

CUSTOMER SPOTLIGHT

**CHILDREN'S HOSPITAL OF ALABAMA
USING THIN CLIENT TECHNOLOGY FOR
SURGICAL PLANNING AND EDUCATION**



Children's Health System (Birmingham, Alabama) traces its roots to three men in 1911 who were touched by the plight of Birmingham's many sick and needy children. They spearheaded the efforts of a small group of Episcopalian men and women who founded the Holy Innocents Hospital as a "charity institution for children alone." The simple frame house that they converted into a 12-bed hospital evolved over the next 95 plus years into a statewide network of 18 primary and specialty pediatric healthcare centers.

The nucleus of Children's Health System is the four primary buildings in the heart of the medical center on Birmingham's Southside. They include the 275-bed Children's Hospital,

the Children's Hospital Office Building, the Children's Midtown Center, and Children's Park Place. Children's announced in early 2008, plans for a major expansion. Each year, Children's Health System records over a 600 thousand outpatient visits (including 58,000 emergency visits) and more than 13,000 in-patient discharges.

Children's Hospital of Alabama, a private, not-for-profit hospital, is now among the top 10 largest pediatric medical centers in the country. The facility is home to a diagnostic center, emergency department, kidney dialysis center, and one of the largest outpatient pediatric centers in the U.S. In addition, the hospital is a leading pediatric hematology/oncology center, and operates the largest pediatric burn unit in the Southeast.

Children's Hospital of Alabama also serves as the primary teaching facility for The University of Alabama at Birmingham (UAB) Department of Pediatrics, and boasts a renowned medical research facility. The Children's Center for Research and Innovation houses some of the most sophisticated research laboratories in the nation searching for breakthroughs in the diagnosis, treatment, and prevention of pediatric diseases and illnesses.

Children's Hospital of Alabama

The Children's Hospital of Alabama is the largest pediatric hospital in the southeastern part of the United States. The hospital's Pediatric Imaging Department, which is the fifth largest radiology center for children in the United States, provides a full range of medical imaging services, from standard 2D primary care studies to the most complicated forms of 3D imaging in preparation for transplantation, neurosurgery, orthopedic surgery, and trauma care.

"In the pediatric realm, the 3D application is more important than it is even in the adult scenario," said Stuart A. Royal, MD, clinical professor in the pediatric radiology section of the University of Alabama, Birmingham. Three-dimensional imaging is essential for unraveling the anatomic peculiarities of complex congenital malformations, outlining the distortions of normal anatomy due to trauma, and characterizing tumor volume and position.

Until Children's Hospital of Alabama acquired thin client technology from Visage Imaging, 3D imaging was not a routine part of radiologic or clinical practice, however. The installation of a thin client solution from Visage Imaging made it efficient for radiologists and clinicians to view 2D and 3D images anytime and anywhere. It allowed physicians across the healthcare system to gain quick and easy access to large volumes of imaging data and fully integrated clinical applications without having to purchase and use expensive, dedicated workstations.

Two-Dimensional Days

Before the thin client-based volumetric imaging era when scans were acquired slice by slice, reconstructions and multiplanar reformatting of an entire area of interest were not done on every case. Clinicians would have to decide when they required volumetric imaging data for a particular patient in advance. "It wasn't infrequent that physicians didn't know they needed 3D images ahead of time, so they ordered conventional scans which didn't give the information they wanted. The patient then would have to be brought back and rescanned, which exposed them to more radiation and meant more cost and more work," Dr. Royal said.

Without thin client technology, 3D imaging depended on advanced workstations that had the power and the software for creating volumetric images and manipulating imaging data sets. "Three-dimensional imaging not only required extra technologist time and extra effort, but it was logistically difficult to do because the technologist had to go to the place where the advanced workstations were located. So even if clinicians ordered the right test, it took hours to get done, and the technologist was off in some room in another part of the department working on it. Three-dimensional imaging therefore could only be done in the radiology department by specialized technologists on special computers," Dr. Royal said.

The Thin Client Three Dimensional Solution

The Children's Hospital of Alabama purchased thin client technology from Visage Imaging because the solution could be fully integrated into the hospital's existing picture archiving and communication system and hospital and radiology information systems. The solution has a core 3D processing paradigm as well as streaming technology that enable all thin clients to act like fully capable front-end devices for viewing and performing the processing functions of the PACS.

Physicians across the healthcare system consequently can compare computed tomographic and magnetic resonance imaging scans with 3D information, link with voice-activated dictation, and still work with underlying software and user-specific settings, such as hanging protocols.

Because the solution is installed on a separate server, online distributed 3D data reconstructions can be done with lightning speed at any location without placing a burden on the information technology infrastructure. "When physicians query the server to do these powerful manipulations, they don't end up throwing a lot of data across the system or straining the bandwidth of the system. The data manipulations do not clog the system or slow it down for other image-transfer purposes," Dr. Royal said.

Now that the Children's Hospital of Alabama has integrated Visage Imaging thin client technology with its information management network, any physician can obtain 3D reconstructions and reformat entire areas of interest in a multitude of planes. "Three-dimensional thin client technology does not require a special workstation. It can be done on any computer that is hooked up to the network," Dr. Royal said.

Thin client technology from Visage Imaging therefore has made sure 3D imaging is not the exclusive domain of the radiology department. "All scans are now done with techniques that allow a 3D application, and the imaging data are distributed throughout the healthcare system. So the data can be acquired and manipulated anywhere—in the physician's office across the street, in the emergency department, in the transplantation unit, or wherever. The thin client technology frees up everyone to use the information the way they need it," he said.

The technology also has allowed radiologists within the department to detect subtleties that might otherwise have been overlooked or misinterpreted—on every case. "I have my routine PACS system up and running and immediately beside it I have the thin client. Before I finish signing out a case, I can look at it in multiple imaging planes, and with a click of a button I can set up different templates.

"The thin client technology has taken something that was difficult, time-consuming, and logistically almost impossible to utilize on a day-by-day, case-by-case basis and made it something that sits by your side and is your friend. It is integral to the full evaluation of every patient who gets a volumetric scan," Dr. Royal said.

Clinical Case Review

Radiologists are indispensable to the interpretation of the intricate relationships between pathology and normal anatomy. But only clinicians know how these relationships will affect their choices of treatment. “We believe as radiologists that we add value because of our special knowledge and the special interpretive capabilities that we have. But it’s not that we have a proprietary ability to create this information. Every physician should have equal access to the information to use to the best of their abilities,” Dr. Royal said.

Thin client technology is especially helpful for surgeons who must choose where to place an incision and how to approach an abnormality without endangering critical normal tissue. Thin client technology gives surgeons the luxury of exploring treatment alternatives before they ever pick up a scalpel by allowing them to track in three dimensions each of the possible paths of incision they may take. “The surgeon can decide to make an incision in one place or another and preoperatively see how the surgery would work in a three-dimensional way. The technology liberates the surgeons so they can plan the procedure the way they want to,” Dr. Royal said.

In a handful of examples from the Children’s Hospital of Alabama, Visage Imaging thin client technology:

- Feeds preoperative axial, coronal, and sagittal views of sinus anatomy to a computerized system otolaryngologists will use during surgery to automatically correlate imaging data with the patient’s actual anatomy and illustrate the position of surgical instruments as they navigate past crucial anatomic formations, such as the orbit and the cranial bone. “Thin client technology is not used for detailed image guidance during the surgical procedure. It’s really used for preoperative planning so the surgeons can look at the imaging data and understand it before they make an incision or do anything else,” Dr. Royal said.
- Offers a more comprehensive view of craniofacial and craniocervical traumatic injuries for both radiologists and surgeons. “Radiologists always thought they could see everything they needed to on a two-dimensional image. But a three-dimensional understanding of trauma in the craniofacial or craniocervical areas can often lead to a different diagnosis than what you might achieve using only the routine sort of cross-sectional images,” he said.

With thin client technology, maxillofacial surgeons, neurosurgeons, and orthopedists have instant access to three-dimensional images in their offices, clinics, and patient care units, as well as the operating room. The 3D images often change the surgeons’ treatment plan by revealing a fracture fragment located next to a major blood vessel.

“Thin client technology has huge ramifications for how the surgeons are going to do their procedures. I’m sure patient outcomes are going to be affected because

the surgeons will be able to avoid vascular and nerve injuries by understanding the complex anatomy and by planning surgical approaches around it," he said.

- Helps plan the placement of catheters in the brain. Hydrocephalus is one of the top three diagnoses in terms of inpatient days for the Children's Hospital of Alabama. "Surgeons use thin client technology to help understand the volume of the ventricular system so they can preoperatively determine how they will position catheters to drain the fluid," Dr. Royal explained.

Education

Thin client 3D imaging helps teach hospital staff at all levels, from non-physicians to physicians-in-training, and attending physicians about anatomy and pathology. "Before we had thin client technology, we couldn't display 3D images in conference rooms. Now it's just as easy as showing a chest x-ray, and you can modify the image on the fly to educate people in the way they need it," Dr. Royal said.

The technology is used during specialty conferences that include radiologists, pathologists, surgeons, and other physicians as well as nurse clinicians and social workers who review pending cases on a weekly basis. It is instrumental for helping healthcare professionals outside of the radiology department who have difficulty comprehending the status of individual patients and the progression of treatment as shown on 2D cross-sectional images. "With 3D imaging, physicians and other healthcare professionals are much more engaged in the conferences and what is going on with their patients. The 3D images show surgeons and oncologists on our tumor board how their patients' tumors relate to normal anatomy and what is happening volumetrically to the tumors they are treating with chemotherapy," he explained.

As a major academic teaching hospital, the Children's Hospital of Alabama provides medical training for medical students, clinical residents and fellows, and other healthcare professionals. "It's very difficult for students to understand the cross-sectional images that we create in the radiology department. But if we create them in a format that is similar to what they learned in gross anatomy classes or what they have seen from a 3D surgical standpoint, they visualize the information and learn it better," Dr. Royal said.

Added Value

"Hospitals that have never used this technology do not know how much extra value it gives them. By gaining the ability to do online distributed reconstructions, thin client technology makes 3D imaging easy, simple, and quick. Three-dimensional imaging therefore becomes beneficial and powerful in the way it can transform physicians' understanding and approach to individual cases," Dr. Royal concluded.

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