

St. Luke's Episcopal Health System: A Case Study in Healthcare Productivity

St. Luke's Episcopal Health System has long been a pioneer in both medical procedures and medical uses of technology. Its Texas Heart Institute performed the first successful human heart transplant in the U.S. Among numerous awards in many areas of medical practice, it has been named a top ten Cardiovascular Center for 17 consecutive years in the highly regarded annual survey conducted by U.S. News & World Report.

Overview

St. Luke's has undertaken many technology initiatives to enhance both clinician productivity and patient care practices. Nearly a decade ago, their IT team began a pilot wireless network implementation with the goal of streamlining clinician work processes. Their pilot project evolved into a multi-facility network with most of St. Luke's staff now accessing data via wireless devices – real-time, 24 hours a day. A visit to St. Luke's today finds physicians and nurses using wireless laptops and tablet PCs to track and chart patient care. Medicines are dispensed after clinicians scan medication barcodes on patient ID bracelets with wireless barcode scanners. Case managers access information on-the-fly as they verify patient records and coordinate services with insurance companies. Even the hospital's nutritionists plan menus with patients and transmit those orders wirelessly to kitchen staff for later preparation.

As an early wireless adopter, St. Luke's offers a unique perspective on the evolution of wireless networking and mobile computing in a healthcare setting. This case study provides a detailed analysis of how mobile technologies have enhanced hospital staff productivity and overall patient care.

Maintaining a Secure Connection to Point-of-Care Applications

St. Luke's building structures have changed over the course of nearly five decades of providing patient care. As new buildings were constructed and older ones renovated, St. Luke's IT team, headed by Gene Gretzer, senior analyst and wireless initiative project leader, began looking for ways that they could ease the flow of information access within their facility. Instead of requiring nurses and doctors to gather at kiosk-style stations to retrieve and send patient information, they looked to wireless technologies that would allow clinicians access to data whenever and wherever they needed it. Gretzer and team began installing wireless access points throughout areas where instant access to information was important for patient care, such as the ER. Later they also added more access points to central clinician station locations and in hallways near patients' rooms.

But maintaining a continuous connection to charting applications was not a simple task. "Clinicians using handheld devices had trouble maintaining their sessions walking around the floors," explains Gretzer. "As doctors and nurses walked through areas where the wireless network did not reach effectively," he continues, "such as long hallways, onto elevators, or through older areas in the hospital, they'd lose their network connection. This caused their legacy VPN and applications to fail which required the clinicians to re-login, restart applications and re-enter any data that may not have been transmitted." The situation frustrated busy doctors and nurses who saw their time wasted on devices that were supposed to be increasing their productivity.

Another issue Gretzer grappled with was wireless security. With both concerns over wireless vulnerabilities and HIPAA standards for data protection, St. Luke's wanted to



Industry

Healthcare

Challenges

- Needed to maintain a secure connection to patient records
- Wanted to maximize the return on investment for hospital medical equipment
- Wanted a solution to increase the efficiency of their blood management system

Solution

- Mobility XE VPN solution

Results

- Mobility XE VPN kept application sessions alive through wireless coverage gaps
- Secured all wireless data with 128-bit AES security
- Clinicians no longer had to re-login or re-key data, as Mobility XE insulated applications from dropped connections
- Mobility XE provided staff and managers with real-time information to speed room preparations
- Value of medical scanning devices was maximized by keeping devices in service for longer periods of time
- Patient diagnosis and treatment was effectively accelerated as Mobility XE allowed faster access to information and test results

ensure patient data could not be compromised. Their security concerns did not stop there, however. Gretzer also had the foresight to consider that “mobile” devices by their very nature could easily be misplaced or potentially stolen. Thus management tools were also needed that could ensure their security.

To solve these problems Gretzer and St. Luke’s IT team implemented NetMotion Wireless’ Mobility XE mobile VPN. Mobility XE provided the cure to the application disruption and security concerns they were struggling with. Installation of Mobility XE was simple and straightforward. Server software was deployed within the IT department and client software installed on their laptops, tablets and handheld devices. With Mobility XE running, all data transmitted between the server and client devices was encrypted using AES 128-bit security. Mobility XE also acted as a second firewall, devices not recognized by the Mobility server were not allowed to access the network. As Gretzer explains, “We treat the wireless side of the network as hostile. The mobile devices do not have direct access to the corporate network. They have to go through the Mobility server. St. Luke’s policy is that all wireless data communication must be encrypted by Mobility XE.”

Mobility XE also insulates applications from lost connections and automatically re-establishes the connection once network access resumes. Thus, clinicians no longer dealt with dropped network connections and crashed applications. While out of range, applications are held in place and upon re-entry into a wireless coverage area, the applications pick up exactly where they left off. Fluctuations in wireless availability could happen so fast that users were not even aware that they had been out of coverage, but with Mobility XE connections were re-established sometimes in less than a second – behind the scenes and without user intervention. As St. Luke’s wireless network spread from a single, IP segment VLAN to a multi-facility network, Mobility XE allowed clinicians to roam between different rooms, floors and buildings, seamlessly reconnecting their devices to the network and allowing them to have anywhere, anytime access to charting applications and patient records.

Lastly, Mobility XE’s management console allows the IT team to centrally manage all of the devices their clinicians use. At any given time, they can get real-time data on a device or user, knowing what applications they are using, the amount of data they are transmitting, even the battery life of the device. And should a device be lost or stolen, they can immediately quarantine it from the network. With significant productivity enhancements realized from clinicians using Mobility XE enabled devices, St. Luke’s IT team began looking for other hospital processes that could be enhanced.

Maximizing the Value on Medical Equipment

One of the major expenses that any hospital faces regardless of size is the cost of medical equipment. In the case of St. Luke’s, they’ve made significant investments in medical scanning equipment to provide clinicians with the latest technology and to ensure patients are receiving the finest care available. Recently, they purchased mobile scanning units for both patient x-rays and neurological studies. These units give them the flexibility to bring the equipment to patients’ rooms as opposed to scheduling patients for neurology or radiology lab visits. Having mobile units, as Gretzer relates, has been beneficial in many instances. “Frequently, neurological studies or x-rays need to be conducted for patients that could not easily visit the neurology department or x-ray lab,” explains Gretzer. “Sometimes you have a patient that was in a serious accident, or in the ICU, and needless to say, couldn’t be easily moved. So with mobile units, we could bring the equipment to their bedside.”

The neurological scanning studies typically lasted from one to three days. Following the completion of a patient study, the unit was rolled back to the neurological department where the data was uploaded for clinicians’ review. The resulting data files were enormous

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*Gene Gretzer,
Senior analyst and wireless
initiative project leader*

and took on average thirty to sixty minutes to upload. Needing to wait for a study's completion and data upload not only slowed the clinician's productivity, but also lengthened the time it took to provide a diagnosis and begin patient care. The clinicians were requesting a way to get real-time access to the information that the studies were gathering.

Gretzer's first step was to connect the monitoring units to the wireless network which let them record and upload data real-time to their MedPlus® care management medical records system. This allowed clinicians to review information as it happened, which increased the speed to diagnosis and treatment. As clinicians moved the carts from room to room, however, they discovered that the units would sometimes lose network coverage which disrupted data upload.

Knowing that Mobility XE had stabilized network connections on their handheld devices, Gretzer deployed Mobility XE on the mobile units and was able to insulate the neurological monitors from lost connectivity. Automatically reconnecting once network access was restored, clinicians can now wheel the mobile units throughout the hospital without being tethered to the neurology office's computer system. Doctors are able to make patient diagnosis faster, patients are receiving care more quickly and the hospital's assets are used more efficiently and effectively.

The mobile x-ray units used in St. Luke's made it simpler to take x-rays in patients' rooms, but they had to be rolled to a nearby film processing machine to upload the images to their patient records database. And this process alone could take anywhere from five to fifteen minutes. Weighing in at around 1,200 pounds, these devices take time to move so making frequent return trips for film processing meant the x-ray machines would be out of service for extended periods. Again, Gretzer connected the units to the wireless network to speed up data transmission. One challenge that they discovered was that the x-ray units required a static IP address. This was an added security measure that ensured uploaded data was only coming from authorized machines. But given the multi-segmented network structure at St. Luke's, these x-ray machines could not handle roaming from one subnet to the next. After installing Mobility XE, however, the problem was resolved. Mobility XE masked the actual IP address and provided the server with a static "virtual" IP, allowing the units to be freely moved to any location within the hospital, yet always remaining connected to the network.

Now that the neurologic and x-ray units remain in constant rounds to patients' rooms, St. Luke's is realizing significant productivity enhancements. "Clinicians are viewing neurologic studies and x-rays faster and visiting more patients during their rounds," adds Gretzer. "We have also reduced the time for a clinician to receive electronic X-rays from, in many instances, thirty to forty-five minutes down to about one and a half minutes – allowing clinicians to diagnose issues and begin treatment faster." In one case, Gretzer explains, "An x-ray machine was rolled across a sky bridge to a doctor's office for patient x-rays. Before the machine was back in the main hospital building, the doctor was already reviewing the x-rays in his office. The images had uploaded wirelessly to St. Luke's patient records database while the x-ray machine was in motion to the next patient's room."

Improving Efficiencies in Blood Management

Blood management is a complex system of monitoring both patients and blood products at any stage in a treatment process. To ensure that patients and blood products are matched correctly, St. Luke's implemented CareFusion™, a bar code scanning and management solution, to handle their blood verification and monitoring needs.

"The blood management process," Gretzer explains, "involves bar code scanning both patient and the blood product during the infusion process using wireless bar code scanners.

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We needed to make sure that no matter where in the hospital facility these devices might be, they worked reliably.” In order to avoid any issues with application disruptions and to add a layer of security to protect patient data, Gretzer loaded Mobility XE onto each of these devices. “With Mobility XE,” adds Gretzer, “we get greater reliability and security which makes our clinicians more productive.” Now clinicians using mobile devices are able to check and confirm patient identification and blood products via handhelds with wireless barcode scanners before proceeding with patient care or treatment.

Next Steps: Boosting Clinician Efficiencies Further

Gretzer and the IT team at St. Luke’s continue to look for new ways to increase clinician productivity and provide better patient care. On the horizon, they’ll be connecting EKG equipment to the wireless network. They’ll also expand the number of wireless devices in use from roughly 750 to over 1,000, with all of the mobile devices taking advantage of the reliability and security that Mobility XE offers.

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