

Ten Things Physicians and Patients Should Question

1

Don't do imaging for uncomplicated headache.

Imaging headache patients absent specific risk factors for structural disease is not likely to change management or improve outcome. Those patients with a significant likelihood of structural disease requiring immediate attention are detected by clinical screens that have been validated in many settings. Many studies and clinical practice guidelines concur. Also, incidental findings lead to additional medical procedures and expense that do not improve patient well-being.

2

Don't image for suspected pulmonary embolism (PE) without moderate or high pre-test probability of PE.

While deep vein thrombosis (DVT) and PE are relatively common clinically, they are rare in the absence of elevated blood d-Dimer levels and certain specific risk factors. Imaging, particularly computed tomography (CT) pulmonary angiography, is a rapid, accurate and widely available test, but has limited value in patients who are very unlikely, based on serum and clinical criteria, to have significant value. Imaging is helpful to confirm or exclude PE only for such patients, not for patients with low pre-test probability of PE.

3

Avoid admission or preoperative chest x-rays for ambulatory patients with unremarkable history and physical exam.

Performing routine admission or preoperative chest x-rays is not recommended for ambulatory patients without specific reasons suggested by the history and/or physical examination findings. Only 2 percent of such images lead to a change in management. Obtaining a chest radiograph is reasonable if acute cardiopulmonary disease is suspected or there is a history of chronic stable cardiopulmonary disease in a patient older than age 70 who has not had chest radiography within six months.

4

Don't do computed tomography (CT) for the evaluation of suspected appendicitis in children until after ultrasound has been considered as an option.

Although CT is accurate in the evaluation of suspected appendicitis in the pediatric population, ultrasound is nearly as good in experienced hands. Since ultrasound will reduce radiation exposure, ultrasound is the preferred initial consideration for imaging examination in children. If the results of the ultrasound exam are equivocal, it may be followed by CT. This approach is cost-effective, reduces potential radiation risks and has excellent accuracy, with reported sensitivity and specificity of 94 percent.

5

Don't recommend follow-up imaging for clinically inconsequential adnexal cysts.

Simple cysts and hemorrhagic cysts in women of reproductive age are almost always physiologic. Small simple cysts in postmenopausal women are common, and clinically inconsequential. Ovarian cancer, while typically cystic, does not arise from these benign-appearing cysts. After a good quality ultrasound in women of reproductive age, don't recommend follow-up for a classic corpus luteum or simple cyst <5 cm in greatest diameter. Use 1 cm as a threshold for simple cysts in postmenopausal women.

Don't recommend ultrasound for incidental thyroid nodules found on CT, MRI or non-thyroid-focused neck ultrasound in low-risk patients unless the nodule meets age-based size criteria or has suspicious features.

Imaging of the neck performed to evaluate non-thyroid-related conditions commonly reveals thyroid nodules. Most are not malignant. Even if malignant, they are likely to have indolent behavior. Fine needle aspiration often fails to definitively characterize a lesion as benign owing to the limitations of cytologic evaluation. Consequently, some patients with incidentally-discovered benign nodules undergo unnecessary serial ultrasound imaging and/or surgery. Accordingly, patients without clinical risk factors* who are found to have asymptomatic, incidental, nonsuspicious thyroid nodules on cross-sectional imaging (CT, MRI or non-thyroid ultrasound of the neck) should be referred for diagnostic thyroid ultrasound only if they meet the following criteria:

- (1) < 35 years of age with normal life expectancy and nodule ≥ 1 cm.
- (2) ≥ 35 years of age with normal life expectancy and nodule ≥ 1.5 cm.

Two published studies reported that the percentage of nodules referred for ultrasound would be reduced by 35–46% using the proposed algorithm.

Suspicious features on CT, MRI or US include signs of local invasion, and the presence of abnormal lymph nodes (enlarged nodes, nodes with cystic change, calcification, or increased enhancement).

- i. Size criteria for enlarged lymph nodes:
 1. ≥ 1.5 cm in short axis for jugulodigastric nodes
 2. ≥ 1 cm for other nodes
- ii. Lymph nodes in levels IV and VI are especially suspicious for thyroid cancer metastases.

**Clinical risk factors: Patients with history of head, neck or chest radiation, family history of thyroid cancer, or diseases that increase the risk of thyroid cancer should be further evaluated regardless of nodule size.*

Don't use a protocol for abdominal CT that includes unenhanced CT followed by IV contrast-enhanced CT, except for the following indications: renal lesion characterization, hematuria work up, indeterminate adrenal nodule characterization, follow-up after endovascular stent repair, gastrointestinal hemorrhage or characterizing a focal liver mass.

With the goal of modulating patient radiation exposure and costs, IV contrast enhanced multidetector CT (MDCT) protocols should include an unenhanced acquisition only if it will provide additional diagnostic information. In conjunction with IV contrast enhanced abdominal MDCT, the literature supports an unenhanced acquisition for the following indications:

- (1) Renal lesion characterization or hematuria work up
 - a. Compare unenhanced with post-contrast to identify enhancement in a mass
- (2) Adrenal nodule characterization
 - a. IV contrast phases are not necessary if nodule measures < 10 Hounsfield units (HU) on unenhanced CT.
 - b. If ≥ 10 HU, unenhanced attenuation is used to calculate percentage washout.
- (3) Endovascular stent evaluation
 - a. Unenhanced scan enables distinction of calcification from endoleak when compared to post-contrast images
- (4) Gastrointestinal bleeding
 - a. Unenhanced CT enables definitive distinction of intraluminal hemorrhage from other high-density material (i.e., medication, fecal matter); however, protocols that use only arterial and venous phase acquisitions may be sufficient, as hemorrhage changes configuration between the 2 phases.
 - b. If available, dual energy can be used to create a virtual unenhanced dataset and avoid the unenhanced acquisition.
- (5) Focal liver mass
 - a. Compare unenhanced with post contrast to identify enhancement in a mass

8

Don't routinely use a protocol for abdominal CT that includes a delayed post-contrast phase after the venous phase, except for the following indications: renal lesion characterization, hematuria work up, CT urogram, indeterminate adrenal nodule characterization, hepatocellular carcinoma and cholangiocarcinoma.

With the goal of modulating patient radiation exposure, IV contrast enhanced multidetector CT (MDCT) protocols should include a delayed post contrast acquisition (defined as an acquisition after the portal venous, hepatic or nephrographic phases) only if it will provide additional diagnostic information. The literature supports an additional delayed acquisition for the following indications:

- (1) Renal lesion characterization, hematuria work up or CT urogram
 - a. contrast enhancement pattern of solid renal mass over time provides diagnostic information about pathologic subtype
 - b. delayed phase defines relationship of solid renal mass relationship to collecting system
 - c. delayed phase facilitates identification of transitional cell carcinoma and traumatic injury
- (2) Adrenal nodule characterization
 - a. delayed attenuation used to calculate Absolute Percentage Washout and Relative Percentage Washout
- (3) Hepatocellular carcinoma
 - a. multiple acquisitions facilitate lesion detection and washout characterization
- (4) Cholangiocarcinoma
 - a. enhancement increases over time, justifying use of delayed in patients where distinction between cholangiocarcinoma and HCC is required.

9

Don't make the diagnosis of Pelvic Congestion Syndrome on CT or MRI unless the patients meet clinical and imaging criteria.

Dilated pelvic veins can be an incidental, clinically insignificant finding on CT and MRI, or may reflect pelvic congestion syndrome. In the latter condition, dilated pelvic veins and venous reflux account for a range of symptoms, including chronic pain of more than 6-month duration. Radiologists must be cognizant of established criteria to suggest this diagnosis on CT and MRI. The diagnostic criteria include the following: 4 or more ipsilateral pelvic varicosities, 1 or more pelvic varicosities measuring more than 4 mm, ovarian (gonadal) vein dilatation > 8 mm in diameter.

In patients with dilated pelvic veins that do not meet these criteria, interpretations should not suggest Pelvic Congestion Syndrome. Furthermore, since these criteria were proposed by Coakley et al in 1999, several investigations have confirmed that ovarian vein reflux, ovarian vein dilatation and parauterine vein dilatation can be observed in asymptomatic patients, particularly multiparous women. Interpretations should recommend that clinical symptoms guide decision-making with respect to the need for vascular interventional consultation.

10

Don't routinely recommend follow-up for nonobstructed, asymptomatic, isolated, short-segment jejunojejunal intussusception in adults.

Transient, idiopathic jejunojejunal intussusception in adult patients can be identified on MDCT in the absence of gastrointestinal pathology. In patients without an identifiable lead point mass lesion, imaging characteristics that favor the transient variety include short length (≤ 3.5 cm) and absence of bowel dilation. Self-limited jejunojejunal intussusception can occur in the absence of any bowel disease, or the finding may indicate an infectious or inflammatory process, such as enteritis or Celiac disease. If CT reveals an asymptomatic short-segment, isolated jejunojejunal intussusception (no bowel wall thickening or mesenteric inflammation, no bowel obstruction, no lead point) follow-up imaging should not be routinely recommended. Decisions regarding the need for additional work-up and follow up imaging should be made on clinical grounds.

How This List Was Created (1 – 5)

The American College of Radiology (ACR) initially solicited expert opinion from physician leaders with its Board of Chancellors. A working group was then formed to further identify common clinical scenarios in which imaging may be misused and should be reconsidered. Members of the group included the physician chairs or vice chairs of seven ACR commissions such as Quality and Safety, Appropriateness Criteria and Metrics. An initial list of topics was narrowed down based on the highest potential for improvement, representing a broad range of tests and the availability of strong guidelines. Members then researched specific recommendations and evidentiary statements based on their expertise. Recommendations that were too general or were well covered by other existing measures and initiatives were eliminated to identify the final five things list.

How This List Was Created (6 – 10)

The *Choosing Wisely*[®] initiative was presented to the organization's physician leaders at a Board of Chancellors meeting and a working group selected five initial low-value imaging targets for reduced utilization. The second set of targets was created by the following working group, with the goals of minimizing unnecessary imaging and biopsy generated by discovery of incidental findings, improving patient safety through reduced radiation exposure, and reducing unnecessary consultations based on imaging findings

- Pamela T. Johnson, MD, Chair, Choosing Wisely Recommendations
- Jacqueline A. Bello, MD, FACR, Chair of Commission on Quality and Safety
- Mythreyi B. Chatfield, PhD, Executive Vice President for Quality and Safety
- Jonathan Flug, MD, MBA, Quality Management Committee
- Jenny K. Hoang, MBBS, lead author on ACR White Paper for Managing Incidental Thyroid Nodules
- Alec J. Megibow, MD, MPH, FACR, Committee on Economics – Body Imaging Commission
- Pari V. Pandharipande, MD, MPH, Chair of Committee on Incidental Findings
- Saurabh Rohatgi, MD, Committee on Quality Experience - Commission on Patient and Family Centered Care

Research: For the topics related to incidental findings on imaging exams, the American College of Radiology has created evidence-based white papers to provide guidance to practicing radiologists on making management recommendations. The white paper publications and additional relevant literature serve as the evidence supporting those recommendations. For the remaining recommendations pertaining to body CT protocol design, published literature was reviewed to define acceptable indications for multiphase protocols.

ACR's disclosure and conflict of interest policy can be found at www.acr.org.

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For more information or to see other lists of Five Things Physicians and Patients Should Question, visit www.choosingwisely.org.