

What's New in the Patient Safety World

April 2013

Radiation Risk of CT Scans: Debate Continues

On several occasions we have talked about the Image Gently or Image Wisely campaigns, the purpose of which is to minimize the unnecessary exposure of patients to radiation (see our February 2, 2010 Patient Safety Tips of the Week "[The Hazards of Radiation](#)" and November 23, 2010 "[Focus on Cumulative Radiation Exposure](#)" and our What's New in the Patient Safety World columns for March 2010 "[More on Radiation Safety](#)" and June 2011 "[Progress in Reducing Radiation from CT Scans](#)").

For many years scientists have warned of the risk of radiation-induced cancers that might develop after exposure to radiation doses involved in medical tests such as CT scans. Those risks have been largely theoretical and based upon cancer rates in Japan following the nuclear bomb explosions in World War II. One of the first studies to actually demonstrate such an increased risk attributable to CT scanning was just published last year ([Pearce 2012](#)). That study showed that use of CT scans in children to deliver cumulative doses of about 50 mGy might almost triple the risk of leukaemia and doses of about 60 mGy might triple the risk of brain cancer. But the cumulative absolute risks were actually relatively small. In the 10 years after the first scan for patients younger than 10 years, one excess case of leukaemia and one excess case of brain tumor per 10 000 head CT scans were estimated to occur. The authors concluded that, although clinical benefits should outweigh the small absolute risks, radiation doses from CT scans ought to be kept as low as possible and alternative procedures, which do not involve ionizing radiation, should be considered if appropriate.

But another study just published ([Zondervan 2013](#)) showed the risk of death from underlying morbidity is more than an order of magnitude greater than death from long-term radiation-induced cancer. They looked at the reasons for CT scans and the mortality rates of the underlying medical conditions. They found that young adults who have had 1 or more computed tomography (CT) scans earlier in life are at significantly greater risk of dying from underlying medical conditions than from radiation-induced cancer.

While we still have not seen a national system for tracking cumulative radiation doses, there appears to have been a slight reduction in the rate of growth of CT scanning in the past couple years. Whether that is due to the Image Gently or Image Wisely campaigns or due primarily to the economic slowdown remains unclear.

We don't do a particularly good job of explaining the potential risks and benefits of CT scans to patients. A recent survey of patients undergoing CT scans showed that only 17% of patients said that the risks and benefits were explained and they were given the opportunity to participate in the decision with their physician about whether to order the scan ([Caverly 2013](#)). 62% felt that the decision to order the scan was mainly the physician's. Only a small percentage were able to state what the risks of radiation were. Also, notably absent in the discussions before the exams were the potential risks that might be associated with incidental findings.

Audit and feedback may be helpful in reducing unnecessary CT scans. We've seen several emergency departments that significantly reduced the variation in CT ordering rates by individual physicians simply by providing the individual statistics at their monthly departmental meetings.

In our November 23, 2010 Patient Safety Tip of the Week "[Focus on Cumulative Radiation Exposure](#)" we noted that use of **clinical decision support rules** is a good way to minimize the number of unnecessary CT scans as well as reduce costs. We noted the multitude of such rules available for determining when to perform head CT scanning in patients with minor head injuries. Recently, a promising clinical decision support rule for deciding whether to perform abdominal CT scans in children presenting to the emergency department with blunt abdominal trauma was developed ([Holmes 2013](#)).

Conditional imaging strategies (see our August 2009 What's New in the Patient Safety World column "[Imaging for Acute Abdominal Pain](#)"), such as performing ultrasound first in children with acute abdominal pain and only doing CT scans if the ultrasound does not provide a diagnosis, may help reduce unnecessary CT scans. However, a shortage of ultrasound techs has left many community and rural hospitals without ultrasound coverage at night. There remains great variation across hospitals in the rates of abdominal CT scans in children with abdominal pain. More and more we will see that appearing as a measurement parameter of quality and patient safety.

While the bulk of our efforts should really be directed at avoiding unnecessary scans it also makes sense to minimize the exposure to ionizing radiation when a scan is really necessary. One group used a multidisciplinary committee in a community hospital setting to reduce patient radiation dose, repeat rate, and variability in image quality ([Siegelman 2013](#)). The committee included radiologists, technologists, consultant medical physicists, and an administrator. This was really a proof-of-concept study that demonstrates it is possible to produce such improvements in quality and patient safety.

So the debate about the magnitude of the problem of unnecessary exposure to ionizing radiations continues. Nevertheless, continued efforts in that goal make sense. For those who are interested, Rebecca Smith-Bindman, MD of UCSF, an outspoken proponent of reducing unnecessary radiation exposure leads a host of authorities on radiation safety in a [virtual symposium sponsored by UCSF on Radiation Safety and Computed Tomography](#) that will be held on May 8-10, 2013.

References:

Pearce MS, Salotti JA, Little MP, et al. Radiation exposure from CT scans in childhood and subsequent risk of leukaemia and brain tumours: a retrospective cohort study. *The Lancet* 2012; 380(9840): 499-505, 4 August 2012

<http://www.thelancet.com/journals/lancet/article/PIIS0140-6736%2812%2960815-0/fulltext>

Zondervan RL, Hahn PF, Sadow CA, et al. Body CT Scanning in Young Adults: Examination Indications, Patient Outcomes, and Risk of Radiation-induced Cancer. *Radiology* 2013; Published online February 5, 2013

<http://radiology.rsna.org/content/early/2013/01/15/radiol.12121324.abstract?sid=339c3863-a2ae-4bd9-9eb1-e5cec0831590>

Caverly TJ, Prochazka AV, Cook-Shimanek M. Weighing the Potential Harms of Computed Tomography: Patient Survey (Research Letter). *JAMA Intern Med* 2013; (); 1-2. published online first March 4, 2013

<http://archinte.jamanetwork.com/article.aspx?articleid=1657757>

Holmes JF, Lillis K, Monroe D, et al. Identifying Children at Very Low Risk of Clinically Important Blunt Abdominal Injuries. *Ann Emerg Med* 2013; DOI: 10.1016/j.annemergmed.2012.11.009; Published online February 4, 2013

<http://www.annemergmed.com/article/S0196-0644%2812%2901743-X/abstract>

Siegelman JRQW, Gress DA. Radiology Stewardship and Quality Improvement: The Process and Costs of Implementing a CT Radiation Dose Optimization Committee in a Medium-Sized Community Hospital System.

Journal of the American College of Radiology 2013; published online March 13, 2013

<http://www.jacr.org/article/S1546-1440%2812%2900741-7/abstract>

UCSF. The UCSF Virtual Symposium on Radiation Safety and Computed Tomography. May 8-10, 2013

<http://rorl.radiology.ucsf.edu/symposiumRegistration/Home>



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