Carolina, Michigan and San Francisco. In the case of the San Francisco health center, Glide Health Services, the center is a member of both SFCCC, a local San Francisco based consortium, and of Alliance Chicago. This is a result of Glide's desire to implement an EHR, a service which their local network, SFCCC, does not offer.

As networks become more specialized in their offerings and as a larger number of networks expand more broadly, it is possible that network and health center relationships will come to resemble the vendor model where services and software are chosen and can be mixed and matched. Regardless of how expansion progressed, health center networks that are expanding cited the need to achieve greater economies of scale over time and believed establishing a business model that would limit their reliance on federal grant resources for their operation as an important motivation for expansion. Many other health center networks continue to focus geographically, usually within a single metropolitan area. In this study, SFCCC, which only serves health centers within the city limits of San Francisco, and the Community Health Center Network of Alameda County are good examples of this approach.

Geographically Defined Networks in the Bay Area. SFCCC member health centers may look elsewhere for services not provided by SFCCC. Health centers across the bay in Alameda County have their own separate organization. In the case of both of these networks, geography continues to play an important role because of the role of local government. For example, one of SFCCC's key functions is to assist health centers' work with the San Francisco Department of Public Health, their health clinics and the main safety net hospital in San Francisco, San Francisco General Hospital. In the case of the Alameda Network, the network serves as a management services organization (MSO) that works on managed care contracting and reporting requirements with all safety net providers in Alameda County and also connects member health centers to the safety net hospitals in their county.

A number of challenges exist for networks providing interstate services. These include establishing forums for collaboration, connectivity issues depending on where applications are hosted and the amount of effort for out-of-state networks to "stay current" on state requirements, particularly those related to Medicaid billing. In addition, while networks have achieved some success in providing IT applications such as PMS or EHRs to a national group of health centers, we found increasing evidence, outlined below, that some of the more advanced network functions, such as support for using IT in the context of QI, are harder to achieve on a national scale.

Governance

The health center networks and consortia we visited exhibited varied organizational structures, but took on many of the same basic features. Each network is governed by a board which is primarily composed of leadership from their member health centers. As a result of this model, network activities are driven by goals set forth by member health centers. Overall, network and consortia boards ranged in size from six (Alliance Chicago) to 30 (SD Council) members. Board members were frequently executive directors of member health centers, the network executives hired by those health centers, and community members.

Some networks include representatives from partner organizations such as the local safety net hospital. In one case, Boston HealthNet, the main safety net hospital in the city, Boston Medical Center (BMC), serves as the convener and lead for the network and offers the network access to IT and administrative resources of the hospital. This arrangement emerged out of the creation of BMC in 1996 and is viewed by hospital executives and the health centers as a mutually beneficial arrangement because of the large volume of patients from health centers that are treated at BMC.

The health center network boards usually consist of committees that work on specific tasks. Frequently, one of these committees is composed of financial leadership from across the member health centers. These committees focus on billing and financial issues and share information and resources. There is also often a forum for Medical Directors and IT leadership from the centers. Of greatest relevance to this project were standing committees to address issues such as EHR implementation or QI. In the case of the SD Council, a subsidiary organization with its own 9-member board of directors was established to handle health IT and data services issues. In networks such as Alliance Chicago, Alameda County and Boston HealthNet, clinical quality committees or EHR committees met to discuss customization of EHR forms as well as IT-related issues centers may be experiencing.

However, despite some uniformity in terms of board members, there exist many variations in the structure of these committees as well as differences in how they conduct their activities. Some networks have taken a purely egalitarian approach to their boards. Such is the case with Alameda County, which provides an equal number of votes to each health center. Other networks utilize a tiered approach. Under tired models, founding or original members of the network either hold the only seats on the board or have greater say in decisions. Alliance Chicago and the SD Council have both adopted a tiered structure. In the case of Alliance Chicago, original members of the network hold votes whereas newer members do not. In some cases, newer members are included in the networks primarily as customers of the services the network provides rather than as organizations that have input in determining the network's future direction. An alternative to these two approaches is a weighted system where some health centers receive more votes based on seniority, level of service fees or membership dues paid.

As networks and consortia expand in membership and service offerings, some have struggled with adapting their governance structures. Finding the right balance between original members and new members, weighing the influence of members relying on the network for limited services and managing the decision-making processes of larger and more geographically dispersed boards have presented challenges to some health center networks. In the case of HCN, separate boards are set up in each state where the network operates as well as at the national level. Each statewide network consists of a board that is made up of health center staff. At the national level, the HCN board is made up of the directors of each of the statewide networks.

Network Level Staffing

Health center networks and consortia are generally led by a core senior leadership team. For the networks we visited, this team typically includes a chief executive officer (CEO), chief information officer (CIO), medical director and chief financial officer (CFO). Other positions may include chief operating officer (COO), chief quality officer, outreach director and director of human resources. Some networks are led by advocates (SFCCC), some by administrators (Alliance Chicago and HCN) and some by clinicians (Alliance Chicago), but each network incorporates leadership with experience across these areas to varying degrees.

Staffing varies based on the level of grant funding. In areas like San Francisco where grant portfolios include a variety of programmatic grants on the local, state and federal levels, the network can afford to have a larger staff. In the case of SFCCC, programmatic grants such as those from the Ryan White Care Act, Healthy San Francisco and Tides Foundation allow for an agency of more than 30 individuals. In the case of the North Carolina network, the primary operations grants come from HRSA and statewide and local supplementary grants are not available. As a result, this network has a total staff of four FTEs.

The staffing configuration at the network level reflects network and health center priorities. For instance, the Alameda County Network employs a QI Director who leads a team of four individuals dedicated to both QI and utilization. Other networks do not have as much of a direct focus on QI and instead are heavily weighted towards IT and financial specialists.

Collaboration and Integration

The majority of the networks we visited worked in a horizontal model, meaning there was collaboration between health centers that were parallel organizations who sometimes shared a locality and preexisting relationships. These collaborations varied in terms of the level of integration and centralization they were able to achieve. The level of integration across health centers also varied within the same network. For example, HCN might serve as an illustration of a highly integrated network that not only hosts practice management and EHR systems for its members, but also makes available a single billing office and a common CFO. However, most out-of-state members of HCN do not use the common CFO and billing office. In the IT area, highly integrated networks tend to not only host software but also provide

comprehensive implementation, training and technical support; serve as central liaison to vendors and provide staff extension for IT and administration purposes.

Three of the networks we visited, Boston HealthNet, SFCCC and the Alameda Network, were vertically integrated. Features of vertical integration include collaboration on systems with one or more safety net hospitals and support for care coordination functions through e-Referrals or by providing access to discharge summaries and emergency department record systems. Typically, being vertically integrated yields benefits such as better access to hospital resources including labs, specialists and imaging as well as electronic hospital records. We describe the nature of vertical integration as it exists among these health centers in greater detail in a subsequent section of this report.

Funding

Annual budgets and funding sources for networks varied significantly. Some networks had budgets totaling roughly $2 million annually, while others had budgets of close to $10 million. Budget differences reflect the different roles, functions and characteristics of each network as well as their relative size and total membership. Funding for health center networks generally comes from the following sources: annual membership dues, services fees, private foundation grants, local and state government grants and federal grants. Data on funding sources are not available for all networks, but some comparisons are possible.

A typical network may rely on government funding for just over 50 percent of its annual budget, with just less than 50 percent coming from service fees and membership dues and a smaller amount from other sources. During much of this decade, networks have understood the need to move away from reliance on federal funding and, as noted above, this has motivated efforts to increase the share of their income that comes directly from members. They primarily accomplish this by seeking to expand their membership. In addition, as networks mature, they are seeing an increasing percentage of their funding coming from payment for services to new members rather than membership dues from founding centers.

Relative to other networks, networks in California seemed to rely less on federal grant support and more heavily on private foundation support. Grants issued by organizations such as the Community Clinics Initiative (CCI) funded by the Tides Foundation and other California-based foundations play a particularly important role in these networks' priorities and budgets. In most other cases, networks emphasized the importance of federal funding for network activities.

In the case of Boston HealthNet, the network benefited greatly from an anonymous gift that entirely covered costs associated with implementation of an EHR for each of its health centers as well as maintenance costs for five additional years. In most cases, networks are able to cover capital expenses for health IT implementations and some ongoing support services with HRSA grants. However, there were several networks (regardless of their level of reliance on HRSA) that seemed to struggle more to sustain service levels and stabilize their budgets. One of the networks had begun exploring the creation of a for-profit entity to support their health center network activities.

Network Functions and Activities

Health center networks and consortia vary significantly in the types of services they provide. Some were formed specifically to handle functions like health IT implementation, while others have evolved from PCAs and local health center consortia focused on improving the financial status of health centers and achieving economies of scale through a range of activities. In many cases, networks take on new roles and functions as members identify emerging needs. Under some models, this could mean that the network provides different services for each member as members pick and choose from a menu of services provided by the network. Below we review the types of activities health center networks and consortia engage in on behalf of member health centers with a focus on functions that relate to adoption and use of IT to improve quality, efficiency and effectiveness of health centers' work.

Group Purchasing and Vendor Relations

One of the greatest advantages for health centers in networks is enhanced purchasing power. Health centers are able to secure cheaper contracts and negotiate more services with the help of their network. This applies far beyond the initial point of purchasing an EHR, electronic registry or PMS. Networks continue to play an integral part after the initial purchase by leveraging combined resources to engage with vendors, provide ongoing IT support and negotiate purchase of additional functions or upgrades. In addition to working with health centers to implement EHRs, networks also assist with the implementation of other systems such as PMS. This is true of Alliance Chicago, HCN and Boston HealthNet.

Networks also play an integral role in facilitating the selection of software vendors. In many cases, this entails winnowing down the initial pool of vendors to a more manageable list during vendor selection. In more integrated arrangements, the network acts as a gatekeeper and aggregator of health center concerns. In some cases, the network facilitated site visits to view applications operating in other health centers. Health center members of several networks that had implemented EHRs indicated that they simply could not have pulled together the resources or methods to consider vendors if it were not for their network.

Other networks such as the San Diego Council take a slightly different approach to vendor relations. This network does not facilitate the selection of a single EHR to support the needs of all members. Instead, it assists in negotiations between individual health center members and vendors and helps guide health centers through the selection process generally. In addition, the consortium convenes a CIO Council to allow health center representatives to share best practices and lessons learned in dealing with IT vendors.

Importantly, some networks play a role in group purchasing in areas other than software. In the case of San Diego, a subsidiary to the Council was created to handle group purchasing for nearly 500 health centers. Most of these health centers do not look to the network for health IT and traditional network functions. Products purchased through the Council's subsidiary include office supplies, technology products and services, medical/surgical supplies, capital and biomedical equipment, printing and forms, laboratory services and supplies, pharmacy products and services and dental supplies.

Software Hosting

One varying element across networks is where applications are hosted. Often the choice was driven by a strategic decision to cut costs and to maximize the utility of a group purchase. Some networks and consortia chose to centrally host clinical IT applications for health center members. Health centers would log in to applications via virtual private network (VPN) or another connection and work directly off the application hosted at the network. In other cases, one health center would host an application for numerous other health centers within a network, such is the case in Alameda County where one health center, La Clinica, hosts a PMS that is used by four of Alameda Network's member health centers. While external centralized hosting reduced the cost and operational burden on the part of health centers, some felt that external hosting limited their ability to customize or configure their applications.

Other networks chose not to host applications centrally which means that health centers host their own applications. These networks may have led planning and selection processes, but decided to delegate actual hosting to the health center and support to the vendor itself. In some cases, this creates confusion for health center staff that may look to the network to handle EHR customizations and fix bugs in the system. Even if they do not host software, networks sometimes act as a designated intermediary between the health center and the vendor. Under this arrangement, the network manages interactions with the vendor and offers smaller health center users additional leverage with the vendor.

Support with Software Adoption

In our discussions, health centers routinely emphasized the importance of the network providing support to facilitate implementation of new software. Exhibit 6 below lists some of the software implementation efforts supported by networks included in this project. Support provided by networks includes help

planning and leading up to the go-live as well as ongoing support after the application is fully operational. With this first type of support, where networks assist in implementation and the go-live process, networks tend to serve as the primary support to the center helping address their questions, serving as an on-site presence to run trainings and helping plan leading up to and during the implementation. In both cases, support needs are met in a variety of ways including the provision of assistance with planning and analysis, conducting in person trainings and support, troubleshooting over the telephone, serving as a liaison with vendors and convening regular forums for health centers to get together to share lessons learned. For example, Alliance Chicago employs implementation specialists that spend a great deal of time helping centers prepare workflows, integrate hardware and train staff in addition to training super users from among a given health center's staff who can be the first on-site line of defense when questions arise or there is a need to troubleshoot problems with use of the software.

The second type of technical support occurs once the application has been implemented and the center has gone live. This support typically takes place in collaboration with the vendor. Despite having access to vendor resources, we found that many health center staff continued to rely heavily on network personnel following go live. These staff members looked for additional training or re-training sessions as well as support in setting up and running reports and diagnosing issues that arose during the early days post implementation with the use of the software.

In Washington DC, health centers, through the network, relied on an external consultant for training and support. DCPCA offered some ongoing support, but most these efforts were led by external consultants. Health center representatives greatly appreciated the consultants' presence and trainings, but felt somewhat abandoned when the consultants' engagement ended. Many of the other networks either chose to support the EHR fully or served as an intermediary between health center members and the vendor. Some networks were unable to provide the level of support needed by their health center members due to, what health centers perceived as, limited resources and expertise at the network level.

Exhibit 6. Clinical Applications Implemented Across Study Networks

Network	EHR Implemented/Supported	PMS Implemented/Supported	Other Clinical IT Applications
Access Chicago	Epic	Epic	Meditech
Alliance Chicago	Centricity	Not supported	
North Carolina	MicroMD	MicroMD	
HCN Utah and New Mexico	OmniDocFor /Intergy	Intergy	
San Diego Council	eClinicalWorks and others	Multiple vendors	i2i Tracks
DCPCA	eClinicalWorks	eClinicalWorks	
SFCCC	Not supported	Not supported	i2i Tracks
Alameda Network	Not supported	Not supported (various in use)	i2i Tracks
Boston HealthNet	Centricity/Epic	Not supported	Laboratory information system (LIS)

EHR Implementation Services

Because the role of networks in implementing clinical applications such as EHRs was a central focus of this project, a large portion of our discussions focused on the processes used by networks to facilitate

EHR adoption. Networks used different strategies for implementation. Some implemented an EHR in numerous health centers simultaneously while others took a more gradual approach. For example, one strategy that seemed to make the transition less difficult occurred when networks staggered implementation so that only one center underwent implementation at a time. This allowed health centers with greater resources to go first and impart their lessons learned to centers later in the queue. For example, in helping member health centers adopt the clinical registry software i2i Tracks, Alameda County implemented sequentially and took factors such as existing systems and the size of the clinic into consideration in planning implementation. As a result, each implementation gleaned applicable experience from the previous center's implementation. Other services provided by networks during implementation were workflow redesign, hardware setup, training and in-person support. Some networks chose to delegate one or many of these functions to consultants and vendors.

Data Management

Networks took differing approaches to data storage, ownership and reporting. The strategy followed often depended on whether or not the networks hosted applications and on the level of trust and commitment health center members had in the network. Some networks made use of data warehouses to support storage, reporting and analysis. In these cases, the data warehouses aggregate common data elements from each health centers' production EHR or PMS database. The network level data warehouse regularly pulls and stores these data from across health centers and provides a single platform that can be used to easily generate reports representing the network as a whole or allowing for comparisons across health centers. For instance, in North Carolina, NC Partners uploads specified data from its health centers' EHRs on a nightly basis and stores that data within their central repository.

NC Partners also handles reporting and data mining in conjunction with its data warehouse responsibilities. Health center members of NC Partners were smaller than most other health centers in this study and the level of IT expertise at the health centers was relatively limited. Under NC Partners' structure, most health center members transferred data from the EHR to the data warehouse via a broadband internet connection. Network outages in the area prevented health centers from accessing EHR data in some cases. Additionally, having to rely on the network for reporting and data mining led to some frustration for health center leaders, especially due to frequent miscommunications with the network about the type of report required.

Networks noted the potential for reports from data warehouses to serve as key tools for network wide for QI initiatives. For example, the Alameda County network, which serves as an MSO for Medicaid managed care billing, used its administrative database as a tool to identify trends in the services offered to these patients. They could track patient activities throughout their health centers and their participating hospitals. During our site visit, the Alameda County was undergoing a project to allow them to track all of their patients in their warehouse via claims, labs and pharmacy data. This would give them a great deal of information that could be used for QI and panel management.

Although current uses of data warehousing for network-wide QI were limited, health centers appreciate having the network handle data issues. Health centers agreed that it was much easier to generate reports using a data warehouse compared to writing reports directly out of an EHR or PMS system database. Health centers noted that reports generated at the network level were sometimes not reliable. This was due in part to challenges with data entry and standardization, as explained later in the report. In general, they felt that networks were in better position to design and deliver reports than their own staff.

Health Information Exchange

Many networks appear to be working towards expanding their ability to exchange data across providers electronically. We encountered a variety of HIE functionalities including e-Referrals, lab exchange and exchange of hospital records. We elaborate on networks' involvement in each of these areas below.

Laboratory exchange. In some cases, health center networks led efforts to create laboratory exchanges for their health center members. Networks that had assisted in the development of lab interfaces to EHRs include: Alliance Chicago, NC Partners, DCPCA, the Alameda Network and Boston HealthNet. In Boston, Boston HealthNet led the effort to create a separate laboratory information system (LIS) for its member centers. The LIS environment provides an interface between the EHR and clinical laboratories used by health centers – either commercial laboratories such as Quest or BMC hospital laboratories. The LIS mediated interface functions for both lab orders and results reporting. Other networks assisted health centers in storing lab test results in data warehouses.

E-Referrals. Networks that worked with local hospital providers often worked to include e-Referral applications for their member health centers. Networks that had developed e-Referral applications include SFCCC and the Alameda Network. At the time of our discussions, Boston HealthNet was moving to develop an e-Referral application with Boston Medical Center and Access had limited electronic referral functionality through its legacy shared information system with a local safety net hospital. Networks often led negotiations with hospitals to grant health center providers and, in some cases, non-provider staff access to referral software and related information.

E-Prescribing. At times, networks implemented e-Prescribing modules or pilots as precursors to wider health IT implementation. In these networks' view, getting accustomed to health IT through e-Prescribing was a good first step for health center staff. Networks engaged in e-Prescribing include the SD Council, Boston HealthNet, the Alameda Network, DCPCA and Access Chicago. Notably, although Alliance Chicago moved to develop e-Prescribing functionality for its members, the network's IT vendor was unable to develop a solution in time for a state-wide mandate that required either e-Prescribing or the use of tamper-proof prescription pads. We provide additional details on HIE efforts among health centers later in this report.

Health Center Level Findings

In conducting the site visits associated with this assessment, NORC met with health center network leaders and representatives from individual member health centers. NORC traveled to health center locations and met with CEOs, CIOs, COOs, CFOs, Medical Directors, Human Resources Directors, Quality Improvement officers, care coordinators and front desk managers, among others. This cross-sample of representatives offered an opportunity to assess the impact of clinical IT applications across departments and throughout health center operations. The number of health center respondents for the staffing categories are listed below in Exhibit 7. In total, NORC met with 106 health center level staff members at 33 health center sites.

Exhibit 7. Number of Participants by Role and Network

Location	*Chicago*		*North Carolina*	*New Mexico*	*Utah*	*San Diego*	*DC*	*California Bay Area*		*Boston*	*Totals*
Network	*Alliance Chicago*	*Access Chicago*	*North Carolina*	*HCN NM*	*HCN Utah*	*San Diego*	*DCPCA*	*SFCCC*	*Alameda County*	*Boston HealthNet*	*9 **
Health centers visited	*4*	*4*	*3*	*3*	*3*	*5*	*3*	*3*	*3*	*5*	*33*
Total Staff Interviewed	*9*	*8*	*10*	*10*	*7*	*13*	*8*	*15*	*12*	*14*	*106*
Executive Directors	*3*	*0*	*2*	*3*	*3*	*3*	*2*	*2*	*3*	*4*	*25*
Medical Directors	*3*	*4*	*2*	*1*	*3*	*3*	*0*	*2*	*3*	*5*	*26*
IT Directors	*1*	*0*	*1*	*2*	*1*	*5*	*2*	*4*	*3*	*4*	*23*
QI Directors	*0*	*0*	*1*	*0*	*0*	*0*	*0*	*0*	*2*	*0*	*3*
Other Staff	*2*	*4*	*4*	*4*	*0*	*2*	*4*	*7*	*1*	*1*	*29*

**counting HCN NM and UT as one network*

The findings below draw on the experiences of the health center representatives we conducted discussions with. In the paragraphs that follow, we discuss themes related to motivations for health IT adoption, current status of health IT adoption, hardware and connectivity, experience with implementation, staffing, and issues related to workforce effectiveness. Each of these sections provides an overview of health centers' experiences in these areas, along with a number of specific examples.

Motivation for IT Adoption

Health center leaders offered a wide range of motivating factors in explaining why they chose to pursue clinical health IT applications. Motivations fell into three broad categories: 1) quality improvement, 2) efficiency and 3) cost of doing business. Many saw EHRs and electronic disease registries as a way to increase adherence to clinical guidelines, make better use of patient data and automate existing quality improvement initiatives. These QI arguments complemented health centers' missions to provide high-quality care to all patients. Some looked forward to having more accurate and timely reports produced using EHRs and automated disease registries. These reports, at the network, health center and provider levels, could be used to improve clinical practice and target QI efforts for specific populations such as chronically ill patients. In some cases, health center leaders were careful to note that QI was a goal, but that any gains would come from having more time to address patient needs in a more efficient system.

Efficiency, on its own, was another motivating factor. Health centers in large and dispersed networks and health centers in rural areas saw EHRs and PMS as a good way to improve communication and coordination across health center sites. For example, Access Chicago indicated that their new information system would allow for scheduling and resource tracking across sites, functions that were not possible using the previous system. In most health centers we visited, both providers and administrative staff looked to their EHR to end the "paper chase" caused by keeping track of a myriad of written records.

Many health centers saw clinical IT applications as a way to improve communication and relationships with hospital partners, specialists and public health departments. In San Francisco, SFCCC sought access to the public health department's EHR system (the Lifetime Care Record, LCR) for its health center members. The public health department plays an integral role in the health care safety net in San Francisco, operating nearly half of the city's clinics and the local safety net hospital. Without access to this system, SFCCC centers would have a very incomplete record of their patients' medical histories and would be forced to constantly request records from the health department.

Finally, some health centers saw funding opportunities as primary motivating factors for EHR adoption. Without funding opportunities focused on EHRs, some of the health centers visited by NORC would not have considered adoption. One health center decided to pursue grant funding for a single health center site to implement an EHR. This meant that the funded site would be on a different system than the rest of the health center, but the center leaders decided that seizing this funding opportunity would be worth it in the long run. Additionally, some health centers pointed to the incentives in HITECH as significant motivation for EHR adoption. Recognizing potential future penalties for providers not engaged in meaningful use of an EHR in the future, some health centers in California began to consider EHR adoption with greater seriousness following the enactment of ARRA.

Current Status of Health IT Adoption

All the health centers we visited had adopted some form of health IT application based on the broad definition we are using for this report. All health centers visited as part of the project had implemented a PMS and most had implemented chronic disease registry systems such as i2i Tracks, the Patient Electronic Care System (PECS) or the Cardiovascular/Diabetes Electronic Management System (or CVDEMS). Some made use of applications that allowed for electronic exchange of information with laboratories, e-Prescribing and automated enrollment of patients in State health benefits programs such as Medicaid and CHIP. While most health centers had either implemented or were planning to implement an EHR, each health center was at a different stage of adoption.

Variation in the stage of health IT adoption among health centers may be linked, in part, to the timing of funding from HRSA, with some networks receiving funding earlier than others. Networks funded earlier were generally further along, but struggled to find resources to fund ongoing EHR support after HRSA funding ended. Some health centers were just beginning to consider implementing an EHR, while others had been working with an EHR for several years and were poised to use EHRs in their QI processes.

Stages of Implementation

As part of the project, we met with health centers at various stages of EHR adoption and implementation. Those health centers that were at the earliest stages of implementation were considering vendors, future funding opportunities and their staff members' overall readiness level. Some health centers had begun thinking about pursuing EHR funding and moving forward with vendor selection, but were constrained by competing priorities. In the case of one San Francisco clinic, an impending move to a new health center facility served as a motivating force for health IT implementation. Leaders at this health center hoped to build the EHR into their new facility but were uncertain if they could select a vendor and prepare for implementation while at the same time planning a new facility. Some health centers had been on an EHR for a year or more, but did not feel that they were using all of the EHR's features. In some cases, staff at health centers adapted their existing workflows to an electronic environment but did not change their clinical practice to benefit from clinical decision support. In addition we found that adoption of an EHR did not automatically result in the ability to produce more robust reports using structured data, as many providers found it preferable to generate their usual unstructured documentation using text fields rather than using forms requiring data entry in constrained fields using checkboxes or drop down menus.

Hardware and Connectivity

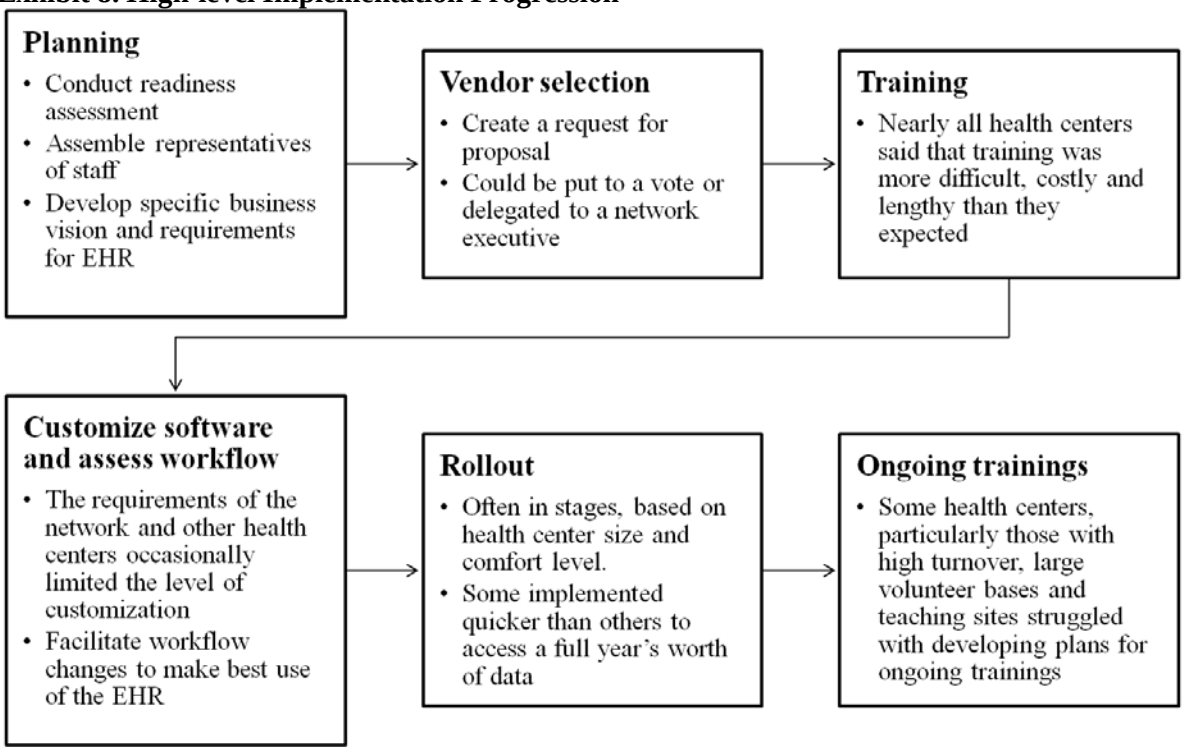
Health centers using externally hosted EHR or PMS software generally relied on broadband internet connections to access software from their network's servers. Most health centers used desktop PCs to access the EHR and other applications, while a small number used laptops. In some cases, health centers chose to install workstations directly in examination rooms and used reporting functionalities and patient education modules directly alongside patients. For instance, in San Francisco one health center used computers in the exam room with patients to show them educational resources available on the Internet. Other health centers chose to install computers in physician office spaces or in common workspaces outside of examination rooms. This kind of configuration requires providers transferring handwritten notes taken in the exam room to the EHR. This could be done by a medical assistant or by the physician outside of patient exam hours. Some health center staff noted that computers designated exclusively for a limited purpose, such as accessing state immunization registries, cluttered their office space and that a more integrated hardware configuration could create greater workflow efficiencies.

Some health centers experienced significant technical difficulties stemming from network infrastructure and hardware limitations in their facilities. Health centers in one rural network reported regular network outages that prevented them from connecting to the EHR system hosted at a central location. During outages, health centers would be forced to either document on paper or shut down entirely. A number of health centers in an urban network reported very slow internet connections, to the point where certain EHR functions were, for practical purposes, completely unavailable to health center staff. These kinds of connectivity problems, while not representative of all health centers' experiences, demonstrate how limited IT infrastructure, even in urban settings, can hamper health IT and HIE activities.

Experience with Implementation

The core of our findings relate to health centers' experiences implementing EHRs and other clinical IT applications. While all implementation processes differ slightly, a certain progression emerged from the many conversations about implementation throughout the project. The figure below depicts a linear progression from one phase to the next. While some stages often occur simultaneously with other stages, the simplified depiction below offers a high-level summary view of implementation processes.

Exhibit 8. High-level Implementation Progression



The sections below provide greater detail on each step in this progression.

Planning

The time spent and processes used to plan for EHR implementation among health centers varied greatly. In the most successful implementations, health center representatives were fully engaged in the planning process, serving on committees and representing the interests of all health center staff. The planning processes used by the Alliance of Chicago stand out as a helpful example. There, Alliance Chicago staff identified health centers for implementation and reached out to primary contact people at each health center. Following an initial contact, Alliance Chicago met with a cross-section of potential EHR users. At one Alliance Chicago health center, this group included representatives from nursing, behavioral health, front desk administration, call center, information technology and various providers. After initial discussions about staff EHR requirements and overall vision, this group began to meet with staff from Alliance Chicago on a weekly basis. The meetings generally lasted four hours and centered on issues surrounding change management and training. Alliance Chicago brought in a trainer to these meetings and the trainer delegated responsibility for certain topics, e.g., infrastructure, to health center staff.

At the same time, health center staff collaborated to redesign workflows at the health center. For instance, nurses previously relied on physically receiving paper charts to alert them to a new patient. Using the EHR, nurses receive notifications electronically, effectively changing their workflow patterns. Alliance Chicago's planning efforts led to an extensive training regimen, lasting 16 hours for each health center staff member designated as an EHR end user. Additionally, Alliance Chicago prepared the health center for an initial 50 percent reduction in productivity. While, in this case, productivity generally picked up to close to baseline level within the first 3-4 months of going live, most health centers did experience a 50 percent productivity decline in the first two months. This alarmed many health centers, but they noted that without the warning from Alliance Chicago staff, they would have been even worse off during implementation. This kind of extensive planning process, while costly and time intensive, proved beneficial to health centers in the long-run.

Planning for Health IT Adoption in DC

In Washington DC, The District of Columbia Primary Care Association (DCPCA) contracted with a consultant group to assist in vendor selection and planning. Part of the planning process involved meeting with the six health center members taking part in DCPA's EHR implementation project. In these meetings, it was determined that making one EHR product work for this diverse group of health centers would prove challenging. One health center in particular stood out because providers there generally conducted very short, high-intensity examinations with patients. This difference in workflow led to different IT needs, including tailored forms and setting a maximum number of possible reminders. Engaging in this type of discussion early in the implementation process helped DCPCA to overcome differences across health centers and resulted in the adoption of a single EHR across health center members.

During the planning process, some health centers considered reassigning staff from areas that they anticipated would be in lower demand under the EHR. Health centers that reassigned staff from being medical records specialists to other positions generally regretted doing so before implementation actually occurred. Other health centers engaged in very informal planning processes. For example, some California health centers indicated a desire to pursue EHRs and engaged in some ongoing conversation on the topic, but were not focused on a particular timeframe for implementation. These types of informal internal conversations could span across a much longer time period than more structured planning processes.

Vendor Selection

Health centers occasionally handled vendor selection independently of networks and consortia. Consortia and networks not leading EHR implementations often played a supporting role for health centers choosing to pursue EHRs independently. These health centers have control over vendor selection. Some health center networks assisted their members in translating a set of functional requirements to a request for proposal that could be distributed to EHR vendors. Other health centers chose to pursue funding opportunities and partnerships with a specific vendor in mind or with the understanding that they would not have control over vendor selection. Regardless of whether or not health center staff have ultimate control over the vendor selection process, health center staff expressed a number of opinions about vendors, applications and the criteria they would use to choose an EHR. Widely-cited criteria included cost, availability of interfaces, reporting capabilities, user friendliness, recommendations from fellow health centers or network, trust of the vendor and the level of clinical decision support available. Respondents noted the importance of conducting due diligence to confirm the financial viability and past record of the organization and conducting thorough risk assessments at the contracting phase to assure that responsibilities of the network, vendor and health center were clearly understood by all parties.

As would be expected, health centers varied somewhat in their approaches to selection and the decision making mechanisms used. For instance, at Access in Chicago, leaders of the 51-site health center narrowed the initial list of possible vendors to five. In 2008, network leaders asked regional managers and regional medical directors to assist in selecting a vendor for both a new EMR and PMS from among the five finalists. Those involved formed committees based on specific needs and concerns and attended demonstrations of the five finalists. The final determination to move forward with a contract with Epic was made in mid-year 2008. Since the vendor selection process concluded, regional leaders have reached out to their staff to help build buy-in. Also of interest in the vendor selection process is the role played by external partners and the prospect of health information exchange in the future. This was a feature of Access's experience as described in the text box below.

Balancing the Needs of Past and Future Partners in Vendor Selection. The Access Chicago health center had historical ties to a local safety net hospital. This relationship manifested itself in a shared practice management system with some limited clinical data exchange. This shared system, Meditech, facilitates communication between health centers and specialist providers at the hospital. However, Access Chicago staff believed that Meditech was not meeting their health IT needs. In choosing to pursue an EHR, health center leaders consulted IT staff at the hospital to see if they would be interested in pursuing a new system as well. The hospital was not in the financial position to do so and indicated it would not pursue an EHR with Access Chicago. Furthermore, Access Chicago believed that a new EHR could make them a more attractive partner for academic medical centers in the area since many of these academic medical centers use Epic as their EHR vendor. Access Chicago hopes to be able to leverage its decision to implement Epic in the future to build new partnerships with local academic medical centers.

Alliance Chicago began their vendor selection process with a rigorous workflow assessment and redesign. This process helped Alliance Chicago identify areas for improvements and allowed health centers to use the implementation to address overall efficiency objectives and redesign workflows as necessary. The workflow assessment also set a benchmark so that health centers can look back after the rollout and see how changes in workflow facilitated by the EMR either improve or do not improve efficiency.

Training

Trainings were in most cases conducted by the application vendor, network staff or external consultants. Each of these approaches offers both benefits and drawbacks for health center staff. One national network relies on short, intensive EHR trainings conducted by network staff flown into the provider location. This approach garnered mixed reviews, with some health centers indicating that the trainings were intense but effective and others indicating that the training was too short to be very effective.

While it may be helpful to have experts on-hand for in-person trainings, the short duration and intensity of these types of trainings make it difficult for staff who may have questions after the training or who were unable to attend. Also, some health center staff took issue with the timing of these trainings, arguing that they should have been scheduled closer to actual rollout. There have been questions as to who is best to conduct training, vendor staff, network staff, or consultants. Several health centers would prefer trainings be conducted by network staff who are familiar with their specific needs.

One network that relies primarily on their own staff for trainings employs a trainer who spends a week at the health centers and then addresses additional concerns remotely from the network location. Health center leaders indicated that this arrangement did not work well. Communication issues and a perceived lack of preparedness on the part of the trainer left many health center leaders feeling unprepared after the training period.

Nearly all health centers indicated that training proved more difficult, costly and lengthy than they had originally expected. As health centers begin to look to networks and other service providers outside of their immediate geographic vicinity, both expertise and access to trainers will contribute to health centers' decisions regarding training. For instance, Access Chicago has chosen to contract with OCHIN in Oregon to provide training and support for their Epic system. In making this decision, Access Chicago decided that any drawbacks of contracting with a relatively distant organization would be outweighed by the expertise and experience OCHIN has with Epic.

Rollout

Most health centers implemented new applications in deliberate phases to minimize inefficiencies and allow for applying lessons learned in early implementations to subsequent rounds. In the case of one network, health centers felt motivated to implement quickly because of the timing of funding and their desire to begin use of an EHR at the beginning of a grant year to assure continuity of systems being used to generate their annual grant reports. The more common approach was a slower, more deliberate roll-out with features of training, customization and workflow redesign still taking place in the early stages.

Most health centers had the support of network staff onsite during the first few weeks of implementation. Most networks also trained individual members of the clinical staff that were most enthusiastic about the use of EHRs to serve as "super users" that had specialized knowledge of the application and could serve as a resource to their colleagues during the implementation and the period of time immediately following. The networks found these super users to be in very high demand. One urban network's health center leaders indicated that super users had trouble doing their regular work during this period. One super user described her situation, saying, "After the consulting group left… there were times I didn't do work for a couple days. I had my own questions as well [as addressing other staff members' question]." Specific problems experienced by one network during rollout included difficulties attaching funding sources to patient encounters, slow overall speed of the system, being intermittently logged off, system freezes and difficulties scheduling individual providers. These issues were not insurmountable for health centers, but almost all that implemented EHRs noted significant discrepancies between what they expected to happen and what actually happened. The experience of DCPCA health centers during the rollout period provides a useful example of the more deliberate approach and is detailed in the text box below.

Example: Going Live with EHRs in DC. Before the go-live, health centers transferred patient demographic information to the new system. They also had providers review clinical records and select some data to enter manually into the new record system, "as if they were new patients." Some clinics scanned patient records and attached them to records in eClinicalWorks (eCW) as images. Both of these approaches were used in other health centers and networks. After migrating patient data, DCPCA centers began implementing eCW features gradually, while running legacy systems in parallel.

First, health center staff began scheduling on eCW before entering clinical data related to the encounter. This allowed front desk staff to adjust to the new system gradually. As health centers moved into entering patient encounters in eCW, appointment times were extended to accommodate additional time for providers entering data and adjusting to the new system. DCPCA recommended that health centers prepare for and accommodate an initial 50 percent reduction in number of patients served, but the final decision about length of appointments and overall patient load was left to individual health center leaders.

While the overall implementation process was gradual and many of eCW's features were not implemented due to a lack of time and funds, some health centers chose to implement e-Prescribing modules within eCW and lab interfaces during the rollout period. DCPCA relied on super users at each health center to assist health center staff with troubleshooting during the initial implementation. Super users were health center staff who received more extensive training and earlier in the implementation process. After other staff received training and after DCPCA's consultants' engagement ended, the super users were the first line of support for DCPCA users.

Health centers NORC visited in one rural network had a specific set of challenges during the initial implementation period. There, health centers were encouraged to go-live on both a new PMS and EHR on or around January 1 to allow for a full calendar year's worth of data. This would allow the health centers to use their new PMS and EHRs for Uniform Data System (UDS) reporting to HRSA for that year. Health centers that chose this timeline regretted it, citing inconsistencies on the part of the vendor and an unmanageable workload for health center staff. One health center leader indicated that staff members were forced to work 20-hour days during the go-live period. While the experience of the centers in this network was not representative of the health centers and networks visited by NORC, it does provide a window into some of the more challenging rollout processes that other health centers may be experiencing across the country.

Customization

Discussants who had implemented EHRs often had to work with vendors to develop a customized version of the software that was able to meet the specific needs of federally funded entities. These needs included capturing specific demographic information accurately and completely to support reporting requirements and implementing special forms to track preventive care or chronic disease management for specific populations of patients. Health centers typically applauded the role of network leadership in

communicating with vendors regarding the specific health center needs, and the extent to which that environment requires different systems than private medical groups and practices. In some cases, health centers and networks had to employ additional applications, such as data warehouses or registries, to achieve the appropriate level of functionality, particularly in the area of reporting.

Beyond basic customization required to convert an "out of the box" EHR for use in federally funded health centers, individual health centers, even those within the same network, often required additional customization to the version of EHR or PMS they used. For instance, health centers in one urban network struggled with coming up with a single set of forms and templates for recording clinical encounters. One provider that primarily provides services to treat HIV/AIDS indicated that they generally meet with patients for a short period of time and deal with relatively intense medical issues. This type of patient visit differs substantially from other health center members that may be doing a broader assessment covering a range of preventive or chronic care management issues in a traditional primary care setting. For the providers at the center with shorter appointments, extensive clinical reminders and decision support features may not be practical given their patient volume. In this case, the network was able to work with their consulting partner to help streamline their use of the EHR.

Another need for customization arises from the fact that different health centers in one network may serve very different populations. These groups range from Asian-Americans to lesbians and transgendered individuals to the homeless. These patient groups present a number of specific IT and data requirements. For example, one health center may need to include more detailed data on patient gender in their records, aside from the male/female distinction that would be required by most other centers. Partly because of these kinds of differences, one urban network has yet to implement a network-wide EHR. While the network may pursue a joint EHR in the future, customization issues will undoubtedly present challenges.

The cost of designing and implementing customizations varies considerably. Some basic customizations, such as adding an item to an existing drop down menu or enabling or disabling specific fields, can be handled relatively quickly by adjusting settings that are pre-programmed into the software. In other cases, such as setting up special forms to help clinicians manage individuals with a specific chronic illness or creating a set of reminders for clinical decision support can be very complicated and time-consuming, requiring substantial programmer hours. In some cases, vendors require complex customizations to be conducted by their own programmers because they do not provide necessary details of their code or database structure to outside organizations.

Ongoing Training

Some health centers, such as those that serve as teaching sites where there is constant change in personnel or other sites which use large numbers of volunteers, struggled with the cost of ongoing trainings for their IT applications. In many cases, health centers did not implement all of their EHR's features during the initial rollout and training period. Updates to the EHR may also prove difficult to roll out without additional training. In the case of one urban network, health centers participated in web seminars conducted by the vendor to train for EHR updates. These proved ineffective for health center staff and many health center leaders were left worrying about the time and resource burdens that additional trainings outside of the web seminars would present.

Another network addressed the issue of training new staff members by delegating this responsibility to super users that assisted during the initial rollout period. While this may present another time commitment for the clinicians that are in this group and there is no guarantee that these individuals will not leave the health center in the future, this type of arrangement may prove to be more sustainable for health centers. Some health centers experienced particularly onerous ongoing training needs. At one health center in San Francisco, a large volunteer base and an active residency program forced the center to make 25 EHR licenses accessible to roughly 120 individuals. These individuals may only work at the health center for a few months, but they must be trained on the EHR system to perform necessary tasks. This health center had not anticipated this need and was struggling to develop a workable solution.

Vendor Relations

Following training and rollout, health centers generally worked with vendors on an ad hoc basis to handle new customization requests, to implement EHR updates and to handle other system-wide issues that could not be resolved by the network directly. Many health centers we spoke with were relatively satisfied with their EHR vendors. While few vendors fully met health center needs, center leaders recognized that they were on the leading edge of safety net users and that a certain amount of difficulty was expected. One urban health center leader recognized deficiencies in working with their vendor, but put these issues in a broader context, saying "In the whole scheme of EHRs, any vendor goes in there to make money, and they started out making these for hospitals. CHCs are unique because we provide free care. We have so many funding sources, each with their own requirements, and data fields are dependent on those requirements. There is no EHR out there that could meet all of our needs."

In many areas, networks and consortia worked with their health centers to compile staff concerns and customization requests. Network leaders indicated that this type of arrangement worked relatively well for all parties, allowing health centers to work with more familiar network staff and allowing the vendor to handle issues in a more orderly manner. Health center leaders also believed that the vendor would be more responsive to the network than their individual health center concerns. Other networks chose to have health center leaders contact the vendor directly for some issues. This led to confusion on the part of health center leaders over whom to contact in specific cases. This often resulted in the health center calling network officials for things that should be handled by the vendor. In addition, some networks experienced turnover and acquisitions among vendors they contracted with. This led some to believe that support for their systems could be phased out over time, creating additional uncertainty.

Staffing

The health centers NORC visited varied greatly in size. Patient volume, patient visits, revenue and other characteristics spanned a wide range. In the area of staffing, health centers employed anywhere from roughly four provider FTEs (including physicians and non-physician providers such as nurse practitioners) at one San Francisco health center to over 200 providers at Access in Chicago.

IT Staffing

Health centers varied in their IT staffing levels, reflecting in part the overall size of the health center. In general, health centers employ a hybrid of the IT staffing models described below, looking to their network leaders to fill in any service gaps. One small health center in a rural network employed a part-time IT support specialist on a contract basis. The health center was able to adjust this IT professional's hours on a monthly basis, according to the center's anticipated needs. Additionally, network staff provided additional support and assistance for this center. Other health centers, such as East Boston Neighborhood Health Center and Access in Chicago employed full departments devoted to IT issues.

Technical support only. Health centers employing this model look to IT professionals to provide basic application support and network maintenance. This approach may be staffed by a part-time contractor or an in-house technical support specialist. Smaller health centers tended to seek out only technical support from their in-house IT staff, looking to network officials and vendors for additional support as necessary. One small health center in an urban network did not employ any IT staff and instead relied on a "tech savvy" CEO to perform IT support tasks on a temporary basis.

Advanced applications support. This IT staffing model is slightly more sophisticated than the technical support only model. In health centers using this approach, IT staff manage interface development and work with health center staff to develop application customizations. While IT staff may deliver basic IT technical support services, they also work with external entities and represent health center staff IT interests. Most health centers visited by NORC were large enough and had enough resources to support this kind of IT staffing model.

Aligning IT with business objectives. This model relies heavily on a CIO and business analysts to work with health center staff and translate their needs into IT applications. In this model, IT is viewed as a business center for the health center. IT staff may handle vendor selection and management, along with a number of other IT and business functions. East Boston Neighborhood Health Center typifies this approach. There, the CIO recruited recent college graduates with strong analytic and communication skills and an interest in aptitude in IT issues and operations improvement as business analysts following the model used on large scale IT consulting firms.

Business analysts met with health center staff to discuss problem areas and gain an in-depth knowledge of staff members' daily routines and lexicons. Additionally, a provider champion worked part-time with the business analysts to provide substantive knowledge about medical issues when necessary. One health center staff member summarized the strengths of this model, saying, "In my experience as a provider, our clinical applications side for non-clinically trained people is leaps and bounds above other places. They understand how providers think, what the impact is on patients. I only have to get 50-60 percent of the idea out there and they will make it happen."

Workforce Issues

In many cases, health centers expressed frustration with the dearth of qualified IT support staff and the significant turnover in IT leadership among health centers. This was particularly true for small health centers in rural areas. One health center in a rural network experienced significant turnover at the executive level of its health center, including its IT director. After an extended period of having the vacancy unfilled, this health center hired an IT director from a different industry, with no experience in health care. While IT functions share similarities across industries, this health center was in the midst of implementing an EHR during this period and faced problems because the IT director was not completely familiar with the specific requirements of end users, but was still responsible for overseeing the vendor.

While no health center had an easy answer for problems associated with attracting qualified staff, some health centers and networks were able to employ partially successful strategies. For example, in San Francisco, SFCCC relied very heavily on AmeriCorps volunteers to support data cleaning, training and support issues associated with teaching safety net providers how to take advantage of the i2i Tracks application made available through the Department of Public Health.

Also, as noted above, health centers or networks with exceptional leadership were able to recruit and train highly capable individuals that were recent graduates with little or no experience in health care or IT, but who could very quickly learn about the health center environment and work to translate the requirements of users to IT professionals with expertise in customizing applications. While this was a viable option in some cases, effective use of these individuals required a relatively seasoned CIO, something most health centers could not afford.

Finally, some health center networks overcame geography by recruiting experienced implementation specialists in different parts of the country that would spend a limited amount of time onsite, but would be responsible for managing an implementation remotely. While in some cases, this model allowed the health center to work with a higher-caliber individual, the lack of proximity sometimes resulted in communications issues and problems in the implementation specialist's ability to understand the day to day workings of the health center. Although, when prompted to comment on opportunities to work with community colleges or other local institutions to institute training or re-training programs to fill the gap in qualified, available IT workers, no centers indicated that they have pursued this approach.

Synthesis of Cross-Cutting Themes

The following findings span both the network and health center levels, and highlight key cross-cutting themes that address several of our most important research questions. Described in this section are

findings related to health IT and quality improvement, return on investment, network models, diffusion of health IT, health information exchange, sustainability and the impact of ARRA.

Health IT and Quality Improvement

One of the most significant changes since the 2005 assessment is the increased focus among health centers on adoption of clinical IT systems with the expectation of improving health care processes and outcomes over time. Health centers visited by NORC as a part of the current study looked to EHRs largely to automate and extend their QI efforts. In most cases, this proved to be a difficult proposition in the short term. Health center staff had trouble finding the right balance between integrating clinical decision support functionalities to further QI and making the EHR easy to use in order to speed uptake. The initial focus tended towards successful implementation and efficient use of the application, rather than extensive use of the application to achieve improvements in outcomes of care. For example, one network's implementation leaders decided to move forward with an initial rollout of a very basic version of an EHR with the emphasis on making the software easy to use rather than adding significant decision support features. They determined that it would be better to get some experience with the EHR before attempting to incorporate clinical decision support, including care reminders and use of special forms for patients with specific conditions.

Chronic Disease Registries

We also found that EHRs generally do not provide the kind of population health management functionalities that could be a part of some electronic chronic disease registries and that networks played an important role in trying to assure this functionality was available to health centers through customizations of the EHR or other means. While disease registries allow users to view and track outcomes on a panel of patients, such as all pediatric diabetes patients, EHRs are set up primarily to allow views and reports on the individual patient level. This difference in perspective limits EHRs' utility for some functions that health centers typically find useful.

For instance, health centers may want to report on the health status of their entire asthmatic patient population over time. Pulling together those data from individual patients' records would require the use of a stand-alone report writer such as Cognos or Crystal Reports in most EHRs. Others systems may have some reporting functionality built into the software itself, but do not reach an adequate level of sophistication and user friendliness for use by clinic staff.

Many health centers previously worked with the HRSA Bureau of Primary Health Care's (BPHC) Health Disparities Collaboratives (HDC) and gained valuable experience with electronic disease registries. This experience helped to frame IT use as a means to achieve QI and often helped improve patient outcomes for staff at participating centers. Additionally, registry systems initially used by BPHC such as the Patient Electronic Care System (PECS) and the Cardiovascular/Diabetes Electronic Management System (CVDEMS) offered health center staff expanded and more efficient reporting capabilities than would be available on previous systems. As a result of the HDC program, health center staffs have gained significant experience working in an electronic environment. Some health centers have continued to use systems like PECS and CVDEMS, even as BPHC phased out support for these applications.

These registries have proven to be effective tools for health center staff in working with diabetic patients and other patient groups. Even in cases where health centers cannot point to improvements in outcomes, use of the registries allows them to monitor and assess care for specific groups of patients over time. In some cases health centers are able to attribute lack of improvement in aggregate rates to increased denominators, while in other cases this is attributed to turnover in clinician staff. Having a registry allows them to generate and test hypotheses and assess the care they deliver overall.

Stakeholders' complaints regarding registries center around the time and effort required to enter data, establish rules regarding who is in or out of a panel, and ensure the validity of the data being entered. Some of the networks demonstrated a tremendous amount of enthusiasm about automated registries,

sometimes referred to as chronic disease management systems or CDMS' which partially address issues related to panel management and data validation. CDMS applications such as i2iTracks make use of interfaces from practice management systems, clinical laboratory information systems or even EHRs to reduce the amount of manual data entry required in maintaining and using registries. However, users of CDMS systems note that interface development is sometime hampered by difficulties in identifying unique patients. Furthermore, these efforts can uncover inherent flaws or inconsistencies in the production systems, such as incorrect diagnoses of diabetes in practice management or billing systems.

The Challenge of Data Integrity

Every health center who had spent time working with EHRs or registries to generate QI reports highlighted the issue of data integrity as a major impediment to true quality improvement with no straightforward solutions. For example, one QI director noted that an effort to set up a special registry of diabetic patients and run those patients through a diabetes-specific clinic led to problems as the diabetes clinic was over-crowded with many individuals that were not diabetics. The original list had been pulled from PMS data based on patient diagnosis of diabetes and/or a recent HbA1c exam. Clearly, the criteria employed were too sensitive; however, there was no easy answer as to how the criteria should be altered to result in a more appropriate list of diabetics without going through the cost-prohibitive process of reviewing each patient chart individually.

QI reports from PMS and EHRs will also reflect idiosyncrasies in the way individual users enter data. While issues of data integrity may be improved by creating and enforcing rules on how data are entered, reports will not be useful for QI purposes until a health center has consistently enforced those rules using a single system over a long enough period of time to be able to detect trends in data that are captured and reported in the same way. Furthermore, health centers acknowledged real challenges associated with getting clinicians and support staff to "follow the rules" and enter data in a consistent manner, a problem that is amplified when working across several sites and across disparate institutions.

Network Approaches to Facilitating QI Functions

While QI and clinical decision support functionalities remain limited in EHRs, both because of a lag in market response to health centers' needs and because of a decision made by many health centers to implement simpler EHR functions, some networks have made great strides in the area of QI. In one of the networks providing services to rural health centers, a data warehouse is used to bring together data from individual health centers' EHR data repositories to gain a wider perspective and perform some of the QI functions EHRs themselves cannot perform. The network staff meet with representatives from individual health centers on a monthly basis to compare their patient outcomes with other health centers in the network. While this process may be improved, having a wider set of data to compare patient outcomes has benefited the network.

Other networks have worked with EHR vendors to create customized disease management screens. At the Alliance in Chicago, Alliance staff worked with General Electric (GE) to create disease management screens for patients with diabetes, heart disease and certain other chronic illnesses. These screens list required preventive and treatment services, such as specific blood tests or exams, the last record that each of these services were provided, the associated clinical data, evidence-based guidelines and normal ranges for each clinical indicator and decision support flags in red font for services that are "due" based on the guidelines. In addition, Alliance Chicago relied on a data warehouse to aggregate data and run a number of reports for its health center members. These reports allow health centers to compare key performance metrics across locations and analyze specific patient population groups' outcomes in what some described as a more efficient manner than many registry systems.

Additionally, some networks moved to standardize forms and reports for health center EHR users. This allows health centers to compare data more accurately and discuss any discrepancies between varying data element definitions. For instance, HCN makes available standardized reports on administrative

functions and costs that draw on PMS data. While not directly related to patient outcomes, cost per visit is an important metric for many health centers. Having these data readily available in a standardized format can make future reporting easier, streamline record keeping and free up resources to perform other QI tasks. In the case of one of the urban networks we visited, health center leaders worked diligently to resolve inconsistencies in legacy data systems and worked to minimize data integrity issues to enable broader use.

The Role of Leadership and Previous Experience

In comparing across networks and across health centers' experiences, it became clear that strong leadership was a key component in obtaining IT-enabled QI. In networks with strong clinical and QI leaders, EHRs and chronic disease registries were conceived as tools for QI. In some cases, a medical director alone would spearhead this initiative with technical backing from an IT director. In other situations, a QI officer or CIO was charged with leveraging health IT for quality improvement. These two approaches, while slightly different, seem to have produced similarly positive results. Having both clinical and IT perspectives at the head of efforts to leverage health IT for QI proved integral to many networks' success.

Along with leadership, one potential predictor of a health center's effectiveness in translating health IT adoption to QI lies with its history with QI efforts and the level of resources dedicated to QI prior to the introduction of an EHR or CDMS. For example, health centers that have dedicated QI directors and teams and that have been working in various ways to structure and monitor their patient data using hand-written forms, flow sheets and manual registries in a robust fashion were more likely to take time to learn about health IT applications that would allow them to do these activities more efficiently and to use the time saved to extend their QI efforts.

Even those networks with strong leadership found the transition to IT-enabled quality improvement to be exceptionally difficult. While the discussion above demonstrates that network leaders are aware of the issues and challenges inherent in using EHRs for QI and some have established mechanisms to help address these issues, most will acknowledge that they are still in early stages of learning how to harness health IT to promote QI. As one QI lead at a network explained, "Most health centers we are working with still struggle with the task of using an EHR day in and day out to document a visit more comprehensively and clearly and are not in a position to use the EHR for panel management or similar QI functions in the first year or two of implementation."

Participation in HIE

HIE remained an important goal for many health center networks. Some networks, such as Access in Chicago, were aiming to expand integration across health center sites to allow health centers to track patients regardless of the site visited, a task made easier by the fact that Access is a single organization. Health center leaders see horizontal integration as particularly useful because patients often seek care at the first location they are able to schedule an appointment. Additionally, this integration allows providers to identify problematic patient behavior (e.g., drug seeking) and coordinate care to a greater degree.

Some health center leaders were also focused on integration across the different type of providers comprising the local health and social services safety net. The San Diego City Council was facilitating a local HIE group called Connecting for Care that included potential HIE partners such as hospitals, laboratories, pharmacies, the local public health department and specialists in the early stages of working on an HIE infrastructure. Connecting for Care hopes to reach beyond these players to include other local community partners such as welfare and public safety agencies. The participation of these non-health care sector partners could enable effective delivery of a range of services related to health and wellbeing to those who rely on the safety net in San Diego.

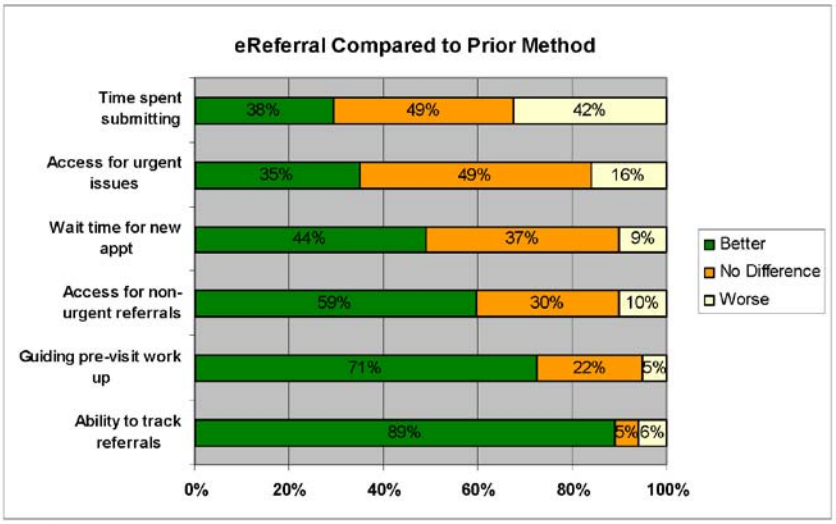
In some cases health center networks successfully pursued vertical integration within the health care sector. Health center networks and consortia that engaged in vertical integration (including, most notably,

Boston HealthNet, SFCCC and Alameda County) built off of historical ties to local safety net hospitals. For example, Boston HealthNet was formed in conjunction with the merger of Boston City Hospital and Boston University Medical Center Hospital to form Boston Medical Center (BMC). Today, Boston HealthNet works with BMC closely, sharing board members and collaborating on health IT issues. This closeness has manifested itself in shared access to patient records between BMC and HealthNet centers.

Exchange with Specialists

Health center staff also shared information, both administrative and clinical, with specialists located both within hospitals and in other settings. These kinds of interactions typically relied on the use of stand-alone e-Referral applications. These applications allow providers to make referrals to providers in other physical locations. In some cases, the e-Referral application can be integrated into an EHR's decision support capability or have decision support capability itself. For example, the tool could alert users when they make inappropriate referrals. At SFCCC, staff described the e-Referral application as a basic email application "dropped on top of" the shared care record, the Lifetime Care Record (LCR) that allows SFCCC clinicians to transmit referral orders for specific patients to area specialists electronically. Providers access e-Referral through the LCR and use it for a number of procedures and referrals, including breast evaluations, cardiology, colonoscopies, endocrinology, gastroenterology, neurology, neurosurgery, neurotrauma, orthopedic surgery, podiatry, Magnetic Resonance Imaging (MRI), respite care, rheumatology, sleep studies, urology and home health. Providers can send their interpretations of tests and initial findings via e-Referral, as well. Providers have seen a marked improvement over the previous system of faxing referrals. The application also sends reminders to specialists for overdue referrals and includes decision support to alert SFCCC clinicians of potentially inappropriate referrals. A summary of provider perceptions of the impact of the e-Referral application provided by SFCCC staff is included below.

Exhibit 9. Perceived Effectiveness of E-Referrals in San Francisco



Survey findings courtesy of Alice Chen, Margot Kushel, Yeuen Lim and Ellen Keith

The Alameda County network also benefits from e-Referral capabilities. In Alameda County, the safety net hospital's network allows health centers to access a separate bi-directional referral system which allows clinicians to submit and view referrals and evaluations to and from hospital-based specialists and share notes. This type of data exchange provides users with communication and capabilities that are absent from many EHRs and unrealistic in situations where EHRs are not interoperable and integrated.

Lab Exchange

Most health centers that had implemented an EHR had a laboratory interface to exchange lab data. Labs represent an important data source to support primary care, and health center staff were eager to integrate lab data into their new information systems. In some cases, health centers had established bi-directional lab interfaces to transmit lab orders and integrate lab results into EHR databases. For example, Boston HealthNet used a laboratory information system (LIS) to mediate interface functions for both lab orders and results reporting. In Alameda County the network stored lab data in a separate database for its health center members and established an interface with their chronic disease registry, i2i Tracks.

Other health centers reported more difficulty in establishing and effectively using lab interfaces. One network's health centers indicated that the lab interface was an important functionality that improved the efficiency of ordering and receiving results, but the implementation of the interface proved problematic because it does not allow automated reconciliation between the tests orders and results. The inability to perform automated reconciliation between test orders and results leaves health centers unable to confirm all tests results from the laboratory without a separate manual reconciliation process. That additional reconciliation process requires staff to print out each requisition ordered via the EHR and each result reported back through the interface and manually verify that a result was received for each test.

One of the urban networks we visited was anticipating difficulties in integrating lab data into its new EHR. In this network, health centers had been allowed to maintain existing relationships with lab providers, resulting in sites working with about fourteen separate lab providers. Health center leaders planned to use the rollout of its EHR as an opportunity to change their policy towards lab providers, noting that the prospect of building and testing 14 different lab interfaces at different health centers sites would prove to be very inefficient. They hope to be able to focus on a smaller number of lab partners and simplify lab interface requirements in the future.

Network leaders noted that the time and cost associated with developing lab interfaces were exacerbated because EHR and LIS databases were proprietary and often used unique coding sets to specify orders and results. In some cases, health centers used internet resources provided by the labs themselves, such as Quest Care 360, for ordering tests and viewing results. While offering simplicity and convenience for health centers not using EHRs, solutions such as this did require printing and re-entry of data for those health centers that wanted lab data included in an EHR or registry.

Public Health Departments

While engagement between health center networks and health departments was limited, we did find some examples of effective data exchange. SFCCC in particular focused on sharing clinical data with the local public health department (DPH), a key partner in the health care safety net in San Francisco. SFCCC network leaders were able to negotiate access to the department's Lifetime Care Record (LCR), an application and data repository that amounts to the public health department's official patient record system. Because the public health department operates roughly half of the city's safety net clinics and the local safety net hospital, having access to this system greatly facilitated access to patient information for SFCCC's clinicians. SFCCC's relationship with DPH proved to be effective. The networks in Alameda County and San Diego worked to establish electronic reporting for county and state immunization registries for its member health centers. Aside from this kind of collaboration, health centers and networks seem to have little to no electronic data exchange with public health departments.

Other Information Sharing Initiatives

Some health center networks engaged in efforts focused on the exchange of demographic data for administrative purposes. For example, health centers in California, including SFCCC and the Alameda Network, used an application called One-e-App to share demographic information relevant for screening individuals for their eligibility to receive health insurance benefits through the State or County. Both SFCCC and the Alameda County network use One-e-App to enroll patients in Medi-Cal (Medicaid in

California). SFCCC also uses it to determine eligibility for Healthy San Francisco, a municipal health care access program for low-income residents. In determining Medicaid eligibility, One-e-App collects demographic information such as family size, address and income. These data are transmitted to the vendor host in Sacramento (the Center to Promote Health Care Access) that stores the data in separate databases by county. Among SFCCC health center staff, several individuals noted that, because it is increasingly used as a way to check eligibility for low-income San Franciscans, One-e-App has come to represent a safety net master patient index that, if integrated with the LCR and EHR databases, could serve a critical role in facilitating health information exchange.

While health centers understood and valued One-e-App as a resource, they did note some missed opportunities associated with its use. Both SFCCC and the Alameda Network health center leaders noted that One-e-App does not interface directly with other health center data systems. There is no direct relationship between One-e-App and the Alameda County's data warehouse or individual health center PMS, and SFCCC has not been able to establish interfaces to the LCR or other systems. Also, some health center leaders noted that One-e-App is often too cumbersome to use, as it can take up to 45 minutes to check eligibility on an individual.

Standards

Although we asked health center and network respondents about the role of standards in enabling or impeding their adoption of health IT, most indicated that they had very little personal knowledge of standards and that they typically relied on their vendors to assure compliance with standard requirements. Most told us that their PMS and EHR vendors had assured them that they could offer ICD-10 compliant versions in time to meet CMS requirements. While there was a healthy level of skepticism about how easy it would be for vendors to switch to ICD-10 based on significant challenges experienced during the implementation of HIPAA and some challenges associated with movement to a common provider ID, health center and network leaders seemed to acknowledge that they were at the mercy of the vendors with respect to compliance with federal standards requirements.

Some networks and consortia indicated that the lack of clear data exchange standards hampered their efforts to engage in HIE. One network reported that setting up interfaces with various laboratories proved difficult due to the use of proprietary interfaces rather than the universal standards being used by both the EHR and the clinical laboratories. At a large, urban health center, leaders indicated that their EHR is currently not capable of generating a full clinical care document (CCD) message for patients included in their EHR databases. This means that significant work would have to go into compiling generic HL7 messages into the CCD format for inclusion in a data warehouse being contemplated by the network. While few pointed to the lack of standards as a core barrier to HIE, those furthest along did indicate that they felt greater reliance on standards by software vendors would dramatically facilitate exchange and limit the cost associated with custom interfaces.

Privacy and Security

Health center and network leaders did not often directly cite privacy and security concerns, but these issues seem to have stalled momentum around some safety net specific HIE initiatives. One regionally based network worked with local safety net partners toward establishing a local HIE. These efforts were still in early stages and participants were still working out how data would be shared and kept secure.

At a more basic level, some health centers had trouble balancing staff usage of their EHRs with patient privacy concerns. For example, a network we visited had a member center provide many other services including public benefit eligibility screening for the Women, Infants, and Children program (WIC), case management, social work and behavioral health services. Because eCW serves as the patient record for these centers, staff in non-medical divisions often access patient medical information, unnecessarily compromising patient privacy. One participant explained, saying, "Every time a case worker goes in, all of their history of medications is there. But that kind of extensive data is not necessary for securing bus

tokens and other unrelated social services." In general, these concerns were few and limited across health centers visited by NORC.

Return on Investment

As part of our site visits we conducted extensive discussions with networks and health centers about their assessment of the costs and returns associated with health IT adoption in general and the use of EHRs in particular. We found that concerns regarding return on investment (ROI) were stronger before the enactment of the American Recovery and Reinvestment Act of 2009 (ARRA), and also when networks and health centers worked under the assumption that federal funders would expect EHR implementation projects among federally funded projects to "pay for themselves" without any reimbursement changes or grant support after a period of time. This conversation changed following ARRA.

For example, in the meetings held with health center members of one of the urban-based networks we visited post-ARRA, while health center members were not fully aware of the details, it was noted that ARRA could provide powerful financial incentives to health centers to implement EHRs. Increased Medicaid and Medicare reimbursement, and the prospect of penalties for non-users in the future led these health centers to reconsider EHR adoption and allowed them to see beyond some of the traditional financial challenges health centers confront in adopting EHRs. While incentives remain uncertain beyond 2016 (or after five years), having this new source of funding and the threat of penalties proved to be an effective mechanism to change health centers' conversations on ROI.

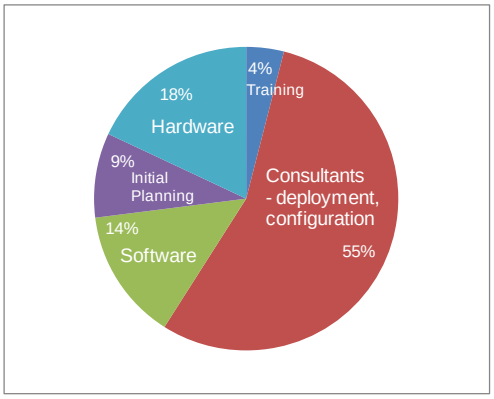
The discussion below outlines some of the broad costs and returns reported by health centers and networks across NORC's site visits. While collecting comprehensive cost data and analyzing these data were not part of the scope for this effort, some rough figures emerged from NORC's site visits.

Costs

Below, we summarize our findings on costs for both initial implementation and annual maintenance of EHRs. While individual health centers and networks differ in exact costs, these figures provide a broad overview of costs at an aggregate level. Costs associated with implementation totaled roughly $30,000 per provider full time equivalent (FTE). These costs include planning, selection, software, hardware, training and rollout. Beyond the initial rollout period, annual maintenance costs average roughly $1,000 per provider. Both of these figures were somewhat lower than prior published estimates, perhaps illustrating the difficulty implementers have in capturing the full cost of a project. The costs for ongoing maintenance were likely to vary considerably from year to year within a single health center depending on its cycle for replacing hardware and making other capital investments. Ongoing costs include system maintenance, support, and customizations as well as capital costs such as hardware and software updates. A breakdown of initial implementation costs follows in Exhibit 10 below.

Notably, the single largest category of costs in the Exhibit is not software or hardware, but costs associated with the professional staff needed to support configuration and implementation. These costs are not associated with basic functions such as planning or training, but represent the extensive work needed to assess workflow at a clinic site, develop a specific set of requirements to integrate an EHR into that workflow, and work with software vendors to configure and customize applications to meet those requirements. Furthermore, this category reflects the time required to deploy the system.

Exhibit 10. Approximate Breakdown of Initial Implementation Costs



Returns

Health centers and networks did not discuss the potential to recoup costs of implementation as a motivation for adoption of EHRs. However, several health centers and health center networks did anticipate some level of return. For example, many noted looking forward to administrative efficiencies such as less need for medical records workers and office supplies, increased amount of patients being serviced and better coding for reimbursement. One health center noted that they believed that improved patient outreach facilitated by their EHR would result in a greater number of patients complying with recommended follow-up exams and consultations, potentially increasing visits and revenues for the health center.

Because they have had more time to recognize potential returns, we focused particularly carefully on the experience of networks that had implemented EHRs the earliest. There, discussants cited improvements in workflow efficiency (e.g. less time spent looking for paper records) that offset some of the costs related to EHR implementation, but noted that the actual time needed for documentation increased. This resulted in no net change in throughput.

While some noted savings in supplies and staffing, these were largely offset by increased capital budgets and hiring more programmers and analysts. This demonstrates the kind of redistribution of costs experienced by health centers in implementing EHRs. When health centers considered the impact health IT would have on their budgets, some realized that costs would simply shift from one area to another. At the same time, almost every health center we visited articulated the point that network affiliation had helped achieve economies of scale and savings in their health IT efforts. Without the leverage of a larger pool of health centers, these users would not have been able to take advantage of vendor discounts for volume and the efficiencies that come from a larger scale implementation (e.g., planning processes, workflow redesign, the use of consultants, and training).

Measuring ROI in the Future

One important finding from the project is that when asked about ROI, both before and after the passage of ARRA, many health centers indicated that accurately measuring both costs and benefits was difficult and ultimately not worth the effort absent an outside incentive to do so. While most health centers have a good sense of the hardware, software and external consulting costs associated with adoption, they noted that "soft" costs were substantial and went far beyond consultant fees or specific services. Adequate planning and implementation of EHRs required a significant level of investment from members of the staff who were the most valuable clinicians that put in additional hours over a long period of time, most of which was not compensated. Health centers indicated that there were likely costs associated with reduced patient load for these providers during the planning and early implementation stages.

In addition, there are a number of benefits that are difficult to quantify at the health center level. These include benefits to health centers that are diffuse, such as an enhanced ability to recruit new clinicians who have been trained using EHRs. In addition, cost savings from QI activities conducted by ambulatory and primary care providers very often accrue to other stakeholders, such as payers or acute care providers who bear a smaller burden of hospital admissions and complications from ambulatory care sensitive conditions. Finally, some of the most obvious benefits of EHRs, such as the ability to access records from remote locations during the time of an emergency, have not been studied closely enough to be quantified.

Most health centers indicated that adoption of health IT was a "no brainer" because it was the wave of the future and would be a necessary cost of doing business in the near term. Prior to ARRA, some health centers noted that it was unlikely that the ROI at the health center level in the current environment would be positive, but that it was the "right thing to do" and that, over time, policy reform would lead to changes in reimbursement and program management that would address the disparities between costs and returns at the provider or health center level. After ARRA, health centers were still uncertain regarding how the specific ROI scenario would evolve, but they did take passage of the legislation as another sign that EHR adoption would make financial sense at some point in the near future.

Sustainability

The concept and relevance of sustainability at both the health center and network level changed over the course of NORC's site visits. In early visits, networks stressed their plans to achieve sustainability once their HRSA grants ended. In later visits, the recent passage of ARRA and, for some sites, private foundation funding led to a decreased concern with sustainability for EHRs and other health IT activities.

Before the passage of ARRA, most networks looked to expansion, either in their immediate vicinity or to health centers across the country, to achieve sustainability. For instance, network leaders at Alliance Chicago indicated that the network had recently begun to pursue expansion because of the need to achieve economies of scale and, ultimately, enable their EHR implementation program to achieve self-sufficiency.

Some health center leaders remained unconvinced that networks could continue to provide the same level of service under an expanded model. One health center believed that some networks were so overstretched in their attempt to achieve sustainability through growth that they are only able to address relatively superficial concerns such as distributing applications and not more substantive attempts to tie health IT to QI. As a result, the perception of the value provided to health centers by some networks, though still strong, has somewhat eroded.

Some health centers were better-positioned to achieve sustainability for health IT investments than others. For instance, Access Chicago leaders stressed the importance of their historic financial commitment to health IT. In recent years, Access Chicago has devoted three to five percent of its $97 million operating budget to IT. While Access Chicago acknowledged that this percentage may increase slightly after implementing Epic, they felt that this ongoing commitment had prepared them for the financial commitment necessary for a wider EHR implementation effort. Other health centers struggled. One SD Council health center that had purchased a PMS jointly with other health centers as part of a HRSA grant awarded several years ago noted that grant funds had been useful for initial costs, but the ongoing maintenance costs of this practice management system proved unsustainable. One health center in New Mexico was particularly daunted by the ongoing costs associated with its EHR. Leaders at this health center believed that they would need to hire additional IT support staff and that the costs associated with the EHR and network membership were unsustainable.

Role of Outside and Foundation Support

Some health centers and consortia have avoided relying exclusively on the federal government for health IT support. In California, the three networks visited by NORC emphasized the important role played by foundation funding. One network leader explained, saying, "In California, we do not necessarily follow HRSA dollars. California is unique; we have a meeting every six months with funders. We've shaped private funding support." Foundations that are particularly active in health centers and health IT in California include the California Endowment, the California Health Care Foundation, the Tides Foundation, the Blue Shield of California Foundation, the McKesson Foundation and the California Wellness Foundation. These funding sources and their willingness to support initiatives such as i2i Tracks add diversity to California health centers' funding sources, contributing to a potentially more sustainable financial outlook than health centers that are completely reliant on federal support.

Most health center networks find themselves in a more challenging financial situation. Up until now, most have focused on achieving the goals of their federal grant sponsors as well as the needs of their health center customers. There has been a relatively close alignment between these two objectives given that both the health centers and networks are funded through HRSA. Their primary strategy for achieving sustainability has been through expansion to other health centers. After the network's HRSA funding ended, network leaders began to look toward other funding sources to help support their level of service. Network leaders are turning to foundation support and the possibility of creating for-profit entities to support their health center operations. Also, they are increasingly looking forward to new opportunities associated with ARRA described below.

Health Information Technology for Economic and Clinical Health (HITECH) and Other Federal Initiatives

The HITECH portion of ARRA of 2009 altered the current conversation on sustainability and motivations for health IT adoption and will continue to shape health centers' involvement with health IT in the coming years. While many health center networks were concerned about achieving financial sustainability using an EHR, the passage of ARRA added another variable to sustainability conversations. Because of the increased Medicare and Medicaid payments for "meaningful use" of health IT included in HITECH (and the prospect of penalties in future years for health centers not engaged in meaningful use), health centers were willing to reconsider the financial calculus of EHR adoption.

HITECH provisions make the Medicaid incentives available to providers that have a case load of at least 30 percent Medicaid patients. Providers practicing in federally funded health centers qualify if 30 percent of their patients are "needy individuals," meaning either on Medicaid or CHIP or receiving uncompensated or reduced fee services on a sliding scale. Under these criteria, most federally funded health centers will qualify for incentives. The Medicaid and needy individual incentives are likely to be more robust than Medicare incentives, however, it is also likely that details of Medicaid meaningful use will be determined on a case by case basis at the state level. Proposed federal rules for meaningful use are likely to be published around the same time as this report, and, based on legislative provisions, it will include use of EHRs to support some form of quality reporting, e-Prescribing and interoperability with other provider systems.

While HRSA funds have succeeded in incentivizing EHR adoption among health centers in many markets, the reality of ongoing maintenance costs and the diffuse returns inherent in health IT (especially for primary care providers) have contributed to concerns. In addition, some have advocated for alternative approaches, such as the use of automated registries to achieve meaningful use goals without using EHRs.

ARRA offers health center networks and consortia other new opportunities. Under the regional extension center provision of ARRA, the federal government will disburse funds to non-profit entities to assist health care providers in specific geographic areas with EHR adoption. It is likely that health center networks will be well-positioned to take part in these efforts. Small and medium-sized practices, because of their similarities to health centers, could particularly benefit from technical assistance provided by a health center network. Additionally, health centers' experiences with health IT and HIE offer important insights that could inform the development and application of meaningful use criteria under HITECH.

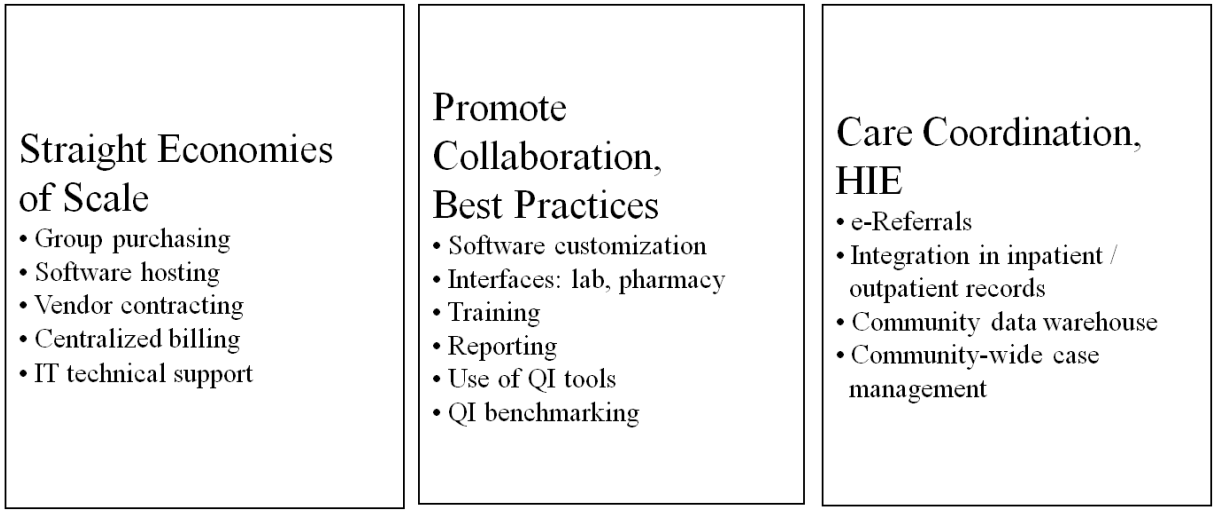
Specifically, many health centers, including some described here, have successfully implemented e-Prescribing, laboratory exchange systems and IT-enabled QI reporting. Each of these could be part of HITECH's meaningful use criteria. Health centers' experiences with these applications could help predict how other small and medium-sized providers might fare under meaningful use criteria. Their challenges and enablers could help refine assistance provided for other providers seeking to achieve meaningful use and generally inform other health care providers as they embark on the path toward meaningful use.

Health Center Network Key Functional Approaches

Several models emerged across the eight site visits conducted by NORC. Exhibit 11 below outlines three different approaches used by networks to provide services for their health center members. The three approaches, "infrastructure and economies of scale," "collaboration and best practices" and "care coordination and HIE" are presented as distinct offerings here, but most health center networks provided some combination of these services. At the most basic level, networks offer health centers an opportunity to leverage economies of scale in pursuing health IT, handling administrative functions and purchasing supplies in volume.

Beyond that, networks have taken a more active role to affect practices at health centers by promoting collaboration between health centers. In many cases, this collaboration revolves around a network-sponsored QI initiative or a specific grant program that health center members participate in. Other efforts in this area include trainings, forums for CIOs and other network leaders, and efforts to customize software for the network. Lastly, some networks have moved to assist in the coordination of care and wider health information exchange efforts. In most cases, this type of work relies heavily on health IT applications, including e-Referral software between health centers and specialty and hospital providers, shared records with inpatient health care providers, and community data warehouses to store and compare health center EHR data. These types of functions are more complex and require a more active network than some of the other services listed. Networks participating at this level include Boston HealthNet, the Alameda County network and SFCCC. While many similarities exist across networks, variation along key variables differentiated them into model groups.

Exhibit 11. Health Center Network Functions



Experience of Rural Providers

Some networks included health centers in rural and frontier areas. These health centers and networks varied in their functions and experiences as well. Rural networks face challenges that are not encountered in urban areas. For instance, in one network providing services to rural members, health center leaders noted that their IT needs differed from more urban health centers because they were physically located near a main highway and were the only care provider in the area. This meant that all automobile accidents on the nearby stretch of highway would first come to this health center which had basic trauma services. In areas with trauma centers and multiple hospitals, health centers would not play this role. In general, health centers in rural areas served as community-wide institutions and resources. In some areas,

health centers were the only ambulatory care provider for a very large geographic area and served a wide range of patients, including many with Medicare and private insurance.

Rural networks also face a number of challenges in achieving meaningful collaboration between health centers. Long driving distances can make in-person network meetings difficult and frustrating for health center leaders. In some cases, network leaders noted that health center staff had become less willing to travel for network meetings. This can make it difficult to build trust needed to share data with the network and other health centers which is a key precursor to achieving improvements.

Without regular in-person communication, small issues can become very difficult for networks to overcome. Additionally, rural health centers and networks reported difficulty in recruiting and retaining well-qualified IT professionals. High turnover among IT support specialists led some health centers to look outside of the health care sector and hire IT directors from other industries. This could cause problems as health centers move into the complexities of EHR implementation, customization and support that require an intimate understanding of health care practice. One health center network lost a skilled programmer who generated reports out of the network's data warehouse when her spouse accepted a job in a distant city. While the network was able to hire a replacement, health center leaders noted a significant decline in the quality of reports following the original staff member's departure.

Horizontal vs. Vertical Integration

In some cases, health center networks assisted in providing access to patient data across all health center members. In addition, some networks were able to facilitate exchange of patient information between health centers, hospitals and specialist providers. These two approaches, horizontal and vertical integration respectively, were key services provided by a number of the health center networks. Most networks' discussions about horizontal collaboration remained in early stages, either waiting to implement a new EHR or not at the level of trust required to share patient information across health centers. Health center and network leaders recognized the potential advantages of horizontal integration, including reduced paper work burdens for patients and increased abilities on the part of providers in areas like identify drug-seeking behavior in patients.

As noted above, other networks were able to accomplish vertical integration in some forms. In the most integrated case, Boston HealthNet had enabled a full clinical information exchange (CIE) enabling all providers to look up patients using a shared master patient index and the ability to access a single clinical record reflecting inpatient and outpatient care.

Exhibit 12. Examples of Vertical Integration in Health Center Networks

Network/Hospitals	Nature of Integration
Boston HealthNet / Boston Medical Center	• Joint accreditation, organizational agreements • Joint implementation of GE Centricity EHR • BMC manages the data warehouse • e-referral to BMC based outpatient clinics • Exchange of labs and radiology reports • Ability to view ED and inpatient records
SFCCC / San Francisco City Hospital	• e-referrals to SFCH outpatient providers • Exchange of labs and radiology reports • Joint use of the DPH life-time clinical record: inpatient data available to health centers
CHCN / Alameda County Health Center	• e-referrals to ACMC and other community hospitals • Portal to allow view-only access to discharge summaries and ED records

Having access to the LCR allows SFCCC staff to integrate with the hospital along with other primary care providers at DPH clinics in a way that was not possible before. The Alameda Network also offers its member health centers a level of vertical integration. Member health centers have access to discharge summaries and ED records at the local safety net hospital, Alameda County Medical Center. An e-Referral application also furthers integration between health centers and the hospital by allowing health center providers to electronically submit referral notifications to specialists working at the safety net hospital. An overview of these three instances of vertical collaboration is provided as part of Exhibit 12 above.

While each of the examples of vertical integration identified as part of this project represents a special case, there are some similarities which may be necessary but not sufficient conditions for effective vertical integration in the context of a health center network. In Boston, Alameda County and San Francisco there is a single hospital which is the dominant safety net hospital in the area and may be considered the "only game in town" by many of the patients that are typically seen in federally funded health centers. In this situation there is a strong, mutually beneficial relationship between a single hospital and a set of federally funded health centers that may increase the likelihood of building enough trust and momentum around data sharing issues.

Hospital executives in Boston did indicate that they benefited from engagement with health centers to assure that their patients had access to care the in the most appropriate settings and that they also benefited from having a significant number of referrals coming from health center members of Boston HealthNet. Presumably, the public hospitals in Alameda County and San Francisco also benefited from providing health centers access to data that could help them to treat patients in an ambulatory care setting and establish that setting as a usual source of care rather than have them rely on the emergency room for minor acute care needs. In addition, when coordination facilitates referrals from health centers to the hospital, there is a potential benefit for the hospitals to enable those interactions.

Another feature that was present in these three examples of vertical integration is an ongoing collaborative or financial relationship between the network and the hospital themselves. In the case of Alameda County, because the network serves as the MSO for all Medicaid patients in the county, it works with the hospital to manage interventions and costs associated with its Medicaid patients. Similarly, in Boston, Boston Medical Center has taken on responsibility to support IT initiatives within the Boston HealthNet network and handle certification requirements on behalf of network member health centers. Finally, in San Francisco, because the safety net hospital is run by DPH which also runs a series of safety net clinics that are "sister clinics" to the SFCCC members and because most referrals for specialty care from SFCCC providers go to the same hospital, there has long been agreement on the benefits of providing SFCCC members access to the Lifetime Care Record for referrals and tracking labs and inpatient care.

Conclusions

We end this report with several overarching conclusions for policy makers and program officials. These conclusions highlight some of the key findings described above and illustrate their implications for policies to encourage health IT and HIE among safety net providers. In particular, we focus on findings relating to the use of health IT to improve quality, efficiency and effectiveness of health care delivery.

Networks have been key to supporting adoption of IT among federally funded health centers. Health centers uniformly praised the network model as the key enabler for the adoption of advanced information technology. With the exception of the largest health centers, most individual providers did not believe they had the resources and access to the expertise necessary to effectively adopt EHRs and, in many cases, PMS applications. Networks assist adoption of technology by helping achieve economies of scale

that reduce the cost of implementation, and also by helping health centers access talent and leadership that very few are able to attract and retain on their own. Health centers also appreciated the use of networks as conveners, allowing them the ability to share ideas and learn from each other. Although health centers all felt that networks were a good idea and provided significant value, they emphasized different benefits from their engagement with networks. In some cases, health centers were enthusiastic about the network's ability to assist with clinical QI, while others focused on the benefits of networks as a provider of access to technical and business expertise.

However, even with networks health IT adoption is far from easy. Health centers also uniformly described the process of adopting health IT applications such as EHRs as costly, time consuming and difficult even when pursued in the context of a network. Health centers emphasized both the importance of planning, assessing needs and conducting a thorough and thoughtful review of vendors, but also noted that this process takes a long time and that even after thorough planning unanticipated challenges will arise. In most cases, health centers adopting EHRs noted a very significant decrease in productivity and patient throughput during the initial months of implementation. In some cases, health centers struggle to return to a pre-EHR rate of productivity even one year following implementation.

Discussants could not overemphasize the importance of adequate training, especially in-person training conducted by someone familiar with the health center setting. They also stressed the value of on-site training and user support during the first several weeks of implementation. Super users and champions from among the clinicians at the health center were also important resources. Ongoing training that stretches far beyond the initial implementation is needed to help support the training needs for new providers and improve use of the EHR over time.

Finally, while health centers participating in this study have found networks and network-related funding as the primary enabler of health IT adoption, they also note significant challenges that hamper the effectiveness of some network models. Health centers using EHRs or other applications hosted externally by a network noted unexpected problems related to connectivity and poor infrastructure within their facilities that either delayed adoption or reduced the reliability and availability of systems. Health centers that had not been able to invest in a dedicated network infrastructure faced significant problems with Internet service and connectivity that hampered their ability to rely on network-hosted applications. While this was particularly true in rural areas, we also noted that some urban providers faced similar issues, particularly those located in the inner city and in aging buildings with poor electrical infrastructure.

Using health IT for quality improvement takes time. While all health centers and networks felt that achieving quality and efficiency improvements motivated their health IT projects, they noted that use of health IT to improve quality is a long process. While this process is helped along through extensive planning and needs assessment, in almost every case, health centers that have adopted EHRs indicated that the stage of implementation itself was overwhelming in terms of the time and resources required for implementation, training and assuring that providers have a basic level of comfort with the system.

Discussants identified different avenues to translate health IT adoption into QI. First, health IT could give providers more information to make effective decisions at the point of care through clinical decision support tools such as display of clinical guidelines and reminders or forms that prompt providers to deliver specific services to special groups of patients. In this case, health centers indicated challenges in working with networks to identify the right number, type and nature of forms or reminders. Their preferences and needs varied depending on the nature of their patient population and their patterns of practice.

Health centers noted that additional documentation and consideration of reminders took time and were open to misinterpretation, and leadership had limited ability to develop prescriptive requirements around how to document clinical care using an EHR. Many health centers noted that they "turned off" reminders or other clinical decision support functions during the initial stages of implementation because they

wanted to know more about how to use those tools most effectively and because they felt that the move to an electronic environment on its own would represent a significant burden for their providers.

Also, use of health IT could result in improved quality by allowing providers to more easily report on and monitor the care they deliver. However, health centers noted that most EHR applications do not have "out of the box" functionality that allows them to generate reports on a panel of patients and track their health care experience over time. Generating these types of reports very often requires the use of additional applications such as registries or data warehouses. Discussants noted that the native reporting capability within EHRs and PMSs is limited. Furthermore, they mentioned that designing new reports requires an advanced understanding of databases and reporting tools that most health centers lack. When QI reports are designed, health center QI leadership noted that problems with data integrity could hamper the effort to translate the reports into action. Data integrity issues could arise from inconsistent and insufficient documentation of patients by clinicians, reliance on billing or administrative data and lack of resources and expertise to identify, diagnose and solve data problems.

We found that enthusiasm for the use of health IT for QI came from among those health centers that had already implemented a robust QI function and were dealing with the issue of data integrity and understanding how to interpret their data and take appropriate action. Typically, these health centers had employed dedicated QI staff that focused on the data rather than patient care. These health centers did not believe that health IT would eliminate the challenges associated with QI, but they did see health IT as an enabler that would help them do what they already do more efficiently.

Interestingly, some health centers with robust existing QI functions made the decision to work with automated disease registries as a primary tool for supporting QI rather than an EHR. These registries or "chronic disease management systems" such as i2i Tracks forgo complete reliance on electronic documentation by clinicians at the point of care. Instead, their approach is to establish electronic interfaces between PMS, clinical laboratories and other systems to generate a patient level database of information relevant to QI for specific types of patients.

Importantly, even those health centers that were particularly enthusiastic about the use of health IT to promote QI at the outset of the project were very cautious in describing the time that it would take to see results. Beyond the problems associated with provider documentation and data integrity, they noted that even establishing a baseline set of measures based on EHR data for a panel of chronically ill patients takes approximately one year. While "quick hits" such as improved ability to identify patients appropriate for outreach and case management services were possible, they very often required designing and running custom reports and then finding the resources to invest in the additional outreach and case management.

Local versus nationwide functions for health centers. As noted earlier in our conclusions, networks were identified as the key facilitator for health IT adoption by health centers we met with as part of this study. There was significant variation however, in the role that the network played with respect to health IT adoption and usage. On the one hand, almost all networks were able to use economies of scale, coordination and grant funding to reduce the cost of health IT implementation at the individual health center level. Very often networks hosted health IT applications accessed by their health center members and provided ongoing maintenance and technical support in conjunction with the relevant software vendors. We found that in addressing these functions, networks did not have to be in the same geographic areas as member health centers.

However, most networks also looked to provide some path for using EHRs or other applications to achieve QI. This proved to be a challenging task for most networks. Health centers reported some difficulty in getting on the same page with respect to customized forms and fields that were appropriated across all settings and reported there was competition in terms of demand for network resources to generate reports and analyses to meet the QI needs of each member. In instances where the network was effective in facilitating a common approach to QI, this was almost always done at the local level, by regularly convening clinical leadership in person to discuss the priorities of each organization.

Networks are involved in data exchange and integration, but not as HIOs. Another network function that required significant engagement at the local level was facilitating data exchange and data integration to promote efficiency and effectiveness of care. In the context of EHR adoption, several networks have facilitated adoption of point-to-point exchange applications such as e-Prescribing and laboratory interfaces. Some networks have also been able to work effectively with their local safety net hospitals and specialty care providers to set up systems for e-Referrals that are highly valued by their members. While networks did indicate an interest and initial plans for pursuing regional health information exchange, these efforts were still usually in very early planning and coordination stages at the time of our discussions. The most advanced safety net HIO project we encountered may be the clinical information exchange set up in Boston that uses a common master patient index and clinical data repository to give safety net providers a comprehensive view of inpatient and outpatient data on an individual patient.

Technical support needed to achieve meaningful use will be substantial and vary by stage of implementation. Our last conclusion relates to nature of resources that may be necessary to achieve meaningful use of EHRs per the goals of the HITECH Act and is an attempt to generalize the experiences of health centers and networks that are the focus of this report to the broader population of providers. Although the definition of meaningful use has not been finalized, it is clear that health centers have grappled with many of the issues that will be included in that definition. As an unprecedented number of health care providers in the United States are moving rapidly towards adoption of EHRs, resources have been set aside to provide technical assistance and other forms of support. In the bullets below we outline some types of support that may be most important at different stages of EHR adoption.

- **Planning.** In the earliest planning and orientation phases, providers need access to resources that can help them take stock of their needs and workflow and plan an implementation that will help address problems they would like to see fixed rather than implement new software simply for the sake of implementation. While it is beneficial for health centers to be able to access consultants or individual experts that can help them navigate these questions, there may be some opportunities to encourage providers to ask the right questions on their own by providing access to online resources, toolkits and case studies outlining where other efforts have succeeded or failed.
- **Vendor Selection.** During vendor selection, providers need good rubrics for use in analyzing options. Resources provided at this stage should allow them to capture the full range of issues associated with adoption of one vendor or another, including costs, the likely ongoing needs for support and the vendors' track record providing it, the level of customization that the vendor is willing to provide, and the relative change from existing practices that will be required to implement the new system. Resources that challenge health centers to look beyond the most obvious criteria of cost and functionality and look at the practical realities of choosing one system over another in terms of training burden, difficulty in achieving buy-in, and cost of ongoing support and maintenance, will be important to assure that providers arrive at decisions that make sense over the long term. In engaging with vendors, individual providers can benefit from economies of scale associated with pooling resources and decision making across a larger set of providers and encounters.
- **Pre-implementation and Implementation.** Pre-implementation activities need to include a detailed breakdown of workflow and how it will change as a result of the implementation. Most providers are not in a good position to document their own workflow and may not be familiar with the tools that are typically used in this process. Therefore for pre-implementation and implementation stages, it is most useful to have the benefit of an outside expert to work with directly. Providers should expect that implementation will be iterative and that new requirements or needs will emerge at every stage of implementation and that they need mechanisms to document those needs and assure they are addressed.
- **Training.** Training is perhaps the single most challenging aspect of pre-implementation, and the most effective practices seem to make use of both experienced outside trainers and super users from among the health center providers and employees. It is important that the training go beyond basic orientation of individuals to the software, and actually work to teach users the intended use of

software as an enabler to their jobs. Furthermore, to the extent that the EHR will facilitate reporting intended to improve operations and quality, staff must be trained in the specific ways in which to enter data and the appropriate and inappropriate use of free text within the system.

- **Post-implementation.** In the post-implementation period, providers will likely require many of the same resources they needed during implementation and pre-implementation. Most health centers noted that they continued to refine their needs and identify new requirements over time and that this continued years into their use of EHRs. In addition, a focus on maintaining a continued training function is necessary to support the needs of staff that come on board after the initial implementation. Finally, in the post-implementation period when provider leaders are expecting some returns or benefits from adoption of an EHR, a great deal of assistance will be required in helping health centers understand what is possible and then design and run reports that best address their needs.

Many of the findings and conclusions described above are generally applicable to the challenges and potential pitfalls associated with widespread adoption of health IT as a means to achieving quality and efficiency improvements in the United States. They also point to the considerable accomplishments of some federally funded health centers and their networks in navigating these challenges and promoting effective adoption. Even as they described problems associated with implementation, the health centers we spoke with never voiced regret that they had pursued EHRs or other forms of health IT and saw their adoption of health IT as a natural, necessary and important step towards improving the quality of the care they provide to their patients as well as the efficiency of their overall operations.

Depending on the mechanisms ultimately established to define and monitor "meaningful use," it is likely that technical assistance providers, vendors and consultants will evolve to establish resources and product lines that support more seamless adoption of health IT and that draw a clearer path from adoption of technology to measurable improvements in clinical outcomes and cost effectiveness of care. In addition to the provisions included in the HITECH Act, further legislation that leads to changes in payment for health care services may lead to more insight into how best to use IT to improve health care delivery. The experiences of early adopter health centers and networks represent a powerful set of findings that policy makers and other stakeholders should draw from over time.

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Appendix A: Environmental Scan

Assessment of Health IT and Data Exchange in Safety Net Providers
Discussion Draft Environmental Scan, February 2008

Table of Contents

Introduction

NORC at the University of Chicago is pleased to present this environmental scan to the Assistant Secretary for Planning and Evaluation (ASPE) for the *Assessment of Health IT and Data Exchange in Safety Net Providers* project. Here we provide a comprehensive review of the existing research on the adoption of health information technology (Health IT) and involvement in Health Information Exchange (HIE) among safety net providers generally and federally funded health centers in particular, and information from the HRSA grantee discussion meetings that were held in November 2007. This report also provides a framework for moving forward with additional phases of the study including conduct of six site visits to geographic locations around the nation where there has been significant progress with safety net provider health IT adoption to review lessons learned and significant findings from these experiences as well as develop a framework for helping safety net providers consider return on investment when planning for health IT adoption.

Background. In the recent years, significant strides have been made in incorporating health IT and HIE in the U.S. health care system to improve its quality, efficiency and effectiveness. The nation's safety net providers, which provide care to the underserved populations including low income and uninsured, are especially poised to garner significant benefits from clinical and administrative benefits from improved IT use. One aspect of the federal government's involvement in supporting health IT adoption among safety net providers has focused on health care providers that are funded through Section 330 of the Social Security Act. These include community health centers, rural health centers, school based health centers and other safety net providers, referred to generically as "health centers".

The Health Resources and Services Agency (HRSA) an operating division of the U.S. Department of Health and Human Services (HHS) is responsible for overseeing Section 330 funded providers and has played an active support role by funding grant programs designed to encourage network formation and collaboration among health centers to achieve economies of scale and facilitate adoption of health IT. The current administration has prioritized investments in expanding the safety net by dramatically increasing funding to expand existing health centers and fund new health centers and has also identified health IT adoption and HIE as an effective means of improving quality and reducing cost across the health care system. Given these dual priorities, we believe the current study will provide invaluable insight into the success factors and challenges facing safety net providers adopting health IT and involved in HIE that can impact HHS program and policy decisions moving forward.

In particular this study will address health centers can effectively consider, measure, manage and monitor return on investment (ROI) in regard to health IT adoption; document progress and lessons learned from implementation and operation of clinical applications such as electronic medical records (EMRs), electronic health records (EHRs), e-prescribing (eRx), Computerized Provider Order Entry (CPOE) and clinical decision support applications (CDS) and address the system wide trends occurring over the last three to four years including HIE and use of standards and assess how health centers are (or are not) participating in these trends.

Purpose of the Environmental Scan. The purpose of the environmental scan is to gather, summarize and synthesize existing information regarding adoption of HIE and health IT in health care organizations, focusing on health centers, and to help identify innovative and particularly successful sites to document and share their success strategies and barriers. Since 2003 when NORC conducted a similar study of IT use among health centers, considerable progress has been made in incorporating health centers in the national effort to modernize health care delivery using information technology. The scan will review the progress made in health IT, both in terms of administrative and clinical applications, lay out lessons learned from the experiences of organizations currently implementing health IT, and generate recommendations for prospective adopters. The environmental scan seeks to answer the research questions that were outlined in the proposal and the work plan, and identify the gaps in the knowledge

that can be addressed in subsequent phases of research. In particular our environmental scan highlights findings in the following areas.

- **Existing data on health IT adoption.** While there is no systematic longitudinal study of the use of health IT among safety net providers specifically, there has been recent research providing a snapshot of health IT adoption trends among safety net providers relative to other providers around the nation. We provide a discussion of findings from this research.
- **Health center motivation.** Prior research has suggested that while safety net providers may be behind other providers in terms of overall adoption, their interests and long term vision may encourage adoption more than private sector providers. We explore health center motivation and vision around health IT.
- **Strategic factors influencing health center adoption.** Prior research has also demonstrated key areas of strategic importance for health centers moving toward health IT implementation. We elaborate these areas, including staffing, planning, leadership and buy-in.
- **Health centers' IT environment.** Prior research suggests that health centers may have limits in terms of their access to necessary hardware and connectivity to effectively pursue health IT and that they may lack access to the appropriate expertise necessary to effectively prepare and manage health IT adoption. We discuss findings from earlier research on the state of IT infrastructure among health centers.
- **Role and nature of networks.** As noted above collaboration and network formation has been one strategy employed by health centers to move forward with health IT adoption in a limited resource environment. Network formation, often motivated by specific funding opportunities offered by HRSA, has taken several different paths each of which are described in this report.
- **Financing and sustaining health IT.** Because a central motivation of this study is to explore return on investment, we dedicate a significant portion of this report to summarize existing research on the costs and financial benefits of health IT adoption.
- **Impact of health IT on populations served by health centers.** Ultimately, federal efforts aimed at encouraging adoption of health IT among safety net providers focuses on improving access to quality care for vulnerable populations served by these providers. Therefore, we summarize existing descriptions of clinical and population health benefits of health IT adoption among populations served by health centers.
- **Program and policy implications.** Finally, we summarize some of the potential implications of findings from previous sections.

Having summarized our findings in these areas, we turn to a discussion of outstanding hypotheses to be explored during site visits discussions with health centers, health center networks, other safety net providers and other stakeholders in six locations around the United States. As an appendix to this report we provide a summary of potential locations to conduct site visits as well as the protocols that can be used to effectively address the outstanding hypotheses described in this report.

Environmental Scan Methods

In preparing this environmental scan, NORC conducted a comprehensive review of existing published literature, gray literature, and official documents made available by government officials. We also relied on guidance and expertise from our Task Order Officer and key contacts at ASPE and HRSA, along with other federal agencies and foundations. We tapped into a number of web-based resources such as search engines and databases to conduct formal literature review as well as general web search using Google and Yahoo. The following general resources were used to gather peer reviewed literature.

1. AHRQ National Resource Center for Health IT Knowledge Library – An online comprehensive search engine, compiled by NORC and its partners, containing articles and information on topics such as evaluation, economics, and management of information systems specifically relevant to ambulatory care.
2. MEDLINE – A computerized bibliographic retrieval system containing a comprehensive listing of articles in the scientific medical literature.
3. Healthstar – Similar to Medline, although it focuses more on health administration and policy.
4. HSTAT – Health Services/Technology Assessment Text – A searchable collection of large, full-text clinical practice guidelines, technology assessments and health information.
5. CINAHL- Source of information for the professional literature of nursing, allied health, biomedicine, and healthcare in general.
6. WorldCat- A network of library contents and services.
7. Gartner for IT Leaders-

The team also reviewed the series of websites of organizations that play a leadership role with health IT adoption and health systems issues. These organizations and websites include the Health Information Management Systems Society (HIMSS), the American Medical Informatics Association (AMIA), the Medical Group Management Association (MGMA), the American Academy of Family Practice (AAFP), the American Health Information Management Association (AHIMA) and the eHealth Imitative (eHi) as well as sites that have information specific to health center and health center issues such as HRSA, the National Association of Community Health Centers (NACHC) and state-level primary care associations.

Beginning search terms were defined broadly to include "health centers", "federally qualified health centers" or "health center networks" crossed with various health IT or HIE technologies, components or concepts including but not limited to "EMR", "EHR", "CPOE", "e-Prescribing", "Return on Investment", "IT strategy", "master patient index", "record locator service" among others. As was the case with the 2003 environmental scan, the primary technique for identifying relevant sources was "snowballing" in which the bibliographies or citations from sources were examined to identify additional relevant sources.

In addition to a systematic review of peer reviewed and gray literature on relevant topics, NORC organized a series of discussion meetings with HRSA grantees to capture their experiences adopting and implementing various clinical applications; get insights on how they calculate the value or benefits of their investment; and the obstacles they faced pre and post implementation. In total 14 individuals from grantee organizations, all of which were safety-nets, attended and contributed to our knowledgebase. Finally, much of the content of this report is informed by NORC's ongoing work to promote health IT adoption among safety net providers as a key research and technical assistance contractor to HRSA's Office of Health IT (OHIT) as well as detailed findings from the study on safety net provider use of health IT conducted by NORC for ASPE between 2003 and 2005.

Key Findings from the Environmental Scan

In this section we outline findings from the activities outlined above around the key topical areas that could be addressed as part of this report. We note that there are some research questions that are relevant for the study overall, that could not be addressed as part of the environmental scan due to the lack of existing research or material covering the topic. These topics as well as further exploration of the topics discussed as part of our findings are described in a subsequent section which relates to hypotheses to be explored as part of the site visit portion of this study.

Existing Data on Health IT Adoption

Current research suggests that adoption of health IT among health centers remains uneven. Until very recently, no nationally representative sample compared HIT adoption rates of community health centers to other types of providers.[1] To date, health centers have embraced electronic disease registry software with roughly 90 percent having some sort of disease-specific registry and approximately 80 percent using electronic patient registries as a part of HRSA's Health Disparities Collaboratives.[2] Despite the widespread adoption of electronic patient registries, adoption of other forms of health care information technology remains low.

Electronic Health Records. EHR adoption among health centers trails physician practices, outpatient hospitals and hospital emergency rooms significantly.[3, 4] Data from 2004 indicate that 75 percent of health centers report not having EHRs, while 16 percent have a partial EHR (partly paper-based), with the remaining nine percent of health centers having full EHR functionality.[5] Further analysis suggests that 13 percent of health centers meet the minimum standard of EHR functionality, as defined by the national health IT adoption initiative.[6] These statistics, taken from the single representative survey of community health center HIT adoption, prove what many presumed: community health centers significantly trail other medical practice settings in adoption of Health IT generally and EHRs specifically.

Despite their relatively low adoption rates, a majority of community health centers plan to implement or update EHRs in the near future.[7] This willingness to embrace health IT suggests that community health centers face barriers to adoption outside of their immediate control. Survey data ranks lack of capital, problems integrating EHRs with billing and claims systems and concerns about loss of productivity or income during the transition to EHRs as the three primary barriers to EHR adoption for health centers.[8] Survey data also suggest that patient mix characteristics are the most significant factors in determining EHR adoption rates. Those centers serving disproportionate numbers of uninsured and low-income patients are less than half as likely to have implement EHRs.[9] Those centers with less certain revenue streams were less likely to have implemented EHRs, corroborating the belief among health centers that capital represents the most significant barrier to adoption.

EHR functionality. The research cited above demonstrates variation in the extent to which health centers use EHR. There are important differences even among the group of health centers reporting some use of EHRs, as on the one hand, EHRs may simply represent electronic versions of a paper chart with no inherent analytic, communications or decision support capacity or on the other hand can represent tools that provide decision support at the point of care, electronic communication of orders to appropriate parties and advanced reporting and analytic capabilities. One study found certain common functionalities between those health centers reporting EHR functionality. Among the common features of health center EHRs are: electronic patient demographics, computerized prescription orders (e-prescribing), electronic clinical notes, computerized test orders and computerized lab results.[10] Another, smaller study found that few health centers have e-prescribing abilities, while those that do are less likely to use paper at all stages of the prescribing process.[11] This somewhat conflicting evidence suggests that the types EHR functionality being employed by health centers varies and is poorly understood.

Telemedicine. Telemedicine also represents an important health IT application used in some health centers. For instance, health centers in New Orleans parish will soon have access to telelpsychiatry services through a collaboration between the Regional Coordinating Center for Hurricane Response (RCC) and the National Center on Minority Health and Health Disparities' EXPORT Centers.[12] Telepsychiatry initiatives such as this can help increase access to important mental health services in areas lacking clinical specialists.[13] Despite their potential utility to expand access and increase quality of care in community health centers (especially in rural areas), use of telemedicine is generally not widespread.[14] Some site a lack of interoperability with EHR systems as a key barrier to further telemedicine adoption.[15]

Health Center Motivation for Health IT Adoption

Findings described above show that though health centers and other safety net providers may lag behind in terms of actual adoption, there may be increased willingness and interest in health IT among these providers relative to others. Certainly the finding that most health centers have some form of functioning disease registry system in place and have plans to adopt EHRs suggests that they are particularly motivated to use information systems to improve care offered to their clients. Although explicit survey results are not available to give a clear view of health centers' motivations for pursuing health IT, some have speculated about the benefits to them. In the paragraphs below we highlight areas that represents reasons given by health centers for adoption of health IT and aspects of the vision articulated by health centers that are at the leading edge of health IT adoption.

Quality and safety improvement. Among the presumed reasons for health IT adoption are improved longitudinal care, disease management and quality improvement.[16] The imperative to provide high quality care particularly to chronically ill individuals may be higher among health centers given that these are mission-driven non-profit providers whose priorities are set by community based boards with heavy representation from individuals who are served by the health center. Although there are strong theoretical arguments for the importance of health IT in improving quality and safety of care, to date, evidence on demonstrating the role of health IT in improving quality is limited and somewhat mixed.

The greatest advances have been made in areas where health IT is used as a component of a broader quality improvement initiative such as the health disparities collaborative initiated by HRSA for health centers. As part of a larger effort to improve quality, health IT applications such as registries and clinical decision support functionality can improve continuity of care, compliance and follow-up and improve the efficiency with which providers are able to track clinical indicators for patients with chronic illnesses.[17] Similarly, research has demonstrated that health IT systems such as reminders and electronic checks of drug-drug interactions and allergies can plan an important role in reducing medical errors including prescription drug errors.

Availability of grant programs. In addition, it is clear from prior research that health centers are largely motivated to pursue health IT because of ongoing grant and funding opportunities that provide access to resources that can be specifically applied to health IT adoption, usually in the context of health center networks. These grant programs have been detailed in prior reports and include the Healthy Communities Access Program (HCAP), the Shared Integrated Management Information Systems (SIMIS) program, the Integrated Communications Technology (ICT) program and the Integrated Service Delivery Initiative (ISDI). The trend among the federal government to offer grant programs specific to quality improvement through health IT adoption has continued with the institution of HRSA's Office of Health IT which has recently continued to fund grants for health IT adoption, innovation and planning.

Financial motivations. Unlike adoption of administrative software such as practice management systems which can streamline billing, there is limited evidence that health centers are motivated by improvements in third party reimbursement through use of EHRs or other clinical systems. Unlike private providers who are able to improve reimbursement from private payers through more comprehensive coding, the prospective payment approach used by most states to reimburse health centers under Medicaid does not allow for increases in per encounter reimbursement based on more effective coding. [18] In addition, some have speculated that increased adherence to best practices for preventive care and management of chronic illness will actually result in more un-reimbursed costs in terms of the delivery of preventive and diagnostic care that is not adequately reimbursed by Medicaid. While we explore evidence of return on investment later in this report, broadly speaking there is no evidence that health centers believe that adoption of EHRs or other clinical health IT systems will improve financial performance in the short or medium term.

Market motivations. Even though there is no convincing evidence that leads most health centers to believe that adoption of clinical systems will improve financial performance, some have cited potential market

issues as motivation for health IT adoption. In particular, in urban areas where there is dense health center presence, some leaders anticipate the use of EHRs will serve as a differentiating factor that will help the health center attract and retain clients as well as quality health center staff. Some have indicated that as EHR adoption grows largely financed from grant programs, use of EHRs among health centers will be part of the "cost of doing business" for health centers in the near future and that being part of a group of early adopters will improve the health centers overall standing relative to other providers in their community. In particular, health centers suggest that using EHRs to report on improvements in quality indicators can serve as an effective marketing tool for attracting new clients, improving the financial stability of their center and facilitating expansion of their centers over time.

Efficiency gains. Another motivation for health IT for health centers in the current environment involves the promise of being able to improve the efficiency and lower the costs of doing business. Although they do not generally believe that these efficiency gains will be an overall positive return on investment, there is some agreement that in the context of being provided start up funds to implement health IT, there may be benefits in terms of efficiencies in clinical work flow and in managing quality improvement initiatives. Some health centers have indicated that use of EHRs does increase the number of patients that can be seen in a given day by a given provider. Health center experience also suggests that integration of disease registry functionality into an operating EHR can reduce effort that goes into data entry, reporting and tracking of data in a traditional registry. Finally, some health centers have sought out health IT as a means for facilitated communication with other providers including acute care hospitals, clinical laboratories, pharmacies and specialists. While some of this integration occurs through adoption of specific technologies such as e-Prescribing, most of this integration will come through broader HIE initiatives that are discussed in subsequent sections of this report.

It should be noted however, the any efficiency gains from EHR come only after a set period of slower productivity during the roll out and adoption of the system. If properly implemented, the reduction in short term productivity losses can be minimized, however, it remains an important implementation consideration for health centers.

Strategic Factors Influencing Health IT Adoption

In addition to demonstrating a range of motivations for adoption of health IT among safety net providers and health centers, recent research demonstrates a number of strategic factors that represent enablers and barriers to adoption of health IT for health centers. Several of these factors are described below.

Leadership. Previous grant programs have demonstrated the important role that health center leadership teams play in successful health IT implementations.[19] Leaders with extensive backgrounds in health IT and organizational process improvement have often driven health centers to take advantage of opportunities to develop or join networks, collaborate and take advantage of federal grant programs to pursue investments in health IT. While some of these investments, such as the institution of practice management systems and streamlined billing through central business offices are seen as self sustaining and increase revenue for participants overall, other investments such as those focused on clinical systems such as EHRs are not viewed widely as self sustaining financially and the motivation to purse them relies largely on the ability to leverage dedicated grant funding. In addition to the ability to effectively pursue and secure grant funding, leadership has proven critical in successfully overcoming challenges associated with limitations in staffing, need for improving basic infrastructure, vendor and consultant selection, management of buy-in from clinicians and key stakeholders, project management and recruitment of health centers for network-based efforts.

Clinician and Administrator Buy-in. Previous research shows that one of the most important roles of IT leaders among health centers is securing buy-in for health IT investments from key stakeholders including the board of directors, executive leadership and, perhaps most importantly, clinicians.[20] While health IT initiatives are often funded as special grant support projects, they do almost always require infrastructure

investments and shifts in priorities the affect the basic budget and staffing of the health center and cannot succeed without the commitment of executive leadership and the board of directors. In addition, it has most health centers contend that development and implementation of clinical systems such as EHRs should involve extensive involvement from chief medical officers and other members of the clinical leadership team. Ideally, detailed definition of requirements around clinical tools such as reminders or inclusion of quality guidelines should be driven by clinicians themselves and the design of systems should rely on extensive usability testing with the actual providers who will be asked to work with the system on a daily basis.

Staffing and Access to Expertise. Staffing represents a significant challenge for health centers implementing new technology. While 59 percent of health centers report having a dedicated health IT staff person, one person is often not sufficient to a handle the challenges of a full implementation.[21] The ability to leverage experts from across a group of health centers is one of the central benefits of using a network model for health IT adoption, and some initiatives have benefited from the ability to assemble volunteer committees of "mission-driven" clinical, administrative and technical staff from across a health center or a group of health centers to lead health IT implementation initiatives.[22] Such a committee could effectively negotiate the interests and requirements of all staff members, providing support and reevaluation throughout the implementation process. Other models rely on using increased investments to bring on new staff to handle IT implementations. As financially constrained as health centers may be, the possibility of being treated unfairly by a vendor or mismanaging the IT selection process led many health center grantees to conclude that expert staff should be hired at the earliest stage possible.[23]

For many health centers, it may be easier or more cost efficient to contract with an external consultant or vendor to handle health IT implementation. However, some health centers caution against this, asserting that only leadership within the organization can make the difficult decisions and build the buy-in necessary for a successful implementation.[24] Further, these grantees found greater success in cases where leaders articulated a clear vision and had a plan to adapt to the changes brought by the new technology.[25]

These differing approaches highlight the important role health center staffing plays in implementing new technologies. Health centers increasingly employ full-time staff to handle information technology needs, yet the implementation of new clinical or administrative technology solutions requires a new commitment of staff resources. Some have managed the process through committees, seeking buy-in from all levels and divisions of the health center. Others have advised hiring new staff early in the process to ensure a smooth transition. While these differing approaches offer no clear path, they do reinforce the important role played by health center staff and leadership at every step of the implementation process.

Planning in the Context of an Implementation. Grantee health centers that have implemented health IT in the past strongly emphasize the importance of planning in implementing new technologies. Planning may include a number of discussions, ranging from strategic planning, business and financial planning and plans to handle organizational change.[26] Previous experience suggests that carefully confronting each of these issues through systematic planning will maximize the benefit of technological innovation.

More specifically, clinics must settle and consider a number of key topics before moving forward with implementation. Defining technological requirements represents a significant first step in the planning process.[27] Early-adopter clinics found it very easy to select the supposed industry standard in choosing between IT vendors. In reality, any application selected will require substantial modification before it is able to adequately meet the requirements of any given clinical setting.[28] In this way, requirements development presents itself as an important first step. This is especially true for health centers, whose needs may differ from other types of health IT purchasers and may often differ among themselves. Careful consideration of the available options and their long-term consequences will undoubtedly prove useful as the implementation process continues.

Additionally, many health centers found that business and financial perspective positively contributed to their health IT planning processes. Using a business plan can help health centers to account for continuing

maintenance costs for health IT.[29] Further, taking account of business and financial implications can make grantees more appealing to external funding sources.[30] Although many health centers do not currently use business plans, using such perspectives can make planning more comprehensive and accurate in the long-term.

Health centers have also emphasized the importance of planning for the organizational change health IT often brings. Often, health centers fail to anticipate the affect health IT will have on all staff members including receptionists and other support staff.[31] Other health centers found that creating an organization-wide plan for change can help to create buy-in. Further, including the entire health center in planning can help to maintain buy-in when implementation has unexpected or negative effects.[32]

Significantly, previous research indicates that small and mid-sized clinics often cannot devote the time and resources needed for health IT planning.[33] Additional research has not supported or contradicted this pattern, suggesting an area for further investigation. In this way, planning amounts to a crucially important first-step toward preparing health centers for health IT implementation. Previous experience shows that requirements development, the use of business planning and anticipating organization-wide changes all play an unexpectedly significant role in health centers' planning processes.

Prioritization and Long Term Financing. While there is evidence that health centers and health center networks have made important strides in all the strategic areas described above, the changing nature of information technology makes it exceptionally difficult for health centers to set clear, attainable priorities.[34] Health centers must constantly reevaluate their information management systems, deciding whether or not to implement an entirely new system or upgrade an existing system to meet their goals.[35] In addition, while dedicated federal grant programs seem to be available at the moment, health centers that are making investments in health IT using these grants do not necessarily have a viable path for maintaining achieving sustainability in the absence of these grants, without significantly altering their approach to network formation to include private providers or reducing the emphasis on use of systems for quality improvement and focusing only on the aspects of health IT that improve efficiency and third party reimbursement. While anecdotal evidence suggests that health centers are increasing their investments in IT overall, many IT staff at health centers still maintain that the level of investment in IT that is allowed is small relative to IT investment for private practices of similar scale due to limited operating margins and restrictions in the use of Section 330 grant money for long term infrastructure improvements that cannot be directly linked to patient care.

Health Centers' IT Environment

In this section we outline findings from prior research that elucidates the basic IT environment in which health centers operate and the relationship between that environment and their ability to effectively adopt health IT and participate in HIE. Unlike the earlier section of this report which focuses on evidence regarding adoption of EHRs and clinical applications specifically, in this section we discuss available evidence regarding infrastructure, use of non-clinical applications and other aspects health center IT.

Hardware and connectivity. The little research that exists cataloging the hardware infrastructure of health centers suggests that the majority of health centers rely on a skeleton approach to IT infrastructure purchases in many cases using outdated computers and not investing in high speed or highly reliable connectivity. If given the option of piggy-backing off of an existing network infrastructure at an affiliated hospital or public health department, we have found that health centers often take that route rather than investing in their own capacity.

In addition to overall limits in resources available, health centers are further constrained due to limits on the use of grant funding for capital investments such as computer hardware and servers. Despite the difficulty in financing hardware purchases, recent research indicates that health centers have managed to adopt a basic, functional computing infrastructure.[36] Moreover, many clinics have broadband internet connectivity, although firewalls and a lack of serious IT support limit utility.[37] Additionally, email access

and access to IT at the point of care remain low among health centers.[38] While health centers do have internet access and computer hardware, other issues prevent them from realizing the benefits of these technologies. Specific types of safety net providers may experience greater hardware and connectivity barriers. For instance, roughly half of a sample of Indian Health Service (IHS) staff that work with health centers and other safety net providers funded by IHS feels that technical limitations of computer hardware (including slow response times) would significantly limit the utility of EHRs in their care settings.[39] This finding highlights the uneven state of computer hardware utility among community health centers and other safety net providers.

Non-clinical uses of health IT. Health centers report wide spread adoption of IT for billing, practice management and accounting functions. In fact, evidence suggests that health centers have taken great strides in the use of information systems to support non-clinical functions.[40] [41] Most often, health centers use administrative applications for billing (both payable and receivable), patient scheduling and payroll functions. [42] [43] Like their counterparts in other care settings, health centers and other safety net providers clearly see the value of information technology in administrative and business functions.

Interfaces and use of standards. A core feature of the IT environment for many health centers that have made investments in health IT has been the need to develop interfaces to facilitate exchange of data between disparate systems. This is especially true for health centers that attempt to populate patient registries or EHRs using their practice management system or health centers that seek to participate in community-wide collaborations such as the development of data warehouses to track care to a broader population. While the need for development of extensive interfaces may be reduced through the use of standards for exchange and data sharing, there is little evidence that health centers consider use and adoption of standards as a critical feature in purchasing health IT applications.

Health Center Network Models

An important area of focus for the current study is examining health center controlled networks that have used a collaborative model to implement health IT. As we demonstrated in the earlier study conducted by NORC for ASPE, many health centers operate in a network of fellow health centers. Networks offer individual centers a number of advantages, allowing them to identify priorities and represent themselves to external parties.[44] Further, networks can help train clinic staff, manage data and realize administrative efficiencies.[45] Each of these services and functions allow individual centers to benefit from economies of scale and collaboration not readily available in traditional clinic settings.

Range of services offered. In our last study we extensively documented differences in variation in various network models employed by health centers collaborating for health IT adoption. Among the greatest areas of variation was in the range of services offered by networks. In most cases, the services offered by networks reflected the original motivation for network development, the financial means employed to sustain the network and the level of need articulated by individual health centers that made up the network.

Because many health center networks formed originally during the mid-1990's out of an interest in achieving economies of scale among health centers in a specific state or local area and reducing administrative costs as Medicaid moved to managed care models for reimbursement, collaboration on financial and administrative issues continues to be a focus for many networks. These collaborations include joint purchasing of basic administrative resources, centralized billing or accounting systems and, in some cases, centrally managed practice management software.

As new funding for instituting clinical improvements through disease management programs or health IT adoption became available from HRSA in the late 1990's and early 2000's many existing health center networks sought to elaborate on their existing collaborations by jointly applying for and securing these grants. As the scope of these grants shifted to focus on health IT and practice management or EHR implementation in particular, networks began increasingly to focus on providing members with access to

common software platforms where vendor contracts, requirements and service agreements are handled for a number of health centers on a network level.

Level of centralization. Health center networks vary considerably in terms of their level of centralization and we found that this variation is dependent heavily on the perceived needs of health center members and their comfort with devolving core functions from the health center to a network. For example, we found health center networks where a single individual served as chief financial officer for a group of health centers that all shared a common billing office and accounting infrastructure. Under this scenario, each health center had to trust that the network's approach to billing was consistent with the priorities of each member health center and that there was significant efficiency in working through the network rather than keeping this function in house.

In terms of IT applications management, we found that some networks were able to work as a type of application services provider (ASP) for their health centers which allowed them to host all health center data and software on a single centralized server and required only a basic computing infrastructure on the health center site. In other cases, networks were able to encourage some level of collaboration among health centers, but this collaboration fell short of joint adoption of specific software programs or devolution of functionality from health centers to networks. In these cases it was unclear if a closer more centralized collaboration would be possible over time or if health centers saw real risks to closer association with a network.

Basis for collaboration. As health center networks have evolved over the last 10 years to focus increasingly on provision of information systems and applications, there is some evidence that the basis for collaboration has shifted. For example, while health center networks originally were built around the idea of collaboration within an existing local, state or geographic region and this proximity was desirable because of the desire to work with others with similar patient populations, state regulations and Medicaid reimbursement rules, increasingly with the networks that focus on providing access to systems applications and data that are centrally maintained we are seeing nationwide health center networks. Increasingly the decision to join a network and which network to join hinges on how a given health centers individual needs and culture matches with the member dues, user fees, services and IT applications offered by a particular network. We are also seeing networks actively market their long term relationships with specific vendors as a rationale for health centers to join their group. Competition among networks and marketing to unaffiliated health centers will likely increase as established networks seek to move from dependence on grant funding to sustainability through member dues and user fees for a larger and larger consortium.

Vertical integration and Health Information Exchange. While there are some examples of health center networks that are affiliated closely with acute care providers and active in the area of health information exchange (HIE). Our experience to date suggests that the majority of health center networks are vertically oriented collaborations of similar providers working together to achieve core functions in a cheaper or more effective manner.[46] While collaboration in HIE is a natural next step for the most advanced health center networks we have found limited evidence of active HIE involvement among health centers to date.

Role of networks verses health center staff. Along with the added services and benefits that health center networks offer, considerable shifts in organizational culture and staff roles can make collaboration somewhat more complicated. For instance, networks can bring new technological capacities to their member clinics, offering them support and purchasing power they might not have on their own. However, networks have not been shown to create the clinic-wide change necessary for successful health IT implementation.[47] Rather, health center staff must champion new technologies to ensure a successful implementation for the clinic.[48] In this way, health center networks provide the resources, capacity and organization that individual clinics may lack, yet the will to change and daily staff support often falls to health center staff.

Additionally, health centers may not be adequately staffed for collaboration with a network. In practice, health center networks must often bring in a more senior staff member to coordinate between health centers, creating a staffing need at the network level.[49] Further, health center staff may be ill-equipped to handle the technology and other changes brought by network participation, creating a need for different or additional staff at the clinic level.[50] Early experience with Health IT implementation and network collaboration suggests that the dramatic changes brought by each require equally significant reactions by both networks themselves and individual clinics.

Return on Investment and Sustainability

There is an increasing pressure on healthcare organizations to invest in information technology amidst continued speculation as well as growing evidence on the benefits of IT in improving quality of service, boosting patient safety, and increasing efficiency and timeliness of care. The proponents of health IT, including IT and patient safety advocacy groups, have gone as far as to hail health IT as the ultimate savior of the U.S. healthcare system. As enticing and feasible as the idea of efficiency and quality improvement through IT adoption may sound, healthcare executives have been asked to adopt technology with caution[51] — the reasons being large initial costs and mostly non-quantifiable returns. The stakes are particularly high for health centers that have very limited resources and numerous competing priorities.

A traditional ROI analysis weighs the financial impact of operating expenses with the revenue gains from service delivery.[52] However, in healthcare, benefits of clinical applications are usually found in cost avoidance and service improvement rather than revenue enhancement, making it less measurable.[53] Due to much "variability and uncertainty" at the point of service in healthcare, identifying ROI poses special challenges.[54] Calculating ROI from billings and scheduling systems used by most business industries is relatively straightforward compared to returns from clinical and decision support applications that are unique to health business. The latter may produce more soft returns than concrete numbers.

With Health IT, hospitals and health centers can incur savings in the areas of patient safety, administrative costs of maintaining paper records, billing and overall efficiency. [55] [56] [57] Such benefits were experienced by a community hospital which prevented the administration of over 1,200 wrong drugs/ dose and around 2,000 early/extra doses using bar code technology and wireless scanners in a year. [58] The monetary value of the errors that were prevented was almost $850,000. Other forms of soft returns may include higher patient and provider satisfaction, better disease management and coordination of care, among others.[59] Applications such as electronic health records (EHR) are especially important for vulnerable and transient populations (like Hurricane Rita/Katrina victims) who could benefit from Health IT in maintaining records and stability.[60]

Findings case studies and interviews with healthcare executives across the country have emphasized that evaluation and measurement of IT investment must go beyond financial performance and focus on outcomes and performance.[61] Some hospitals and clinics have taken this approach and calculated its ROI in terms of population health status. Such is the case of a health centers in New York City which implemented an EHR system and calculated its returns in health outcomes as opposed to financial gains. They stated that their system's computer alert system led to the pneumonia vaccination of 90% of 65+ patients in their community; reduced medical errors; and protected health of the public by transmitting anonymous data to NY Department of Health for syndromic surveillance.[62]

While there is a plethora of studies on the ROI from IT applications in other industries, very limited information is available in regard to the healthcare industry. Furthermore, the body of literature citing a positive return on investment is largely anecdotal and infrequently published in peer-reviewed journals.[63] Robert Wood Johnson Foundation, George Washington University Medical College and International Health Programs jointly conducted an environmental scan and found that data currently available on the returns on investment from EHR adoption among physicians, physician groups and hospitals is limited

and variable.[64] The gap is especially severe for other clinical applications and among providers that disproportionately serve vulnerable populations, such as health centers and public hospitals.

However, there have been some efforts in filling this gap in the recent years. Studies on the individual provider level and on certain clinical applications have documented attractive returns. For example, Brigham and Women's Hospital (BWH) assessed the costs and financial benefits of their Computerized Provider Order Entry (CPOE) system over ten years. The BWH spent $1 1.8 million to develop, implement, and operate CPOE system which generated cumulative net savings of $16.7 million and net operating budget savings of $9.5 million given the institutional 80% prospective reimbursement rate.[65] Another success story is that of University of Rochester Medical Center which implemented EHR in its ambulatory offices and had a positive ROI with total annual savings of $393,662, recouping the initial costs of investment in 16 months.[66]

Primary Care Partners, P.C. experienced the reduction in the overhead costs by 6% the first year of use of its newly implemented EMR. The estimated savings were of about $60,000 per year with estimated savings of over a half million dollars since 1993.[67] On the industry level, a comprehensive analysis to examine the potential health and financial benefits of health IT showed that moving the U.S. health care system to broad adoption of standards-based EMR systems could dramatically reduce national health care spending. Effective EMR implementation and networking could eventually save more than $81 billion annually by improving efficiency, safety, and that health IT-enabled prevention and management of chronic disease could substantially increase both the financial and social benefits. [68] However, this overhaul has to be complemented by a number of system-wide changes.

While there are some positive experiences of health care organizations with health IT, there are studies that have reported mixed results across applications and across the industry. For instance, the value of EHR in terms of hard revenue to health centers has been reported to be varied, mostly going into financial losses but experienced substantial quality improvement (QI) gains. One study on EHR implementation in health centers in six states (NY, TX, HI, WA, FL, and NH) found that most or all of the studied health centers studied incurred net financial losses from EHR due to high initial and ongoing EHR costs but documented considerable improvements in quality.[69]

To add to the knowledgebase on health IT ROI in health centers, NORC held meetings with a number of HRSA grantees to capture their experiences arming their services with IT and insights into documenting the value or benefits from their investment. Some of the attendees expressed that their investment in IT systems is primarily for improving quality of care and that financial returns were secondary. One grantee stated that health centers have a lot to gain from IT investment as they have an enormous amount of information and that information could be made available at finger tips. With clinical applications such as EMR, the needed, comprehensive information can be made available in the most efficient and cost-effective way.

One of the grantees in New York went into EMR knowing that they will not incur financial gains, and expressed that it was problematic with the funders as well as their institutional board. Instead, they laid down returns in terms of quality of care and empowering patients and providers. A lot of the community health centers have similar woes and more often than not their proposition to implement health IT gets ignored. Some of the meeting attendees also explained that there are a lot of costs associated with IT implementation that are not always foreseen, such as ergonomic issues while housing EMR systems. Reorganizing office space to make the machines accessible, creating server rooms and buying air conditioners are some of the sources of additional costs.

Securing buy-in from stakeholders, community partners and funders is one of the major obstacles that health centers face. Limited financial resources along with the difficulty in making business case for investment in IT makes health IT adoption among health centers an uphill battle. While the huge portion of implementation costs is incurred during the initial phases, maintaining the system and continuous training of the workforce are integral. In addition to demonstrating a positive ROI, sustainability is

another burning issue. With initial cost estimates for an EHR from $33,000 to $64,000 per participating physician, and monthly maintenance costs ranging from $1,500 to $1,750 per physician[70] [71] sustaining the system without negatively affecting the bottom line is a major challenge for safety net providers. Sustainability of HIE efforts hinges on the overall competence of management teams.[72] Internal resources (superusers) and external resources (such as vendors) play an important role in sustaining HIT within health clinics.[73] Amidst a number of challenges, including limited resources and difficulty in demonstrating ROI, which health centers face in adopting health IT, the advent of pay-for-performance in reimbursements may act as an impetus in adopting EHRs.[74]

Impact of Health IT and HIE on Patients and Populations

While return on investment may not be a primary motivator in health center adoption of health IT, other benefits such as individual patient outcomes, quality measurement, patient safety and the ability to closely monitor population health could provide significant benefits to the health center community. In the case of individual patient outcomes, very little has been done to clearly establish acausation between technological innovations and changes in patient outcomes. To date, very few studies have been conducted on this matter and many in the field remain skeptical of the impact health IT and HIE may have at this individual level.[75] However, in one case some clinical outcomes (blood pressure and HgbAlc measures) showed improvement after implementing an EHR.[76] Despite these positive results, a clear body of literature linking health IT and HIE with patient outcomes is not available.

Rather, health IT and HIE do have more clearly positive impacts on other important areas for health centers. Most notably, quality and measurement stand to improve greatly from the implementation of new technologies and data exchanges. Health centers that have implemented health IT systems think of them as ways to improve quality of care, much like patient registry systems many have implemented in the past.[77] Additional research indicates that providers' perceptions of quality improvement tend to increase with actual usage of health IT systems.[78] This finding suggests that as providers gain exposure to and experience with Health IT systems, reports of quality improvement may increase.

Other studies have shown a more direct benefit, albeit outside of community health center settings. The literature suggests that Health IT has contributed to quality improvement most directly by increasing attention paid to preventive care.[79] health IT has been found to increase adherence to clinical guidelines for both primary and secondary preventive care, in some cases notifying providers of high-risk patients.[80]

Others have speculated about the potential impacts health IT could have on quality of care. For example, health IT could make additional health information available to providers through electronic medical records. This could allow providers to make more informed decisions when considering care options.[81] Additionally, health IT could greatly enhance public health reporting, an area in which community health centers could make a significant contribution.[82] Not all are convinced of health information technology's potential to increase quality of care. A significant minority (39%) of Indian Health Service staff felt that EHRs reduced the quality of patient-provider interactions.[83] While this represents an important point to be addressed, it should be noted that respondents also felt health IT had the potential to increase quality in underserved populations generally, with other quality improvements potentially off-setting reductions in patient-provider interactions.[84]

The findings presented suggest that health IT and HIE have created some quality improvements in care settings. Community health centers face unique challenges in realizing those benefits, yet health center staff themselves indicate that health IT has great potential in their settings. Removing financial and organizational barriers will undoubtedly produce more literature to add empirical evidence to the ubiquitous perceptions of quality improvement.

Health IT has also shown promise in improving patient safety. Various studies show that the use of health information technology significantly decreases adverse medication events (AMEs) and medication errors.[85] More specifically, computerized physician order entry (CPOE) has been shown to reduce adverse

medication events and medication errors.[86] While little evidence connects these findings with better health outcomes, reducing AMEs and medication errors undoubtedly improves the quality of care and contributes to improved health indicators. These findings have not gone unnoticed by providers. Increases in patient safety rank among the leading motivators for health IT adoption in various states and hospitals.[87] [88] Community health centers also stand to reduce medication errors, adverse mediation events and generally increase patient safety through use of health IT.

Further, health IT can contribute to more direct and timely monitoring of population health. Moving toward a paper-less system allows more complete record keeping and reporting, ultimately improving quality of care in settings that have implemented health IT.[89] Additionally, specific populations such as migrants, non-English speakers and the homeless can be clearly identified through interoperable practice management and EHR systems.[90] health centers have shown specific improvements in monitoring population health, benefiting from patient tracking functionality and follow-up notifications.[91] [92] In this way, health centers have shown that HIT can appreciably improve population health monitoring, a finding that many other health care settings have supported.

Future Program and Policy Implications

Although few studies have been conducted that specifically address the way health centers and safety net providers interact with health IT, some evaluative reports offer insights into the problems they have encountered and potential solutions moving forward. Subsequent phases of the current study will seek to expand upon the literature summarized above and inform policy makers, safety net providers and program officials seeking to facilitate health IT adoption and HIE involvement among safety net providers. While a number of ongoing programmatic initiatives to fund health IT adoption and provide technical assistance to funded projects is underway, the most critical questions of how to encourage models that will most directly and significantly improve the health and health care available to underserved Americans and that will be self-sustaining over time remain. In addition, it is unclear if existing initiatives and programs can be expanded or adjusted to meet the objectives of health IT and HIE adoption and use or if more significant changes in health care reimbursement and safety net support are required to achieve permanent improvements through use of improved systems. In the paragraphs below we highlight some of the program and policy issues that we will address in subsequent phases of the study.

Implications for health center decision making. As federal government continues to sound the call to adopt health IT and get involved in HIE, many health centers find themselves in the dilemma of how to move forward with initiatives whose financial implications are unclear. While health centers seem largely bought into the relationship regarding practice management systems and greater billing efficiency and overall financial benefit, they are increasingly aware that "Models based on private sector economics and return on investment will likely not apply" to health centers.[93] While there is some evidence that clinical applications can produce significant improvements in efficiency, which in-turn improves cost efficiency[94], there is no solid evidence on the potential size of savings or how those savings compare with the cost of implementing health IT. This can be a very important consideration for health centers which often face financial constraints and barriers. A central goal of the remainder of this study will be to develop a framework that can be used by health centers and others to consider and track costs and benefits associated with health IT adoption in financial terms.

Implication for grant funding decision making. Consistent with suggestions from the literature, funding to date for health center and safety net adoption for health IT has focused on encouraging collaboration between health centers and safety net providers to form networks.[95] [96] Grant funding targeted at collaboration has empowered health centers to build capacity among themselves. However it is unclear whether these efforts will allow health centers to sustain the benefits of health IT even after direct funding runs out. During the remainder of the study we will explore additional directions that grant funding may go to improve the likelihood of the long term success and sustainability of health IT and HIE initiatives, with particular focus on needs with respect to technical assistance and the potential for other types of

investments, such as capacity building or staff development grants to contribute to health center needs in this area.

Appropriate role for non-health center participants. While research to date has focused on the role of the federal government and Section 330 funded health centers, there is a clear need to explore the appropriate role for other providers and entities. For example, state entities play an important role in fostering health IT adoption and implementation among health centers. In many states, the Governor's Office and/or the Department of Health have taken a leadership role in state-wide health IT efforts.[97] Such initiatives must include and actively engage health centers to ensure that all providers and all patients are included in state-wide programs. Others have made more specific recommendations, arguing that health centers should be included in all health information exchange legislation and that they be connected to all local, regional and state health department data systems.[98] These sorts of connections may encourage safety net inclusion in HIE over time and will be explored in the remainder of the study.

Reimbursement and payment policies. Finally, health IT financing and reimbursement policies may determine the levels of adoption for safety net providers. Much of the literature notes that health centers rely heavily on public funding, with Medicaid providing the highest percentage of center revenue.[99] [100] This means that public policies and reimbursement decisions ultimately determine whether or not all health centers have capacity to implement new health IT. Recent discussion has focused on and advocated a clear role for state and federal governments. In the eyes of many, payment policies at all levels of government must change to support the adoption and ongoing costs of health IT for community health centers.[101] [102] [103] [104] [105]Others go further suggesting that without specific health IT funding for health centers, another digital divide will be created between providers, ultimately affecting the degree to which health centers can further reduce health disparities.[106] [107] As these passionate commentaries suggest, health center adoption of HIT largely rests in the hands of state and federal policy makers. Grants and pilot programs can bring some health centers into the digital age, yet clear and decisive action by government officials is required for wider adoption.

Outstanding Research Questions

We conclude this report with a set of hypotheses to be explored in site visits represent the subsequent phase of this study. We look forward to discussing these hypotheses with ASPE and refining them as we move forward with site visit selection and conduct in person meetings with health centers, networks and other stakeholders in six locations around the United States. We note that these are not the only areas of inquiry that will be pursed as part of site visits, but these hypotheses will serve as the core areas for investigation with health centers, health center networks and other stakeholders.

Hypothesis 1: Market forces are increasingly playing a role in motivating health centers to adopt health IT and participate in HIE. Although health center adoption of health IT continues to be motivated by the mission to provide the highest quality of care to vulnerable populations, increasingly health centers view health IT adoption as a necessary component of doing business to continue to attract and keep patients as well as clinical staff.

Hypothesis 2: Even the most advanced health centers in terms of health IT adoption are just now incorporating systems to see gains in quality improvement. While our initial study suggests that early adopting health centers did experience anecdotal improvements in quality of care measures following health IT adoption, we know that health IT adoption does not automatically lead to quality improvement in the absence of dedicated programs to design appropriate clinical decision supports, report on process and outcomes measures and communicate those measures back to providers.

There is also the problem that prior to EHR adoption, many health centers may have not had data on pre-implementation baseline outcomes for which to compare their post-EHR data. Health centers that were early adopters in the first half of this decade may just now be at the point of being able to point to and

publish improvements in quality. In addition, the most advanced health centers are just now being able to replicate registry functionality using EHRs.

Hypothesis 3: The most important obstacles to adoption continue to be lack of leadership, expertise and resources. Although grant programs to support health IT adoption persist and a new set of organizations have been awarded funding, we may find that it is largely the same group of health centers and networks that are in greatest position to leverage these available funds. Leadership and expertise among health center staff is still in limited supply and these are the essential elements to being able to successfully move collaboration, planning and implementation tasks forward.

Hypothesis 4: New resources such as CCHIT vendor certification and the HRSA health IT toolbox are making a difference. Although the vendor environment continues to be dynamic and muddled, health centers increasingly feel that they have some basic trusted resources to start with when starting out with a health IT implementation project.

Hypothesis 5: Network model continues to be the most reliable avenue for health centers to pursue health IT. While there are still example of health centers and safety net providers that "go it alone" with respect to health IT adoption, the majority of successful health center EHR adoptions occur in the context of network-based collaborations with other health centers. HRSA's effort to promote networks is having an impact on the way health centers think about systems implementation even as they have incentives from increased Section 330 funding to expand as individual health centers as well.

Hypothesis 6: Established networks are increasingly focused on marketing and recruiting new members in order to maintain sustainability. At the time of our initial study, health center networks were largely geographically defined associations of health centers that were based on voluntary membership and relied on grant funds to minimize user fees and membership dues, as they move towards self-sustaining models, health center networks are becoming more aggressive marketers of their services looking to attract new members and heavily subsidize operating costs based on user fees and membership dues. As such networks are likely to be increasingly seeking to differentiate themselves based on the quality of software applications they provide for their members (practice management and EHR) as well as maintenance, other services and price. Geographic boundaries are no longer important particular for ASP-type networks.

Hypothesis 7: Network models continue to evolve, but the more centralized models are most effective and have the best opportunities to expand. At the time of our initial study we found great variation in the level of centralization that networks were able to achieve. Today, we may find that even as health center networks look to differentiate themselves from a marketing perspective, they are increasingly centralized following the more successful models from earlier in the decade. Established networks are even better at building the trust among health center members necessary for achieving significant gains through shared expertise and administrative functions.

Hypothesis 8: Health centers are a long way away from being able to accurately identify costs and benefits associated with health IT adoption and a framework will represent significant value add. Even those health centers pursuing health IT do not have a comprehensive sense of the costs of adoption. Even when hard costs such as hardware updates, software licenses and upgrades and increased staff or consultants are known soft costs associated with lost productivity during implementation and training, planning and work flow re-assessment are not closely tracked. In addition, benefits are only loosely defined currently and are also not assiduously tracked.

Some health centers working under grant funding with strict timelines and deliverables have indicated that they do not have ample incentive to currently comprehensively track costs and benefits. In addition, costs and benefits can be highly variable depending on the specific circumstances (e.g., which network is chosen by a given health center). As such, developing a framework for identifying and enumerating costs and benefits will represent a significant value add for health centers, program officials and policy makers.

Hypothesis 9: Health center networks are aware of standards discussions and are keeping an eye on HIE, but are not yet active participants in HIE. Even as the most entrepreneurial health center networks are taking a leadership role in state and regional HIE efforts, it is likely that most health center networks are still focused on providing value add by improving processes, care delivery and administration at the health center level, though there may be limited exchange of data with laboratories, pharmacies and even hospitals for the rare examples where there is a link to acute care providers.

Hypothesis 10: Barriers to health center adoption of health IT will require innovative evolution of a range of programs, policies and regulations. While existing grant and technical assistance programs provide a value service in terms of promoting awareness and providing initial funding to get networks and health IT projects "off the ground", creating sustained improvements in quality and access via health IT will require a broader set of initiatives that look at reducing the barriers to health center use of Section 330 grant funds to invest in infrastructure, dedicated investment in professional development and leadership training for health center administrative, technical and clinical staff and a path for increasing reimbursement for health centers that are able to demonstrate that their level of care to Medicaid beneficiaries is enhanced following health IT adoption. It will also require greater integration between health center networks and State-level HIE initiatives and Medicaid offices.

Hypothesis 11: EMRs are not right for some health centers. Some thought leaders have recently suggested that the promise of EMRs is oversold and that many health centers and similar safety net providers are not at the stage where they can benefit from adoption. Furthermore, they suggest that implementation of more robust quality assurance practices facilitated by more targeted applicatiosn such as disease registries may be the best way to proceed.

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Potential Site Visit Locations

Site	State
Alaska RHIO	AK
Alaska Tribal Health System Multi-Facility Integration (MFI)	AK
Central Peninsula Health Information Network	AK
Birmingham Health Care, Inc.	AL
Mid-Alabama Information Network (MAIN)	AL
Gulf Coast Health Information Task Technology Force (GCTF)	AL, LA, MI, TX
CHC Collaborative Ventures, Inc.	AZ
EL RIO SANTA CRUZ NEIGHBORHOOD HEALTH CENTER	AZ
Health-e Connection	AZ
Alliance for Rural Community Health	CA
ASIAN HEALTH SERVICES	CA
ASSN OF ASIAN/PACIFIC COMM HLTH ORGANIZATIONS	CA
California Regional Health Information Organization (CALRHIO)	CA
CLINICAS DEL CAMINO REAL, INC.	CA
Community Health Alliance of Pasadena	CA
Community Health Center Network	CA
Council of Community Clinics	CA
Darin M. Camarena Health Centers	CA
eHealth Connecticut	CT
La Clinica de la Raza	CA
Lifelong Medical Care	CA
Long Beach Network for Health	CA
Mendocino	CA
North Coast Clinics Network	CA
Northern Sierra Rural Health Network	CA
Redwood Community Health Coalition	CA
San Francisco Community Clinic Consortium	CA
Shasta Community Health Center	CA
SOUTH CENTRAL FAMILY HEALTH CENTER	CA
T.H.E. Clinic	CA
Tiburcio Vasquez Health Center	CA
Venice Family Clinic	CA
Colorado Community Managed Care Network	CO
Colorado Regional Health Information Organization (CORHIO)	CO
UNITY HEALTH CARE, INC.	DC
Delaware Health Information Network (DHIN)	DE

Henrietta Johnson Medical Center	DE
COLLIER HEALTH SERVICES	FL
Community Health Centers Alliance, Inc.	FL
Family Health Centers of Southwest Florida (member of HCN)	FL
Florida Health Information Network (FHIN)	FL
Health Choice Network (HCN)	FL
GEORGIA ASSOCIATION FOR PRIMARY HEALTH CARE	GA
Georgia HIE	GA
Hawaii Health Information Corporation (HHIC)	HI
Waianae Coast Comprehensive Health Center	HI
PRIMARY HEALTH CARE, INC.	IA
ACCESS COMMUNITY HEALTH NETWORK	IL
Alliance of Chicago Community Health Services	IL
NEAR NORTH HEALTH SERVICE CORPORATION	IL
Northern Illinois Physicians for Connectivity (NIPFC)	IL
Indiana HIE (IHIE)	IN
Hazard Appalachian Regional Healthcare Medical Center	KY
Kentucky e-Health Network	KY
Southeastern Kentucky Community Access Program	KY
Lousiana Health Information Exchange (LaHIE)	LA
Boston HealthNet	MA
JOSEPH M. SMITH COMMUNITY HEALTH CENTER	MA
MA-SHARE	MA
Community Health Integrated Partnership, Inc.	MD
Maryland/DC/ Collaborative for Healthcare Information Technology	MD, DC
HealthInfoNet (Maine Health Information Center)	ME
Maine PCA	ME
Michigan Health Information Network (MiHIN)	MI
Voices of Detroit Initiative	MI
Minnesota e-Health Initiative	MN
Northern Minnesota Network	MN
COASTAL FAMILY HEALTH CENTER, INC.	MS
YELLOWSTONE CITY COUNTY HEALTH DEPARTMENT	MT
GREENE COUNTY HEALTH CARE, INC.	NC
North Carolina Healthcare Information and Communications Alliance	NC
Nebraska Health Information Initiative (NEHII)	NE
Western Nebraska Health Information Exchange	NE
Community Health Access Network (CHAN)	NH

Lamprey Health Systems in New Hampshire	NH
New Hampshire Citizens Health Initiative	NH
Healthcare Information Networks and Technologies group	NJ
New Mexico Healthcare Information Collaborative (NMHIC)	NM
Nevada Health Centers, Inc.	NV
CHARLES B. WANG COMMUNITY HEALTH CENTER, INC.	NY
Community Health Care Association of NY	NY
Taconic Health Information Network and Communities	NY
Institute for Urban Eamily Health (IUEH)	NY
Northwest Buffalo Community Health Care Center	NY
Northeast Ohio Regional Health Information Organization	OH
Ohio HIT (OHHIT)	OH
Ohio Shared Information Services	OH
OCHIN	OR
Oregon Health Information Infrastructure (OHII)	OR
Oregon Healthcare Quality Corporation	OR
B-K HEALTH CENTER,INC.	PA
Health Federation of Philadelphia	PA
Pennsylvania eHealth Initiative	PA
Quality Community Health Care	PA
Puerto Rico Healthcare Information Network (PRHIN)	PR
Blackstone Valley Community Health Care	RI
CareSpark Consortium	TN
Innovation Valley Health Information Network	TN
Volunteer eHealth Initiative (Regional Informatics)	TN
Heart of Texas (HOT) Community Health Center	TX
Utah Health Information Network (UHIN)	UT
Wasatch Homeless Health Care, Inc. (now Fourth Street Clinic)	UT
Community Care Network of Virginia	VA
MedVirginia	VA
SOUTHWEST VIRGINIA COMMUNITY HEALTH SYSTEMS, INC.	VA
Vermont IT Leaders (VITL)	VT
Community Health Association of Spokane (CHAS)	WA
PTSO of Washington	WA
SEA-MAR COMMUNITY HEALTH CENTER	WA
West Virginia eHealth Initiative WVeHI	WV
West Virginia Health Information Network	WV
West Virginia PCA	WV

Appendix B: Health Center Discussion Guide

Health Center Discussion Guide

Center/Systems Background Information

1. What are the characteristics of your regions' patients in terms of case mix and payer?
2. What geographic area is covered by your region?
3. How long have these sites been a part of your network?
4. Why did various clinics in this region choose to join this network?
    - Geography?
    - Service set?
    - Approach?
    - Level of centralization?
5. What role do information systems play in the daily work at your region's sites?
    - How far along are you in the EMR implementation process
6. How are information system related activities funded at your center?
    - What role do individual health center budgets and finances play in the information system financing?

Organization Domain

7. Please describe your overall health information vision and strategy.
8. In your own words, how is health information technology used to accomplish your networks overall mission?
    - Your region's mission?
9. How are IT needs addressed within your network ?
    - How are IT professionals spread between sites?
    - How are IT requests handled?
    - How are these services perceived at the regional and site levels?
    - What is the current use of or need for outside technical assistance or consulting?
10. How do sites within your region differ in their use of HIT?

11. Please describe any partnerships or affiliations between sites in your region and other providers (e.g. CHCs, hospitals, etc.)

Process Domain

12. In general, how are technology decisions made in your network ?
    - What decisions are made at the site and network level respectively?
13. What role have center managers played in:
    - EHR procurement
    - System design
    - Implementation
    - On-going support
14. How would you characterize your relationship with networks's software vendors?
15. How have you and your centers' leaders been involved in the vendor selection process?
16. How was this process managed by the network leadership?
17. What steps have been taken to move toward implementation?
    - At the network, regional and center levels?
18. How would you rate your satisfaction to date with network efforts related to information technology and information exchange?
19. How has your network trained center level staff to work with information systems?
    - What role has your IT vendor played in these trainings?
20. How do center-level staff interact with information systems in your region?
21. How have information systems been able to affect the following:
    - Quality of care
    - Costs
    - Efficiency
    - Patient safety
22. How has your network addressed the issue of quality improvement in its HIT efforts?
    - How have HIT implementation efforts complimented or detracted from existing quality improvement processes?
23. How have your centers managed change associated with HIT implementation?
    - What factors have enabled your centers to move forward with implementation?

- What factors have presented challenges?

24. What role center leaders play in assisting with implementation?

Finance Domain

25. For IT improvements and software in particular, what investments are made at the site level as opposed to the network level?
    - Startup costs
    - Staffing relating to IT systems
    - Hardware
    - Connectivity
    - Software
    - Network membership
    - User fees
    - Vendors and consultants
    - Relative to other costs
    - Savings from network collaboration (e.g. economies of scale)
    - Maintenance and use costs
26. How much do center leaders consider these costs?
27. What surprise you most about these costs?
28. How have your efforts at HIT implementation affected
    - Methods for accounting
    - Health care benefits
    - Hard revenues
    - Other intangible returns

Applications Dimension

29. Please describe how you use health information technology in your region:
    - How far along are in you in EHR implementation?
    - What other HIT applications do you use?
    - Do any of these applications or combination of them approach the functionality of an EHR?

- How has HIT impacted the operation of the centers in your region?
- Are you or any of your centers involved in health information exchange efforts?

30. From your perspective, what is motivating your move towards EHR adoption and improvements in the way you approach IT applications generally?
    - Network leadership
    - Financial returns?
    - Quality improvement (e.g. regular monitoring, disease/procedure programs, systematizing QI efforts)
    - Market position
31. What have been the greatest barriers to HIT adoption among your sites?
    - Costs
    - Staffing
    - Leadership
32. What are the major benefits of HIT applications to centers?
    - Electronic health records
    - Clinical decision support
    - Reporting to HRSA and other agencies
    - Tracking specific outcomes or exposures
    - Administrative/billing functions
    - Other features
33. Are there any functions are that currently needed but unavailable? Any that you have access to but do not use?
34. Are there other systems applications that you would like to see initiated? How would you prioritize these?
35. How has your region integrated legacy systems such as disease registries into your current information systems?
36. How will your network move forward with implementation and support?
37. What role do center leaders play in planning for the future?

<u>Technology Domain (offer to allow them to send you this information afterwards as part of follow-up)</u>

38. What type of hardware (e.g. servers, desktops, laptops, PDAs, notebook PCs, monitors, kiosks, etc.) are used in your centers?

39. Please describe your physical plant (e.g. cabling).
40. What kind of connectivity do you provide to the Internet (e.g. bandwidth and access points)?
41. Do you have a wireless network or plans to implement one?
42. To what extend does your network standardize hardware used across centers?
43. What are your plans to update hardware in the future? How much of this is standardized across network sites?

Data Domain

44. How are data managed within sites?
    - Are some data maintained and assessed by site or regional leaders (which domains, financial / administrative / clinical (in the future)?
    - How are database maintenance and management tasks shared between your network and your health center and your health center's sites.
45. What types of reports and metrics are tracked at the site level?
    - What is your ideal "data dashboard"?
46. How do you exchange data between your network's centers?
47. How do you exchange data with external entities:
    - Payers
    - Other providers
48. How do interoperability standards (e.g. HL7, NCPDP, etc.) affect your data exchange efforts?
    - To what extent is there any variation on use of standards across regions or sites? (probably none)

Environment Domain

49. How do state and federal regulations affect your information systems activities?
    - Is this different for your region or even different sites within your region?
50. Please describe how other external forces affect your health information technology efforts.
    - How do these domains differ if at all across your network's centers and your health center sites?
        i. State and federal payment policies
        ii. Private sector payment policies
        iii. Interactions with other safety net providers
        iv. Interactions with other types of providers

v. Community resources

Appendix C: Network Discussion Guide

Network Discussion Guide

Organizational Domain

1. How did this network originate?
2. Please describe your network's organizational structure.
    - What is the structure for governance?
3. How does this network handle expansion to new sites?
    - What motivates independent health centers to join your network?
    - How do you target potential members?
4. Can you describe the details of your membership?
5. How does and to what extent does this network centralize its services and functions?
    - Does this network participate in HIE?
    - Can you describe the expansion of services and functions that this network provides?
6. We have some information on how your organization formed can you please describe your network's current objectives?
    - Strategic plan?
    - Expansion to new members
    - Expansion to new services
7. Can you describe your relationship to your member health centers?
    - Levels of centralization and control?
    - Overall management of health center functions?
    - Distance issues?

Services and Features Domain

8. How does this network oversee different services and functions? (PLEASE DESCRIBE FOR EACH OF THE FOLLOWING)
    - Billing?
    - Purchasing?

Applications and Technical Assistance Domain

9. Which HIT applications does this network currently use?
10. What level of technical assistance do you provide to network members?

- Can you tell us about the value of your existing resources?
- Peer to peer support?
- Needs moving forward?
- Training?
- User support?
- Interactions with vendors and consultants?

11. What are the major benefits of the software applications to your network, how would you prioritize their importance to overall network objectives? (PLEASE ASK FOR ALL OF THE FOLLOWING)

    - Electronic health records
    - scheduling and resource management
    - claims submission, billing – including under capitated arrangements
    - tracking eligibility (e.g. Medicaid, SCHIP) and insurance status and verification
    - administrative reporting to HRSA and other federal agencies
    - tracking payments and accounts receivable
    - other administrative and financial functions
    - Tracking of specific outcomes or exposures (e.g., birth weight, exposure to environmental hazards)
    - Availability and utilization of specific "free" resources (e.g., pharmaceuticals)
    - Other features?

<u>Finance Domain</u>

12. Can you give us an overview of the network's budget? PLEASE CONSIDER EACH OF THE FOLLOWING IN RELATION TO BUDGET)

    - Staffing?
        - Creative approaches?
        - Appropriateness of workflow overall?
    - Hardware
    - Infrastructure, for example servers
    - Connectivity
    - Software
    - Other costs

13. Please describe your funding model.

    - Federal funding
    - State funding
    - Local funding

- Research funding
- Other grants

14. Describe model for EMR roll-out and support.

    - Application hosting
    - Customization
    - Reporting
    - Training and user support
    - Registries
    - Use of quality guidelines
    - Clinical decision support

15. What are your plans for sustainability?

    - Increasing members
    - Expanding services and fees
    - Increasing patient throughput
    - Increasing enrollment in public programs

16. How do you engage in HIE? (PLEASE ASK ABOUT EACH OF THE FOLLING)

    - Exchange with hospitals
    - Exchange with payers
    - Involvement with and startup of RHIOs
    - Connectivity to clinics and labs
    - Connectivity to pharmacies
        - Connectivity to medication history data sources?
    - Uses of standards and taxonomy
        - HL7: clinical messages
        - DICOM: digital messages
        - NCPDP standards: e-RX
        - LOINC: clinical labs
        - Moving to new diagnosis (e.g. ICD 10)
        - NPI
        - Impact on standards on implementation and QI
    - Public health reporting
        - Health reporting
        - Quality measures
        - Immunizations
        - Reportable conditions

<u>Data Domain</u>

17. What are your major domains of data (e.g. clinical and financial)?

18. How do you exchange data between network centers?
19. How do you exchange data with external entities:
    - Payers
    - Other providers
20. How do interoperability standards (e.g. HL7, NCPDP, etc.) affect your data exchange efforts?

21. What degree of success have you encountered in your HIE efforts?

22. What have been the biggest challenges in your HIE efforts?

23. How do your centers ensure confidentiality/privacy with regard to patient data?
    - What standards or auditing processes are used to ensure data security?

24. Please describe how data is stored and archived to ensure complete records.

25. What model are you using to access EMR (ASP v. direct contracting)?
    - What software is in use?

26. How did you gather requirements for your information system?
    - What role did regional and site level leaders play

27. How do you choose an EMR vendor?
    - Toolkit
    - Role of Regional Managers
    - Timeline
    - Role of planning
    - Costs of vendor selection process

28. How did you train staff to use your information system?
    - Timing
    - Organization
        i. By job categories
        ii. By individuals' level of expertise
    - Role of "super users" in peer-to-peer training

29. What is your perspective on using an EMR?
    - Have providers interacted with the EMR? If so, how have they responded?
    - Do you use of clinical decision support, registries or databases?

30. Are EMRs integrated into quality improvement?
    - How does HIT integrate with existing quality improvement initiatives?
    - What types of registries, clinical decision support and disease management do you use?

31. How have you measured changes in quality of care?
    - Baseline taken?
    - Methodology
    - Role of patient perceptions and quantitative data

32. To what extent does your information system incorporate clinical decision support?
    - How effective has this been?
    - What have been the reactions of providers?
    - Patients?

33. Are your EMRs integrated with HIE?
    - How did HIE affect your EMR selection process?
    - Do you exchange with payers?
    - Do you exchange with other providers?
    - Do you exchange with clinical labs?
    - Pharmacies?
    - Describe your use of standards?
    - What types of issues and opportunities do you face with integration?

34. How will your EMR system interact with public health agencies and their information systems?

35. How do you plan to support your HIT initiatives?
    - Federal grants
    - Private, hospital contributions

- Technical assistance
    i. Federal government
    ii. Peer-to-peer

36. How do you foresee your technical assistance needs evolving as your HIT initiatives progress? What would assist you most in effectively implementing HIT throughout your network?

Appendix D: Methods

Methods

As noted in the main body of this report, at its core, this project involved a series of site visits conducted to large health center networks around the country. Each site visit involved anywhere between 5 and 10 meetings conducted in person or over the telephone. Prior to selecting and conducting the site visits, we completed an environmental scan examining existing materials and discussions with a selected group of thought leaders to frame research questions and identify parameters for selecting sites. Following each site visit, we developed a site visit report detailing our findings. This final report represents a summary of those findings as well as a synthesis of broader themes that emerged over the course of the site visits. In the paragraphs that follow, we outline the approach taken to each phase of the project.

Environmental Scan

In preparing the environmental scan, NORC conducted a comprehensive review of published literature, gray literature, government reports and other printed or published materials. We also relied on guidance and expertise from our Task Order Officer and key contacts at ASPE and HRSA, along with other federal agencies and foundations. We tapped into a number of web-based resources such as search engines and databases to conduct a formal literature review as well as general web searches using Google and Yahoo. The following general resources were used to gather peer reviewed literature: AHRQ National Resource Center for Health IT Knowledge Library, MEDLINE, Healthstar, Health Services/Technology Assessment Text (HSTAT), Cumulative Index to Nursing and Allied Health Literature (CINAHL), WorldCat and Gartner for IT Leaders.

The team also reviewed the series of websites of organizations that play a leadership role in health IT adoption and health systems issues. These organizations and websites include the Health Information Management Systems Society (HIMSS), the American Medical Informatics Association (AMIA), the Medical Group Management Association (MGMA), the American Academy of Family Practice (AAFP), the American Health Information Management Association (AHIMA) and the eHealth Imitative (eHi) as well as sites that feature information specific to health center and health center issues such as HRSA, the National Association of Community Health Centers (NACHC) and state-level primary care associations.

Beginning search terms were defined broadly to include "health centers", "federally qualified health centers" or "health center networks" crossed with various health IT or HIE technologies, components or concepts including but not limited to "EMR", "EHR", "CPOE", "e-Prescribing", "Return on Investment", "IT strategy", "master patient index", "record locator service" among others. As was the case with the 2003 environmental scan, the primary technique for identifying relevant sources was "snowballing" in which the bibliographies or citations from initial sources were examined to identify additional relevant resources.

In addition to a systematic review of peer reviewed and gray literature on relevant topics, NORC organized a series of discussion meetings with HRSA grantees to capture their experiences adopting and implementing various clinical applications; obtain insights on their methods for calculating the value or benefits of their investment; and identify the obstacles they faced pre and post implementation. In total, 14 individuals from grantee organizations, all of which were safety net providers, contributed to the environmental scan. Finally, much of the content of the environmental scan report is informed by NORC's ongoing work as a key research and technical assistance contractor to HRSA's Office of Health IT (OHIT) to promote health IT adoption among safety net providers as well as by detailed findings from the study on safety net provider use of health IT conducted by NORC for ASPE between 2003 and 2005.[1]

Selecting and Conducting Site Visits

Following the environmental scan report, NORC began the site visit selection process. Having gained a better understanding of the current state of health IT adoption and HIE activities among health centers during the environmental scan stage, NORC developed a list of networks to be considered for site visits. Primary considerations in developing the list were:

- The state of health IT adoption
- Experience with HIE
- Geographic diversity
- Presence of rural and frontier health center sites
- Participation in the previous assessment
- Proximity to other health center networks and consortia

Using these criteria, findings from the environmental scan and in close coordination with ASPE and HRSA, we generated a list of potential geographic areas to conduct site visits. In some cases, we targeted metropolitan areas where we would be able to interact with more than one network or with one network and other health centers not affiliated with the network. The list of potential site visit networks is included below.

Exhibit 1. Potential Site Visit Locations

Boston, MA
- Boston HealthNet*
- Cambridge Health Alliance Health Centers

South Florida
- Health Choice Network*

Philadelphia, PA
- Health Federation of Philadelphia*
- Quality Community Health Care

San Francisco, CA
- San Francisco Community Clinic Consortium
- North East Medical Services
- Asian Health Services (Oakland, CA)
- Northern California (Rural)
- Mendocino Community Health Clinic, Inc.
- Redwood Community Health Coalition,
- Alliance for Rural Community Health (Ukiah, CA)

Central, South Texas (Rural)
- Heart of Texas Community Health Center
- TX Association of Community Health Centers

Chicago, IL
- Alliance of Chicago Community Health Services
- Access Community Health Network
- Near North Health Service Corporation

New York, NY
- Institute for Urban Family Health
- Community Health Care Association of NY
- Charles B. Wang Community Health Center
- NYC Dept. of Health and Mental Hygiene

Seattle, WA
- Sea-Mar Community Health Center
- International Community Health Services
- Washington Association of Community and Migrant Health Centers

Washington, DC
- District of Columbia Primary Care Association

St. Petersburg, FL
- Community Health Centers Alliance Inc.

New Mexico (Rural)
- Health Choice Network affiliates
- Ben Archer Health Center
- First Nations Community HealthSource
- Indian Health Service providers in state

*Sites visited in NORC's 2005 study.

NORC then discussed the networks and consortia listed above in greater detail with HRSA and ASPE. Specific locations for site visits were selected iteratively from among this group as the study progressed, with some of the original sites deleted and others added. Ultimately, we conducted meetings with network and provider leadership and staff in eight different locations around the country: Chicago, IL;

Eastern North Carolina; Washington, DC[1]; Boston, MA; San Diego, CA; the Bay Area in California; Southern New Mexico and Eastern Utah. In these locations, we visited with staff from the eight different networks or consortia listed below. Once a site was selected, NORC sent an initial invitation email to network and consortia representatives based in that geographic area (included as Appendix A). In preparation for each site visit, we conducted brief telephone discussions with network leadership to coordinate logistics, develop a list of meetings and discussants and share information on the topics that we would cover when on site. This process was repeated for each health center network and consortium visited, roughly two months before each visit.

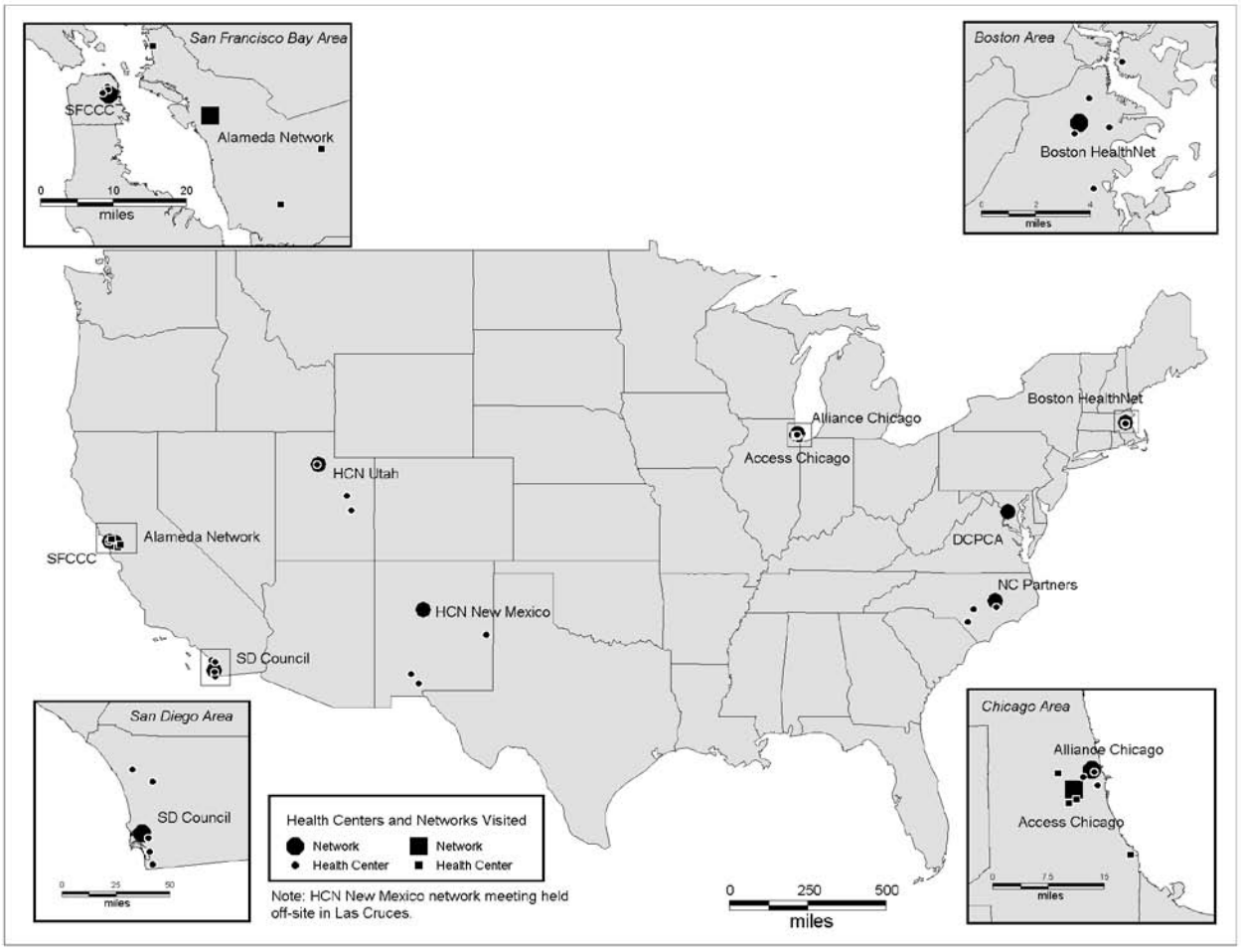
Following the initial contact, NORC sent network and consortia representatives a list of topics that would be covered during the site visit (included as Appendix B). NORC then requested existing background information materials from the network representative and discussed assembling the relevant stakeholders for the visit. Most often, this included the CEO, CIO, Medical Director, QI specialist and leadership from individual health center sites. In some cases, network leaders scheduled meetings on behalf of the NORC team, although NORC scheduled meetings for most of the site visits. Exhibits 2 and 3 below depict the geographic areas and networks visited.

Exhibit 2. Site Visit Information

Network/ consortium name	Location	Number of Participants	
		Network	CHC
Alliance of Chicago	Chicago, IL	4	9
Access Community Health Network	Chicago, IL	3	8
Community Partners HealthNet	Eastern North Carolina	2	10
Health Choice Network-New Mexico	Southern New Mexico	1	11
Health Choice Network-Utah	Eastern Utah	2	7
Council of Community Clinics	San Diego, CA	3	13
District of Columbia Primary Care Association[1]	Washington DC	1	8
San Francisco Community Clinic Consortium	San Francisco, CA	6	14
Community Health Center Network	Alameda County, CA	5	13
Boston HealthNet	Boston, MA	6	13
TOTAL		33	106

[1] Our site visit to Washington DC was structured differently than our other site visits. One meeting was held with key stakeholders including network and health center leadership.

Exhibit 3. Site Visit Locations



Before the site visits began, NORC developed two master site visit agendas for network-level meetings and health center-level meetings. These agendas focused on the set of topics shared with the networks originally, but were also tailored and targeted to specific initiatives taking place within the network or health center being visited. The higher-level topic areas included in the site visit agenda for networks were:

Organization: Broad background information on the network. Subtopics covered include network origins, organizational structure and membership level structure.

Services and Features: Other non-health IT services provided by the network. Of particular interest were group billing and purchasing.

Applications and Technical Assistance: Primary subtopics included applications used and the level of technical assistance provided by the network. We sought detail on trainings, peer-to-peer support and vendor relations, among other topics.

Finance: Overall finances and financial plans for the future. Primary subtopics included budget expenditures on staffing and software, the network's funding model and sustainability plans.

Data: Data exchange and issues surrounding data security. Subtopics included data exchange between health centers, data exchange with other health care providers, data exchange standards, data storage and confidentiality and privacy.

Topics addressed during health center-level meetings include the following:

Center/Systems Background Information: Health center background. Subtopics covered included patient characteristics, health centers' history with their networks and health centers' experiences with health IT.

Organization: Health center operations. Subtopics included how health IT needs are addressed, partnerships and health centers' relationships with their network.

Process: Details on various processes at the health center level. Of particular interest were processes used for health IT decision making, vendor selection, quality improvement and health IT implementation.

Finance: Health centers' investments in health IT and the effect of those investments on health center-level finances.

Applications: Health centers' IT use. Primary subtopics included the state of implementation, motivations for health IT adoption, integrating legacy systems and next steps in implementation.

Technology: Two primary issues: hardware arrangements at the health center-level and connectivity.

Data: The role of data and data uses at the health center level. Primary subtopics included data management, data exchange and metrics and reports at the health center-level.

Environment: The influence of external forces. Of particular interest are local, state and federal regulations and the role of external organizations in health IT plans.

While on site, NORC staff generally split into teams of two, with one project lead driving the discussion and an additional team member taking detailed notes and assuring that all the key topics in the agenda were covered. Site visits lasted one to two and a half days, with additional time for travel. In some cases, NORC met with other groups during site visits. These groups included a gathering of health center medical directors at the network level and regional exchange partners in one area visited. These additional meetings added richness to our findings by offering discussants an opportunity to hear and react to each others' comments.

Site Visit Reports

Following the site visit, we cleaned the detailed notes from all meetings which were then reviewed by the accompanying senior staff member. The cleaned and revised notes were used as the primary data source for each site visit report. Our site visits to Chicago and the San Francisco Bay Area both yielded multiple site visit reports. On these visits the NORC team met with multiple networks and accordingly wrote up separate site visits reports reflecting the individual experiences for each respective network and its health centers. While the organization of each report reflects the specific features and findings associated with the site visit, the reports generally begin with background information on the networks and health centers

being visited summarized both from our notes as well as patient population data and reports made available to us by discussants.

Each report also describes characteristics of the target network in some detail including its history, staffing, governance, services provided and their business plan. We also provide information on challenges, barriers and opportunities for health IT adoption as viewed by the network leadership and staff. The reports then address the findings from meetings with staff and leadership from the health centers that were visited including the centers' IT adoption status, their IT and QI staffing model, their experience with adoption of clinical IT systems and their impressions of the role of the network. We ended each site visit report with a series of conclusions and potential themes to be elaborated as part of the final report in conjunction with findings from the other site visits.

For each site visit report, the NORC team produced an initial draft for review and comment by ASPE. Following ASPE's initial review of the document and a revision based on ASPE comments, NORC made the draft report available for comment by leadership from the networks that were the focus for each report. Network leaders were free to share findings with their health centers or other network staff and provide comments to make any clarifications or factual corrections and, in some cases, supply additional information to help provide additional context for the findings section. After addressing the comments from ASPE and the network leads, each site visit report was finalized. Each site visit report is included as an Appendix to this report.

Appendix E: Glossary of Abbreviations

Agency for Healthcare Research and Quality (AHRQ)

Alameda Health Consortium (AHC)

Alliance of Chicago (Alliance)

American Academy of Family Practice (AAFP)

American Health Information Management Association (AHIMA)

American Medical Informatics Association (AMIA)

American Recovery and Reinvestment Act of 2009 (ARRA)

Association for Utah Community Health (AUCH)

Boston Medical Center (BMC)

Bureau of Primary Health Care (BPHC)

Cardiovascular/Diabetes Electronic Management System (CVDEMS)

Care management services organization or MSO

Centricity (GE Centricity)

Certification Commission for Healthcare Information Technology (CCHIT)

Chief Executive Officers (CEO)

Chief Information Officer (CIO)

Chief Operating Officer (COO)

Children's Health Insurance Program (SCHIP)

Chronic Disease Management Software (CDMS)

Chronic Disease Management Systems (CDMS)

Clinical Care Document (CCD)

Clinical decision support (CDS)

Community Health Center (CHC)

Community Health Center Network (CHCN)

Community Health Information Network (OCHIN)

Community Partners HealthNet (CPH)

Computerized Provider Order Entry (CPOE)

eClinicalWorks (eCW)

eHealth Imitative (eHi)

Electronic Health Records (EHRs)

Electronic Medical Record (EMR)

Electronic Prescribing (e-Prescribing)

Electronic referrals (E-referrals)

Emergency Department (ED)

Federally Qualified Health Center (FQHC)

Full Time Equivalent (FTE)

General Electric (GE)

Health Center Controlled Networks or (HCCNs)

Health Choice Network (HCN)

Health Disparities Collaboratives (HDC)

Health Information Exchange (HIE).

Health Information Management Systems Society (HIMSS)

Health Information Technology for Economic and Clinical Health (HITECH) Act

Health IT Standards Panel (HITSP),

Health Resources and Services Administration (HRSA)

Healthy Communities Access Program (HCAP)

Healthy Communities Access Program (HCAP)

HRSA Bureau of Primary Health Care's (BPHC)

HRSA's Office of Health IT (OHIT)

i2i (i2i Tracks)

Information Technology (IT)

Integrated Communications and Technology (ICT)

Integrated Services Development Initiative (ISDI)

Integrated Services Development Initiative (ISDI)

Intergy (Sage Intergy)

Joint Commission on Accreditation of Healthcare Organizations (JCAHO)

Laboratory information system (LIS)

Lifetime care record (LCR)

Magnetic Resonance Imaging (MRI)

Medi-Cal (Medicaid in California)

Medical Director And Chief Financial Officer (CFO)

Medical Group Management Association (MGMA)

National Association of Community Health Centers (NACHC)

National Institute of Standards and Technology (NIST)

National Opinion Research Center at the University of Chicago (NORC)

Nationwide Health Information Network (NHIN)

New Mexico Health Choice Network (NMHCN)

Office of Health IT (OHIT)

Office of the Assistant Secretary for Planning and Evaluation (ASPE)

Office of the National Coordinator for Health IT (ONC)

Operational Networks (OPN)

Patient Electronic Care System (PECS)

Practice Management System (PMS)

Practice Management Systems (PM)

Primary Care Association (PCA)

Public Health Department (DPH)

Quality Improvement (QI)

Quest (Quest Diagnostics)

Regional Health Information Organization (RHIO)

Returns on Investment (ROI)

Robert Wood Johnson Foundation (RWJF)

San Francisco Community Clinic Consortium (SFCCC)

Shared Integrated Management Information System program (SIMIS)

Shared Integrated Management Information Systems (SIMIS)

Technical Assistance (TA)

The Council of Community Clinics (CCC)

The District of Columbia Primary Care Association (DCPCA)

Transforming Healthcare Quality through Information Technology (THQIT)

Uniform Data System (UDS)

United States Department of Health and Human Services (HHS)

Utah Health Choice Network (UHCN

Virtual Private Network (VPN)

Women, Infants, and Children Program (WIC))