Santa Barbara Blueprint: a Regional Health Data Network Takes the Plunge

by Michael Schrader

In Santa Barbara County, a regional data-sharing network offers a model for the future of HIM infrastructures.

Located north of Los Angeles, Santa Barbara County is a favorite destination, known for its beaches, resorts, and vineyards. Local homeowners include Oprah Winfrey, Martin Sheen, and Steve Martin.

But Santa Barbara County has its share of healthcare challenges. One in five residents lack health insurance and proper access to care. Furthermore, the county is designated as a rural area for Medicare. Provider reimbursement in the region is much lower than it is in the San Francisco and Los Angeles areas, yet the cost of delivering healthcare in Santa Barbara County is the same or higher.

Many regions share similar healthcare challenges, but few are watched with as much interest as Santa Barbara County. The reason is an ambitious data-sharing project five years in the making that many in the profession consider a model for improving care and reducing cost.

The Santa Barbara County Care Data Exchange

In response to the financial squeeze of increased demand and diminished resources, leading area public and private health-care organizations created the Santa Barbara County Care Data Exchange (SBCCDE) in 1998. Combined, the coalition members provide approximately 80 percent of medical services in the region. (For the group's membership, see "The CDE Six", below.) Physicians form a clinical advisory committee, and chief information officers comprise a technical advisory committee.

The loosely formed coalition set as its goal improving the efficiency and quality of healthcare delivery in the county through the efficient exchange of patient health information. The result is the Care Data Exchange (CDE), a browser-based utility that allows healthcare providers to share patient records online.

The CDE is the kind of local health information infrastructure envisioned as the core of a national health information infrastructure (see "Building the National Health Information Infrastructure" *Journal of AHIMA*, May 2004), and it has not gone unnoticed. A 2003 General Accounting Office report specifically identified the SBCCDE data-sharing model as one that is expected to realize cost savings as well as benefits related to clinical quality and delivery of care.[1]

The project began with a $10 million grant from the California HealthCare Foundation. The foundation's investment in the CDE is intended to "improve the safety and quality of care, while demonstrating that the efficiencies of community-wide data sharing can financially support the infrastructure that delivers these improvements," says Sam Karp, chief information officer of the foundation.

The CDE is designed to improve clinical quality by mitigating two problems that result in a lack of complete information at the point of care and contribute to redundant treatment, prescribing errors, and duplicate lab tests and radiology services. "The first is that patients often move from one caregiver to another over time and their clinical information doesn't always move with them," says David Brailer, MD, PhD, senior advisor to the CDE. "The second is that the burden of sharing patient information between parties doesn't keep pace with diagnostic and treatment decisions."

How the CDE Works

The CDE is powered by peer-to-peer technology, the same kind of technology developed by Napster to swap music files online. With a single query, an authorized user can obtain patient information from multiple data holders simultaneously, such as hospitals, clinics, labs, radiology centers, and a health plan.

The exchange is a public utility that will be available to all authorized users, not just large healthcare entities. Large organizations will supply and query data from the CDE, whereas independent physicians and patients, called "consumers," will only query the utility.

Data presently available through the CDE include laboratory results, radiology images, transcription reports, clinical notes, and audio, as well as hospital, medical, and pharmacy information derived from claims. Clinical systems belonging to different data holders continue to be plugged into the CDE to supply more data. The utility's official rollout is scheduled for the second quarter of 2004, once a critical mass of information is available. As of today, the CDE's basic infrastructure is operational with multiple data sources.

Independent physicians and consumers will be given access to the CDE utility at no cost. The operational expenses of maintaining the CDE will be assumed by the large healthcare organizations in the community. An independent study published at the request of the California HealthCare Foundation found that these organizations could expect a positive return on investment since they will no longer have to manually produce and collect the information. Phillip Greene, chair of the council that governs the CDE project, believes "the CDE utility should help reduce administrative costs for healthcare concerns that are often overburdened by paper forms, written requests, faxes, and telephone calls."

Physicians and their staff will be the primary users of the CDE. Before a routine office visit, retrieving a patient's medical history using the CDE could become as common as checking the patient's eligible status with a health plan. In fact, one query to the CDE returns both sets of information. The CDE presents information to the browser in the form of JPEG images and HTML and XML documents. The images can be printed, but they cannot be downloaded into an electronic health record. Electronic downloading may come in later releases of the CDE.

For physicians who case-manage patients with chronic diseases that require routine monitoring, the CDE offers automated features to streamline data requests. Physicians can build patient lists, such as a list for people with diabetes or a list for those with asthma; the system will poll clinical sources at a predetermined interval and automatically update the list with the current clinical information. Lists also may be created for the patients scheduled to be seen the next day, expediting data access for the physician during the patient visit.

A secure messaging system allows participating CDE physicians to refer patients or request consults with the benefit of being able to attach all relevant clinical reports. Accessible over the Internet, the CDE can be used in most practice locations, including urgent care centers and emergency rooms.

Consumers authorized by a clinician will be able to view and print their health information, such as lab results, as well as receive and respond to messages from clinicians regarding the authorized results. There are potential care benefits to this function, as there is some evidence that patients who see their clinical information ask more questions and become more engaged in their care.

Consumers who access their protected health information (PHI) can act as guardians of its privacy. Consumers will be able to view access logs that display names of clinicians and staff that have used the CDE to view their medical information, as required by the HIPAA privacy standard. Employees of the University of California Santa Barbara, the county's largest employer, will be the first to access their clinical data through the CDE's consumer portal Web site.

Ensuring Privacy and Security

With the convenience of sharing PHI electronically comes additional responsibility for privacy and security. SBCCDE has taken a multilayered approach to ensure the confidentiality, integrity, and availability of PHI by applying administrative, technical, and physical safeguards.

Organizational and individual users must sign an agreement attesting that they will use the CDE only for purposes of healthcare treatment, payment, and operations consistent with the HIPAA privacy standard and California law.

A CDE interface confirms that the user represents an entity with a prior relationship with the patient before allowing the user to access an individual's medical information. Emergency room physicians, urgent care centers, and referral doctors will be allowed to "break the glass" to access a patient's medical information for the first time. Built-in audit trails track a user's access to patient information, and the resulting audit trail will be available to the patient through the consumer portal Web site and available to the data holder through routine reports. The data holder will be able to see who has used the CDE to access clinical records in its system, including details of frequency, date, and time.

Each organization can keep its proprietary and sensitive data in its own facility under lock and key. The peer-to-peer model allows each data holder to control its own information and act as the final authority. Thus data holders can prevent access to all or part of a particular patient's medical information, such as records pertaining to HIV, AIDS, and mental health.

Plugging in to the CDE

The greatest technical challenge to implementing the CDE was interfacing the various information systems into a centralized CDE network. There were initial concerns that many unique interfaces would have to be developed for each organization and for every type of data that it supplied. These were put to rest as the project got under way.

Three different healthcare organizations in the community operate the same vendor's picture archiving and communication system. Thus one interface linked three different data sources for radiology information. Likewise, a single interface for the system of a leading diagnostic testing service supplies laboratory results for most hospitals, groups, and independent physicians in the community. A single vendor interface currently under development could provide information for the majority of pharmacy transactions within Santa Barbara County.

Most data-source organizations chose to port data from their legacy systems to clinical data repositories, which contain clinical information from a data holder's production systems and can be located and controlled at the data holder's premises. The repositories have a standard interface for supplying data to the CDE.

SBCCDE considered several architectures for the CDE data-sharing architecture, in the end choosing a peer-to-peer (P2P) network. Tom Colbert, CIO of the Sansum–Santa Barbara Medical Foundation Clinic, explains, "Asking competing entities to give their proprietary and sensitive medical information to be stored in a centralized data warehouse associated with the client/server model seemed like a hard sell." Nick Augustinos, vice president of CSI, adds, "We all acknowledged that it was simpler to build centralized versus decentralized systems, but the P2P model is more scalable. Each new data store, no matter how large, is just another source that's plugged in."

The CDE's P2P architecture does include some middle components. A master patient index correlates patient identities across organizations, confirming, for example, that John Smith at the hospital and Jonathan Smith at the clinic are the same person. An access control component applies privacy and security controls and manages patient consent. It authenticates users, establishes a prior relationship between the organization that the user represents and patients, and administers built-in audit trails that track a user's access to patient records. An information locator service identifies all data sources that have information for a given patient and provides URL links to records within those systems. The links lead into a peer-to-peer connection with the data source and direct access to the information.

The Initial Analysis

One measure of the CDE's success clearly will be whether its benefits outweigh the costs of its development and maintenance. To the many healthcare professionals following SBCCDE's progress from outside the county, a second question is of particular interest: Can the CDE data-sharing model be replicated affordably in other regions? To address these questions, the California HealthCare Foundation contracted an independent costs-versus-benefit analysis of the CDE.

Analysts separated CDE costs into initial startup and ongoing maintenance. They identified the potential benefits as improved productivity, fewer duplicate lab and radiology tests, and reduction of medical errors, among others.

Three hypothetical communities were modeled—large, medium, and small—with low and high participation levels. A large region was identified as one with more than 5,000 physicians; medium as between 1,000 and 5,000 physicians; and small as

fewer than 1,000 physicians. Low participation was defined as less than 33 percent of the institutions and 15 percent of the physicians. High participation was defined as more than 66 percent of the institutions and 35 percent of the physicians.

The analysis found that the larger the region and greater the participation, the higher the return on investment. Data suppliers benefit because they no longer manually produce data to fulfill another party's request. The community network benefits because it no longer must manually collect patient information. Of all the entities, hospitals were found to draw the most benefit. The first few participants in a region face disadvantages because the cost to maintain the network is covered by the few instead of the many, and the first few participants must continue to produce and collect data manually from nonparticipants.

Meanwhile, the CDE is nearing its official launch. Formal testing, currently under way, includes technical testing by a vendor involved in the project, security testing by a third-party firm, and user acceptance testing by clinicians in the community. Educational materials, user manuals, and policies and procedures surrounding the use of the CDE are being produced. After the launch, SBCCDE will initiate a broad physician recruitment program. Santa Maria physician George Hiester trusts that "the completeness of data through a single access point and the anytime-anywhere Internet availability" of the CDE will make the system a "compelling cost-saving, administrative-reducing, and quality-improving utility" for providers.

The SBCCDE data-sharing model is available for replication for other regional healthcare networks. "The CDE could work in most any community and be implemented in much quicker time than it's taken in Santa Barbara County," says Roger Heroux, director of the public health department of Santa Barbara County. "The technology's been developed, the business model has been independently assessed, and matters of privacy and security have been considered. These are things that protracted the development of the project in Santa Barbara County."

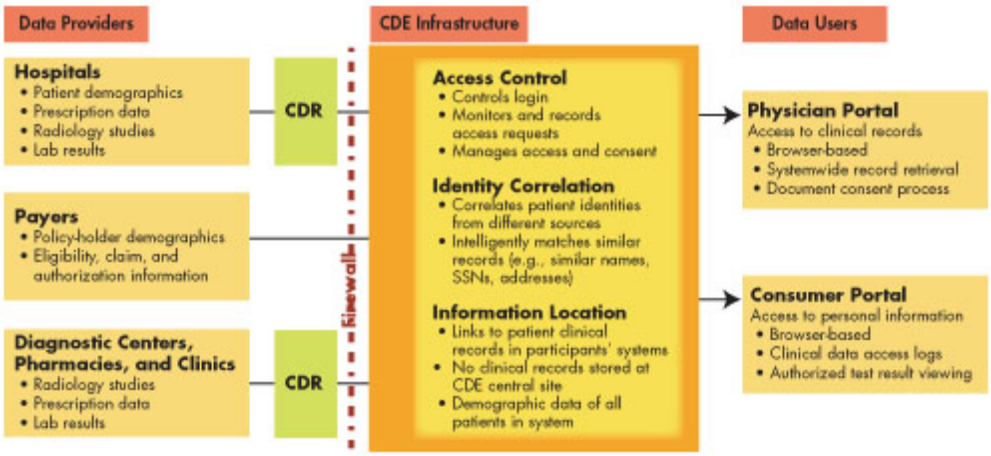
"The most important thing for any new community is a spirit of cooperation," says Paul Jaconette, vice president and chief administrative officer of the Sansum–Santa Barbara Medical Foundation Clinic. "The rest is just details."

The CDE Six

Organizations that joined to form the SBCCDE and subsequently established data feeds to the CDE include:

- Sansum–Santa Barbara Medical Foundation Clinic, which has 180 physicians and operates nine clinics, three urgent care centers, a pharmacy, and a medical laboratory
- Catholic Healthcare West, Marian Medical Center, which operates a 167-bed hospital and 95-bed extended-care center
- Cottage Health System, which operates three hospitals, one of which is a 436-bed acute care teaching facility, the largest of its kind between the Los Angeles and San Francisco Bay Area
- The Santa Barbara County Public Health Department, which operates six clinics, three medical laboratories, two pharmacies, and a physicians' group
- Midcoast Care, a private practice physician medical group
- The Santa Barbara Regional Health Authority, a nonprofit health plan that primarily serves the Medi-Cal population within Santa Barbara County

Data Flow in the CDE



Most data providers port data from their legacy systems to clinical data repositories (CDRs) they control. The CDRs link to the CDE through a standard interface. CDE components provide access control, identity correlation, and links to data in participants' systems. Large organizations both provide and query data. Authorized physicians and patients ("consumers") query data.

Note

1. United States General Accounting Office. "Information Technology: Benefits Realized for Selected Health Care Functions." GAO-04-224. 2003. Available online at www.gao.gov/new.items/d04224.pdf.

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