

The Overuse of Diagnostic Imaging and the Choosing Wisely Initiative

Vijay M. Rao, MD, and David C. Levin, MD

Health care in America costs too much. There are many reasons for this, but an important one is the overuse of diagnostic tests—including but not limited to imaging studies.

A report by Iglehart (1) indicated that, between 2000 and 2007, use of imaging studies grew faster than that of any other physician service in the Medicare population. Another report by the influential group America's Health Insurance Plans (2) claimed that 20% to 50% of all “high-tech” imaging provides no useful information and may be unnecessary. Reports like these have led to cost concerns among key federal agencies like the Congressional Budget Office, Government Accountability Office, and Medicare Payment Advisory Commission (3, 4), and steps have been taken in recent years to reduce reimbursements for imaging (3). However, an even better approach might be to try to limit imaging studies and other tests and treatments that are inappropriate, unnecessary, wasteful, or redundant.

In an attempt at this latter option, the American Board of Internal Medicine Foundation worked with *Consumer Reports* to conceive and organize the Choosing Wisely initiative (5). The Foundation brought 9 other leading medical organizations into the campaign: the American Academy of Allergy, Asthma and Immunology; American Academy of Family Physicians; American College of Cardiology; ACP; American College of Radiology (ACR); American Gastroenterological Association; American Society of Clinical Oncology; American Society of Nephrology; and American Society of Nuclear Cardiology. These 9 organizations were asked to pick 5 tests or treatments within their purview that they believed were overused. The list of 45 services was announced on 4 April 2012 and drew widespread and generally favorable commentary in the national news media (6, 7). A few days later, a *New York Times* editorial lauded the effort, saying that “The groups showed admirable statesmanship by proposing cuts that would affect their incomes . . .” (8).

The Choosing Wisely Web site (www.choosingwisely.org) lists these 45 tests and treatments. As radiologists, we were interested to note that 24 of the 45 were directly related to diagnostic imaging. Among the 9 organizations that participated, 8 listed at least 1 imaging test. The Table shows the specific imaging tests that were judged to be overused, along with the organizations that chose them. To formulate the table, we paraphrased some of the descriptors, combined others that were similar or duplicative, and eliminated 1 that was nonspecific to yield a list of 16 distinct overused imaging studies.

Choosing Wisely follows closely on an initiative of the ACP, described in the 17 January 2012 issue of *Annals*. Qaseem and colleagues (9) reported on an ACP workgroup of internists from various subspecialties who identified

common screening and diagnostic tests that they believed were overused. The final list contained 37 tests, 18 of which were imaging studies—13 commonly performed by radiologists and 5 commonly performed by cardiologists. In an accompanying editorial, Laine (10) cited an estimate that up to 5% of the country's gross national product is spent on tests and procedures that do not improve patient outcomes. Considerable overlap exists between the ACP's 18 imaging tests and the 16 in the Table.

This suggests a widespread perception among many branches of medicine that imaging is overused. We agree that all 16 of the tests shown in the Table are overused. We hope that all physicians who order imaging tests will reflect on the Choosing Wisely lists and adjust their ordering patterns accordingly.

The American Board of Internal Medicine Foundation deserves great credit for its leadership in organizing this important initiative, as does the ACP for its earlier effort (9). The ACR, the American College of Cardiology, and the American Society of Nuclear Cardiology similarly deserve credit for their roles in the campaign. Many of their members perform the very tests that they included on their lists and this could adversely affect their practices. The 3 organizations clearly acted in the best interests of patients and the health care system, without regard to their own self-interest.

Three important questions must be considered if we are to reduce the overuse of imaging tests. First, why is imaging overused? Many physicians worry about malpractice liability and order too many tests for fear of overlooking anything that could conceivably contribute to a lawsuit. Meaningful tort reform is needed if the problem of inappropriate testing is to ever be solved.

Advanced imaging equipment is installed in nonradiologist physician offices with some frequency and incentivizes these physicians to order abundant imaging tests to generate revenues. Numerous studies over the past 4 decades have shown that self-referral invariably leads to higher use of imaging studies (11–14). The problem is compounded by the fact that many patients demand advanced imaging after hearing about it from friends, the media, or even direct-to-consumer advertising of certain types of imaging-based screening. Radiologists, who have generally been unwilling to act as gatekeepers, should be more proactive in using evidence-based criteria in front-end consultations with ordering physicians to reduce inappropriate or unnecessary imaging tests.

Radiologists can help to educate ordering physicians who lack informed knowledge of which imaging tests, if any, are most appropriate for the patient's clinical circumstances. Even when the initial test is appropriate, the tests are sometimes unnecessarily duplicated when a patient

Table 1. List of Specific Imaging Tests in the Choosing Wisely Campaign That Are Believed to Be Overused

Imaging Test	Sponsoring Organization
Imaging for headache in patients without risk factors for structural problems	ACR
Imaging for suspected pulmonary emboli in patients with low pretest probability; should perform D-dimer test first	ACR, ACP
Routine preoperative chest radiography in patients without cardiopulmonary symptoms	ACR, ACP
CT for suspected appendicitis in children; should perform ultrasonography first	ACR
Follow-up imaging of small, simple adnexal cysts <1 cm in diameter in postmenopausal women or <5 cm in diameter in younger women	ACR
CT of sinuses in uncomplicated acute rhinosinusitis	AAAAI
Imaging in patients with low back pain in the absence of red flags	AAFP, ACP
DEXA for suspected osteoporosis in women <65 y and men <70 y in the absence of risk factors	AAFP
Stress cardiac imaging in patients without symptoms or high-risk markers for diabetes	ACC, ASNC
Regular stress cardiac imaging in asymptomatic patients during routine follow-up after treatment	ACC, ASNC
Stress cardiac imaging during preoperative assessment for low-risk noncardiac surgery in patients with low to intermediate risk for CAD	ACC, ASNC
Echocardiography for routine follow-up in patients with low-risk native heart valve disease	ACC
Brain CT or MRI after simple syncope without neurologic abnormalities	ACP
Repeat CT in patients with abdominal pain who meet Rome III criteria for the functional abdominal pain syndrome and whose symptoms have not changed	AGA
PET, CT, or radionuclide bone scans in staging early prostate cancer unless the patient is at high risk for metastasis	ASCO
PET, CT, or radionuclide bone scans in staging early breast cancer unless the patient is at high risk for metastasis	ASCO

AAAAI = American Academy of Allergy, Asthma, and Immunology; AAFP = American Academy of Family Physicians; ACC = American College of Cardiology; ACR = American College of Radiology; AGA = American Gastroenterological Association; ASCO = American Society of Clinical Oncology; ASNC = American Society of Nuclear Cardiology; CT = computed tomography; DEXA = dual-energy x-ray absorptiometry; CAD = coronary artery disease; MRI = magnetic resonance imaging; PET = positron emission tomography.

seeks care from a new physician or at a new site, because the old studies are not readily available or the clinicians have more confidence in their own equipment and radiologists.

Finally, radiologists themselves must acknowledge their own potential conflicts of interest about overuse of imaging studies. The more imaging studies they do, the more they earn. Radiologists should recommend additional imaging tests in their reports only when such additional testing is truly warranted. Too often, such casual recommendations about additional testing ties the hands of treating physicians and compels them to order further tests largely for defensive purposes.

Second, why is too much imaging a bad thing? Cost issues aside, inappropriate imaging unnecessarily exposes patients to excessive radiation, inconvenience, and actual harms that come from the cascade of diagnostic and ther-

apeutic interventions that often follow identification of a lesion that proves only to be an incidentaloma.

The third question is how can we fix the problem? Awareness of the Choosing Wisely and ACP initiatives is another important step in the right direction. As noted previously, radiologists need to make some modifications to their daily routines and recommend testing only when indicated and intervene to cancel inappropriate tests when ordered. Physicians should also be aware of the ACR's evidence-based appropriateness criteria for imaging that were first developed in the 1990s.

The ACR frequently updates the appropriateness criteria, and they currently cover 175 clinical conditions with more than 850 variants, including cardiac imaging tests. Expert panels developed the criteria using evidence review and input from more than 300 physicians, including some 80 clinical specialists from 20 nonradiologic medical organizations. These appropriateness criteria are readily accessed at the ACR's Web site at www.acr.org/quality-safety/appropriateness-criteria. Many nonradiologist physicians are unfortunately unaware of these criteria (15), and radiologists do not always implement them in their daily practices.

Appropriateness criteria can be a valuable resource in the effort to reduce unnecessary imaging. To augment their use, the criteria are increasingly being incorporated into computerized decision-support tools linked to the ordering of imaging tests. Although not yet widely used, these decision-support tools show promise for the future (16). In addition, the so-called radiology benefits management companies are using their own variations of the appropriateness criteria in their preauthorization programs. Although these programs are unpopular among clinicians, they are widely used by commercial insurers and have helped to control inappropriate imaging (17, 18).

One final matter is worth mentioning. Earlier, we mentioned that use of imaging was growing rapidly during the past decade (1). However, that growth seems to have halted. Recent studies by our group show that in the Medicare population, use of advanced imaging has actually begun to decline (3, 4, 19). Moreover, overall Medicare payments for noninvasive diagnostic imaging decreased by 21% between 2007 and 2010 (20). These trends could signify that downturns in imaging and the associated costs are already at hand.

Current campaigns that draw attention to overuse of imaging studies coupled with greater physician knowledge and use of the criteria for appropriate imaging can help to ensure a further reduction in unnecessary testing—a result that would benefit both patients and our health care system.

From Thomas Jefferson University Hospital, Philadelphia, Pennsylvania.

Potential Conflicts of Interest: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M12-1458.

Requests for Single Reprints: Vijay M. Rao, MD, Thomas Jefferson University Hospital, Department of Radiology, 132 South 10th Street, Suite 1087 Main, Philadelphia, PA 19107; e-mail, Vijay.Rao@jefferson.edu.

Current author addresses and author contributions are available at www.annals.org.

This article was published at www.annals.org on 28 August 2012.

References

1. Iglehart JK. Health insurers and medical-imaging policy—a work in progress. *N Engl J Med*. 2009;360:1030-7. [PMID: 19264694]
2. **America's Health Insurance Plans**. Ensuring Quality through Appropriate Use of Diagnostic Imaging. Washington, DC: America's Health Insurance Plans; 2008.
3. Levin DC, Rao VM, Parker L, Frangos AJ, Sunshine JH. Bending the curve: the recent marked slowdown in growth of noninvasive diagnostic imaging. *AJR Am J Roentgenol*. 2011;196:W25-9. [PMID: 21178027]
4. Levin DC, Rao VM, Parker L. Physician orders contribute to high-tech imaging slowdown. *Health Aff (Millwood)*. 2010;29:189-95. [PMID: 20048376]
5. Cassel CK, Guest JA. Choosing wisely: helping physicians and patients make smart decisions about their care. *JAMA*. 2012;307:1801-2. [PMID: 22492759]
6. Rabin RC. Doctor panels recommend fewer tests for patients. *New York Times*. 4 April 2012. Accessed at www.nytimes.com/2012/04/04/health/doctor-panels-urge-fewer-routine-tests.html on 4 April 2012.
7. Jaslow R. Doctors unveil "Choosing Wisely" campaign to cut unnecessary medical tests. *CBS News*. 4 April 2012. Accessed at www.cbsnews.com/8301-504763_162-57409204-10391704/doctors-unveil-choosing-wisely-campaign-to-cut-unnecessary-medical-tests on 29 May 2012.
8. Do you need that-test? *New York Times*. 9 April 2012:A20. Accessed at www.nytimes.com/2012/04/09/opinion/do-you-really-need-that-medical-test.html on 9 April 2012.
9. Qaseem A, Alguire P, Dallas P, Feinberg LE, Fitzgerald FT, Horwitch C, et al. Appropriate use of screening and diagnostic tests to foster high-value, cost-conscious care. *Ann Intern Med*. 2012;156:147-9. [PMID: 22250146]
10. Laine C. High-value testing begins with a few simple questions [Editorial]. *Ann Intern Med*. 2012;156:162-3. [PMID: 22250151]
11. Childs AW, Hunter ED. Non-medical factors influencing use of diagnostic x-ray by physicians. *Med Care*. 1972;10:323-35. [PMID: 5050742]
12. Hillman BJ, Olson GT, Griffith PE, Sunshine JH, Joseph CA, Kennedy SD, et al. Physicians' utilization and charges for outpatient diagnostic imaging in a Medicare population. *JAMA*. 1992;268:2050-4. [PMID: 1404741]
13. Hughes DR, Bhargavan M, Sunshine JH. Imaging self-referral associated with higher costs and limited impact on duration of illness. *Health Aff (Millwood)*. 2010;29:2244-51. [PMID: 21134926]
14. Levin DC, Rao VM. The effect of self-referral on utilization of advanced diagnostic imaging. *AJR Am J Roentgenol*. 2011;196:848-52. [PMID: 21427334]
15. Bautista AB, Burgos A, Nickel BJ, Yoon JJ, Tilara AA, Amorosa JK; **American College of Radiology Appropriateness**. Do clinicians use the American College of Radiology Appropriateness criteria in the management of their patients? *AJR Am J Roentgenol*. 2009;192:1581-5. [PMID: 19457821]
16. Sistrom CL, Dang PA, Weilburg JB, Dreyer KJ, Rosenthal DI, Thrall JH. Effect of computerized order entry with integrated decision support on the growth of outpatient procedure volumes: seven-year time series analysis. *Radiology*. 2009;251:147-55. [PMID: 19221058]
17. Levin DC, Bree RL, Rao VM, Johnson J. A prior authorization program of a radiology benefits management company and how it has affected utilization of advanced diagnostic imaging. *J Am Coll Radiol*. 2010;7:33-8. [PMID: 20129269]
18. Mitchell JM, Lagalia RR. Controlling the escalating use of advanced imaging: the role of radiology benefit management programs. *Med Care Res Rev*. 2009;66:339-51. [PMID: 19208823]
19. Levin DC, Rao VM, Parker L. The recent downturn in utilization of CT: the start of a new trend? *J Am Coll Radiol*. 2012. [Forthcoming].
20. Levin DC, Rao VM, Parker L, Frangos AJ. The sharp reduction in Medicare payments for noninvasive diagnostic imaging in recent years: will they satisfy the federal policymakers? *J Am Coll Radiol*. 2012;9:643-7.

Current Author Addresses: Dr. Rao: Thomas Jefferson University Hospital, Department of Radiology, 132 South 10th Street, Suite 1087 Main, Philadelphia, PA 19107.

Dr. Levin: Thomas Jefferson University Hospital, Department of Radiology, 132 South 10th Street, Suite 1090 Main, Philadelphia, PA 19107.

Author Contributions: Conception and design: V.M. Rao, D.C. Levin. Drafting of the article: V.M. Rao, D.C. Levin.

Critical revision of the article for important intellectual content: V.M. Rao, D.C. Levin.

Final approval of the article: V.M. Rao, D.C. Levin.