The Medical Imaging and Technology Alliance provided funding for this research. Avalere Health maintained full editorial control and the conclusions expressed here are those of the authors.
Executive Summary

Advances in medical imaging technology have redefined how physicians diagnose and treat some of the most life threatening diseases – like cancer and heart disease – and have nearly eliminated the need for exploratory surgery. As recognition of diagnostic imaging’s capability has grown, the corresponding spike in utilization has legislators, health plans, and the providers of imaging services considering various utilization management programs.

This paper examines three emerging strategies to ensure appropriate and safe use of imaging: professional societies’ development of appropriateness criteria or guidelines; modality-specific accreditation and certification programs; and clinical educational initiatives. In plain language, the goal of these strategies is to order the right image for the right patient, rendered by the right physician in the right setting of care. Our report outlines these three sets of initiatives within the context of this common goal.

**Appropriateness guidelines** seek to optimize use of imaging services by ensuring patients do not go without important studies when they are indicated while avoiding unnecessary studies. These tools link clinical evidence to use of imaging services, advocating use only when a clinical benefit is expected. Such criteria are most often developed by national professional societies; physician leaders in the imaging market are expanding on a solid foundation of guidelines as new evidence emerges. Professional societies are updating existing guidelines, developing new criteria, and exploring novel methods of dissemination and communication with physicians as the debate about imaging utilization continues.

**Accreditation and certification programs** for facilities, physicians, and equipment seek to assure adherence to core equipment, facility, and clinician standards. These programs assess the safety and adequacy of the equipment, the ability of the imaging facility to provide a safe environment for imaging services, and/or the professional background and training of the image-rendering and – interpreting physicians. Some programs recognize facilities that produce images of superior technical quality and providers who demonstrate skilled interpretation.

**Education and training programs** represent a growing and important bridge between professional organizations that evaluate imaging appropriateness and the physicians who provide imaging services. Training programs, both during residency and in the form of continuing medical education, offer providers opportunities to solidify skills on existing and new technologies and revisit best practices for their safe and appropriate use. Educational interventions and knowledge access at the point of care may be especially important for referring physicians, who often hail from specialties other than radiology or cardiology. Professional societies, hospitals, imaging equipment and service providers, and payors are pursuing new educational content and outlets – such as decision support tools that provide instant feedback on appropriateness – to equip
physicians with the information they need to practice appropriate and efficient medicine.

In sum, an array of initiatives are underway to ensure that patients in need of imaging services receive them – furnished by a skilled provider at a high-quality site.

I. Introduction

The benefits of diagnostic imaging in healthcare are well-documented in many reports and studies. Imaging has reduced the use of invasive exploratory surgery;¹ improved our ability to detect malignancies at treatable stages;² and allowed more accurate and timely diagnoses of joint, tissue, and cellular disorders.³ It may be appropriate to include diagnostic imaging as one of the most important innovations in the practice of medicine⁴ – a claim that seems reasonable given the hundreds of millions of patients who have benefitted from non-invasive, accurate, and timely diagnoses.

With more and more clinicians and patients becoming aware of these advances in imaging, it should come as little surprise that the utilization of advanced imaging techniques – notably computed tomography (CT) and magnetic resonance imaging (MRI) – has also increased. A number of recent studies and analyses have highlighted the rapid growth in our healthcare system’s use of advanced imaging technologies, leading some stakeholders to express concern about the sustainability of recent utilization trends. While a growing body of research supports the broader application of new imaging technologies, other research focuses on the appropriateness of recent increases in imaging utilization.

The goals of this report are to:

• Review responses emerging in the provider community to ensure appropriate use of imaging services, focusing on three initiatives:
  > Development and refinement of appropriateness criteria
  > Development and refinement of accreditation and certification protocols
  > Education programs for imaging providers

¹ For example, see Hayes, E. (2006). Imaging may save women from needless appendectomy. Diagnosticimaging.com
⁴ Elias Zehrouni, M.D. Director of the National Institutes of Health, as quoted by the Medical Imaging & Technology Alliance. January 31, 2006.
II. Recent Analyses of Medicare Spending Patterns

Multiple Factors Driving Changes in Spending Patterns

Several analyses have sought to understand the drivers of imaging growth. In some cases (e.g., positron emission tomography, or PET), the technologies are so new that their early adoption generates significant uptake of the emerging technology. Several recent analyses suggest additional factors:

- Advancing technology has allowed imaging to move from the hospital inpatient setting to outpatient clinics and physician offices – resulting in easier access for patients and lower costs for health plans and consumers.\(^5\) As imaging services moved from Part A-paid inpatient space to Part B-paid physician office and outpatient sites, the amount of imaging spending subject to the sustainable growth rate (SGR) update has necessarily grown. Thus, a complete picture of imaging should include assessments of both hospital-based and non-hospital-based sites-of-service.

- In their 2005 report, “Impact of Shift in Site of Services,” The Lewin Group estimated that roughly 20 percent of the growth in Part B imaging spending from 1999 to 2003 was due to this shift in sites-of-service.\(^6\)

- A 2005 study by the Medicare Payment Advisory Commission (MedPAC)\(^7\) supports this analysis. The Commission found that approximately 20 percent of the growth in Part B imaging spending was related to services that would have occurred in the hospital in prior years.

- A recent analysis\(^8\) by David W. Lee, Ph.D., Senior Director of Health Economics and Outcomes Research at GE, finds that the percentage of Medicare beneficiaries using imaging services has grown. To the extent that a greater fraction of Medicare beneficiaries receive imaging services, a portion of the growth can be arguably attributed to greater access to these technologies.

  - New technologies may be prone to marked increases in utilization rates in their early years as payors begin to cover additional applications and providers offer services to additional patients. Early growth rates may yield an incomplete view of overall utilization, however, as they build on a very low base. For example, a provider who performs 5 imaging services one year and 10 the next realizes a 200 percent increase in utilization.

  - Christopher Hogan, Ph.D.\(^9\) of Direct Research LLP also found a correlation between spending on imaging and spending on all other services for high-cost Part B patients. Medicare beneficiaries in the top 10 percent of imaging spending were also in the top 10-20 percent of non-imaging spending.

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Deficit Reduction Act and Impact on Imaging

The Deficit Reduction Act (DRA) of 2005 introduced new reductions and limitations on imaging payment. These reductions created caps on payments to physicians and imaging centers for the technical component of imaging services and limited payment for multiple images. An analysis by the Moran Company estimated that DRA will reduce total payments for Part B imaging services by 10 percent, from an estimated $12.0 billion (using 2008 pre-DRA payment rates and 2006 service volumes), to $10.8 billion (using 2008 post-DRA payment levels and 2006 volumes).

Figure 1  Estimated Impact of DRA Caps on 2008 Physician Fee Schedule Imaging Spending (using 2006 service volumes)

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<table>
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<tr>
<td>Total Payments, Uncapped</td>
<td>$12,022,502,162</td>
</tr>
<tr>
<td>Total Payments, with DRA Cap</td>
<td>$10,764,009,237</td>
</tr>
<tr>
<td>Impact of DRA Caps (dollars)</td>
<td>$1,258,492,926</td>
</tr>
<tr>
<td>DRA Impact as Percent of Total Payments</td>
<td>10%</td>
</tr>
<tr>
<td>DRA Impact as Percent of Technical Component Payments</td>
<td>16%</td>
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The effects of DRA are just beginning to be felt throughout the imaging community – its full impact on physicians and patients remains to be seen. Below, we summarize more recent analyses of patterns in Medicare spending for imaging services.

Diagnostic Imaging and Spending Growth: Recent Moderation

Most of the analyses of imaging growth focus on the 1999 through 2003-2004 period. For example, in 2005, MedPAC found that diagnostic imaging utilization outpaced other physician fee schedule services from 1999 through 2002 before moderating from 2002-2003.  

Additional studies suggest growth moderation, in part driven by the DRA changes. For example, a recent analysis by Hogan uses the most recent Medicare data (through December 31, 2006), and provides important – albeit limited – insights into a possible moderation of the growth rate of Medicare imaging services.

- Hogan’s analysis confirms a 13 percent annual growth rate for Medicare imaging services (carrier-paid + hospital outpatient) over the 2002-2005 period.
- From 2005 to 2006, Hogan finds that spending for carrier-paid imaging services grew just 4.6 percent.

12 Please contact authors for a copy of this report.
Importantly, this apparent 2005+ slowdown in spending is also occurring in non-imaging Part B services. The most recent Actuary's letter from the Centers for Medicare & Medicaid Services (CMS) on SGR-based growth rates reported just a 1.7 percent increase over 2005-2006 for all SGR-related spending – owing to a combination of Medicare Advantage enrollment, underlying declines in utilization rates, and reductions in the price paid per service. While imaging growth continues to outpace overall spending growth, the moderation of total Part B spending comes as welcome news to those concerned about the long-term sustainability of the Medicare program.

Finally, in a recent report issued by one of the leading imaging market research firms, the 2003-2007 average annual growth in MRI procedures across 7,195 surveyed sites was 3 percent per year – compared to a 1999-2003 average annualized growth rate of 15 percent.  

Payor Responses to Growth in Imaging
A number of private health plans and some state Medicaid programs are exploring various utilization management programs – including prior authorization – to manage their diagnostic imaging costs. These more interventional strategies are often outsourced from private plans to the relatively new industry of radiology benefit managers, or RBMs. RBMs typically offer a menu of services ranging from provider privileging to physician-to-plan notification to formal prior authorization (requiring that clinicians obtain authorization from the payor before performing imaging services). These companies also develop or adopt medical coverage policies that may be embraced in whole or in part by the payor.

Patient and physician advocates have raised questions about prior authorization programs' impact on physician decision-making and administrative overhead, as well as their impact on patients' ability to receive timely, convenient, and appropriate imaging services.

In all cases, our interviews and research revealed that health plans view imaging as an extraordinarily valuable and effective medical technology, with the clear ability to improve the quality of care for patients. Against rising utilization levels, some plans are adopting direct forms of oversight and control (i.e., prior authorization), and others are embracing less direct forms of oversight – including education, development of appropriateness criteria, and adoption of certification and accreditation criteria.

With a number of other studies focused on the policy, business, and clinical issues surrounding prior authorization, the bulk of this report examines physician-led initiatives to assure the appropriate development and use of imaging.

III. Imaging Service Provider Initiatives

A. Appropriateness Guidelines
As evidence on imaging technology accumulates, professional societies are independently developing and updating appropriateness criteria or guidelines. Designed to provide physicians with distillations of clinical trial and other evidence, such criteria help providers target specific imaging procedures to patients likely to benefit from them. Although some appropriateness criteria have been in existence for decades, professional societies and other criteria-producing entities are revisiting existing guidelines, pursuing evidence-based protocols in new treatment areas, and exploring new applications and outlets for this information.

Steady Increase in Guideline Development
The recent past has seen a steep increase in the availability of guidelines related to imaging. The Agency for Healthcare Research and Quality's (AHRQ) National Guideline Clearinghouse lists 781 existing clinical practice guidelines; historical data from the clearinghouse indicate that the number of guidelines related to imaging has increased markedly since 2000.14

Figure 2 Clinical Guidelines on Imaging Are Proliferating

![Figure 2](chart.png)

Leaders of professional societies have also developed and updated numerous appropriateness criteria for imaging studies. The American College of Radiology (ACR) has developed criteria for more than 160 topics, while the American College of Cardiology (ACC) lists 12 sets of guidelines on its website, of which 7 are new or recently updated. The Society of Nuclear Medicine lists 37 guidelines published since 2001.

Researchers can now retrospectively classify imaging studies performed by appropriateness. These analyses seem to indicate that the majority of imaging services performed are appropriate.¹⁵

- For example, Al-Mallah et al. examined 5,943 patients who underwent single-photon emission computed tomography myocardial perfusion imaging (SPECT MPI) exams. Based on the American College of Cardiology Foundation (ACCF) and American Society of Nuclear Cardiologists (ASNC) appropriateness criteria, 75.3 percent of scans received were appropriate. 13.1 percent of studies were classified as inappropriate, and 11.6 percent as uncertain.¹⁶

- For comparative purposes, a 2003 study of 6,712 adults found that 54.9 percent received recommended care across 439 quality indicators, the majority of which focused on non-imaging care.¹⁷

Baseline assessments of appropriateness indicate that guidelines put forth by organizations such as the ACR and ACC are themselves appropriate metrics for judging imaging studies. Policymakers need to consider the potential for current appropriateness criteria to guide physicians and patients toward greater use of recommended services – since underutilization of imaging can have a significant impact on treatment decisions, treatment efficacy, and, ultimately, on the overall burden and cost of illness.

**Measuring and Maximizing the Impact of Guidelines**

Professional societies and imaging equipment providers have reached an important milestone in pursuing a larger evidence base in imaging appropriateness. The sector’s next challenge is to ensure that these newly formulated guidelines and criteria impact clinical decision-making and practice. While development and updating of appropriateness criteria and guidelines is important, the existence of guidelines may not be sufficient to effect changes in physician behavior or utilization of imaging services. Professional societies and other stakeholders face the dual challenges of updating current guidelines in the face of increasingly complex medicine and translating these guidelines into real-time tools for physicians and patients.

Several studies have attempted to gauge the impact of clinical guidelines on physician utilization of imaging services. For a number of therapies, evidence-based guidelines have had great success in shaping clinical practice. Beta-blocker therapy’s rise from ACC recommendation to standard hospital quality measure demonstrates the promise for clinical guidelines to shape everyday practice.

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¹⁵ For example, see Mehta et al. (2007). “Gender Difference in Application of the Appropriateness Criteria for Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging.”


In the imaging space, Ayyad et al. compared utilization of cardiac CT scans prior to and after publication of appropriateness criteria by ACC in 2006. The authors found a 9 percent increase in appropriate exams, from 76 percent in 2006 to 85 percent in 2007. The researchers identified a concurrent decrease in the number of inappropriate scans, from 12 percent in 2006 to 5 percent in 2007.18

Ensuring criteria are available and reflected in physician behavior will require innovative strategies and a commitment to ongoing refinement. For example, physicians may now download ACR guidelines to their personal digital assistants. ACR updates the searchable criteria regularly and notifies physicians of newly available materials via alerts on their portable devices.19

Some private health plans are beginning to incorporate appropriateness guidelines into physician outreach and education strategies to help align physicians’ decision-making with best clinical practice.

### Case Study: ACCF-United SPECT MPI Registry

In early 2008, the ACCF and UnitedHealthCare (UHC) jointly launched a pilot program designed to test ACCF’s appropriateness criteria for SPECT MPI at the point of service in 10 outpatient physician practices nationwide.20

The pilot captures data on every SPECT MPI study performed over a six-month period at participating practices, including information on patient demographics, risk factors, and relevant medical history. Once the data is entered into the registry, the registry calculates a score of appropriate, inappropriate, or uncertain. Participating physicians and practices receive periodic feedback and personalized analyses.

The registry was conceived as a potential alternative to UHC’s Radiology Notification Program, under which physicians who register their imaging referrals agree to a physician consultation if the requested study varies from written protocols, yet retain the ultimate authority to refer or perform the study. For the duration of the six-month SPECT MPI pilot, UHC has excused participating practices from its notification protocol for cardiac imaging tests. While the project is in its early stages, the data may permit an analysis of the impact of appropriateness criteria on ordering patterns.

ACCF and UHC have established several key functions for the pilot. First, the pilot will provide all stakeholders with a snapshot of SPECT MPI utilization relative to ACCF’s

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20 American College of Cardiology SPECT-MPI Pilot. https://www.ncdr.com/WebNCDR/Spect/
appropriateness criteria and assess ordering patterns over time. Second, the registry will allow the College to refine its criteria and educational offerings based on physicians’ demonstrated needs. Finally, the pilot should generate a mutually beneficial exchange of information between ACCF, UnitedHealthCare, and physicians and generate valuable lessons for any subsequent initiatives.

B. Accreditation and Certification Programs

As new medical technologies emerge and enter the market, patients, providers, and payors need to know that the new methods will be used safely and appropriately. Accreditation or certification programs for equipment, physicians, and facilities can help identify quality programs and regulate the use of imaging technology. The Mammography Quality Screening Act of 1992 (reauthorized in 1998) initiated the first federal wide-scale accreditation of diagnostic imaging facilities. Broadly speaking, accreditation attests to the quality of practice and image outputs at a given facility. Facilities may pursue accreditation for a variety of reasons, including the opportunity for peer review, evaluation of imaging quality by outside experts, and external assessments of equipment and/or staff needs.

In reviewing current accreditation and certification programs, it is important to keep in mind the array of standards and accrediting bodies that regulate imaging facilities, providers, and equipment. Accreditation and certification are most often modality- or specialty-specific; for example, a facility accredited to perform MR is not typically accredited to perform CT by default. Thus, multiple accrediting bodies have formulated standards for imaging, each ostensibly focusing on one or another modality, physician specialty, and/or site-of-service. While comparable in substance, there often exist multiple pathways to accreditation.

Our research suggests that initiatives at the federal and state levels, as well as programs by professional societies and health plans, are increasingly focused on the need for evidence of efficient settings-of-care, well-trained providers, and modern equipment. Accreditation and certification programs can address both the technical quality of images produced and the experience of the physician providing the interpretation. The following sections will delve deeper into recent initiatives in two spaces: facilities and equipment, and providers.

Facilities and Equipment

Outpatient facilities have long been candidates for accreditation. ACR has offered multiple accreditation programs for years, tracing its first back to 1963. Current programs have embraced new techniques and modalities. A summary of ACR’s requirements for radiation oncology facilities is provided below as an example of these requirements.
ACR continues to refine its accreditation and certification offerings as the practice of imaging evolves. In 2006, the College announced plans to revamp its MRI program to address current trends. Previously a single certification, the new program includes six modules loosely associated with the body parts most often imaged for similar groups of patients; sample modules include MR of the spine and musculoskeletal MR.\(^7\) The new program, set to launch in 2008, grants applicant facilities more flexibility to pursue accreditation in the MR techniques most useful to their patients. ACR has convened one dedicated subcommittee per module; each is currently developing scoring metrics for clinical images submitted under its jurisdiction.\(^21\)

Accreditation programs are also gathering momentum in the payor community. In fall 2008, UHC will begin requiring facilities billing for CT, MRI, PET, nuclear cardiology, and echocardiography to submit proof of accreditation or applications for accreditation by ACR or the Intersocietal Accreditation Commission (IAC).\(^23\) Of note, the professional payment component for the above services is not subject to the new accreditation requirement. ACR estimates that 16,000 facilities nationwide are already accredited.\(^24\)

Originally scheduled to take effect in March 2008, UHC has extended its deadline in response to concerns from participating facilities. Accreditation can be a time-consuming process, even for centers that provide high-quality care; for centers unfamiliar with existing accreditation standards, the administrative input required to obtain accreditation can be burdensome. According to UHC, achieving accreditation takes an average of six to nine months, barring organizational or application-related complications.\(^25\) Anthem Health Plans of Virginia recently announced its plan to adopt an

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\(^7\) American College of Radiology press release, “ACR Develops Modular MRI Accreditation Program.”

\(^21\) Ibid.

\(^23\) United Healthcare Imaging Accreditation program. https://www.unitedhealthcareonline.com/b2c/CmaAction.do?channelId=dda4364ab6e32110VgnVCM100000c520720a


accreditation program for all CT, MR, PET, and nuclear cardiology equipment used to image its members. Facilities in Anthem’s network must achieve ACR or IAC accreditation for each piece of equipment (often through assessment of the equipment’s ability to generate a high-quality image) used at their sites.²⁶

Should accreditation requirements encourage use of health information technology, these programs may generate cost savings. Electronic health records (EHRs) appear to help hospitals and health systems – any community of providers – realize savings by eliminating or reducing duplicative studies. A recent study of two large Philadelphia hospitals found that a health information exchange identified 1,520 duplicate imaging exams at an estimated cost of $218,000.²⁷

**Physicians**

In 2005, MedPAC accelerated the discussion on accreditation and certification by recommending that the CMS develop standards for Medicare-participating physicians who interpret imaging exams.²⁸ MedPAC was silent on the specifics of these standards, but noted that they should be modality-specific; for example, a physician certified to perform CT exams should not automatically be certified to perform MR, according to the Commission.²⁹

MedPAC noted that such standards “would represent a major change in Medicare’s payment policy for physician services.” However, the Commission identified several examples of existing physician standards under the Medicare program, including CMS’ recent coverage decision for PET scans in patients with suspected mild cognitive impairment, which makes coverage contingent on physician expertise and qualifications.³⁰

In its report to Congress, MedPAC cautioned against adopting a privileging scheme for Medicare providers. In a privileging model, only physicians who practice in designated specialties or can demonstrate specialized training may provide certain services. In 2005, the Tufts Health Plan in Boston established a privileging program for non-radiologists wishing to bill for imaging studies. Only providers specializing in orthopedic surgery and rheumatology are authorized to perform cervical spine studies, for example.³¹ For other physicians, certification by a specific accrediting body is required for reimbursement. The health plan requires that all physicians performing bone densitometry achieve certification by the International Society for Clinical Densitometry. Again, multiple certifying entities are engaged in the market; it is possible that, as certification programs proliferate, providers will be required to obtain certification for the same competencies from multiple groups, depending on the preferences of the payor.

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²⁹ Ibid.
³⁰ Ibid.
Like the RBMs discussed earlier, health plans are also exploring preferred provider and facility networks. Providers designated as “preferred” – based on quality measures, appropriateness ratings, or prior authorization approvals – may receive benefits such as preferential referring or additional reimbursement. Not all payors favor preferential programs at the individual physician level, and several plans and firms employing this approach are facing judicial and/or regulatory challenges by physicians alleging anti-competitive practices.

Assessing the Impact of Accreditation
While certification programs can facilitate greater knowledge of imaging technique, questions about their efficacy remain. The various certification programs are evolving and have not yet achieved widespread consensus on the appropriate requirements for facilities, physicians, or equipment. In their current state, a number of certification programs tend to emphasize process over outcomes; facilities achieve accreditation by demonstrating adherence to quality assurance processes and by verifying completion and maintenance of personnel training. While educational programs and other accreditation requirements can help physicians and non-physician providers keep abreast of new technological developments, evidence-based guidelines, or emerging clinical data, the costs and benefits of accreditation programs on imaging quality and resulting patient care have not been demonstrated.

C. Education Programs
Imaging appropriateness criteria and accreditation cannot impact physician or patient behavior unless education campaigns raise awareness and understanding of these tools. Education on new technologies and their appropriate use is a necessary first step for imaging providers – both those who refer patients for imaging, and those who perform and interpret the images – seeking to provide the right image to the right patient.

Education: New Technology
With imaging technology becoming more and more complex, imaging equipment manufacturers are playing an increasingly important role in educating providers on the use of their products. One company provides educational support at the machine level in the form of CDs, as well as a “Training In Partnership” program designed to familiarize providers with their new equipment. The manufacturer offers on-site training for staff, formal classroom training at its institute, and video tutorials available anytime.

Another company offers an online, searchable database of global courses and fellowships; providers wishing to learn more about the company’s products may enter a modality, machine, and specialty to find courses tailored to their specific needs. For example, the company’s Cardiac CT Angiography Training Masterclass includes an overview of CT imaging capabilities, appropriateness criteria for CTA, and machine operation. A third company offers more than 350 clinical courses to support continuing medical education of radiologic technologists, sonographers, and dosimetrists to raise their clinical knowledge on systems, safety, and workflow. More than 70,000 providers
have completed this training. In a program demonstrating the role of training in an evolving market, the company plans to offer wide-scale training for technologists on the transition from film to digital images.

Training in the technical performance and interpretation of images is also woven into many aspects of physician education, both in their residency programs and in their continuing medical education (CME) curricula. The American Association of Orthopedic Surgeons (AAOS) provides an illustrative example of how imaging training is already integrated with physician education. Speaking before the House Committee on Ways and Means, AAOS Deputy Director Kathy Pontzer testified that the orthopedic surgery board examination requires applying physicians to evaluate numerous images, and that image interpretation is required for 50 percent of the exam’s written portion. Two years after completing their residencies, physicians are required to present 10 case studies, all of which must include the interpretation of images.\textsuperscript{2} This system ensures that newly trained orthopedic specialists are competent on current imaging modalities and techniques and could provide meaningful opportunities for professional societies or other educators to inform physicians about appropriate imaging utilization before practice patterns become engrained.

A large component of physician training on imaging use and technique continues to be the requirement that physicians pursue a structured program of CME. Many specialty societies require CME training, as do hospitals. CME programs offer unique opportunities to inform the prescribing behavior of physicians already in the field, who may have varying levels of experience and expertise with emerging imaging modalities such as combination machines.

The American Board of Radiology requires any physician receiving a diploma from the organization to participate in a “maintenance of certification” program. The program’s four components include: continuous, current, and unrestricted board licensure; yearly participation in CME courses, complete with self-assessments; a written examination to be taken in the three years before certificate renewal; and engagement in at least one project designed to improve the quality of services provided at the physician’s practice site.

Non-traditional training opportunities can also instruct providers in the proper use of new systems. ACR has recently launched a Radiology Knowledge Assessment Test, a series of online exams. This latest offering from ACR includes 11 exams in various subspecialties; test-takers receive immediate scoring and feedback, as well as detailed explanations of test answers. The tool also provides a peer comparison based on the individual’s practice patterns.\textsuperscript{3}

\textsuperscript{2} Testimony of Kathy Pontzer, American Association of Orthopedic Surgeons. “Managing the Use of Imaging Services,” March 17, 2005.

PHYSICIAN ACQUISITION AND MAINTENANCE OF IMAGING COMPETENCE

SPENDING TRENDS AND THE INCREASING USE OF APPROPRIATENESS CRITERIA AND ACCREDITATION

Physician education represents one arena in which current initiatives in the imaging market could well complement one another: combining education and training with updates on appropriateness protocols can help ensure data gathered on imaging appropriateness have meaning for practice patterns. It is important to note that educational needs may change by specialty; cardiologists will likely require different training and tools than primary care or family physicians, who refer many imaging studies.

Appropriateness criteria and education programs may be mutually informative by creating a feedback loop between developers and users. Examining practice patterns with respect to appropriateness may direct educators to topics or modalities where educational campaigns might make a greater impact. Specifically, collecting data on study appropriateness could allow professional societies or other criteria-developing bodies to identify studies that physicians repeatedly over- or under-order. Such patterns may suggest a need for targeted education or more detailed guidelines.

For example, in a study of 582 patients who underwent SPECT MPI or stress echocardiography studies at the Mayo Clinic, studies were retrospectively classified as...
appropriate, inappropriate, or uncertain. Of the studies judged inappropriate, nearly 50 percent were for asymptomatic patients who were referred for heart disease screening. According to the ACCF/ASNC criteria used in this study, there are 13 inappropriate indications for SPECT MPI or stress echocardiography. The authors found that seven appeared in the study group; four of these seven accounted for 88 percent of all inappropriate scans. The authors concluded that their study suggested “great potential for improvement...as an educational effort directed toward ordering physicians need focus only on a few specific situations.”

The American Health Information Community’s (AHIC) Quality Workgroup has also engaged on this issue, noting that an electronic linkage between referring physicians and the knowledge-holders (such as ACR) is an important long-term path, and has established a clinical decision support (CDS) planning group tasked with coordinating AHIC’s efforts to develop and implement CDS interventions.

Case Study: Massachusetts General Hospital (MGH)

In 2005, MGH implemented a decision support tool designed to guide physician ordering toward optimal use of diagnostic imaging. Based on the ACR appropriateness criteria, the tool provides appropriateness scores and educational support at the point of service.

Unlike many appropriateness criteria, which tend to assume the presence of a diagnosis, the system (now licensed and in use at other facilities) starts with the patient’s presentation symptoms – typically, a physician’s first perspective. When ordering an imaging study, the physician enters basic information about the patient into the system, and is presented with a set of imaging options – ranging from “low” to “high” appropriateness, on a scale of 1-9. For example, a physician seeing a patient with a suspected knee injury may see one score for an MR exam, and another score for a CT of the same body part.

Ultimately, the decision is left to the physician; while the tool provides appropriateness scores and educational materials to support those scores, the ordering doctor is solely responsible for selecting the test performed.

MGH has expanded this tool to include radiologists as well as other specialties. One of the more interesting dynamics, post-implementation, was the mutual recognition that both referring physicians and the rendering radiologists share in the responsibility for

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35 Ibid.
36 Ibid.
38 Massachusetts General Hospital, Radiology Order Entry and Decision Support. http://www.massgeneralimaging.org/roe/
appropriate use: while referring physicians may benefit from up-to-date education on evolving appropriateness criteria, rendering radiologists may benefit from more judicious report findings. Physician leadership recognized that radiologists who consistently recommend follow-up studies may also contribute to high utilization of imaging services. To that end, the hospital is now using “natural language” analytic tools to distill findings from radiology reports and link them to physicians and post-image outcomes.

The decision tool allows the hospital to track individual physicians’ ordering patterns over time. The health system selects physicians and radiologists demonstrating persistently high rates of inappropriate orders for educational interventions.

Use of the decision support tool is voluntary; however, MGH has included participation in the system as an internal physician quality measure. Additionally, physicians who order their imaging studies through the tool are exempt from any prior authorization protocols established by third-party insurers. Any study ordered through the decision tool, irrespective of its appropriateness score, is approved.

Pay-for-Performance Tools and Imaging
Pay-for-performance, or P4P, programs seek to reward physicians for high-quality care without directly managing practice patterns. While not educational programs per se, many P4P initiatives rely on the educational attributes of performance “scores” to reinforce quality guidelines. While P4P programs may have originated within private health plans and closed delivery systems, their definition and oversight is increasingly the province of neutral third-party organizations.

In a typical P4P scheme, an oversight body works with physicians and other stakeholders to develop performance metrics. For example, the organization could evaluate participating physicians on the percentage of their diabetic patients who have had their hemoglobin levels measured in the past year. Participating physicians are then asked to input data related to the metrics. Physicians achieving predetermined scores, or levels of performance, receive some reward or inducement. To return to the example above, physicians who achieve a 75 percent hemoglobin-screening rate among diabetic patients might be eligible for a 2 percent reimbursement increase.

P4P programs are gaining traction among both public and private payors; however, radiology and imaging services have not been a historical target for these programs. Public payors tend to focus on so-called “pay-for-reporting” (P4R) as a means to generate the underlying reports needed to assess performance. In that vein, a relatively new program, Medicare’s Physician Quality Reporting Initiative (PQRI) currently includes two measures related to imaging performed in the context of stroke care. In October 2007, CMS announced that eight additional measures related to diagnostic radiology qualified
for inclusion in the program. While the measures are largely operations-oriented, their inclusion in the 2009 program will ensure continuing discussion of performance measures in imaging.

As P4R and P4P programs mature, metrics could become more content- and even appropriateness-driven. Although education is not explicitly intertwined with P4P, participation reinforces attention to quality. While P4P programs almost universally face significant design and implementation challenges, payors and providers remain committed to exploring their possibilities.

Reporting programs may also influence coverage decisions. For example, payors looking to the Healthcare Effectiveness Data and Information Set, managed by the National Committee for Quality Assurance, may opt to cover CT colonography to help performance on the data set’s colon cancer screening measure.

IV. Implications for the Medicare Program

As we have summarized in this paper, the Medicare program could employ numerous tools to help optimize the appropriate use of diagnostic services. Legislators have demonstrated strong interest in both appropriateness criteria and accreditation for imaging in the Medicare program. The Medicare Improvements for Patients and Providers Act of 2008, passed by the House, includes an accreditation requirement for all Medicare-participating providers by 2012 and establishes a two-year demonstration program to test the use of appropriateness criteria. Sens. Baucus (D-MT) and Grassley (R-IA) also included these provisions in draft Senate bills.

Below, we summarize the highlighted initiatives and pose several questions for policymakers as they consider various approaches to imaging policy.

Prior authorization programs seek to limit reimbursement to only those imaging studies deemed appropriate according to pre-specified algorithms. These programs are often deployed in the private sector and rely on information provided by ordering physicians (or their staffs) to assess appropriateness and award or deny coverage. Questions about their impact on patients and providers persist. Physicians contend that time spent seeking approvals is burdensome and takes away from patient care. Patient advocates worry that prior authorization programs may deny needed services for some patients whose cases fall into medical gray areas. A prior authorization program for Medicare beneficiaries would need to resolve the following questions, among others:

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40 Ibid.
41 Medicare Improvements for Patients and Providers Act of 2008 (H.R. 6331).
42 Medicare Improvements for Patients and Providers Act of 2008 (S. 3101).
• What entity would be responsible for developing coverage protocols?
• How would CMS assess the program's impact on beneficiaries?
• Who would be liable for adverse events related to a specific coverage decision?

Clinically driven appropriateness criteria and guidelines represent efforts by physicians and other clinicians to guide their colleagues' behavior toward appropriate and efficient utilization. Usually developed by national professional societies, these guidelines educate physicians on the appropriate use of imaging technology by providing evidence-based assessments of which interventions are most beneficial for which patients. Professional societies are pursuing new applications for their guidelines as evidence accumulates. Online tools, self-assessment programs, and personalized feedback have the potential to guide physicians toward more appropriate use of services while maintaining their locus of clinical control. Questions about the impact of these guidelines persist, and given the nascent of these new clinically led appropriateness initiatives, data on their impact are not yet available. In the Medicare program, several unique questions about appropriateness criteria emerge:

• Are existing guidelines applicable to the aged and disabled population?
• How will the professional societies' evolving guidelines be reflected in Medicare's current payment policies?

Accreditation and certification programs can improve the quality of imaging facilities, providers, and equipment. Long in existence, accreditation and certification programs are increasingly being linked by private payors to their reimbursement requirements. With one large health plan committed to accreditation and several others experimenting with similar programs, other players in the healthcare space are likely to venture into accreditation as well. Accreditation or licensing speaks amply to a facility or provider's preparedness to perform technically sound imaging studies. Questions for a Medicare accreditation program might include:

• Would multiple entities continue to offer accreditation? Or would it be a single body?
• What is the optimal accreditation schedule for Medicare providers?

Educational programs can bridge the gap between a growing evidence base and everyday use of imaging technology. Residency training and continuing medical education can provide new and practicing physicians with information on the safe and appropriate use of new technologies. Decision support tools can integrate appropriateness education at the point of service. However, educational interventions rely on physician self-motivation for their efficacy. While physicians are motivated to continue learning in pursuit of better, more efficient patient care, competing demands on their time, attention, and other resources may crowd out plans to learn about a new set of appropriateness guidelines. Medicare-participating physicians might pose additional questions:
• Which types of physicians (primary care, specialists, and/or imagers) should be targeted for education?
• How could Medicare ensure the availability of educational information for physicians working with the aged and disabled population?

V. Conclusion

Diagnostic imaging procedures have expanded rapidly in the past several years in part due to their unmatched capability to detect myriad diseases at early, treatable stages, in part due to uptake by both providers and their patients, and in part due to other, as yet unidentified factors. While the appropriateness of this growth in imaging utilization and spending has not been assessed, all parties have an interest in optimizing imaging use. This paper surveyed emerging responses in the payor and provider communities, and put forth discussion questions for policy officials or legislators contemplating any utilization management strategy for the Medicare program. Ultimately, all patients will benefit in a world where physicians order, perform, and interpret “the right image, for the right patient, at the right time.”
**Glossary**

**Definitions**

**Accreditation**  
Attestation that a facility provides high-quality images. Often accomplished by reviewing practice patterns, technical image quality, and personnel qualifications. Offered by multiple professional organizations.

**Appropriateness guidelines/criteria**  
Evidence-based practice guidelines outlining when care is appropriate (likely to provide a clinical benefit that outweighs its risks) based on diagnosis and other patient characteristics.

**Certification**  
Attestation that a provider has the requisite education, training, and experience to perform high quality, specialized care. Often awarded by medical specialty societies.

**Pay-for-performance**  
Reimbursement system in which provider payment is tied to performance on pre-determined quality measures.

**Prior authorization**  
Reimbursement system under which providers must gain approval from the insurer before performing certain services or procedures.

**Preferred facility/provider**  
Providers or facilities designated as preferred by an insurer, often based on negotiated rates or practice patterns. These physicians or sites may receive incentives, such as favored referring.

**Privileging**  
Reimbursement strategy under which providers or facilities must be authorized to perform certain services (e.g., CT).

**Self-referral**  
The practice of a physician referring a patient for care at a site with which he/she has a financial relationship.

**Sustainable growth rate**  
Payment mechanism used by the Centers for Medicare & Medicaid Services to determine physician payment rates. Ties payment rates to the difference between actual physician spending and target spending.

**Selected Acronyms**

**ACC(F)**  
American College of Cardiology (Foundation)

**ACR**  
American College of Radiology

**AHRQ**  
Agency for Healthcare Research and Quality

**CME**  
Continuing medical education
CMS  Centers for Medicare & Medicaid Services
CT  Computed tomography
DRA  Deficit Reduction Act
IAC  Intersocietal Accreditation Commission
MedPAC  Medicare Payment Advisory Commission
MR(I)  Magnetic resonance (imaging)
P4P  Pay-for-performance
PET  Positron emission tomography
RBM  Radiology benefit manager
SGR  Sustainable growth rate
SPECT  Single photon emission computed tomography
UHC  UnitedHealthcare