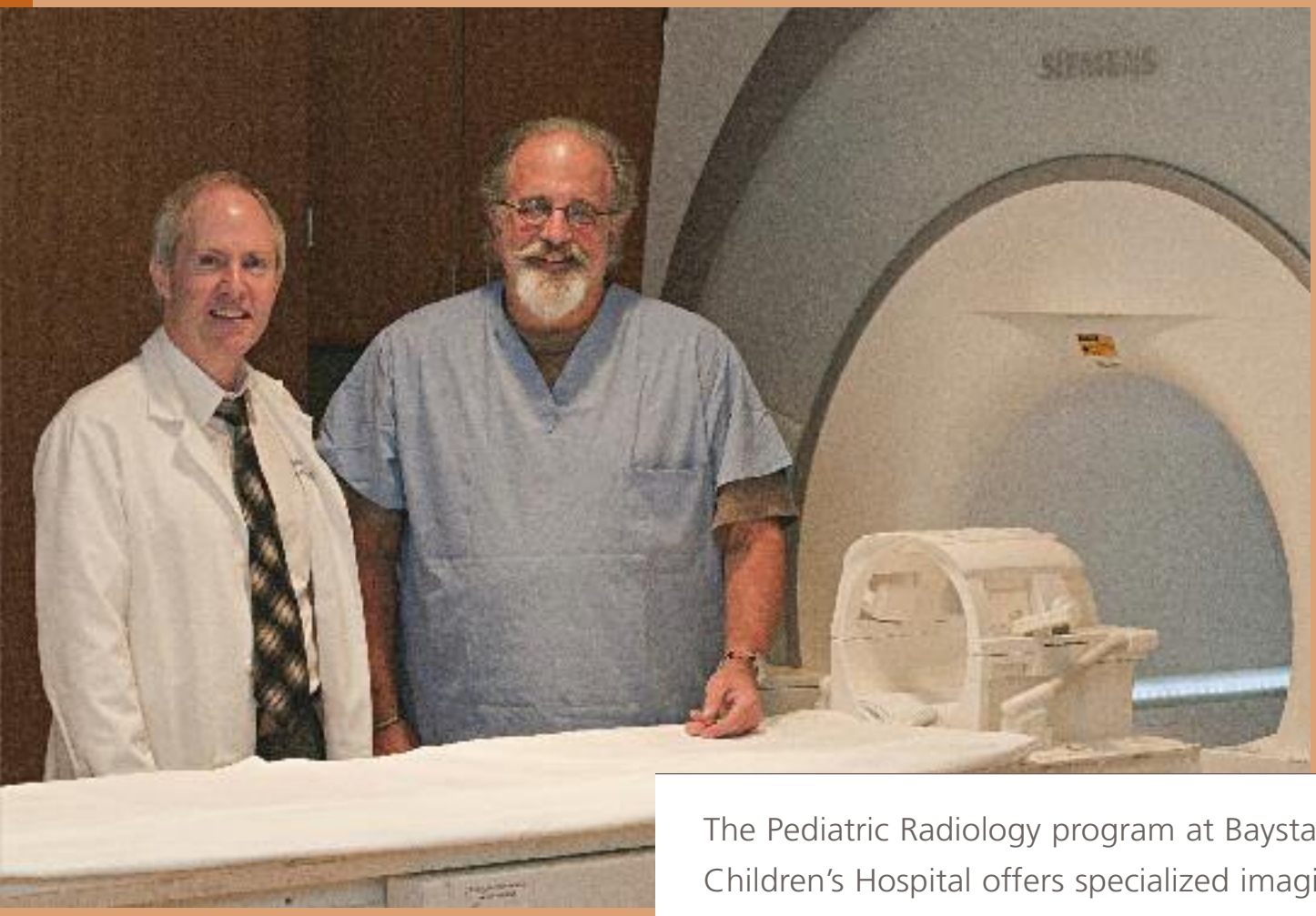
Pediatric Radiology:

Imaging for Baystate's Littlest Patients

By Scott P. Edwards



Pediatric intensivist Dr. Stephen Lieberman (right) and anesthesiologist Dr. Steven Dunn (left) note that Baystate is the only hospital in the region that offers a sedation service for pediatric patients who require imaging.

The Pediatric Radiology program at Baystate Children's Hospital offers specialized imaging services for neonates, infants, children, adolescents, and young adults using state-of-the-art technologies in a safe, child and family friendly environment.

The program offers the full gamut of imaging studies and image guided pediatric care including standard X-rays, fluoroscopy, ultrasound, CT, and MRI. The studies are supervised, performed, and interpreted by radiologists with subspecialty training.

Pediatric radiologists are experts in selecting the best imaging techniques to diagnose medical and surgical problems in infants and children. They are available as consultants to guide the imaging algorithm and recommend non-radiation examinations, when appropriate. The pediatric radiologists ensure that the testing is performed properly and safely so that an accurate diagnosis can be made.

Baystate's Pediatric Radiology program is a subspecialty within the Department of Radiology. The bright colors and toys in the pediatric waiting room provide comfort for children and their families. The exam rooms are staffed by a dedicated group of radiology technologists who create a safe, family friendly environment. Nurses and Child Life specialists are also key members of the team. No other hospital in the region provides this level and range of subspecialized care. Three unique initiatives make Baystate's Pediatric Radiology program further stand out: sedation, fetal MRI, and "image gently."

Sedation

Because most children, especially very young ones, are unable to hold still for the 15 to 90 minutes it takes to complete an MRI and other imaging studies, many of them receive moderate sedation to decrease their movement so the scan can be completed.

A combined program to support Pediatric Radiology services was developed with Baystate's pediatric anesthesiologists and pediatric intensivists. The pediatric anesthesiologists and nurse anesthetists from the Department of Anesthesiology manage infants and children with complex medical problems and the need for general anesthesia to complete their MRI studies. Cases requiring moderate sedation are supported by the pediatric intensivists who are experienced with the medications used for sedation as they are widely used in Baystate's Pediatric Intensive Care Unit.

"The program started when, rather quickly, there became an increasing number of children who required some type of medication for a variety of imaging procedures," says Stephen Lieberman, MD, the pediatric intensivist who started the program. Between 800 to 900 procedures will be performed this year at Baystate Children's Hospital.

While many children undergoing imaging studies can be sedated, others need to be completely unconscious in order to remain still. "Similar to when anyone has surgery, we have a system in place to screen pediatric patients and prepare them for anesthesia," says Steven Dunn, MD, interim chair of Baystate's Department of Anesthesiology. "Many other places don't offer this service because it is labor intensive, and they might not have enough anesthesiologists who are completely comfortable caring for small children."

Pediatric intensivists provide moderate sedation for a variety of procedures, including interventional radiology (PICC lines, feeding tubes, arteriograms); CT scan-guided removal of fluid from the chest, abdomen, and surrounding the heart; MRIs; ultrasound-guided biopsies of the kidney and liver; gastrointestinal endoscopies, bronchoscopies, spinal taps, and bone marrow biopsies; and voiding cystourethrograms.

Pediatric radiologists (left to right) Drs. Stephen O'Connor, Tara Catanzano, and Stanley Polansky offer comprehensive imaging studies and image guided pediatric care including standard X-rays, fluoroscopy, ultrasound, CT, and MRI.

In addition to Dr. Lieberman, pediatric intensivists Christine McKiernan, MD, and Michael Canarie, MD, are part of the program, as well as Rebecca Blanchard, RN, who assists with the large volume of MRIs that require sedation.

"We are the only hospital in the area to offer this service because Baystate Children's Hospital is the only institution in Western Massachusetts with the expertise to do it safely, especially the nursing personnel who place the IVs and monitor the children," says Dr. Lieberman.

Fetal MRI

Baystate Medical Center is also the only institution in Western Massachusetts that offers fetal MRI. Stephen O'Connor, MD, pediatric radiologist, has primary responsibility for this service. "Fetal MRI is a powerful tool that can expand and confirm information obtained from the high quality ultrasounds performed by our colleagues in Maternal Fetal Medicine. It allows us to further investigate potentially serious fetal anomalies in the brain, spine, thorax, and abdomen without the use of sedation or radiation."

Unique to fetal MRIs, Dr. O'Connor says he actually sits at the console with the MRI technologist so that the images can be obtained quickly to account for fetal motion. "This makes it especially challenging," he says.

"When we see certain anomalies on ultrasound in either the fetus or the mother," says Baystate Maternal/Fetal Medicine specialist Fadi Bsat, MD, "MRI can help. It can also be helpful in conditions that could change the management of the pregnancy or in preparation for possible complications at delivery."

Dr. Bsat says fetal MRIs are most often used at Baystate for fetal central nervous system abnormalities or fetal chest or neck masses. For example, ultrasound may not be able to determine if a baby with a chest mass will be able to breathe after delivery, but MRI can tell physicians if the baby's lungs may be compromised and intubation or other interventions are required at delivery.

Dr. O'Connor adds, "The push to add fetal MRI at Baystate came from a group of specialists including pediatric surgeons, geneticists, neonatologists, and maternal fetal specialists, who approached us because at the time, the closest place offering fetal MRI was in Boston. Traveling that far was often a hardship for patients, so offering this subspecialty locally is a tremendous benefit for patients, making it much more likely they'll stay with Baystate for the remainder of their pre- and post-natal care. It also offers positive implications for our graduate medical education programs in obstetrics/gynecology, surgery, pediatrics, anesthesiology, and radiology."

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MRI is also used for the health of the mother, especially in trauma cases in which the mother's abdomen or pelvis is involved and for whom X-ray or CT scan may be associated with some fetal risks. It can also help detect problems such as placenta accreta, a severe obstetric complication involving strong attachment of the placenta to the uterine wall, which can cause severe bleeding with detachment.

Image Gently

Radiation exposure, including medical radiation, is a concern for both adults and children. This is particularly important in children since their tissues are more radiosensitive. Children have a longer lifetime in which to manifest radiation-induced injury. Each examination should be considered cumulative and therefore more likely to result in adverse health effects.

Baystate's Pediatric Radiology program has been active for years in efforts to reduce medical radiation in children. This goal is fostered through a long-term involvement in the Society for Pediatric Radiology and, since 2006, in the Alliance for Radiation Safety in Pediatric Imaging. Baystate's program has participated in the national "image gently" campaign since its inception. The motivating principle is to change medical and radiology practice by increasing awareness of the opportunities to lower radiation doses when imaging children.

"At Baystate, we respect the fact that children are more susceptible to radiation problems than adults," says Stanley Polansky, MD, chief of Pediatric Radiology, "so we use the lowest possible levels of radiation. We took the pledge to 'image gently,' and we adhere to the principles expounded by the Alliance."

With the help of medical physicist M. Terry LaFrance, Baystate's pediatric radiologists follow the ALARA (As Low As Reasonably Achievable) principle of radiation safety, scaling back radiation doses for children.

"This is a dynamic process with constant monitoring of techniques to further cut back radiation exposure, particularly in CT," says Dr. Polansky. "In general, properly performed CT examinations of children should expose a child to much lower exposures than those for the same procedure on an adult. The potential benefit from an indicated CT examination is clinically recognized and documented and is far greater than the potential cancer risk."

In addition, Dr. Polansky and his colleagues Drs. Stephen O'Connor and Tara Catanzano, serve as resources for referring physicians and patients' families. They offer advice about what imaging procedures are appropriate and what imaging alternatives are available that do not use radiation.

"The role of the pediatric radiologist is multifold," says Dr. Polansky. "It is to understand radiation doses; review requests for higher dose studies; discuss cases with clinicians; use appropriate technical factors; help spread current knowledge about radiation doses; train medical students, residents, and radiology technologists; educate health care providers; and participate in Professional Quality Improvement programs."

"Our pediatric radiologists do not fit the profile of a typical 'adult' radiologist," says Laurie Gianturco, MD, chair of Radiology at Baystate Medical Center. "They spend a lot of time working closely with patients and their families, and the pediatricians and surgeons at Baystate and in the community."

Dr. Polansky concludes, "When a child is referred to us, their family can feel secure that they are going to a center that provides special attention to children, offers a safe and friendly environment, accomplishes imaging exams with high degrees of success, and adheres to principles for using the least amount of radiation possible."

Refer a Patient

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