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**Indian Health Service electronic health record:
Development, implementation and promise**

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Abstract: The United States Indian Service is entering the final phase of full implementation of an Electronic Health Record (EHR) in its federal facilities in 2007. The system is built upon a successful twenty year old clinical information system and done in collaboration with the Veterans Health Administration. Key development and implementation strategies as well as initial formative evaluation are described. The Indian Health service is in a unique position to evaluate the EHR promise as the only federal health care delivery agency to electronically track performance measures with information input from its EHR

Key Words: Medical record, computerized; Electronic Health Record; North American Indians; United States Indian Health Service

Search Strategies:

Searches of the PubMed, FirstSearch and the Native Health Research Databases were performed to identify published resources relevant to this paper. The MeSH Database within PubMed was searched with terms “United States Indian Health Service” OR “North American Indians” AND “Medical records systems, computerized”; no limits were applied. The search resulted in nine citations from which four were selected. Using FirstSearch selecting the medical/health professional topic area, keywords “Indian” and “Health” and “Service” were searched. The WORLDCAT, NMCat and ECO databases and “computerized medical records” were added with an AND. The search resulted in two citations from which one was selected. The Native Health Research Database of the University of New Mexico was searched with the phrase “computerized medical records.” The search resulted in two records from which one was selected. The Native Health Research Database of the University of New Mexico was searched

with the phrase “electronic health record.” The Native Health Research Database of the University of New Mexico was searched with the phrase “Information technology.” The search resulted in twelve records from which two were selected. Detailed accounts of the successive search strategies appear in the table that accompanies this paper.

The U.S. Indian Health Service (IHS) is pursuing the promise of improved quality of care and system performance of the Electronic Health Record (EHR). EHR implementation is a system level intervention to improve patient safety by reducing error in clinical delivery of services, provide better adherence to disease management standards through more complete patient data and decision support. These features add up to measurable healthcare quality change and this evidence has spurred widespread recommendations in favor of EHR adoption.(1, 2) The most recent Institute of Medicine recommendations for improving rural health care delivery also include the EHR.(1)

The Indian Health Service has the compounded challenges of health service delivery in rural, under-resourced environments to Sovereign Indian groups. Many of the well-known health status disparities among American Indian people may be amenable to improvement though the contribution of EHR supports. The prevalence of chronic conditions such as diabetes and cardiovascular disease are higher within this population(3-5) and data on achievement of benchmark clinical care standards for these conditions within this population has been unavailable and inconsistent.(6) The most recent reports on health care disparity indicate that American Indians receive poorer quality care than whites on 41% of AHQR core measures and people living in poverty receive poorer quality care than those not in poverty on 71% of core measures.(7) The rural nature of many Indian communities makes the availability of complete current clinical records in remote ambulatory clinics a benefit to comprehensive care and clinical tracking. Electronic decision tools may support generalist rural clinical service providers by providing prompts and decision supports for prescribing medications or interpreting analyses that may be used infrequently in remote settings.

History and Implementation

In 2002 the IHS leadership mandated EHR development for use in federal, tribal and urban facilities.(8) The Information Technology Support Center of the IHS was charged with development and implementation in federal facilities and offering implementation to tribal facilities by 2008.

The Indian Health Service (IHS) built upon the Patient Care Component (PCC) of the Resource Patient Management System (RPMS) to develop the new EHR. Summary clinical data was available and stored in the RPMS but it lacked key features of EHR such as order entry, note authoring and decision support tools (reminder systems). IHS Information Technology Support Services worked with the Veterans Health Administration (VHA) to co-develop the system.(8) Computerized medical records are a key component of widely acclaimed quality improvement achievements of the VHA. (9) This partnership made sense because the clinical data platforms of the two agencies were similar because of prior interrelated RPMS system applications development. The VHA had expertise in software as well a track record in EHR implementation that could be shared in this collaboration.(8)

Initial EHR development focused on testing interfaces for different types of system users. The graphic user interface (GUI) is simple, familiar and similar to point and click operation of Windows, but slow. The scroll and keyboard entry is preferable for high volume users. IHS has retained both types of user interfaces. The initial phase included a pilot of components of the VHA system in a graphical user interface of Windows format was conducted in one IHS clinical

setting. *Vue Centric*, a product of Clinical Informatics Associates was the GUI selected.(8) One key advantage to this GUI that influenced the selection was its individualized applications capacity. Although not technically supported by the central IHS, running “commercial off the shelf” applications enabled the many future clinical site adopters options to provide a distinct set of applications suitable to their environment. Software upgrades and maintenance of the RPMS system were conducted system-wide and in adopting sites during this period.

Alpha testing of the GUI interface occurred at Tuba City, Arizona in 2003. Beta testing was conducted in seven IHS and tribal facilities in 2004. The new EHR was officially released in December of 2004 and certified in January of 2005. Between 2003 and 2005 twenty six health centers implemented the EHR, sixty one percent were federally-operated and thirty-one percent were tribally operated(10). Seventy eight sites were using the HER in early 2007(11) and all federally operated facilities are anticipated to be in implementation phase by 2008.

The IHS Office of Information Technology (OIT) developed a comprehensive implementation program. Implementation began with promoting benefits of EHR through internal IHS publications and soliciting clinical site volunteers. Knowledge of barriers to implementation in prior systems as well as lessons learned from early IHS adopter settings were used in design of subsequent implementation strategies.(12) Pre-clinical site implementation processes included identification and training of a Clinical Champion from within the setting to oversee implementation and readiness assessment that consisted of both survey and in-person OIT site visit evaluation of hardware, information technology staff capacity and financial commitment(12). Business process and technical support were provided by OIT and VHA

during the deployment. Extensive information was available on trainings; updating, trouble-shooting and new components from the OIT EHR web page. List serves were also used as a communication tool throughout the system.

The current status of implementation finds at least seventy-eight clinical sites at different stages of implementation and the late adopters moving into implementation. There are new components for the EHR available for the early-EHR adopter settings, recent packages include pharmacy counseling, adverse tracking, behavioral health GUI and packages for community health representatives. Recent internal IHS communications characterize this phase of implementation as a “journey not a destination” and some aspects of clinical training as “water torture”(11).

Preliminary Evaluation and Promise

While summative and impact evaluation of EHR implementation in the IHS is premature, some lessons learned and preliminary indicators are available. Sequist(10) reported a survey-based process evaluation of clinician perceptions of EHR implementation. Both champions and primary care clinicians were included and had response rates of 73% and 59% respectively. Implementation was less problematic than anticipated for the respondents, however only about one third concurred with the claim that the EHR is improving quality and safety. Although clinicians did feel that the system could assist them in providing culturally appropriate care, the need for training on interacting with the computer and patient in a more appropriate manner was identified. This aspect has been previously identified in the literature(10). Attention to this end

user concern may be an important contextual factor influencing use, and therefore successful long term adoption of the EHR systems(13).

Selected preliminary performance data reported as attributable to EHR implementation show signs of positively impacting quality. Pharmacy wait time reduced from 120 to 45 minutes in the first month in one setting, medication errors reduced by 50 – 60 % in two reporting hospitals in first month and increases in recorded performance measures for domestic violence and prenatal HIV screenings and 65+ flu vaccine administrations were noted. Whether such isolated data items will become a sustained pattern of change identifiable as quality improvement will be seen as the implementation and evaluation continue.(14)

Improved local and population level disease management and error reduction are key promises of the EHR implementation. EHR implementation and accompanying RPMS upgrades increase the scope and detail the data available within the Clinical Reporting System (CRS) component of the RPMS. For example, laboratory, pharmacy and radiology are new components. The CRS links to the NPIRS, a data repository, and to the new national data warehouse, scheduled for completion in 2006(6). The data warehouse will serve multiple health care improvement functions including disease and pharmacoepidemiology, health care utilization as well as system performance measurement. Of the three federal health care agencies implementing EHR, the IHS is currently the only one that uses an automated system linked to the EHR to track performance(15). This capability provides the current technical capacity to also evaluate impacts of EHR component such as decision tools. The IHS is uniquely positioned to examine whether the EHR promise is fulfilled for Indian people.

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CTSC Biomedical Informatics (BMI) Course

Research Literature Searching: Overman EHR/IHS

Instructions: For each assigned research question, please complete an individual sheet. Be sure to include all search efforts on separate horizontal rows, regardless of rate of success per effort. Carefully and completely document all “failed” search efforts since on some occasions these can be immensely valuable for our collaborative learning in this seminar.

Clearly state your search question:

How was the Electronic Health Record within the Indian Health Service developed?

Attempt	Database	Dates	Controlled Vocabulary*	Subheadings (optional)	Limits	Inclusion Criteria	Comments
1	PubMed/MeSH	8/28/07	United States Indian Health Service(Mesh) –OR- Indians, North American (Mesh) -AND- Medical records Systems, computerized		None None None		Nine articles were retrieved using this combination. Three were disease focused, two were different types of technologies
2	PubMed/MeSH	8/31/07	(see inclusion criteria colum)			Selected related articles link for result	This gave 105 results on Information technology. I selected and used one article that referred to

						number 2 from above search.	the IHS records development process
3	FirstSearch	8/31/07	<p>Indian Health Service (keyword selected in drop down box) on Home Page</p> <p>Medical records, computerized (keyword selected in drop down box)</p>		<p>In the IN: pull down menu I selected Medicine/Health professional</p> <p>Subsequently I selected to do the search in this subset of databases that first search accesses:</p> <p>I selected three (WorldCat, NMCat and ECO) of the four databases.</p>		<p>I did not select the MEDLINE database because I thought it would be redundant to the initial PubMed search above.</p> <p>Two articles were retrieved with this strategy. One was related to a specific disease management system.</p>

							Both of these were in English, the next step would have been to limit to English. This was not necessary.
4	Native Health History Database	9/1/07	Computerized medical records (phrase entered)				No records were retrieved
5	Native Health History Database	9/1/07	Electronic health record (phrase entered)				No records were retrieved
6	Native Health History Database	9/1/07	Information technology				No records were retrieved
7	Native Health Research Database	9/1/07	Computerized medical records (phrase entered)				Two records retrieved
8	Native Health Research Database	9/1/07	Electronic health record (phrase entered)				One record was retrieved
9	Native Health Research Database	9/1/07	Information technology (phrase entered)				Twelve records were retrieved
10	Public Affairs International & PAIS Archive	9/2/07	North American Indian AND Electronic Health Record		Limited to: English (checked) Date range: 2000-2008		No records were found (0 published works, 56 scholars)
11	Public Affairs	9/2/07	Indian Health		Limited to:		No records were

	International & PAIS Archive		Service AND Electronic Health Record		English (checked) Date range: 2000-2008		found (0 published works, 56 scholars)
12	Public Affairs International & PAIS Archive	9/2/07	Indian Health Service AND computerized medical records		Limited to: English (checked) Date range: 2000-2008		No records were found (0 published works, 56 scholars)
13	Public Affairs International & PAIS Archive	9/2/07	Indian Health Service AND information technology		Limited to: English (checked) Date range: 2000-2008		No records were found (0 published works, 56 scholars);

Direct Search History from records:

PubMed Search

"United States Indian Health Service"[Mesh] OR "Indians, North American"[Mesh] AND "Medical Records Systems, Computerized"[Mesh]

FirstSearch Search

WorldCat, NMCat, ECO results for: (kw: Indian and kw: Health and kw: Service) and ((kw: Medical and kw: records, and kw: computerized)). [\(Save Search\)](#)

Records found: 2

By database: ECO (0) NMCat (0) [WorldCat](#) (2)

There was no similar record located for the Native Research Database search.