What's New in the Patient Safety World

January 2017

Still Too Many CT Scans for Pediatric Appendicitis

It's been a while since we last discussed efforts to reduce patient exposure to ionizing radiation. We've previously discussed the Imaging Gently® and Imaging Wisely® campaigns, which are attempts to reduce the inappropriate use of imaging with ionizing radiation when safer alternatives are available (see our multiple columns on radiation safety and the Imaging Gently® and Imaging Wisely® campaigns listed below).

One particular area in which efforts have been focused is minimizing use of CT scanning for pediatric appendicitis, instead using modalities that avoid ionizing radiation like ultrasound or, to a lesser degree, MRI.

A retrospective study looked at imaging performed in children prior to appendectomy for acute appendicitis at a metropolitan hospital system that had one children's hospital and eight non-children's hospitals (Anderson 2016). They found that children's hospital patients had fewer computed tomography scans (23% vs 70%) and more ultrasonography (75% vs 20%). At non–children's hospitals, older age (age >10) and higher patient weight (>45 kg) predicted computed tomography use. Another recent retrospective study compared imaging for suspected pediatric appendicitis between definitive care hospitals and the hospitals referring to those centers (Glass 2016). About a third of patients had an attempt at imaging before transfer to the definitive care hospitals. The overall odds of an initial attempt at ultrasound prior to CT was 11.1 times greater and the odds of receiving any ultrasound was 6.25-times greater at definitive care hospitals compared to referral hospitals. A 2015 study of over 2500 Washington State appendectomy patients 18 years old and under (Kotagal 2015) found that 52.7% had a CT scan as their first imaging study. Evaluation at a non-children's hospital was associated with higher odds of CT use (OR 7.9). Similar to the Anderson study, children age >10 and obesity were associated with higher rates of CT scanning.

Russell and colleagues developed a clinical practice guideline that focused on examination, early surgeon involvement, and utilization of ultrasound as the initial imaging modality for evaluation of abdominal pain concerning for appendicitis in a children's hospital emergency department (Russell 2013). After implementation of that guideline for evaluation of abdominal pain concerning for appendicitis they saw a 41% decrease in CT use for patients undergoing appendectomy without an increase in the negative appendectomy rate or missed appendicitis. Even more striking, in the subset of

patients undergoing appendectomy without imaging from an outside hospital, CT scan utilization decreased from 82% to 20%, a 76% reduction.

Ultrasound is the modality used most often as an alternative to CT scanning for suspected appendicitis. What about MRI scanning? A 2015 study found that MRI had excellent diagnostic accuracy and was associated with good outcomes in cases of suspected appendicitis (Kulaylat 2015). Those findings, in conjunction with avoiding ionizing radiation, led to the authors' suggestion that MRI may supplant the role of CT scans in pediatric appendicitis imaging. We don't have any statistics on how often MRI scanning is being used for pediatric appendicitis. However, a recent presentation at the 2016 RSNA meeting showed that use of overall MRI scanning in pediatric patients has been increasing at a major New York City hospital (Hulkower 2016). In a discussion of that presentation (Forrest 2016) it was noted that the rates for "trunk" exams were steady until the final year of the study (2015) "when there was an uptick, likely due to an emphasis on performing more MRIs than CTs for appendicitis workups". We don't have a position on the role of MRI in suspected pediatric appendicitis. We expect, however, to be doing another column in the future on issues of safety in pediatric patients undergoing MRI.

There likely are multiple factors, aside from lack of awareness, contributing to the continued performance of CT scans for suspected pediatric appendicitis that seems prevalent in non-children's hospitals. One is that the early surgical consultation, as emphasized in the Russell study, may not be readily available in the non-children's hospitals (since such patients are often transferred to children's hospitals if they need surgery). Another and perhaps more likely factor is that it's often easier to find a CT technician than a pediatric ultrasound technician at non-children's hospitals.

Bottom line: there continue to be too many CT scans for suspected appendicitis in children seen at non-children's hospitals. This makes for an opportunity to do community-wide collaboratives that identify and track the rates of such CT use at all area hospitals, look for root causes, and perhaps set up programs where pediatric surgeons would be available via telemedicine for early evaluation of such patients and discussion as to whether imaging without ionizing radiation is possible or whether the patient should be transferred to the children's hospital for such studies.

Some of our previous columns on the issue of radiation risk:

- February 2, 2010 "The Hazards of Radiation"
- November 23, 2010 "Focus on Cumulative Radiation Exposure"
- March 2010 "More on Radiation Safety"
- June 2011 "Progress in Reducing Radiation from CT Scans"
- April 2013 "Radiation Risk of CT Scans: Debate Continues"
- June 4, 2013 "Reducing Unnecessary CT Scans"
- July 2013 "More on the CT/Cancer Debate"

References:

Imaging Gently®
http://www.imagegently.org/

Imaging Wisely®
http://www.imagewisely.org/

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