# Planning the Implementation of Health Information Technology (HIT) in a Rural Setting

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# Structured Abstract

Purpose:

The goal of this planning project is to prepare for the implementation of a Healthcare Information Technologies infrastructure that will eventually weld together as a "virtual organization" all of the disparate healthcare organizations and providers in Deer Lodge, Granite and Powell Counties, Montana.

Scope:

This project was conducted by a partnership including six initial members: the Community Hospital of Anaconda, Inc. (CHA), the Deer Lodge County Public Health Department, the Mt. Powell Medical Society, Anaconda Internal Medicine, PC, David Kidder, DO and the Health Services Center, Anaconda Jobs Corps of the USDA Forrest Service.

Community Hospital of Anaconda is located in the town of Anaconda, Deer Lodge County (DLC), Montana. The most recent information posted by the Economic Research Service of the USDA assigns DLC a RUCC of 7 and notes a population of 9,417 people with a median income of < ½ the US average, an unemployment rate of 1-1.5 times the US average and with 14.6% of its population below the poverty level. DLC has been designated a Health Professionals Shortage Area by the Department of Health and Human Services.

Methods:

The planning effort included nine areas of activity:

1. Hospital management and financial software systems
2. Hospital-based clinical operations
3. Ambulatory care EHR
4. Continuity of Care Record (CCR)
5. Technology
6. Partnership extension and model exportability
7. HIPPA and Regulatory Compliance
8. Capitalization and economic sustainability of the HIT effort
9. Research

Results:

1. Hospital management and financial software systems – pre-project systems will be retained and expanded
2. Hospital-based clinical operations – single source solution chosen over best of breed / systems integration approach

3. Ambulatory care EHR – provider collaborative initiated to obtain benefits of more robust products
4. Continuity of Care Record (CCR) – development within this project suspended as commercial solutions have become available
5. Technology – rural high-speed VPN internet connectivity investigated and established by a variety of mechanisms including satellite connection with satisfactory speed using SSL security
6. Partnership extension and model exportability – the original partnership membership has been extended with emphasis on shared systems, particularly ambulatory care EHR, with project results presented at state-wide conferences
7. HIPPA and Regulatory Compliance – not independently addressed by project, increasingly addressed by vendor standards and certifications
8. Capitalization and economic sustainability of the HIT effort - pending
9. Research - pending

Key Words:

Health Information Technology, HIT, Health Information Exchange, HIE, Rural

# Purpose

The purpose of the project's HIT planning is to:

1. Improve inpatient and outpatient hospital, nursing home and home health patient safety through better information transfer, including CPOE with CDSS and through medical records data sharing via direct network access or through an easily transportable CCR, thereby decreasing both medication errors and medical errors;
2. Improve inpatient and outpatient hospital, nursing home and home health quality of care through a basic EHR with "clinical view" and decision support capabilities that integrates clinical data from all sources, thereby improving clinical outcomes;
3. Improve provider office quality of care through use of an advanced capability template-driven EHR linked to medical knowledge bases that actively solicits and structures provider input according to standards-of-care algorithms assisted by clinical decision support tools, thereby improving clinical outcomes;
4. Improve the quality of care through enhanced Internet-based information exchange between organization partners and outside parties such as tertiary care referral hospitals, telemedicine networks and national public health alert and data-gathering networks, thereby improving clinical outcomes and public safety;
5. Improve patient care through an electronic CCR that will include a "transportable" core set of patient data easily accessed and updated by all providers within the community;
6. Improve the financial stability of organization partners and ensure HIT sustainability by adopting shared computerized management and financial systems capable of reducing the operating cost of providing care;
7. Improve the financial stability of organization partners and ensure HIT sustainability by demonstrating HIT-related safety and outcomes improvements that reduce the cost of illness and generate enhanced rates of reimbursement from private and governmental payors.

# Scope

This Application is being submitted by a collaborative partnership including six initial members: the Community Hospital and Nursing Home of Anaconda, Inc., the Deer Lodge County Public Health Department, the Mt. Powell Medical Society, Anaconda Internal Medicine, PC, David Kidder, DO and the Health Services Center, Anaconda Jobs Corps of the USDA Forrest Service.

Community Hospital of Anaconda, Inc., a private not-for-profit 501 (c) 3 corporation, will be the Lead Partner in this project. CHA is a small rural Critical Access Hospital licensed for 15 acute care beds and 8 skilled swing beds. Its nursing home is a physically separate facility licensed for 62 beds, all designated as Medicare skilled beds. While the nursing home does not meet the criteria for a separate partnership

entity, it will behave as one functionally. CHA and all of its associated facilities have been designated as smoke free workplaces.

CHA provides Family Practice physician services including gynecological and obstetrical care and pediatric care through its Pintler Family Practice clinic. Clinic medical staff includes three full time Board Certified Family Practice physicians, one part time General Practice physician and one Certified Physician's Assistant. CHA provides 24-hour emergency services through its Emergency Department, staffed by mid-level practitioners with physician backup on weekdays and by independent physicians during nights and weekends. CHA also provides home health and hospice care through its Pintler Home Options service.

CHA is located in the town of Anaconda, Deer Lodge County (DLC), Montana. The most recent information posted by the Economic Research Service of the USDA assigns DLC a RUCC of 7 and notes a population of 9,417 people with a median income of < ½ the US average, an unemployment rate of 1-1.5 times the US average and with 14.6% of its population below the poverty level. DLC has been designated a Health Professionals Shortage Area by the Department of Health and Human Services.

Of patients served by CHA, payor sources include 44% Medicare, 12% Medicaid, 37% private insurance and 7% self-pay. CHA collected $11,203,784 in net revenue during 2003, with net operating income of $606,809. As the community's only source of safety net care, CHA provided $664,973 during 2003 as charity care for uninsured and under-insured people.

In the three county areas that this planning effort will eventually encompass, two other rural community hospitals, Granite County Hospital (Granite County, RUCC 7) and Deer Lodge Hospital (Powell County, RUCC 8), are each located approximately 30 miles from CHA and are smaller in size.

# Methods

The planning effort included nine areas of activity:

1. **Hospital management and financial software systems.** A planning sub-committee will perform a complete assessment of adequacy of function and training for CHA's current Health Management Systems, Inc. (HMS) management and financial modules. CHA non-clinical department heads, including nursing home and home health personnel, will assist in evaluating those modules that apply to their departments. The capabilities of additional systems will be reviewed and their effect on workflow and ability to reduce expense vs. new systems costs will be determined. This will also include evaluation of HMS physician practice management modules and other management modules that CHA may "host" for the benefit of independent providers or organizations that wish to share such systems. Competitive products will be reviewed and the advisability of continuing to develop the HMS system vs.

changing to a different vendor will be determined. This determination will be based both upon the functional capabilities of the products and their interoperability with other anticipated components of the evolving HIT system (interoperability considerations will be the responsibility of a technical sub-committee). The sub-committee will recommend which software solutions from which vendor and in what order they should be brought online during the project implementation phase.

2. **Hospital-based clinical operations.** These will include CPOE with CDSS and "Clinical View" integrated data access. A planning sub-committee will review the HMS clinical modules currently used at CHA and the additional modules that are available. CHA clinical department heads will assist in evaluating those modules that apply to their departments. An HMS module enabling a basic "Clinical View" EHR synthesis of electronic data files created by all other HMS clinical modules and those imported from other sources and that includes physician order entry ability will receive the most careful review. The adequacy and customizability of the physician-software interface and its CDSS ability will be assessed. HMS consultants will assist with this analysis. Competitive clinical software solutions that are not necessarily linked to HMS management and financial products will be reviewed. The sub-committee will recommend which software solutions from which vendor and in what order they should be brought online during project implementation and it will obtain all required training details and purchase and on-going support cost information for recommended software.

3. **Provider location-based EHR.** A planning sub-committee will review HL7 compliant template-driven EHR products with integrated knowledge bases. The EHR will be used by office-based providers and will be required to be able to exchange data with hospital-based systems. As with the hospital-based EHR, the physician-software interface will be a determining factor in choosing a system. The sub-committee will recommend which software solution from which vendor should be brought online during project implementation and it will obtain all required training details and purchase and on-going support cost information for the recommended software;

4. **Continuity of Care Record (CCR).** A planning sub-committee will review CCR specifications currently being collaboratively developed by the Massachusetts Medical Society, the Health Information Management and Systems Society, the American Academy of Family Physicians, the American Academy of Pediatricians and the American Society for Testing and Materials. The Partnership believes that the CCR is an essential early step in using HIT to improve patient safety and clinical outcomes and is the future of personal health records. It will be developed as an XML standard document and so will be both machine and human readable and the data content will be technology-neutral and capable of display in a variety of formats. Appropriate content will be determined through a consensus of local providers, the most widely usable electronic media to record the CCR will be ascertained and concept acceptance by all community providers for early implementation will be sought. HIPPA and other regulatory compliance will be assured. This sub-committee will also be responsible for the development of a core medical and demographic data set to be used by emergency responders sufficiently limited in

size to allow rapid completion and transmission via slow satellite Internet link from the field.

5. **Technology.** The sub-committee will be responsible for designing the network and high-speed communications needed for software sharing, data sharing and Next Generation Internet applications among the initial and future community partners. The network will be configured to enable better teleradiology and telemedicine functionality. Its design will eventually encompass most available computer communications and Internet access mechanisms including T-1, DSL, radio wireless, cellular wireless, high-speed satellite, slow-speed satellite and analog telephone to allow the widest possible number of network users wherever they work or reside. In preparation for this application, the sub-committee has designed a prototype network that is essential to enable high-speed Internet communications among the partners and that will allow the software testing needed as part of the planning process. It will also design network connections that allow for mobile or "nomadic" computing capabilities, both for emergency responders and for outreach to areas without local physicians. The sub-committee will ensure that all project software and hardware components meet current data exchange and interoperability standards, that its databases are properly integrated and that the network is highly secured in compliance with Office of Management and Budget (OMB) standards and National Institutes of Standards and Technology (NIST) implementation guidelines.

6. **Partnership extension and model exportability.** This sub-committee will encourage additional healthcare organizations and providers throughout the three county areas comprising the Mt. Powell Medical Society to join this effort, either in the planning stage or in the anticipated implementation stage. It will also remain alert to the concept that the means and technologies chosen to effect this project should include all those necessary in areas that will have more limited communications abilities, ensuring that the project model is reproducible in the widest possible variety of rural circumstances;

7. **HIPPA and regulatory compliance.** This sub-committee will ensure that project parameters are compliant with HIPPA and other regulatory standards;

8. **Capitalization and economic sustainability of the HIT effort.** This committee will address the critical issues of capital funding for HIT implementation and of HIT sustainability after the conclusion of implementation financing. We believe that if capital resources were available to the partnership as a straightforward business matter, HIT would provide a good return on investment. In preparing this application, four areas of opportunity have been identified that will be further pursued during the planning process. (1) Additional grant support. This planning effort should place the partnership in a good position to request AHRQ implementation funding, if available, and implementation support from other governmental and non-governmental sources. Grant support and other outside support is most important for the initial capitalization of rural projects since "investment capital" in a business sense is not usually available and borrowing ability is often constrained by prior debt. (2) Cost savings that follow from improved management and financial operations that can be applied back to implementation expenses and then to on-going HIT operations will be identified. The sub-committee will make a detailed projection of savings that can be expected from new software and systems implementation after

expense. (3) Although the timing remains uncertain, it is probable that both governmental and non-governmental payors will develop reimbursement strategies to encourage the adoption of HIT designed to affect patient safety and improve clinical outcomes. The recognition by payors of the need for effective HIT, and increased reimbursement tied to its implementation, would effectively sustain those systems. While this planning effort cannot impact the timing of such reimbursement changes, it will follow the evolving thinking in this area and so be able to project its contribution to HIT implementation and sustainability. (4) The HIT infrastructure envisioned by this planning effort would effectively create a Practice-Based Research Network (PBRN). Individual members of the partnership have considerable clinical research experience and maintain on-going participation in multi-center trials. This expertise, in combination with the data-gathering abilities of an extended HIT infrastructure, will form an attractive clinical research environment. The partnership's ability to participate in commercially sponsored multi-center clinical trials will provide an on-going source of revenue for HIT and general organizational support.

9. **Research.** This sub-committee will consider research and evaluation questions arising directly from this HIT project work. These will principally include the effectiveness of various networking technologies in an extended rural community setting and their respective abilities to allow software function and to HIT's ability to achieve its desired effect on clinical and financial outcomes. The outcome questions will have to await project implementation for answers, but they should be designed as part of the planning process. Four areas of clinical and financial interest have been identified during this application process and doubtless more will follow during the planning process. (1) Enhanced patient safety secondary to CPOE has been described in large hospital settings, but it will be helpful to extend this finding to results obtained in a different setting. CHA currently tracks medication administration errors and medication-related adverse events, providing baseline data for an historical comparison to such errors and events after implementation of CPOE. (2) Blue Cross Blue Shield currently tracks some elements of physician performance data, as described earlier. It would be useful to work with their medical director to select performance criteria for the partnership's extended physician group, collect this data and then compare historical performance to performance after implementation of the provider-location EHR. (3) Likewise, MPQHF currently collects physician and hospital performance data through a variety of means. These means and data sets should be reviewed and the EHR implemented in such a way as to best allow historical comparisons. Comparative outcome data including economic analysis, both historical and physician-to-physician, will provide an objective learning mechanism for providers within the partnership. The electronic collection of comprehensive clinical outcome and related economic data from the physician office setting would be a new undertaking. This will speak not only to improving the quality of medical care by raising it to the highest standard across the partnership, but with equivalent outcomes will speak to how some doctors spend half as much money as do others, even if obtaining the same high-quality results. (4) This project must avail itself of "The Healthcare Cost and Utilization Project (HCUP), a Federal, State and industry partnership to build a standardized, multi-state health

data system maintained by AHRQ. We understand that input to HCUP databases is by manual entry from summaries of hospital discharge data, with 29 states currently participating, and that Montana is not a participating state. HIT planning projects such as this should investigate the possibility of collecting data structured so as to allow electronic input to HCUP databases and should also follow the design of these databases in its own work. Ultimately, HCUP hospital data could be joined with physician practice data to provide a persuasive argument to shift care to cost-efficient, high-quality hospitals and providers where the data identifies such constellations of excellence and to encourage improvement where it does not.

# Results

Hospital management and financial software systems:

Comprehensive review of CHA's HMS management and financial solutions determined that the products were effective and cost efficient. CHA decided to leave these systems in place, expand its use of HMS business solutions and separately evaluate HMS vs. other vendor's clinical systems. During the planning period, business document scanning was introduced, further reducing operating costs and taking the facility a step closer to becoming paperless.

It was determined that the HMS products did not lend themselves to sharing with other small hospitals.

Hospital-based clinical operations:

Extensive product evaluations and discussions were undertaken with two major CIS vendors. Other companies were approached but declined to pursue serious discussions with a small hospital. Both companies offered very robust multi-million dollar CIS products that the companies claimed had the capability of being shared among a collaborative of small hospitals, theoretically making the product affordable for each hospital. These discussions did not result in a viable plan for three major reasons: (1) the distributed pricing still remained above the means of most small hospitals; (2) further product price reduction could have been achieved by expanding the number of users but the vendors were unwilling to enter into a project with contingent user volume and wanted the initial hospital participants to take all of the financial risk, untenable for small organizations that did not themselves have any anticipation of financial gain from project success; and (3) much of the robust functionality of the products actually exceeded the requirements of small hospitals. As an example, a small hospital does not require a CIS product to have the ability to page housekeeping when a patient in a 10 bed hospital is discharged.

CHA therefore determined to pursue a single vendor rather than a best of breed solution when adding CIS to its other HMS systems. During the planning period, full capabilities of the HMS clinical care documentation (nursing), LIS, microbiology, eMAR, radiology

and an integrated clinical view of all information held within the system were implemented. The clinical view is available both within the hospital and via web at physician offices and homes.

Hospital CPOE with CDSS remain the final CIS challenge to solve that will then allow CHA to become a paperless hospital.

Ambulatory care EHR:

Ambulatory care EHR received the lion's share of attention during the second year of this project. Consensus determination of necessary functionality for a community-wide EHR made dramatically clear the differences between first-tier and lower-tier EHR products. It became just as apparent that the only way in which solo and small group providers could afford the benefits of a first-tier EHR product would be to form a collaborative that would in its aggregate be able to afford a large practice product. Accordingly, the project's physician participants formalized their activity as the Northwest EHR Collaborative, Inc., a Montana not-for-profit corporation.

From a regional presentation:

## Agency for Healthcare Research and Quality (AHRQ)

- Transforming Healthcare Quality through Information Technology (THQIT) grant portfolio

- Community Hospital of Anaconda, Lead Partner, Planning Grant, 2004 - 2006

- "Planning for the Implementation of HIT in a Rural Setting" (AHRQ Grant Number P20 HS14903)

- Planning identified the need for a shared system for a first-tier EHR product to be affordable for small practices

- EHR collaborative organized by the Mount Powell Medical Society (Deer Lodge, Granite and Powell counties), a component society of the Montana State Medical Association and a THQIT grant partner

The collaborative evaluated in detail major first-tier EHR vendors. Many were not willing to enter into serious discussions with a group of small practices. The collaborative worked extensively with the vendor of its first choice EHR solution that believed its product could be deployed with a multi-organization shared database with a cost-effective business model that would also allow regional HIE among its participants. These discussions ultimately failed for three main reasons: (1)

although a pricing model was developed that compared very favorably with average national pricing, the absolute cost of implementing the solution remained out of reach of most rural solo and small group practice physicians; (2) as with CIS, the vendor was unwilling to further lower the solution's cost by scheduling its pricing so that initial participants could enjoy the pricing discounts that would have been granted to a larger group as participation expanded; and (3) over the course of 18 months of planning, new solution possibilities came to market that did indeed offer most of the robust functionality of traditional first-tier EHR products at considerably lower cost.

From a regional presentation, EHR pricing in a shared system model:



National Average EHR Cost vs. EHR Collaborative Cost Comparison
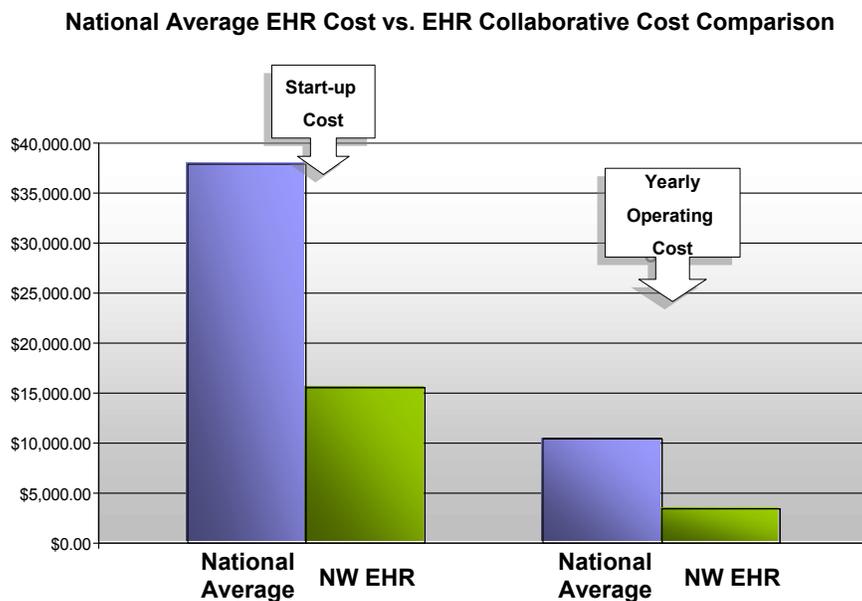
When this project was initiated, the principal differences between first-tier and lower-tier EHR products were centered on patient management and decision support capability, e-prescribing and formulary determination capability, data import, alert and tasking capability, CCR and data exchange capability and true web-native vs. web-enabled functionality. Although its final decision is pending at the time of this report, NW EHR will likely proceed with a solution created by collaboration among DocSite™, NewcropRx™ and Solventus' Aquifer EHR™, to become available in mid-2007 after CCHIT certification is obtained. The annual cost of the new product combination, deployed via an ASP model, is expected to be less than the yearly operating cost described above with no up-front server or vendor implementation costs and will provide much of the functionality previously found only in what have traditionally been regarded as first-tier EHR products.

Continuity of Care Record (CCR):

Project participants believed that a CCR capability was a critical function to include in local HIT development. Working with the Computer Sciences and Healthcare Informatics Departments at Montana Tech of the University of Montana, a CCR approach using Microsoft's Excel and Access products was under development for local use, but as it became apparent that standardized CCR functionality was becoming an integrated element of EHR, it's separate development within this project was suspended.

Technology:

Review of rural HIT planning efforts may often underestimate the paucity of network and communications resources in non-urban areas and regard with wonder the joy rural folks experience when achieving capabilities already be superseded in urban environments.

This project has resulted in new DSL internet connectivity for our hospital and other providers located within the center of town, high-speed encrypted radio links bringing our clinics onto our network, broad-band satellite connectivity able to process SSL-secured communications at reasonable working speed when no other high-speed internet connectivity is available and VPN capability to secure internet-based communications among our community health-care providers.

Partnership extension and model exportability:

As was anticipated, project participation has extended to the two critical access hospitals in adjacent Powell and Granite counties and to the additional physicians practicing in those counties. Through NW EHR Collaborative and its participation in the Montana HIT Task Force and regional conferences, learning from this project will continue to be extended throughout Montana.

HIPPA and Regulatory Compliance:

As vendor products have become increasingly compliant with national standards, no separate HIPPA or regulatory effort was needed as part of this project.

Capitalization and economic sustainability of the HIT effort:

Attention provided to this area of activity during the project term was not formalized as the ambulatory care EHR component, a major variable in capitalization and sustainability considerations, has not been finally determined.

Research:

Attention provided to this area of activity during the project term was not formalized as the ambulatory care EHR component, the capabilities of which are a major pre-requisite

for the kind or research envisioned as part of this project, has not been finally determined.  In a continuing effort towards formalizing community-based HIT-based research, CHA and the physicians participating in NW EHR have obtained a Small Healthcare Provider Quality Improvement Grant from the Office of Rural Health Policy, Health Resources and Services Administration, through which it will pursue research goals during 2007-2009.