Safer Scans: Four Steps to Reduce Radiation

Marianne Aiello, for HealthLeaders Media, February 13, 2011

Since Cedars-Sinai infamously gave patients eight times the normal amount of radiation during CT scans over an 18-month period beginning in 2008, hospitals have tightened their protocols aimed at reducing patient radiation. Radiologists say limiting unnecessary radiation has always been their top priority, but now they are increasing efforts to prevent unintentional radiation overdoses.

“With the growing public health issues around the increasing use of ionizing radiation over the last five years in particular, we have amped up our efforts because we’re using radiation more,” says Steven Seltzer, MD, chairman of the department of radiology at Brigham and Women’s Hospital in Boston. “We feel it’s incumbent on us to take steps to reduce the amount of radiation we use in a given study, and we have to be more critical about how many studies we do.”

Radiology societies are also launching efforts to help providers monitor radiation dosing. Four radiology associations formed the Image Gently Alliance, which aims to raise awareness in the imaging community of the need to adjust the radiation dose when imaging children. The American College of Radiology also formed Image Wisely, a similar organization geared toward adult imaging.

First defense: Education

Both associations offer protocols and best practices for radiologists. These educational elements are critical to reducing radiation, says John Weaver, PhD, professor of radiology at Dartmouth Medical School and director of clinical physics at Dartmouth-Hitchcock Medical Center, which is working to bring the organization in line with Image Gently guidelines.

“Training is not very glamorous, but it’s certainly important to have well-trained people doing these scans,” he says.

Technologist training is the most important step to ensure patients receive the lowest radiation dose possible says, Anand Lalaji, MD, chairman and CEO of the Radiology Group in Atlanta. His company works to train all CT-scan staff at the health systems they serve.

“We are not allowing any technologist or any personnel that’s not a radiologist to change protocol unless it’s approved by the radiologist,” he says. “That prevents mistakes, because they could change the setting on a study for a larger patient that requires more radiation, but who’s to say that they don’t change the setting back. We put a protocol in place where they go through checks and balances before they are able to change the settings.”

Second defense: Eliminating unnecessary scans

The Radiology Group also works to educate referring physicians, who often do not know the correct type of study to order.
“They’ll do the CT scan and invariably the patient is going to need an MRI or another type of study,” Lalaji says.

So his company provides physicians with order guidelines that list common symptoms and the best test for each symptom.

At Brigham and Women’s, radiologists were able to limit unnecessary scans by using decision-support software that warned physicians if the test they were ordering for a patient was recently done or if the yield of the diagnostic information was likely to be low and, therefore, the test useless. The software would then steer the physicians to an equivalent imaging test that doesn’t use ionizing radiation, like ultrasounds and MRIs.

By using this software, Brigham and Women’s decreased CT-scan utilization by 15% over the past three years, well below the industry average increase in CT scan use of 5% to 8%, Seltzer says.

**Third defense: Radiation-reducing technology**

“Intra-procedurally, we’ve tried to capitalize on everything that the equipment manufacturers have been able to deliver, and there are a handful of technological innovations that help minimize radiation exposure,” Seltzer says.

One of the technologies his team uses is automatic tube-current modulation, which helps CT scans to maintain constant image quality regardless of patient attenuation characteristics, allowing the radiation dose to patients to be reduced. For example, a CT scan with this technology will reduce exposure when the tube is over a part of the body with less tissue, rather than send a consistent amount of radiation throughout the test.

“Machines now are smart enough to know when the x-ray tube is at the 12 or 6 o’clock position, and it can reduce the radiation exposure and not sacrifice image quality,” Seltzer says. “The end result is more economical use of radiation and generally lower doses.”

While automatic tube-current modulation technology has been on the market for several years, other methods of reducing exposure, such as adaptive statistical iterative reconstruction, are just becoming commercially available. This image-filtering process allows technicians to see a higher-quality image from a study done with a lower dose of radiation.

But this technology can only be used in certain situations, Weaver warns.

“You have to make sure that you still retain your ability to see the anomalies that you need to see,” he says. “The risk of radiation is generally less than the benefits of the exam. You want to make sure you retain your ability to see the pathology.”

When reduced-radiation tests are appropriate, the benefits can add up.
“If it’s a routine study, many times you can lower the radiation dose and still get really no perceptible significant difference [in image quality],” Lalaji says. “If we can lower the dose by 20% for a routine exam and still get the same image quality and do that over 30 years, that makes a significant difference in terms of radiation exposure for a patient.”

**Fourth defense: Capturing exposure data**

Looking to further reduce CT-scan radiation exposure, Brigham and Women’s is beginning to track the amount of radiation patients actually absorb so they can use that data to make well-informed care decisions down the line.

“We’re working to harvest that information after the test is done and enter it into the EMR,” Seltzer says. “That way we can have as part of the EMR a field that shows the cumulative exposure to the radiation a patient has had over their entire lifetime.”

All in all, experts believe the key to reducing radiation exposure during CT scans is to constantly analyze the risk ratio of radiation dose and image quality. Any extreme measures brought on by the recent negative media attention could set back diagnostic imaging, Weaver says.

“Part of me welcomes the extra attention which has been shown toward dose in general, and there’s part that says it’s inappropriate because almost all the exams are well-justified,” he says. “You wind up with people being too afraid or too cavalier.”

---