Making CT scans kid-friendly

August 5 2010, By Judith Graham

Ferdousi Dawood was worried. Her daughter's headaches were excruciating, and prescription medicines and natural remedies had failed to make a difference. Now, a doctor at Children's Memorial Hospital was recommending a CT scan to peer inside the 10-year-old's brain.

Dawood was concerned about the radiation and what it might mean to the girl's development.

"As a mom, I feel so bad," she said recently. "I try to do everything positive for her, to keep her away from anything that can hurt her." But if there were something wrong with Safa, her daughter, Dawood wanted to find out.

Families have reason to be alert to risks associated with diagnostic tests such as CT scans. Kids' changing bodies and brains are especially sensitive to ionizing radiation from X-rays used in the exams. And because children have longer to live than adults, they're more likely to experience delayed effects of radiation exposure, notably a small potential increased risk of cancer.

That's not a cause to shun the tests, medical experts agree. Medical imaging is an extraordinary tool that allows doctors to make diagnoses, select optimal treatments and save lives, they say.

But it does warrant caution, and medical professionals have been adopting measures to reduce children's radiation exposure. These include adjusting CT scanner settings for smaller bodies, imaging only those

areas under medical investigation and using other tests, such as ultrasounds and MRIs, whenever possible.

Yet problems remain. Some hospitals and freestanding imaging centers continue to administer adult-size doses of radiation to children, experts report. Facilities also sometimes scan children repeatedly without cause or expose children's breasts, eyes, thyroids and genitals to unnecessary radiation by scanning too broadly or failing to use protective shields.

"We still have a way to go in terms of optimizing these examinations," said Dr. Donald Frush, chief of pediatric radiology at Duke University Hospital, acknowledging the shortcomings in the medical field.

About 7 million CT scans are administered to children every year; the number is expanding nearly 10 percent annually, according to a 2008 review of radiation risks associated with CT scans for kids in Current Opinion in Pediatrics. Almost one-third of the tests are given to children in their first decade of life.

Safa Dawood had complained of feeling "water in her head" for months before her family doctor ordered a CT scan at Children's Memorial, her mother said. The pain was so bad that the gentle girl with soft dark eyes sometimes would lay her head on a table and weep.

The day of the scan, her mother said she was determined to ask Safa's doctor how much radiation Safa received and what effects it might have on her health. To protect the girl's eyes, a radiologic technologist arranged for the scan to be done at an angle that avoided this sensitive area.

Later, Dawood said the test did not identify a specific problem, and Safa's headaches were continuing.

Experts say that although children's hospitals have focused on minimizing radiation exposure, most kids get scans in adult hospitals or imaging centers that have been slower to improve practices.

"It's common for us to see children who come in from other hospitals having had scans that often weren't necessary," said Dr. James Donaldson, chairman of medical imaging at Children's Memorial.

Often, scans taken at other institutions have to be redone at Children's because kids weren't prepared properly for tests or because the right area wasn't imaged, he said. Many involved high radiation doses that weren't adjusted for a child's size or weight, Donaldson said.

Changing that is the goal of a national campaign called Image Gently that is endorsed by the American College of Radiology, the American Academy of Pediatrics, the Society for Pediatric Radiology and more than a dozen other U.S. medical organizations.

Participants have agreed not to be sidetracked by ongoing controversy over the relationship between CT medical imaging and cancer. Some experts argue that only high doses of ionizing radiation -- much higher than those given via CT scanning -- are known to be dangerous; others insist that no dose, however low, can be considered safe. The evidence comes from studies on survivors of the atomic bombs in Japan and on workers exposed to radiation.

"While we don't know with absolute certainty that medical radiation causes cancer, we want to act as if it does," said Dr. Marilyn Goske, chair of the Alliance for Radiation Safety in Pediatric Imaging and head of radiology education at Cincinnati Children's Hospital Medical Center.

At Children's Memorial, that means figuring out how little radiation can be used to obtain an image that's useful to physicians. Think of radiation

as light: The more used, the more brilliant the image becomes. The trick is to calibrate the radiation so that the exposure is just enough, Donaldson said.

Help is expected to come later this year from a blue-ribbon panel developing guidelines for better child-size estimates of radiation doses, said Keith Strauss, director of radiology physics and engineering at Children's Hospital in Boston.

"The research has been done, the data is out there, now it's a matter of pulling it together," he said.

At the University of Chicago's Comer Children's Hospital, Dr. Kate Feinstein, section chief of pediatric radiology, said her group reviews every request for imaging, referring to information from prior imaging studies included in electronic medical records. (An exception is trauma cases that require immediate action.)

"If there's an exam we feel would be better to do with ultrasound or a MRI, we'll call the doctor and recommend it," she said. An example is when a child has suspected appendicitis, for which ultrasounds have become the usual first choice.

Minimizing radiation doses is routine at the U. of C., and the effort will be aided by a 256-slice CT scanner just installed at Comer Hospital. Kids spend less time exposed to X-ray beams because of the machine's speed, and radiation doses should be at least half of what they are currently, Feinstein said.

Last week Lindsey Eyles, 11, became one of the first patients to try out the equipment. Her doctor, James Nachman, said he was looking for signs that the girl's cancer was responding to chemotherapy. Just over a year ago, Lindsey was diagnosed with Ewing's sarcoma that originated in

her upper arm and traveled to her lung.

The girl has had 10 CT scans, mostly of the chest, at three medical centers where she has been treated, in addition to X-rays and a positron emissions tomography scan, or PET scan.

"Too many, in my book," said her mother, Susanne Eyles.

At this point, the benefits from the tests -- monitoring the progress of the girl's cancer and its response to treatment -- are far more important than any risks, said Nachman, a pediatric oncologist.

"Unfortunately, we really don't have the data to say whether the number of scans we're doing are optimal," he added.

As long as Lindsey's doctors say imaging tests are medically necessary, "then we'll say yes, go ahead," her mom said. But "as a parent, I plan to keep on asking how many of these does she really need."