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# Information Technology: Integrating Care Across Multiple Sites

by Patrick Carney

*Information technology plays a vital role in helping maintain quality patient care in the inpatient hospital setting as well as off-site clinic settings. Using a data network based on "asynchronous transfer mode" technology, Staten Island University Hospital is linking three main campus locations to its growing system of outpatient oncology providers in the New York City metropolitan area.*

**S**ince the early 1990s, the penetration of managed care into the metropolitan New York marketplace has skyrocketed, altering practice patterns (and thus market share) and restricting reimbursement. The deregulation of the New York State reimbursement system and the arrival of capitation, the most advanced form of managed care, have further complicated this scenario. Only a few years ago risk contracts had just been introduced; now they are commonplace.

The results of these market forces include the transition of many health care services traditionally performed in an inpatient hospital setting to an off-site clinic location, reduced hospital length of stays, and an overall push to drive down provider costs as far as they

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can go. With two main hospital locations, as well as a large network of physicians on Staten Island and in Brooklyn, the hospital was prepared to transition to an outpatient market. However, analysis continued to point toward managed care's serious impact on hospital revenues; further market expansion would be required to offset the expected losses.

The Board of Trustees and a senior management team developed a strategic response to this managed care reality. With managed care essentially forcing much of our business out of the hospital, we had to aggressively forge alliances with primary and specialty care providers to expand site of care delivery to remote clinic locations, urgent care centers, and physician practices beyond the borough of Staten Island and into Brooklyn. A physical network would be required to link users and their computer systems to the Staten Island University Hospital system, with the aim of improving patient care, operational productivity, and financial management.

The hospital's information technology strategic plan centered on implementation of an enterprise-wide information technology system. Several system components were viewed as critical to the hospital's information network:

*Managed care contracting.* The system had to support sharing of the clinical and financial outcomes data that hospitals and physicians need to enter into risk-sharing arrangements.

*Transmission of voice, video, and imaging.* Our expansion into Brooklyn required the delivery of diagnostic services, the availability of medical records, and videoconferencing at multiple sites. Thus, the speedy exchange of images,

video, and voice had to be supported across the system.

*Integration with primary care physicians.* As a major source of referrals to the system, primary care physicians had to be connected to facilitate timely referrals and consultations.

*Enhanced access to clinical and financial data by those who need it.* Users in all settings—physician offices; the hospital and its medical school; data, laboratory, and administrative offices; nursing homes; home health; pharmacy; and medical equipment providers—had to be able to access data from a central data repository and create custom reports.

Thus, a primary goal of Staten Island University Hospital's information technology effort is to integrate the continuum of oncology care across our Staten Island facilities and physician practices in Brooklyn. By both standardizing the data and the ways in which people retrieve it, we are working to ensure that patients receive the same level of care at our remote sites as in our academic medical center.

## THE ATM ARCHITECTURE

Years ago, the hospital was the hub in the community wheel of health care. With managed care and its shift to the outpatient settings, the hospital has become one of several components, or spokes in the wheel, within the continuum of care. Information technology is now positioned as the hub (i.e., the wheel) because it can integrate the different care settings (i.e., the spokes).

A wide area network links our three main campus locations with nearly 200 remote sites, a large physician group, home health, as well as various other business partners. Our network, called "StatNet," is based on an asynchro-

nous transfer mode (ATM) data network. (StatNet is not intended to reflect our Staten Island location, but rather the clinical term "stat," which is more closely aligned with the objectives of the network.) ATM is the "backbone" of the network, allowing Staten Island University Hospital to connect to the wide- and local-area networks of its outside partners.

Any network enables the use of software applications across a large number of users. However, ATM is unique in its ability to support clinical applications requiring high transmission speeds, large transmission capacities, bandwidth (or network space) on demand, and effective network management. As a result, the hospital and its affiliated practices will be able to share access to such network-intensive functions, including:

- central repository for clinical data
- single-point access to patient data. (Data are categorized, indexed, and stored in the repository. Users have the ability to review data results in the repository.)
- billing and other administrative functions for physician practices
- enterprisewide scheduling
- medical diagnostic and document imaging to create a complete electronic medical record.

The decision to invest in ATM technology was directly tied to our strategic technology plan, which could only be realized through a high-speed, flexible network able to support real-time data transmission. Without a direct association to our strategic initiatives, the costs of ATM technology would likely have been prohibitive to our institution. The network is designed to accommodate rapid growth and scalability, allowing StatNet to grow as Staten Island University

Hospital grows. Scalability refers to the ability of a product or technology to handle diverse requirements. In our case, we were able to purchase a higher-end ATM device to manage our large, several-thousand-user campus as well as another comparable device, scaled down

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in capacity and price, to handle physician practices. These devices can be seamlessly integrated as if they were one.

Maintaining cost effectiveness, as well as the widely varying connectivity requirements throughout our enterprise, drove the need for a scalable infrastructure. We refined our technology plan with the understanding that our connectivity requirements would vary considerably depending on the functions and needs of particular sites. For example, we found the use of ATM in small remote clinics to be cost prohibitive, and for the most part, overkill. As a result, the enterprise-

wide communications infrastructure seamlessly integrates various communications protocols in a very cost-effective and efficient manner.

#### **BENEFITS TO REMOTE LOCATIONS**

We expect electronic coordination of patient care to enhance quality across the system. The implementation of StatNet has brought about significant changes in the delivery of patient care by:

- providing real-time patient information to caregivers
- reducing the amount of redundant tests or procedures performed
- improving patient care by providing information from other encounters throughout the continuum.

Health care information and medical records are easily available to authorized caregivers throughout the system. In oncology, as in other clinical specialties, the development and administration of various treatment protocols are key to the care provided. With StatNet, oncology caregivers at remote sites can access these protocols and other patient information prior to their treatment. A physician can review the patient's treatment history and analyze prior blood work and other test results while at the remote location. As new protocols are developed or new tests are completed, the remote caregivers have as much information as the campus-based caregivers. A soon-to-be-implemented scheduling component will make patient encounters throughout the system seamless. For example, when referring patients to a specialist, the primary care physician will be able to set the appointment before the patient leaves the office.

In addition, physician practices will be upgraded with network-



ing hardware and software allowing them to access images on-line. This feature allows physicians to rapidly diagnose and treat the patients; previously X-rays and scans would have been hand-carried to physicians' offices. Information will soon be exchanged among physicians across the system, without duplication.

Security was a major concern in constructing the StatNet network. The strategic use of firewalls, network security applications, and constant network monitoring help ensure a secure environment. We have since found that with StatNet we are able to provide a higher level of security than our former paper-based system. Consider the hazards of a paper-based system in a network with multiple locations:

Sensitive information would likely get lost in transit from one site to another. The copious paper trail in a paper-based medical chart would make accessing specific patient information difficult.

#### LESSONS LEARNED

StatNet has been operational for nearly three years. Not coincidentally, Staten Island University Hospital has been named to the "Top 100 Hospitals in the United States" (in an annual study conducted by HCIA, Inc., and published in *Modern Healthcare*) for three consecutive years. This honor coincides with our successful implementation of an information system that allows patients to benefit from our world-class health care at any point along the care continuum.

We found that the involvement of clinical staff and the physician community has been a critical factor in achieving each of our information technology strategic initiatives. This process introduced a significant level of change for Staten Island University Hospital providers. Early on the users of our system were able to discern the advantages to the practice of oncology.

At the end of the day, patient care is improved, and patient satisfaction is greater, as a result of specialty services now available in the patients' own communities. The use of information technology throughout oncology—and health care in general—can provide many benefits both to health care organizations and their patients. ■

## ENTERPRISEWIDE SOFTWARE APPLICATIONS

**S**ales of health care information technology to hospitals and integrated delivery systems will soar to \$21 billion next year, according to health care consultant Sheldon I. Dorenfest, president of Sheldon I. Dorenfest & Associates Ltd., a Chicago-based consulting company. That's up from \$13.6 million in 1997. Interviewed in the June 1998 issue of *Health Data Management*, Dorenfest said that delivery systems are investing heavily in technology to ensure they can provide caregivers at multiple sites easy access to clinical and financial information.

Health care information "enterprise-wide" applications are a new breed of health care information software designed to run at multiple provider sites. Enterprise-wide applications are popular among delivery systems because they help ease the flow of data among different facilities. A Dorenfest research study of 1,196 hospital systems published in the same issue of *Health Data Management* shows that registration and master patient index software are the most common enterprise-wide applications, at 58.9 percent and

53.4 percent, respectively, of systems surveyed. These two categories of software are good starting points for future applications. Just 18.4 percent of systems report having enterprise-wide e-mail. Dorenfest defines enterprise-wide applications as those that are accessible at every facility within a delivery system.

As for the future, integrated delivery systems pick enterprise-wide data repositories as their most planned information technology purchase, according to the Dorenfest study. Developing and implementing treatment protocols require collecting data as to which treatments yield the best outcomes. Once protocols are developed, the most efficient way of distributing them to physicians is via an electronic records system. As the physician treats the patient and enters data into the record, he or she can gain immediate access to treatment guidelines, according to the *Health Data Management* article.

Enterprise computer-based patient records and enterprise scheduling software are also purchasing priorities

among hospital systems.

Dorenfest & Associates sells its massive database, which offers information on the use of hundreds of information technologies. The company also offers customized reports based on the data. For information, call the company at 312-464-3000.

Who are the top vendors of enterprise-wide computer-based patient records and managed care software? Dorenfest lists:

McKesson HBOC, Inc.  
301 Perimeter Center North  
Atlanta, GA 30346  
770-393-6000

SMS  
SMS Corporate Headquarters  
51 Valley Stream Parkway  
Malvern, PA 19355  
610-219-6300

Meditech  
Meditech Circle  
Westwood, MA 02090  
781-821-3000

Source:  
Anderson, HJ. 1998 market leaders report. *Health Data Management*, 6:47-64, June 1998.