



## Case Study

### A New View for Children's Hospital Boston

**"The bottom line is that the 3-megapixel monitors provide an excellent display for CT (computed tomography) and magnetic resonance images, and we have been very pleased with the resulting image quality."**

Dr. Richard L. Robertson, Jr.

Rapid advances in digital imaging and display, data storage, Web-based software and fast-processing computers are revolutionizing the work of hospital medical staff. The latest generation of picture archiving and communication system (PACS) technology, for example, continues to change the ways in which radiologists and radiology staff display, read, report on, store and distribute patients' diagnostic images.

Regarded by many as the best pediatric hospital in the United States, Children's Hospital Boston is a 325-bed, comprehensive center for pediatric and adolescent healthcare that treats some of the most complex and challenging pediatric patient cases in the world. Each year, Children's logs about 18,000 admissions and 300,000 outpatient visits. The primary pediatric teaching affiliate of Harvard Medical School, Children's is also home to the world's leading pediatric research enterprise.

A team made up of staff from Children's Radiology and Information Systems Departments took two years to determine which PACS software and equipment would provide the best solution for the hospital, a process that involved extensive evaluation of similar projects at others hospitals. For Children's, a key success factor in its PACS project was the quality of the image radiologists would view. "Monitors are to diagnostic imaging what speakers are to a stereo system," said S. Ted Treves, M.D., chief of the division of nuclear medicine and vice chair of information technology for the department.

#### **Ensuring Radiologists' Acceptance with High-Quality Displays**

Children's selected Planar Systems' state-of-the-art DOME® C5i and C3 flat-panel displays to serve as this integral component of the PACS. According to Dr. Treves and John Speziale, Children's director of radiology information technology, the flat panels provide better resolution and brightness, take up less precious department space, use much less electricity, weigh less and are better ergonomically than standard CRT monitors — all for roughly the same cost as the CRTs.

"We had the radiologists compare the Planar monitors with other monitors side by side for a week, and the Planar monitors were found to be the most effective," said Speziale.



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S.Ted Treves, M.D.

“Typically, CRT monitors do not have enough brightness for plain radiographic evaluation,” added Dr. Treves. When using the Planar flat-panel displays, he explained, radiologists no longer need to be in completely dark rooms to read diagnostic images, a big change from the lighting requirements for properly reading diagnostic images on viewboxes or CRT monitors.

#### Seeing the Results

Better resolution and brightness translate into higher-quality images for clinicians. On high-volume days, these benefits are particularly important, as eye strain can interfere with the ability to interpret images appropriately. For example, on Wednesdays, the radiology department holds its weekly brain tumor clinic, which typically keeps three magnetic resonance imaging (MRI) units busy all day. Similarly, each Thursday is “Scoli Day,” when approximately 130 radiology exams are conducted on children who may have scoliosis.

“The high brightness of the monitors makes it much easier to obtain an appropriate window and level for the images,” explained Dr. Richard L. Robertson, Jr., chief of the department’s division of neuroradiology, director of magnetic resonance imaging, and clinical coordinator of neurovascular and neonatal imaging. “The high brightness and flat-screen design significantly reduce eye strain during readout sessions and thereby improve lesion detection.”

“The monitors are very good for soft tissue contrast and high-density imaging,” added Caroline D. Robson, M.B., Ch.B., director of neuromagnetic resonance and clinical coordinator of head and neck imaging for the department.

According to Dr. Robertson, the fact that the Planar displays are self-calibrating means that technical staff are needed less often to keep them functioning at the proper settings, an additional benefit. “The bottom line is that the 3-megapixel monitors provide an excellent display for CT (computed tomography) and magnetic resonance images, and we have been very pleased with the resulting image quality,” Dr. Robertson concluded.

In areas where plain radiography studies are frequently examined, such as the newly redesigned radiology department reading room, Children’s has purchased 16 C5is, the 5-megapixel displays that yield the higher resolution radiologists need.

#### More Effectively Managing Complex Medical Information

The 26 radiologists, 20 fellows and 12 to 14 residents on staff in Children’s radiology department perform over 150,000 diagnostic imaging studies and interventional radiology procedures each year on infants, children and adolescents — more than any other children’s hospital in the country. The department consists of divisions covering body imaging, cardiovascular and interventional radiology, neuroradiology and nuclear medicine. Across these divisions, an array of imaging modalities are used, including two CT scanners, four MRI units, five ultrasound units, four interventional radiology units, three fluoroscopy units, five nuclear medicine units, including PET, and eight general x-ray units. Equipment has been adapted or specifically designed to meet the unique needs of children.

All diagnostic images must be saved for 20 years. Therefore, moving to an electronic form of storage and retrieval for these images was imperative to manage the huge volume more efficiently, provide wider and more timely image access, and facilitate consultations between physicians.

In addition, the new PACS needed to integrate with the existing “mini-PACS” found in several radiology divisions, then assemble all images within the overall hospital information system. The hospital’s goal was to be able to combine patient images from the radiology department with patient reports, data and images generated by other hospital departments and make all of this information available to authorized hospital personnel via a Web browser.



#### Selecting the Right PACS

Given the scope of the hospital’s integration, distribution and storage issues, as well as the challenge of managing diagnostic images captured by multiple modalities in various sections of the department, selecting a PACS was no simple task. Although hospital leadership had discussed PACS implementation for many years, work began in earnest in 2001 with the formation of a task force to determine the best solution.

The hospital selected the SYNAPSE PACS from FUJIFILM Medical Systems USA because it is web-based and has other features that allow it to easily integrate with Children’s existing hospital information system. In addition, because SYNAPSE uses standard PC software and hardware, its capacity to expand along with its ease of use and maintenance made it a good choice.

“SYNAPSE fits nicely into the hospital and department infrastructure,” explained Dr. Treves. “We use the technology to improve the process. Images move faster now.”

Radiology department staff at Children’s are understandably excited about the PACS implementation because, as Dr. Treves explains, “Now, viewing diagnostic images can happen anytime, anywhere.”

Eight PACS workstations are located in the main radiology reading room, with the rest scattered throughout the radiology divisions. In all, the radiology department has 23 PACS interpretation workstations to meet department needs given the volume and variety of images generated daily at Children’s. Each workstation is equipped with a set of Planar monitors.

To provide quality images to non-radiologist healthcare providers and to simplify equipment maintenance, Children’s will likely recommend Planar desktop units as the standard monitors for the PC stations around the hospital — for example, in surgery, orthopedics and oncology. Although these monitors are less sophisticated than their counterparts in radiology, their brightness and resolution were found to be effective.



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**Caroline D. Robson, M.B., Ch.B.**

### Enhancing Quality of Care with State-of-the-Art Technology

Located on the second floor of Children's Hospital's main building, the radiology department at times has the feel and look of a preschool, with cartoon characters dancing across waiting-room murals and guiding children down what otherwise might be intimidating corridors. In examination rooms, small plastic toys distract children about to undergo diagnostic imaging examinations.

This warm and caring environment softens and all but hides the focused and highly skilled intensity with which the radiology staff carry out their work. Children's radiology staff strive to attain optimal diagnostic imaging in the safest, easiest, most efficient, and least traumatic way possible. Now, with the most technologically advanced PACS of the hospitals in Boston's famed Longwood Medical Area — home to Harvard Medical School, Brigham and Women's Hospital, the Dana Farber Cancer Institute, the Joselyn Diabetes Clinic, and Beth Israel Deaconess Medical Center — they have expanded the list of state-of-the-art tools available to assist them in this goal.

Children's new capacity to more quickly and efficiently collect, share and store images combined with the best displays for interpreting this critical patient information ultimately means that sick children are being better cared for — which is what the technology upgrades are all about.



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