

Part B. Information Systems and Information Technology Solutions

*There are three roads to ruin; women, gambling and technicians.
the most pleasant is with women, the quickest is with gambling,
but the surest is with technicians.*

Georges Pompidou (1911–1974)

This section aims to forecast the direction of automation for health services information systems. An inclusive view of the likely technological trends can provide the health services manager and IS&T professional with a useful roadmap for planning the implementation. One central assumption of any information systems design and implementation is that all viable systems must align themselves with the growing trend toward placing the patient at the center of the health services delivery process.

B.1. Healthcare Information Systems Outlook

To provide a sound basis for a high-quality health service, first and foremost healthcare organizations need sufficient and capable staff working in adequate facilities. It also needs proper work processes, including processes for monitoring and improving clinical and service quality essentials. Given those essentials there is now worldwide evidence that modern information and communication technologies can increasingly make a dramatic improvement to healthcare quality. Why is this changing?

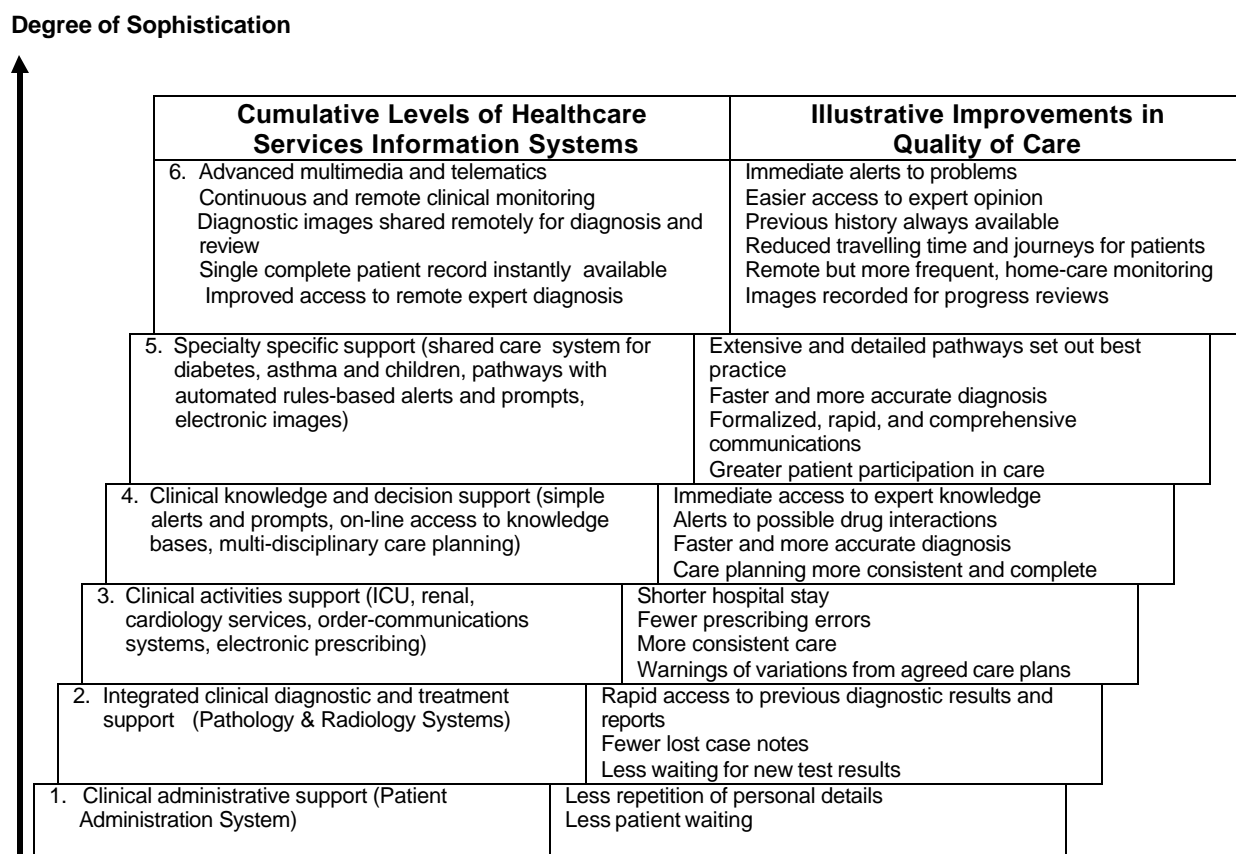
The focus of research, applications, and investment in systems has shifted during the 1990's from replacing clerical work to direct clinical support. Similarly, in communication technologies the focus has shifted from sending simple point-to-point messages about laboratory results, for example, to the creation of virtual electronic health records. The use of mobile computing means these can be created and accessible from almost any point. Finally, using large databases to pull together data from health, social, and economic sources at a fraction of their former costs means that the combined health histories of millions of people can be used to predict the future health needs of any given population and to allocate and prioritize resources accordingly. Informatics contribution to the quality of care is therefore about both individuals and populations (Figure 1).

B.1.1. Healthcare Information Networks

From the information perspective, the term "Healthcare Information Network" (HIN) describes many combined systems functions that utilize communication technologies, singly or in concert, to meet the needs of a specific client. HIN applications can provide health services information and integrated

functionalities within an institution or throughout multiple institutions and can provide the technical foundation for managing and concurrently accessing clinical and administrative information throughout the continuum of care. It can provide the framework and applications whereby all stakeholders share patient and population information.

Figure 1. Advanced Informatics Improves Quality and Gains



B.1.1.1. Healthcare Information Network Design

Healthcare information networked applications enable healthcare providers to have up-to-date information on care and services provided to patients — whether they are treated or seen in the family practitioner's office, a specialist's clinic, an inpatient health service, or an emergency facility.

The Healthcare Information Network (HIN) provides an architecture and infrastructure to meet the information needs of numerous constituents. Equally important, it should be designed to be scalable to support the needs of a growing managed care organization, payer, provider, or integrated delivery network.

In a multi-institution environment, HIN can provide the electronic framework to share information and business processes among providers, payers, employers, government agencies, and others touched by the health delivery system, even patients themselves. HIN applications allow integrated delivery networks formed of partners in contracting relationships to manage this "virtual institution" without compromise of data and information availability. In a single institution environment, such network can provide the framework to share information and business processes among departments with disparate information systems and provides the ability to extend information access to physician partners.

Another advantage of a properly designed information network is that it should not require the overhaul of participants' current information systems. Network architects should make every attempt to protect the investment in pre-existing information infrastructure and applications, and end-users need to interact with different legacy environments in a common "look-and-feel" interface. In some cases, this can actually increase the useful life of their current information systems applications.

Research in leading-edge health services institutions around the world has identified these major categories of potential benefits that accrue to the institution establishing a Healthcare Information Network (HIN), ideally including a Computer-based Patient Record (CPR):

- *Improved Clinical Quality* - Physicians, nurses, therapists, and other caregivers, armed with up-to-date information at the points of care, can provide better-quality care in the clinical setting. In addition, it is generally recognized that over the long term, better and more complete clinical data available electronically will produce improved outcomes.
- *Reduced Costs* - Health services institutions can increase administrative efficiency, lower medical costs, and achieve real labor savings by using the network to perform time-consuming manual chores. This is particularly true of traditionally cross-institution transactions such as referrals, claims, eligibility, and even clinical data.
- *Improved Customer Service* - Health services institutions can use the network to provide better, faster information over telephone help lines, reduce waiting time in doctors' offices, and avoid repeated filling out of forms by pre-populating them with information from the HIN.

B.1.1.2. Features of a Healthcare Information Network

Some of the key features of a capable HIN are:

- *Global Registration* - This application overlays or "front-ends" other registration and admission applications. It addresses numerous user requirements including: common access to disparate admission and registration applications; the ability to register a patient for services from remote locations such as physicians' offices or clinics; and simplified registration across multiple systems technologies.

- *Professional Communication* - This provides the ability to communicate with any user on the network through e-mail, bulletin board services for common areas of interest, announcements, and general broadcast information, fax server capabilities to communicate or transmit information from the network to users who are not electronically connected (such as faxing a referral request to a physician who is not connected to the network), and gateway capabilities to other non-HIN electronic mail facilities.
- *Claims Management* - This supports the ability to access, upload, transmit, and support response processing of standard claims forms from physicians, health services institutions, and other provider settings to payers, managed care plans, government plans, and other entities providing payer functions.
- *Clinical Documentation* - This provides authorized users the ability to access clinical information from the source repository/data store of that information, including laboratory results, dictated reports from transcription systems, radiology results, etc. (This can be used in lieu of a fully fledged CPR.)
- *Master Patient Index* - These applications provide an indexing mechanism to identify people and other items of interest throughout the network. The index creates a unique identification number which is "mapped" to all other known identifiers about the item of interest. It provides the ability for the end user to identify a patient in the network by the identifier that the user knows. This makes all the other identifiers, by which that patient may be known in other applications, transparent to the end user. It provides the institution the ability to maintain multiple identifiers to support operations in different user environments, while minimizing invasiveness of legacy applications. It also has the ability to map information of interest throughout the extended health services institution, including physician offices, clinics, health services institutions, payers, employers, and governmental agencies, and the ability to map to different legacy application identifiers both within institution and inter-institution.
- *Health Administration* - These applications provide many aspects of administrative processing of patients and their associated information as they progress through their encounters with the health delivery system. Business issues addressed with these applications include: capturing information only once, at the point of service, and making it available throughout the patient encounter; making information available to the next logical user of the data (workflow support); and smoothing the entire patient encounter with the health system by making information available for verification, rather than requiring redundant capture.
- *Clinical Management* - These are the applications summarily described in the previous section as the components of the Computer-based Patient Record, the key component of a HIN.