

# Children's National Medical Center: DR Makes Its Mark in Pediatric Imaging

The lure of lower dose and rapid exposures proved irresistible to one pediatric hospital.

By Dana Hinesly

Children are not just small adults. Tending to, and providing treatment for, the smallest patients takes not only a gentle touch, but equipment (such as low-dose imaging systems) designed to meet their specific needs. Low dose, as a description, may prove to be somewhat misleading in radiography applications. Although newer systems are capable of producing diagnostic-quality images while delivering less radiation, clinicians are constantly vigilant to apply the concept of using doses as low as reasonably achievable (ALARA).

Raymond W. Sze, MD, is chief of radiology and diagnostic imaging for Children's National Medical Center, Washington, DC. He says, "ALARA means taking a conventional system and modulating the current (mAs), as well as the energy level (kVp), to deliver as little radiation dose as possible to get the diagnostic information, so on one level, we've been striving to use low dose forever." He continues, "Specific to the digital radiography (DR) systems, one of the points that was extremely intriguing to us is the claim that you could double the resolution and halve the radiation. That was an irresistible prospect."

## EMBRACING TECHNOLOGY

Children's National Medical Center is a 279-bed facility and is the largest nongovernmental provider of pediatric care in the District of Columbia. In 2005, the imaging department performed approximately 82,000 examinations, with more than 31,000 done as inpatient services, almost 20,000 performed in the emergency department, and more than 30,000 done for outpatients.

Children's National Medical Center uses GE equipment in the hospital's three general radiography rooms. It is also using Agfa computed radiography (CR) equipment and a Fuji picture archiving and communications systems, which provides clinicians with remote access to images. The most recent addition to its capabilities is DR. Two new Swissray ddRFormula™Plus systems arrived in May 2006. The ddRFormula Plus ensures the lowest possible radiation dose because its casing and grid are constructed from advanced carbon-fiber materials.

According to Swissray, the system's pediatric package includes 3.5 line pairs/mm spatial resolution with special imaging algorithms and radiography parameters, providing exceptional image



Low-dose imaging is particularly important in the pediatric population.

Robin Miller

quality. Designed for functionality, the ddRFormula Plus includes a C-arm with the x-ray tube always centered on the FP-5000 Si flat-panel detector to allow for the most precise patient positioning. In addition to a square, 43-cm format intended to satisfy large-field requirements without the need for detector rotation, the detector features a five-field measuring chamber, which has been ideal for the team at Children's National Medical Center.

Bruce Dietrich, RT, manager of radiology, says, "We love the flat panel because its five detectors mean you don't actually have to be in the middle of the detector, which, for pediatrics, is excellent." The system's C-arm also makes life a little easier for the fussiest patients. When necessary, the DR system can come to the child, making it possible to image the patient in the arms of the parent.

### DIGITAL OPERATION

The ultimate goal for Children's National Medical Center radiology department is to reap the benefits of operating 100% filmless. While bringing in the DR system was a step in that direction, it has yet to entirely eliminate the need for film. "There are certain examinations, such as spine films for scoliosis, where the orthopedic surgeons are very, very much in favor of having hard copy because they are uncomfortable looking at the image on the digital monitor," Sze says. To accommodate this request for large, high-resolution images, the department is currently operating with both digital and conventional, wet-film radiography processes. "Having said that, I do believe it is a technical challenge we can overcome, and I'm working very hard in collaboration with the orthopedists to address the challenge of scoliosis images," he adds.

Sze believes that a technological solution could be the correction for this problem. "What we are trying to do is install a big, wide-screen, panoramic monitor in the operating room," he says. "It will be equivalent to the size of the scoliosis films, and I think it will be attractive to the orthopedic surgeons." He also believes that, once they can visualize the spine according to their preferences, orthope-

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dic specialists will find a great deal of value in some of the automated functions provided by the DR system.

"If they accept the quality of the studies, there are certain built-in digital solutions that will enhance their ability to analyze the image," Sze says. "If we can overcome the quality issue, there are considerable intrinsic advantages. For instance, using x-ray film, you have to take out your ruler and measure with a protractor, both to measure scoliosis angles and fit prostheses. With the digital solution, there are built-in tools and templating functions that allow you to more rapidly and accurately measure Cobb angles and fit hardware to the image."

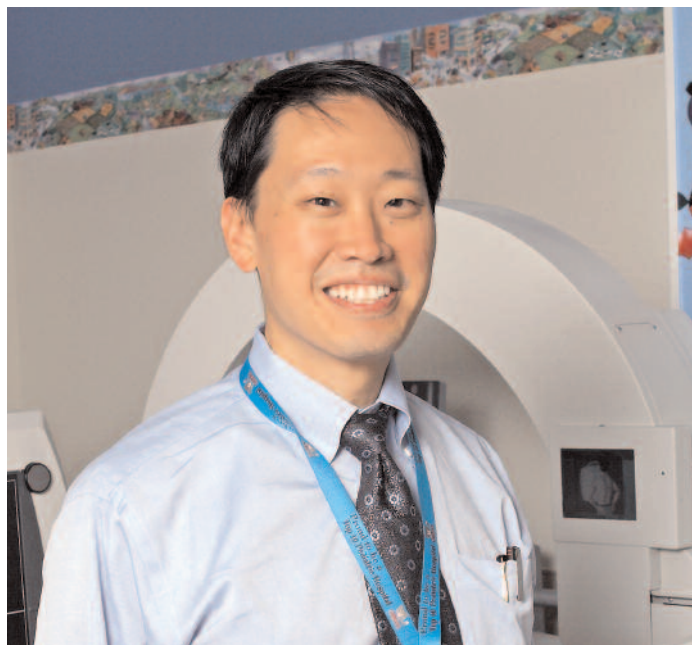
### QUALITY AND SERVICE

For Children's National Medical Center, purchasing the DR systems was motivated as much by more rapid exposures as it was by the lure of delivering lower doses. An edge specific to DR is the promise of improved throughput efficiency. "By report, you can increase unit throughput by a factor of almost four to five using a DR unit," Sze says. "That's a strong motivation because, like most hospitals, we are working toward enhancing the patient experience by decreasing wait time. If you can cut that time down by a quarter, that's highly attractive. The goal for the systems is to dramatically improve patient and referring clinician service by increasing speed, doubling the quality of the films, and halving the radiation exposure."

Shorter imaging times are not only beneficial to patients, but make it possible for the staff to help more patients. The design of the system itself assists in decreasing examination times. "The way the machine is set, it's a single movement to move it into position. Many of the functions also operate by remote control, so the technologists can modify the position of the machine with the touch of a button," Dietrich says. "We can turn the patients around faster because the whole process is faster."

Speed is a convenience when working with adults, but an absolute necessity when imaging children. "Unlike adults, whom you can generally talk through a procedure no matter how anxious or scared they are, children don't always respond to reason," Sze says. "Even when you do manage to secure them in place, with a papoose or other gentle restraint, if they're crying, screaming, and breathing rapidly, that also introduces problems. The speed of exposure is very important."

Coupled with fast acquisition, the DR's ability to provide quick access to images is another factor in improving technolo-



Raymond W. Sze, MD, looked to increase speed and quality and reduce dose with DR.



gist productivity. Because images are often available 1 or 2 minutes after exposure, technologists can reimage, if necessary, while the patient is still in the room and in the desired position.

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Image quality also topped the list of priorities when the facility determined whether to invest in a DR solution. One of the challenges of using computed radiography for pediatric imaging is that children and infants have relatively little calcium in their bones compared to adults. This often results in image resolution that is not of sufficient quality for an accurate diagnosis. “If digital radiography can truly live up to its ability to look at these very small body parts, such as hands, feet, and ribs, that makes it very attractive,” Sze says. “As a whole, we are very satisfied with the images we’re getting.”

Exactly how much of an impact the new imaging systems have had on the department’s numbers has yet to be quantified. Because the systems have been installed less than 6 months, Children’s National Medical Center is currently compiling statistics on throughput and efficiency. A considerable amount of attention is being paid to training the staff in how to get the most from the new equipment.

The more technologically sophisticated it is, the more it requires a thorough investment in technologist training and retraining, according to Sze. Training covers not only how to use the technology, but becoming comfortable using the equipment while still working with children before, during, and after an examination. “The quality of our technologists is a critical part of it, too,” Sze says. “It takes a special person to be able to work with the child and try to calm them down or place them gently in a device that helps hold them.”

## FAMILY FIRST

Sze says, “Our mission is family-centered care; clearly, the family is not just the child in isolation. A huge part of what we do is to educate the parents and make them feel very comfortable.” While drawing on the latest technology certainly helps the team at Children’s National Medical Center reassure parents, it can also be done through something as seemingly minor as a simplified scheduling process. Dietrich says, “We do all of our scheduling at a central office within the radiology department; we have not outsourced that function to any type of

remote scheduling location. By containing it within the department, we have more control and more opportunities to train the schedulers so they know how to schedule certain examinations.”

To make this happen, schedulers work together with clinicians and technologists to ensure that examination times are realistic. This integrated, hands-on approach is especially important for multimodality examinations. “If a patient needs both an ultrasound and a fluoroscopy study, we have to coordinate the timing, as well as the order,” Dietrich says. “In certain cases, you can’t have barium from a fluoroscopic study first (before an ultrasound, for instance), and often the oral-intake restrictions are different, so it’s really a specialized area.”

Beyond that, informed and knowledgeable scheduling can be one more area where patients receive exceptional care and services. “Scheduling it is critical. If you don’t anticipate the needs of the parent and the patient, and if you can’t answer some basic questions (such as, ‘Will my child be scared?’ or, ‘Is an IV required?’), then I think your ability to help the parent navigate the system is much compromised,” Sze says.



*Teen-aged patient is positioned for a radiograph of the hand, one of the most difficult body parts to visualize in children, by technologist John Holland, RT, as Raymond W. Sze, MD, looks on.*

Being a resource for parents is one of the highest priorities for Children’s National Medical Center. “In pediatrics, you not only have the sick patient, but you have the parent of the sick patient that you have to be aware of as well,” Dietrich says. Sze adds, “We pretty much touch every department, every patient, and every aspect of their care, from the venerable x-ray for a broken bone to an MRI of the brain for seizures or headache. We are really striving for a very child- and family-centered, seamless and efficient process in radiology.” ■

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