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Health Information Exchange: A Frontier Model

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TITLE OF PROJECT:

Health Information Exchange: A Frontier Model

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Organizations
Chadron Community Hospital
Rural Nebraska Healthcare Network
Western Nebraska Health Information Exchange

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1. STRUCTURED ABSTRACT

This project laid the groundwork for the formation of a health information exchange within an established network of critical access hospitals, clinics, public health providers, and behavioral health providers across the rural, remote Nebraska Panhandle. The three goals were: (1) to develop an operational entity and incorporate a regional health information organization to support the development of a health information exchange; (2) to provide standardized training and user capacity development programs throughout the Panhandle; and (3) to implement electronic health records in critical access hospitals and rural health clinics through a shared process. The evaluation explored both the extent to which the objectives were obtained, and the outcomes:

- An operational entity was established (Goal 1). The Rural Nebraska Healthcare Network formed the Western Nebraska Health Information Exchange, LLC as the operational entity and the Managers are responsible for all implementation and operation activities.
- Standardized training and user capacity development programs were delivered to hundreds of Panhandle participants live, and over Nebraska's telehealth network (Goal 2).
- Progress was made toward implementing electronic health records (Goal 3). A vendor was selected and, at the grant's conclusion, the Managers were negotiating contract terms and identifying funding for the implementation costs.

Key words: Health Information Exchange, Critical Access Hospitals, rural

2. PURPOSE

The purpose of the project was to implement a **regional health information exchange (HIE)** within an established network of rural health care providers that serve 90,410 people across 14,000 square miles of the Nebraska Panhandle. This purpose is in line with the initial call from President George W. Bush and more recently President Barack H. Obama to build a national network for exchanging patient health information electronically.

The project was expected to enable partners to improve patient safety and quality of care. Particularly in rural areas, health care is provided through an array of geographically dispersed providers, each often having only pieces of the total health care record. When full medical information is unavailable to providers, decisions must be made either with incomplete information or delayed until the information can be obtained later and at considerable expense. The current system compromises quality care through the underuse, overuse, and misuse of health care services (Chassin & Galvin, 1998). The project builds upon the **Critical Access Hospital (CAH) Network** framework with the intention that it will model interconnections with rural health clinics (RHC), behavioral health providers, physicians' practices, public health providers, and other health and human services organizations.

Partnering organizations envisioned a regional electronic health information exchange that would enable providers, patients, and others to share information, communicate orders and results, support evidence-based decision-making, streamline public health disease surveillance and reporting, and enable data management for non-clinical purposes (e.g., billing, quality management). Information sharing would be patient-centric (i.e., available where the patient and his/her provider needs it regardless of where the information was originally gathered). Transmission and access of information by authorized individuals would be through secure systems. The technology system would enable all partners with basic technological infrastructures to participate.

The three goals of the implementation project were to:

1. Form an operational entity and incorporate a regional health information organization (RHIO) to provide the infrastructure necessary to support regional health information exchange and common developments in the EHRs.
2. Provide standardized training and user capacity development programs throughout the Panhandle, and
3. Develop and implement EHRs in CAH's and RHC's through a common process and shared resources in order to enhance local and regional capacity development toward health information exchange.

3. SCOPE

Background and Context: Need for a Rural Health Information Exchange
In sparsely populated, low-income rural areas, health care providers understand that survival through collaboration makes sense for patients and providers. Providers must take advantage of technology and economies of scale through collaboration, because in most cases, the hospitals themselves do not have scale advantages. Just as the CAH network creates the economies for accessing increasingly sophisticated medical expertise and "shared" patients, the same system offers economies for collaborative electronic health information exchange. Progressive CAH networks in rural areas have reached well beyond the local hospitals to behavioral health systems, public health, and other health and human services providers.

Clinicians need access to comprehensive information about patients, support to make decisions, and timely order execution. Rural physicians provide care under alarming pressures to serve significantly more patients with less access to technological and collegial support (Rost, Humphrey, & Kelleher, 1994). Information is needed at the point of care at the time of care. When clinicians do not have important information about conditions, previous test results, medication and allergy lists, precious time may be lost in locating, obtaining releases between providers, and transporting or otherwise communicating information. The result may be medication errors, repeated tests, protracted diagnoses and longer-than-optimal recovery periods. Tests, orders, results, and specialists' information may never be communicated back to the local doctor or hospital. Because of the breadth of their patient care responsibilities, rural clinicians need support to inform their diagnoses and care decisions, and need to have their orders executed in a timely manner.

Patients need geographically and financially accessible healthcare in rural areas. The CAH designation has created regional systems of primary, secondary, and tertiary care that promote the local health service as the medical home and key point of contact. However, hospitals are thinly-funded and patient volumes make profitability difficult (Stensland & Milet, 2002). Patients must be able to rely on networks of viable CAHs, particularly in remote rural regions where they provide the only care for hundreds of miles. However, the CAH network concept breaks down when clinicians do not have information about patients as they move back and forth between providers. When care is duplicative, delayed, or inappropriate, patients (particularly among the large, uninsured population in rural areas) end up paying more, both in direct charges as well as in the related, and very real costs for transportation, time off work, and so on. **Providers in rural areas must make an extra effort to use scarce resources productively and efficiently.** In rural areas, efficiency at all levels of the organization is necessary to survive.

Health information technology maximizes the productive and efficient use of resources. Electronic health information exchange introduces opportunities for efficiencies. EHRs create efficiencies that enable greater time for patient care (Healthcare Information and Management Systems Society, n.d.). EHRs may be an especially potent cure to hospitals devoting a significant percentage of their budgets on data management costs and doctors spending one-third of their time in managing patient records (Overhage, Perkins, Tierney, et al, 2001).

Setting: The Vast, Remote Western Nebraska Panhandle

The **remote** 11-county, 14,000 square mile Panhandle region comprises all of western Nebraska. The 90,410 Panhandle residents are especially isolated. It is not uncommon for residents to have to drive for several hours to obtain health care or even to visit a neighbor. None of the counties fall within the Census Bureau's Metropolitan Statistical Area designation. Indeed, 8 of the 11 counties are considered **frontier counties** with fewer than 7 persons per square mile. The Panhandle region of Nebraska is bordered by equally-isolated areas of Wyoming (west), Colorado (south), and South Dakota (north). Seven of the counties are full **Federally Designated Primary Medical Care Health Professional Shortage Areas**, one is a partial area, and one is special population shortage area (Fraser, Hesford, & Rauner, 2003). Three entire counties are **Federally Designated Medically Underserved Areas**; one is a **Medically Underserved Population** (Fraser et al., 2003). Every county is a **Federally Designated Mental Health Professional Shortage Areas** with only six psychiatrists, and they all practice in the same county.

Participants: Patients are Likely to be Poor, Older and Un/underinsured

Panhandle residents are **poorer** than those living in other parts of Nebraska and the nation. Forty-three (43) percent of area individuals live at or below 200% of the federal poverty level, with 13.6% of Panhandle residents having incomes below the federally defined poverty level. One of the 11 counties has one of the nation's ten lowest per capita personal income levels. The Panhandle's residents are also less likely to have access to

insurance. It is estimated that over 30% of the population is un/underinsured (NHHS-Western Service Area Profile -1999; Tripp, Umbach and Associates, 2000). Out of all Nebraska health department districts, the Panhandle ranked next to last for the number of adults aged 18-64 years with no health insurance. Similar to many other rural areas, the age distribution is also undergoing dramatic reshaping: Over 21% of the Panhandle's residents are over 60. Nearly 40% of these older adults are over 75 years of age.

Participants: Collaborative Healthcare Partners

Collaboration between organizations is fundamental (Kukafka, Johnson, Linfante et al, 2003; Turisco & Metzger, 2002). The implementation project was based upon the unflinching vision for health information exchange established by the partner CEOs. Provider participation is essential to the success of this work; however, there are significant time and travel limitations for many providers. Distances are great in the Panhandle. To travel roundtrip by car from Chadron to Scottsbluff takes 5 hours in good weather. In addition, in five of the eight communities served by CAHs, only one or two physicians are employed by the hospital and there are no private practices. Travel time for regional meetings is significant in rural areas since there are so very few physicians.

Operating within this remote, rural region are the **four established collaborative partnerships** that worked to establish the Western Nebraska Health Information Exchange, LLC (WNHIE) and implement the regional health information exchange. Each of the partnerships has experience planning and implementing projects, **independently** and **jointly**:

- Rural Nebraska Healthcare Network (RNHN)
    - Box Butte General Hospital, Alliance; Chadron Community Hospital, Chadron; Garden County Health Services, Oshkosh; Gordon Memorial Hospital, Gordon; Kimball Health Services, Kimball; Memorial Health Center, Sidney; Morrill County Community Hospital, Bridgeport; Panhandle Community Services, Gering; Panhandle Mental Health Center, Scottsbluff; Panhandle Public Health District, Hemingford; Perkins County Health Services, Grant; Regional West Medical Center, Scottsbluff.
- Panhandle Public Health District
- Panhandle Community Services Health Center (the Federally Qualified Health Center serving the region)
- Region I Behavioral Health Authority

Incidence and Prevalence

Since this is an evaluation of an implementation project, incidence and prevalence is not applicable to this report.

4. METHODS

Study Design: Program Evaluation

A multidimensional program evaluation was selected as the method to assess the program. The process evaluation was conducted to assess whether the program was being delivered as intended in the original grant. An outcome evaluation was conducted to determine the program results.

The Process Evaluation. Detailed logic models with specific goals and objectives were used to design and manage the project and also served as a basis for the process evaluation. The Logic Models were helpful in identifying and tracking linkages throughout the project and were the primary units used to measure the process evaluation.

The Outcome Evaluation. The evaluation team also assessed the outcomes of the project and made suggestions for the future. Wholey (2004) suggests this is crucial not only for the progress of any particular program, but also for future programs. The evaluation components were identified early in the project, reviewed and revised as needed by the WNHIE Leadership Team and WNHIE Managers during the course of the grant, and reported to AHRQ as impact statements in the AHRQ Quarterly Reports. The impact statements are listed below.

Impact Statement 1: Acceptance of Technology by Organizations
Impact Statement 2: RWMC Portal and Provider Training
Impact Statement 3: Provider Acceptance and Use of Technology Survey
Impact Statement 4: Provider Satisfaction Surveys I & II
Impact Statement 5: RWMC Portal Use by Providers
Impact Statement 6: Quality Indicators
Impact Statement 7: Efficiencies with Technology
Impact Statement 8: Patient Satisfaction Surveys

Data Sources, Collection, and Measures for the Evaluation

The Process Evaluation. The University of Nebraska Public Policy Center (PPC) Evaluation Team gathered information for the evaluation primarily through the assistance of the WNHIE partnering hospitals, WNHIE Managers, and the project manager. An ongoing analysis of all aspects of the project was incorporated into weekly conference calls by the WNHIE Leadership Team, Consultants Team, and other organizational teams, with input from the PPC Evaluation Team. The process analysis for teams consisted of reviewing the logic models, project timelines, implementation plan, documents, memos, budgets and interim reports. The items were reviewed in order to assess the project's successes and challenges, and to make appropriate revisions to the plans as they were needed. This ongoing analysis proved useful as the status reports were prepared for the WNHIE Managers, partners and other stakeholders.

The Outcome Evaluation The PPC Evaluation Team obtained information regarding each of the eight impact statements primarily from the WNHIE partnering hospitals, WNHIE Managers and the project manager. Specific measures and limitations for each impact statement are listed with the components in the results section of this report.

Interventions

Since this is an evaluation of an implementation project, an interventions section is not applicable to this report.

5. RESULTS

Principle Findings

WNHIE made significant strides in working toward implementing a regional health information exchange for Western Nebraska. The **goals and objectives** of the grant project were largely achieved:

- An operational entity was established (Goal 1). The RNHN formed the WNHIE as the operational entity and appointed the WNHIE Managers, who are responsible for the implementation and operations of all activities.
- Standardized training and user capacity development programs were delivered throughout the project (Goal 2). Training was delivered to hundreds of participants through region-wide trainings delivered in-person and over Nebraska's telehealth network throughout the Panhandle.
- Progress was made toward implementing EHRs (Goal 3). WNHIE has identified a preferred vendor and, at the conclusion of the grant, was negotiating contract terms and identifying funding for the implementation costs.

Beyond the objectives of the grant, the evaluation identified several other findings, including:

- Achieving a fully operational health information organization implementation is, as noted by the eHealth Initiative (2009), a time-consuming and costly process.
- Expanded access to the RWMC Portal was one of the early achievements of the WNHIE collaborative and providers were extremely positive about having access to the Portal when they received an orientation about how to use it. High use RWMC Portal respondents were positive about their use of the Portal and felt it had benefitted their practices.
- Limited or outdated technology in the CAH appeared to be the primary reason providers were not using the Portal. When providers were faced with one outdated computer at their facility, and often that single computer was not easily accessible where they provided patient care, they often did not bother using the Portal and instead used more traditional methods of sharing patient information (e.g., FAX, phone, courier, or mail).
- Not specific to the RWMC Portal, providers from CAH did not feel they were able to access patient information such as discharge instructions, test results, specialist's visits, and medication records from other health care facilities.

Outcomes – Process and Outcome Evaluation Results

Part I. PROCESS EVALUATION RESULTS

The process evaluation examined the project's adherence to the logic models that centered on the three goals described below.

Goal 1: HEALTH INFORMATION EXCHANGE: REGIONAL HEALTH INFORMATION ORGANIZATION

Goal 1 Statement**:** Form an operational entity and incorporate a regional health information organization (RHIO) to provide the infrastructure necessary to support regional health information exchange and common developments in the EHRs.

Goal 1 Objectives:
1.1 Hire a Project Manager to oversee development of Regional Health Records project.
1.2 Retain Legal Consultants for completion of RHIO formation, legal and regulatory aspects of RHR.
1.3 Finalize governance structure for a Regional RHIO.
1.4 Develop by-laws for the regional sharing of health information.
1.5 Develop regional security policies and standards.
1.6 Develop regional financing plans for EHR development.
1.7 Develop user agreements, which identify the duties and right of members, HIPAA compliance, proper use, ownership, cost and liability sharing and technology standards.
1.8 Develop budgets and business plans for Regional Health Records.
1.9 Complete corporation formation.

Goal 1: Process Evaluation Results

All objectives (1.1 through 1.9) for Goal 1 were met successfully. To meet objectives 1.1-1.9 the following items were completed. Appropriate personnel were retained including Kim Woods, RN, Project Manager; Steve Lazarus, PhD, HIT Expert Consultant, President and Co-Founder of Boundary Information Group, and Paul Smith, JD, HIT Expert Legal Counsel, Partner with Davis, Wright, Tremaine. The formation of WNHIE created economies in developing training and capacity-building opportunities, legal agreements, policies and procedures, and security and privacy practices. Rather than each participating organization having to develop and execute agreements with all other organizations, the new WNHIE infrastructure streamlined and standardized these activities. The WNHIE governance structure was created and a series of business and financing plans developed to create sustainable models for implementation and operations. When the exchange was formed, the former Steering Committee disbanded and became the WNHIE Managers as WNHIE became the lead organization for implementation activities.

GOAL 2: HEALTH INFORMATION EXCHANGE:
EDUCATION, TRAINING AND USER CAPACITY DEVELOPMENT

Goal 2 Statement: Provide standardized education, training and user capacity development through the provision of regional courses and criteria.

Goal 2 Objectives:
2.1 Provide change management workshops for all members of Regional and Local teams.
2.2 Develop and provide ongoing health information and technology educational sessions for current and future participants.
2.3 Develop and provide user competency training in preparation for EHR.
2.4 Develop regional training modules and provide local training for each implementation stage of EHR.

Goal 2: Process Evaluation Results

The objectives (2.1-2.4) for Goal 2 were met successfully. Standardized educational training sessions (face-to-face and via the Nebraska Telehealth Network) for partnering organizations on health information technology and issues related to the implementation of a health information exchange were provided at no or minimal charge in order to increase user capacity. Strategies included coursework in CPEHR and CPHIT, Process Mapping, Project Management and Vendor. A variety of health information technology related courses were offered for continuing education credit and for college credit through the Western Nebraska Community College and the RNHN Training Academy. In addition, on site IT technical assistance, migration path development and work breakdown structure analysis also were offered at no cost to participants. Members from each of the targeted organizations participated in the training sessions and the participant evaluations were overwhelmingly favorable.

GOAL 3: ELECTRONIC HEALTH RECORDS

Goal 3 Statement: Develop and implement EHRs in CAH's and RHC's through a common process and shared resources in order to enhance local and regional capacity development toward health information exchange.

Goal 3 Objectives:

3.1 Facilitate local process for affirmation of priorities for Core Functionality for Electronic Medical Records addressing a variety of areas.
3.2 Ratify or revise regional priorities for electronic health record implementation as defined from local clinics and hospitals.
3.3 Provide Technical Assistance for each CAH and Rural Health Clinic to complete a Migration Path which includes a variety of areas.
3.4 Revise and enhance Regional Migration Path for EHRs.
3.5 Complete Work Breakdown structure for EHRs priority areas.
3.6 Complete vendor selection for new EHRs.

Goal 3: Process Evaluation Results

All the processes for objectives 3.1 through 3.5 were met, and only one objective (3.6) was not completed. The following items for objective 3.1-3.5 were completed successfully: the facilitation of local process for affirmation of core functionality for EHR addressing health information and data bases, results management, order entry, e-prescribing and a variety of other areas; regional priorities for local facilities were revised or ratified; technical assistance was provided to each CAH and clinic to help them complete a Migration Path; the Regional Migration Path was revised for EHR; and the work breakdown structure for EHR priority areas was completed.

Significant progress was and continues to be made, but objective 3.6 has not been met completely**.** The WNHIE Managers and their partnering organizations have laid a solid foundation for future implementation of the exchange. Using eHealth Initiative's (2005) framework for assessing and tracking the development of a health information exchange which uses a staging scale of 1 to 7, **the development of this exchange is well into Stage 3 and has completed some aspects of Stage 4** (Figure 1). The exchanges are

considered operational at stages 5-7. WNHIE has been successful in defining the vision, goals and objectives; setting up legal and governance structures; defining needs and requirements of the partnering organizations; and defining the goals and objectives of the business plan. Most Health Information Exchanges (eHealth Initiative, 2009), including WNHIE, are in the intermediate stages of development where the focus is on implementation. Although WNHIE has had success securing partial funding, financing this exchange continues to be one of the greatest challenges as they work toward becoming fully operational in stages 5, 6, and ultimately Stage 7 when they will have a fully operational HIE with a sustainable business model.

Figure 1 – 2009 HIE Stages of Development

HIE Stage	Definition of stage	2009 HIE Development Stage reported to eHI
Stage 1	Recognition of the need for health information exchange among multiple stakeholders in your state, region or community. (Public declaration by a coalition or political leader)	9
Stage 2	Getting organized; defining shared vision, goals, and objectives; identifying funding sources, setting up legal and governance structures. (Multiple, inclusive meetings to address needs and frameworks)	17
Stage 3	Transferring vision, goals and objectives to tactics and business plan; defining your needs and requirements; securing funding. (Funded organizational efforts under sponsorship)	26
Stage 4	Well under way with implementation –technical, financial and legal. (Pilot project or implementation with multiyear budget identified and tagged for a specific need)	36
Stage 5	Fully operational health information organization; transmitting data that is being used by healthcare stakeholders.	27
Stage 6	Fully operational health information organization; transmitting data that is being used by healthcare stakeholders and have a sustainable business model.	13
Stage 7	Demonstration of expansion of organization to encompass a broader coalition of stakeholders than present in the initial operational model.	17

Note: The majority of respondents reportedly are in the intermediate stages of development, with a focus on implementation. Of the respondents, 57 are operational, 79 are in the implementation stages, and nine are in early planning stages (see *Figure 4* below). Five respondents did not report a stage of development.

Source: Migrating Toward Meaningful Use: The State of Health Information Exchange eHealth Initiative's Sixth Annual Survey 2009

The vendor selection process continues to be a challenge for WHNIE. WNHIE employed a detailed vendor selection process that took much longer than anticipated, but all WNHIE partners and stakeholders were directly involved. By summer 2008, WNHIE Managers had narrowed the selection to two qualified vendors as finalists. The preferred vendor was selected and negotiations with that vendor started in fall 2008 and continued through July 2009 when the vendor admitted that it could no longer provide the functionality described in their proposal. As a result, WNHIE restarted negotiations with the other finalist and hopes to execute a contract with that vendor by the end of 2009. The eHealth Initiative report (2009) emphasized that **becoming fully operational is a slow process** and the research team can only agree with this. WNHIE has worked extensively to prepare a solid foundation for a smooth implementation process once the vendor is selected. **Implementation costs, particularly for a rural area, however, remain an issue**. WNHIE is exploring nonoperational solutions for financial sustainability for the exchange by actively seeking contributions, grants and revenues from a variety of sources.

Part II: OUTCOME EVALUATION RESULTS

The **Outcome Evaluation** examined the specific evaluation components or Impact Statements listed below.

Impact Statement 1: Acceptance of Technology by Organizations
Impact Statement 2: RWMC Portal and Provider Training
Impact Statement 3: Provider Acceptance and Use of Technology Survey
Impact Statement 4: Provider Satisfaction Surveys I & II
Impact Statement 5: RWMC Portal Use by Providers
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Impact Statement 1: Acceptance of Technology by Organizations

WNHIE obtained permission to use the Revised California Community Clinics EHR Assessment and Readiness Tool, which was developed to help clinics assess organizational readiness for EHRs. This survey was shared with the WNHIE partnering organizations in 2007 and there is a plan to distribute this survey again to participating organizations once new technologies are in place.

Impact Statement 2: RWMC Portal and Provider Training

Expanded access to the RWMC Portal was one of the early achievements of the WNHIE. Beginning in mid-2006 and into early 2007, the RWMC Portal allowed health care providers from Western Nebraska who provided care to the Scottsbluff – Gering community to access their patient's medical records from RWMC in real time. About a decade earlier, RWMC opened its Portal to one rural facility, Location D. As a part of the grant project, RWMC allowed providers from other hospitals and regional health clinics access to the Portal. As the Portal was made available to providers over a period of months in late 2006 and early 2007, eligible providers (Medical Doctor (MD), PAC

(Certified Physician Assistant), and APRN (Advanced Practice Registered Nurse)) were trained on Portal use. RWMC provided 10 separate training sessions to providers at seven different facilities throughout the Panhandle in order to meet the scheduling needs of providers.

Impact Statement 3: Acceptance and Use of Technology Survey (AUTS)
The **AUTS** is one-page, 29-item survey with questions designed to assess the providers' thoughts on a new technology system, which for this project was the RWMC Portal (AUTS, Appendix A.) Upon completion of each RWMC Portal training session, the providers were asked to complete the **AUTS** (Venkatesh et al, 2003) and were given a $25 Visa card as a thank you when they left the session.

Results of the AUTS
The results of the AUTS are based on 36 providers from CAH or rural clinics who took the survey after completing training on the RWMC Portal in late 2006 or early 2007. Overall, **the response was very positive to the RWMC Portal** after providers received training:

- 89% indicated they agreed or strongly agreed that the RWMC Portal would be **useful to them in their job**.
- 75% agreed or strongly agreed that the Portal would enable them to **accomplish tasks more quickly**
- 58% agreed or strongly agreed that the Portal would **increase their productivity**.
- 89% agreed or strongly agreed that the RWMC Portal would be **easy to use.**
- 92% agreed or strongly agreed that they **had the resources necessary** to use the Portal.
- 90% agreed or strongly agreed that they had the **knowledge necessary to use the Portal.**
- 90% agreed or strongly agreed that **their organization supported the use of the Portal.**
- **Almost all (97.2%) agreed or strongly agreed that they planned to use the Portal within the next six months**.

Impact Statement 4: Provider Acceptance, Use and Satisfaction with Technology
To gain a better understanding of the providers' views and perceptions about their receptivity to health information technology, researchers administered a series of surveys and interviews (Provider Survey, Appendix B, and Interview Questions, Appendix C.)

Provider Surveys Phase I and II, and Provider Interviews
Provider surveys and interviews with providers were used to measure the level of satisfaction mid-level providers (MDs, PACs, APRN) have regarding their access to health information and the implementation of the health information exchange in Western Nebraska. The PPC designed the provider survey, which was approved by the WNHIE partnering organizations and RNHN. The surveys were administered by the PPC in two phases. Phase I was sent to providers in early 2007 and Phase II was sent to providers in early 2008. In late spring 2008, providers were interviewed by phone or in person to find out more about how they used the Portal and the benefits and challenges of Portal use.

Comparisons were made between the responses from providers at CAH, who were just getting access to the Portal and those at RWMC, who had a history of using the Portal and an EMR system. Due to the nature of this population, the small number of participants (Table 1) posed a problem for the analysis in terms of significance and generalizability; however, the results provide a baseline of information between the two phases of the surveys which were a year apart. The results suggest that **providers from CAHs did not feel they were able to access patient information such as discharge instructions, test results, specialist's visits and medication records from other health care facilities**. Generally, providers indicated that they were easily able to obtain patient information within their own facilities. Table 1 illustrates the breakdown of providers who participated in the surveys by roles and by their practice location, CAH or RWMC.

Table 1.
Provider survey respondents by role and location.

Provider Type	**Phase 1**				**Phase 2**			
	Critical Access		**RWMC**		**Critical Access**		**RWMC**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Physician	28	62.2	4	57.1	16	50.0	26	72.2
Physician Assistant	11	24.4	2	28.6	9	28.1	6	16.7
Nurse Practitioner	6	13.3	0	0	6	18.8	3	8.3
Valid Total	45	100.0	6	85.7	31	96.9	35	97.2
Unknown	0	0	1	14.3	1	3.1	1	2.8
Total	45	100.0	7	100.0	32	100.0	36	100.0

Table 2 illustrates that providers **at the CAHs thought the Portal was more difficult to use than those at RWMC who had years of experience using it.** Because it was not possible to match Phase I and Phase II respondents directly, it is important to interpret within-group changes with caution.

Table 2.
Provider survey question: Ease of use
Thinking about your experience at the hospital/clinic where you practice the most hours each week, how easy is it for you to use the Regional West Medical Center Portal?

	Phase 1				**Phase 2**			
	Critical Access		**RWMC**		**Critical Access**		**RWMC**	
	N	**Valid %**	**N**	**Valid %**	**N**	**Valid %**	**N**	**Valid %**
Very Easy	4	14.3	1	16.7	4	21.1	12	35.3
Easy	9	32.1	3	50.0	5	26.3	18	52.9

Neutral	10	35.7	1	16.7	4	21.1	1	2.9
Difficult	3	10.7	1	16.7	3	15.8	1	2.9
Very Difficult	2	7.1	0	0	3	15.8	2	5.9
Valid Total	28	100.0	6	100.0	19	100.0	34	100.0
Not Applicable /Unknown	17		1		13		2	
Total	45		7		32		36	

Table 3 shows how providers viewed access to patient information. Response patterns in Phase I and II were similar. That is, across nine items, the majority or near majority of all respondents at both **CAHs and RWMC disagreed that they had easy or quick access to patient information from other locations**.

Table 3.
Providers views on access to patient information
*Thinking about your experience at this hospital, please rate your level of agreement with the following statements: (*strongly agree, agree, neutral, disagree, and strongly disagree *1=SD, 2=D, 3=N, 4=A, 5=SA)*

Questions	**Phase I**				**Phase II**			
	Critical Access		**RWMC**		**Critical Access**		**RWMC**	
	Mean (SD)	**N**	**Mean (SD)**	**N**	**Mean (SD)**	**N**	**Mean (SD)**	**N**
I am able to access my patients' discharge instructions when they have an in-patient stay at another Western Nebraska referral hospital.	3.52 (.969)	42	3.83 (.753)	6	3.83 (1.020)	30	3.90 (1.076)	31
I have immediate access to test results when my patients are treated at other Western Nebraska hospitals or clinics.	3.70 (1.047)	44	3.71 (.756)	7	3.81 (.980)	31	3.85 (.972)	33
When specialists from another hospital or clinic have seen my patients, I am able to get immediate information about their visit.	3.82 (.843)	44	3.67 (1.033)	6	3.77 (1.006)	30	3.83 (.985)	35
When I provide primary care for patients with acute conditions, I can easily access treatment plans, lab tests, and other information about their most recent visit to other providers.	3.64 (1.055)	42	3.67 (.516)	6	3.37 (1.129)	30	3.32 (1.147)	34
I often meet with patients without having lab and test results I need from other providers.	2.18 (.995)	44	2.33 (.5160	6	2.53 (1.252)	30	2.17 (.971)	36
When my Western Nebraska patients are unable to communicate their medical histories, I am able to easily find their histories from their most recent visits to another clinic or hospital.	3.86 (.878)	44	3.43 (.787)	7	3.93 (.868)	30	3.86 (.944)	35

Table 3. **Providers views on access to patient information** *Thinking about your experience at this hospital, please rate your level of agreement with the following statements: (*strongly agree, agree, neutral, disagree, and strongly disagree *1=SD, 2=D, 3=N, 4=A, 5=SA)*								
When seeing my patients at this hospital, I am able to get the information needed to give optimal care to my patients.	2.60 (.903)	43	2.33 (.8160	6	2.73 (.944)	30	2.50 (1.183)	36
When seeing my patients at this hospital, I wish I had access to the information other providers have about my patients.	1.93 (.856)	43	2.00 (.577)	7	2.13 (.860)	30	1.69 (.710)	36

Results of the Provider Interviews

After contacting over 30 providers, the researchers conducted six 30-minute in-person or phone interviews in May and June 2008; two respondents' were MDs, three were PACs, and one was an APRN. The six respondents were from three different partnering CAHs. Interview participants were primarily selected based on their high Portal use since the interviews were designed to better understand use patterns of successful Portal users. In fact, the researchers observed that providers who had higher Portal use were more willing to be interviewed than those who had not used the Portal.

Results of the Provider Interviews

Overall, the high use respondents were positive about use of the Portal and felt it had benefitted their practices. The interviews generated very specific examples of benefits and barriers of the Portal from the perspective of providers who used the Portal.

- Use of the Portal was determined primarily by the number of their patients who had been served by RWMC any point in time. According to respondents, **when more of their patients were treated at RWMC, their Portal usage increased**. Note that while patients who need specialized care are generally referred to RWMC, some patients from the Panhandle use other medical centers in South Dakota, Colorado or Nebraska.
- High users of the RWMC Portal. The interviews revealed that one of the highest Portal users from a CAH was a midlevel provider who had extensive experience with EMRs and portals in another state. That person was asked to access the Portal for other midlevel providers at the facility. Many of the "high users" were surprised to be categorized as such and said they would use it more if the technology at their facilities were better.
- Providers identified a number of benefits of their use of the Portal:
    - Immediacy. The primary benefit mentioned by respondents was the timeliness of getting access to patient information. Most said accessing information through the Portal was substantially faster than previous methods (e.g., FAX, phone, courier or mail).
    - More complete information. CAH Portal users said they liked accessing more and different types of information (consult notes, vital signs, treating

provider) than is normally available when patient information is delivered from RWMC by FAX, phone, courier, or mail.
    - Training. Respondents found the Portal training sessions useful and offered no suggestions for improvement.
- Providers identified a number of barriers to their use of the Portal:
    - Limited technology at CAH. Users reported slow or outdated computers, or in some cases, there was only one computer at the facility. This made accessing the Portal difficult to impossible.
    - Limited Access at Clinics. Some reported they couldn't access computers at clinics and had to drive miles back to a hospital where they could face slow or outdated equipment.
    - End-User Issues. Issues related to end-user technology rather than a limitation of the Portal itself. Many talked about old and out of date equipment, but this is all they had available in rural clinics and hospitals. Another end user barrier mentioned by infrequent users of the Portal, was forgetting their password to access the Portal. The solution by one individual was to tape the password to his computer tray. However, this has obvious security issues. A third end-user barrier was lack of familiarity with computer technology.
    - Providers with poor computer skills. Individuals who did not have strong computer skills often said they found accessing the Portal or any technology difficult. One way some providers got around this issue was to have others, with better computer skills and more experience with the Portal, access the information for them.

Overall, responses to the Portal were very positive in terms of obtaining immediate and complete information from the RWMC Portal, but respondents speculated that some barriers were so overwhelming they kept providers from using the Portal at all. The significant barriers included limited or inadequate technology or access at the CAH, and end-user issues where, for a variety of reasons, the provider was hesitant or uncomfortable using this technology.

Impact Statement 5: RWMC Portal Use by Providers

Data collection and analysis on RWMC Portal use

Data on Portal use was collected by RWMC and analyzed by The PPC. The Portal was made available to mid-level providers after 36 providers were trained at 7 facilities in the panhandle in late 2006 and early 2007. Data on Portal use was collected for the 2008 calendar year to determine use nearly a year after training took place.

Participants

Fourteen (14) providers in the NE Panhandle accessed the Portal to retrieve records of their patients who had been seen at RWMC in 2008 (Table 4). Of the 14 providers, 3 (21.4%) were from Location A, 1 (7.1%) was from Location B, 1 (7.1%) was from Location C, and 9 (64.3%) were from Location D. The breakdown of their professional roles is as follows: 3 (21.4%) were APRNs, 1(7.1%) was an Osteopathic Physician (DO),

1 (7.1%) was an MD, 4 (28.6%) were PACs, and 5 (35.7%) were RNs. Providers were also classified as either midlevel (e.g., MD, DO, APRN, PA, PAC) or nurses without an advanced practice degree. Given this classification, of the 14 providers, 5 (35.7%) were nurses and 9 (64.3%) were midlevel providers (Table 4.) All providers at Locations A, B and C were midlevel, while at Location D, 5 of the providers were nurses without advance practice degrees, and 4 were midlevel providers.

Table 4 illustrates the breakdown by role of providers who used the Portal to retrieve records of patients who had been seen at RWMC in 2008.

Table 4. **Use of the RWMC Portal in 2008 by provider role**		
Provider Type		
	N	**%**
Midlevel providers MD, PAC, APRN	9	64%
Registered nurses	5	36%
Total	14	

Measures of Portal Use

Two measures of yearly Portal usage were considered: number of patient records accessed, and number of days the Portal was used. Both were highly correlated.

Results

Portal usage data for 2008 is presented below. Although the usage information presented is at the year level, keep in mind that only 1 provider used the Portal over all 12 months of 2008. Seven (7) providers used it for 3 months or less, and 7 providers used it for 6 months or more.

Table 5 illustrates the number of patient records viewed by providers from CAHs in 2008. While 2 patient records were viewed at 2 of the facilities, providers each viewed between 2 and 299 patient records in 2008. Eleven (11) of the 14 providers viewed less than 55 records per year while the 3 most active users viewed at least 139 records.

Table 5. **Number of patient records viewed by providers in 2008 by CAH location**	
Critical Access Hospital in Western Nebraska	Number of Patient Records Viewed per year by Location
Location A	352 (40%)
Location B	12 (1%)
Location C	139 (16%)
Location D	388 (44%)
Total	891

Number of Days Accessed per Year by Provider

Providers used the Portal between 2 and 122 days in 2008. Eleven (11) of the 14 providers used the Portal less than 30 days per year while the 3 most active users used the Portal at least 69 days.

High and Low Usage by Location of CAH
By definition, because a median split was used, half (7) of the providers are classified as high users while half (7) are classified as low users (Table 6). All 3 providers at Location A and the provider at Location C are considered to be high users. Conversely, the only provider at Location B is classified as a low user. Of the providers at Location D, 85.7% (6) are low users while 42.9% (3) of the providers are high users.

Table 6 illustrates the CAH location of the high and low users of the Portal.

Table 6.
High and low portal use by CAH location

CAH in Western NE	**High and low use**
Location A	100 % (n=3) high user
Location B	100% (n=1) low user
Location C	100 % (n=1) high user
Location D	86% (n=6) low users; 43% (n=3) high users
total	891

High and Low Usage by Provider Type
It is also useful to look at high and low users by provider type. Recall that five of the 14 providers are RNs while 9 are midlevel providers (e.g., MD, DO, APRN, PA, PAC). Three (42.9%) of the 5 RNs are low users while 2 (28.6%) of the RNs are high users. Four (57.1%) of the 9 midlevel providers are low users while 5 (71.4%) are high users.

Table 7 shows the number of high and low users of the Portal by provider role.

Table 7.
High and low portal use by provider type

Provider Type	High User	Low User
Midlevel providers MD, PAC, APRN	71% (n=5)	57% (n=4)
Registered nurses	29% (n=2)	44% (n=3)

Impact Statement 6: Quality Indicators
A considerable amount of effort was spent trying to find effective quality indicators that would measure the impact of health information technology on reducing the number of unnecessary medical tests. After conferring with a number of medical experts locally and nationally, it was not possible to identify a measure (e.g., A1C test for diabetics, or inoculations) that could reliably measure significance given the very small number of cases available.

Impact Statement 7: Efficiencies with Technology
Days in Accounts Receivable (A/R) figures for each facility were collected to provide baseline and trending information for the eventual impact. After implementation, of the EHR on number of days patient bills stay in accounts receivable. Panhandle hospitals also provided a number of other financial metrics for baseline data.

Impact Statement 8: Patient Satisfaction Survey

A patient satisfaction survey (Patient Satisfaction Survey, Appendix D) based on the HCAHPS, was designed for use by the WNHIE partnering CAHs. This tool (which was also translated into Spanish) helped standardize the hospitals' patient surveys that had a great deal of variability prior to the implementation of the new survey process. Each of the WNHIE hospitals who participated in the surveys received two individualized and confidential full length reports where each survey question was analyzed. These reports let administrators see how, over the course of a full year, their hospital compared to the Panhandle on each of the survey questions.

- The Western Nebraska Health Information Exchange, LLC: Survey Summary Report (April – July 2007)
- The Western Nebraska Health Information Exchange, LLC: Inpatient Summary Report (April 1, 2007 – March 31, 2008)

In addition, because the researchers were in contact with each hospital at least weekly, the survey process helped build and foster the collaborative relationships between the small rural hospitals and the WNHIE organization. As planned, the survey process was turned back over to the individual hospitals in the spring of 2009

Discussion, Conclusions and Significance

The ongoing fidelity analysis, through scheduled meetings with agendas by the Project Manager, WNHIE Leadership Team, WNHIE Consultants, and Evaluation Team helped keep the project grounded, transparent, and allowed all project stakeholders to have a greater understanding of and participation in the project on a variety of levels. By using the implementation plan, the Leadership Team was able to provide timely reports for the WNHIE Managers and could include specific recommendations and options with new strategies. Transparency regarding WNHIE activities and interactions was especially helpful during the vendor selection process during which stakeholders throughout Western Nebraska participated in several large group process sessions to ensure that all involved parties could contribute to the specific elements of the proposed RFP (user agreements, vendor contract, technology needs). WNHIE continues to actively work on selecting an appropriate vendor and find nonoperational means to sustain the exchange.

The outcome evaluation Impact Statements provided the WNHIE organizations with a better understanding of how providers in small CAHs and rural clinics view technology. The Acceptance and Use of Technology Survey (AUTS) results demonstrated that **all 36 providers from CAH had a very high level of acceptance towards the RWMC Portal after Portal training**. These providers felt comfortable with the Portal, could see benefits to using the Portal and had high intentions to use the Portal within six (6) months, yet only 14 of the 36 trained on the Portal actually used it a year after training. The Portal use data describes the use patterns for the 14 providers who used the Portal in 2008, but combined with other data such as the provider surveys and interviews helps contribute to the picture on technology use and acceptance in Western Nebraska.

Phases I and II of the Provider Surveys examined a number of questions about the ease of use, and level of satisfaction with the Portal. Among providers from RWMC, where the Portal has been in use with EMRs for over a decade, providers were more likely to report

that **the Portal is easy or very easy to use** than were providers from CAH who had recently obtained access of the Portal. Providers at RWMC were more likely to report they were **satisfied with patient health information available at their facility** while providers at CAH were evenly split on being satisfied, neutral or dissatisfied on this parameter. Across nine items, the majority or near majority of all respondents at both **CAH and RWMC disagreed that they had easy or quick access to patient information from other locations**. This makes sense because the RWMC Portal is a one way communicator: that is, providers at RWMC are not able to view patient records at the CAH. RWMC providers were happy with their ability to view patient records at RWMC through the Portal. When interviewed, providers at the CAHs described the limitations they faced in using the Portal, such as outdated or unavailable computers.

When six providers were interviewed a year after they were able to access the RWMC Portal from their remote CAH, several lessons were learned. These individuals discussed the benefits of the Portal (immediate and more complete information) and the challenges of the Portal (limitations in technology where care is delivered, provider's hesitation to use computers, and other implementation issues) and their responses offered insights as to why Portal use was not as high as expected after providers throughout the region had demonstrated a very high degree of acceptance by the AUTS. Limited or outdated technology in the CAH appeared to be the primary reason providers were not using the Portal. When the provider was faced with one outdated computer at their facility, and often that single computer was not easily accessible where they provided patient care, they often did not bother using the Portal and instead used more traditional methods of sharing patient information (e.g., FAX, phone, courier, or mail). Overall, however, **providers had positive responses to the potential of the Portal** in terms of being able to provide more complete information immediately for the benefit of their patients. This likely bodes well for the implementation of a Panhandle-wide EHR.

Implications

The initial groundwork has been laid for a Panhandle-wide exchange, but WNHIE has more work to do in terms of securing a vendor and a sustainable health information exchange. The 2009 ehealth survey on the current status of health information exchanges acknowledges that this is a long process (ehealth Initiative, 2009). WNHIE has made great strides in building a good foundation for a health information exchange in a relatively short amount of time. Again, this bodes well for the implementation of a Panhandle-wide exchange.

6. LIST OF PUBLICATIONS AND PRODUCTS

Appendix A Acceptance of User Technology Survey (AUTS)
Appendix B Provider Satisfaction Survey
Appendix C Provider Interview Questions
Appendix D Patient Satisfaction Survey
Appendix E Literature Cited