

# **Integrating Information: Selected Issues**

A Technical Assistance Paper of  
**The Robert Wood Johnson Foundation  
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Prepared by the  
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## The Medicare/Medicaid Integration Program

The purpose of The Robert Wood Johnson Foundation (RWJF) Medicare/Medicaid Integration Program (MMIP) is to end the fragmentation of financing, case management, and service delivery that currently exists between Medicare and Medicaid. States are provided with grant support and technical assistance in their efforts to restructure the way in which they finance and deliver acute and long-term care. Technical assistance focuses on those states that have been awarded grants but is not limited to grantees. It is recognized that other states and initiatives can benefit from this help.

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Information about the MMIP can be obtained from the following locations:

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## National Chronic Care Consortium

The National Chronic Care Consortium (NCCC) is a mission-driven organization of leading nonprofit health systems in the United States and Canada dedicated to transforming the delivery of chronic care services. Each NCCC member seeks to integrate care across a full continuum of services, including primary care, hospitals, nursing homes, and community-based long-term care. Members are required to demonstrate a high standard of excellence in chronic disease management, innovative care financing, integrated service delivery, and a commitment to a common vision and collaboration in establishing best practice methods. Members work together as an operational laboratory to improve systems both for people with serious and disabling conditions and for their family caregivers. These conditions represent the fastest-growing and highest-cost segment in healthcare.

The NCCC has also established a subsidiary corporation, the NCCC National Resource Center on Chronic Care Integration, to provide education, information, and consultation.

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## About This Report

This report is one of five technical assistance reports prepared by the National Chronic Care Consortium (NCCC) for the Medicare/Medicaid Integration Program Office. The five reports focus on topics pertinent to creating more integrated delivery networks or coordinated systems of care for people who are dually eligible for Medicare and Medicaid. The topics chosen include:

1. Case Management: Methods and Issues
2. Targeting Beneficiaries Who Are Most at Risk
3. Primary Care for People with Chronic Conditions: Issues and Models
4. Quality Methods and Measures
5. Integrating Information: Selected Issues

This report has drawn on the following National Chronic Care Consortium sources and is reprinted with permission of the National Chronic Care Consortium:

- *Integrating Care for People with Chronic Conditions*, by Richard Bringewatt. 1995.
- *NCCC 1998 CareLink Compilation*, 1999.
- *NCCC 1999 CareLink Compilation*, 2000.
- *Transforming Care Delivery: Bridging Concepts and Practices, Proceedings from the NCCC National Conference September 21–23, 1997, Minneapolis, MN*. 1997.

# Table of Contents

Introduction .....	1
History .....	2
The Importance of Integrated Information .....	4
The Vision .....	5
Barriers .....	5
Strategies .....	6
Developing a Computer-Based Patient Record .....	6
Defining Episodes of Care .....	7
Creating a Data Warehouse .....	8
Developing Decision-Support Tools .....	9
Keeping Information Confidential .....	10
Advice from the Experts .....	10
The Internet and E-Health .....	11
Healthcare Internet Usage .....	11
Internet Innovations .....	12
Conclusion .....	13
Case Illustration .....	14
Selected Articles .....	16
References .....	23

# Introduction

Most healthcare organizations' information systems remain fragmented, mirroring the fragmentation between administrative, financial, and clinical operations and structures. Approaches that only aggregate data by funding source, discipline, setting, program, or provider allow us to see only a part of the total care picture. Continuity of care requires that information be integrated so that people responsible for making administrative, financial, or care decisions for a given clientele/patient group, can see the whole picture—what is being done for this group, at what cost, and to what effect, over time. The goal of integrating information is to link key decision-makers at all levels of authority, in all settings, so that the integrated information supports overall client and organizational goals.

The task of bringing together key information systems and processes has not been easy. Yet healthcare organizations have made important strides. Many organizations have been working to build a better infrastructure for their information systems or have electronically tied together key settings to bring themselves closer to the goal of an integrated information system. This report will explore recent innovations in information system development and answer the key questions below.

## Major Questions for Discussion in This Report:

- Where has the healthcare industry been with regard to the use of computerized information systems?
- Why is integrating information so important to healthcare delivery?
- What is the vision for an integrated information system?
- What are the barriers to integrating healthcare information?
- What information system development strategies are healthcare providers and health plans pursuing?
- How will the Internet affect efforts to develop integrated information systems?

# History

## *Where has the healthcare industry been with regard to the use of computerized information systems?*

Historically the healthcare industry has invested fewer resources into the development of information system (IS) technology, as compared with other service industries that rely heavily on information. For example, the banking and insurance industries have typically invested from 7 to 10 percent of operating expenses in information technology, whereas the healthcare sector averages around 2 percent of operating expenses annually (Moran 1998). Furthermore, resources expended on computer hardware and software have only recently been focused on **integrated** information systems.

In the last 20 to 25 years each service sector in healthcare has addressed the need to convert its paper-based records to electronic records to gain efficiency, reduce payment cycles, avoid duplicate and missing records, and streamline processes. Hospitals were probably the first organizations to convert some of their paper-based records, systems, and processes to electronic systems, followed by large physician practices and large home healthcare agencies. Nursing facilities (as an industry) came to computers later. The development of the Minimum Data Set (MDS) assessment tool for nursing facilities helped to drive some of the conversion to electronic recording in the nursing home industry in the late 1980s. Unfortunately, many smaller or stand-alone nursing facilities had too few resources to cover the costs of comprehensive information systems or for the additional staff training that would have helped the organizations make best use of their computer technologies.

In the healthcare industry most information systems were developed to automate core functions. The first function was the claims and billing system; the second was clinical and care information. Because claims and billing systems came first, payment regulations and billing rules have inadvertently driven many decisions about what data is seen as necessary to capture. Claims are generated per unit of service delivered (for example, blood drawn, lab test done, radiology scan conducted, physician consultation provided, medication prescribed). Each activity generates a new "line item." On top of this, each care setting (for example, physician office, home healthcare agency, nursing home, hospital, rehabilitation unit, transitional care unit) tracks information, submits

claims for payment, conducts patient assessments, and monitors care received in its own way, according to the standards and definitions derived for that service sector. Not surprisingly, information systems for different service sectors are different, and there are few natural linkages between them.

*The infrastructure of fee-for-service has left a legacy of independent and unintegrated providers, each having its own billing system that cannot interface [with] . . . any other billing system. . . . To further complicate the process, professionals will often perform services at many different hospitals, making the physician or hospital billing interface problem even more disconnected. Even staff model [health plan] providers use separate and distinct billing systems for professional and hospital services (Schmitz 1999).*

In the 1980s and 1990s many larger healthcare organizations and hospital systems grew in size and scope, adding new settings and levels of care to their "continuum" of services offered to consumers. As they did this, these organizations tried to tie the disparate information systems together, only to find that the legacy (read "existing") systems did not match each other.

In an article on the performance of integrated delivery systems (IDSs), Edric Engert and Douglas Emery (1999) discuss the intense merger and acquisition activity and consolidation in the healthcare industry that characterized the 1990s. Single hospitals became part of multihospital systems, small home care agencies were acquired by other agencies, larger systems purchased or affiliated with physician group practices, and small systems became bigger through mergers with other small systems or through the purchase of post-acute facilities and other services. Engert and Emery reflect on the result of all this activity on the organization's information system development:

*. . . a patchwork of computer systems is usually created in which incompatible components within each silo of the delivery system attempt to communicate with each other. Various administrative functions all*

*are performed using idiosyncratic platforms. What results is a systems Tower of Babylon that costs millions to standardize and is usually antiquated before it even becomes operational. Many IDSs are attempting to address this problem, and there is general consensus that this is a necessary step in the total integration process. However, few realize just how much of an investment, in time and money, it actually takes.*

Engert and Emery point out that the promise of IDSs was not realized because these delivery systems were not able to generate necessary revenue, control costs, nor change clinical care enough to improve quality with any consistency. The IDSs were competing for a shrinking market, were unable to significantly change financial incentives or secure full risk contracts from payers, and lacked insurance experience.

# The Importance of Integrated Information

## *Why is integrating information so important to healthcare delivery?*

We live in a fast-moving information age. In an era where any person with a computer and Internet access can check the weather in any city in the world, “talk” to people thousands of miles away via chat rooms, and purchase an endless array of goods and services with the click of a mouse, it is time that healthcare information systems entered the twenty-first century. Even without consumer expectation (in some cases consumer demand) for better information management, providers’ own growing sense of the costs of fragmented information drives the need to better integrate information.

A case in point is provided by the dramatization of an actual patient’s experience as portrayed in the video, *Mrs. Dorothy Peterson* (1995), by Terra Nova Films. This case story of a 72-year-old woman chronicles the journey from her status as an active, independent woman living in her own apartment, to her death. In the course of receiving emergency room, acute medical, rehabilitation, home health, and nursing facility care, Mrs. Peterson has 14 different patient assessments conducted on her condition—many of which assess the same demographic, medical history, and other information such as whether she has advance directives. Mrs. Peterson and her niece find themselves answering the same questions over and over again. In addition, because of the numerous healthcare staff who treat Mrs. Peterson in a multitude of care settings—without an integrated medical record—some valuable information is lost. For example, one care team is unaware of the fact that Mrs. Peterson’s previous living situation, before a mild stroke, was independent living in her own home. In another care setting, the nurses do not know the extent of her cognitive impairment following her stroke. Another group of emergency room staff are without information about her current medications. These gaps in information affect how the practitioners plan treatment for Mrs. Peterson and, at times, threaten her life.

Information is power, and without it, bad decisions can be made. Unfortunately, we know that, too often, physicians, nurses, and other healthcare workers do not have complete information when they treat their patients. In one study of adverse drug events in two hospitals, many errors were found to be due to incomplete or

inaccurate patient information. In some cases results of laboratory tests, current medications, or information about the patient’s condition were not easily accessible when needed. At times pharmacists also lacked critical information that would have allowed them to stop an improper drug order (Leape et al. 1995). A report on medical records by the General Accounting Office found that records of past medical care may be unavailable in up to 30 percent of ambulatory and hospital patient encounters (GAO 1991). Another examination of ambulatory practices found that physicians could not find valuable longitudinal information about their patients when they needed it in up to 80 percent of cases (Tang et al. 1996).

Another important reason for pulling together information is to improve our understanding of what works and what doesn’t—either on an individual basis or on a population basis. The potential for quality improvement is vast. In an analysis of the potential of the electronic medical record, Drs. Coombs and Norris (1998) discuss how the evolution of quality measurement and improvement is dependent on “the ready availability of data that can be transformable into timely information that supports the objective measurement and explicit nature of the ‘new quality.’” They assert that, previously, quality measurement relied on proxies for excellence, that is, defined structures and processes and a limited number of reported outcomes. “New quality,” however, draws its definition from explicit dimensions found in a wider array of outcome measurements, practice guidelines, and the principles of continuous quality improvement.

# The Vision

## *What is the vision for an integrated information system?*

The vision for an integrated information system is a fully automated system allowing data entry, retrieval, analysis, trending, profiling, and benchmarking across settings of care, between individuals, and over time. This means that all designated users in all services and settings could access the information system according to their duties in delivering care to people.

Demographic, clinical, satisfaction, cost, administrative, and other types of data would be “searchable” in this integrated information system. Data that had been previously stored separately could be matched in a meaningful way. This ideal system would create a longitudinal record for each person (patient) served so that valuable information was never lost. Such a system would fully support the information needs of healthcare workers in real-time; that is, as the events occurred, the information system would capture them.

Such a system would easily reconfigure data into usable information, according to the needs of the user—reports could be tailored, and the system would be easy to use. This ideal information system would serve as a powerful tool in clinical decision making, quality improvement, and patient education. Individual patient response to a particular treatment or service could be documented so that provider and patient could learn what best fits that person. In addition, similar patients could be grouped together to allow for population-based analysis.

This system would, of course, have all the necessary protections and safeguards for consumer privacy. Finally, this system would be completely dependable; it would never fail or “go down.”

# Barriers

## *What are the barriers to integrating healthcare information?*

There are many barriers to integrating information and to developing a common information system that would serve multiple organizations. Here are a few:

- Lack of common data definitions across organizations
- Lack of electronic data collection so that information collected manually must be “keyed in”
- Lack of a uniform classification of patient groups
- Different relevant “time cycles” for different care settings
- Different understandings of the purpose of care and of the measures of successful outcomes
- Lack of a universal patient identifier
- Worries about information confidentiality
- Previous investments in legacy systems
- Costs of new systems (access to capital), new software, or IS consultants
- User reluctance to change or learn new technologies
- Lack of confidence in the system (potential for system failure or belief that it won’t make much difference)
- Costs (in time and money) of training staff
- Beliefs that the need for integrated information will go away or diminish
- Beliefs that regulatory requirements prohibit information sharing

# Strategies

*What information system development strategies are healthcare providers and health plans pursuing?*

## Developing a Computer-Based Patient Record

One important strategy for many healthcare providers has been the development of an electronic medical record (EMR) or computer-based patient record (CPR). The terms *electronic medical record* and *computerized* or *computer-based patient record* are used synonymously in this report.

One health information consultant refers to a CPR as “a system that contains patient-centric, electronically maintained information about an individual’s health status and care,” focusing on tasks directly related to patient care (“What Is a Computer-Based” 1999). Core functions that a CPR must fulfill are:

- Provide clinical documentation and capture data
- Display and store data
- Manage clinical tasks/protocols
- Provide decision support
- Link to medical references
- Secure data
- Communicate and process

Maintained over time, integrated patient care records could make up a large longitudinal database that could be queried by age, gender, diagnosis, laboratory test result, or even by progress notes—anything that is entered into the record is searchable. The computerized patient record then could be used to support continuous quality improvement (CQI) projects, primarily through the use of quality control charts, which are regularly generated as a way to evaluate how a particular process is working (Ornstein et al. 1997).

Ornstein and colleagues discuss the advantages of a computerized patient record over a paper record. Advantages include the following:

- Large amounts of data can be consolidated, summarized, and easily tracked.

The Institute of Medicine (1997) defines an ideal CPR as:

*. . . the set of components that form the mechanisms by which patient records are created, used, stored, and retrieved. It includes people, data, rules and procedures, processing and storage devices, and communications and support facilities.*

- Data used for monitoring care and for CQI projects can be downloaded directly from the CPR.
- Once the CQI project framework is in place, the CPR variables and search criteria can be easily modified.
- Patient records remain available for continued use by others.
- Incomplete data due to lost or misplaced paper records is reduced.
- Statistical tools can be preprogrammed to produce automated control charts.

However, establishing a CPR has been a daunting task for many of the organizations that have tried it. An article on the development of computer-based patient records appeared in the May 1999 issue of *Healthcare Informatics*—a trade journal for information system experts in healthcare (Marietti 1999). The article discusses the challenges many have faced in establishing this technology.

*David Tucker earned his CIO [Chief Information Officer] stripes three years ago when he helped jump-start a computer-based patient record system (CPR) project at Hermann Hospital, in Houston. While most healthcare CIOs today are still only talking about CPRs, Tucker is already launching his second project: at Seton Healthcare Network, Austin, Texas, where he is vice president of information services. . . . Part of the problem with CPRs, as Tucker learned*

early on, is that they require CIOs to become adept at both the technology and the politics of computerizing patient records. "You can't possibly lead this from an IS or administrative standpoint. It must be clinically led," he says.

Getting physician buy-in upfront by showing clinical leaders the usefulness of the CPR is a reoccurring theme in the literature. Systems need to support clinical care management, clinic operations, point-of-care medical management, and physician connectivity. Physician connectivity and perceived relevance is an important issue. Karen Sandrick (1997) talks about the possible benefits to physicians of the CPR, including easier data collection, improved encounter forms, and effortless analysis and calculations. The potential for better patient education is also a selling point.

The market is still immature, however, and the ideal product is an elusive dream. When Mount Sinai Medical Center in New York began to plan its CPR, the management and clinical leaders spearheading the effort could not find a single product on the market that could manage the flow of the patient record across the continuum, from inpatient to outpatient to long-term care (Marietti 1999). They decided to first focus on the ambulatory care record, which would need to handle data on 350,000 to 900,000 visits per year. A review of medical records products on the market revealed shortcomings—none could cover all the functions Mount Sinai was looking for, which included management of patient information, order processing, forms customization, and cost issues.

Given the long time needed to establish a computer-based patient record—especially across large healthcare organizations—and the lack of turnkey products on the market, the great achievements of CPRs, such as automating workflow, supporting a clinical data repository, and facilitating outcomes management, have not occurred on any large scale. Some experts suggest that healthcare organizations can achieve worthwhile results by settling for a less-than-perfect CPR. A "good enough" approach is based on four principles (Gaillour 1999):

1. Aim for 100 percent clinician and physician participation in a minimum set of the easier CPR components.
2. Leverage Web connectivity and organizational intranets.
3. Use manual processes, paper, and clinical data entry when appropriate.
4. Capitalize on data outcomes and reporting early.

The key benefit of this approach, says Gaillour, is "in the incremental value. Furthermore, the organization is not stalled or sidetracked by smaller, but complex, pilot projects that cannot be extrapolated to wide clinician adoption."

Mark Hornbrook and colleagues (1998) suggest that CPR enhancements of the future should focus on these priorities:

- Measuring disease and disease episodes (for example, onset, progression, severity, and outcomes)
- Assessing and addressing concerns in the areas of functional health status, behavioral health, and social supports
- Incorporating advances in telemedicine
- Supporting lifetime medical records
- Serving as a foundation for other diverse applications (for example, payment systems and HEDIS [Health Plan Employer Data and Information Set])

## Defining Episodes of Care

Believing that care continuity will require it, some have called for the development of standard definitions for "episodes of care," that is, periods of time where a person with discernible characteristics needs healthcare services. Hornbrook and colleagues (1998) have defined a healthcare episode as:

*The period of time during which a specific disease process, illness, health care problem, or treatment process is present. It is characterized by an onset, or beginning, and a resolution, or ending, between which the health problem state applies. . . . The health care episode is a higher-order concept that deals with all reasons for contact with the health care system.*

People who were in the same episode grouping would have to be seen as clinically equivalent. An episode of care would likely involve several different encounters with health and social services providers over a period of time. All services, treatments, and interventions received would be bundled, from an information perspective, to designate them as an episode. Rosen and Mayer-Oakes (1999) point out that a healthcare episode can be different, depending on one's perspective—patient, provider, or payer, for example.

Theoretically, analyzing care according to defined episodes of care could provide a powerful method for assessing results of healthcare “inputs.” If a standard, clinically relevant product category known as an episode could be created, expected outcomes and measures of performance could be developed (Rosen and Mayer-Oakes 1999). There is no gold standard for defining episodes of care, though a number of researchers have attempted to define and construct episodes. Some have used ICD-9-CM codes to cluster certain diagnoses (Cave 1995). Others have used a computerized algorithm to identify episodes from insurance claims data (Garnick et al. 1990). There are several episode-grouper software products on the market that capture the clinical content of inpatient and outpatient settings, have a case-mix adjustment, and are based on a methodology that is empirically based. However, these products are in their infancy, and the reliability of the group software has not been demonstrated adequately (Rosen and Mayer-Oakes 1999).

As with many of the IS strategies, there are difficulties with this approach—especially with grouping disparate patient information into clinically relevant units of analysis. Since most data systems were designed to process claims or track utilization, they tend to represent isolated “line items” of clinical services, rather than meaningful medical events. One observer (Kleinke 1998) notes that “an outpatient medical encounter can generate up to five different claims: one for physician services, one for lab tests, another for radiology, another for the prescription, etc. . . . The fragmentation would not be a problem if the data streams from the various care providers and facilities were all captured by the same software, or patched together within a reliable shared infrastructure.” However, he goes on to note, the historical fragmentation and competitive nature of the different organizations and sites of care have created legacy systems that specifically preclude such interoperability. “The end result is a data chaos that makes uniform ‘encounter-building’—a necessary data preparation step upstream of any clinical information development—highly problematic.”

*To date, there exists no commonly accepted system for grouping a patient’s condition-related records over time into a clinically coherent diagnostic group, despite multiple generations of systems for describing surgeries, grouping inpatients, classifying outpatient procedures, and recording physician visits and other ambulatory services. For example, ICD-9-CM codes describe surgeries as performed at a hospital; CPT-4 codes describe these same surgeries as performed by physicians. The design of the codes for entire classes of these surgeries*

*almost never matches. Conflicting classification systems mean significant potential conflicts in how medical care is described in digital form, thus precluding the ability to draw any reliable clinical conclusions from the information (Kleinke 1998).*

Another key issue around existing experience with patient classification is that patient severity is often based on costs not clinical impact. Thus, when physicians say, “my patients are sicker,” this really translates into them saying that the severity system that is based on utilization and costs to the provider/plan/payer does not represent the clinically severity as judged by clinicians.

## Creating a Data Warehouse

Given the difficulty in actually tying together separate systems to create a real-time computer-based patient record with longitudinal information from all relevant sources, some have supported the creation of a data warehouse or repository. In such a warehouse, certain core data from each organization or setting is captured and reconfigured/ordered in a certain way to allow those from other settings to read the data, match it up with other records, or create tailored reports. One requirement is a specific patient identifier or combinations of identifiers that specifies what information is to be grouped. For example, a health plan that wishes to link its membership data with certain medical data from the clinic would have to create a common identifier between the person’s enrollment number and the medical record number.

Some organizations wishing to improve patient care for certain high-cost, high-care diseases through a disease management approach have taken this route. For example, health plans interested in monitoring patients with a particular disease need several types of data: enrollment, claims, pharmacy, lab. These data are often dispersed throughout many different information systems—the information is there but spread out (Darby 1998). One managed care giant, Kaiser Permanente, has developed a data warehouse on a disease-specific basis. Kaiser Permanente Northwest utilizes a population management program for about 15,000 diabetic members. Data from laboratories and pharmacies and some data from the clinic are pooled into a data warehouse that can be queried for very specific analyses. Information from the data warehouse is used to identify high-risk diabetic patients and those who need additional case management. Information is provided to the patients’ nurse case managers. Results are promising. In 1993 the plan determined that 48 percent of its diabetic patients had good or

excellent glucose control. By 1997 this figure had risen to 66.5 percent (Darby 1998).

Development of a data warehouse has its own drawbacks. Experts say that a full data warehouse is a costly undertaking. Estimates of cost for a health plan run up to \$.50 per member per month (PMPM)—a significant investment when the health plan is counting PMPM costs in the pennies (Darby 1998). Another problem is the lack of consistency in data definitions and a common vocabulary. According to one industry expert, developing and implementing common vocabularies is “the largest single challenge in building the longitudinal patient record because it requires changes in the basic methods of every entity involved and virtually every staff member inside each entity” (“Virtual Integration” 1999).

The problem of “populating the data repository” (that is, transferring and translating data from different sites of care or providers into the central data warehouse) was faced by Moses Cone Health System in Greensboro, North Carolina. The organization had automated health records in the early 1990s for many of its services—pharmacy, laboratory, radiology, clinics, etc.—but these legacy systems were unable to interface with the software in the central repository. Thus, the organization worked to construct a “universal language” that all of the organization’s information technology could use. The Internet is an example of this. Computer users around the world are able to connect with and browse the Internet—regardless of the kinds of systems they log on with—because of universal languages and protocols (Heimoff 1998).

## Developing Decision-Support Tools

One of the more important initiatives in integrating information is the development and use of decision-support tools. Decision support combines patient information with contemporary knowledge (research, science, accepted protocols and guidelines) and offers support to the clinician or healthcare team in managing care for a particular person/patient.

A data warehouse or clinical repository is used to support common views and guide practice—with a research and practice management component. This has also been called “electronic clinical logic.” The technology involves pooling data from multiple sources, matching it up in a logical way, and then creating a set of decision rules that can be used in a variety of ways—to identify high-risk patient groups, for example—before people experience major health events (Peterson 1998).

For example, Wellmark Blue Cross and Blue Shield of Iowa (a health plan with 1.2 million covered lives), implemented electronic clinical logic technology that helped identify patients with asthma who were at risk of hospitalization. Prior to the technology, a representative from Wellmark says that “we would have identified asthmatic patients who needed individual case managers after they had an acute event that brought them to the emergency room and they were hospitalized for it. . . . Today that same asthmatic patient probably would be identified from a series of subtle ‘warning signs’ in the plan’s integrated database” (Peterson 1998).

Some believe that the CPR’s or data repository’s most valuable role will be “at the bedside,” in that it will provide real-time access for the provider to knowledge bases and patient care information, ensuring sound decision making right at the point of care. With decision-support technology linked to the CPR, for example, the system could generate an alert for a possible drug reaction at the point of prescribing while the patient is still in the examining room, suggest alternative medications, provide drug dosage guidelines, and offer useful patient education information about how the drug should be taken and what other substances (for example, foods, liquids, herbs) might interact with the drug. The system could generate reminders for immunizations, help to automatically schedule appointments for certain high-risk patients, and provide the physician or nurse with the latest information on treatment options or protocols. The decision-support system could use a series of rules that would review claims and medical records to identify candidates for case management services in a routine, automated manner (Ullman 1998).

The potential for changing medical practice, based on “hard evidence” over time, is promising. Methods for changing practice behavior have been described and categorized as follows: education, performance feedback, financial incentives, administrative rules (regulation), and an organized quality improvement program. The automated nature of the CPR allows for timely performance feedback and practice profiling, immediate “help screens” that prompt physicians without requiring a direct request, and the ability to catalog new knowledge and best practice results that can be collected across providers and over time (Coombs and Norris 1998).

Intermountain Health Care’s LDS Hospital in Salt Lake City demonstrated that its computerized decision-support system for managing antibiotics and anti-infective agents improved quality of care. The hospital developed a computerized decision-support program that was linked to its computer-based patient records. The program provided epidemiological information and detailed

recommendations and warnings and provided immediate feedback about anti-infective regimens and courses of therapy to assist physicians.

The importance of an anti-infective decision-support program to improve quality for hospitalized patients is substantial. Infectious-disease problems cross all specialties; more than half of patients receive anti-infective agents, and these agents account for one-third to one-half of the pharmacy budget. LDS Hospital found that the program led to significant reductions in excess drug dosages, antibiotic-susceptibility mismatches, and orders for drugs to which the patients had reported allergies. The decision-support program also significantly reduced costs of anti-infective agents, total hospital costs, and hospital lengths of stay. According to R. Scott Evans, Ph.D., director of clinical epidemiology research, the advantage for physicians was that it saved time but also allowed for differences so that physicians could override the computer program suggestions (Evans 1998).

## Keeping Information Confidential

Every application discussed in the literature also carries with it protections and safeguards for patient confidentiality. Access to integrated data warehouses, for example, is limited to those directly involved in an individual's care by special access codes and passwords. Secured, dedicated cable modem lines for electronic data submission and several layers of encryption are two other strategies used by providers and plans to keep information confidential (Peterson 1998).

## Advice from the Experts

Several experts offer advice on integrating information:

- Buy equipment or invest in new technology for core physician groups and other key providers so that electronic data collection is facilitated and usable data is collected (Peter Boland, Boland Healthcare, in Darby 1998).
- Begin by focusing on a single, well-defined, clinically-relevant patient population group (Darby 1998).
- Create a common patient identifier, install standard systems or processes, and protect the security of private medical and business data (Field 1997).
- Know your data—what it contains, how it is collected, what the data definitions are, who can access the system (Jolynne Williamson, Heritage Information Systems, Inc., in Darby 1998).
- Tie the need for data to a well-defined goal with a set of simple interventions that have broad-based support—use data that is collected on a routine basis (David Knutson, HealthSystem Minnesota, and David Plocher, Ernst & Young, in Darby 1998).
- Collect/store only the data that is needed, otherwise the staff/organization could suffer data overload and the purpose for data collection (that is, to use it in a sound way) could be compromised, undermining future efforts (David Knutson, HealthSystem Minnesota, in Darby 1998).
- Make sure you have clear objectives for your initiative; set specific priorities, and identify meaningful phases where shorter-term gains can be documented (Darby 1998).

# The Internet and E-Health

## *How will the Internet affect efforts to develop integrated information systems?*

The Internet has opened up new possibilities for healthcare information integration. With its universal language and protocols, it has enabled low-cost interfacing among all computers for the first time. With the proper safeguards and firewalls to prevent unauthorized access to sensitive information, the Internet becomes a huge information network (Heimoff 1998). Healthcare providers stand to benefit from e-health because their continuum of care focus requires an expanded information conduit that only the Internet can provide. Moreover, the Internet extends existing software applications without requiring costly and time-consuming redevelopment of those applications (Lohman 1999).

## Healthcare Internet Usage

Although healthcare organizations may see the potential value the Internet can bring to their businesses, most organizations are in early stages of Internet usage. In a recent survey of e-health executives at top health plans, First Consulting Group (FCG) found that nearly 80 percent of plans believe the Internet will enable them to streamline processes, but few are far enough down the road of e-transformation to realize this potential. FCG's two recent e-health market surveys—one of leading health plans and the other of large health systems—show the industry in a nascent stage of Internet adoption (McGoldrick and O'Dell 2000).

In 1997 Ernst & Young produced a comprehensive report on the role of the Internet in healthcare. They noted that as the requirements for accurate, timely, and comprehensive information are intensifying—both in clinical and administrative decision making—the need for integration is increasing. The Internet and related technologies offer the potential to provide this integration and affect the future of healthcare. Based on their study of how leading healthcare organizations are using Internet technologies, Ernst & Young identified the following conclusions on the current state of Internet technologies in the healthcare industry:

- Healthcare lags behind other industries in leveraging the power of Internet-derived technologies.

- Security is a nonissue from a technology perspective.
- Immediate value is available to those who are proactive.
- Technology-enabled “knowledge management” is a critical success factor for surviving and thriving in the future.

Results from a survey led Ernst & Young (1997) to identify four levels of interactivity in healthcare Internet usage:

*E-health capitalizes on the Web's inherent qualities: ubiquity, ease of installation and use, and relatively low start-up costs to link all healthcare segments—health plans, integrated delivery systems, physicians, pharmaceutical and life sciences firms, and consumers—into a single, integrated entity with the “customer” at the center (Lohman 1999).*

**1. Publication of information**, including marketing, branding, and knowledge—the common denominator among all the companies interviewed.

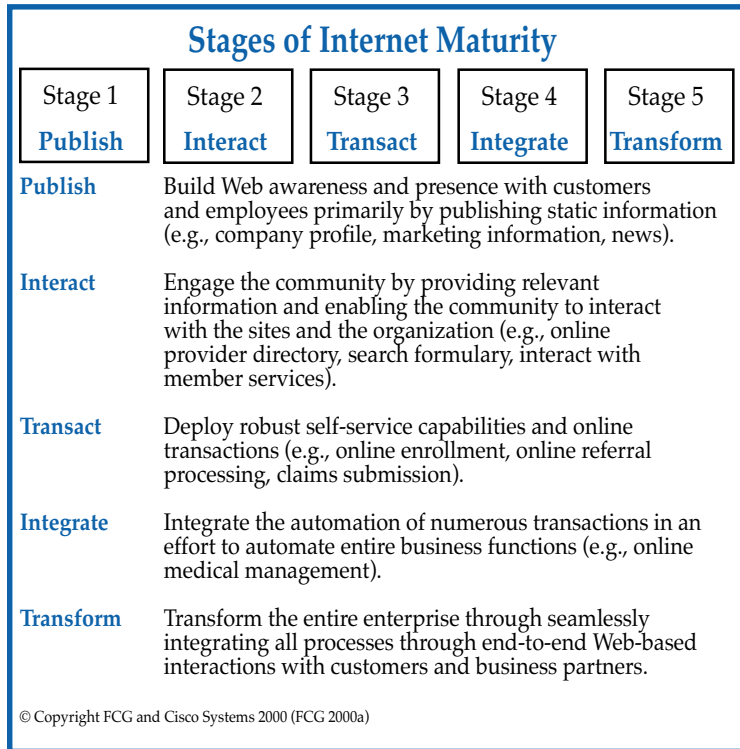
**2. Communication exchange**, including e-mail, chat groups, and document or file transfers—used by one-third of all companies interviewed.

**3. Transaction**, including database updating of legacy or speed application files—used by only a few of the companies interviewed.

**4. Collaboration**, that is, multiple users communicating at the same time while accessing and updating databases—a hypothetical future state, based on the opportunities presented by Internet technologies.

FCG also created a framework for tracking the evolution of e-health. FCG's five stages of e-health transformation are: publish, interact, transact, integrate, and transform (FCG 2000b). Comparing the market against this five-stage model, developed in collaboration with Cisco, FCG has determined health plans are solidly in Stage 2 working toward Stage 3 (see Figure 1), while most provider organizations are now entering Stage 2. The real value of Internet business is yet to come. In the early stages of transformation, there is little demonstrated return on investment. Organizations tend to focus on publishing and interacting—activities that require a substantial investment and improve customer service but do not radically reduce costs or contribute to the development of new revenue streams (McGoldrick and O'Dell 2000).

Figure 1



FCG (2000a) identifies a number of implications for the future based on the current state of e-health in healthcare:

- Leaders must be innovators.
- The window of opportunity is open now.
- Long-term market leaders will develop strategies supported by information technology, marketing, and operations leadership.
- Automating transactions will remain the near-term focus.
- Web sophistication will become a more important consideration for consumers.

Ernst & Young (1997) offers six recommendations to leverage Internet technologies and create value in healthcare organizations:

1. Actively explore Internet technologies to complement the existing information architectures within your organization.
2. Establish a corporatewide, multidisciplinary governance group to set the policies, guidelines, standards, technologies, and usage goals for Internet technologies to ensure broad representation and corporatewide compliance in deploying these technologies.

3. Evaluate the implications of these technologies on your current healthcare processes and new business opportunities.

4. Consider using Internet technologies to implement your knowledge network if your organization has little or no enterprisewide information infrastructure.

5. Ensure that before any purchasing decisions are made, those who make these decisions first consider the capabilities of these technologies and their impact on existing information architectures.

6. Establish ubiquitous access to information technologies, especially e-mail and World Wide Web capabilities.

## Internet Innovations

Internet technology vendors have brought to market a number of innovations that are stepping stones toward the vision of integrated information systems for healthcare.

### Application Service Providers

Application Service Providers (ASPs) are companies that provide application software via the Internet. Users pay for the software on the basis of their usage rather than purchasing a software license. These “rent-an-app” solutions are quickly making their way into the healthcare market. Some ASPs rent applications that are downloadable from their Web sites. Others offer customized one-stop solutions to administrative and/or clinical reporting tools. For example, an ASP might contract with vendors throughout the healthcare industry and tie them together with an Internet-based infrastructure; the ASP tailors each group of applications to individual customers, allowing users access to all the different software they will need to perform their specific functions. ASPs maintain the applications. Because they are Web-based, users don’t need an infrastructure. All they need is a computer and an Internet Service Provider (ISP) connection. Individual ASPs may function differently, but they all provide customers with similar benefits: relative cost efficiency, fast implementation, and regular upgrades (Stammer 2000).

## An Online Healthcare Community

Winona Health Online, a project launched in June 2000 in Winona, Minnesota, will provide comprehensive and personal information delivered through a high-speed network that is already well-established in this community of 30,000. This project, a partnership between Winona Health and Cerner Corporation, a Kansas City, Missouri-based healthcare information company, aims to cement relationships between care providers and consumers through the broad use and acceptance of interactive health records. The system includes a 99-bed hospital and other long-term and post-acute care facilities. By the fall of 2000 individuals will be able to renew medications, make appointments, receive lab results, and exchange messages with their physicians through [www.winonahealth.org](http://www.winonahealth.org). Information gathered in the sign-up process and through online health risk assessments will provide a baseline for community health management initiatives (Morrissey 2000).

## Interactive Technologies

Interactive technologies promise to improve workflow, information access, data collection, and quality of care. Recent developments include the following (Le 2000):

- Continuous speech recognition, intelligent and optical character recognition, and touch screen and multimedia technologies are poised for widespread adoption in the healthcare industry.
- Physicians can use natural voice commands to update patient files at the point-of-care and write e-prescriptions for automatic transmission to pharmacies.
- Patient education programs can provide interactive experiences capable of providing complete information tailored to the individual based on disease status, demographics, and learning potential.

## A National Link-Up of Electronic Health Records

The National Committee for Quality Assurance (NCQA)—an organization that accredits health plans—has theorized how a national link-up of electronic health records might occur. They describe a seven-stage process (Heimoff 1998):

1. Standardize data elements.
2. Link all systems.

3. Standardize definitions and coding of medical information.
4. Screen and monitor all data continuously.
5. Build protocols that ensure confidentiality and security.
6. Fully automate all patient record keeping.
7. Share data completely among all health providers, health plans, and public agencies.

## Conclusion

The Internet will continue to revolutionize healthcare and the ability of healthcare organizations to integrate information. The Internet and e-health offer clear benefits, including improving access to vital patient information at the point of care to reduce cost and improve care delivery (Lohman 1999). Healthcare organizations that embrace the changes offered by the Internet and related technologies will be closer to achieving the vision of integrated information.

# Case Illustration

## Developing a Better Patient Information System: An Overview of the VHA Experience

*A. Clayton Curtis, chief information systems architect for VHA, and Carol Ann Bedford, health systems specialist, spoke at the National Chronic Care Consortium's 1997 National Conference in Minneapolis, Minnesota. The following is a summary of their remarks.*

The Veterans Health Administration (VHA) healthcare system includes 171 medical centers, 450 outpatient clinics, 131 nursing homes, and 35 domiciliaries. In 1993 the activity in these settings included 1.1 million inpatient stays, 24 million outpatient visits, 50 million prescriptions, and 250 million lab tests. It is large and it continues to change. The VHA has transitioned from an insular hospital system to large service centers of primary care. Modest approaches are necessary given cost constraints. For example, implementation of a modest selection of personal computers in VA facilities would cost about three-quarters of a billion dollars. As an alternative, teleterminals are being used. In the future we plan to improve interfaces for users and devote more effort to capturing the full healthcare event.

The ambulatory setting is one major focus. Records captured include information from dentistry, dietetics, hospital-based home care, nursing, medicine (diagnostic procedures), mental health, national registries, nursing, oncology, quality management, radiology, social work, surgery, laboratory, and pharmacy. Medline and office automation tools including notes to the referring physician are available. Also, patient education and drug information are available.

### Decision-Support Systems

A decision-support system is designed to access multiple databases to provide information to drive management, resources, and patient care practices and decisions. We chose a decision-support system on the market to consolidate our data across a wide range of systems, including treating specialty, surgery, dental, clinics, outpatient prescription, IV pharmacy, unit dose pharmacy, nursing, admissions, lab results, transfer and discharge, laboratory, and radiology.

How does it work? The local patient and provider data are transferred to the VA Austin Automation Center (AAC). AAC then combines this information with financial data, and the end result

is department- and patient-specific utilization data. The data support clinical pathway development and assessment, continuous quality improvement, identification of cost reduction opportunities, and clinical research. Managers are given department-specific cost and utilization data, variance reporting, and specific costs by patient and by category. Our goal is to provide these data within 45 days of the monthly fiscal closeout.

### Chronic Disease and Prevention Indexes

The chronic disease index (CDI) and prevention index (PI) are other innovations in the VHA. CDI consists of 14 interventions that assess compliance with nationally recognized guidelines for five high-volume diagnoses. The PI consists of nine interventions that assess compliance with nationally recognized primary prevention and early detection recommendations for eight diseases. Performance benchmarks are set at 95 percent compliance. These systems involve locally developed computer software to remind providers of needed medical interventions prior to appointments and to collect data on interventions performed during patient visits.

First results from the system demonstrated a significant need for improvement. The 1996 performance evaluation showed 44 percent of providers achieved compliance for CDI and 35 percent for PI. A network team was established and within one year the system experienced significant improvement: 88 percent for CDI and 70 percent for PI. Next innovations include testing the value of videoconferencing from the patient's home. Reaching patients in rural settings and addressing the growing need for home healthcare is prompting us to experiment in this area.

### Trends

First, there is a significant increase in data collection activity. Almost everything that is done is documented in some way and put into useful forms. Some of the simplest issues can serve as stumbling blocks—the location of monitors in the clinics, where to create an opening in the wall, questions about asbestos. This process is a little like Maslow's hierarchy: once you have done some of the basics, such as lab results, then providers want actual functional support.

In this environment the VHA was forced to migrate to open systems. There is a new emphasis on buying vendor software instead of building from scratch.

For many years the VHA analyzed data at the local level. Now that clinics are being integrated into the larger VHA system, they have to design a repository to track clinical information resources on a broader scale. This repository is linked to systems supporting local operations, such as reminder notices, but it is also linked to external groups that support new business partnerships, such as contract providers. The system is designed around a master patient index to allow us to track a patient, for example, who spends the winter in Florida and the summer in Boston. Supporting data across sites is a challenge.

### Lessons Learned

- It is difficult to predict all the things that happen in the external world that will affect your operations (for example, facility consolidation).
- It is difficult to make the “build or buy” decisions. Prepare to devote time and resources to making these decisions.
- It is difficult to set priorities in large centers.
- A lot of management layers think in very short timeframes. It is difficult to get the commitment for a multi-year development, and this is what it takes to support the clinical functions.
- The burden in clinical settings is very real. Clinicians are justifiably concerned about more time away from the patient.

### Advice

- Watch out for heterogeneous systems. They can be hard to manage. Some people are well-advised to spend more and buy one complete system.
- Know what your level of customization is and what it will cost. It can cost five to seven times beyond the original cost of the system for customization needs.
- Watch out for long-term costs.
- The maintenance fees for seven applications can be as much as \$250,000 a year. Watch out for secondary costs such as the extra cost for proprietary coding systems or subscriptions to CD-ROM products.

- Do not ignore training. We all have a bad history of not making the investment in training. It does not make sense to invest in systems and not utilize them to their maximum capacity.
- Integrate, integrate, integrate...
- Tightly integrate the use of systems into operations.
- Seek the advice of your clinicians. Clinicians ought to expect relevance, value, and efficiency. On the other hand, there is a quid pro quo—clinicians need to participate in the process. No play, no pay. Peer communication is a critical success factor.
- The business and clinical cases for systems can be made; you can deliver better care and reduce paperwork if it is done right.

### Better systems do the following:

- Offer providers better access to records, that is, more timely data and fewer gaps in patient data.
- Improve the mental health of the providers because they can reduce the scout work in chasing data, develop less dependence on physical location, provide easier ways to communicate between providers, and, most importantly, allow more time to be humane caregivers.
- Benefit the patient by allowing safer and more reliable care, less duplicate questioning and testing, and more comprehensive and better coordinated care.

# Selected Articles

## Health Information Policy

Health policy in Washington is dependent on the transformation, over the next few decades, into a “paperless clinical enterprise” that permits clinicians to synthesize and apply the sum of human medical knowledge at the patient’s bedside through the medium of advanced information technology. We have a long way to go before reaching this vision.

Information technology spending in the healthcare industry has lagged far behind such spending in other industries (around 2 percent in healthcare compared to 7 to 10 percent in other information-intensive industries such as banking and insurance). “Products now being developed by the private health information technology industry run across the full gamut of tools that will wire the clinical enterprise. Some companies focus on providing ways for clinicians to originate data in digital form, others concentrate on paperless solutions for clinical departments, others are developing specialized data warehouse applications.”

Running up against this activity are several issues that may require a larger policy debate about healthcare information, including: medical privacy, regulation of clinical decision-support software as a medical device by the Food and Drug Administration (FDA), and coverage of telemedicine.

Clinical decision-support software applications are intended to run in freestanding physician workstations in offices or at the patient’s bedside. They are designed to support the automated retrieval and analysis of relevant information and to automate those aspects of clinical decision making that are reducible to prospectively determined rules. The issue under consideration by the FDA is whether, at some point, the amount of “clinical thinking” done via the workstation will become sufficiently sophisticated to constitute the practice of medicine. “Clinicians might come to rely on ‘what the box says’ to make critical decisions about patient care. To the extent that they do, the FDA sees a clear mandate to regulate.”

Source:  
Moran, D. 1998. “Health Information Policy: On Preparing for the Next War.” *Health Affairs* 17 (November/December): 9–22.

## Progress in Building Health Information Networks Lags

Computer networks offer great promise as resources for improving the quality of healthcare, lowering its cost, and enabling consumers and providers to make more intelligent choices. Yet, even as network development accelerates, there has been no government and private sector resolution of two of the most fundamental questions about computerized health information: how to keep private what ought to be private and how to make public what ought to be public. The recent evolution of health information networks has narrowed the scope from broad public purposes to limited commercial ones. Proposals by the Bush and Clinton administrations have failed to win congressional approval, creating a policy void in which community health information and quality assurance have been left entirely to voluntary action. Author Paul Starr makes the argument that the government ought to ensure that consumers and other purchasers have the information to evaluate the cost and quality of competing plans and providers.

Source:  
Starr, Paul. 1997. “Smart Technology, Stunted Policy: Developing Health Information Networks.” *Health Affairs* 16 (May/June): 91–105.

## Enhancement Priorities for Computerized Patient Records

Computerized patient records are the focus of the October/November 1998 issue of *Effective Clinical Practice*. The issue contains several articles that “assess the status of CPR implementation in mainstream organizations with full-time clinicians delivering care on a daily basis.” In one article, Mark Hornbrook and colleagues discuss the potential of CPRs to track risks, diagnoses, and patterns of care and outcomes across large populations. The authors suggest that CPR enhancements of the future should focus on the following priorities:

- Measuring disease and disease episodes (for example, onset, progression, severity, and outcomes)
- Assessing and addressing concerns in the areas of functional health status, behavioral health, and social supports

- Incorporating advances in telemedicine
- Supporting lifetime medical records
- Serving as a foundation for other diverse applications (for example, payment systems and HEDIS)

Source:

Hornbrook, M., M. Goodman, P. Fishman, and R. Meenan. 1998. "Health-Based Payment and Computerized Patient Record Systems." *Effective Clinical Practice* 1 (October/November): 66–72.

## CQI and Computer-Based Patient Record

The department of family medicine at the Medical University of South Carolina developed an innovative infrastructure for a continuous quality improvement process that capitalized on the existing computer-based patient record system. This infrastructure could serve as a template for other organizations looking to use the CPR as a CQI tool.

Maintained over time, the CPR information makes up a large, longitudinal database that can be queried by age, gender, diagnosis, laboratory test result, or even by progress notes—basically anything that is entered into the CPR is searchable. The CPR then can be used to support CQI projects, primarily through the use of quality control charts, which are regularly generated as a way to evaluate how a particular process is working.

There are several advantages of CPR over paper medical records:

- Large amounts of data can be consolidated, summarized, and tracked easily.
- CQI data can be downloaded directly from the CPR.
- Once the CQI project framework is in place, the CPR variables and search criteria can be modified easily.
- Patient records remain available for continued use by others; incomplete data due to lost or misplaced paper records is reduced.
- Statistical tools can be preprogrammed to produce automated control charts.

Specific ongoing multiple patient care-related projects include: optimizing the treatment of acute bronchitis, improving adherence to practice guidelines for patients with diabetes mellitus,

improving the recognition and treatment of tobacco abuse, and improving blood pressure control in patients with stage II or higher hypertension.

Source:

Ornstein, Steven M., et al. 1997. "The Computer-Based Patient Record as a CQI Tool in a Family Medicine Center." *The Joint Commission Journal on Quality Improvement* 23 (July): 347–61.

## Key Factors to Successful CPR Implementation

For several years healthcare organizations have been searching for a CPR that is fully integrated and interactive and that provides patient information when and where it is needed. Sandrick writes about several important elements that can help facilitate one's efforts to successfully implement a CPR system. A reliable information infrastructure is an essential element, especially as integrated delivery systems provide and try to coordinate care in more settings. Another element is caregiver and, especially, physician willingness to use information systems to improve care of the patient. Buy-in from the caregivers can be achieved by involving clinical staff in the building of the CPR, including the database, screens, and decision-support structure. Physicians will appreciate the CPR if it makes the method for data collection painless, for example, by improving the encounter form and allowing calculations and conversions to be done automatically. Physicians will also appreciate the ability to turn collected data into patient-friendly information that can be used for patient education. Finally, a CPR program should always be looking ahead to the possibilities that new technology provides for system improvements.

Source:

Sandrick, Karen. 1997. "CPRs: Why Some of the Best Work so Well." *Health Management Technology* 18 (October): 10–6.

## Creating an Electronic Repository for Clinical and Research Use

The Scott and White Memorial Hospital and Clinic (SWMHC) in Temple, Texas, faced a problem historically common to chronic care networks (CCNs)—none of its major IT systems were designed to share information with the others. This lack of integration created big headaches for the organization. Clinicians, for instance, had to

resort to paper charts if they wanted a long-term view of a client's progress. Researchers were largely unable to analyze the outcomes of different treatments. SWMHC made progress toward integration by establishing a central electronic repository that could assist both clinicians and researchers. This repository is designed to contain data on "patient care, administration, and billing to accommodate both patient care and aggregate analyses." The hardware is an IBM RS6000 R50 server; the software is Synthesys Technologies' EMRx. SWMHC reported savings of more than one million dollars, in large part because of fewer patient record pulls. Clinicians and researchers also reported enhanced productivity and improved patient outcomes; for example, clinical notes are screened for potential adverse drug interactions.

Source:

"Electronic Repository Saves \$1 Million Plus." 1998. *Health Management Technology* 19 (December): 29.

## Case Studies of What Works

*Health Management Technology* recently selected winners of its "What Works" awards, highlighting healthcare information technology innovations that may be of particular interest to CCNs. The top three winners were:

1. Scott and White Memorial Hospital for its mobile training facility that allows an information system conversion team to conduct "off-site-on-site" training.
2. The University of Pennsylvania Health System for its prototype disease management system that provides "electronic distribution of best-practice clinical guidelines, patient and provider education materials, online data entry, and an outcomes database and reporting mechanism."
3. Children's Hospital in Cincinnati for its customized Lotus Notes application developed by Chart Links. This "comprehensive workflow application has minimized documentation time and increased efficiency and communication while automating the entire patient care cycle."

Source:

Tjapkes S. 1999. "The What Works Awards." *Health Management Technology* 20 (February): 12-4.

## Episode Grouper Products

In the March 1999 issue of *The Joint Commission Journal on Quality Improvement*, Rosen and Mayer-Oakes describe four episode grouper software products that use administrative data to monitor and analyze episodes of care. The authors compare the tools according to purpose, case-mix adjustment, comprehensiveness, and clinical flexibility. The authors also describe differences in how the software products define an episode of care. The four products described are Episode Treatment Groups, Clinical Episode Groups, Physician Review System, and CareTrends.

Rosen and Mayer-Oakes conclude that "although all the groupers reviewed have many strengths, much developmental work still needs to occur in order to standardize the measurement and operationalization of episodes of care as units of analysis. Furthermore, until the data sources used are more valid and reliable, they will at best remain gross screening measures of quality."

Source:

Rosen, A., and A. Mayer-Oakes. 1999. "Episodes of Care: Theoretical Frameworks versus Current Operational Realities." *The Joint Commission Journal on Quality Improvement* 25 (March): 111-28.

## Building and Using Benchmark Databases

Information system investments should include the development and use of benchmark databases, which have important strategic payoffs such as improving clinical and operational performance, strengthening community health initiatives, boosting efficiency, successfully negotiating favorable contracts, and profitably managing them. Simply stated, benchmarking means comparing aspects of your organization's performance with those of others—usually the leaders.

David Schwartz, president and publisher of *National Health Information*, identifies the following key benchmarking categories:

- **Clinical**—examples: procedure- or disease-specific outcomes, complication rates, length of stay (LOS) rates, readmission rates.
- **Community health**—examples: prevalence of specific risk factors such as obesity or smoking and screening and immunization rates for specific diseases.

- **Operations performance**—examples: “back-office” functions such as average days in accounts receivable as well as satisfaction rates in clinical and operations areas such as waiting times and complaint rates.
- **Cost and efficiency**—examples: cost benchmarks on a per procedure, per admission, per diagnosis, or per member basis as well as PMPM costs, LOS, bed days per 1000, admits per 1000, referral rates.
- **Contracting**—examples: actual or average PMPM rates along with utilization data, severity scores, cost data, procedure data, population/demographic data.

He also identifies sources of benchmark data, including consulting and actuarial firms, professional associations and specialty societies, and federal and state agencies.

In recognition of the critical importance of benchmarking data to its members in this era of accountability, the Medical Group Management Association (MGMA) is in the process of developing an extensive and reliable benchmarking database that will enable practices of all sizes and payer arrangements to compare themselves with their peers. As a first step, MGMA has analyzed its cost survey data to identify 16 “better practices”—multispecialty groups with high physician incomes and below-median costs. They have the following common characteristics: superior information systems, physician-administrator leadership teams, cost controls, successful strategic plans, and greater use of medical assistants.

Sources:

Schwartz, D. 1998. “Creating a Benchmark Database.” *Health Management Technology* 19 (January): 66.

Jaklevic, M. C. 1997. “Benchmarking Push.” *Modern Healthcare* 27 (15 December): 42.

## Systems Integration: Case Report on Project Spectrum

In 1994 BJC Health System in St. Louis, Missouri, began developing an integrated information system that would “reach beyond the boundaries of the acute care setting to facilitate a true continuum of care.” The project team focused on three objectives: integrated care, physician linkages, and medical management. The result was Project Spectrum, an information system now in its fifth year. Lessons learned by Project Spectrum staff include:

- “First and foremost, there is no quick fix. True integration means a long-term, institutional commitment to information system objectives.” For example, it takes time and patience to standardize medical lexicons across sites.
- “Most important, the stakeholders must be informed, enthusiastic, and supportive of an initiative that’s designed for future growth.”

Source:

Weiss, D. A., and R. Ricci. 1999. “See the Light: Project Spectrum Solves Some of Healthcare’s Most Challenging IT Problems.” *Healthcare Informatics* 16 (May): 105–11.

## Managed Care and Public Health Look to Data-Sharing Partnerships

As more organizations see value in community-based health assessment and management, managed care plans and public health agencies are increasingly looking for ways to build data linkages. Examples of these data-sharing partnerships in various states include:

- Missouri: Healthcare providers and plans and public health officials have built onto HEDIS to develop the Missouri Health Indicator Set (MoHIS). Specifically, they are looking to link state birth records, death records, hospital discharge records, and cancer registries with plans’ enrollment information.
- Arizona: Health officials are using Centers for Disease Control and Prevention software to construct a statewide immunization registry called PC-Immunize. Physicians will be able to access local databases for up-to-date immunization information.
- Maryland: As mandatory Medicaid managed care gets underway, health officials have established baseline data on infant mortality and low birth-weight infants in order to track maternal and child health and private-sector providers.
- California: Managed care plans with Medicaid risk contracts must enter into agreements with local health departments. The plans must show that they are offering family planning, child and maternal health services, immunizations, tuberculosis treatment, diagnosis and treatment of sexually-transmitted diseases, and HIV testing.

- Minnesota: Managed care plans are developing relationships with 50 community health services agencies.

Many challenges are ahead for these partnerships, including issues such as confidentiality, consensus on data definitions and terms, data availability, cost, coordination, and data system differences. Although these public-private, data-sharing partnerships have a long way to go, data coordination is seen as an important step in ensuring better care across the board.

Source:

Darby, Mary. 1997. "Managed Care Plans and Public Health Agencies Take First Steps Toward Data-Sharing Partnerships." *State Health Watch* 4 (January): 5-6.

## Massachusetts Consortium: Model for Data Interchange

Early success achieved by the Massachusetts Health Data Consortium in the concept of using data gateways as a means of sharing data among its 20 members has attracted the attention of JCAHO (Joint Commission on Accreditation of Healthcare Organizations) and NCQA representatives who see the innovative initiative as a possible national model of electronic standards for quality measurement and accreditation. The Consortium has chosen to use data gateways, rather than a costly data warehouse, to facilitate data interchange. Gateways enable a user at one healthcare organization to reach into the information system of another facility to access pertinent medical information without removing the data from the host information system.

Eric Schneider, M.D., consulting health services research scientist at NCQA comments, "I think what's unique and promising about the Massachusetts vision is that rather than creating a central storage area for data, everyone keeps the data they have in their own purview and they create standardized ways of communicating those data to and from other organizations. In a sense, they are creating a virtual warehouse where people with appropriate access can get the data they need."

The Consortium's greatest challenge has been finding a method of standardization and integration. The Consortium's standards are based on those developed by the American National Standards Institute (ANSI). Financial incentives created by the Kennedy-Kassebaum bill were a major impetus for members to commit to standardization, a significant step given the

presence of legacy systems that prevent easy reprogramming for communication with other systems.

Additional challenges facing Massachusetts and other state initiatives include:

- The lack of federal legislation on confidentiality and, related to this, the requirement for a universal patient identifier. Without identifiers, it will not be possible to cross settings and build episodes of care.
- A mechanism for developing consensus among members, primarily on the issue of selecting a standard for computer language.

Source:

"Massachusetts Makes Progress on Regional Standardization." 1997. *Report on Healthcare Information Management* 5 (February): 1-4.

## Technology Meets Assessment: Indiana's Automated Assessment Demonstration

Care planning and quality assessment have entered the computer age in Indiana's Area Agencies on Aging (AAA). In a statewide demonstration funded by The Robert Wood Johnson Foundation, case managers are using an automated assessment tool, the Normative Treatment Planning (NTP) program, as part of a provision of community-based long-term care services under Indiana's Medicaid waiver and CHOICE programs. Some AAAs also use the Client Feedback System (CFS), which enables service providers to gain client feedback on the quality of their care. Both programs run on notebook computers, which AAA case managers carry with them on home visits.

Important features of this major initiative are briefly highlighted:

- The NTP is a set of guidelines and decision trees that enable case managers to assess needs and prescribe home-based long-term care services. It is the product of a large-scale collaborative effort involving AAA case managers, vendors, consumers, and state agency staff.
- The case manager uses the NTP to develop a care plan from a list of needs and recommended services generated from the decision trees. The program permits the case manager and the client to evaluate whether treatment goals have

been met and to determine and record whether client-oriented goals have been met.

- After completing or updating the care plan each quarter, the case manager can upload the care plan to the NTP management information system at the AAA office. This capability enables case managers and supervisors to review individual care plans, monitor attainment of treatment and evaluation goals, and chart patterns and trends in client outcomes and care delivery.

Indiana's experience has shown that:

- It is feasible to automate the care planning and quality assurance processes.
- Nearly all case managers can become proficient at using the computer notebook.
- Clients find the automated assessment process to be less intrusive than manual note taking.
- The automated programs provide invaluable data on the nature of clients and the services they need, gaps in the availability of services throughout the state, and client perception of the quality of services provided.

Source:

Kinney, Eleanor, et al. 1997. "Automating Assessment for Community-Based Long-Term Care: Indiana's Experience." *Generations* 21 (spring): 62-5.

## Patient Registry and Health Promotion

The identification and tracking of at-risk individuals are important to the integration of care for populations served. The Center for Health Promotion at HealthPartners in Minneapolis has developed a Partners for Better Health Registry from administrative databases. Using the administrative databases allows the registry to obtain information that is based on clinical encounters, rather than on self-reported information from self-assessment surveys. The developers of the registry claim that the development of a clinical encounter-based registry in combination with self-reported risk assessment data will aid in efforts to reach hard-to-reach groups for health improvement and services, will increase the size of the population that can be targeted for interventions, and can provide useful information for health promotion programs.

HealthPartners found that the cost difference of identifying individuals at risk through the

encounter-based method and a self-report survey was dramatic. The cost of identifying heart disease and diabetes through self-report surveys was approximately \$13.50, while the cost of identifying individuals using existing administrative databases was \$.40.

The registry raises issues of patient privacy, confidentiality, and the patient-provider relationship, which are treated strictly and seriously. Only assigned personnel have access to the database and can generate the query results. Information generated at the individual level is directly linked to the patient's medical record and is not shared with employers. Nicolaas Pronk, Ph.D., director of the Center for Health Promotion, believes that the development of the registry "has the ability to allow for targeted efforts that address the need of individuals and specific groups of patient" and will aid in the "appropriate assignment of resources for health improvement and disease prevention initiatives."

Source:

Pronk, Nicolaas P., et al. 1997. "Building a Patient Registry for Implementation of Health Promotion Initiatives: Targeting High-Risk Individuals." *HMO Practice* 11 (March): 43-6.

## Customizing Patient Education and Self-Care Information

An essential part of empowering patients is to provide them with information that is relevant to their conditions and understandable. A new clinical software tool, Patient Ed, is designed to help providers educate patients more effectively. The software generates instructions, which have been approved by the American Academy of Family Physicians Health Education Program, for an individual patient. These instructions can be used in conjunction with a nurse consultation as a way to provide more effective patient education.

The goals of the software program are to tailor the information to a specific patient, to empower the patient toward better self-care, to reduce medication errors by providing comprehensive drug reference information, to decrease physician liability, and to reduce office paperwork and streamline administrative support. Patient Ed is a product of Medifor of Port Townsend, Washington.

Source:

"Software Program Generates Customized Patient Information." 1997. *Healthcare Demand and Disease Management* 3 (October): 157-9.

## Computer Technology Applications for Health Consumers

Exciting consumer-focused applications of computer technology demonstrate its power to help individuals become better informed about their health risks, available options for health improvement, and use and access to their health plan services. Here are several innovative examples:

- HealthCompass, dubbed “a consumer health information system of the future,” is under development by Denver-based HealthMagic, Inc., in collaboration with Henry Ford Health Plan, Detroit, and Blue Cross/Blue Shield of Minnesota, for use by residents of Celebration, a model community in central Florida. Among its key features: a personal and confidential lifelong health record, secure messaging to healthcare providers and others designated by the consumer, an online medical library, the ability to electronically schedule appointments and receive referrals, pre-visit symptom descriptions, a baby book, caregiver services, self-care services, alternative medicine/complementary health, as well as Internet support and discussion groups.
- Allina HealthVillage is an Internet site developed in partnership with IBM Global Healthcare Industry that provides Allina Health System’s Medica Health Plan (Minneapolis) members with easy-to-use, round-the-clock access to medical and health plan information, such as a provider directory, online member services, library services, e-mail links to advice nurses, health and wellness information, and online registration and schedules of classes and seminars. Following the completion of a three-month pilot, the HealthVillage is about to be made available to an initial group of members and will eventually be expanded to a wider group of members, providers, and employers.
- Neighborhood Networks is a HUD program that uses computer technology to empower residents of assisted and insured housing to become more self-sufficient, employable, and better informed about issues affecting their lives and communities. Catholic Charities housing developments host several Neighborhood Network centers in Maryland. For more information, contact the Neighborhood Network Information Center at (888) 312-2743.

Sources:

“Neighborhood Networks and Telehealth: Exploring the Possibilities.” 1997. *AAHSA Currents* 12 (November): 6.

Peoples, C. 1997. “Improving Quality of Life Through Computer Technology.” *AAHSA Currents* 12 (November): G.

“Putting Health Information in Consumers’ Hands.” 1997. *Healthcare Forum Journal* 40 (November/December): 16.

Sunquist, J. 1997. “The HealthVillage Pilot: Tuning Up an Internet Solution.” *Health Management Technology* 18 (November): 38–9.

# References

- Cave, D. G. 1995. "Profiling Physician Practice Patterns Using Diagnostic Episode Clusters." *Medical Care* 33:463–86.
- Coombs, J., and T. Norris. 1998. "The Electronic Record: Linking Patient Care and the Management of Quality in Clinical Practice." *New Medicine* 2(3): 215–22.
- Darby, Mary. 1997. "Managed Care Plans and Public Health Agencies Take First Steps Toward Data-Sharing Partnerships." *State Health Watch* 4 (January): 5–6.
- . 1998. "Making the Most of Data for Disease Management." *The Quality Letter for Healthcare Leaders* 10 (September): 1–9.
- Electronic Repository Saves \$1 Million Plus. 1998. *Health Management Technology* 19 (December): 29.
- Engert, E., and D. Emery. 1999. "Integrated Delivery Systems: Non Fait Accompli." *Managed Care Quarterly* 7 (winter): 29–38.
- Ernst & Young LLP. 1997. *The Role of the Internet in Health Care: Current State*. Monograph 2 (February) of *Health Care Cybervision: The Role of the Internet in Health Care*. N.p.: Ernst & Young LLP. (Printed from the Ernst & Young Web site, [http://www.ey.com/global/gcr.nsf/US/Library-Health\\_Care-Ernst\\_&\\_Young\\_LLP](http://www.ey.com/global/gcr.nsf/US/Library-Health_Care-Ernst_&_Young_LLP))
- Evans, R. S., et al. 1998. "A Computer-Assisted Management Program for Antibiotics and Other Anti-Infective Agents." *NEJM* 338 (22 January): 232–8.
- Field, Tom. 1997. "Information Infrastructure: Managed Share Networks." *CIO Magazine* (15 June). (Printed from the *CIO Magazine* Web site, [http://www.cio.com/archive/061597\\_information.html](http://www.cio.com/archive/061597_information.html).)
- First Consulting Group (FCG). 2000a. *First Reports—Health Plans on the Road to E-Health: New Findings from Two Studies of Leading Health Plans*. (January). Long Beach, Calif.: First Consulting Group. (Printed from the First Consulting Group Web site, [http://www.fcg.com/knowledge/first\\_reports.asp](http://www.fcg.com/knowledge/first_reports.asp).)
- . 2000b. *First Reports—Health Systems on the E-Health Path: A Survey of Scottsdale Institute Members*. (May). Long Beach, Calif.: First Consulting Group. (Printed from the First Consulting Group Web site, [http://www.fcg.com/knowledge/first\\_reports.asp](http://www.fcg.com/knowledge/first_reports.asp).)
- Gaillour, F. 1999. "Rethinking the CPR: Is Perfect the Enemy of the Good?" *Health Management Technology* 20 (May): 22–5.
- Garnick, D. W., et al. 1990. "Services and Charges by PPO Physicians for PPO and Indemnity Patients: An Episode of Care Comparison." *Medical Care* 28:891–907.
- General Accounting Office (GAO). 1991. *Automated Medical Records Hold Promise to Improve Patient Care*. Washington, D.C.: General Accounting Office.
- Heimoff, Steve. 1998. "The Irrepressible Computer." *Healthcare Forum Journal* 41 (January/February): 14–9.
- Hornbrook M., M. Goodman, P. Fishman, and R. Meenan. 1998. "Health-Based Payment and Computerized Patient Record Systems." *Effective Clinical Practice* 1 (October/November): 66–72.
- Institute of Medicine (IOM). 1997. *The Computer-Based Patient Record: An Essential Technology for Health Care*. Revised edition. Washington, D.C.: National Academy Press.
- Jaklevic, M. C. 1997. "Benchmarking Push." *Modern Healthcare* 27 (15 December): 42.
- Kinney, Eleanor, et al. 1997. "Automating Assessment for Community-Based Long-Term Care: Indiana's Experience." *Generations* 21 (spring): 62–5.
- Kleinke, J. D. 1998. "Release 0.0: Clinical Information Technology in the Real World." *Health Affairs* 17 (December): 23–37.
- Le, Yen. 2000. "Nine Hot Technology Trends: Interactive Technologies." *Healthcare Informatics* 17 (February): 70–2.
- Leape, L., et al. 1995. "Systems Analysis of Adverse Drug Events." *Journal of the American Medical Association* 274 (1): 35–43.
- Lohman, Philip. 1999. *E-Health: Putting Health on the Net*. A First Consulting Group White Paper (December). Long Beach, Calif.: First Consulting Group. (Printed from the First Consulting Group Web site, [http://www.fcg.com/knowledge/white\\_papers.asp](http://www.fcg.com/knowledge/white_papers.asp).)
- Marietti, C. 1999. "O Pioneers! Trail-Blazing CIOs Are Leading Healthcare across the CPR Frontier." *Healthcare Informatics*. 16 (May): 63–8.

- "Massachusetts Makes Progress on Regional Standardization." 1997. *Report on Healthcare Information Management* 5 (February): 1–4.
- McGoldrick, Chris, and Steve O'Dell. 2000. *First Reports—Where Will the Road to E-Health Lead? Ten E-Health Trends*. (May). Long Beach, Calif.: First Consulting Group. (Printed from the First Consulting Group Web site, [http://www.fcg.com/knowledge/first\\_reports.asp](http://www.fcg.com/knowledge/first_reports.asp).)
- Moran, D. 1998. "Health Information Policy: On Preparing for the Next War." *Health Affairs* 17 (November/December): 9–22.
- Morrissey, John. 2000. "Week in Healthcare—Minn. Town to Get Health Data Online." *Modern Healthcare* 30 (12 June): 18.
- Mrs. Dorothy Peterson. 1995. Evanston, Illinois: Terra Nova Films.
- "Neighborhood Networks and Telehealth: Exploring the Possibilities." 1997. *AAHSA Currents* 12 (November): 6.
- Ornstein, Steven M., et al. 1997. "The Computer-Based Patient Record as a CQI Tool in a Family Medicine Center." *Journal on Quality Improvement* 23 (July): 347–61.
- Peoples, C. 1997. "Improving Quality of Life Through Computer Technology." *AAHSA Currents* 12 (November): G.
- Peterson, C. 1998. "Using Technology to Target Disease Management Approaches." *Healthplan* 39 (May/June): 15–9.
- Pronk, Nicolaas P., et al. 1997. "Building a Patient Registry for Implementation of Health Promotion Initiatives: Targeting High-Risk Individuals." *HMO Practice* 11 (March): 43–6.
- "Putting Health Information in Consumers' Hands." 1997. Special Section: Celebration Health. *Healthcare Forum Journal* 40 (November/December): 16.
- Rosen, A., and A. Mayer-Oakes. 1999. "Episodes of Care: Theoretical Frameworks versus Current Operational Realities." *The Joint Commission Journal on Quality Improvement* 25 (March): 111–28.
- Sandrick, Karen. 1997. "CPRs: Why Some of the Best Work so Well." *Health Management Technology* 18 (October): 10–6.
- Schmitz, R. 1999. "Building Global Billing and Payment Systems." *Managed Care Quarterly* 7 (winter): 16–28.
- Schwartz, D. 1998. "Creating a Benchmark Database." *Health Management Technology* 19 (January): 66.
- "Software Program Generates Customized Patient Information." 1997. *Healthcare Demand and Disease Management* 3 (October): 157–9.
- Stammer, Lisa. 2000. "Nine Hot Technology Trends: Application Service Providers." *Healthcare Informatics* 17 (February): 46–8.
- Starr, Paul. 1997. "Smart Technology, Stunted Policy: Developing Health Information Networks." *Health Affairs* 16 (May/June): 91–105.
- Sunquist, J. 1997. "The HealthVillage Pilot: Tuning Up an Internet Solution." *Health Management Technology* 18 (November): 38–9.
- Tang P., M. Iaworski, C. Fellencer, et al. 1996. "Clinician Information Activities in Diverse Ambulatory Care Practices." In *Proceedings of the 1996 AMIA Annual Fall Symposium*, ed. J. J. Cimino. Washington, D.C.: American Medical Informatics Association.
- Tjapkes S. 1999. The What Works Awards. *Health Management Technology* 20 (February): 12–4.
- Ullman, M. 1998. "Beyond Report Cards: Managing Clinical Performance." *New Medicine* 2:241–7.
- "Virtual Integration Alters Information Technology Demands." 1999. *Report on Healthcare Information Management* 7 (January): 5–7.
- Weiss, D. A., and R. Ricci. 1999. "See the Light: Project Spectrum Solves Some of Healthcare's Most Challenging IT Problems." *Healthcare Informatics* 16 (May): 105–11.
- "What Is a Computer-Based Patient Record System?" 1999. *Healthcare Perspective*. (7 June): 1–8.