

# The Utility of Appropriate Use Criteria for Radionuclide Imaging

Radionuclide myocardial perfusion imaging (MPI) is commonly used to assess coronary artery disease (CAD). In fact, nearly 8 million MPI scans are performed each year in the United States.<sup>1</sup> The continued growth of MPI demonstrates its important role in the care of patients with known or suspected cardiovascular disease.<sup>2</sup> However, in a 2005 report to Congress, the Medicare Payment Advisory Commission (MedPAC) stated that the growth rate of imaging far exceeded that of other services, which raised questions about the necessity of imaging services being performed.<sup>3</sup> MedPAC recommended that Medicare require preauthorization to help manage the volume growth and quality of imaging services.

In the 2010 MedPAC report, the growth of imaging had declined from 8.6% in 2003 to 3.3% in 2008, partly due to a reduction in Medicare payment rates.<sup>3,4</sup> Even with the decline, the high volume of imaging tests and associated costs, plus the growing concerns about radiation exposure, have continued to raise concerns about overutilization and inappropriate use.<sup>5</sup> As a result, regulatory initiatives and radiology benefit management (RBM) programs have attempted to curb unnecessary or inappropriate imaging.<sup>5</sup>

Payers using RBMs to limit the number of advanced imaging tests performed often require that referring physicians go through a precertification process to receive prior authorization for an imaging procedure.<sup>5</sup> However, there are no data to show that precertification or RBM approval criteria improve the quality of care.<sup>5</sup> Because precertification is labor intensive and costly, and may result in the denial of tests that the ordering physician feels are appropriate, basing decisions on appropriate use criteria (AUC) represents an alternative that helps the healthcare provider make responsible decisions about appropriate MPI.<sup>5</sup>

## THE APPROPRIATE USE CRITERIA FOR TEST SELECTION

The *Appropriate Use Criteria for Radionuclide Imaging* were first published in 2005 and updated in 2009 in response to the need for practical guidelines for the use of radionuclide MPI.<sup>6</sup> These evidence-based criteria have been widely adopted as a practical tool for making patient-focused imaging decisions. Utilizing the AUC is likely to reduce the number of inappropriate imaging tests, reduce costs, and reduce radiation exposure. It also provides assurance that imaging is appropriate, according to national quality standards, when the clinical benefits of CAD detection and early intervention outweigh the potential risks.

The AUC take into account the benefits and risks of performing imaging and support clinical decisions about procedural appropriateness.<sup>7</sup> For instance, cardiac imaging is beneficial for the detection or exclusion of disease, risk stratification, and the evaluation of therapeutic efficacy.<sup>7</sup> Cardiac imaging also promotes efficient patient care by allowing the selective use of more invasive procedures such as angiography.<sup>5</sup> However, low quality imaging or inappropriate imaging may lead to a false positive result and an unnecessary procedure or test.<sup>7</sup>

## The AUC definition of appropriateness is as follows:

*“An appropriate imaging study is one in which the expected incremental information, combined with clinical judgment, exceed the expected negative consequences by a sufficiently wide margin for a specific indication that the procedure is generally considered acceptable care and a reasonable approach for the indication.”<sup>6</sup>*

The decision whether cardiac imaging is reasonable or not should be based on how the information gained will influence subsequent patient care and patient outcomes including health status and survival.<sup>7</sup> For example, in a patient who has a low risk of a cardiac event based on clinical factors and family history and is not experiencing any symptoms, the imaging result would most likely be normal, and, therefore, provide no information that would change how the patient is treated. In this case, the risks of the imaging procedure would outweigh the benefits, making imaging inappropriate.

For patients or referring physicians who may question the necessity of MPI and have concerns regarding the associated risk, it is important to emphasize the appropriateness of the test and the utility of the information obtained for making treatment decisions. Imaging decisions based on authoritative criteria for the appropriate use of MPI provides assurance that the test is reasonable and the clinical benefits of detection and early intervention outweigh the potential risks.<sup>8</sup>

## PRACTICAL APPLICATION OF AUC

The AUC represent the majority of cardiovascular nuclear testing scenarios and fall into 8 indications, including<sup>6</sup>:

1. Detection of CAD in symptomatic patients
2. Detection of CAD in asymptomatic patients
3. Risk assessment for patients with prior stress imaging test results
4. Preoperative risk assessment prior to noncardiac surgery
5. Risk assessment within 3 months of acute coronary syndrome
6. Risk assessment postrevascularization
7. Assessment of viability/ischemia
8. Evaluation of ventricular function

Within these indications, the AUC list 67 patient categories scored on a scale of 1 to 9 to indicate appropriate use, inappropriate use, or uncertain use of MPI based on the pretest probability of CAD.<sup>6</sup> In general, according to the AUC scoring, the use of MPI is considered appropriate for the diagnosis and risk assessment of intermediate- and high-risk CAD patients. MPI testing for low-risk patients, routine repeat testing, and general screening in certain clinical scenarios are considered less appropriate.<sup>6</sup> Table 1 lists some of the appropriate and inappropriate scenarios for MPI according to the AUC.

## IMAGING CONSIDERATIONS FOR ASYMPTOMATIC PATIENTS

While there is strong supporting evidence for the diagnostic evaluation and risk assessment of symptomatic patients with known or suspected CAD, there is a paucity of evidence related to asymptomatic patients.<sup>9</sup> In general, MPI is appropriate in asymptomatic patients when the benefits of accurate diagnosis and therapeutic management outweigh the risks of radiation exposure.

The best option is one that provides the needed information for diagnostic and management purposes, at the lowest possible radiation dosimetry.<sup>9</sup> In certain situations, the American Society of Nuclear Cardiology (ASNC) recommends that alternative diagnostic tests before MPI, such as calcium scoring, might be appropriate for asymptomatic patients.<sup>9</sup>

## TRACKING AUC AND ACCREDITATION

According to Robert C. Hendel, MD, from the University of Miami Miller School of Medicine, enforcing appropriate use may help eliminate inappropriate imaging, cut costs, and reduce patient exposure to radiation. Of the imaging exams performed, Dr. Hendel thought that between 11% and 24% may be deemed inappropriate. He also notes that educating clinicians about appropriate use criteria can reduce inappropriate imaging by 50%.<sup>10</sup>

A recent pilot study conducted by the American College of Cardiology and United Healthcare found that the tracking of appropriate use was feasible in clinical practice and can be used to identify sources of inappropriate testing and the need for quality improvement initiatives. Therefore, measuring imaging appropriateness based on appropriate use criteria is a viable alternative to RBMs and has the potential for widespread application.<sup>11</sup>

The Intersocietal Commission for the Accreditation of Nuclear Medicine Laboratories (ICANL) requires accredited facilities providing nuclear cardiology and cardiac imaging to incorporate measurements of appropriate use of radionuclide testing based on published criteria, such as the AUC, to fulfill annual quality assurance requirements.<sup>12</sup> And, as of January 1, 2012, all nonhospital providers of advanced diagnostic imaging will be required to receive accreditation as a condition of reimbursement and, therefore, will be required to measure appropriate use to fulfill ICANL quality standards.<sup>13</sup>

## CONCLUSIONS

Advancements in cardiac imaging have enhanced the clinical application and growth of cardiac imaging, which has also raised concern about overuse. Today, there is a greater focus on ensuring high quality cardiovascular stress imaging because inappropriate use may lead to unnecessary procedures for the patient and unnecessary costs to the healthcare system.<sup>6</sup>

The AUC help to define and assure quality cardiac imaging and appropriate imaging selection to minimize radiation exposure and achieve optimal patient outcomes in a cost-effective manner.<sup>6</sup> Together with clinical experience and judgment, the AUC is the definitive, evidence-based tool for helping to determine whether radionuclide MPI is appropriate for individual patients in order to improve the prevention, diagnosis, and management of cardiovascular disease.<sup>2</sup> Additionally, to meet lab accreditation standards, incorporating measurements of the appropriate use of radionuclide testing based on the AUC will be necessary to fulfill annual quality assurance requirements and qualify for reimbursement.<sup>12</sup>



Go to [astellasapps.com](http://astellasapps.com) to download the AUC app to your smartphone. The app helps guide you through the decision-making process based on the published *Appropriate Use Criteria for Radionuclide Imaging*.

**Table 1.** Examples of Appropriate and Inappropriate Use of MPI According to the AUC<sup>6</sup>

APPROPRIATE INDICATIONS FOR MPI	INAPPROPRIATE INDICATIONS FOR MPI
<ul style="list-style-type: none"> <li>• Intermediate or high-risk CAD patients</li> <li>• Patients with a low likelihood of CAD who are unable to exercise or had an uninterpretable electrocardiogram</li> <li>• Symptomatic patients following revascularization</li> <li>• Patients with possible acute coronary syndrome</li> <li>• Asymptomatic patients with incomplete revascularization</li> <li>• Evaluation of left ventricular function</li> <li>• Evaluation of patients with unexplained troponin elevation</li> <li>• Evaluation 3 months after acute coronary syndrome if there was no prior coronary angiogram</li> </ul>	<ul style="list-style-type: none"> <li>• Asymptomatic or low-risk patients</li> <li>• Risk assessment of asymptomatic patients with a low to intermediate risk of coronary heart disease less than 2 years after stress testing</li> <li>• Routine testing less than 2 years after coronary revascularization in asymptomatic patients</li> <li>• Pre-operative testing of low-risk patients with good functional capacity before noncardiac surgery</li> <li>• Detection of CAD in stable symptomatic patients who have a low pre-test probability of CAD, interpretable baseline electrocardiogram, and are able to exercise</li> <li>• General screening prior to discharge from the hospital or prior to initiation of cardiac rehabilitation</li> </ul>

## References

1. AMR Data on File. 2009.
2. Douglas P, Iskandrian AE, Drumholz HM, et al. Achieving quality in cardiovascular imaging. *J Am Coll Cardiol.* 2006;48:2141-2151.
3. Report to the Congress: Medicare Payment Policy. Washington, DC: Medicare Payment Advisory Commission, 2005.
4. Report to the Congress: Medicare Payment Policy. Washington, DC: Medicare Payment Advisory Commission, 2010.
5. Hendel RC. Utilization management of cardiovascular imaging. *J Am Coll Cardiol.* 2008;1:241-248.
6. Hendel RC, Berman DS, DiCarli MF, et al. ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009 appropriate use criteria for cardiac radionuclide imaging. *JACC.* 2009;53:2201-2229.
7. Patel MR, Spertus JA, Brindis RG, et al. ACCF proposed method for evaluating the appropriateness of cardiovascular imaging. *J Am Coll Cardiol.* 2005;46:1606-1613.
8. Fazel R, Disizian V, Einstein AJ, et al. Strategies for defining an optimal risk-benefit ratio for stress myocardial perfusion SPECT. *J Nucl Cardiol.* 2011;18:385-392.
9. Hendel RC, Abbott BG, Bateman TM, et al. ASNC information statement. The role of radionuclide myocardial perfusion imaging for asymptomatic individuals. <http://www.asnc.org/imageuploads/Asymptomatic.pdf>. Accessed October 10, 2011.
10. Dmyterko K. Curbing unnecessary tests: will that cut costs, improve care? *Cardiovascular Business.* [www.cmio.net/index.php?option=com\\_articles&article=29849](http://www.cmio.net/index.php?option=com_articles&article=29849). Accessed October 10, 2011.
11. Hendel RC, Cerqueira M, Douglas PS, et al. Multicenter assessment of the use of single-photon emission computed tomography myocardial perfusion imaging with appropriateness criteria. *J Am Coll Cardiol.* 2010;55:156-162.
12. Changes: The latest revisions to the *ICANL standards*. 2010. [www.icanl.org/icanl/standards/2010\\_Summary\\_of\\_Standards\\_Revisions.pdf](http://www.icanl.org/icanl/standards/2010_Summary_of_Standards_Revisions.pdf). Accessed October 26, 2011.
13. Intersocietal Commission for the Accreditation of Nuclear Medicine Laboratories. Reimbursement and the nuclear laboratory: an overview. [http://www.intersocietal.org/icanl/main/reimbursement\\_ICANL.htm](http://www.intersocietal.org/icanl/main/reimbursement_ICANL.htm). Accessed October 10, 2011.

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