Regional Health eDecisions: A Guide to Connecting Health Information Exchange in Primary Care

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Authors:

Dewey Scheid, M.D., M.P.H.*
Brian Yeaman, M.D.**
Zsolt Nagykaldi, Ph.D.*
James Mold, M.D., M.P.H.*

* Department of Family and Preventive Medicine, University of Oklahoma Health Sciences Center
** Norman Physician Hospital Organization

Foreword

The Oklahoma Physicians Resource/Research Network has engaged in a series of interconnected research projects, funded in part by the Agency for Healthcare Research and Quality, the Presbyterian Health Foundation, the Oklahoma State Medical Association, and the Oklahoma State Department of Health, to support primary care clinicians through a professional network for peer learning, sharing of resources for best practices, and practice-based research. This project was informed by a vision of interconnected health information technology and utilized the experience gleaned from best practices research to facilitate change.

Acknowledgments

Many people, practices, and organizations contributed to this guide. Without their time, support, participation, and expertise, it would not have been possible for us to complete this project or create this guidebook.

Our Partners

We would like to extend special thanks to the following organizations for partnering with our team to integrate a local health information exchange hub with a regional health information organization.

- Our practice-based research network partner—OKlahoma Physicians Resource/Research Network (OKPRN)
- Our health system partner—the Norman Physician Hospital Organization, Norman, Oklahoma
- Our health information system partners—SMRTNET—Secure Medical Records Transfer Network, Cerner's Health-e Intent Platform, and eClinical Works EHX Platform

Our Practice Partners

We would like to thank the following practices for participating, allowing us to systematically observe their implementation process, and for continued dedication to improving the delivery of patient-centered care:

- Moore Medical Center, Moore, Oklahoma
- Noble Clinic, Noble, Oklahoma
- Norman Clinic, Inc., Norman, Oklahoma
- Waterview Medical Center, Norman, Oklahoma
- Yeaman Signature Health Clinic, Norman, Oklahoma

We would also like to acknowledge the authors of *An Interactive Preventive Care Record: A Handbook for Using Patient-Centered Personal Health Records To Promote Prevention* for inspiring the design, format, and content of this guidebook.

Our Guidebook Reviewers

We appreciate the following people for sharing their opinions with us about how to make this guide useful for practices: the clinicians and staff of the OU Physicians Family Medicine Clinic; Matt Cairns, Director at Projects at Yeaman and Associates, and Grady Cason of Cerner Corporation.

Our Funder

We are grateful to the Agency for Healthcare Research and Quality, which funded this guidebook and the project that informed the development of this guide. We are also grateful to Rebecca Roper, M.S., M.P.H., for her valuable direction, guidance, feedback, and support throughout the project and development of this guide.

For More Information

Questions about this guidebook should be directed to Dr. Dewey Scheid at dewey-scheid@ouhsc.edu.

Related AHRQ-Sponsored Web Conference

A free, AHRQ-sponsored Webinar titled "Using Health IT To Improve Primary Care," will be held August 6, 2013, from 2:30-4 p.m., E.S.T.

Presenters will provide practical insights on a few Practice-Based Research Network Health Information Technology projects that have recently ended. Also included will be information on how to use *Regional Health eDecisions: A Guide to Connecting Health Information Exchange in Primary Care.*

Participants who attend the entire Webinar will earn 1.5 continuing education (CE) credit hours for their participation and must complete an online evaluation at the end of the Webinar to obtain a CE certificate.

To register for the Webinar or review the transcript and presentation slides after it has ended, select http://healthit.ahrq.gov/events .

Glossary of Abbreviations Used in This Guidebook

AAFP	American Academy of Family Physicians
ACIP	Advisory Committee on Immunization Practices
ACO	Accountable Care Organizations
CCD	Continuity of Care Document
CCR	Continuity of Care Record
CDA	Clinical Document Architecture
DURSA	Data Use and Reciprocal Support Agreement
eCW	eClinicalWorks® Practice Electronic Health Record
EHR	Electronic Health Record
HIE	Health Information Exchange
HIPAA	Health Insurance Portability and Accountability Act of 1996
IHE	Integrating the Healthcare Enterprise®
IT	Information Technology
NPHO	Norman Physician Hospital Organization
OSIIS	Oklahoma State Immunization Information System
PHI	Protected Health Information
PSRS	Preventive Services Reminder System
RFI	Request for Information
RFP	Request for Proposal
RHIO	Regional Health Information Organization
SMRTNET	Secure Medical Records Transfer Network

Contents

Introduction

This guide introduces you to—

- Connecting an electronic health record (EHR) to a local health information exchange (HIE) hub and a regional health information organization (RHIO).
- Incorporating HIE into the clinical practices and workflows of providers using EHRs.
- Connecting clinical decision support to an aggregate HIE database via the Preventive Services Reminder System (PSRS).
- Using the principles of organizational change to implement the connection between clinical decision support, PSRS, and HIE in provider workflows and practices.

The intended audience for this guide includes—

- Health care organizations that want to participate in HIE and use data at an aggregated level to drive decision algorithms to help providers deliver recommended care.
- Practice leaders and information technology support staff responsible for selecting informatics systems and ensuring implementation.
- All participating HIEs with any type of EHR.
- Practices of all sizes. Most of the concepts apply equally well to small groups of associated primary care practices. There are a few identified steps that are specific to large practices and health systems.

This guidebook is based on a project designing, implementing, assessing, and refining the use of local HIE hubs connected to an RHIO in Oklahoma using SMRTNET (September 2007–March 2012). The project involved six primary care practices using different installations of the same EHR. By the end of 2012, more than 70,000 patient records had been processed from these practices.

The project was funded by the Agency for Healthcare Research and Quality to test the feasibility and impact of HIE and the provision of decision support via a RHIO on the delivery of recommended preventive services and other components of primary care such as laboratory test use, medication reconciliation, and coordination of care.

Why Connect EHR to a RHIO?

As information systems continue to advance, we believe that more EHRs will need to exchange data with RHIOs and health care organizations will want patient-centered, evidence-based, decision support health care software provided by RHIOs.

Handbook Organization

This guide is organized into four basic sections with references and an appendix for more detailed information. Whenever possible, we have provided hyperlinks to external information, resources, and tools.

- Section 1: Planning
- Section 2: Technical Process
- Section 3: Decision Support at the HIE Level Design
- Section 4: Implementation of Clinical Decision Support
- Section 5: References

Using This Guidebook

This guidebook addresses the entire process of connecting EHRs to a RHIO and establishing clinical decision support. We discuss assessing readiness, setting up technology, and sustaining the use of an HIE. The guide can be read cover to cover or by section, as needed.

Different audiences may want to read different sections of this guide at different times.

- Practice leaders will be interested in Section 2: Technical Process, before making the decision to integrate new technology, Section 3: Decision Support at the HIE Level Design, and Section 4: Implementation of Clinical Decision Support, when creating a practice/organization strategy to start software and practice implementation.
- Information technology staff will be interested in Section 3, which is about the technical integration of the RHIO and EHRs.
- Practice personnel will be interested in Section 1: Implementation to learn about the impact of new software functions and Section 3 during and after implementation when focusing on sustaining practice changes.

Icons

The following icons are used in this guide to highlight information.

Information that may be useful to efficient implementation and avoiding problems

Additional resources

Tools that you may want to use

Caveats or cautions

Case Examples   Relevant examples

Guidebook Caveats

•	Integration of local HIE hubs to RHIOs is not the only way to use the Internet to improve health care quality in primary care practices.
•	There is no single best way to integrate local HIE hubs to RHIOs.
•	Using a local learning collaborative and practice enhancement assistants to help clinicians learn the new systems and implement necessary practice changes is not the only model for implementing integration.

Background

Health information exchange (HIE) occurs when two or more organizations electronically exchange health-related data.[1] HIE hubs mobilize health care information electronically across health care organizations within a region, community, or hospital system. HIE systems increase participation of multiple providers in a patient's continuity of care. With HIE health care providers can save money on the following:

- Manual printing, scanning, and faxing of documents.
- Phoning and mailing to share patient health care information.
- Time and effort involved in recovering missing patient information.
- Repetitious gathering of provider information when sharing information.

What Is a Regional Health Information Organization?

A Regional Health Information (exchange) Organization (RHIO) is a group of organizations within a specific geographic area that share health care-related information, often via HIE(s), according to accepted health care information technology standards. RHIOs are a basis for the National Health Information Network, which promotes universal access to electronic health records (EHRs).[1] Sources of data for RHIOs included hospitals (84 percent); laboratories (68 percent); and imaging centers (57 percent). Eighty-four percent of RHIOs exchanged test results, followed by inpatient data and medication history. Eighty-two percent of RHIOs supported reporting results and 64 percent displayed medication lists.[2] Far fewer allow consultation/referral, chronic care management, disease registries, public health surveillance, or quality improvement reporting.[3]

Sustainability has been a difficult issue for many RHIOs.[4] In a recent survey, only 42 percent of RHIOs were operational and actively exchanging clinical data, 26 percent had pursued clinical data exchange in the past but had discontinued, representing a 20-percent failure rate.[2] Sustainability has been limited in some cases, because there was no viable and long-term business model to maintain operations. Seventy-two percent of the 42 operational initiatives surveyed in the 2008 eHealth Initiatives cited sustainability as a very difficult or moderately difficult challenge.[3] In a 2007 national survey, 48 percent of operational RHIOs relied on grant funding.[2] Only 41 percent of operational RHIOs reported that they were able to cover operating costs with revenue from entities participating in data exchange and only 28 percent expected to in the future.

If a RHIO cannot deliver tangible clinical value to participating providers and their patients, it will not be used. Thus, financial sustainability and perception of the value of the system are closely linked. Most RHIOs face substantial challenges in the area of legal negotiations across diverse stakeholder groups. Federal organizations, State entities, private companies, and nonprofit participants have very different administrative and technical constraints, capabilities, and interests. Successful RHIOs have invested heavily in building partnerships and creating proficient governing bodies based on clearly structured mutual agreements.

More than 200 RHIOs in various stages of development have been identified.[2] A majority are nonprofit supporting organizations. The number of RHIOs is increasing, even though most collected and exchanged limited data and suffered from funding and other issues.[2,5] HIE is perceived as helpful: 69 percent of 2008 eHealth Initiative's survey respondents said that HIE allowed them to reduce redundant tests; reduce patient admissions to hospitals for medication errors, allergies or interactions; decrease the cost of care for patients with chronic diseases; or reduce administrative staff time.[3] However, a longitudinal study begun in early 2007 to evaluate the status of RHIO development in the United States found little empirical evidence that health information technology (IT) alone will deliver cost savings. The eHealth Initiative reported similar findings in a series of annual surveys begun in 2005.[3] RHIOs often lack enough data from the ambulatory setting and consultants to benefit primary care providers. Local hospital data is available through other means, though it may be time consuming and expensive. Surveys of the benefits and obstacles to HIE tend to be limited and vary widely in their definitions and measurements of success or failure in the development and use of a RHIO.

The lack of a convincing value proposition for providers has been a major barrier to use of RHIOs. Although there appears to be a net societal potential benefit of investing in sharing information between different health care organizations, the return on investment for individual medical practices is less certain. Apart from capital expenses and fees, medical practices must adapt their workflow so they can benefit from the RHIO technology. Implementation costs, including the loss of productivity, come directly from practice income and adoption is risky for small medical practices. Many medical practices lack managers with the skills and experience necessary for implementation.

Section 1: Planning

Process Overview

- Local learning collaborative—The learning collaboratives, consisting of representatives from each practice, share information to facilitate change. They are modeled after the Breakthrough Series collaboratives developed by the Institute for Health Improvement.[6]

- Practice enhancement assistants work with clinicians and staff throughout the process to help them learn to use the new systems and implement practice changes to incorporate the new systems into clinical workflows. Key representatives of the participating practices meet to share and learn about successful approaches to implementing practice changes in these collaborative.

- Between meetings, members use rapid-cycle change methods to improve their clinical services by making small incremental changes.[7]

- Key changes are tested using the Plan-Do-Study-Act cycle:

  - The team proposes a plan with expected measurable outcomes.
  - They then do (implement the change), and then
  - Study the outcomes to determine whether expectations were met.
  - Next, they act on their conclusions by making further changes to the process.

Read about organization change theory:

- Glanz K, Rimer BK. Theory at a glance: A guide for health promotion practice. U.S. Dept. of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute. Bethesda, MD; 1997. http://www.cancer.gov/cancertopics/cancerlibrary/theory.pdf

Read about local learning collaboratives:

- Aspy CB, Mold JW, Thompson DM, et al. Integrating screening and interventions for unhealthy behaviors into primary care practices. Am J Prev Med 2008 Nov;35(5 Suppl):S373-80. http://www.ajpmonline.org/article/S0749-3797(08)00680-6/abstract.

Read about practice enhancement assistants:

- Nagykaldi Z, Mold JW, Aspy CB. Practice facilitators: A review of the literature. Fam Med 2005;37(8):581-8. http://www.stfm.org/fmhub/fm2005/September/Zsolt581.pdf

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Implementation Considerations

- Determine the primary goals of your network.
- Plan with the end in mind, but keep the scope limited at the beginning.
- Secure leadership buy-in and support.
- Communicate a shared vision with clinicians.
- Use experienced vendors with scalable solutions.
- Use quality attorneys who understand health IT.
- Develop a sustainability plan.

Assessing Readiness

A primary care practice group is ready to implement local health information exchange (HIE) and connect to a Regional Health Information Organization (RHIO) if it has the following:

- A culture that prioritizes effective primary care services that emphasize continuity, coordination, and comprehensiveness. This includes prevention delivery.
  - ❍ Leadership that is committed to the implementation of HIE locally, regionally, and nationally.
  - ❍ An existing EHR and a working relationship with the vendor.
  - ❍ Informatics expertise. A clinician with expertise or a strong interest in clinical informatics with available information technical support is required.

Change Process Capability Questionnaire

- Measures a practice's readiness to manage the changes needed to implement recommendations that depend upon changing practice systems.
- Incorporates items identified by a panel of experienced guideline implementation leaders as the most important organizational factors and strategies.
- Contains 30 items measured on a 5-point scale from strongly agree to strongly disagree.
- Solberg LI, Asche SE, Margolis KL, Whitebird RR. Measuring an organization's ability to manage change: the change process capability questionnaire and its use for improving depression care. Am J Med Qual 2008 May-Jun;23(3):193-200. doi: 10.1177/1062860608314942.

Resources

Leadership

Successful implementation requires commitment from three levels of leadership.

- Organizational leadership sets priorities for implementation, ensures needed resources are available, and negotiates with outside organizations.

- Practice leadership tailors the implementation to the individual practices' needs and resources, in a way congruent with the practice culture. They work with key representatives from each practice to integrate the new technology into existing workflows.

- Individual leadership includes all implementation participants and users who together contribute to a positive climate for change.

Support

Implementation requires the following personnel:

- A facilitator who coordinates and runs learning collaborative meetings.

- Practice champions and early adopters who catalyze change.

- Key representatives (the learning collaborative members) who guide the coalition for implementation.

- Information technology support staff who work closely with leaders and users.

- Trained staff in the individual practices with protected time.

- Legal staff who are familiar with regulations and laws regarding electronic transfer of patient information.

> Attorneys must understand Health IT, HIE, EHR, HIPAA, PHI*, and DURSA*
>
> **Helpful Tips**

Practice enhancement assistants develop a relationship with a group of practices over a period of time to help them to evaluate and improve their quality of care. Practice enhancement assistants helped clinicians learn to use the new systems and implement practice changes to incorporate the new systems into clinical workflows. They also collected data about implementation, usefulness, and acceptability of these changes for staff and patients.

HIPAA = Health Insurance Portability and Accountability Act; PHI = Protected Health Information; DURSA = Data Use and Reciprocal Support Agreement

Practice Personnel and Patients

All practice personnel that use patient information should be involved in implementation since their current workflow patterns may change. To anticipate and facilitate changes, support staff should be aware of the current workflows of front desk staff, nurses, medical assistants, and clinicians. In addition, the impact of implementation on health care and patient satisfaction should be monitored.

Implementation Schedule

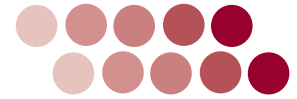The implementation schedule should provide the following information:

- Project phases
- Activities for each phase
- Deliverables for each phase
- Key milestones
- Who is responsible for each activity and deliverables
- Any dependencies

Issues around technology or functionality should be resolved during plan development.

Helpful Tips

For more information regarding HIE planning, see the Appendix.

Section 2: Technical Process

The major technical task of setting up a connection between a regional health information organization (RHIO) and an electronic health record (EHR) or a health information exchange (HIE) hub is to get separate computer systems to work together. The EHR must be able to access and send information to the RHIO database so that clinicians can use this information at the point of care. The information provided by the RHIO must be easy to access within the existing EHR. To be effective, the process must be accurate, efficient, and automatic. This requires close cooperation between the practices' technical support staff, the EHR vendor, and the RHIO software vendor.

The Clinician's Perspective

Busy primary care providers may be still adjusting to EHR implementation. To make the process of adopting HIE as seamless an experience as possible, the system should allow the following:

- Clinicians are able to access information from the RHIO within their EHR.
- The extra work navigating within the EHR to RHIO data is minimal.
- Transfer of data between the RHIO and EHR is automated.
- The use of RHIO data should be easily integrated into the practice workflow.

Technology Infrastructure

A detailed understanding and communication of the EHR and RHIO software data specifications is critical for implementation. Requirements to allow automated flow of data between RHIO database and EHRs include the following:

- An EHR with scalable HL-7 compliant software.
- A RHIO with Internet servers and scalable HL-7 compliant database software that corresponds to the "data warehouse" and/or the "federated database system" models of data integration.
- Interfaces compliant with the Continuity of Care Document (CCD) specification, an XML-based markup standard to specify the encoding, structure, and semantics of patient clinical data.

Data Transfer Technology

Prior to the approval of the CCD as an ANSI Standard in 2007, electronic data exchange of clinical data used one of two XML-based formats: HL7 Clinical Document Architecture (CDA) or ASTM Continuity of Care Record (CCR). The CCD was formed through a collaboration between Health Level 7 and ASTM International to combine the benefits of CDA and CCR specifications. An important difference between CCR and CDA is that CCR uses only specified XML code. It does not support free-text and it is not electronically acceptable by all systems. Also, CCR was intended to be technology neutral and so can be transmitted on paper so that he patient can manually carry the CCR.

The Medicare and Medicaid EHR Incentive Programs provide a financial incentive for achieving "meaningful use," which is the use of certified EHR technology to achieve health and efficiency goals. As part of Meaningful Use, the CCD and CCR were both selected as acceptable extract formats for clinical care summaries in the program's first stage. A certified EHR must be able to generate a CCD (or equivalent CCR) that has the sections for allergies, medications, problems, and laboratory results in addition to patient header information.

Because CCD is built using both CDA and CCR, it is compatible with many systems that use either of these standards. This allows clinicians to work seamlessly with differing formats as needed.

Read this white paper from Core Point Health to learn more:

http://www.corepointhealth.com/sites/default/files/whitepapers/continuity-of-care-document-ccd.pdf

Helpful Tips

How Does SMRTNET Work?

- In SMRTNET (See Figure 1), HIE-enabled information automatically updates the PSRS (a list of recommended evidenced-based preventive services linked to the EHR).

- The HIE information is shown in a virtual window.

- Clinicians can import the information to the patient's managed care plan and continuity of care record.

FIGURE 1. SECURE MEDICAL RECORDS TRANSFER NETWORK (SMRTNET)
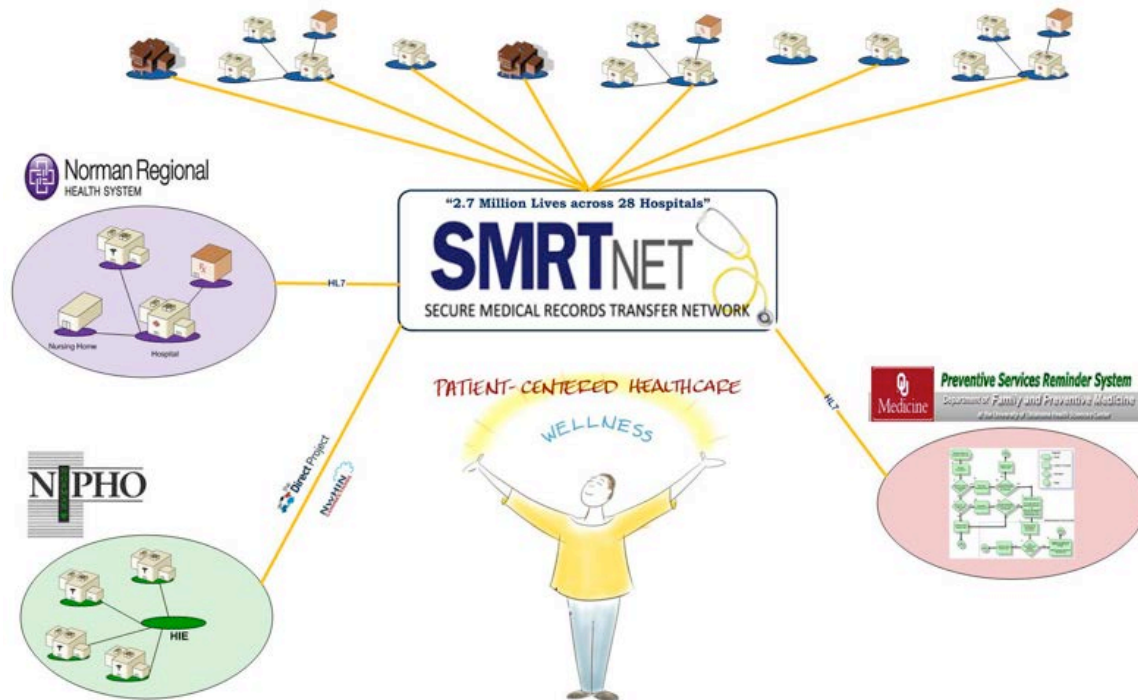
Modifications to the EHR User Interface and Data Transfer Technology

The eClinical Works® EHR interface was modified (see Section 3, Figure 2) to include a tab for accessing the local eHX hub Web interface (#2) through single-sign-on technology. The eHX Hub provided an aggregated view of the selected patient's record in a tabulated format, including clinical and administrative information from all participating Norman area providers (RHIO-level aggregation). Consequently, several options have been developed and offered to practices to access various segments of HIE data (#3). These segments included general patient information, clinical and visit data, medications, laboratory tests, imaging, encounters with other providers, and HIE-enabled/ informed clinical decision support. Practices could interface with clinical decision support via PSRS two ways. First, the eHX Hub interface incorporated a new tab that provided a seamless and direct single-sign-on access to PSRS (#4) preventive services recommendations. eHX users were logged on securely to PSRS and automatically navigated to a screen where recommendations were displayed for a particular patient.

During the project, a second option was developed that allowed the automated delivery of care recommendations to the eHX viewer via batches of specialized CCDs (# 5) that PSRS assembled on a weekly basis (approximately 5,000 CCDs per week) and delivered to SMRTNET for further processing. Care recommendations were "pre-positioned" and ready for immediate delivery. The

initial trigger for initiating the CCD loop was the closing of the chart in the local primary care practice's EHR. Only patients who had an active appointment on file in Task Order practices in the next 6 months were selected for data processing. Data processing triggers were modified to include this criterion.

HIE data transfer relied preliminarily on assembling, parsing, interpreting, and reassembling CCDs. A variety of technologies were used by various HIE partners to achieve this including open-source platforms and software that are available publicly or via national HIE developer groups (e.g., Mirth, Java, X-Path, SFTP, Linux OS). These technologies were meticulously tested, adjusted, retested, and monitored in the course of the project to achieve a reasonably smooth operation.

Working with multiple technologies enhances innovation but makes the development process more complex. To achieve timely operations, it was critical that each stakeholder designated a liaison who continually facilitated the HIE design and testing process within their organization. Liaisons communicated technical challenges and plans for solutions daily via an e-mail list. Liaisons also managed "support tickets" collaboratively.

Helpful Tips

Working With Vendors

EHR and RHIO software vendors must provide ongoing support of numerous clients and upgrade software to comply with new governmental regulations. Assisting a group of practices with HIE needs may not be a priority. EHR vendors may see accessing data and decision support software from RHIOs as competition with their own product. Despite HL-7 specification regarding transfer of heath data, the proprietary nature of medical software makes some software modification necessary to enable two or more systems to transfer data.

Strategies for success when working with software vendors include the following:

- Understand your vendor's interests. Where does your project fit into the vendor's priorities? Learn how your vendor thinks your software should work.

- Work through existing relationships. You should have a relationship with vendor employees. You will need to work with vendor's executives and software programmers.

- Be flexible, but firm. Vendors have other priorities, design barriers, and resource constraints that limit what they can do and how fast they deliver. Be prepared to be flexible and creative at solving problems. However, determine who is responsible for each task in the project, agree on a timeline, and do not accept flimsy excuses.

- Don't put the cart before the horse. Before you start software development, make sure legal agreements are completed with the vendors and between organizations that are sharing information.

❍ Assess the startup costs from the EHR vendor, initial ongoing maintenance payments, and the health information exchange side.

❍ Secure best pricing for the EHR vendors, the hospitals, and providers.

❍ Add at least 20 percent to your total budget for expected overages.

Helpful Tips

For more information regarding dealing with vendors, see the section on HIE Vendor Evaluation and Selection in the Appendix.

Going Live

● Finalize all the "documents" (software) required in the kickoff phase.

● Determine provider types and level of access to the data.

● Start with the fewest practices necessary and expanded later.

● Satisfying providers at go live is difficult to balance with timelines and startup costs, but if this is not appropriately addressed the sustainability plan can be threatened.

Delay going live until the key elements of demographics, labs, drug allergies, medication list, and problem list are in place. Missing any of these key elements may create significant frustration and loss of momentum. The trust and confidence lost if the HIE is launched before having a significant threshold of clinical data cannot be overestimated.

Helpful Tips

Section 3: Decision Support at the HIE Level Design

Decision Support From RHIO-Based Applications

Information Flow in the HIE-i

- Physician practices in the Norman Physician Hospital Organization (NPHO) schedule patients through their electronic health records (EHRs) for followup visits on a daily basis (Figure 2). Practices generally schedule patients for return visits or procedures elsewhere several weeks or months ahead which gives ample time for the health information exchange (HIE) to turn information around using schedule entries as trigger events.

- The eHX hub transfers and aggregates data from Norman, Oklahoma, practices on a daily basis and runs stored procedures to send a daily Continuity of Care Record (CCR) dataset for scheduled patients to the State-level SMRTNET database.

FIGURE 2. INFORMATION FLOW IN THE HIE NETWORK
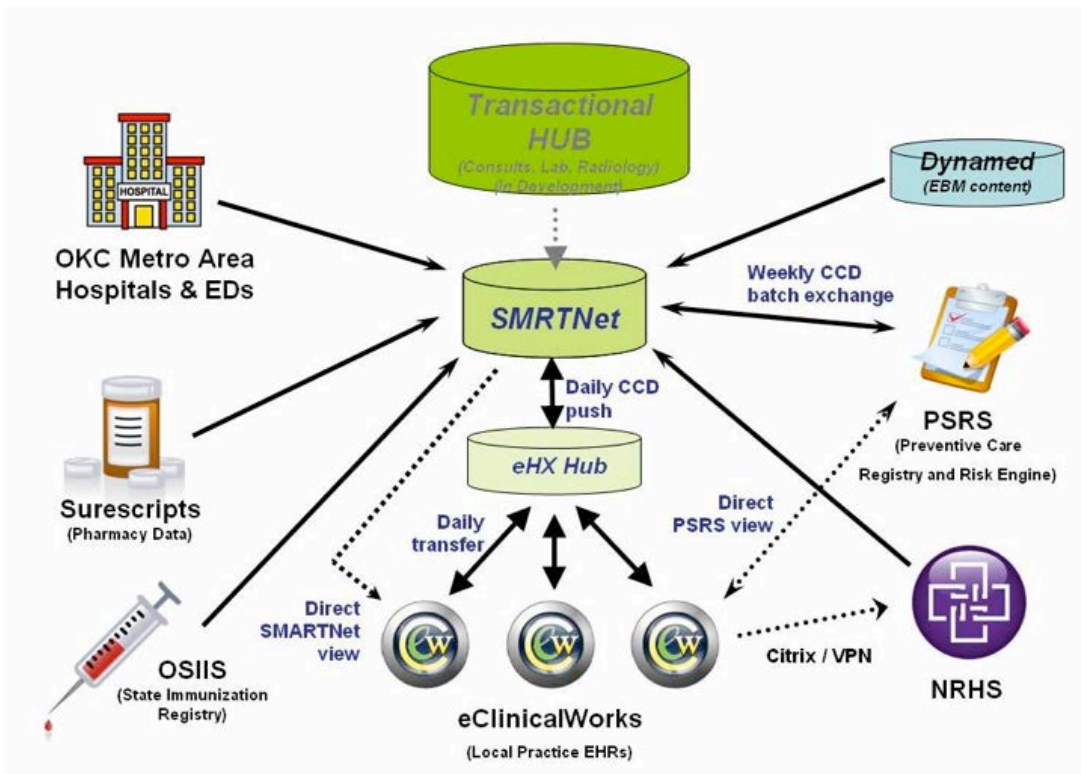
PSRS – Preventive Services Reminder System

OSIIS – Oklahoma State Immunization Information System

eCW – eClinicalWorks® Practice Electronic Health Record

eHX Hub – Local Physician Network Data Repository

SMRTNET – Secure Medical Records Transfer Network (State-wide Health Information Exchange)
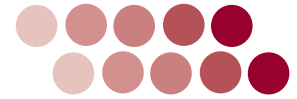
- A specialized aggregator procedure runs overnight on eHX CCDs at the State-level (SMRTNET).

- The aggregator collects locale-specific health information from a variety of sources across Oklahoma and aggregates them into a "Super-CCD" that contains information from clinical entities, pharmacy systems, laboratories, imaging facilities, and public health databases.

- Super-CCDs are then sent weekly to PSRS in batches using secure shell protocol.

- PSRS parses each Super-CCD xml file and identifies relevant clinical targets in the dataset (e.g., demographic information, past immunizations and preventive services, clinical and behavioral risk factors, vital signs, diagnoses, laboratory tests, medications, and allergies).

- The PSRS-Risk Engine builds virtual patients from these data in an object-oriented framework and runs its risk algorithms on patient profiles to generate personalized care recommendations.

- PSRS then assembles a Response-CCD which incorporates demographics and patient identifiers in the CCD Header and <patient> section and new care recommendations in the <PlanOfCare> section.

- Batches of Response-CCD files are then sent back to SMRTNET overnight via secure shell for further processing and incorporation into the Super-CCD that now contains clinical intelligence (CCD-i) that was not previously present in the CCD.

- The CCD-i can reside at multiple levels. When physician practices open a scheduled patient's chart before the visit, a tabulated representation of the CCD-i can be called up and used for clinical decision-support either via a local EHR-embedded eHX viewer (local view) or a Web-based SMRTNet browser which is available for authorized care providers (State-level view).

During the Task Order project, we experienced a significant "bloating" of some CCDs as they became richer with information and/or duplication. This resulted in very large amounts of clinically unactionable data in some CCDs that occasionally stalled automated processes responsible for assembling and parsing CCDs. We developed an iterative process to diminish these problems by focusing on core elements of the CCD (e.g., demographics, medications, labs, clinical services history, personal risk factors) and screening CCDs by size prior to processing (e.g., those over 5 Mb). This was also important for continuous quality improvement and learning.

Implementation of the Preventive Services Reminder System

PSRS was developed with extensive input from practicing primary care clinicians in the Oklahoma Physicians Resource/Research Network and has been used by 33 clinicians in 14 separate practices. More information on PSRS and screen shots of the Web interface are available at http://www.okprn.org/psrs.html.

The PSRS is a comprehensive clinical tool for improving the delivery of patient-centered preventive services via patient registry, prompt/reminder, clinical decision support, and quality improvement (audit) functions that are accessible through a simple, secure Web interface.

- **Patient Registry:** PSRS is built on a relational PostgreSQL database that includes patient/family demographics, history of immunizations, screening tests, counseling sessions, well child visits, health habit information (e.g., smoking status), personal risk factors (e.g., chronic illnesses), allergies and adverse reactions to vaccines, patient care preferences (e.g., options for colon cancer screening method), and reasons for not delivering particular preventive services.

- **Prompts/Reminders:** PSRS utilizes a unique recommendation algorithm that considers all of the information available in the registry and evidence-based preventive services guidelines (U.S. Preventive Services Task Force, Advisory Committee on Immunization Practices, and American Academy of Family Physicians) to generate a list of primary and secondary preventive services indicated for a patient on any date in the past, present, or future. Set theory is used to fit patients behind on immunizations into the most appropriate catch-up regimen by filling up virtual slots by qualifying vaccines and doses. Recommendations are generated by an RMI Java Web service that receives a simple coded request from the client including age, gender, recommendation date, past service history, personal risk and preference profile and responds with a structured text stream of preventive recommendations that are parsed by the Web server and sent back to the client's browser in plain HTML generated in a Java Struts environment. The recommendations are available to clinicians online or via a printable PDF document that summarizes history of past preventive services, current recommendations and patient risk factors.

- **Patient Recalls:** PSRS includes a powerful electronic chart auditing and patient recall tool that helps clinicians track their performance and identify/recall eligible patients for preventive services. A list of patients who are due for services is produced by running each patient's profile through the recommendation algorithm and comparing service history with evidence-based, personalized recommendations in a selected patient group.

- **Patient Education:** Automated selection from a comprehensive library of patient education materials are generated on-the-fly from PDF document streams combined with the patient- and visit-specific recommendations. Patient education materials can be printed automatically (e.g., flow sheets for children due for well child visits or CDC-approved immunization information) or selectively after discussion with the patient. Educational materials are available in both English and Spanish.

- **Wellness Plan:** A 3-year prospective wellness plan can be generated for individual patients based upon the assumption that patients and clinicians address all items on the sequential recommendation lists each year.

- **Task Manager:** The negotiated wellness plan can be recorded and tracked by a task management tool built into PSRS to streamline care delivery and personalize future recommendations.

- **Interoperable Continuity of Care Record:** PSRS has a Continuity of Care Record (CCR) interface that allows data transfer between PSRS and CCR-enabled EHRs or other compatible patient databases.

Some Results of HIE and PSRS Integration

Improved delivery of preventive services:

- Increase in the documentation of breast cancer screening using mammography from 27 to 51 percent.

- Increase in the documentation of colorectal cancer screening using colonoscopy from 32 to 54 percent.

- Increase in the documentation of pneumococcal vaccination from 39 to 51 percent.

- Increase in the documentation of influenza vaccination from 23 to 42 percent.

Improvements in other medical services:

- Increase in documentation of hemoglobin A1c's of diabetic patients from 68 to 83 percent.

- Increase in medication reconciliation accuracy from 35 to 45 percent.

For more information, see the sections on Installation of HIE and Integration to EHR in the Appendix.
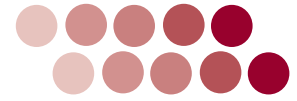
Section 4. Implementation of Clinical Decision Support

Learning Collaboratives

The implementation process described in this guide is based on organizational change theory. Practices were engaged in local learning collaborative. In these collaboratives, key representatives of all of the participating practices meet throughout the project to share and learn about successful approaches to implementing practice changes. The timeline for learning collaborative meetings emphasizes more frequent meetings at the start (see Table 1.) However, the process of change may take much longer than 1 year. The representatives were responsible for disseminating information to the practice and providing feedback to other practices and staff leading the implementation. Between meetings, members are encouraged to utilize rapid-cycle change methods to improve their clinical services by making small incremental changes. Practice changes at each step were tested using the Plan-Do-Study-Act cycle (see Section 1). These practices changes were supported by a Practice Enhancement Assistant.

- Encourage participation from all members.
- Promote mutual respect between members.
- Value all perspectives.
- Make meeting accessible.
- Provide refreshments.

Helpful Tips

TABLE 1. LEARNING COLLABORATIVE TIMELINE AND AGENDA

Learning collaborative #1	2 months prior to implementation	Introduce the goals of the project. Describe the expected effects on the practices. Describe the timeline of implementation. Describe the function of the learning collaborative, member responsibilities, and timeline of meetings.
Learning collaborative #2	1 months prior to implementation	Discuss current workflows. Review baseline practice performance of key outcome measures.
Learning collaborative #3	2 months after implementation	Share initial software use experiences. Identify and troubleshoot implementation problems.
Learning collaborative #4	5 months after implementation	Share software use experiences. Share and discuss workflow changes.
Learning collaborative #5	8months after implementation	Share software use experiences. Share and discuss workflow changes. Review practice performance of key outcome measures.
Learning collaborative #6	12 months after implementation	Share software use experiences. Share and discuss workflow changes. Review practice performance of key outcome measures. Discuss strategies to sustain use.

Understanding Workflow

During learning collaboratives, members are tasked with determining their current workflows for accessing data outside of their practices and redesigning their workflow to incorporate the additional methods of accessing and using data provided by the RHIO connection.

EHR Data Quality

Performance monitoring, preferably through the EHR, of the quality of data provided to clinicians and patients, is vital to determine baseline performance and improvements over time. Members need to review performance reports to make sure information appears valid. Three types of errors are possible: (1) errors in HIE data transfer, (2) entry error by clinicians and staff, and (3) data query errors in which data is not accurately captured in the EHR generated query and subsequent report. Data entry errors can be random or systematic error in the use of the EHR. Invalid reports are a particularly insidious cause of measurement error.

Administrative processes and reporting is one of the Institute of Medicine's eight core functions of an EHR. In 2010, the Office of the National Coordinator for Health IT issued a rule on the criteria and technical specifications for an EHR geared towards ensuring that EHRs are capable of performing the functions for meaningful use, including quality reporting. Many EHRs can generate reports, but the quality varies. EHR report generation can require a steep learning curve and can be labor and time intensive. It is important to work closely with the vendor or specialist to learn to generate reports that capture the desired information.

Read about how EHRs facilitate quality reporting:
http://www.hrsa.gov/healthit/toolbox/HealthITAdoptiontoolbox/QualityImprovement/howcanehrsfacil.html

Practices may need to relearn how to enter data into their EHR and how to use data from HIE.

Common Errors

- Not recording data in the EHR in the standard field
- Not recording data in the EHR standard format
- Not using electronic functions provided within the EHR such as electronic ordering or standard forms
- Recording information as text in notes
- Not recording an electronic date with information
- Relying on scanned documents

Helpful Tips

Use AHRQ's Workflow Assessment for Health IT Toolkit to learn more about workflow, find workflow assessment tools, and find out about others' experiences at http://healthit.ahrq.gov/workflow.

Training

Each practice must decide how to train clinicians and staff. During the learning collaboratives members should discuss training activities. Training must address three areas:

1. Users must become familiar with software modification in the user interface to access RHIO information and decision support,

2. Users must learn how to enter data accurately,

3. Staff must understand new roles in any revised workflow.

For this project, (1) members participated in group demonstration during collaborative meetings; (2) Practice Enhancement Assistants provided one-on-one training; and (3) there was peer-to-peer learning.

Sustaining Use

- Beginning: Plans for sustaining use must begin with the go-live date and continue throughout the implementation period. Provider satisfaction at go live is vital for sustainability.

- Middle: Regularly address the sustainability plan any time the project plan is adjusted.

- End: Perhaps, during the later phases of implementation, improvement of quality measures will reinforce the benefits of HIE. The final collaborative should focus on making HIE a part of the practice's mission by ongoing monitoring of use and feedback.

For more information, see the sections on Go Live-Advanced Implementation and Advanced or Mature HIE Installation in the Appendix.

Section 5: References

1. Health Information Exchange Steering Committee. Regional Health Information Exchanges (RHIOs) & Health Information Exchanges (HIEs) Overview.http://www.himss.org/content/files/RHIO/RHIO_HIE_11_10_07.pdf. Accessed September 19, 2012.

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Appendix: Framework for Connecting Regional Health Information Exchange To Support eDecisions[1]

Subtask	Description	Checklist
HIE Planning		
Use Case for Provider Practice/Performance/Decision Support in EHRs	Determine the primary goals of your network. Plan with the end in mind, but keep the scope limited at the beginning. What is the use case? Medication reconciliation, handoffs, high-risk patient management, condition management (if so, what conditions?), emergency department and hospitalist connection to ambulatory providers? Accountable care organizations (ACOs) are a pinnacle of doing all of the above, perhaps better reached over time, as it would be difficult to have all use cases in place initially.	❏ Use Case for Provider Practice/Performance/Decision Support in EHR
Workflow-informed EHR use	Simply having installed the EHR is not enough. The key is utilization of the EHR and adoption of workflows that create structured data to be shared with HIE.[2]	❏ Consider the quality and depth of implementation in the practices engaged when evaluating EHR adoption.
Governance Body—The Board?	Governance should match the use case. Primary care driven use cases need to be focused on the involved parties sharing data; both those with whom the data will be shared and those whom the data is serving. Consider patient advocates and 501c3 structures to assist in grant funding and ACO eligibility.	❏ Board structure designed to meet the needs of contributors, beneficiaries, advocates, and potential grant opportunities.
Legal Guidance	It is critical to have informed attorneys that understand health IT, EHR, HIPAA, PHI, DURSA, and HIE.	❏ Experienced health IT attorney or firm.

[1] See also http://www.healthcare-informatics.com/article/hie-sustainability-built-solid-use-cases for more information on this topic.

[2] EHR = electronic health records; HIPAA = Health Insurance Portability and Accountability Act of 1996; PHI = Personal health information; DURSA = Data Use and Reciprocal Support Agreement; HIE = health information exchange

Subtask	Description	Checklist
HIE Technology Vendor	Experienced HIE vendors with scalable solutions are critical members to a successful team. Look for IHE profiles and HL7 connections that are the current best practice and that don't break the bank. What EHRs do you have in your community? Test the feasibility/experience of interconnection between the HIE vendor with these EHRs.	❑ Look for scalable vendors with IHE standards and HL7 connections who allow lower cost onboarding and interface costs with add on modules for advanced midrange and long-term goals. Look for HIE vendors who have connected a variety of EHRs. Ask the vendors for points of contact references to discuss their experience.
HIE Startup Costs	Initially aim low, go slow, and pace your growth. Consider starting with an initial set of clinician offices. Once you have defined best practices and have awareness and comfort with technical, legal, governance, and use cases, expand the number of offices. Costs can spiral and high costs of initial entry on the HIE side and on the EHR side for connections can stall your effort before it ever takes off. The minimum functionality, for the HIE technology itself, software and hardware interfaces, planning meeting support and time, initial training, and legal support costs will be substantial. See the checklist for cost considerations.	❑ Resources to support planning meetings ❑ HIE Vendor startup cost ❑ Interface costs for HIE ❑ Interface costs on EHRs ❑ Ongoing HIE vendor fees ❑ Legal fees to establish privacy and security agreements ❑ Legal fees to establish the board ❑ Board costs for meetings ❑ Network administrator costs

Subtask	Description	Checklist
HIE Sustainability Plan	Sustainability of HIEs has been very difficult to achieve and remains complex. To date, financial sustainability has been achieved in two approaches: 1) hospital and provider driven or 2) payer driven. ACO considerations, condition management programs, and associated withholds or fees for contributors are likely to comprise a strong plan. Grant funding is helpful with startup costs or determining and testing initial use cases/clinical outcomes, but rarely covers the full gambit of startup and additional fees. These costs tend to double rapidly. Option 1—Provider/Hospital Sustained: Providers appear to be willing to pay $25–75 a month for initial HIE services to connect with each other and the hospital and to coordinate care initially when there are no reimbursement methodologies from payers. Hospitals will vary from 10-50k annually (based on our experience) based on their volume. Option 2—Payer-Based Option HIE: ACO plays a picture here; the complexity and governance and reimbursement models are varied and a best practice producing real clinical outcome improvement is evolving still. Option 3—Combination of Provider/Hospital and Payer-Based Option	❑ Startup cost coverage ❑ Ongoing fees per provider and/or hospital ❑ Payer contributions at the organizational level versus reimbursement through ACO or performance improvement/ quality improvement organization collaboration
Planning for Quality Measurement and reporting	Begin planning how you will measure your initial use cases and then pursue an iterative process for quality improvement.	❑ Measurement for initial use cases ❑ Quality improvement plan
Common Pitfalls	While many vendors tell you that their interfaces are standard and that they can pull all the elements of structured data that you may need for a quality equation or calculation, this is frequently not the case. Ask to speak to reference sites using your same EHRs and the vendors of the HIE.	❑ Re-examine your plan for scope creep

Subtask	Description	Checklist
	Interoperability is still a very difficult thing to achieve. It is important to not allow scope creep to consume your model and it is extremely important to not allow your initial startup costs in one boarding cost for your providers and hospitals to expand before you have proven any use case or initial return on investment.	
HIE Vendor Evaluation and Selection		
	Provider Use Case to Determine Scope and Selection Process	
Use Case for Provider Practice/ Performance/Decision Support in EHR	At this point, you may want to reduce or expand the number of use cases, depending upon where you have gone once contracting and initial interface discussion have occurred with a vendor. Cost and personnel and health IT resources can become challenged during this phase depending on initial scope.	❑ Reevaluate the number of use cases. ❑ Create a project plan beginning with the clinical measurements you are trying to achieve
EHR Use	Both established EHR installs and newly installed EHR systems may not be used uniformly by staff or may have limited/inconsistent activation of prospective functionality. Determine the extent and nature of actual EHR use, including who is using the system and where they are entering the information, which is critical to the quality measures of your use case(s). Discuss these issues with your clinicians, data entry staff, health IT support, and vendors. Surveys and on-site assessment of your initial practices will be critical during this phase to understand your starting point for the project prior to completing a project plan.	❑ Complete in-depth surveys and on-site assessment of the practices in their depth of implementation of EHRs to include the structure data elements that you will need for your use case.

Subtask	Description	Checklist
Governance Body	Governance is an ongoing process. Through initial meetings, educate the government body about HIE and privacy and security before introducing them to the enhanced provider/performance/decision support EHR technology.	❑ Educate your board about HIE. ❑ Educate your board about privacy and security. ❑ Educate your board about the technology involved with EHR and HIE. ❑ Create organizational goals/mission. ❑ Create an RFI and release it. ❑ Create a vendor selection scoring sheet ❑ Host vendors for in-depth demonstrations on my technology; save only a short amount of time for future enhancements ❑ Complete an RFP process. ❑ Initiate and complete contracting. ❑ Create project plan and assign a project manager. ❑ Tightly bind your vendor to consistent contacts that will be responsible for your project. ❑ Ensure that you have executive- level support from your HIE vendor and your largest EHR vendor.

Subtask	Description	Checklist
Legal Guidance	Legal framework will evolve over the project. Initial legal framework and bylaws must be completed prior to go live of the enhanced provider/performance/ decision support EHR technology. There are many frameworks now available through the beacon projects from the Office of the National Coordinator for Health IT (ONC) that may be applicable to your organization as an initial starting point.	❑ Complete bylaws of the organization. ❑ Complete the privacy and security framework ❑ Complete the Protected Health Information (PHI) form for patients and determine opt in or opt out strategy.
Startup Costs	Assess the startup costs from the vendor and initial ongoing maintenance payments and the interface fees on the HIE side. Secure best pricing for the EHR vendor side as well as for the hospitals and providers. Increase your total budget by at least 20 percent to allocate funds for yet-unidentified but likely expected overages.	❑ Once contracting is complete allocate the expenses and invoice the members or sustaining organization.
Sustainability Plan	At this point, the sustainability plan will be tightly associated with your project plan. This will be a moving target throughout the next 12 to 18 months, and it is important for your board to understand that.	❑ Create a 6-, 12-, 18- ,and 24- month budget at this time ❑ Regularly address the sustainability plan any time the project plan is adjusted or milestones are added or subtracted.

Subtask	Description	Checklist
Quality Measurement, Reporting, and Performance Improvement	Identify who will deliver the quality and performance improvement aspect of your project. Tie in the quality officer in training and go-live in order to have the assurance that they understand the infrastructure of the HIE to enable data collection and performance improvement cycles in later stages of the project. Continuity in this role throughout your project will be critical to having early success. Work with the quality officer, providers, vendors, and measure developers to assure accuracy of the quality measures and the efficiency and usability of the quality measure reports. It is very important that your quality measures be accurate, actionable, and accessible.	❑ Identify and higher the quality and performance improvement officer ❑ Allocate time for the quality and performance improvement officer to be engaged at all levels with the project director.
Common Pitfalls	During this phase, scope creep can again become a problem, in addition to escalating costs from the vendor. Ensure that the contracts with the vendors clearly specify the milestones, their delivery dates, and who is responsible for additional costs incurred for delays in missed milestones and extended timelines.	❑ Assign accountability for overages on costs and missed milestones and prolonged timelines.
Installation of HIE and Integration to EHR		
	This phase is defined by integrating the HIE to the EHR to allow adequate data transfer to satisfy the use cases. Over time, the use cases could expand. Pursue well-paced growth. Start slow.	
Use Case for Provider Practice/ Performance/Decision Support in EHR	Identify the workflow and each disparate EHR to accomplish the use case for the quality and preventive milestone you are implementing. Working with vendor, clinicians, and staff determine which data elements will be used. Identify how this information will flow to the HIE and be received by other participants in your organization via portals or EHRs.	❑ Create workflow documents for each milestone in each DHR to create structured data. ❑ Create workflow documents for how each EHR Will consume data from the HIE.

Subtask	Description	Checklist
EHR Adoption	Back to school time. This is a critical time to engage the practices in hospitals and provide refreshed education in training core aspects of EHR use to ensure that structured data is being entered. The completeness and accuracy of the data will drive values of your milestones measurement . These in turn will inform quality improvement activities.	❏ Train clinicians and staff on the essential elements of EHR data EHR capture of structured data related to your use case and quality improvement goals.
Governance Body—The Board	Finalizing all of the documents required in the kickoff phase will be critical for go live. Determining provider types and level of access to the data during this time will be key to having a smooth go live. Start with the smallest number that you feel are necessary and expand during later phases.	❏ Publicize internally the organizational mission ❏ Publicize internally the organizational milestones. ❏ Publicize the timeline for implementation. ❏ Determine which provider types from physicians, extenders, nursing levels, front desk, office managers, educators, case managers, and registration clerks will be able to access information and into what level they can access.
Legal Support	Finalizing all of the elements of the kickoff phase will be key for go live. Typically, once the project is live the legal support costs will trend down significantly.	❏ Implement new PHI form and consent for care documents at all of the participating practices and hospitals
Startup Costs	Costs will be highly variable. It is important to reach a key threshold of completion of key tasks prior to contemplating go live.	❏ Revisit the budget
Sustainability Plan	This will continue to evolve; costs, technical possibilities, and hurdles become more tangible and projections can be taken out to 3 to 4 years.	❏ Revisit the sustainability plan

Subtask	Description	Checklist
Quality and Safety Planning	This is a critical time to create baseline measurements prior to implementation of the HIE. These will vary depending upon how well your providers are currently using the EHR. Create early goals for the first 6 months of implementation and training and the initial quality improvement activity. Create initial measurement and remeasurement intervals.	❑ Create baseline measurements for the performance improvement measures related to the use cases ❑ Determine intervals of measurement ❑ Determine education plans for quality improvement ❑ Determine corrective plans for providers and hospitals that are not adopting or not improving
Common Pitfalls – Premature launching of HIE	Commonly the HIE is launched before enough key clinical data has been interfaced into the system. The trust, confidence, and faith that can be lost with providers by launching the HIE prior to having a significant threshold of clinical data cannot be underestimated. Delaying the go live in favor of having the key elements of demographics, labs, drug allergies, medication list, and problem list is key to maintaining provider confidence. Failure to accomplish provider satisfaction at go live is difficult to balance with timelines and startup costs, but if this is not appropriately addressed the sustainability plan can be tremendously threatened.	❑ Ensure that the minimal data set HIE is sufficient to go live for providers and hospital acceptance and clinical relevance to justify the change and workflow and process. Remember that providers are click counters, one click may be too many if the value on the other side of that click is limited to their practice.
Go Live—Advanced Implementation		
Use Case for Provider Practice/Performance/Decision Support in EHR	Implement the HIE technology with the use case(s) in mind as the indicator to change the providers' workflow to look at the HIE data.	❑ Design workflows for HIE revolve around he use cases.

Subtask	Description	Checklist
EHR Use	Continual education of physicians and nurses on the core EHR functionality will be an ongoing process to ensure they know how to access the HIE. This will also be critical in the go live.	❑ Create workflow documents to access HIE data for each EHR supported in your organization. ❑ The HIE/Quality organization needs to publicize the EHR workflows to capture the needed structure data for your quality measurement and performance improvement . ❑ Train the practices in hospitals on how to access the HIE.
Governance Body	Continued evolution of the milestones will become more obvious during this phase.	❑ Reevaluate the milestones. ❑ Reevaluate who can access into what level. ❑ Ensure that patient education material is available. ❑ Ensure that education legal and government policies are well understood by the practices in hospital. ❑ Ensure that the practices and hospitals have a resource, typically the project manager, to whom they can bring questions or issues.
Legal Support	The initial legal work from the planning stages must be complete, in place, and signed by all participating parties prior to go live.	❑ Ensure all documents are completed and signed by the appropriate parties.
Startup Costs	Significant costs during this phase are associated with training and support for the first 30, 60, and 90 days.	❑ Ensure adequate training and support services are in place.

Subtask	Description	Checklist
Sustainability Plan	Ongoing costs for future needs will begin to become more obvious during this phase and will significantly impact the sustainability plan. This is typically an underbudgeted segment of an HIE implementation and where costs can spiral.	❏ Readdress the budget
	The quality improvement officer should be deeply involved in the training and support during go live.	❏ Use the quality officer as additional support/trainer for go lives ❏ Ensure the quality officer begins to build rapport and trust with the practices and hospitals and providers
Common Pitfalls	Inadequate training and support can create significant lack of adoption and/or misunderstandings of how privacy and security can operate. This is a critical time to ensure that everyone engaged in the project understands the privacy and security elements in order to avoid upsetting and confusing patients. The physician is typically the best person to refer a confused patient to before any issue can escalate. In addition to patients, frequently providers can become just as confused and upset if they do not understand the governments, legal implications, and technology functionality in this phase .	❏ Ensure adequate training has occurred. ❏ Ensure adequate go live support is available. ❏ Consider phasing the connection of HIE to practices and hospitals. ❏ Connect practices and hospitals in the order of most frequent crossover of patients. ❏ Ensure that adequate high-level support and legal support is available to defuse conflicts.

Subtask	Description	Checklist
Advanced or Mature HIE Use		
Use Case for Provider Practice/Performance/Decision Support in EHR	This is a period of proven quality and performance improvement associated with the use cases and milestones. Provider confidence and acceptance of the HIE and quality improvement goals are well understood, and new use cases and performance improvement plans are continually added at a steady pace during this time. Ensure that new use cases can align with sustainability associated with reimbursement or required quality recording.	❑ Meet with provider and quality committees to determine desired next use cases. ❑ Meet with the governance board and evaluate use cases that would promote sustainability or organizational objectives.
EHR Use	EHR training, support and expansion capture structured data elements and will continue to evolve. The role types that enter this data may vary and frequently will extend well beyond the physician.	❑ Continue to evaluate EHR training and support to promote the capture of structured data elements to aggregate in the HIE and for the quality reports and decision support.
Governance Body	This is a period where the mission statement and milestones begin to evolve to address current alignment consistent with reimbursement from the payers and CMS and healthcare reform to ensure sustainability. These documents should be actively discussed and refined to reflect current practices and future objectives.	❑ Tailor governance to meet sustainability, reimbursement drivers from the payers and to drive growth of the HIE and expansion of quality improvement and participating physicians, hospitals, quality organizations, research, long- term care, home health, hospice, public health, underserved, mental health, etc.
Legal Guidance	Periodic (every 3 months?) revisiting of the privacy and security agreement as well as patient consent models will continue to evolve. Additional legal costs may begin to arise associated with connecting two other HIEs in your area, State, intrastate region.	❑ Continue to evaluate privacy and security agreements and consent policies to meet changes in HIPAA and CFR 42 and that the technology and interfaces are aligned with legal policies.

Subtask	Description	Checklist
Ongoing Costs	Additional modules from the vendors will continue to rise to improve recording, measurement, and intervention. These costs will continue to evolve over time and should be budgeted in each interval cycle.	❏ Continue to evaluate additional quality and decision support modules as they fit into sustainability planning and governance and quality objectives versus the ROI and current budget of the network.
Sustainability Plan	Alignment with reimbursement and quality initiatives from the Centers for Medicare & Medicaid Services in the private payers will be critical to evolving the sustainability improving return on investment. Avoidance of primary admissions will occur during this time as well as hospital remissions for chronic conditions. Patient-centered medical home will be a key element of sustainability as well as quality models evolve. Improved patient outcomes will be critical in negotiating variable reimbursement rates associated with quality.	❏ Creative solutions and evolving health care reimbursement strategies create opportunity to support the HIE. ROI equations have been elusive for HIE to date. Even avoided medical record requests may be an adequate place to show a hard ROI versus softer factors that have many variables from competing quality programs within clinics or hospitals such as reduced readmissions.
Quality	Initial quality and performance improvement measurements may be less than anticipated in terms of improvement from the baseline. This should be expected and changing provider workflows is typically a 6- or 12-month cycle. Continuing learning cycles to drive improvement will ultimately result in improved outcomes. Expansion of the quality and performance improvement staff during this time will be key. Analytics will be necessary and more practice enhancement assistance may be necessary.	❏ Ensure appropriate measurement resources between staffing and the ability to provide support to run reports or the quality modules. ❏ Ensure accuracy of quality measurements. ❏ Ensure a clear and consistent strategy is applied from the quality and performance improvement director position. ❏ Ensure adequate performance enhancement and assistance are available and have access to the clinical environments.

Subtask	Description	Checklist
Common Pitfalls	Don't have your system outpace your clinicians use of the EHR and/or quality reports. It is easy to engage in all the potential and want to embark into many initiatives at once. It is critical in maintaining the trust of the providers that a slow and steady pace of initiatives are adequately implemented, trained, and supported.	