Sustainability, Partnership, and Teamwork in Health IT Implementation

Findings From the Transforming Healthcare Quality Through IT Grants

AHRQ
Agency for Healthcare Research and Quality
Advancing Excellence in Health Care ● www.ahrq.gov

Final Report

Sustainability, Partnerships, and Teamwork in Health IT Implementation

Essential Findings From the Transforming Healthcare Quality Through IT Grants

Prepared for:
Agency for Healthcare Research and Quality
540 Gaither Road
Rockville, MD 20850
www.ahrq.gov

Contract Number: HHSA 290200900019I

Prepared by: Mathematica Policy Research and Geisinger Health System

Submitted by:
Mathematica Policy Research
600 Maryland Avenue, SW, Suite 550
Washington, DC 20024-2512

Authors:
Suzanne Felt-Lisk
Grace Ferry
Rebecca Roper
Melanie Au
James Walker
J.B. Jones
Virginia Lerch

AHRQ Publication No. 12-0075-EF

December 2012

This document is in the public domain and may be used and reprinted without permission except those copyrighted materials that are clearly noted in the document. Further reproduction of those copyrighted materials is prohibited without the specific permission of copyright holders.

Suggested Citation:

Felt-Lisk S, Ferry G, Roper R, Au M, Walker J, Jones JB, Lerch S. Sustainability, Partnerships, and Teamwork in Health IT Implementation: Essential Findings From the Transforming Healthcare Quality Through IT Grant. (Prepared by Mathematica Policy Research and Geisinger Health System, under Contract No. HHSA 290200900019I). AHRQ Publication No. 12-0075-EF. Rockville, MD: Agency for Healthcare Research and Quality. December 2012.

None of the investigators has any affiliations or financial involvement that conflicts with the material presented in this report.

This project was funded by the Agency for Healthcare Research and Quality (AHRQ), U.S. Department of Health and Human Services. The opinions expressed in this document are those of the authors and do not reflect the official position of AHRQ or the U.S. Department of Health and Human Services.

Acknowledgments

The authors would like to thank the THQIT grantees for their extraordinary cooperation beyond any obligation remaining from their grant, both in completing surveys and in making time for follow-up interviews when requested.

We also thank staff members and reviewers without whom this report would not have been possible. Kirsten Barrett (Mathematica) expertly led the design and administration of the survey of THQIT grantees, a key data source for this report. Her skillful dedication to maximizing survey participation was appreciated. Becca Wang (Mathematica) provided timely and accurate programming support to analyze the survey data. Rachel Machta provided excellent research support to the survey and grantee interviews.

Drs. Marsha Gold (Mathematica), Thomas Fritz (CEO, Inland Northwest Health Services), Fred Rachman (CEO, Alliance of Chicago), and Ms. Lisa Davis (Director, Pennsylvania Office of Rural Health) provided helpful comments on earlier drafts of this report. Betty Teller edited the report, and Alfreda Holmes and Donna Dorsey produced it.

Contents

Executive Summary 1
Chapter 1. Introduction 11
Background on the THQIT Program 12
Understanding the THQIT Grantee Experience 16
Chapter 2. Sustainability of Health IT Supported By The THQIT Grants 19
Most Health IT Systems Supported by Implementation and Value Grants Were Sustained or Expanded Over Time 20
Most Planning Grantees Subsequently Implemented Some of the Health IT They Planned 23
Rescaling Ambitious Health IT Plans 26
Reasons for Not Sustaining or Not Implementing Planned Health IT 27
Chapter 3. Vendor Selection and Support 29
What Did Grantees Consider When Selecting Health IT? 29
How Did Grantees Characterize Their Relationships With Vendors and the Vendor Impact on Projects? 33
Chapter 4. Other Cross-Organizational Partnerships for Health IT Implementation 35
Who Participated in the THQIT Partnerships? 36
Most Grantees Sustained Their Partnerships 38
How Did Partnerships Impact Health IT Implementation? 41
Chapter 5. Teamwork: Involving End Users in Health IT Planning, Workflow/Process Redesign, and Training 45
Planning and Selection of Health IT 45
Training 46
Workflow Redesign 51
Chapter 6. Conclusion 55
References 56

Tables

Table 1.1 Locations of THQIT applicants and grantees 13
Table 1.2 Characteristics of THQIT grantees, survey respondents, and interview respondents 17
Table 5.1 Summary of types of health IT training provided to intended users 46

Figures

Figure ES.1. Reported level of health IT use in summer 2011, compared with end of grant period 4

Figure ES.2. Percentage of implementation grantees where intended users attended competency-based training 7

Figure 2.1. Use of health IT—summer 2011 compared with end of grant period 20

Figure 2.2. Reported level of health IT use in summer 2011, compared with end of grant period 21

Figure 2.3. Reasons for sustained or increased use of health IT 24

Figure 2.4. Needs and support for extended planning process by planning grantees 25

Figure 2.5. Comparison of selected implementation features among grantees that did and did not experience a show-stopper 27

Figure 3.1. Association between strengths of implementation grant projects and completing a thorough vendor-selection process 30

Figure 3.2. Percentage of implementation grantees who undertook steps for vendor selection 31

Figure 3.3. Most important factors in purchasing a health IT product for implementation grantees 32

Figure 4.1. Types of patient care delivery organizations included in grantee partnerships 36

Figure 4.2. Types of hospitals included in grantee partnerships (n = 488 hospitals) 37

Figure 4.3. Size of private physician practices included in grantee partnerships (n = 528 private physician practices) 37

Figure 4.4. Percentage of grantees whose partnerships included organizations that do not deliver patient care 38

Figure 4.5. Continuation of planning and implementation partnerships after conclusion of the grant 39

Figure 4.6. Reasons patient care delivery organizations stopped working together after the planning or implementation grant period 40

Figure 4.7. Association between strengths of planning and private physician involvement for planning and implementation grantees (combined) 43

Figure 5.1. Encouraging training of all targeted end users 48

Figure 5.2. Percentage of implementation grantees that had users attend competency-based training 49

Figure 5.3. Training super users and champions early 50

Figure 5.4. Timing of training relative to go-live 51

Figure 5.5. Percentage of grantees with formal and informal process redesign (n = 41) 52

Appendixes

Appendix A: Supplemental Tables....A-1

Appendix B: Getting Ready: A Planning Checklist for rural and Community Hospitals Considering Implementing Health IT....B-1

Appendix C: Success Story—Partners Use Electronic Health Records To Steer Quality Improvement.... C-1

Executive Summary

In this age of incentives and widespread implementation of a variety of health information technology (health IT)—including electronic health records (EHR), health information exchange (HIE), clinical decision support (CDS), personal health records (PHR), and other forms of health IT—many may benefit by the practical experiences of those who have gone before. Under the Agency for Healthcare Research and Quality's (AHRQ) Transforming Healthcare Quality Through IT (THQIT) program (http://healthit.ahrq.gov/THQIT), 118 grantees planned, implemented, and studied health IT implementations across a wide range of care settings, communities, and types of health IT systems (2004-2009).

This report presents an informed distillation of the THQIT grantees' experience, as reflected in content of their final grant reports to AHRQ shortly after the completion of the grants, their thoughtful retrospective responses to surveys several years after the end of their grant period, and follow-up interviews with selected grantees. This report focuses specifically on sustainability, partnerships, and effective teamwork—which were recognized by THQIT grantees as critical aspects of successful health IT implementation. The goal is to provide those currently working towards health IT implementations with information to support more effective implementation.

This report offers insights into four questions:

- **Sustainability:** How likely was the projects' purposeful use of health IT to be sustained and what factors influence the sustainability of health IT projects?
- **Vendors:** How should patient care delivery organizations engage and work with health IT vendors?
- **Other Cross-Organization Partnerships:** How can health care organizations work together to facilitate health IT implementation?
- **End Users:** What methods of involving intended end users of grant-featured health IT did grantees find most valuable?

Background

The THQIT program consisted of grants awarded to 118 applicants in 38 States, responding to four funding opportunity announcements during 2004-2005:

- One-year planning grants of up to $200,000 were awarded to 38 grantees (http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-010.html)
- Two sets of 3-year implementation cooperative agreements of up to $1.5 million from AHRQ, with a requirement for equal matching funds. The first set of 40 grants was available to a broad group of applicants. The second set of 16 grants were awarded to grantees who had completed THQIT planning grants. (http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-05-013.html, and http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-011.html)
- Three-year value grants of up to $1.5 million were awarded to 24 grantees (http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-012.html)

Eighty-six percent of funded projects included at least one hospital as a partner, more than half included private physician practices, and over a quarter included safety net providers (e.g., Federally

Qualified Health Centers [FQHCs], health department clinics). The most common technologies of focus for the grants were HIE, EHR, CDS, computerized provider order entry (CPOE), and telehealth. Eighty-six percent of the grantees pursued more than one type of technology.

The report draws on four sources of information: (1) a review of grantees' final reports to AHRQ and the literature that grantees produced related to their grant project (Au and Anglin, 2010; Jones et al. 2010); (2) a Web-based survey of all the THQIT grantees in summer 2011, with survey response rates for the planning, implementation, and value surveys totaling 79 percent, 86 percent, and 83 percent, respectively; (3) semistructured interviews with 16 grantees in fall 2011; and (4) quality improvement stories completed with 9 grantees. Because the survey and interviews occurred several years after the end of the grant periods, they were ideal for shedding light on the sustainability of the projects. Note that the grant project periods ended prior to the implementation of the Medicare and Medicaid EHR Incentive Programs ("meaningful use"), while the period of experience covered by the survey and interviews overlapped the first year of that program.

Sustainability

Many successful research grants conclude at the end of project funding. Yet, research can have an impact well beyond the end of the project period. Most projects sustained or increased use of at least some of the health IT that was a focus of their project (70 percent of implementation and value grantees). Several successful results included:

- The Erie Family Health Center, Inc.'s EHR-focused project led by Fred Rachman, M.D., began by implementing a single, centrally operated EHR in four FQHCs. Now 32 safety-net clinic sites spread across 11 States use this EHR system, with common data concepts, clinical content, and decision support. (See Appendix C and http://healthit.ahrq.gov/THQITStoryRachman2012.pdf.)

- International Severity Information Systems, under the direction of Susan Horn, Ph.D., first implemented health IT in 15 nursing homes through the "'On-Time' Quality Prevention Program for Long-Term Care" and found it helped reduce pressure ulcers. Twenty-one additional nursing homes implemented it the next year; since then, at least 46 others have implemented the system, encouraged by Medicaid incentives to use health IT to support quality improvement (http://healthit.ahrq.gov/UC1HS015350Hornfinalreport2008).

- Led by Sanjeev Arora, M.D., the University of New Mexico Health Sciences Center began its telemedicine project (Project ECHO) by providing 21 remote clinics support in managing Hepatitis C. Between the end of AHRQ funding and 2010, the program expanded to 13 other medical conditions, each with between four and 43 locations supported. (Project ECHO story is accessible from this Web site: http://healthit.ahrq.gov/UC1HS015135Arorafinalreport2008).

At the same time, 60 percent of implementation and value grantees reported having to narrow their scope of the THQIT study or curtail some of their health IT implementation plans or discontinue implementation.

The most important factors that grantees reported influenced sustainability of the THQIT health IT projects were—

- **Ability to Demonstrate Benefits from the Health IT to Their Organizations***:* 28 of the 48 responding implementation grantees reported that the ability to demonstrate benefits was a reason they were able to sustain or increase their use of the health IT.
- **Clinician Support:** 22 of the 48 responding implementation grantees reported that adequate clinician support was a reason they were able to sustain or increase their use of the health IT, and conversely, 4 reported that lack of clinician or physician enthusiasm was a reason they were forced to never implement or discontinue the health IT.

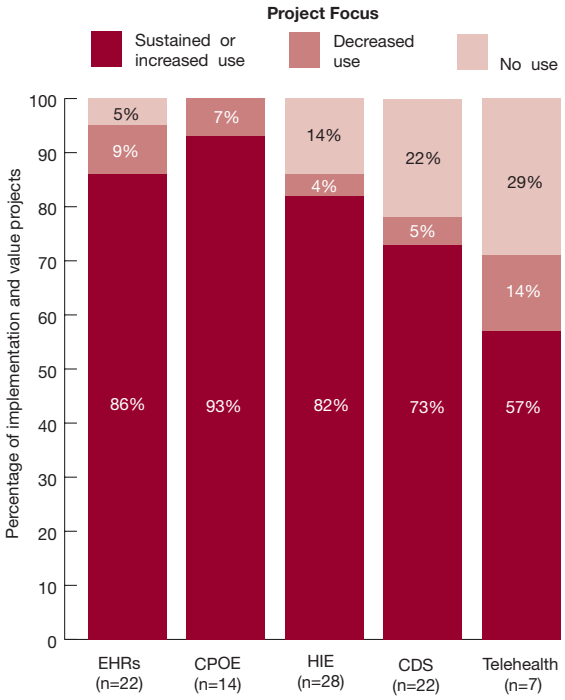
- **Cost-Related Issues:** 11 of the 69 responding implementation and value grantees indicated that the high cost of health IT was a reason why the THQIT-funded health IT was not being used at least 2 years after the end of their project.

Also, projects that conducted intensive process redesign before implementation and developed a detailed implementation plan were more likely to be able to implement or continue using all their planned health IT.[1] Beyond the most common factors in sustainability, the list of other factors that forced cancellation of some of the health IT plans in individual circumstances was long.

Sustainability also varied by type of health IT, with EHRs and CPOE most likely to be sustained or show increased use in 2011 compared with the end of their grant period, followed by HIE, CDS, and telehealth (Figure ES.1).

[1] Process redesign (also known as workflow redesign) means transforming the way clinicians work together to achieve improvements in care quality, costs, and patient outcomes.

FIGURE ES.1. REPORTED LEVEL OF HEALTH IT USE IN SUMMER 2011, COMPARED WITH END OF GRANT PERIOD



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: The number of respondents (n) included for each column differs depending on the number of respondents who implemented a type of health IT. Grantees may be counted in more than one category if they implemented more than one of these types of health IT. The average time between grantees submitting their final report at the end of their grant period and completing the survey for grantees that implemented EHRs, CPOE, HIE, CDS, or telehealth was 2.5 to 3 years.

Vendors

Considerations at Time of Health IT Purchase

When purchasing a health IT product, the grantees stressed the importance of checking a source of product ratings (such as Gartner or KLAS). The 59 percent of such grantees that *did* check a product rating prior to purchase were more likely to indicate that the usefulness of their health IT product to patient care was a strength of their project than those that did not complete this step.

In addition, over a third of grantees (35 percent) wished they had considered the quality of technical support more carefully before they purchased their health IT.

Seeing vendor role more broadly

Health IT vendors played a large role in planning and implementation for THQIT grantees: 40 percent of planning grantees and 66 percent of implementation grantees considered vendors to be partners in their projects. From the grantee interviews, we believe some of the more productive

relationships involved a large patient care delivery organization with negotiating clout and/or internal health IT experience acting as the link to the vendor.

Other Cross-Organization Partnerships

Of the partnerships that were built or enhanced as a result of the planning and implementation grant opportunities (65 of them), nearly all continued to work together in part or in whole after the end of the grant period on health improvement projects (with two exceptions). Partnerships ranged in size and composition, but more than half the grant projects included one or more private physician practices (a majority of which had fewer than five physicians), hospitals (a majority were Critical Access Hospitals or small rural hospitals), a university, and a health IT vendor. Grantees with more complex and larger projects—those with more than one type of patient care delivery organization and/or involving more than 10 organizations of any type—were as likely to continue their partnerships with full versus partial participation as their smaller or counterparts or those including only one type of patient care delivery organization.

Including an organization whose primary mission is *not* care delivery appears advisable: partnerships involving organizations such as professional associations, health IT vendors, and/or a consultant were significantly more likely to continue with full participation than partnerships without these organizations involved. Implementation projects with a "major rural" focus were also more likely to report *all* partners continuing to work together after the grant, compared with other grantees.

Grantee interviews suggested several features of successful health IT partnerships: a shared view among partners that health IT is an enabler to a common goal, trust among partners, and, when relatively small organizations with constrained resources are included, also including a larger, well-resourced partner (see box).

Helpful Features of Grantee Partnerships

The findings in this box are based on interviews with 16 THQIT grantees.

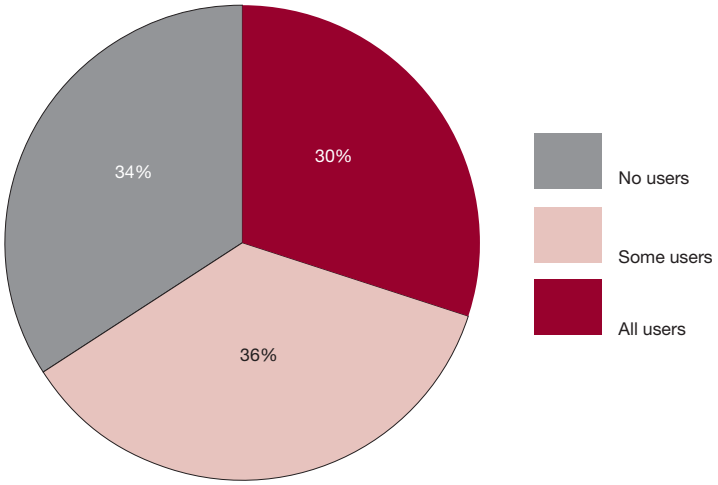
1. **Health IT as an Enabler:** Grantee stories suggested that health IT partnerships are more successful when they selected health IT as an enabler to help meet a broader common goal, rather than having technology implementation as the primary goal.
    - Examples of a broader goal in the THQIT partnerships included behavioral health quality improvement and better care for Medicaid patients.
2. **Trust:** Trust between partners is critical to successful collaboration, and helps reduce concerns around privacy and confidentiality.
    - Several grantees found that setting up a process for regular formal and informal interaction where all partners can have their opinions shared in a neutral environment helped them build trust.
3. **Including Well-Resourced Organizations with Less Resourced Partners:** Partnerships involving relatively small organizations with fewer resources often benefited greatly from the financial resources and technical expertise of a larger, well-resourced partner.
    - THQIT grantees also emphasized that the larger organization must advance the common goals of the partnership instead of leveraging the group around their own interests or trust may suffer and the smaller organizations may withdraw.
    - Some THQIT grantees were composed of partnerships of small, resource-constrained organizations and were also successful. For example, two grantees, one composed of small hospitals and the other of community health centers, implemented a shared EHR across their partners. These grantees benefited from the ability to share staff and spread the cost of health IT maintenance across partner organizations.

End Users

THQIT grantees generally recognized the importance of involving intended end users in planning and product selection: almost three-fourths cited end users' involvement in planning as a strength of their project, and 88 percent reported that end users played a major role in product selection.

Sixty-six percent of implementation grantees provided competency-based training to at least some intended users, but only 30 percent provided it to all intended users (Figure ES.2). Competency-based training requires learners to demonstrate understanding of the content addressed in the training before it is considered to be complete, rather than just requiring attendance at the training.

Figure ES.2. Percentage of implementation grantees where intended users attended competency-based training



Grantees compensating all end users for time spent in training were significantly more likely to implement or continue to use their technology than grantees compensating some or no end users. Only 20 percent of grantees offered any intended users continuing education credits for training—an offer which signals that the organization values the participant's learning and may increase buy-in.

Fifty-one percent of the implementation grantees provided training more than 2 weeks before go-live, risking memory loss of the training content. Several grantees who were interviewed reported that *ongoing* training activities beyond initial training facilitated successful use of the health IT.

Intended end users were also involved in or at least trained on workflow redesign.

> "Using health IT is not just about how and which button to push, it's about how to incorporate it into workflow and how to do so efficiently."
> —An implementation grantee

Eighty-five percent of grantees performed process redesign before implementation, with 26 percent reporting *intensive* process redesign at that stage.

There was a statistically nonsignificant pattern in which grantees that performed intensive process redesign prior to health IT implementation reported experiencing quality or efficiency benefits more than other grantees at the time of the survey (75 percent vs. 55 percent).

Implications

Sustainability

How likely was the projects' health IT to be sustained and what factors influence the sustainability of health IT projects? The fact that most of the THQIT projects led to sustained health IT implementations has particular significance because these grantees represent health care organizations that are more typical of those that serve most of America, rather than the large, innovative systems that were the first to adopt and study health IT. Those implementing health IT now may find encouragement in the fact that others found their implementations valuable enough to sustain. They may also wish to build on the lessons learned from THQIT by building in ways to demonstrate the benefits of the health IT to their organization, working to build clinician support, and conducting intensive process redesign prior to implementation.

Vendors

How should patient care delivery organizations engage and work with health IT vendors? Checking a source for a product rating and carefully considering technical support when selecting a vendor at the time of a health IT purchase are two useful practices highlighted by the THQIT grantee survey. The fact that a majority of the implementation grantees considered a vendor to be a partner underscores their importance in implementation.

Partnerships

How can health care organizations work together to facilitate health IT implementation? The organizations that participated in THQIT grant partnerships nearly all found enough benefit ensued to continue to work together after the grant period. Even absent a grant program that requires partnership, organizations implementing health IT may want to consider initiating a partnership that takes into account the helpful features reported by the THQIT grantees we interviewed: implementing health IT as an enabler to a broader common goal, such as quality improvement; building trust among partners; including well-resourced along with smaller organizations in the partnership; and including an organization that does not focus on patient care delivery (such as a consultant, a university, or a professional association).

End Users

What methods of involving intended end users did grantees find most valuable? In most grant projects, end users were involved in process redesign prior to implementation, and competency-based training as part of implementation. The grantees varied in how they encouraged or required users to be trained, but those that paid all the end users for their time in training were less likely to report having to discontinue their implementation plans.

Other Products Highlighting the THQIT Grantee Experience

The THQIT grantees have published more than 150 peer-reviewed articles and conducted more than 300 presentations related to their THQIT projects. Moreover, the experiences of THQIT grantees have informed these other useful documents produced for AHRQ:

- *Using Health IT: Eight Quality Improvement Stories.* This document provides eight case summaries of THQIT grant projects demonstrating promising practices and/or achieving measurable results and points to the challenges that must be addressed to realize health IT potential more broadly (Au et al., 2010). The case stories include projects focusing on EHRs, CDS, CPOE, HIE, telehealth, a Web-based quality reporting system with feedback, and an electronic continuity of care record used to help overcome barriers in accessing care (http://healthit.ahrq.gov/SuccessStoriesTHQIT).

- "Partners Use EHRs to Steer Quality Improvement." This case story describes how an EHR with evidence-based decision support technology and an electronic data warehouse for tracking quality of care was implemented by 32 community health centers across 11 States. (See Appendix C and http://healthit.ahrq.gov/THQITStoryRachman2012.pdf.)

- *Getting Ready: A Planning Checklist for Rural and Community Hospitals Considering Implementing Health IT* is designed to help rural and/or community-based hospitals assess their level of preparation for health IT implementation (Appendix B).
- Podcasts highlighting three grantees' successful projects:
  - "E-prescribing and Reducing Medication Costs," featuring Dr. Joel Weissman (http://www.healthcare411.ahrq.gov/radiocastseg.aspx?id=1174&type=seg),
  - "Preventing Bed Sores," featuring Dr. Susan Horn (http://www.healthcare411.ahrq.gov/radiocastseg.aspx?id=1183&type=seg), and
  - "Keeping Kids in School Via Telemedicine," featuring Kenneth McConnochie (http://www.healthcare411.ahrq.gov/radiocastseg.aspx?id=1179&type=seg).

- *The AHRQ Health IT Value Grant Initiative: A Programmatic Review of the Peer-Reviewed Literature.* This report highlights the value of health IT as it is being implemented, discussing the opportunities for and impediments to using health for quality improvement (McGowan and Roper, 2010) (http://healthit.ahrq.gov/THQITValuePaper).

Interested in Learning More About the THQIT Grantees?

Appendix A, Table A.7 provides links to the final reports of each grantee. In addition, the AHRQ National Resource Center for Health IT maintains a project profile for each THQIT grantee. The profiles include a project description, ongoing project updates, and links to related publications. To access more information about grantees, search on http://healthit.ahrq.gov/portfolio.

Chapter 1. Introduction

Patient care delivery organizations that implement new health information technology (health IT) over the next few years will face many of the same hurdles tackled by early adopters and can learn from their implementation experiences. This report draws on the lessons learned by early adopters under the Agency for Healthcare Research and Quality (AHRQ) Transforming Healthcare Quality through Information Technology (THQIT) grant program to help address the following questions:

- **How likely was the projects' health IT to be sustained and what factors influence the sustainability of health IT projects?** This report reviews the factors that grantees reported may influence the sustainability, expansion, and discontinuation of health IT projects with a particular focus on the success factors for patient care delivery organizations that have traditionally lagged in health IT implementation, such as small physician practices and Critical Access Hospitals (CAHs, McCullough et al., 2011; Rao et al., 2011).
- **How should patient care delivery organizations engage and manage health IT vendors?** Working with health IT vendors is a fundamental aspect of implementing health IT. This report underscores steps patient care delivery organizations should take during their vendor selection process, and provides insight into the barriers and facilitators to achieving an effective working relationship with a vendor.
- **How can health care organizations work together to facilitate health IT implementation?** This report discusses how implementing health IT in partnership with other health care organizations can facilitate implementation for resource-poor patient care delivery organizations and help increase participation in health information exchanges (HIEs).
- **What methods of involving intended users did grantees find most valuable?** This report describes a range of strategies that grantees found valuable to engage intended users in health IT planning and selection, training, and workflow redesign.

These questions are addressed in the sections that follow. Our findings are not intended to provide a complete consideration of these issues but to represent the viewpoint of this group of early implementers. Appendix A contains material to supplement the tables and figures in the body of the report and links to final grantee reports.

Appendix B provides a *Planning Checklist for Rural and Community Hospitals Considering Implementing Health IT*. This guidance document is designed to assist rural and/or community-based hospitals considering the implementation of health IT, such as HIE or EHRs (electronic health records), to assess their level of preparedness. It addresses such topics as leadership, whom to involve, project participants, and several other dimensions of planning. Organizations can use the practical tool to self-determine their readiness for health IT implementation and/or upgrades, and to consider areas where they may benefit by additional preparation. The checklist is based primarily on THQIT grantee experiences and was reviewed by several rural hospital health information and medical executives.

Background on the THQIT Program

Under the THQIT program, AHRQ funded 118 grants for health IT planning, implementation, and/or evaluation. The funded organizations were required to partner with at least two other organizations to complete the grant project. Grant and cooperative agreement funding was awarded under the funding announcements described below.

- In 2004, 38 organizations from the 220 organizations that applied were awarded 1 year **planning grants** (RFA-HS-04-010 <http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-010.html>) of up to $200,000 for exploring health IT implementation. This funding was used to define implementation goals, conduct needs assessments, upgrade IT infrastructure, and develop plans for implementation. Fifteen planning grantees received a 1-year, no-cost extension on their grant. Thirty-five grantees applied for subsequent THQIT funding for implementation (RFA-HS-04-013).
- **Implementation cooperative agreements** were issued to 56 awardees through two waves of funding to organizations implementing community-wide or regional health IT projects. Through these cooperative agreements, funded organizations were provided up to $1.5 million over a 3-year grant period and were required to provide at least 50 percent matching funds, bringing many project budgets to over $3 million. Of the 56 implementation grantees, 31 received no-cost extensions of about 1 year.
    - In 2004, 142 organizations applied for the first wave of funding under a general request for application (RFA-HS-04-011<http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-011.html>) and 40 grants were awarded.
    - The second wave of funding awarded in 2005 was restricted to those with planning grants. Of the 35 planning grantees which applied, 16 received an implementation grant (RFA-HS-04-013 <http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-05-013.html>).
    - In 2004, 24 organizations out of 216 that applied were awarded **value grants** (RFA-HS-04-012 <http://grants.nih.gov/grants/guide/rfa-files/RFA-HS-04-012.html>) of up to $1.5 million. The value grant projects aimed to understand the value of health IT for care quality, safety, and efficiency. Value grantees were often involved in both the implementation of the health IT project and the evaluation of its impact. Eighteen value grants received no-cost extensions for 1 or 2 years.

The planning and implementation grants focused on engaging small, rural patient care delivery organizations, whereas the value program focused on more traditional research organizations. The THQIT grantee organizations are from all across the country (Table 1.1). Nearly half of the implementation projects had a rural focus and almost two-thirds of the planning projects included only rural patient care delivery organizations. Eighty-six percent of funded projects included at least one hospital as a partner, more than half included private physician practices, and over one-quarter included safety-net providers (for example, Federal Qualified Health Centers [FQHCs], health department clinics).

Table 1.1. Locations of THQIT applicants and grantees

State	All Applicants	All Grantees	Planning Only Grantees	Planning and Implementation Grantees	Implementation Only Grantees	Value Grantees
	577	102	22	16	40	24
AK	2	1	1	0	0	0
AL	5	0	0	0	0	0
AR	8	1	0	0	1	0
AZ	3	0	0	0	0	0
CA	39	6	0	2	3	1
CO	9	0	0	0	0	0
CT	9	2	0	0	1	1
DC	6	0	0	0	0	0
DE	1	0	0	0	0	0
FL	21	2	2	0	0	0
GA	11	1	0	0	1	0
HI	5	2	0	1	1	0
IA	7	3	0	1	1	1
ID	7	2	1	0	1	0
IL	19	5	1	1	1	2
IN	12	3	0	0	1	2
KS	12	0	0	0	0	0
KY	10	3	1	0	2	0
LA	9	4	2	1	1	0
MA	32	10	0	0	3	7
MD	20	1	0	1	0	0
ME	12	4	1	1	2	0
MI	21	3	0	1	1	1
MN	19	3	1	1	1	0
MO	11	1	0	0	1	0
MS	6	2	0	1	1	0
MT	9	3	2	0	0	1
NC	9	2	0	0	1	1
ND	4	0	0	0	0	0
NE	10	2	1	1	0	0
NH	5	1	1	0	0	0
NJ	5	0	0	0	0	0
NM	3	2	0	0	2	0
NV	1	0	0	0	0	0

State	All Applicants	All Grantees	Planning Only Grantees	Planning and Implementation Grantees	Implementation Only Grantees	Value Grantees
NY	44	4	1	0	2	1
OH	18	2	0	0	1	1
OK	5	2	0	1	1	0
OR	11	5	2	0	2	1
PA	34	2	0	1	1	0
RI	1	0	0	0	0	0
SC	3	0	0	0	0	0
SD	4	0	0	0	0	0
TN	11	3	1	1	1	0
TX	24	2	0	0	1	1
UT	8	2	0	0	1	1
VA	8	1	1	0	0	0
VT	4	2	0	1	1	0
WA	17	2	0	0	1	1
WI	14	4	2	0	1	1
WV	6	2	1	0	1	0
WY	3	0	0	0	0	0

Source: THQIT grantee applications

Note: Grantees that received planning and implementation grants are not double counted.

Eighty-six percent of the grantees pursued more than one type of technology. The most common technologies pursued were HIE and EHRs. Other technologies of focus included clinical decision support, computerized provider order entry (CPOE), and telehealth.[2] More detail on the characteristics of the grantees by grant type is included in Appendix A, Table A.1.

Goals of the THQIT Grant Program

Planning grants (RFA-HS-04-010)

- Foster collaboration on health IT between three or more organizations, especially between small, rural hospitals and/or multiple types of patient care delivery organizations.
- Support health IT planning activities (for example, establishing organizational collaboratives, developing business and financial plans, improving IT infrastructure, developing health IT research capacity).
- Support the development of viable and sustainable health IT plans that will result in data sharing across patient care delivery sites.

Implementation cooperative agreements (RFA-HS-04-011, RFA-HS-04-013)

- Foster collaboration on health IT between three or more organizations, especially between small, rural hospitals and/or multiple types of patient care delivery organizations.
- Support organizational and community-wide implementation of health IT, with a focus on health IT that will result in sharing clinical and research data across patient care delivery organizations.
- Assess the extent to which health IT contributes to measurable and sustainable improvements in patient safety, costs, and overall quality of care.

Value grants (RFA-HS-04-012)

- Foster collaboration on health IT between three or more organizations, especially between diverse health care settings.
- Assess the value derived from the adoption and use of health IT, especially new health IT.
- Support the development of tools or models that can be used to demonstrate the value of health IT, such as tools to calculate return on investment or to advance health IT adoption, especially by rural and small health care delivery organizations.

[2] Most of the THQIT projects involving telehealth were of the type that provided clinical services remotely through health IT; one value grantee that studied telemonitoring of patient data was also included in this category.

Understanding the THQIT Grantee Experience

AHRQ and its contractors, Mathematica Policy Research and Geisinger Health System, worked together to synthesize the experience of the THQIT grantees. The team completed a systematic review of the planning and implementation grantee final reports and other available publications, surveyed the grantees, and conducted semistructured qualitative interviews with a subset of grantees. This report synthesizes findings across these sources.

Web-based surveys were designed to follow up on themes identified through a review of grantee reports and other documents. All grantees were recruited to participate in the survey. Planning grantees that received subsequent THQIT implementation funding received both the planning and implementation surveys.[3] The response rate was high across grant types: for planning, implementation, and value surveys, the response rate was 79 percent, 86 percent, and 87 percent, respectively. Grantees that received both a planning and an implementation grant responded at a similar rate to grantees receiving just one of those survey types. The majority of surveys were completed by the principal investigator for the THQIT projects (85 percent). Other individuals directly involved with the grant or with organizations that participated in the grant completed the remaining surveys. The Medicare and Medicaid EHR Incentive Program's stage one "meaningful use" criteria were released in final form in July 2010, well prior to this survey, and so may have influenced grantees' responses to the survey and their overall work related to health IT in this period.

Semi-structured interviews were designed to supplement the information gained through the surveys.[4] The interviews were conducted with 16 grantees selected to represent the range of organizational characteristics listed in Table 1.2. The majority of interviews lasted 2 hours and were completed by one to three interviewees, at least one of whom was the principal investigator or the project manager for the THQIT grant. Other interviewees included one systems analyst and two evaluation directors. The qualitative interview responses were confidential; therefore, quotes here are not attributed to individuals or grantees.

Some discussions in this report are relevant to all grantee types and others are relevant to a subset of THQIT grantees. When appropriate, we combine results across relevant grant types to streamline the display of similar results. Where results from multiple grant types are combined, subgroup analyses were performed and differences are noted. However, the small numbers that result from subdividing the grantees mean only the largest differences are detectable with statistically significant results.

---

[3] Eleven planning grantees that received subsequent THQIT funding completed both the planning and implementation surveys, two additional grantees completed only the planning survey, and two other grantees completed only the implementation survey. The surveys were programmed with skip patterns to reduce duplication between the planning and implementation surveys for these grantees.

[4] Survey instruments and interview guides were approved by the Office of Management and Budget (0935 0175).

Table 1.2. Characteristics of THQIT grantees, survey respondents, and interview respondents

	All Grantees	Survey Respondents	Interview Respondents
Type of Grantee			
Planning-only grantee	22 (22%)	17 (20%)	6 (38%)
Implementation-only grantee	40 (40%)	35 (40%)	3 (19%)
Planning and implementation grantee	16 (16%)	15 (17%)	6 (38%)
Value grantee	24 (24%)	21 (24%)	1 (6%)
Community			
Rural	58 (57%)	49 (56%)	11 (69%)
Rural and nonrural	12 (12%)	11 (13%)	2 (13%)
Non-rural	31 (31%)	27 (31%)	3 (19%)
Health IT of Focus*			
HIE	53 (52%)	47 (54%)	15 (94%)
EHR	44 (44%)	42 (48%)	8 (50%)
Clinical decision support (CDS)	32 (32%)	31 (36%)	1 (6%)
Computerized Provider Order Entry (CPOE)	23 (23%)	21 (24%)	2 (13%)
Telemedicine	11 (11%)	10 (11%)	2 (13%)
Care Setting for Implementation*			
Inpatient	62 (61%)	51 (59%)	9 (56%)
Ambulatory	69 (68%)	59 (68%)	14 (88%)
Pharmacy	15 (15%)	13 (15%)	2 (13%)
Emergency department	13 (13%)	12 (14%)	1 (6%)
Long-term care	13 (13%)	11 (13%)	1 (6%)
Behavioral health	6 (6%)	4 (5%)	2 (13%)

Notes: Data come from an AHRQ-provided data set on grantee characteristics. Information for one grantee who did not submit a final report was not included in the data set, so characteristics are reported for 101 out of 102 grantees in the "All THQIT Grantees" column and for 87 out of 88 grantees in the "Survey Respondents" column. Data were available for all interview respondents.

Grantees receiving planning and implementation funding are not double counted.

*Categories are not mutually exclusive.

Chapter 2. Sustainability of Health IT Supported by the THQIT Grants

KEY FINDINGS

"This project has taken on a life of its own."

—A value grantee

- Eighty-five percent of implementation and value grantees sustained or expanded health IT systems after the end of the grant.
- Sixty-five percent of the planning grantees that did not receive THQIT implementation funding still implemented some of the health IT they planned.
- The most common reasons grantees reported they could sustain the health IT were ability to demonstrate benefits (77 percent) and clinician support (69 percent).
- The most frequent problems that led to some of the 69 implementation and value grantees discontinuing or not implementing health IT were cost of ongoing maintenance (6 grantees), lack of business case for the health IT and availability of funds (5 grantees), suboptimal level of participation across partners (5 grantees), and lack of enthusiasm among physicians (4 grantees).
- Projects that reported conducting intensive process redesign before implementation, and those that developed a detailed implementation plan, were significantly more likely to implement all of their planned health IT.

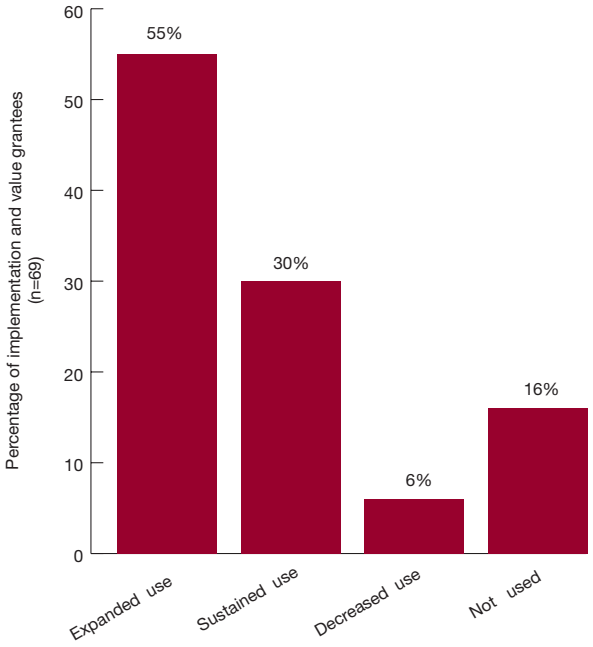
Final grant reports are limited to 20 pages and must be filed within 90 days of the completion of a grant. These requirements reduce the depth of available contextual and longitudinal information about each project and limit evaluation of its impact, as it is not possible to assess whether results were sustained beyond the project period. To complement the end-of-project reports, a comprehensive set of surveys was administered to the THQIT grantees about 5 years after the end of the planning grants and 2 to 3 years after the end of the implementation and value grants. Based on the survey and follow-up interviews, this section explores answers to three key questions:

- To what extent was the health IT that was the focus of the THQIT grants sustained or increased after the grant period?
- Where health IT was sustained, what were the reasons for and funding sources or income streams for sustaining it?
- Where health IT was not sustained, what were the reasons for nonsustainability?

Most Health IT Systems Supported by Implementation and Value Grants Were Sustained or Expanded Over Time

Fifty-five percent of implementation and value grantees reported that the health IT implemented during the project had been expanded, and 30 percent reported that health IT use had been stable since the end of AHRQ funding (Figure 2.1). A minority of grantees reported decreased use of implemented technologies (6 percent) or no current use (16 percent).

FIGURE 2.1. USE OF HEALTH IT—SUMMER 2011 COMPARED WITH END OF GRANT PERIOD



Source: Survey of THQIT Grantees conducted in summer 2011.

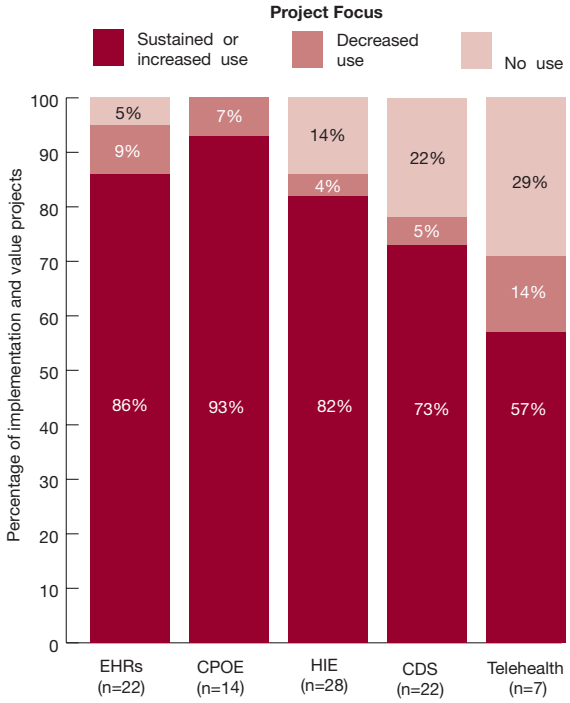
Note: Grantees could give multiple responses because many implemented multiple technologies. The average time between grantees submitting their final report and completing the survey for grantees that expanded, sustained, decreased, or were not using health IT was 34, 34, 37, and 35 months, respectively.

Expansions involved an increase in the number of organizations using the health IT (33 percent), an increase in the number of clinicians or staff within the original partner organizations using the health IT (46 percent), or an increase in health IT functions (48 percent). Seven of the 19 value grantees specifically reported implementation of health IT in organizations that were not involved in the value study, and said that those expansions were likely a result of positive study findings. The types of organizations affected included large and small hospitals, large and small physician practices, safety-net clinics, and long-term care organizations.

Projects focused on EHRs and/or CPOE were more likely to report sustained or increased use after the grant period than projects focused on clinical decision support (CDS) and/or telehealth; fewer than 5 percent of the former reported no use at the time of the survey (Figure 2. 2) ($p<.05$).

In contrast, projects focused on telehealth and/or CDS were less likely to report sustained or increased use, and over 20 percent reported no use at all ($p=.069$). Note that telehealth is not typically financed through insurance, which is focused on paying for services delivered in person. However, the University of Rochester Medical Center, a telehealth grantee under the direction of Dr. Ken McConnochie, demonstrated results in terms of decreased emergency use that were so compelling to local payers that all except the fee-for-service Medicaid program began to pay for the telehealth service, allowing it to be sustained (http://www.innovations.ahrq.gov/videos.aspx). Go to (http://www.healthcare411.ahrq.gov/radiocastseg.aspx?id=1179&type=seg) for related podcast.

Figure 2.2. Reported level of health IT use in summer 2011, compared with end of grant period



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: The number of respondents (n) included for each column differs depending on the number of respondents who implemented a type of health IT. Grantees may be counted in more than one category if they implemented more than one of these types of health IT. The average time between grantees submitting their final report and completing the survey for grantees that implemented EHRs, CPOE, HIE, CDS, or telehealth was 2.5 to 3 years.

Expansion of THQIT Grant Projects

The following are examples identified in the evaluation that illustrate how some of the THQIT grant projects have expanded since the time of the grant:

- The Erie Family Health Center, Inc.'s EHR-focused project led by Fred Rachman, M.D., began by implementing a single, centrally operated EHR in four FQHCs. Now 32 safety-net clinic sites spread across 11 States use this EHR system, with common data concepts, clinical content, and decision support (http://healthit.ahrq.gov/THQITStoryRachman2012.pdf).

- International Severity Information Systems, under the direction of Susan Horn, Ph.D., first implemented health IT in 15 nursing homes through the "'On-Time' Quality Prevention Program for Long-Term Care" and found it helped reduce pressure ulcers. Twenty-one additional nursing homes implemented it the next year; since then, at least 46 others have implemented the system, encouraged by Medicaid incentives to use health IT to support quality improvement (http://healthit.ahrq.gov/UC1HS015350Hornfinalreport2008). An array of instructional resources for replicating this program are available at http://www.ahrq.gov/research/ontime.htm.

- Led by Sanjeev Arora, M.D., the University of New Mexico Health Sciences Center began its telemedicine project (Project ECHO) by providing 21 remote clinics support in managing Hepatitis C. Between the end of AHRQ funding and 2010, the program expanded to 13 other medical conditions, each with between four and 43 locations supported. (Project ECHO story is accessible from this Web site: http://healthit.ahrq.gov/THQITStoriesArora2010.pdf.)

Eighty-two percent of projects that included a health information exchange were sustained or experienced increased use over time, while 14 percent of these projects reported no current use. THQIT grantees faced a number of barriers to health information exchange—such as the lack of common standards—and tended to scale back their projects or not implement the HIE part of their project (see box at end of section). (Often the grant projects included multiple technologies, so that some of the grantees' goals could still be met.) There were also some solid successes. For example the SAFEHealth Project, led by Lawrence Garber, provides medication lists, vital signs, and lab data to several health system partners for a cost of around $2,000 per year (featured in "Success Stories from the AHRQ-Funded Health IT Portfolio (2009)," available at [http://healthit.ahrq.gov/successstoriesCY2009]).

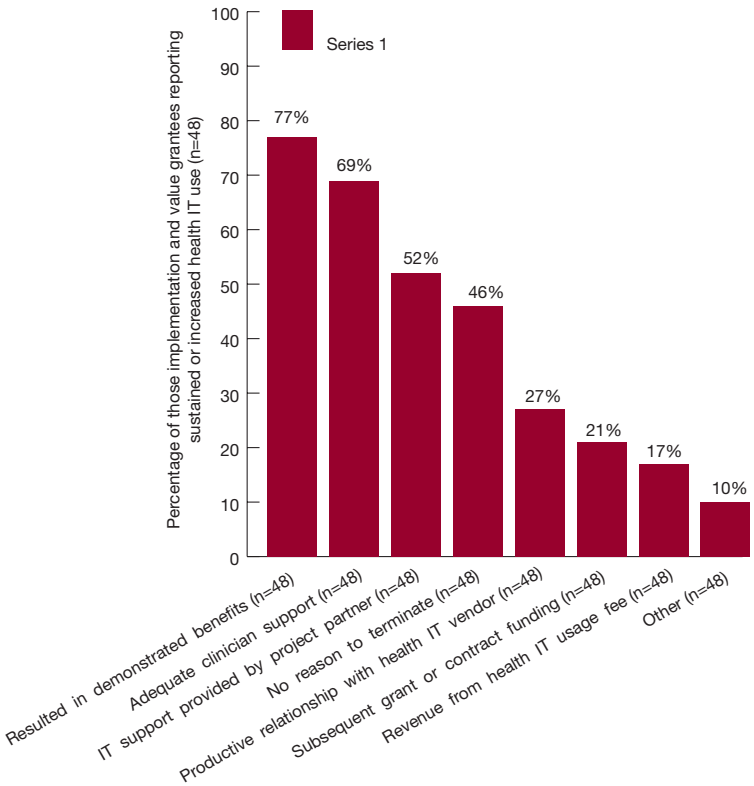
The top two reasons grantees reported for sustained or increased use of health IT were the fact that it resulted in benefits that were demonstrated sufficiently for their organizations to continue to support the health IT, and adequate clinician support (Figure 2.3). Grantees again emphasized the importance of partnerships, with 52 percent reporting that IT support provided by a project partner was a reason for sustaining or increasing use of the health IT.

Most Planning Grantees Subsequently Implemented Some of the Health IT They Planned

Most THQIT planning grantees (27 of 33, or 82 percent) proceeded to implement at least some of their planned health IT after the end of the grant. Nearly half of the THQIT planning grantees were awarded THQIT implementation grants, and of the 17 planning grantees that did not receive a further grant ("planning-only grantees"), 65 percent also implemented at least some of the health IT on which they focused during their planning. The technologies most frequently implemented were EHRs (five grantees), HIE (four grantees), and a clinical data repository (four grantees). Planning-only grantees that did not implement all their planned health IT cited lack of funding (11 grantees). In addition, three to four grantees each cited lack of necessary infrastructure, end-user support, administrative support, and a plan for sustainability and/or business case.

Example of marketing business case from the field: One planning-only grantee, a university, was able to persuade its leadership to fund a modified HIE plan after the THQIT planning grant work crystallized the need for rural physician practices in the State to know about the specialty and hospital care their patients received at the university. The university justified the expense of their health IT as a marketing strategy. While the original plans specified in the planning grant were more ambitious and involved establishing a many-to-many data sharing network, the university learned from the planning grant process and developed a more feasible option that translated to a portal where about 2,000 community physicians can view their patients' records of inpatient and most outpatient care provided by the university system.

Figure 2.3. Reasons for sustained or increased use of health IT

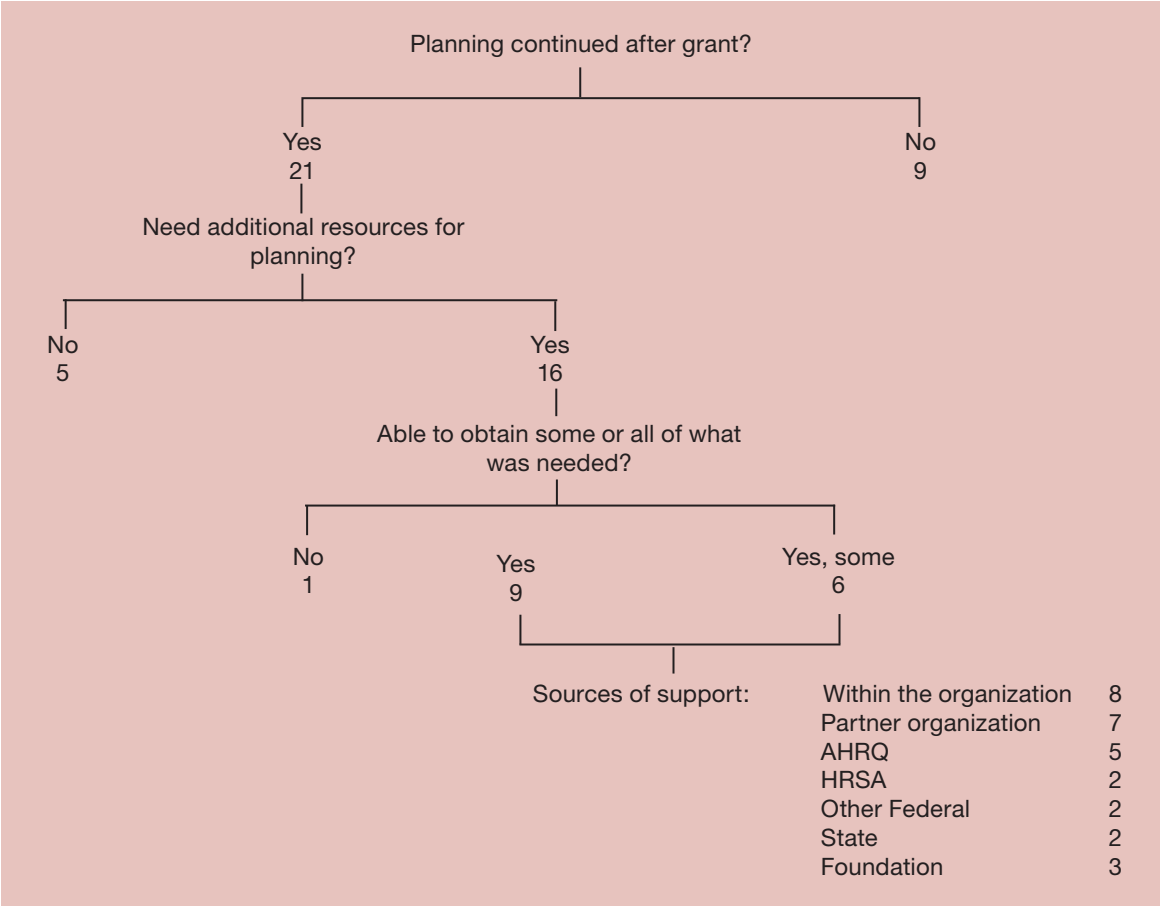


Source: Survey of THQIT Grantees conducted in summer 2011.

The sustained implementations of many of the planning-only grantees were achieved after a planning period that typically ranged from 2.5 to 3 years, taking into account the grant period, a 1-year extension granted to 15 planning grantees, plus typically 6–12 more months after the end of the grant. Five of the 21 responding grantees reported that the planning process continued for more than 24 months after the end of the grant. Figure 2.4 shows the sources of support for the 15 grantees that needed additional resources for planning and found support; they were heavily reliant on their own organizations and their partners, although Federal funding and other sources also played a role.

Implementation and value grantees also used extended periods of planning and development that led to the need for grant extensions; 46 received a 1-year extension to their 3-year grant period and three received 2-year extensions. The need for an extended planning period may be partially attributable to the early stage of the technology and project management skills. For example, a value grantee explained, "At the time we did this project, the [Web-based] approach we ultimately used for decision support was fairly novel; we were making it up as we went. It was part of the reason we had the delay—it took us a longer time to get something robust enough to do the decision support that we had committed to doing" (Lobach, 2008).

Figure 2.4. Needs and support for extended planning process by planning grantees



Source: Survey of THQIT Grantees, conducted in summer 2011

Using Payer Financing—an example from the field

A value grant project, which used claims data from hospitals and clinics submitted to a central repository to identify "sentinel health events" among Medicaid patients and notify the patients' care managers and patients of an issue for action, has "taken on a life of its own." The project started in one county and has since expanded to five additional counties, doubling the patient population to over 57,000. Thinking ahead about sustainability, the project focused initially on the Medicaid program but created the health events notification system in such a way that other payers could—and now do—use the same system and contribute financially. While the system is not totally self-sustaining, income offsets much of the operational cost. The project has identified savings—in part from reduced emergency department use by low-severity cases—that it uses to justify the investment.

Rescaling Ambitious Health IT Plans

Projects were often unable to implement all of the ambitious health IT they originally planned. Of 69 implementation and value grantees, 29 (60 percent) reported having to discontinue or never implement a technology initially included in their project. The four most common factors preventing implementation or forcing discontinuation, as identified in the THQIT survey were as follows:

1. Cost of ongoing maintenance—six implementation and value grantees did not implement health IT or were forced to discontinue it for this reason.
2. Lack of business case for the health IT and availability of funds—five implementation and value grantees did not implement health IT or were forced to discontinue it for this reason.
3. Level of participation across partners—five implementation and value grantees did not implement health IT or were forced to discontinue it for this reason.
4. Lack of enthusiasm for the project among physicians—four implementation and value grantees did not implement health IT or were forced to discontinue it for this reason.

Between four and six implementation and value grantees cited each of these factors as a project weakness that either prevented implementation or forced discontinuation.

However, other factors can surface as well that compromise a health IT implementation. The list of factors cited as forcing discontinuation or preventing implementation of a technology by one to three grantees is surprisingly long, and includes—

- Factors related to project staffing and support among partnership and organizational leadership: lack of continuity of organizational leadership (four grantees); lack of continuity of project staff, poor level of trust among partners, and lack of administrative support (three grantees each); and lack of physician or clinician champions (one grantee)
- Technical factors: reliability of the software (three grantees), poor fit of new health IT with pre-existing system (two grantees), and usability of the health IT (one grantee)
- Factors related to the availability of knowledge and skills: poor health IT vendor support (two grantees); low degree of clinicians' or staff comfort with computers (one grantee); lack of available, knowledgeable health IT staff (one grantee)
- Concerns about information security or patient confidentiality (three grantees)

Only one grantee reported discontinuing or not starting implementation due to perceived lack of usefulness to patient care.

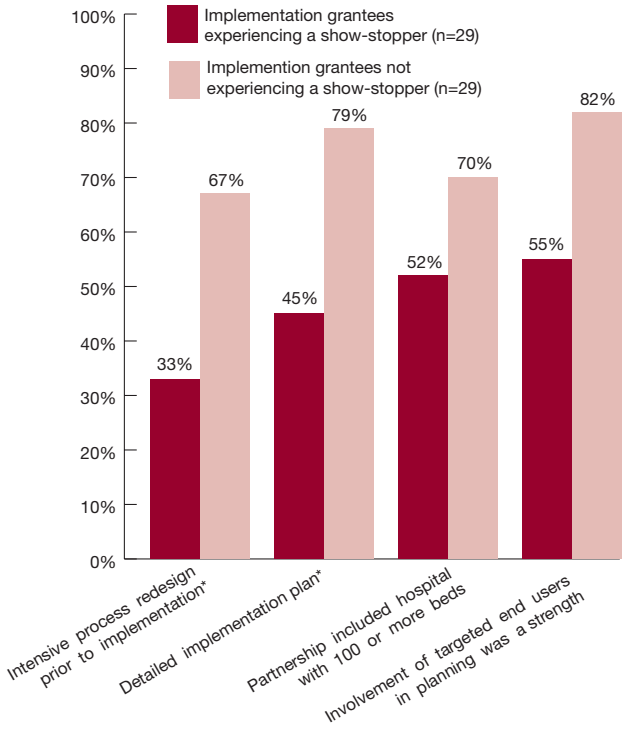
Grantees interviewed about their experience implementing HIE revealed that doing so was often more difficult than originally anticipated, leading all but one grantee with an HIE focus to scale back their original implementation goals. The grantee that did not scale back their HIE implementation plans expanded their exchange from involving three health systems to including all hospitals in the State with a common EHR vendor. Changes to original implementation plans for HIE included involving fewer patient care delivery organizations in the exchange than originally intended and establishing a view-only portal instead of an exchange with read and write functionality.

Reasons for Not Sustaining or Not Implementing Planned Health IT

When we compared the characteristics of the 29 projects that experienced one or more show-stoppers—reasons health IT was discontinued or never implemented—with the 19 that did not, we found that a detailed implementation plan and intensive process redesign[5] prior to implementation were beneficial factors: only 45 percent of those with a detailed implementation plan and 33 percent of those who engaged in intensive process redesign experienced a show-stopper, versus 79 percent and 67 percent of other grantees (respectively, Figure 2.5). Other apparent differences were not statistically significant.

The importance of a well-resourced partner organization with health IT expertise for sustaining the health IT was highlighted in the grantee interviews pertaining to health information exchange projects in particular. And the struggle with how to finance HIEs continued even for those that have been able to sustain their efforts (see box).

FIGURE 2.5. COMPARISON OF SELECTED IMPLEMENTATION FEATURES AMONG GRANTEES THAT DID AND DID NOT EXPERIENCE A SHOW-STOPPER



Source: Survey of THQIT Grantees conducted in summer 2011.

Note: A grantee was categorized as experiencing a show-stopper if it reported that one or more factors prevented implementation or forced discontinuation of a technology involved in its project.

*Statistically significant difference, p<.05

[5] Process redesign, also known as workflow redesign, means transforming the way clinicians work together to achieve improvements in care quality, costs, and patient outcomes.

The Importance of Involving a Larger Organizational Partner for HIE Implementation—an example from the field

A project implemented a health information exchange among a hospital and two primary care clinics, inputting patient data (demographic data, lab data, some transcription files, order and some results data, and radiographic images) into a central repository and then allowed viewing of the data by area physicians. When the team worked to establish financing for the HIE, conflict emerged: "Who pays what came down to counting parking spaces, counting patients served. We were splitting hairs, it was terrible!" As a result, the HIE was almost not implemented. However, the hospital decided that even though the business case for the hospital was not strong, it would present a "last ditch" more affordable option in order to "do that for our community." The two clinics agreed and the HIE remains operational today.

Grantees focusing on HIE reported the following barriers contributed to their need to scale back their projects:

- **Limited IT infrastructure at partner organizations.** A few grantees led by experienced organizations encountered unexpected IT challenges at their partner organizations, causing them to involve fewer partners or scale back the degree of exchange. For example, one planning grantee led by a university health system had intended to implement an exchange with read and write functionality with community providers. Limited health IT capacity at partner organization contributed to the grantee's decision to implement a view-only portal instead. Moreover, two grantees that originally intended to implement EHRs and an HIE at hospitals decided not to pursue HIE once they recognized the effort required to overcome the challenges of implementing an EHR.
- **Cost of health IT implementation and maintenance.** The cost of implementation kept some partners from joining HIEs and kept one grantee from implementing a shared medication list that could be updated by different patient-care delivery organizations. The grantee reported that establishing interfaces between multiple disparate systems was too costly; instead they created a view-only medication list containing their health system's data. Furthermore, one grantee that successfully implemented a record-locating service to allow hospitals and FQHCs to find patient records available in an HIE discontinued the project after the grant period due to the ongoing maintenance costs.
- **Inadequate vendor support.** Two grantees that are exchanging at least some data through a view-only portal reported that vendors had failed to adapt and/or deliver promised software and, as a result, they were unable to implement an active exchange.

A summary of HIE goals, HIE accomplishments, and reasons for scaling back health IT for the planning and implementation grantees interviewed can be found in Appendix A, Table A.8

Chapter 3. Vendor Selection and Support

KEY FINDINGS

"The relationship with [our vendor] has been helpful because they had other health information exchange experiences to draw on."

–A planning and implementation grantee

- Grantees that checked a product rating prior to purchase were significantly more likely than others to consider the usefulness of the health IT product to patient care to be a strength of their project.
- Over one-third of grantees wished they had considered the quality of technical support more carefully before they purchased their health IT.
- Health IT vendors played a large role as project partners to 40 percent of planning grantees and 66 percent of implementation grantees.

Purposeful and informed vendor selection can have long-term impacts on technical support, product reliability, system usability, and other factors. In the sections that follow, we draw on the THQIT grantee final reports, survey data, and qualitative interviews to lay out factors that patient care delivery organizations looking to purchase new health IT should consider in their decision making process, and discuss strategies that may be used to help foster a positive vendor relationship. This section synthesizes lessons learned across grantees and does not identify vendors by name or endorse a specific vendor.

What Did Grantees Consider When Selecting Health IT?[6]

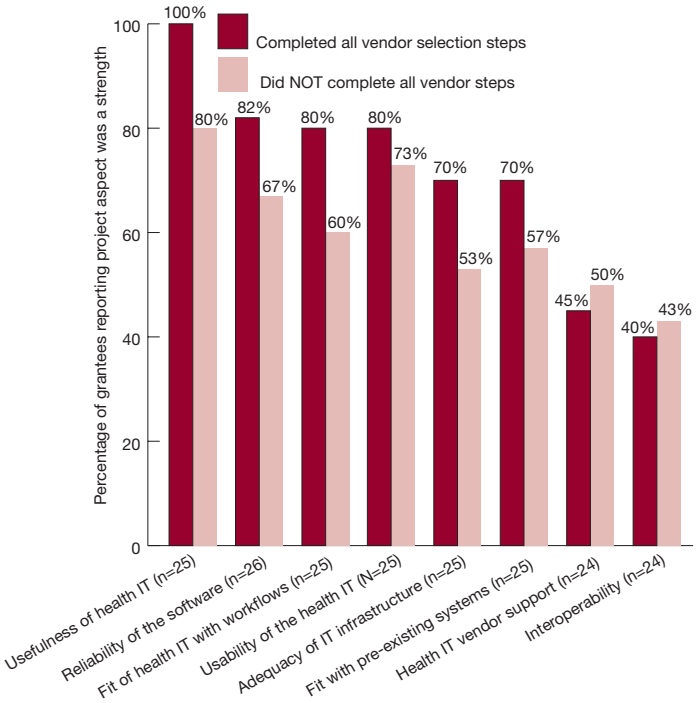
Over half of the implementation grantees (56 percent) purchased new health IT for the research project for which they were funded, and most heavily involved end users in the process (88 percent). Forty-two percent of these grantees completed a thorough vendor selection process, defined as completing the following steps: (1) conducting a needs assessment, (2) issuing a formal request for proposal (RFP), (3) undertaking reference checks on the vendor, (4) reviewing vendor longevity and financial integrity, and (5) checking a product rating (such as Gartner or KLAS). Some grantees sought assistance from other organizations in completing these steps: 6 out of 13 grantees issuing a formal RFP contacted other organizations to ask for a copy of their RFP.

Though significant differences were not detected, grantees that undertook all of the vendor selection steps appear more likely to rate vendor-related aspects of their project, such as usefulness of health IT and adequacy of vendor support, as project strengths than their counterparts with a less thorough vendor selection process

[6]This section focuses on the vendor selection process for implementation grantees. Planning grantees and value grantees were not surveyed on this topic.

(Figure 3.1). Grantees not completing all of these steps were least likely to issue a request for proposal and/or check a product rating (Figure 3.2). Not checking product rating appears to be a critical step missed by these grantees: those checking a product rating were significantly more likely to name the usefulness of their health IT product as a project strength than those not completing this step.

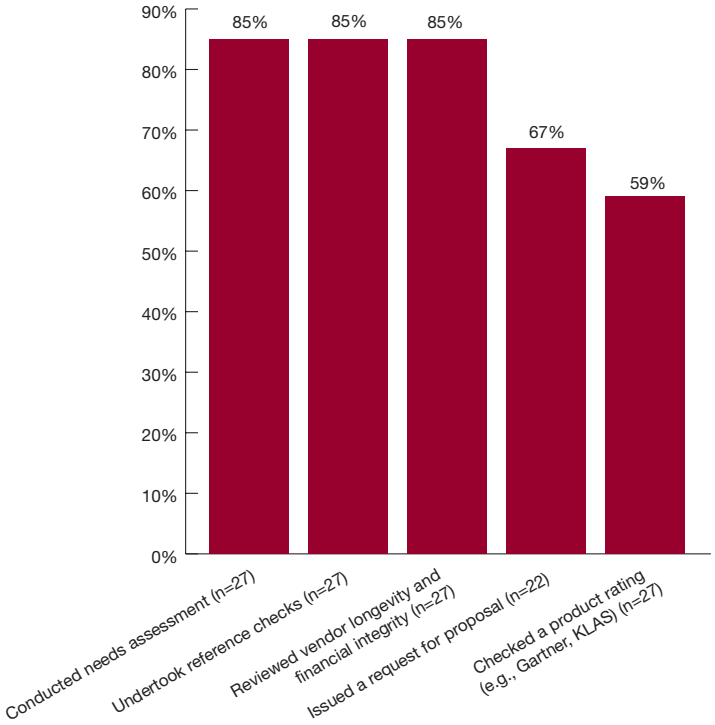
FIGURE 3.1. ASSOCIATION BETWEEN STRENGTHS OF IMPLEMENTATION GRANT PROJECTS AND COMPLETING A THOROUGH VENDOR-SELECTION PROCESS



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: If the number of respondents (n) included for a column is less than 26, one or more respondents skipped the question asking if a given aspect of implementation was a strength, weakness, or had no impact.

Figure 3.2. Percentage of implementation grantees who undertook steps for vendor selection

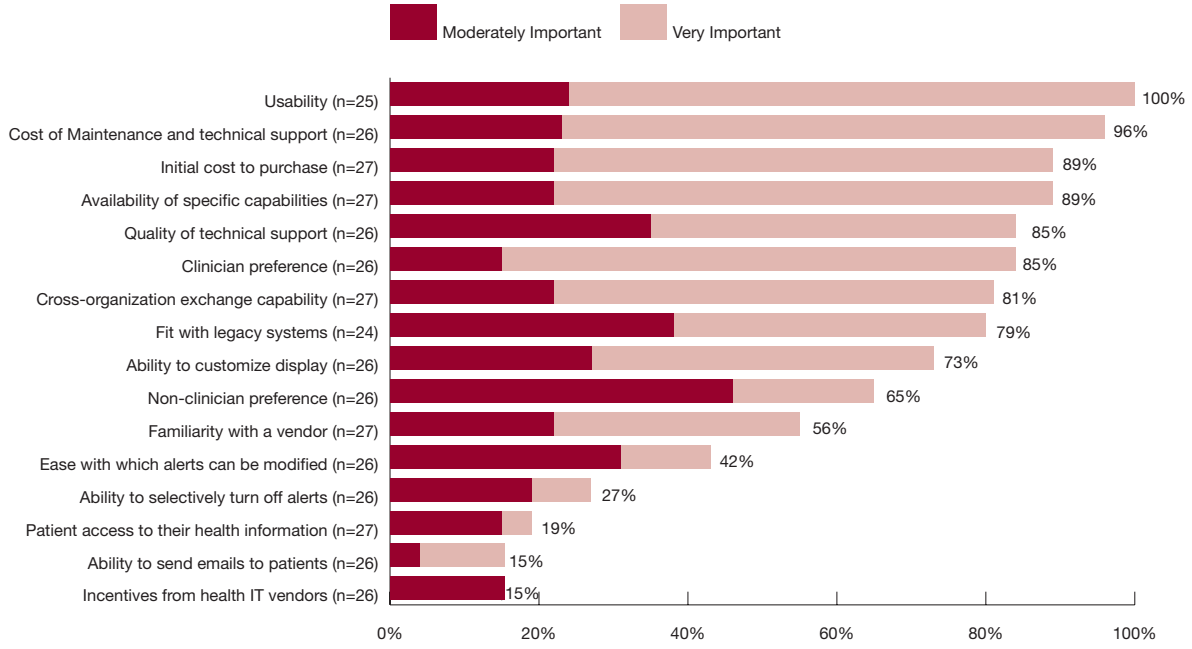


Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: If the number of respondents (n) included for a column is less than 27, one or more respondents skipped the question asking if they undertook a given vendor selection step.

Product usability, the availability of specific capabilities, initial purchase cost, and ongoing costs for maintenance were the most important factors grantees considered during their vendor selection process (Figure 3.3). In hindsight, 24 percent of grantees that considered purchase costs and 12 percent of grantees concerned with ongoing costs indicated these factors should have played a less important role. Some grantees also felt their existing relationship with a vendor played too great a role: 13 percent of grantees factoring in familiarity with the vendor and 25 percent of grantees factoring in vendor incentives reported they should have placed less emphasis on those factors.

Figure 3.3. Most important factors in purchasing a health IT product for implementation grantees



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: If the number of respondents (n) included for a bar is less than 27, one or more respondents skipped the question asking how important a given factor was in their decision to purchase health IT.

Looking back, one-quarter or more of the grantees wished they had considered the following to be more important than it actually was in their purchase decision:

- Inclusion of patient access to their health information (40 percent)
- Quality of technical support (35 percent)
- Ability of clinician to send emails to patients (35 percent)
- Ability to exchange information with health care providers at other sites (32 percent)
- Ease with which alerts can be selectively turned off by users (30 percent)

How Did Grantees Characterize Their Relationships With Vendors and the Vendor Impact on Projects?

Health IT vendors played a large role in planning and implementation for THQIT grantees: 40 percent of planning grantees and 66 percent of implementation grantees considered vendors to be partners in their projects. An additional 30 percent of planning grantees and 15 percent of implementation grantees involved vendors to a lesser extent, for example, as advisors or technical assistance providers.

Grantees reported a range of viewpoints on their relationships with vendors. Some grantees reported vendor involvement was a positive experience, with close to half of the implementation and value grantees (48 percent) naming vendor support as a strength of their project; almost one-third (27 percent) of grantees that sustained or increased use of their health IT indicated that a productive vendor relationship was a contributing factor. Other grantees reported experiencing challenges with their vendor: 16 percent of implementation and value grantees reported vendor support was a weakness for their project. Of those grantees, six indicated that poor support limited the benefits of their health IT project and another two reported it prevented implementation or forced discontinuation.

Grantees suggested that developing the best possible vendor relationship can be a challenge, especially since vendors may be overburdened by the push for health IT implementation, and provided insight into strategies that patient care delivery organizations can use to help foster a positive vendor relationship.

Seek Assistance in Vendor Negotiations

Patient care delivery organizations with more familiarity negotiating with vendors reported experiencing more productive vendor relationships. Organizations with limited experience or that feel they have less negotiating leverage, may benefit from seeking assistance from a consultant during negotiations or by partnering with a more experienced patient care delivery organization. For one grantee, an experienced hospital system handled vendor negotiations for all hospitals in the partnership, "buffering" less experienced hospitals from the vendor.

Establish Clear Vendor Expectations

Multiple grantees reported that their selected vendor was unable to adapt technology or incorporate new standards as needed and, as a result, a few grantees pursuing HIE had partners drop out of the exchange or had to switch vendors midway through the grant. For another grantee, the inability of the vendor to adapt their HIE system resulted in the grantee only implementing a view only portal instead of a system with full exchange functionalities.

Some grantees indicated they could have avoided these issues if they had spent more time outlining and discussing expectations with the vendor before contracting with them to ensure the vendor would be able to meet their needs.

Work Collaboratively With the Vendor

Grantees reported experiencing a more positive relationship with their vendor if they collaborated with them on system design and/or implementation. For example, one grantee worked together with their vendor to develop new products that drew on the health system's impressive in-house developed systems and the vendor's experience with different exchange settings. The grantee reported that "some things we may not have thought of they have already experienced. . . It is a back and forth to get where we need to be."

On the other hand, grantees treating their vendor relationship as a one-way exchange of information from the vendor to the patient care delivery organization reported they faced challenges as a result. For instance, some grantees relying solely on vendor processes for implementation and training reported their implementation would have gone more smoothly if they had worked closely with the vendor to adapt those processes for their specific organization.

These strategies draw on the experiences of patient care delivery organizations and do not include a vendor perspective. Vendors may be able to build upon this advice to provide additional insight on developing productive partnerships between patient care delivery organizations and vendors.

Working Together to Get the Vendor Committed—an example from the field

The California Rural Indian Health Board and its partners, implementing an ambulatory EHR in eight tribally owned and operated clinic sites, experienced significant issues with the functionality of their system. While the Tribal Health Programs (THP) operating the clinics were led to believe that the EHR system would meet their needs with minimal adaptation, they encountered numerous issues, including the inability to replicate data entered in one template on other templates and to produce verifiable data reports—which are especially important to tribal clinics with Indian Health Service reporting requirements. The participating THPs found that other tribal users were having similar difficulties and formed a national group representing nine THPs across eight States "to pressure the vendor to put Indian clinic projects higher on their priority list." The group met regularly by phone and held an annual conference attended by vendor leadership and trainers. The vendor responded to their collective voice and started to adapt the system to accommodate the THPs' needs (Aranaydo et al. 2007).

Chapter 4. Other Cross-Organizational Partnerships for Health IT Implementation

KEY FINDINGS

"The partnership aspect of the project was critical. Many organizations could not have a system like they do without having the support of the group." —A planning grantee

- Of the 65 planning and implementation grant partnerships built or enhanced as a result of the planning and implementation grant opportunities, all but two continued to work together in part or in whole after the end of the grant period.
- Helpful features of partnerships highlighted by grantees included a shared view among partners that health IT is an enabler to a common goal (such as quality improvement), trust among partners, and including well-resourced organizations together with less-resourced partners.
- Partnerships which included at least one organization whose primary mission is not care delivery (such as a consultant, vendor, or professional association) were significantly more likely than others to report all partners continuing to work together after the grant.
- Small patient care delivery organizations reported benefiting from partnerships by gaining access to human resources they otherwise would have been unable to afford through shared staffing models or technical support provided by larger partners.

The THQIT grant program required grantee organizations to partner with at least two other organizations to encourage the development of health IT that would result in the sharing of clinical or research data across organizations. Moreover, planning and implementation grantees were encouraged to partner with small, rural hospitals and to include a variety of patient care delivery organizations in their partnership to stimulate health IT implementation in health care settings that have historically lagged in implementation.

We draw on the THQIT grantee final reports and their responses to survey questions and qualitative interviews to demonstrate how this partnership requirement may have facilitated implementation at smaller organizations, increased participation in HIE activities, and encouraged future collaboration. Most commonly, respondents from the lead grantee organization completed the survey and, when applicable, the interview. Only two grantees had respondents participate from multiple partners: the lead grantee organization and another participating patient-care delivery organization. Thus, the information presented on partnerships may not reflect the perspective all partner organizations. To provide appropriate context, we first describe who participated in the THQIT partnerships. We then outline four strategies that grantees used to build lasting relationships between partners, and describe how those relationships benefited the participating organizations.

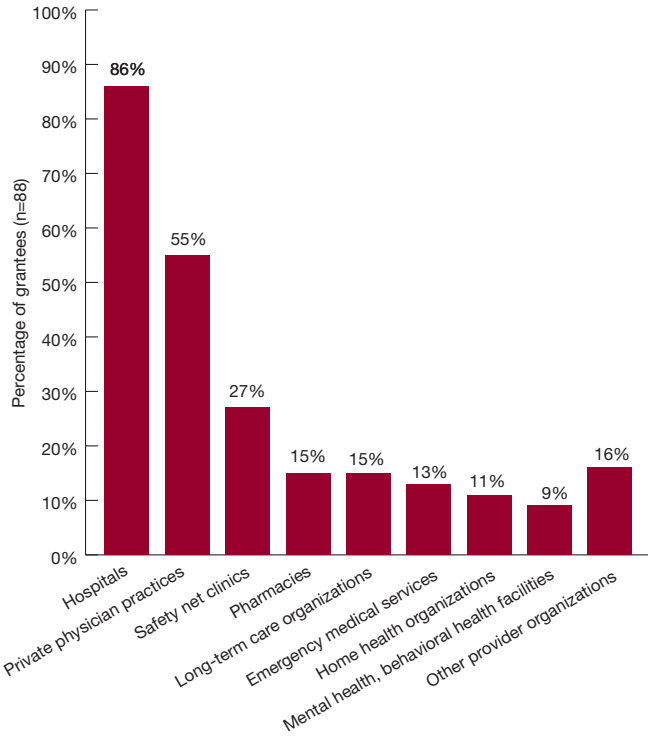
Who Participated in the THQIT Partnerships?

The partnerships formed by organizations funded under the THQIT program ranged in scale and included a wide variety of organizations that deliver patient care, as well as organizations that do not deliver care. Most projects focused on either one (31 percent) or two (31 percent) types of patient care delivery organizations, with hospitals and physician practices the most likely types of organizations

to be included (Figure 4.1; Appendix A, Table A.2). Another one third of grantees had more complex partnerships, with one grantee attempting to build connectivity among widely disparate health care organizations in its community, including hospitals, private physician practices, pharmacies, emergency medical service agencies, mental health and behavioral health centers, FQHCs, and other safety-net providers.

Around half of the THQIT grantees included 10 or fewer patient care delivery sites; the other half had between 11 and 124 sites participating. Private practices with fewer than five physicians and CAHs were the most common patient care delivery sites included, indicating the THQIT grant program successfully engaged organizations that have traditionally lagged in health IT implementation (Figure 4.2 and Figure 4.3). Other common partners generally considered to be vulnerable included non-CAH rural hospitals with fewer than 100 beds and FQHCs.

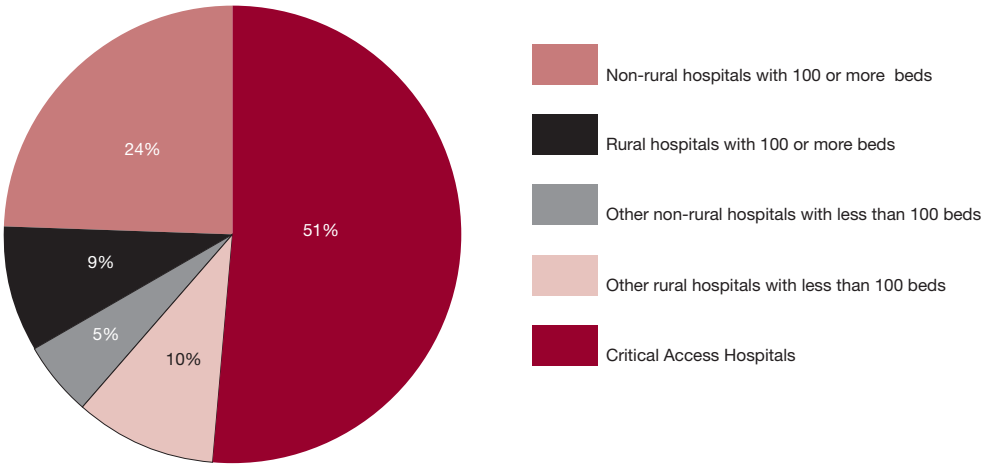
Figure 4.1. Types of patient care delivery organizations included in grantee partnerships



Source: Survey of THQIT Grantees, conducted in summer 2011.

Notes: Patient care delivery organizations partnering with grantees that received a planning and an implementation grant are not double counted. Safety-net clinics include FQHCs, health department clinics, and other safety-net clinics.

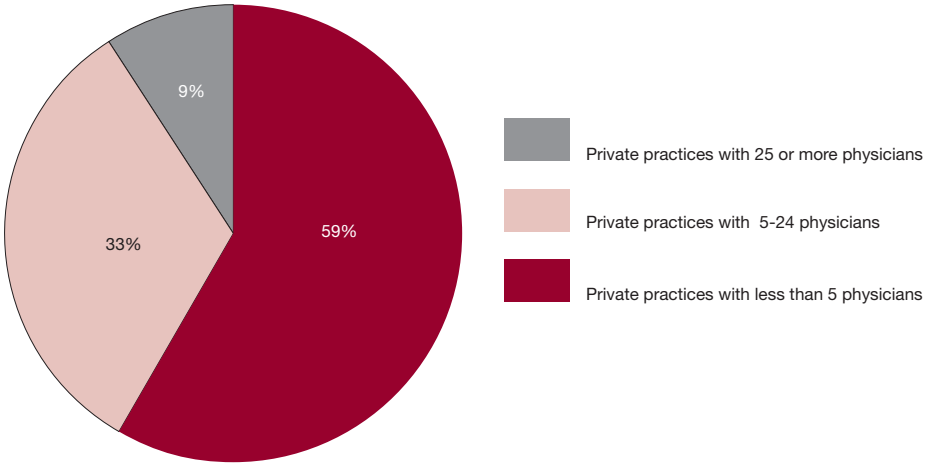
Figure 4.2. Types of hospitals included in grantee partnerships (n = 488 hospitals)



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: Hospitals partnering with grantees that received a planning and an implementation grant are not double counted.

Figure 4.3. Size of private physician practices included in grantee partnerships (n = 528 private physician practices)



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: Private physician practices partnering with grantees that received a planning and an implementation grant are not double counted.

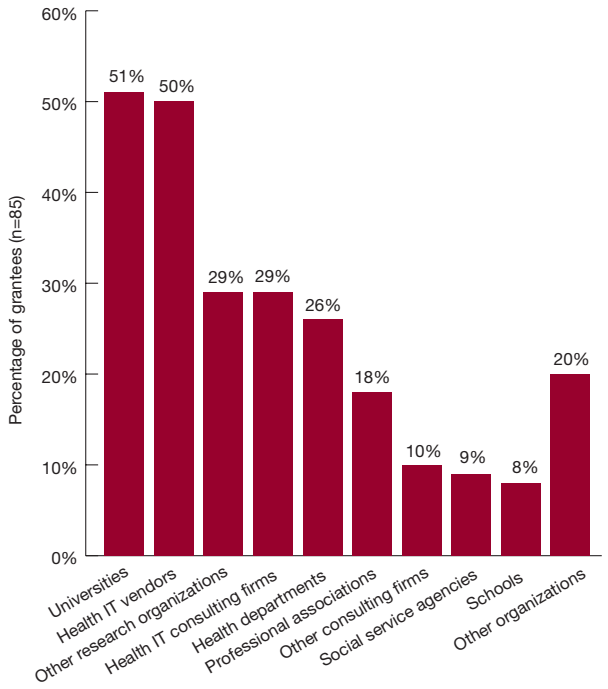
In addition to patient care delivery organizations, two-thirds of partnerships included a research organization in their project and three-fourths of the projects included other organizations that do not deliver patient care, such as health IT vendors, health IT consulting firms, and health departments (Figure 4.4; Appendix A, Table A.3).

Most Grantees Sustained Their Partnerships[7]

All but two of the planning and implementation grantees continued to work together on health care improvement activities after their grant period ended (Figure 4.5). Half of those partnerships were sustained in their entirety, while others proceeded to work on future projects with some of the partners. Patient care delivery organizations that stopped working together reported financial constraints at a partner, different levels of readiness across partners, and/or a divergence in health IT strategy among partners were contributing factors (Figure 4.6).

Grantees with more complex and larger THQIT projects—those with more than one type of patient care delivery organization and/or involving more than 10 organizations of any type—were as likely as their smaller or simpler counterparts to continue their partnerships, with all partners remaining involved (Appendix A, Table A.4). Similarly, projects with a focus on different types of health IT were as likely as others to have all partners continue to work together after the grant period ended.

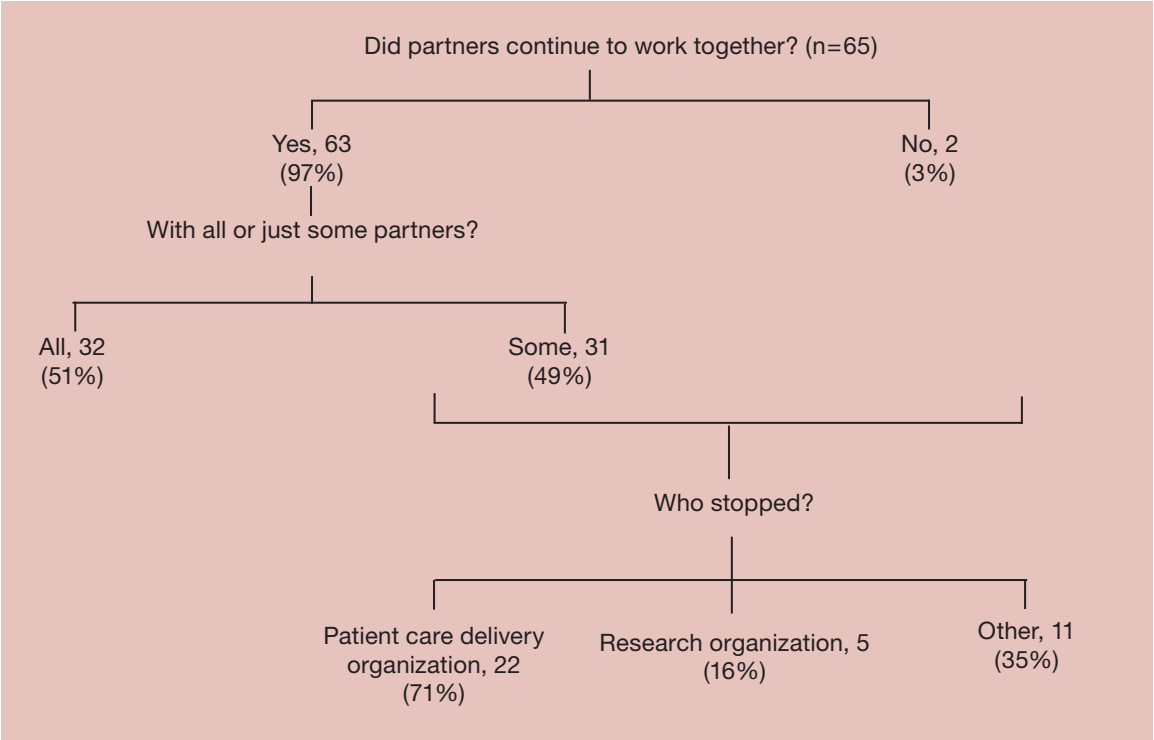
FIGURE 4.4. PERCENTAGE OF GRANTEES WHOSE PARTNERSHIPS INCLUDED ORGANIZATIONS THAT DO NOT DELIVER PATIENT CARE



Source: Survey of THQIT Grantees, conducted in summer 2011.

[7] This section focuses on the partnerships of planning and implementation grantees because they were formed for the purpose of implementation, whereas the value partnerships were formed for evaluation.

Figure 4.5. Continuation of planning and implementation partnerships after conclusion of the grant



Source: Survey of THQIT Grantees, conducted in summer 2011

Note: Implementation grantees (those that received prior planning grants and those that did not) are more likely than planning-only grantees to have all partners continue to work together after the grant period.

Largely successful at sustaining activities with some or all of their grant partners for at least 1.5 years, the THQIT grantees provided insight into strategies that can be used to build lasting relationships between organizations that deliver patient care.

Finding the Unifying Factor

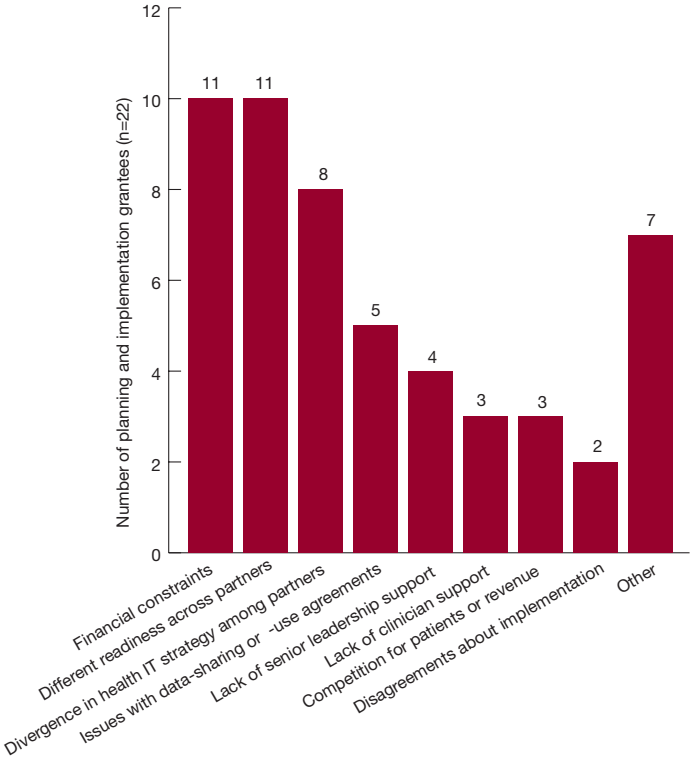
Strong, sustainable partnerships identified a shared vision for their projects and continued to focus on helping partners achieve their goal for health IT implementation. One HIE-focused planning grantee reflected, "Having a shared vision and recognizing the value of that mission helps strike a balance between individual interests and achieving a greater good for everyone." Grantees suggested that health IT partnerships were most successful when their aim was not simply to implement technology, but rather to select and implement health IT to meet a broader common goal. One value grantee indicated that patient care delivery organizations that compete for the same patients were able to successfully work together on the project because the partners "really came together to take care of the Medicaid population. It was the unifying factor." To identify common goals, grantees held stakeholder meetings and conducted needs assessments to determine common areas for quality improvement. For example, one successful grantee partnership formed when stakeholders at a meeting

on improving quality of behavioral health care decided that implementing a behavioral HIE would be important to achieving that goal.

> "Having a shared vision and recognizing the value of that mission helps strike a balance between individual interests and achieving a greater good for everyone."
>
> —A planning grantee

> ". . .they really came together to take care of the Medicaid population. It was the unifying factor."
>
> —A value grantee

FIGURE 4.6. REASONS PATIENT CARE DELIVERY ORGANIZATIONS STOPPED WORKING TOGETHER AFTER THE PLANNING OR IMPLEMENTATION GRANT PERIOD



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: Grantees could check all the reasons that applied, and many indicated more than one reason.

Involve an Experienced Patient Care Delivery Organization

Partnerships involving patient care organizations with limited experience implementing health IT often relied on the financial resources and technical expertise of a large, well-resourced partner. Partnerships involving these organizations noted that the experienced organization must advance the common goals of the partnership instead of leveraging the group around their own interests; otherwise, the partnership may suffer and smaller organizations may withdraw.

Build Trust Between Partners

Trust between partners and/or prior experience working together helped support successful collaboration and reduced concerns around privacy and confidentiality of patient data. One grantee indicated that "existing relationships were more important than cost contributions" to the success of their project. Moreover, rural grantees—who were significantly more successful at sustaining partnerships with all partners than their urban counterparts—partially attributed their success to their tight-knit provider communities.

Grantees without existing collaborative relationships experienced more difficulties establishing data sharing agreements and plans for fee schedules. A grantee explained that competitive dynamics between clinics caused "discussions around money to devolve rapidly."

Setting up a process for continued formal and informal interaction where all partners can have their opinions shared in a neutral environment helped some grantees build trust within partnerships. One partnership involving competing clinics that drew patients from the same pool instituted a formal governing structure with voting rules to overcome competitive dynamics.

Seek Guidance From a Neutral Organization Not Involved in Patient Care

Partnerships involving a nondelivery organization, such as a professional association, health IT vendor, and/or consultant, were significantly more sustainable than partnerships without these organizations involved. One grantee indicated that involving an external organization can encourage patient care delivery organizations to participate in HIE because they feel the project is not controlled by the lead organization.

How Did Partnerships Impact Health IT Implementation?[8]

All grantees interviewed indicated that the partnership aspect of their project was important to its success. They reported that the partnerships facilitated implementation by reducing the financial burden of health IT, providing opportunities for shared learning, and facilitating health information exchange.

Reducing the Financial Burden of Health IT

Partners shared resources for health IT implementation and ongoing maintenance, redistributing the financial burden many patient care delivery organizations face when implementing technology across a larger number of organizations. Grantees reported that small patient care delivery organizations benefited most often from shared human resources: they gained access to health IT support staff either by hiring a staff member who was shared between small organizations or by receiving technical support from larger, well-resourced partners.

[8] This section focuses on the partnerships of planning and implementation grantees because they were formed for the purpose of implementation, whereas the value partnerships were formed for evaluation.

Moreover, partners implementing a shared EHR platform reported they reduced the cost of maintenance by hosting the EHR at a central location. A planning grantee that pursued a shared EHR indicated: "The partnership aspect of the project was critical. Many organizations could not have a system like they do without having the support of the group. . . . The network approach versus the stand-alone approach definitely saved [us] money. There are economies of scale in implementing through a network such as shared hardware, volume discounts, and shared staff."

Providing Opportunities for Shared Learning

Partnerships also allowed patient care delivery organizations newer to health IT the opportunity to learn from the experiences of their more veteran colleagues. A few grantees indicated that health IT was phased in across the organizations in the partnership, beginning with more experienced partners, in order to explicitly allow for this type of collaboration. One such grantee indicated, "The second phasers [those who implemented in the second wave] learned a lot from those who were turned on first. If there was a problem, they would talk to each other."

Developing Organizational Interoperability—an example from the field

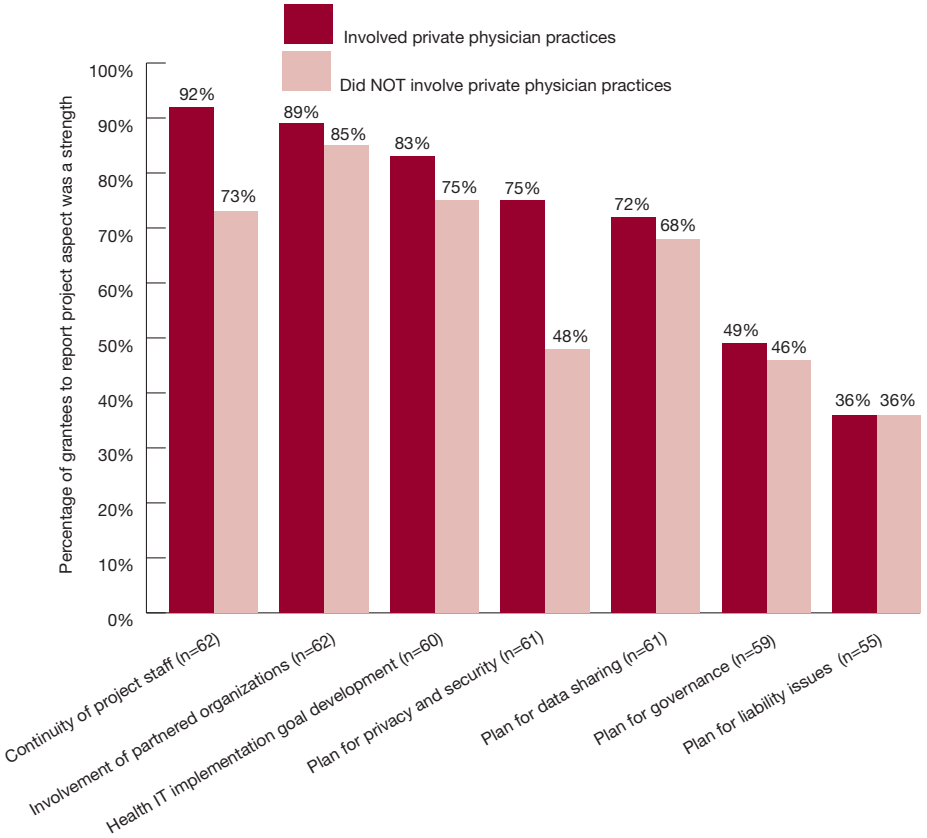
The University of Mississippi Medical Center (UMMC) partnered with eight small, rural hospitals to develop a network for reporting rural hospital medication errors. When UMMC started the project, they believed the grant would result in a one-way transfer of knowledge on error reporting from UMMC to their small partners. However, after working closely with their partners, they realized that they could also learn how to improve their error-reporting processes. The principal Investigator and his colleagues indicated, "We learned more about our own error reporting by listening to what was going on in the rural settings, and vice versa." UMMC changed their mind-set and focused more on implementing a process that drew on the experiences of their partners and that could accomplish a range of partner goals in addition to their own. The grantee reported, "Ultimately, by creating a close, reciprocal community of eight rural hospitals and UMMC, the distance between the two settings seemed less significant and the common goals of all participants were reached." (Brown et al., 2008)

Facilitating Health Information Exchange

Partnerships can help align the goals and strategies of different organizations, easing the process for establishing data sharing agreements and encouraging participation in exchanges. Several grantees pursuing HIE reported that collaborating with different patient care delivery organizations resulted in implementing health IT systems that met the needs of diverse health care providers in their community, increasing the likelihood of wide participation in the exchange. One grantee that pursued a regional exchange of medication information indicated that aligning organizational goals and strategies was just as important to their project success as the fit between different IT systems. The grantee reported "If you want HIE, you have to have those partners. You can find a lot of people who have accomplished HIE that didn't have partners but they can't share [patient data] outside of their own system."

Certain partnership characteristics may be associated with project success. Partnerships involving ambulatory, private physician practices were significantly more likely to indicate that continuity of project staff and the plan for privacy and security were project strengths than were partnerships that did not involve this type of practice (Figure 4.7). Moreover, partnerships involving safety-net clinics were significantly more likely to consider their plan for liability issues to be a project strength than partnerships not involving safety-net clinics (Appendix A, Table A.5).

Figure 4.7. Association between strengths of planning and private physician involvement for planning and implementation grantees (combined)



*Significant difference at the p<0.05 level

Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: If the number of respondents (n) included for a column is less than 62, one or more respondents skipped the question asking if a given aspect of implementation was a strength, weakness, or had no impact.

Chapter 5. Teamwork: Involving End Users in Health IT Planning, Workflow/Process Redesign, and Training

KEY FINDINGS

"Staff at all levels of the partner organizations learned about health information technology and became aware of the complexity of health records sharing. Teamwork developed as people learned they could achieve more together than they could apart." (Shank et al., 2005)

- Planning. THQIT grantees generally recognized the importance of involving end users in planning and product selection: almost three-fourths of planning and implementation grantees cited end users' involvement in planning as a project strength, and 88 percent of implementation grantees who purchased new health IT reported end users played a major role in product selection.
- Workflow/Process Redesign. Eighty-five percent of grantees performed process redesign before implementation, with 26 percent reporting intensive process redesign at that stage.
- Training.
  - Fifty-eight percent of grantees required all intended users to participate in some form of training and an additional 31 percent required some to participate.
  - Grantees that compensated all end users for time spent in training were significantly less likely than others to discontinue or fail to implement their technology.

This section provides a window into how grantees involved the targeted users of health IT in their projects and what they learned about doing so. Targeted end users were often involved in three major activities: (1) planning and selecting health IT, (2) training, and (3) workflow redesign. The targeted users for health IT implemented under the implementation grants almost always included physicians (94 percent) and usually included nurses (81 percent). Other staff specifically targeted (such as pharmacists, front-desk staff, billing staff, medical assistants, technicians) varied by grant project. Notably, patients were rarely targeted as a health IT user.

Planning and Selection of Health IT

Generally, grantees recognized that involving intended end users in the planning and selection of health IT was important to generate buy-in. "We could have said, 'We're going to have a portal, you all use it,' and it wouldn't have worked. Instead we asked 'How would it work best for you?' 'How are we going to go about this?' We did interviews with people. . .we did focus groups. . . ."

Almost three-fourths of the planning and implementation grantees considered their efforts to involve intended users of the health IT in planning to be a strength of their project, while 21 percent said that lack of such involvement was a project weakness (5 percent said it had no impact). Several of those citing it as a project weakness reported lacking time for more involvement of targeted users, several did not think that more was needed, and others reported lack of interest among intended users in being involved.

Among implementation grantees who purchased new health IT (27 out of 48), 88 percent reported that end users played a "major role" in product selection and only 4 percent reported "no role" for this group. (The remainder reported users played a minor role in product selection.)

Involving End Users—an example from the field

A grantee reports learning to let ideas for technology change originate, or appear to originate, with end users, since top-down demand for increased information technology can tend to engender user resistance. For example, rather than first purchasing and implementing a CPOE system, the hospital began by standardizing order forms. Physicians had been complaining about the different forms being used in each department, so this was perceived by the physicians as a fix. Information system personnel worked with clinicians on form design and then put the forms online for physicians to print and use. Soon physicians began asking why they couldn't just fill in the forms online. The hospital was then able to move closer toward its goal (CPOE) while retaining full physician support (Hayden and Bacon, 2008).

Training

"You can never do too much training."

—An implementation grantee

What Type of Training Was Provided?

Formal staff training was part of the implementation process for nearly all the implementation grantees (96 percent). Table 5.1 summarizes the types of health IT training provided. Most grantees (71 percent) provided training using the classroom plus another mode, such as online or hands-on training. The most common combination was classroom and hands-on training (35 percent of grantees).

Table 5.1. Summary of types of health IT training provided to intended users

Type of Training Provided	Number of Grantees
Classroom only	7
Classroom plus one or more other type (self-directed online, hands-on, or self-directed paper-based)	32
Hands-on only	5
Hands-on plus self-directed paper-based	1
Total	45

Both classroom and hands-on training were commonly used alone or in combination with other modes (85 and 72 percent respectively). Self-directed online training was used by 30 percent of the grantees. Only seven grantees (15 percent) used classroom training alone.

In their open-ended comments on training, several grantees noted that one-on-one training is required (or favored) by physicians, and one said they needed a physician champion for physician training. One also commented that nurses, administrative staff, and others favored formal, structured, individual and small-group training.

One grantee reported that on-site training proved to be essential for the success of their project, which focused on the long-term care setting: "Distance learning was helpful, but was not a substitute for a consultant being there on-site. Staff would not go through materials by themselves. Sites reported that many staff would have given up without on-site, one-to-one time with [trained] RNs."

One grantee pointed to the power of incorporating informal testimonials by peers who have used a health IT system—to be part of the training curriculum. The grantee explained that during one of its educational seminars, a physician who had worked with a similar system developed at another location noted, "I spend more time here looking for the paper form than I do filling out the report with the [health IT] system." By showing end users the practicality of the system as part of their daily workflow routine, the project reports gaining end-user trust (Brown et al., 2008).

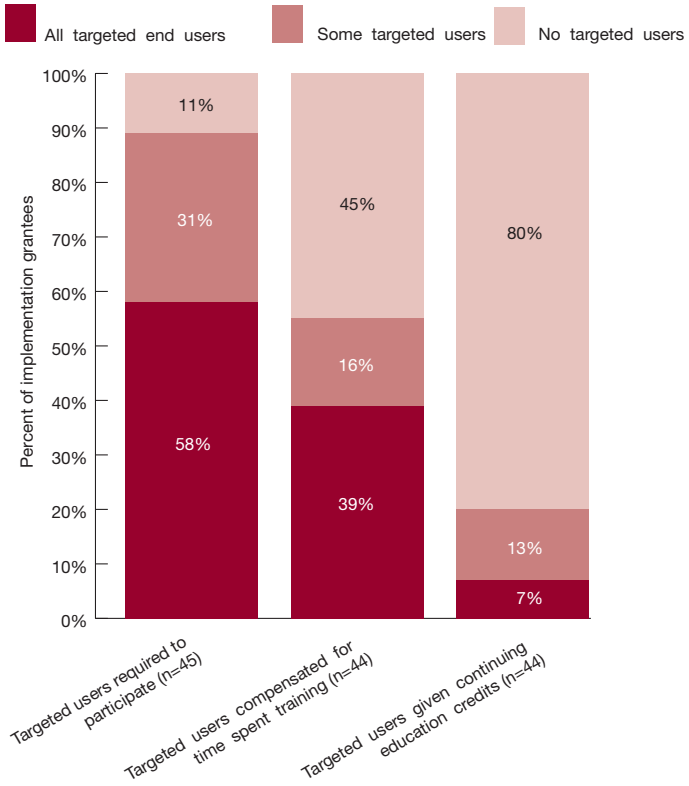
Training strategy also depended on the specific circumstances of the grant project and starting-point environment, and included train-the-trainer approaches. For example, training individuals throughout one rural region to be able to support training of end users on the health IT, rather than the grantee directly training all the end users, became a major activity for one partnership after they realized the extent of this need. "Some hospitals didn't even have email or personal computers at the time this project was implemented," the grantee noted. Through a partnership with a community college, they enabled remote as well as in-person learning by making CDs for participants and using telehealth and online training.

Another project focusing on HIE reported that a train-the-trainer approach was a realistic choice given resource limitations, and that one of the benefits was that it allowed for tailoring the specifics of health IT use to the workflow of that particular organization. However, this grantee also noted that control over the quality of the training is sacrificed with train-the-trainer.

To what lengths did the grantees go to encourage or require training of all end users?

A majority of the grantees required all targeted users to participate in some form of training, although nearly one-third (31 percent) required only some to participate (Figure 5.1). Projects focused on HIEs were less likely to require all users to participate in training than other projects (39 percent versus 76 percent of other projects), probably because implementation of HIEs in the context of these grants usually involved opening up channels and making available processes for exchange of information rather than forcing a change in workflow which would have necessitated the use of HIE.

Figure 5.1. Encouraging training of all targeted end users



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: If the number of respondents (n) included for a column is less than 45, one or more respondents skipped the question asking if the grantee used a given form of encouragement for completing training.

Compensating the learners or giving them continuing education credits could enhance their receptiveness to the training by showing respect for their time and supporting their career development. The compensation policy varied across grantees:

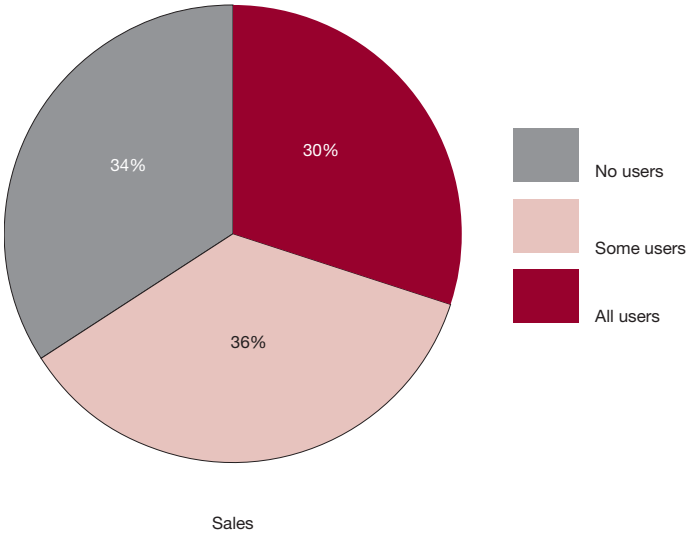
- Thirty-nine percent compensated all targeted users for training, and 45 percent compensated no targeted users for training.[9] Grantees compensating all end users for training were significantly less likely to discontinue or fail to implement their technology than grantees compensating some or no end users.
- Only 20 percent of grantees gave continuing education credits to some or all targeted users for participating in training.

[9] It is not clear what percentage of the projects that did not compensate training participants for their time employed those participants and thus simply allocated some of their salaried time to the training.

Did the grantees ensure the end users understood the training?

All the grantees reported that the training was based on relevant clinical scenarios and 66 percent of implementation grantees provided competency-based training to at least some intended users. However, only 30 percent provided it to all intended users (Figure 5.2). (Competency-based training requires learners to demonstrate understanding of the training before it is considered complete, rather than just requiring attendance at the training.)

FIGURE 5.2. PERCENTAGE OF IMPLEMENTATION GRANTEES THAT HAD USERS ATTEND COMPETENCY-BASED TRAINING

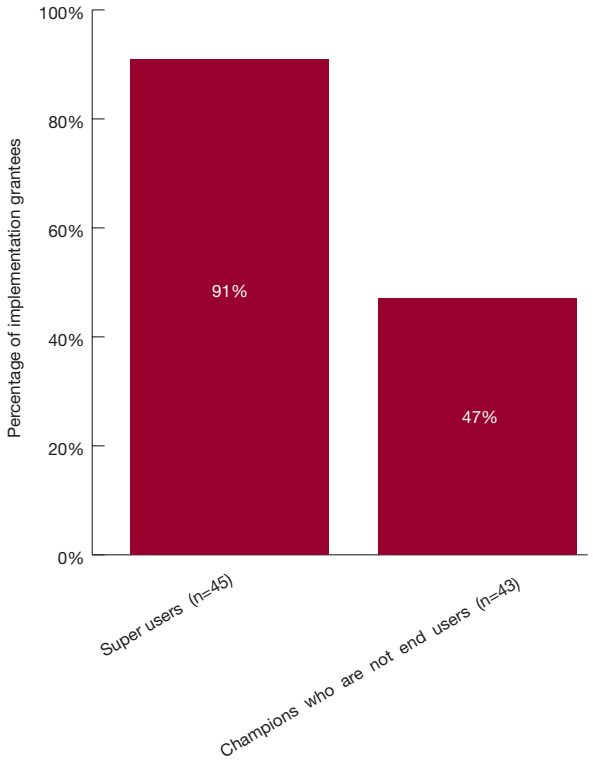


Source: Survey of THQIT Grantees conducted in summer 2011.

Were super users and other health IT champions trained in advance of others?

The vast majority of implementation grantees trained super users in advance of other users; the super users then helped train their colleagues (91 percent) (Figure 5.3). About half of implementation grantees (47 percent) trained health IT champions (who were not targeted users) in advance of the targeted users.

Figure 5.3. Training super users and champions early



Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: Two respondents answered the survey question on training super users but did not answer the question on training champions who are not end users.

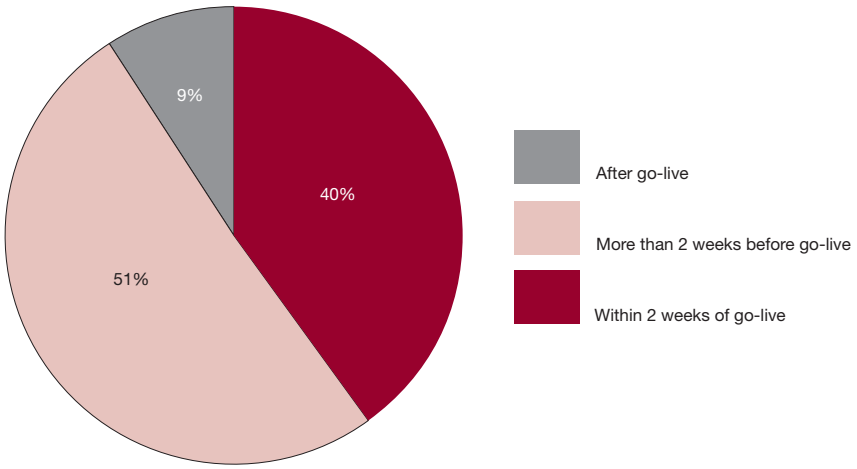
Super Users—examples from the field

A grantee implementing an electronic pharmacy system in a pediatric health care system reported that along with the formal training sessions, the availability of pharmacy "super users" was identified by a majority of study participants as a key implementation strategy. Super users were available in the clinical work setting for several weeks post-implementation (Jose, Sanfort, and Rask, 2008). Another grantee who managed five hospital implementations of bar coding in Northern Michigan similarly reported learning that having super users on-site was critical to smooth implementation (Oehlers, 2007).

Was the training well-timed relative to "go-live?

Most often, training occurred more than 2 weeks prior to go-live (51 percent), a somewhat risky time frame since the targeted users may forget the training if it is not used shortly thereafter (Figure 5.4). In only four cases (9 percent) did the first training take place after go-live; however, several grantees commented that training was an ongoing process that continued after go-live.

FIGURE 5.4. TIMING OF TRAINING RELATIVE TO GO-LIVE



Source: Survey of THQIT Grantees conducted in summer 2011.

In their final grant reports to AHRQ, several grantees reported learning that ongoing training activities beyond training for initial implementation facilitated the successful use of the health IT:

- Clinicians' attitudes were more varied, but they gradually became more satisfied with the EMR. An important implementation change that greatly improved clinician satisfaction was the addition of EMR training staff regularly on-site at each practice (Mingle, 2008).
- A major lesson learned by a grantee that implemented e-prescribing in 16 sites involving 60 clinics was that ongoing and readily accessible training is necessary, and that implementation is a journey, not a solution (Sullivan and Fisk, 2007).
- A grantee who implemented a health IT system including decision support modules for long-term care in 15 nursing homes reported that CNA staff required frequent instruction on how to document properly, and RNs needed to be educated more than once on how to log on to computers and access reports. In short, health IT implementation required ongoing staff education and attention to workflow issues (Horn, 2008).

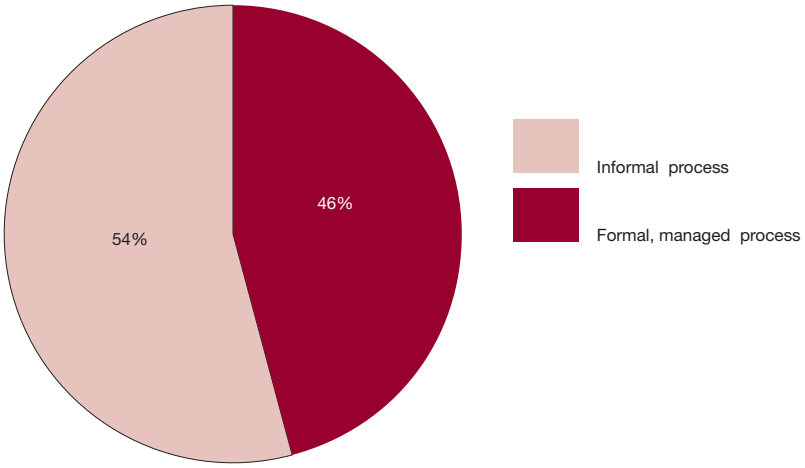
> "Using HIE effectively is not just about how and which button to push, it's about how to incorporate it into workflow and how to do so efficiently. Not just how to push a button, but how to make it work."
>
> —An implementation grantee

Workflow Redesign

Care process or workflow redesign was accomplished to some degree prior to implementation for most grantees (all but 15 percent) but was only intensive at that point for about one-quarter of them (26 percent). Grantees that undertook redesign were nearly evenly split in whether they undertook process redesign as a formal (46 percent) or informal (54 percent) process (Figure 5.5). In all cases, relevant clinicians and staff were trained on new workflows, and workflow redesign continued after the project period for most (80 percent). One grantee came to recognize the need for training to include workflow redesign at the individual level, and hired a new trainer who would engage individuals in the redesign, "He is going on-site at the point of care and asking, 'How can I make your day maximally efficient?' Because he has lengthy experience at the hospital, he is well versed in how things operate." This is an example of informal workflow redesign. An example of a more formal process appears in the box.

> "The EHR changes more than removing paper charts, it shines a light on clinic management problems that may already exist." (Aranaydo et al., 2007)

Figure 5.5. Percentage of grantees with formal and informal process redesign (n = 41)



Source: Survey of THQIT Grantees, conducted in summer 2011.

Grantees that reported intensive process redesign prior to health IT implementation were more likely to report experiencing quality or efficiency benefits relative to other grantees at the time of the survey (75 percent vs. 55 percent); however, the difference was not statistically significant, perhaps because of the small number of grantees who completed intensive process redesign prior

to implementation. In one grantee's words, "The EHR changes more than removing paper charts, it shines a light on clinic management problems that may already exist, resulting in staff frustration. There were many aspects of clinic workflow to change and 'work arounds' to manage with diverse staff members" (Aranaydo et al., 2007). Another grantee, a hospital system, found that redesigning their health information management department workflows with implementation of an EHR allowed them to reduce the time frame after discharge for a patient's chart to be finalized from more than a week to typically 24 hours. This accelerated the billing process, bringing a financial benefit (Bentley, 2008).

Workflow Redesign—an example from the field

A grantee implementing EHRs in four safety-net health centers designated cross-functional implementation teams from the health centers. The teams were trained on the application and functionality so they understood what was there to work with, and then they documented every workflow. They were trained on using Visio as a tool to diagram the workflows and to flag those that were not working well. They redesigned each workflow to incorporate the application prior to implementation. This approach was practical for the grantee because "we weren't using vendor costs to do this. The hourly vendor rates would make it unaffordable," even more so for individual [safety-net] sites undertaking implementations.

Chapter 6. Conclusion

Key conclusions include the following:

- **The THQIT health IT grant projects were generally sustained for more than a year beyond the end of the funding for the THQIT projects.** Most organizations that received THQIT grant funding sustained or increased use of the health IT that was a focus of their project during the next several years after the grant period ended. The most important factors reported by grantees to affect sustainability were the ability to demonstrate benefits from the health IT to their organizations, clinician support, and cost-related issues.
- **Vendors played a large role in health IT implementation.** Two-thirds of the THQIT implementation grantees considered vendors to be partners in their projects. Grantees highlighted the importance of carefully considering the quality of technical support and checking a product rating prior to purchasing health IT.
- **Organizations that partnered to implement THQIT grants continued to work together on health improvement.** All but two of the partnerships that implemented THQIT grant projects continued to work together, at least to some degree, on health improvement. Grantee interviews suggested several features of successful health IT partnerships: a shared view among partners that health IT is an enabler to a common goal, trust among partners, and, when relatively small organizations with constrained resources are included, also including a larger, well-resourced partner.
- **End users played important roles in planning and product selection, and received training through multiple modes.** Almost three-fourths of planning and implementation grantees cited end users' involvement in planning as a major strength, and 88 percent of implementation grantees purchasing new health IT reported end users played a major role in product selection. A majority of grantees trained end users on the health IT using classroom training plus another mode, such as hands-on training.
- **Process redesign—either formal or informal—typically began before health IT implementation and continued after it.** Eighty-five percent of grantees performed process redesign before implementation, with 26 percent reporting intensive process redesign at that stage. Just over half the grantees performed redesign as a formal effort, with 46 percent redesigning care process informally. Eighty percent indicated that the redesign continued after implementation as well.

In sum, both the health IT implemented under the THQIT grant program and the THQIT organizational partnerships continued to evolve long after the end of the grant periods. The lessons discussed in this report about sustainability, partnerships, and teamwork in health IT implementations, along with the planning checklist in Appendix B, should assist organizations planning health IT implementations now to build on this earlier AHRQ-funded work.

References

1. Aranaydo L, Dahl D, Carter D, et al. Information Technology Systems for Rural Indian Health Care: Implementation and Use of a Commercial Ambulatory Care Electronic Health Record (Prepared by the California Rural Indian Health Board under Grant No. UC1HS15330). Rockville, MD: Agency for Healthcare Research and Quality; December 2007.

2. Au M, Anglin G. Literature Review Summary for Planning Grantees (Prepared by Mathematica Policy Research under Contract No. HHSA 290200900019I). Rockville, MD: Agency for Healthcare Research and Quality; February 2010.

3. Au M, Felt-Lisk S, Anglin G, et al. Using Health IT: Eight Quality Improvement Stories (Prepared by Mathematica Policy Research under Contract No. HHSA 290200900019I). AHRQ Publication no. 10-0102. Rockville, MD: Agency for Healthcare Research and Quality; September 2010. http://healthit.ahrq.gov/SuccessStoriesTHQIT. Accessed May 2, 2012.

4. Bentley P. Connecting Health Care in Central Appalachia: Final Progress Report (Prepared by Appalachian Regional Health under Grant No. UC1HS015182). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/portal/server.pt/document/955349/15182bentley_082611comp_pdf. Accessed June 20, 2012.

5. Brown CA, Rudman W, East H, et al. Detecting Med Errors in Rural Hospitals Using Technology (Prepared by the University of Mississippi Medical Center under Grant No. 1UC1HS015400). Rockville, MD: Agency for Healthcare Research and Quality; August 2008. http://healthit.ahrq.gov/1UC1HS015400Brownfinalreport2008. Accessed June 20, 2012.

6. Hayden A, Bacon J. Improving Health Care Quality via Information Technology (Prepared by Southwestern Vermont Health Care under Grant No. UC1HS015270). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/1UC1HS015270Haydenfinalreport2008. Accessed May 2, 2012.

7. Horn S. Nursing Home IT: Optimal Medication and Care Delivery (Prepared by International Severity Info Systems Inc. under Grant No. UC1HS015350). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/UC1HS015350Hornfinalreport2008. Accessed May 2, 2012.

8. Jones J, Lerch V, Clarkwest C, et al. Literature Review Summary for Implementation Grantees (Prepared by Mathematica Policy Research under Contract No. HHSA 290200900019I). Rockville, MD: Agency for Healthcare Research and Quality; February 2010.

9. Jose J, Sanfort F, Rask K. Comprehensive Information Technology (IT) Solution for Quality and Patient Safety: Final Report (Prepared by Children's Healthcare of Atlanta under Grant No. UCIHS015236). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/UC1HS015236Josefinalreport2008. Accessed June 20, 2012.

10. Lobach, D. Showing Health Information Value in a Community Network: Final Report (Prepared by Duke University Grant No. ROIHS015057). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/R01HS015057Lobachfinalreport2008. Accessed June 20, 2012.

11. McCullough J, Casey M, Moscovice I, et al. Meaningful use of health information technology by rural hospitals. J Rural Health 2011;27(3):329-37.

12. McGowan J, Roper R. The AHRQ Health IT Value Grant Initiative: A Programmatic Review of the Peer-Reviewed Literature (Prepared for the AHRQ National Resource Center for Health Information Technology under Contract No. 290-04-0016). AHRQ Publication No. 10-0063-EF. Rockville, MD: Agency for Healthcare Research and Quality; June 2010. http://healthit.ahrq.gov/THQITValuePaper. Accessed May 2, 2012.

13. Mingle D. Improving HIT Implementation in a Rural Health System (Prepared by Maine General Medical Center under Grant No. UC1HS015337). Rockville, MD: Agency for Healthcare Research and Quality; 2008. http://healthit.ahrq.gov/portal/server.pt/document/955347/15337mingle_081111comp_pdf . Accessed June 20, 2012.

14. Oehlers R. Bar Coding for Patient Safety in Northern Michigan (Prepared by Munson Medical Center under Grant No. UC1HS014878). Rockville, MD: Agency for Healthcare Research and Quality; 2007.

15. Rao S, DesRoches CM, Donelan K, et al. Electronic health records in small physician practices: availability, use, and perceived benefits. J Am Med Inform Assoc 2011;18:271-5.

16. Shank, N, Engel K, Frances J, et al. Regional Health Records for Frontier Communities (Prepared by Chadron Community Hospital under Grant No. 1 P20 HS015365). Rockville, MD: Agency for Healthcare Research and Quality; September 2005.

17. Sullivan S, Fisk A. Evaluating the Impact of an ACPOE/CDS System on Outcomes (Prepared by the University of Washington under Grant No. UC1HS015319). Rockville, MD: Agency for Healthcare Research and Quality; 2007. http://healthit.ahrq.gov/1UC1HS015319Sullivanfinalreport2007.

Appendix A: Supplemental Tables

A.1 THQIT grant project characteristics—percentage of grants with each characteristic A-3

A.2 Types of patient care delivery organizations included in grantee partnerships A-4

A.3 Involvement by organizations that do not focus on delivering patient care A-5

A.4 Characteristics of planning and implementation grant partnerships that had all partners working together after the grant A-6

A.5 Association between partnership characteristics and reported project strengths for planning and implementation grantees A-7

A.6 Characteristics of implementation grantees experiencing one or more "show-stoppers" A-8

A.7 Web links to implementation and value grantee final reports A-9

A.8 Reasons for scaling back HIE goals within 14 THQIT projects with that as a focus.....A-16

Table A.1. THQIT grant project characteristics—percentage of grants with each characteristic

Characteristic	All THQIT Grants	Planning-Only Grants	Implementation Grants	Value Grants
Surveyed Grantees	n=88	n=17	n=48	n=21
Partnership Includes:	n=85	n=17	n=45	n=21
Hospitals	73 (86%)	15 (88%)	41 (87%)	17 (81%)
Private physician practices	47 (55%)	12 (71%)	25 (53%)	10 (48%)
Pharmacies	13 (15%)	2 (12%)	6 (13%)	4 (19%)
Emergency medical services	11 (13%)	2 (12%)	6 (13%)	3 (14%)
Safety-net clinics [a]	23 (27%)	2 (12%)	15 (33%)	6 (29%)
Research organizations	53 (66%)	12 (71%)	25 (61%)	16 (80%)
Health IT Features:	n=87	n=17	n=49	n=21
Health information exchange (HIE)*	47 (54%)	15 (88%)	27 (55%)	5 (24%)
Electronic health records (EHRs)*	42 (48%)	12 (71%)	27 (55%)	3 (14%)
Computerized Provider Order Entry (CPOE)	21 (24%)	5 (29%)	9 (18%)	7 (33%)
Telehealth[b]	10 (11%)	2 (12%)	6 (12%)	2 (10%)
Clinical decision support (CDS)	31 (36%)	4 (24%)	16 (33%)	11 (52%)
Multiple technologies	75 (86%)	15 (88%)	45 (92%)	15 (71%)
Patient Population Focus Includes:	Implementation and value grantees; n=67		n=47	n=20
Rural population*	21 (31%)	NA[c]	19 (40%)	2 (10%)
Inner-city population	12 (18%)	NA	7 (15%)	5 (25%)
Minority population	16 (24%)	NA	11 (23%)	5 (25%)
Low-income population	15 (22%)	NA	11 (23%)	4 (20%)
Children	10 (15%)	NA	6 (13%)	4 (20%)
Women	10 (15%)	NA	7 (15%)	3 (15%)
Elderly	9 (13%)	NA	5 (11%)	4 (20%)
Individuals with special health care needs	6 (9%)	NA	5 (11%)	1 (5%)
End-of-life care	1 (1%)	NA	1 (2%)	0 (0%)

Source: Survey of THQIT Grantees, conducted in summer 2011.

*Notes significant difference between groups ($p<0.5$).

[a] Safety-net clinics included FQHCs, health department clinics, and other safety-net clinics.

[b] Any use of health IT to support professional health care at a distance.

[c] Eleven planning grantees (65%) included only rural partners in their grants.

Table A.2. Types of patient care delivery organizations included in grantee partnerships

Type of Patient Care Delivery Organization	Number of Unique Grantee Partnerships with At Least One Such Partner (N=88, n=85 per row)[a]	Total Care Sites Included Across All the Grants
All hospitals	73 (86%)	488
Critical Access Hospitals	39 (46%)	251
Other rural hospitals < 100 beds*	21 (25%)	51
Other nonrural hospitals, <100 beds	13 (15%)	24
Rural hospitals 100 or more beds	29 (34%)	43
Nonrural hospitals 100 or more beds*	31 (36%)	119
All private physician practices	47 (55%)	528
Private practices <5 MDs	33 (39%)	310
Private practices 5-24 MDs	33 (39%)	173
Private practices 25 or more MDs	22 (26%)	45
All Safety-Net Clinics **	23 (27%)	NA
Federally qualified health centers**	17 (20%)	36
Health department clinics	4 (5%)	NA
Other safety net clinics**	10 (12%)	48
Pharmacies	13 (15%)	79
Long-term care organizations	13 (15%)	48
Emergency medical services	11 (13%)	32
Home health organizations	9 (11%)	17
Mental health centers or behavioral health facilities*	8 (9%)	19
Other point-of-care organizations*	14 (16%)	27

Source: Survey of THQIT Grantees, conducted in summer 2011.

[a] Planning grantees that received subsequent implementation funding are counted if they indicated an organization was involved in their planning or implementation grant (they are not double-counted).

* Implementation grantees are more likely than value grantees to include this type of patient care delivery organization.

** Implementation grantees (those that did and did not receive planning grants) are more likely than planning-only grantees to include this type of patient care delivery organization.

Table A.3. Involvement by organizations that do not focus on delivering patient care[a]

Organization Type Included in Partnership	Number of Grantees with At Least One Such Partner (N=88, n=85 per row)	Total Number of These Organizations Included Across All the Grants
Partnership Includes:		
Universities	41 (51%)	50
Health IT vendors*	40 (50%)	52
Other research-focused organizations	23 (29%)	23
Health IT consulting firms	23 (29%)	23
Health departments**	21 (26%)	29
Professional associations	14 (18%)	24
Other consulting firms	8 (10%)	7
Social service agencies	7 (9%)	12
Schools	6 (8%)	16
Other organizations	16 (20%)	30

Source: Survey of THQIT Grantees, conducted in summer 2011.

[a] Planning grantees that received subsequent implementation funding are counted if they indicated an organization was involved in their planning or implementation grant (they are not double-counted).

* Implementation grantees are more likely than value grantees to include this organization type.

** Implementation grantees (those that did and did not receive planning grants) are more likely than planning-only grantees to include this organization type.

Table A.4. Characteristics of planning and implementation grant partnerships that had all partners working together after the grant

Characteristic	Partnership Had Characteristic and All Partners Worked Together After Grant	Partnership Did Not Have Characteristic and All Partners Worked Together After Grant
Involvement of Health Care Delivery Organizations		
10 or fewer point-of-care organizations as partners	14 (42%)	14 (54%)
Involved more than 1 type of point-of-care organization	20 (44%)	9 (53%)
Hospitals were involved in partnership	27 (50%)	2 (25%)
Private physician practices were involved in partnership	16 (43%)	13 (52%)
Safety-net providers were involved in partnership	10 (63%)	19 (41%)
Involvement of Organizations That Do Not Deliver Patient Care		
Research organizations were involved in partnership	14 (39%)	13 (56%)
Other organizations that do not deliver patient care (e.g., health IT vendors, consultants, professional associations) were involved in partnership*	25 (52%)	2 (18%)
Population Focus		
All patient care delivery organizations in rural location*	26 (58%)	5 (26%)
Health IT Focus		
Grant projects featuring EHRs	16 (46%)	15 (52%)
Grant projects featuring HIE	19 (45%)	12 (55%)
Grant projects featuring CPOE	7 (70%)	24 (44%)
Grant projects featuring telehealth	4 (57%)	27 (47%)
Grant projects featuring CDS	6 (35%)	25 (53%)

Source: Survey of THQIT Grantees, conducted in summer 2011.

*Significantly different at the $p<0.05$ level

Table A.5. Association between partnership characteristics and reported project strengths for planning and implementation grantees

	Number of grantees that did or did not report a strength		Partnership included hospitals		Partnership included private physician practices		Partnership included safety-net providers		Partnership included a research organization		Partnership included 10 or fewer point-of-care organizations		Partnership included 1 type of point-of-care organization		Partnership included only rural patient care delivery organization	
	#Y	#N	Y n(%)	N n(%)	Y n(%)	N n(%)	Y n(%)	N n(%)	Y n(%)	N n(%)	Y n(%)	N n(%)	Y n(%)	N n(%)	Y n(%)	N n(%)
Strengths of Planning (includes planning and implementation grantees)																
Involvement of partnered organizations in planning	52	6	48(87)	6(86)	32(89)	22(85)	15(94)	39(85)	33(92)	19(86)	28(85)	24(96)	13(76)	41(91)	37(88)	17(89)
Continuity of project staff	48	10	47(85)	5(71)	33(92)*	19(73)	15(94)	37(80)	31(86)	17(77)	26(79)	22(88)	14(82)	38(84)	35(83)	16(84)
The plan for governance	26	29	24(46)	4(57)	16(49)	12(46)	11(69)	28(62)	19(56)	8(36)	16(52)	10(42)	8(47)	20(48)	17(44)	10(53)
The plan for privacy and security	37	20	36(65)	3(50)	27(75)*	12(48)	9(60)	19(43)	21(58)	15(71)	19(58)	18(75)	7(44)	32(71)	29(69)	10(56)
The plan for data sharing	39	18	39(71)	4(67)	26(72)	17(68)	13(81)	30(67)	25(69)	14(67)	20(61)	19(79)	10(63)	33(73)	29(69)	14(78)
The plan for liability issues	33	19	16(33)	4(67)	12(36)	8(36)	9(60)*	11(28)	13(39)	6(32)	10(34)	9(39)	7(47)	13(33)	11(30)	8(47)
Development of the goals for health IT implementation	44	12	43(80)	5(83)	30(83)	18(75)	15(94)	33(75)	30(86)	14(67)	24(73)	20(87)	11(73)	37(82)	32(78)	15(83)
Continuity of project staff	33	7	33(85)	3(60)	19(83)	17(81)	14(93)	22(76)	21(84)	11(73)	16(76)	17(89)	12(92)	24(77)	27(82)	10(77)
Level of trust among partners	33	7	33(85)	4(80)	18(78)	19(90)	13(87)	24(83)	19(76)	14(93)	16(76)	17(89)	11(85)	26(84)	26(79)	13(100)
Level of participation across partners	27	13	29(74)	2(40)	17(74)	14(67)	13(87)	18(62)	16(64)	11(73)	13(62)	14(74)	6(46)*	25(81)	22(67)	9(69)
Organization(s) financial involvement in the project	33	6	26(68)	4(80)	18(78)	12(60)	12(80)	18(64)	21(88)*	7(47)	14(70)	14(74)	6(50)	24(77)	20(63)	10(77)
Business case for the health IT and availability of funds	28	11	22(56)	2(40)	14(61)	10(48)	7(47)	17(59)	15(60)	7(47)	10(48)	10(53)	9(96)	15(48)	7(55)	18(54)
Interoperability with other health IT systems	20	20	21(55)	1(25)	13(59)	9(45)	5(33)	17(63)	14(61)	6(40)	12(60)	8(44)	7(64)	15(48)	16(50)	6(50)

Source: Survey of THQIT Grantees, conducted in summer 2011.

*Significant difference at the $p<0.05$ level.

Table A.6. Characteristics of implementation grantees experiencing one or more "show-stoppers"

Characteristic (number with and without the characteristic)	Percent of Total With Each Characteristic That Are in the One or More Show-Stoppers Group[a]	Percent of Total Without Each Characteristic That Are in the One or More Show-Stoppers Group[b]
Partnership included hospital(s) with 100 or more beds (n=25 with, 20 without)	52.0	70.0
Major rural focus (n=28 with, 20 without)	64.3	55.0
Process redesign intensive prior to implementation* (n=12 with)	33.3	66.7
Purchased health IT (n=27 with, 21 without)	59.3	61.9
Detailed implementation plan* (n=20 with, 14 without)	45.0	78.6
Involvement of targeted end users in planning was a strength (n=38 with, 7 without)	54.6	81.8
Identification of champions from targeted user groups was a strength (n=32 with, 12 without)	62.5	58.3
Targeted users played a major role in selecting health IT (n=23 with, 3 without)	60.9	33.3

Source: Survey of THQIT Grantees, conducted in summer 2011.

Note: Twenty-nine projects reported experiencing one or more show-stoppers, and 19 projects did not. A show-stopper was indicated if a project reported one or more weaknesses that prevented implementation or forced discontinuation of health IT that was part of their project (Implementation Survey questions Q50 and Q52), or if they reported not using some or all of the health IT that was part of their project (Q54).

*Chi-square significant, $p<.05$

[a]Denominator is number with the characteristic, the first number noted by each row label

[b]Denominator is number without the characteristic, the second number by each row label

Table A.7. Web links to implementation and value grantee final reports

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Implementation Grantees Bar Coding for Patient Safety in Northern Michigan	Munson Medical Center	Oehlers, Randi H.	http://healthit.ahrq.gov/OehlersUC1HS14878
Enhancing Patient Safety through a Universal EMR System	DuBois Regional Medical Center	Johnson, Thomas	http://healthit.ahrq.gov/JohnsonUC1HS15083
EMS Based TIPI-IS Cardiac Care QI-Error Reduction System	New England Medical Center Hospitals	Selker, Harry P	http://healthit.ahrq.gov/UC1HS015124Selkerfinalreport2008
Medication Management: A Closed Computerized Loop	Three Rivers Community Hospital	Hetz, Mark J	http://healthit.ahrq.gov/HertzUC1HS15231
Comprehensive Information Technology (IT) Solution for Quality and Patient Safety	Children's Healthcare of Atlanta, Inc.	Jose, James	http://healthit.ahrq.gov/UC1HS015236Josefinalreport2008
Improving Health Care through HIT in Morgan County, IN	Morgan Hospital and Medical Center	Aders, Deborah	http://healthit.ahrq.gov/AdersUC1HS15258
Accessing the Cutting Edge—Implementing Technology to Transform Quality in SE Kern	Tehachapi Hospital	Nocella, Kiki Coyne	http://healthit.ahrq.gov/UC1HS016146Nocellafinalreport2009
Service Integration	Franklin Foundation Hospital	Mathews, Craig Alonzo	http://healthit.ahrq.gov/UC1HS016151Mathewsfinalreport2008
The Chronic Care Project	Aroostook Medical Center	Nashan, Georges	http://healthit.ahrq.gov/UC1HS016154Nashanfinalreport2009
Automated Adverse Drug Event Detection and Intervention	Duke University	Ferranti, Jeffrey	http://healthit.ahrq.gov/UC1HS014882Ferrantifinalreport2008
ED Information Systems: Kentucky & Indiana Hospitals	Jewish Hospital Health Care	McKnight, Jacob	http://healthit.ahrq.gov/McKnightUC1HS14897
Partnering to Improve Patient Safety in Rural WV	West Virginia Medical Institute	Bellamy, Gail R	http://healthit.ahrq.gov/BellamyUC1HS14920

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Using IT to Improve Medication Safety for Rural Elders	Samaritan North Lincoln Hospital	Gorman, Paul N	http://healthit.ahrq.gov/UC1HS014928Gormanfinalreport2008
Louisiana Rural Health Information Technology Partnership	Assumption Community Hospital	Salles, Paul A	http://healthit.ahrq.gov/SallesUC1HS14953
HIT-Based Regional Medication Management Pharmacy System	Cloquet Community Memorial Hospital	Schmidt, Mark D	http://healthit.ahrq.gov/5UC1HS014965-03/Schmidtfinalreport2007
Creating an Evidence Base for Vision Rehabilitation	Lighthouse International	Stuen, Cynthia	http://healthit.ahrq.gov/UC1HS015052Stuenfinalreport2008
Arkansas Delta Inpatient-Outpatient Quality Improvement	St. Bernards Medical Center	Bates, Cinda R	http://healthit.ahrq.gov/Bates1UC1HS01505901
CCHS-East Huron Hospital CPOE Project	Huron Hospital	Moran, Barbara	http://healthit.ahrq.gov/MoranUC1HS15076
Tulare District Hospital Rural Health Electronic Medical Record Consortium	Tulare Local Healthcare District	Davison, Rod	http://healthit.ahrq.gov/UC1HS015096Davisonfinalreport2008
Project Infocare	Citizens Memorial Hospital	Esch, Peggy L	http://healthit.ahrq.gov/EschUC1HS15110
Project ECHO: Extension for Community Healthcare Outcomes	University of New Mexico at Albuquerque	Arora, Sanjeev	http://healthit.ahrq.gov/UC1HS015135Arorafinalreport2008
Connecting Healthcare in Central Appalachia	Appalachian Regional Health	Bentley, Polly M	http://healthit.ahrq.gov/UC1HS015182Bentleyfinalreport2008
Rural Iowa Redesign of Care Delivery with EHR Functions	Mercy Medical Center – North Iowa	Crandall, Donald K	http://healthit.ahrq.gov/UC1HS015196Crandallfinalreport2007
Secure Architecture For Exchanging Health Information (SAFEHealth)	Fallon Clinic, Inc.	Garber, Lawrence D	http://healthit.ahrq.gov/UC1HS015220Garberfinalreport2009
Improving Healthcare Quality via Information Technology	Southwestern Vermont Health	Hayden, Avis	http://healthit.ahrq.gov/1UC1HS015270Haydenfinalreport2008

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Improving Patient Safety/Quality with Health Information Technology Implementation	St. Joseph's Community Hospital	Reiling, John G	http://healthit.ahrq.gov/UC1HS015284Reilingfinalreport2008
Rural Community Partnerships—Electronic Medical Record (EMR) Implementation Project	Magic Valley Regional Medical Center	Mullen, R'nee	http://healthit.ahrq.gov/UC1HS015302Mullenfinalreport2008
Taconic Health Information Network and Community (THINC)	Taconic Independent Practice Association	Blair, A John	http://healthit.ahrq.gov/UC1HS015316Blairfinalreport2008
Evaluating the Impact of an ACPOE/CDS System on Outcomes	University of Washington	Sullivan, Sean D	http://healthit.ahrq.gov/1UC1HS015319Sullivanfinalreport2007
Improving Care in a Rural Region with Consolidated Imaging	Maine Medical Center	Coleman, Robert M	http://healthit.ahrq.gov/5UC1HS015328-03Colemanfinalreport2007
Improving Health Information Technology Implementation in a Rural Health System	Maine General Medical Center	Mingle, Daniel B	http://healthit.ahrq.gov/UC1HS015337Minglefinalreport2008
IT Systems for Rural Indian Clinic Health Care	California Rural Indian Health Board	Aranaydo, Linda	http://healthit.ahrq.gov/AranaydoUC1HS15339
Nursing Home Information Technology (IT): Optimal Medication and Care Delivery	International Severity Info Systems, Inc.	Horn, Susan D	http://healthit.ahrq.gov/UC1HS015350Hornfinalreport2008
Enhancing Quality in Patient Care (EQUIP) Project	Erie Family Health Center	Rachman, Fred	http://healthit.ahrq.gov/UC1HS15354Rachmanfinalreport2007
INTEGRIS Telewoundcare network	Integris Health, Inc.	Bryant, Charles A	http://healthit.ahrq.gov/5UC1HS015359-04/Bryantfinalreport2008
Santa Cruz County, CA Diabetes Mellitus Registry	Pajaro Valley Community Health Trust	Littman, Eleanor	http://healthit.ahrq.govLittmanUC1HS15362

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Statewide Implementation of Electronic Health Records	Brigham and Women's Hospital	Bates, David W	http://healthit.ahrq.gov/UC1HS015397Batesfinalreport2008
Detecting Med (Medication) Errors in Rural Hospitals Using Technology	University of Mississippi	Brown, C Andrew	http://healthit.ahrq.gov/1UC1HS015400Brownfinalreport2008
Electronic Records to Improve Care for Children	Yale University	Shiffman, Richard N	http://healthit.ahrq.gov/UC1HS015420Shiffmanfinalreport2007
Rural Hospital Collaborative for Excellence Using IT	Palo Pinto General Hospital	Brooks, Harris	http://healthit.ahrq.gov/BrooksUC1HS15431
Technology Exchange for Cancer Health Network (TECH-Net)	University of Tennessee Health Science Center	Waters, Teresa	http://healthit.ahrq.gov/UC1HS015437Watersfinalreport2008
New Mexico Health Information Collaborative (NMHIC)	Lovelace Clinic Foundation	Gunter, Margaret J	http://healthit.ahrq.gov/UC1HS015447Gunterfinalreport2008
Ambulatory Electronic Medical Record and Shared Access	Sarah Bush Lincoln Health Center	Deluca, Michael	http://healthit.ahrq.gov/UC1HS016128Delucafinalreport2009
El Dorado County Safety Net Technology Project /Access El Dorato County (ACCEL)	Marshall Medical	Bergner, Gregory W	http://healthit.ahrq.gov/UC1HS016129Bergnerfinalreport2009
Metro DC Health Information Exchange (MeDHIX)	Primary Care Coalition of Montgomery County	Lewis, Thomas L	http://healthit.ahrq.gov/UC1HS016130Lewisfinalreport2009
Implementation of Health Improvement Collaboration in Cherokee County, Oklahoma	Tahlequah City Hospital	Jones, Mark H	http://healthit.ahrq.gov/UC1HS016131Jonesfinalreport2008
Improving Quality Care for Children with Special Needs	University of Tennessee Knoxville	Lozzio, Carmen B	http://healthit.ahrq.gov/UC1HS016133Lozziofinalreport2010

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Improving Rural Healthcare: Implementing Innovative Integration Solutions	Mt. Ascutney Hospital and Health Center	Sims, Thomas R	http://healthit.ahrq.gov/UC1HS016142Simsfinalreport2008
Health Information Exchange: A Frontier Model	Chadron Community Hospital	Shank, Nancy C	http://healthit.ahrq.gov/UC1HS016143Shankfinalreport2009
Creating Online Newborn Intensive Care Unit (NICU) Networks to Educate, Consult & Team	University of Southern Mississippi	Rachal, Valerie	http://healthit.ahrq.gov/UC1HS016147Rachalfinalreport2009
Critical Access Hospital Partnership Health Information Technology Implementation	Upper Peninsula Health Care Network	Wheeler, Donald A	http://healthit.ahrq.gov/UC1HS016152Wheelerfinalreport2009
A Community-shared Clinical Abstract to Improve Care	Fairview Health Services	Connelly, Donald Patrick	http://healthit.ahrq.gov/UC1HS016155Connellyfinalreport2009
Electronic Health Record Implementation for Continuum of Care in Rural Iowa	Hancock County Health Services	O'Brien, John	http://healthit.ahrq.gov/1UC1HS016156Obrienfinalreport2009
Holomua Project Improving Transitional Care in Hawaii	Hawai'i Primary Care Association	Sakuda, Christine M	http://healthit.ahrq.gov/UC1HS016160Sakudafinalreport2009
Regional Approach for Transforming Healthcare Quality through Information Technology (THQIT) in Rural Settings Value Grantees	Weis Center for Research/Geisinger Clinic	Richards, Francis M	http://healthit.ahrq.gov/UC1HS016162Richardsfinalreport2009
Value of Imaging-Related Information Technology	Massachusetts General Hospital	Gazelle, G Scott	http://healthit.ahrq.gov/R01HS014891Gazellefinalreport2008
Web-based Renal Transplant Patient Medication Education	Yale University	Friedman, Amy L	http://healthit.ahrq.gov/FriedmanR01HS15038
Value of New Drug Labeling Knowledge for e-Prescribing	Regenstrief Institute	Schadow, Gunther	http://healthit.ahrq.gov/R01HS015377Schadowfinalreport2008

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
ParentLink: Better and Safer Emergency Care for Children	Children's Hospital Boston	Porter, Stephen C	http://healthit.ahrq.gov/R01HS014947Porterfinalreport2007
Improving Pediatric Safety and Quality with Healthcare Information Technology	Massachusetts General Hospital	Ferris, Timothy G	http://healthit.ahrq.gov/R01HS015002Ferrisfinalreport2008
Health Information Technology Value in Rural Hospitals	University of Iowa	Ward, Marcia M	http://healthit.ahrq.gov/R01HS015009Wardfinalreport2008
Health Information Technology Support for Safe Nursing Care	University of Michigan at Ann Arbor	Keenan, Gail M	http://healthit.ahrq.gov/R01HS015054Keenanfinalreport2008
Showing Health Information Value in a Community Network	Duke University	Lobach, David F	http://healthit.ahrq.gov/R01HS015057Lobachfinalreport2008
Value of Technology to Transfer Discharge Information	University of Illinois at Chicago	Graumlich, James F	http://healthit.ahrq.gov/5R01HS015084Graumlichfinalreport2007
Trial of Decision Support to Improve Diabetes Outcomes	Case Western Reserve University	Cebul, Randall D	http://healthit.ahrq.gov/R01HS015123Cebulfinalreport2008
Toward An Optimal Patient Safety Information System	Joint Commission	Koss, Richard	http://healthit.ahrq.gov/R01HS015164Kossfinalreport2008
Valuation of Primary Care-Integrated Telehealth	University of Rochester	McConnochie, Kenneth M	http://healthit.ahrq.gov/
Evaluating Smart Forms and Quality Dashboards in an Electronic Health Record	Brigham and Women's Hospital	Middleton, Blackford	http://healthit.ahrq.gov/R01HS015169Middletonfinalreport2009
E-Prescribing Impact on Patient Safety, Use, and Cost	Massachusetts General Hospital	Weissman, Joel S	http://healthit.ahrq.gov/R01HS015175Weissmanfinalreport2007
A Rural Health Information Technology Cooperative to Promote Clinical Improvement	Rural Healthcare Quality Network	Huck, Jacqueline	http://healthit.ahrq.gov/portal/server.pt/document/955348/15188huck_081111comp_pdf
Improving Safety and Quality with Outpatient Order Entry	Brigham and Women's Hospital	Gandhi, Tejal K	http://healthit.ahrq.gov/R01HS015226Gandhifinalreport2008

Title of Grant	Primary Organization	Principal Investigator (Last, First)	Web Link to Final Project Report to AHRQ or AHRQ Project Profile*
Measuring the Value of Remote Intensive Care Unit (ICU) Monitoring	University of Texas Health Science Center Houston	Thomas, Eric J	http://healthit.ahrq.gov/R01HS015234Thomasfinalreport2008
Computer-based Provider Order Entry (CPOE) Implementation in Intensive Care Units (ICUs)	University of Wisconsin Madison	Carayon, Pascale	http://healthit.ahrq.gov/R01HS015274Carayonfinalreport2009
Impact of Health Information Technology on Clinical Care	Kaiser Foundation Research Institute	Hsu, John	http://healthit.ahrq.gov/R01HS015280Hsufinalreport2008
Improving Safety and Quality with Integrated Technology	Oregon Health & Science University	Guise, Jeanne-Marie M	http://healthit.ahrq.gov/R01HS015321Guisefinalreport2009
Value of Health Information Exchange in Ambulatory Care	Indiana University – Purdue University at Indianapolis	Overhage, Joseph Marcus	http://healthit.ahrq.gov/R01HS015409Overhagefinalreport2009
Rural Trial of Clinic Order Entry with Decision Support	University of Utah	Samore, Matthew H	http://healthit.ahrq.gov/R01HS015413Samorefinalreport2008
Health Information Technology in the Nursing Home	University of Massachusetts Medical School Worcester	Gurwitz, Jerry H	http://healthit.ahrq.gov/R01HS015430Gurwitzfinalreport2008
Home Heart Failure (HF) Care: Comparing Patient-Driven Technology Models	St. Vincent Healthcare Foundation	Goldberg, Lee Richard	http://healthit.ahrq.gov/R01HS015459Goldbergfinalreport2008

*Web links to AHRQ Project Profiles are provided if the grantee did not submit a final report or if the final report was not uploaded to AHRQ's Web site. Web links to AHRQ Project Profiles are marked with an asterisk.

Table A.8. Reasons for scaling back HIE goals within 14 THQIT projects with that as a focus

Grantee*	Original HIE Goal	HIE Accomplishments	Reasons for Scaling Back HIE Project
1. Planning only	Create an electronic referral system that uploads data directly from EHRs to the HIE.	Sharing basic templates through a view only portal between multiple types of patient care delivery organizations.	Vendor failed to deliver health IT product needed for a more robust exchange.
2. Planning and implementation	Implement an exchange between three health systems with a common EHR platform.	Implemented a statewide exchange between users with a common EHR platform.	Implementation not scaled back.
3. Planning and implementation	Share patient-level data directly over a secure connection.	Sharing electronic faxes and radiology images on CDs.	Lack of consistent standards for data exchange.
4. Planning only	Establish interfaces between partner organizations that allow for push and pull functionality.	Implemented a view-only portal containing data from a hospital and two primary care clinics.	Implementation was delayed due to a lack of financial and human resource at partner organizations.
5. Implementation only	Share medication lists across patient care delivery organizations through a two-way exchange, allowing for electronic medication reconciliation.	Implemented a view-only portal for medication lists that requires manual medication reconciliation.	E-prescribing standards not well-developed. Security and compliance concerns by providers and vendors.
6. Planning only	Develop a shared medication list with viewing and writing capabilities across multiple patient care delivery organizations in a region.	Implemented a shared medication list with view and write privileges within a health system. Provide view-only portal access to other patient-care delivery organizations.	Competition between provider care delivery organizations. Cost and difficulty of creating interfaces between EHR systems.
7. Planning only	Implement an active push and pull exchange between a university system and community providers.	Implemented a view-only portal housed at the university and viewed by community providers.	Insufficient IT infrastructure in the community.
8. Planning only	Share demographic data between patient care delivery organizations and other relevant data with social service providers.	Limited data sharing between a few partners through a view-only portal.	Vendors failed to adapt products as needed. Limited resources at partner organizations.

Grantee*	Original HIE Goal	HIE Accomplishments	Reasons for Scaling Back HIE Project
9. Planning and Implementation	Implement a shared EHR platform that allows for secure exchange of patient information.	Implemented shared EHR platform at 9 hospitals. Patient data are not exchanged.	Grantee focused more on other goals of the shared EHR such as medication verification by a pharmacist.
10. Implementation	Implement shared EMR and develop a single data warehouse across clinics.	Implemented shared EMR and developed individual data warehouses for each clinic.	Health centers want control of data so move away from central repository.
11. Planning and implementation	Develop a view-only portal to allow for exchange of information across different types of patient care delivery organizations.	Implemented a view only portal between 5 hospital systems.	Different levels of IT sophistication at hospitals and other patient care delivery organizations. Difficulties getting legal agreements in place.
12. Planning and implementation	Develop a record locator service and master patient index between large hospital systems and FQHCs.	Developed a record locator service that provided access to a view-only visit summary. Service was discontinued after the grant ended.	Cost of ongoing maintenance of the system.
13. Planning and implementation	Exchange data between large hospital and community hospitals.	Implemented EHRs at some partner hospitals. Patient data is not exchanged.	Exchange goals were delayed due to lack of IT infrastructure at partner hospitals.
14. Planning only	Develop systems for exchanging data between community hospitals.	Implemented a shared EHR platform between 5 partners. Patient data is not exchanged.	Delayed exchange goals to implement shared EHR platform at hospitals lacking IT infrastructure.

Note: Many of these grantees included other technologies in their projects as well; however, the focus of this table is on the HIE portion of their project.

*Grantees are not identified since much of the information comes from grantee interviews where the grantee was promised confidentiality.

Appendix B: Getting Ready: A Planning Checklist for Rural and Community Hospitals Considering Implementing Health IT

Getting Ready: A Planning Checklist for Rural and Community Hospitals Considering Implementing Health IT

This checklist is designed to assist leaders and stakeholders in rural and/or community-based hospitals to assess their level of preparation for the implementation of health information technology (IT), such as Electronic Health Records (EHR) and/or Health Information Exchanges (HIE). It addresses topics such as leadership, whom to involve, project participants, and several other dimensions of planning.

The checklist is not designed for the identification of health IT functions or products to be implemented

INTRODUCTION

This checklist is based on the experience of 88 grantees in the "Transforming Healthcare Quality through Information Technology" (THQIT) initiative funded by the Agency for Healthcare Research and Quality (AHRQ). These grantees received funding to support the installation and/or evaluation of health IT.

The checklist can be administered and interpreted multiple times throughout planning and implementation to gauge an organization's progress towards readiness for undertaking various components of the project.

The checklist can be used at any point in the process of installing health IT, although issues that are identified earlier are easier to address effectively. For this reason, the checklist may be especially useful if completed during the planning phase of the health IT life cycle. Ideally, the checklist should be completed by a wide range of the stakeholders involved in the planning, implementation, and use of the health IT system. You may also want to use the checklist to assess the project's increasing readiness as it progresses beyond the planning phase.

BACKGROUND

The THQIT grantees, many of whom were first-time implementers of health IT, received partial funding from AHRQ to assist in planning and/or implementing community-wide and regional health IT systems. In 2011, informed by their practical experience planning and implementing projects in the new world of health IT ushered in by HITECH, the grantees completed surveys and participated in qualitative interviews designed to elicit key lessons learned during their planning and implementation processes. These key lessons included identifying significant barriers and facilitators to health IT implementation.

This checklist is designed to enable an organization or collaboration to assess how well it is prepared to use these facilitators and overcome the barriers identified. The checklist focuses on key areas identified by THQIT grantees as being particularly important to successful implementation including leadership, project participants and planning (Table 1).

Table 1. Key areas and topics of checklist

Key Area	Topic
Leadership	Clinical, Administrative & IT support
	Project Stakeholders
	Project Champions
Project Participants	Characteristics
	Agreements/Commitments
Planning	Financial
	Project Team
	Care-Process (Workflow) Redesign
	Change Management
	Information Technology
	Patient Privacy and Information Security
	Implementation
	Training
	Assessment

This checklist complements the Rural Health IT Adoption Toolkit developed by the Health Resources and Services Administration (HRSA), which "provides users with a compilation of resources relevant to all stages of planning, executing, and evaluating the implementation of health IT": (http://www.hrsa.gov/healthit/toolbox/RuralHealthITtoolbox/index.html). It also complements the AHRQ National Resource Center for Health IT's toolkit for HIE projects, which helps users devise realistic and achievable evaluation plans: (http://healthit.ahrq.gov/evaluation_toolkit).

CHECKLIST INTERPRETATION

This checklist does not produce a summary score by which the organization's level of preparation can be determined. Rather, the checklist is designed to enable individual organizations and collaboratives to evaluate their overall level of preparation, and to identify specific areas in which additional preparation may be required.

- Checklist items scored as "1" and "2" may need focused attention to enable a successful implementation. For example:
  - Do more resources need to be allocated to some of the items?, or
  - Can the timeline be lengthened to allow for more thorough preparation?
- Items scored as "3" may represent issues that put the success of the implementation at risk.

- For each "3", consider developing a plan for moving the item's score to a "4" or "5"

- Finally, consider diverting some resources from items rated as "5" to items rated "3" or lower.

OTHER RESOURCES

When applicable, the checklist provides Web links to reliable resources for additional information. These resources include other toolkits available on the AHRQ Web site, as well as *Effective Teamwork and Sustainability in Health IT Implementation*, a report which summarizes the findings and experiences of all THQIT grantees, and *Using Health IT: Eight Quality Improvement Stories*, a collection of success stories of several THQIT grantees. These resources provide examples and/or established processes for improving the level of preparation for the related checklist item. In combination, this checklist and the additional resources are designed to help organizations anticipate known barriers and facilitators in order to successfully implement health IT.

The Department of Health and Human Services is offering financial incentives ($44,000 through Medicare incentives or $63,000 per physician in the case of physician practices) to hospitals and doctors' practices that can achieve Meaningful Use of EHRs. See http://www.cms.gov/ehrincentiveprograms/ for details.

GLOSSARY OF TERMS

- Care-Process Redesign (also known as workflow redesign): transforming the way patients and clinicians work together to achieve improvements in care quality and costs, and patient outcomes.
- Project Participants: internal and/or external collaborations among different departments, hospitals, clinics, and other care-delivery and noncare delivery organizations.
- Adult Learning Theory: a theoretical framework for helping adults learn new skills or information. Trainings that utilize adult learning theory occur very close to project go-live ("just in time") and use scenario-based and learner-directed approaches to provide users with "just enough" detail to use the system as intended.

[NOTE TO AHRQ:

Links to relevant sections of the report *Effective Teamwork and Sustainability in Health IT Implementation* are shown within relevant sections of the table in yellow highlight. Page number references may have to be updated to correspond to the final report produced by MPR.]

INSTRUCTIONS FOR COMPLETING THE CHECKLIST

Please rate your level of agreement with each of the following statements by checking one response for each item. For items that do not apply to you, select n/a. If you would like to make specific notes about any item(s), do so in the notes field at the end of each section.

Health IT Project Description: _____

Project Scope: _____

Project Objectives: _____

Leadership	**1**	**2**	**3**	**4**	**5**	**n/a**
Administrative leadership (including Executives and Board of Directors) supports the project as a strategic priority. 1-not at all, 5-unanimously						
Clinical leadership (physicians and other clinicians) supports the project as a strategic priority. 1-not at all, 5-unanimously						
IT leadership supports the project as a strategic priority. 1-not at all, 5-unanimously						
Physician and other clinician champions from all project participants have been identified and have agreed to actively participate in project planning and implementation. 1-not at all, 5-unanimously						
Notes:						
Project Participants	**1**	**2**	**3**	**4**	**5**	**n/a**
All relevant project participants have been included. 1-strongly disagree, 5-strongly agree						
The project participants have a history of successful collaborations. 1-strongly disagree, 5-strongly agree Go to "Build Trust Between Partners," top of page 41.						
The project participants agree on project goal and main objectives. 1-not at all, 5-unanimously Go to "Finding the Unifying Factor, bottom of page 39.						
Levels of participant commitment (e.g., time, effort, monetary) have been agreed on. 1-not at all, 5-unanimously						

The proposed project participants compete with each other.* 1-aggressively, 5-not at all * Of course, many effective collaborations include active competitors; such competition is simply one of the project factors that deserves a thoughtful management plan.						
Project participants are well-resourced or experienced.* 1-none, 5-all Go to "Involve an Experienced Patient Care Delivery Organization," bottom of page 40. *Having well-resourced or experienced participants is helpful but not necessary; see Appendix C or http://healthit.ahrq.gov/THQITStoryRachman2012.pdf for an example of a successful partnership of resource-constrained organizations.						
The health IT project will compete for resources with other health IT projects, participants' needs, or governmental projects.* 1-definitely, 5-not at all *For example, project time lines may need to be adjusted if critical resources will be in short supply.						
A transparent, accountable process for continued interactions between participants has been agreed on. 1-not at all, 5-unanimously Go to "Build Trust Between Partners," top of page 41.						
Policies and procedures for adding new participants have been agreed on. 1-not at all, 5-unanimously						
Notes:						
Planning	**1**	**2**	**3**	**4**	**5**	**n/a**
Financial						
A realistic business case has been developed. 1-not at all, 5-thoroughly						
The cost of the project is based upon an understanding and scoping of requirements 1-not at all, 5-thoroughly						
The cost of the project is agreed on by the leadership of the project participants. 1-not at all, 5-unanimously						
The project participants agree on who will benefit from the implementation of the project. 1-not at all, 5-unanimously						

The project participants agree on who will pay for implementation and ongoing maintenance of the project. 1-not at all, 5-unanimously						
The project participants understand their liability and have obtained adequate insurance. 1-not at all, 5-completely						
Notes:						
Project Team						
The project participants have or can access the following skills (in bold) required for the project:						
Project management, including in-project and final evaluation. 1-not at all, 5-world class						
Clinical informatics: capable of matching IT functions to clinical and operational needs. 1-not at all, 5-world class						
Organizational change: capable of making systematic changes. 1-not at all, 5-world class						
Care-process (workflow) redesign: capable of analyzing and improving existing care processes (workflows). 1-not at all, 5-world class Go to Workflow Assessment for Health IT Toolkit: http://healthit.ahrq.gov/workflow Go to "Workflow Redesign," page 52.						
Vendor and/or consultants: the project management team is capable of managing vendors and/or consultants. 1-not at all, 5-world class Go to "How did Grantees Characterize their Relationships with Vendors…", page 33.						
The project team understands or has access to all relevant perspectives within the organization. 1-not at all, 5-thoroughly						
The project team can represent or access all relevant skills and people within project participants. 1-not at all, 5-thoroughly						
The project team has adequate decision-making authority within the organization. 1-not at all, 5-thoroughly						
Notes:						

Information Technology						
Project participants will use the same health IT applications or have the knowledge to create seamless interfaces between different applications. 1-none, 5-all Go to "Reducing the Financial Burden of Health IT," page 41.						
Project participants are committed to designing shared care processes (workflows). 1-not at all, 5-completely						
Notes:						
Patient Privacy and Information Security						
Leadership is committed to the privacy and security of patient information 1-not at all, 5-unanimously						
The project participants have the technical skills and resources to achieve patient privacy and information security. 1-not at all, 5-world class The project participants' privacy and security policies (e.g., opt-in versus opt-out) are in sync. 1-not at all, 5- completely aligned						
(Go to the Health Information Security and Privacy Collaboration Toolkit http://healthit.ahrq.gov/security_and_privacy_collaboration_toolkit)						
Project participants have developed shared policies and procedures for secure data sharing. 1-not at all, 5-world class						
Notes:						
Training (pre-implementation and continuing) and Go-live						
Resources for effective training are available (e.g., online learning, classroom instructors, shadow trainers). 1-not at all, 5-world class Go to "Training," page 46.						
The project team has knowledge of adult-learning theory. 1- not at all, 5-world class						

The project team has the skills to balance the benefits and risks of phased versus "big-bang" (i.e., all at once) implementations. 1-not at all, 5-completely Go to "Providing Opportunities for Shared Learning," page 42.						
Go-live personnel needs have been planned for. 1-not at all, 5-completely						
Notes:						
Project Assessment						
On-going project assessment has been planned and budgeted for. 1-not at all, 5-thoroughly Go to Health Information Exchange Evaluation Toolkit: http://healthit.ahrq.gov/tools_and_resources						
Final project assessment has been planned and budgeted for. 1-not at all, 5-thoroughly Go to AHRQ NRC Evaluation Toolkit: http://healthit.ahrq.gov/evaluation_toolkit						
Meaningful use criteria have been included in the assessment. 1-not at all, 5-thoroughly						
Notes:						

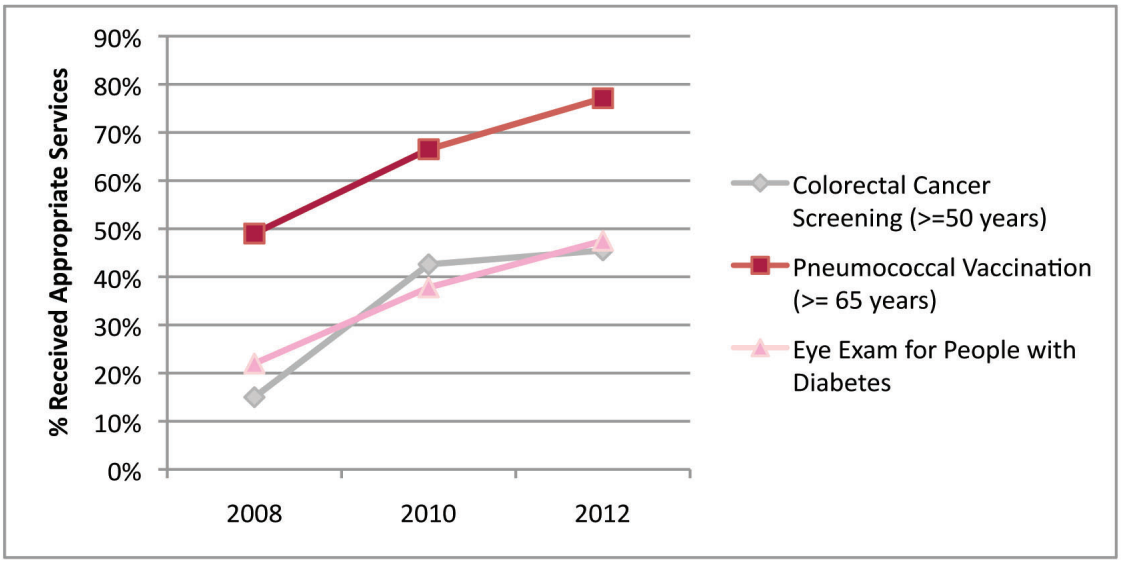
Partners Use Electronic Health Records to Steer Quality Improvement

A decade ago, the Alliance of Chicago Community Health Services considered the operational and clinical challenges ahead and identified health information technology (IT) as a critical area in which to build infrastructure. Although limited in financial resources, the Alliance and its four Chicago-based health centers that serve underserved populations made the most of electronic health record (EHR) functionality by creating a standard data infrastructure to capture, store, and analyze data to improve the quality of care delivered to patients. The infrastructure and implementation approach, designed years ago, has since expanded to 28 additional health centers, effectively extending its benefits to many others.

With support from the Agency for Healthcare Research and Quality (AHRQ) and in collaboration with General Electric, the EHR vendor, the Alliance and health centers deployed a customized EHR to capture point-of-care data. They developed EHR-enabled tools to provide evidence-based decisionmaking support to clinicians. They created an electronic data warehouse to organize and report data to identify gaps in care and develop programs to assist patients' self-management of chronic conditions, such as diabetes.

At one of the original centers, Erie Family Health Center, some outcomes measures have improved since it deployed the EHR and began using aggregated performance data in the form of "quality dashboards" to guide improvements in patient care. In the 5 years since implementation and the end of the grant, measures for the percentage of people receiving appropriate colorectal screening, pneumococcal vaccination, and eye exams have improved drastically (see Figure 1). Health center efficiencies clearly have also improved, as the EHR has enhanced workflow.

FIGURE 1. Family Health Center: Improvements in Rates of Recommended Procedures



Grant Title: Enhancing Quality in Patient Care (EQUIP) Project
Principal Investigator: Fred D. Rachman, Chicago, Illinois
Grant Number: This project was supported by grant number HS 015354 from 9/30/2004 to 8/31/2007
AHRQ Final Report: *http://healthit.ahrq.gov/UC1HS15354Rachmanfinalreport2007*

Implementation of health IT is not a start end process. It is constant, requiring lots of decisions to keep it viable.

ANDREW HAMILTON, RN, ALLIANCE CHIEF OPERATING OFFICER

The success of the Alliance health IT project has led to its adoption at 32 different health center organizations across 11 states. The new members and sites receive the same content and services as the original participants. According to Andrew Hamilton, Alliance Chief Operating Officer, the project's aim to spread the implementation of EHR and use of clinical decision support and performance measurement has succeeded beyond expectations.

Implementation and Results

The process of making the EHR useful to the Alliance health centers required employing an operational workflow at each center to encourage practical use of the EHR and its tools. This process included an implementation team, with its members involved in care delivery to vet the workflow, simulations to test the workflow, and a "dress rehearsal" before the system went live. At the final stage of implementation, the clinic closed for 4 hours and hired "patients" to test the new system and workflow.

Once the EHR system was in place, the Alliance health centers incorporated toolkits into their workflow and established processes for using the information collected through the EHR to improve care. One toolkit, UPQUAL (Utilizing Precision Performance Measurement for Focused Quality Improvement), summarizes on a single page a wide range of different clinical situations for a patient. For example, in the case of a 55-year-old woman, the tool provides information on her last mammogram and cholesterol screen, and prompts for new tests if needed. Dr. David Buchanan of the Erie Family Health Center confirmed that the tool eliminates the need to search through charts for information. If only a few minutes remain in a visit, he can spend that time more effectively in addressing follow-up issues.

Erie also uses quality dashboards to aggregate EHR data and set goals on quality for providers and the health center. Provider groups, such as the adult medicine team, set annual goals for a handful of quality indicators they view as important for patient outcomes. During the year, data on those quality indicators are presented at the provider level, and a small incentive is paid to high-performing providers. Erie also uses the quality dashboards to identify needed changes at the health center. In 2008, the health center decided that it needed to improve eye exams for diabetic patients because only 22 percent of patients who should have been getting exams actually were receiving them on time. Erie developed a program to expand its capacity for providing eye exams, including bringing an optometrist on site. As of February 2012, the number of diabetic patients receiving eye exams on time had increased to 47. percent (see Figure 1).

Sustainability and Future Direction

The success of the program has led to an expansion in the number of health centers that have joined the Alliance and implemented the EHR. New members have varied in settings and size, ranging from nurse-managed health centers housed in academic institutions to multispecialty health centers and mobile vans. The implementation, workflow redesign, and training processes developed for the original project have worked at all of these varied sites, demonstrating that the EHR and related tools and processes are applicable to varied outpatient health care settings. Although expansion to newer Alliance members often is grant funded at the outset by the Health Resources and Services Administration, the Centers for Medicare & Medicaid Services, or private foundations, the cost of the EHR eventually is incorporated into the general operational costs of the health centers. The mindset behind this decision by the centers to assume the costs for ongoing maintenance of health IT is indicative of what is required to sustain success in such endeavors—an understanding that health IT is not a one-time fix, but requires consistent and concerted efforts to keep it viable.

"Having providers pick the [annual] goals [on quality] makes a difference."

— DAVID BUCHANAN, MD, CHIEF MEDICAL OFFICER, ERIE FAMILY HEALTH CENTER

AHRQ Publication No. 12-0075-EF
December 2012