



The Nebraska Heart Hospital attracts visitors from all over the world who want to discover how information technology is changing healthcare delivery.

Taking Care of Hearts in America's Heartland

Though most of its patients lead lives steeped in the farming traditions of the Midwest, the Nebraska Heart Hospital in Lincoln, USA, is a model of modern technology.



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Visitors come here, of all places, to America's rural heartland, to see the future of cardiology. They come from Japan, Singapore, Spain, and Germany. Observers from more than 100 hospitals worldwide have endured cumbersome airline connections to reach the Nebraska Heart Institute Heart Hospital (NHH) in Lincoln to observe an unparalleled technological sophistication. Tremendous amounts of data, for example, images, reports, waveforms, and clinical observations, funnel automatically into the electronic patient record, where the information can be quickly retrieved, distributed, and interpreted by a variety of users. "What most impresses visitors," says Chief Information Officer (CIO) Douglas Colburn, "is the ability to obtain any portion of a patient's record, from

anywhere within and even outside the hospital, at any time." There is an impressive array of technology involved.

Realizing an Ambitious Plan

The NHH was conceived in 2001 and opened in May 2003. Prior to building, planners searched the impressive wares of major vendors and then deliberately selected one – Siemens – for the majority of the hospital's 30-some medical and informational systems.

The goal of the physicians at Nebraska Heart Institute (NHI) was to rethink the documentation process encumbering cardiology – to replace the repetitious and the mundane with liberating technology. But instead of creeping along the evolu-

tionary path, they wanted to make a leap. "A lot of things that we did here had been done before, but not all together," Colburn says. "That's what sets us apart."

The grand goal was equaled by the risks. The schedule envisioned patients coming through the front doors just 16 months after groundbreaking and would have been ambitious even for an off-the-shelf hospital. Additionally, the information technology (IT) timeline called for only nine months of implementation for more than 30 clinical applications and a full compliment of imaging modalities. Electrical, paging, and communication systems would be coming online alongside medical systems. Technical bugs would mean delays and additional costs. But there were no delays. The 63-bed



Right after completing a procedure, a report is made available throughout the hospital, often before the patient returns to his or her room.



NHH opened on schedule and on budget. Today, it employs more than 300 people. Meanwhile, NHI has grown and now employs more than 30 cardiologists, surgeons, and anesthesiologists, providing outreach to 48 communities throughout Nebraska, northern Kansas, and western Iowa. The realities of medicine today, even here on the Great Plains, require that it be delivered within the confines of cost containment and improved efficiency, while also creating better outcomes and patient satisfaction. "We don't have an intensive care unit," says Thomas Burnell, Chief Executive Officer (CEO) for Nebraska Heart Institute and Heart Hospital. "All of our rooms are capable of being an ICU [intensive care unit], and our nurses are all cross-trained to handle any type of patient. Every room is electronically wired so that the physician can call up the patient's data or films and show them to the patient and the family on a computer." The results must speak for themselves, and at NHH, they do.

In the days when NHI did the majority of its work at two award-winning community hospitals, the average patient stay was 4.3 days. Today at NHH, with the same doctors doing the same procedures, it is 2.5 days. For some time now, turnaround time in billing days in accounts receivable has been just over 30 days, compared to the national average of between 50 and 55 days. "Our strategic partnership with Siemens has proven to be of great value in realizing our goals for operational efficiency," says Mark Smith, Chief Financial Officer (CFO) of Nebraska Heart Hospital. "Without the ability to leverage technology and the power of Soarian®, we would not have experienced such a high degree of financial success over the last four years." Last year, in only its third year of existence, NHH was named a Solucient Top 100 Hospital for Cardiovascular Benchmarks.

The Ultimate Goal: Full Data Integration

It surprises visitors to encounter such sophistication in a state that was once part of the vast North American buffalo range and is today inhabited by only 1.7 million people. A majority of NHH patients come from small towns scattered among irrigated corn, vast soybean fields, and cattle feedlots. Interventions at NHH actually decline during spring planting and

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Douglas Colburn, Chief Information Officer, Nebraska Heart Hospital, Lincoln, NE, USA

fall harvest, when not even angina drags farmers from their fields.

But despite the accomplishments, the NHH vision is but half complete. Visitors marvel at the paperless admissions process, lack of a physical admissions department, the universal bed care model, and integrated technology workflows throughout the entire cardiovascular continuum of care. NHH has achieved what hospitals everywhere have long desired from technology: the ability to enter and store data once, but make it available instantly to multiple users in multiple ways. To that end, NHH is slightly more than halfway through its five-phase technology plan, with completion scheduled for the end of 2008. Stages four through five will push hospital integration further and extend those abilities to NHI's many clinics. The objective: one complete lifetime clinical record available for each patient throughout the NHI and NHH systems.

The latest significant upgrade to Siemens Soarian Cardiology occurred December 11, 2006, when version 2.0 went into the live clinical environment. Soarian Cardiology is a comprehensive, Web-based solution providing access to complete clinical information. It helps physicians deliver effective cardiac care from admission to discharge including follow-up care. "We are very pleased with Soarian from both a patient care and an operational perspective," says Colburn. "Because Siemens solutions focus on team-based care, we know they can support our care delivery model today and far into the future." Working in concert with Soarian Cardiology are *syngo*® Dynamics for dynamic image review and picture archiving as well as AXIOM® Sensis recording system for hemodynamics. "The three play nicely in the same sandbox," Colburn says. Various types of information – like that from a computed tomography and

magnetic resonance imaging cardiac angiography – populate the electronic patient record, and help to streamline patient care.

A People-Friendly System

NHH staff members describe their transition to the new version of Soarian Cardiology using adjectives like smooth and painless. Cath lab team leader Jackie Mendoza knew that the team's first impressions of the new version of Soarian Cardiology would determine whether they bought into it, setting a tone for the future.

The fast pace with which everything occurs at NHH demands that the technology serve the people rather than the other way around. The four-person cath teams here create cardiology charts in real time, a kind of complex extemporaneous dance that is only made possible by the technology. Upon completing a procedure, the physician steps to a nearby monitor, where he reviews, revises, and electronically signs the document, making it available throughout the hospital, often before the patient returns to his or her room.

"The new version of Soarian Cardiology," Mendoza says, "offers speed, shortcuts, refinements, and more." The clinicians like the software. "This time the implementation was much easier," Mendoza says, it was nothing compared to what it was like when the hospital first opened. Instead of being like the Wright Brothers and creating an airplane, the experience was more like a navy pilot making a measured progression. The change occurred after sufficient simulator time, in controlled conditions, and with experts all around. In the cath labs, teams underwent six to eight mock procedures. More than a dozen Siemens representatives spent



Thomas W. Burnell, CEO

two weeks in Lincoln for the conversion, which itself required only 2.5 days. Old and new Soarian versions operated alongside one another for most of that time. Everything went as scripted.

Saving Time Saves Lives

Clearly, lessons were learned from the hospital start-up, but even those early days were the result of far more preparation than the cath lab teams might realize. "One thing Siemens did that we didn't fully appreciate at the time was to do a full workflow analysis with all of the stakeholders," Colburn says. Back then, NHH viewed it as a waste of precious time. In hindsight, he says, it allowed Siemens to customize applications to fit the ways NHH wanted to provide care rather than deliver a generic system for the hospital to adapt. When the pieces did come together, Colburn says, it worked much like all had envisioned.

Evidence of that can be observed in the hospital reading room, which at most institutions is filled with people completing patient charts. At NHH, charting that once consumed five or more hours of every nurse's 12-hour shift now takes three hours or less. "There's almost no overtime due to charting after a shift," Colburn says. The time saved by workflow optimization is a critical success factor for the hospital. "We do things at a very fast pace," says Janet Huenink, a tenured NHH nurse practitioner. "A lag won't work for

us." Completing charts in real time is a luxury made possible by Siemens technology, and it is what defines the NHH model. Huenink summarizes the changes she has observed since she left the community hospitals. In the old days, she would get word that a patient was coming in from an area nursing home, and Huenink would plead on the telephone, "Send me all the records you have." When the patient arrived, she would sort through stacks of paper to glean the information a doctor needs to choose the course of care. Today, if a patient has been seen previously at any NHH clinic, a few mouse clicks provide full access to the electronic patient record – including exams, past procedures, even the diameter of arteries down to the millimeter – so that when the patient arrives, the conversation focuses on current symptoms rather than stumbling into the maze of patient memory. In the past, it might have taken Huenink hours to obtain critical records by fax. Now, most patient workups can be completed in 20 minutes. In matters of the heart, the quicker the better, for everyone – quicker to the cath lab to fix the problem, and shorter interventions that place less strain on the patient. In an emergency, the tempo can be stepped up another notch. As the call comes in that an ambulance is ten minutes out, Huenink and other nurses are waiting. They know their systems intuitively. They can safely prioritize patient needs and provide safe, emergency care.

"The patient can be rushed to the cath lab because we know the system," she says. "In an emergency, we can have them ready in ten minutes."

Intuitive Navigation

When NHH opened, Siemens transformed the NHH paper forms so that the information is displayed the same way on the computer screen. Today, questions get asked only once, eliminating the frequent patient complaint, "You've already asked me that," Huenink says.

Huenink, who admits to lacking technical savvy, states the new Web-based version of Soarian Cardiology has made navigation more intuitive. "People know what links look like," Colburn says, "and certainly they have noticed the speed." Today, as users sign on, the role-based system will display the appropriate information needed to complete their individual tasks. Because the system is Web-based, it can be accessed from anywhere, at anytime. NHH physicians from Hastings, Grand Island, and North Platte, NE, – the latter 250 miles away – come frequently to NHH to perform procedures. The new electronic sign-off capability makes it possible for them to review and close the case from their home computer. The system already knows the referring physician and faxes him or her a copy. Often, those hometown doctors could recognize their patients by the tilt of their cowboy hats. They are neighbors. The doctors want those charts. Prompt delivery, plus treating their patients well, keeps them satisfied. The recent upgrade also streamlines tasks for those who harvest data for reporting to medical registries, like that of the American College of Cardiology. Thus, visitors to NHH from all over the world gain meaningful information on how the cardiology workflows used at the hospital can provide benefits at their organizations as well. Many anticipate that as more healthcare professionals learn the NHH story, healthcare enterprises around the world will deliver cardiovascular care with the same marriage of skill and technology that NHH already has achieved today. "Technology will continue to become more sophisticated in ways we can't even think of today," Burnell says. "We want to evolve with those technologies to provide up-to-date, leading-edge tools for diagnosis and treatment."



Clockwise from top left: Douglas Colburn, CIO; Janet Huenink, Advanced Practice Registered Nurse (APRN); Mark Smith, CFO; Jackie R. Mendoza, Cath Lab Team Leader