What's New in Clinical Data Repositories?

by Dan Soule

Clinical data repository (CDR) technology may have dropped off your radar screen, but new developments are giving a second generation of CDRs a renewed role. This article offers an overview of the latest developments and a look at how CDRs can benefit healthcare.

What's new in clinical data repositories? Surprised to hear that this technology is still around, or that new uses and capabilities are afoot? You're not alone. After a few false starts in the early 1990s, clinical data repository (CDR) technology may have dropped off many HIM managers' radar screens. Now, client/server processing and the Internet are giving a second generation of CDRs a renewed role and more immediate payoffs.

Whether or not the HIM department will be the driver of acquiring a CDR product, these new developments in the capabilities of CDRs and in the business case for acquisition of a CDR merit another glance. Read on for a look at CDR history, current use, and what to look for when purchasing a system.

Some Basic Definitions

The term "clinical data repository" is commonly used to describe two different product strategies and objectives. To clinicians, the CDR is a database where data from multiple departmental information systems can be stored to create multidepartment, multivisit, multifacility electronic views of a longitudinal patient record. The goal is to create a single place for clinicians to review any and all information about a patient.

To management, the CDR is a system that stores summary information about a patient encounter that can be analyzed to provide comparison views of physicians, diagnoses, procedures, lengths of stay, and other management benchmarks. This article will focus on the clinician strategy.

History of the Clinical Data Repository

The concept of a CDR began in the early 1990s and was popularized by several suppliers of commercial products and a few hospitals that created systems. The objective of these systems was to provide the clinician a consolidated view of patient clinical data from "best of breed" departmental systems that had been selected independently.

Advocates of this approach included Donald Simborg and David Margulies, both of whom created successful commercial products to accomplish this objective. Other suppliers followed, but most eventually disappeared from the vendor landscape as a result of the competitive nature of the healthcare information technology business. Proprietary, hospital-created systems, too, gradually have been replaced by commercial offerings that include order management and clinical documentation functionality.

By the late 1990s, the concept of a CDR virtually disappeared from the marketplace of healthcare IT. The reasons for this vary-from Y2K pressures to increasing accessibility of Internet technology that advocated a connectivity approach to the problem to the fact that many health providers began to desire a complete electronic medical record system that included documentation and order management, as well as results browsing. The industry needed time to catch up with new technologies and more demanding requirements.

In the last 18 to 24 months, the concept of a CDR has reemerged as a solution to a different set of business challenges:

- physician access to medical records
- patient safety and medical errors reduction

- staff productivity and efficiency enhancements
- consumer/patient interest and participation in the healthcare system

Each of these challenges will be addressed separately in order to gain a better understanding of the underlying organizational challenges and how the CDR has been able to assist in addressing them.

Physician Access to Electronic Medical Records

The need of today's physicians for information has expanded outside the physician office. Physicians see an ever increasing number of well-educated patients who demand high-quality care and interaction. In addition, in highly competitive healthcare markets, specialists must view primary care physicians as customers. To grow and thrive within these market conditions, improved communications are necessary. The Internet, backed by a modern CDR foundation, offers a low-cost solution to these needs for all stakeholders.

In addition, as physicians continue to focus on improving work flow, lack of access to the patient record becomes one of the key obstacles. Fortunately, as technology has improved, remote connection and portable devices have increased accessibility to the medical record, and more physicians are willing to accept these technologies. Using a portable device to retrieve information also provides instant rewards for both the provider and the patient by making clinical data available at the point of care and at the point of medical decision making. More accurate and available data have been shown to reduce costs, improve the quality of care, and increase patient satisfaction.

Thanks in large part to the availability of the Internet, physician expectations and system usage have risen dramatically. For some physicians, interaction with other clinicians through the use of the Internet has become an accepted practice. Physicians are beginning to demand electronic access to patient data from home and office.

Proponents of using the Internet to access patient records point to the improvements in the quality of care brought about by these technologies. With them, important information is not as easily missed, required documentation-enabled by electronic signature-is submitted in a more timely way, and lengths of stay are decreased because reports are available as soon as they are completed. Nevertheless, security and confidentiality remain a major concern for both the physician and the healthcare organization. Both the organization and the physician should be well informed about the security of their systems.

There are several technical approaches to physician access. A CDR is generally not the lowest-cost approach to meet physician access objectives, but it often serves as the foundation for solutions to other business initiatives.

While the Web is currently the predominant method of providing physician access to clinical information, physician use of personal digital assistant (PDA) technology continues to improve. A CDR can be the foundation for centralizing the collection of patient-related clinical data for download and display on PDA devices that are used by physicians during hospital rounds and for quick and easy on-call reference. Healthcare organizations view these devices as a way to increase clinician satisfaction, while at the same time improving work flow. With the average cost of a PDA at $200 to $300, the device itself is very affordable.

Patient Safety and Quality Improvement

In an eye-opening report earlier this year, the Institute of Medicine of the National Academies snapped the industry to attention with references to the "disjointed and inefficient" state of healthcare today. The report urgently called for "reorganization and reform."[1]

No healthcare provider wants to harm patients or knowingly provide poor-quality care. But the implications of this issue reach even further. The public relations and legal costs associated with patient safety issues are one of the top concerns for healthcare organizations, particularly those organizations in a highly competitive market or those facilities that exist on narrow margins.

Recognizing both the human and business costs of these issues, the report also presented a call to action for the industry, including a movement toward the use of IT as key: "The committee believes information technology must play a central role in the redesign of the healthcare system if a substantial improvement in quality is to be achieved over the coming decade." With

the Institute of Medicine's endorsement, interest in the CDR is reviving to move the healthcare industry along a safety and quality trajectory already successfully blazed by the airline, banking, and retail industries.

Yet the current complexity of healthcare information systems, with a different system in each major department from laboratory to pharmacy to outpatient physicians' offices, contributes to safety and quality problems by isolating and fragmenting critical patient information into departmental islands of automation. A CDR can help bridge this gap and, combined with expert system "rules" technology, has been shown to be extremely effective in reducing adverse drug events (ADE), improving patient care quality, and even reducing Medicare fraud and abuse risks. The cost savings from the reduction of ADEs alone is often enough to provide return on investment in two years or less. Thus, implementing a CDR to reduce ADEs can often provide an incidental solution to physician access virtually for free.

Staff Productivity and Efficiency Improvement

Healthcare is a labor-intensive business. Most healthcare providers spend 60 percent or more of their annual operating expenses on payroll and employee benefits. As healthcare organizations have expanded, many, if not most, offer medical services in a variety of care settings, including critical, acute, outpatient, clinic, skilled nursing, long term, and more. Cost estimates for pulling and delivering a paper-based medical record to a clinician vary between $4 and $7 per chart pull.[2]

In this environment, the CDR is a key enabling technology that provides efficient information sharing and a paperless practice environment. Even before an organization "becomes paperless," the use of a CDR has been shown to significantly reduce the number of chart pulls requested by clinicians. (See "Reduction in Chart Pulls" below.)

A second area of improvement provided by a CDR is the reduction of unnecessary or duplicate tests. By providing timely access to patient data from all encounters in all settings of care, the additional cost to run tests ordered due to lack of access to results and the time wasted waiting for duplicate results can be eliminated. Whether several minutes, hours, or weeks, the time saved can lead to reduced lengths of stay and increased patient satisfaction.

Consumer/Patient Satisfaction

Today's consumers are increasingly interested in being better informed and more proactive in addressing their healthcare issues or problems. The Internet, through both formal healthcare organization sites and sites with unknown credibility, is the source of much of this information. Despite having no validation for the information contained on their sites, many consumer-oriented healthcare sites have gained market credibility.

In addition, healthcare providers are increasingly using e-mail to better serve the consumer. Although it was initially viewed as a time consumer, more physicians are adopting e-mail as a good communication tool for interacting with some patients, especially those who can benefit from receiving recent data or routine lab results in a more timely manner. When connected with the enabling technologies of the Internet and e-mail, the CDR can make clinical results more available to the provider and the consumer and become the foundation for what is being referred to as e-health.

For providers interested in a more secure method of communicating with their patients, a CDR can form the basis for a provider-to-consumer health-related messaging system. A CDR can also enhance an existing health-related messaging system with access to clinical results that can be used by a consumer or patient to create a personal health record. Early adopters of this technology, such as providers in Winona, MN, are realizing improvement in both patient/consumer and provider satisfaction. Winona providers hope to eventually show that access to health information can improve the overall health and wellness of the community.

Choosing the Right Clinical Data Repository

When choosing a CDR, an organization should consider several things. First, take into account the existing system and current state of the organization. Many organizations have evolved "silos" of information that may or may not play a significant role in the organization's future. Organizations need to determine if and how this information will be carried forward.

The second factor is the overall strategic plan of the organization. Some organizations are developing a single source of information, while others rely on a completely interfaced model. The CDR decision should include a discussion with the vendor

on the current and future needs of the healthcare organization and its market. Items such as patient safety and overall organizational benefits should be discussed.

Third, the choice of CDR will in some ways be dependent on the needs of the healthcare organization's future patient population. For example, if an organization's focus is on improving quality and reducing medical errors, then a CDR with expert systems capability and predefined packages of alerts would be important. If the business emphasis is on consumer/patient communications, then a CDR with personal health record capability might be purchased. As the public's acceptance of technology increases, more patients will rely on technology for communication and interaction with providers.

Into the Future

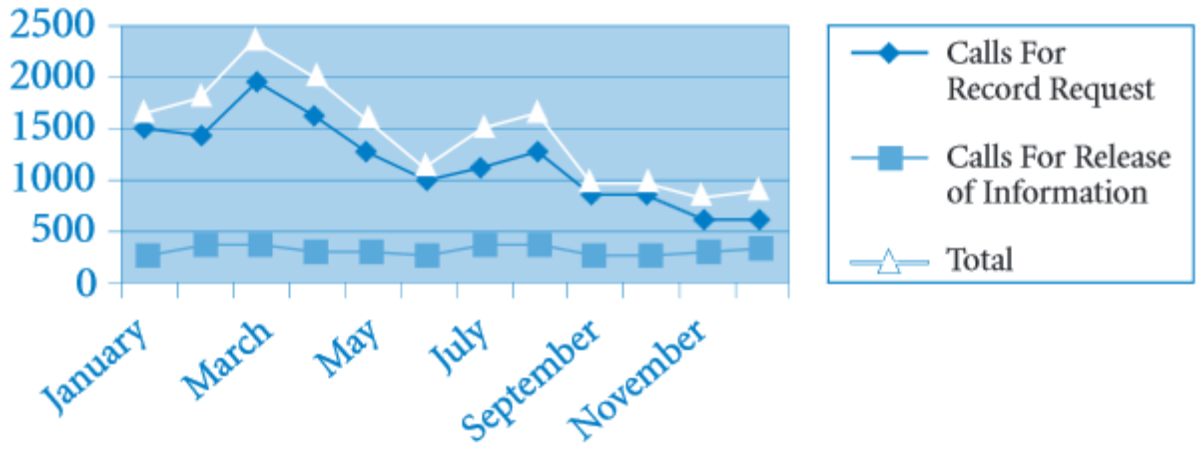
Looking toward the future, second-generation CDR products, based on now widely accepted client/server and Internet-enabled technology, should be registering once again on the radar screens of HIM managers. By providing the foundation for achieving significant benefits and cost reductions-often leading to an acceptably low time frame for return on investment-these technologies are earning their place in tomorrow's HIM environment. HL7 interfaces, once a rarity, are now commonplace, helping to reduce implementation time to a matter of months and further reduce the investment in time and money required to achieve significant payback.

CDRs, once thought of as the way to fill the deficit of clinical information that was lacking from legacy healthcare information billing systems, are providing cost-effective solutions to some of healthcare's most pressing challenges.

Collection of clinical information into a single unified database will not only improve direct patient care, it will also serve as the store of information from which new medical knowledge will be obtained and verified. As more and more healthcare organizations adopt this technology and HIM evolves, it is clear that the CDR will continue to be important.

Reduction in Chart Pulls

The diagram represents the decrease in the number of chart pulls when a CDR is implemented at an integrated delivery network. The data was produced during a benefits realization study performed by Cerner Corp.



Notes

1. Institute of Medicine. "Crossing the Quality Chasm: A New Health System for the 21st Century." Institute of Medicine Report available at www.nas.edu.

2. Cerner benefits study, 2000. Internal document from Cerner Corp.

References

Collen, Morris F. “A Vision of Health Care and Informatics in 2008.” *Journal of the American Medical Informatics Association* 6, no. 1 (1999): 1-5.

Guyer, Skip. “Clinical Data Repositories: An Overview.” *Nurse Case Management* 5, no. 1 (2000): 2-9.

Schoenberg, Roy, and Safran, Charles. “Internet Based Repository of Medical Records that Retains Patient Confidentiality.” *British Medical Journal* 321, no. 7270 (2000): 1199-1203.

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