



Computerized Decision Support (CDS) Systems for Advanced Imaging Services

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Summary

The Imaging e-Ordering Coalition is an alliance of healthcare providers, technology companies and diagnostic imaging organizations leveraging Health Information Technology (HIT) enabled decision-support as a solution to assure that all patients receive the most medically appropriate diagnostic imaging test for their specific condition.

In recent years, a path-breaking approach to promote the proper ordering of imaging services has emerged – the use of electronic computerized decision support (CDS) tools that provide physicians with immediate access to evidence-based clinical guidance in the ordering of advanced diagnostic imaging services.

CDS is a cost effective, efficient and reliable method for analyzing the clinical indications of a patient and comparing those indications to evidence based data sets allowing physicians to recommend the most appropriate course of treatment for the patient. The benefits of CDS leverage data driven decision making, improve quality and safety and help reduce costs by ensuring the right imaging study is recommended.

Advanced Imaging Services: Promise and Challenges

Advances in medical imaging technology have contributed significantly to improved health care quality and safety through faster and more accurate diagnoses, the avoidance of costly invasive procedures, and the improved effectiveness of interventions and treatments. Research suggests that the use of advanced medical imaging technologies have increased average U.S. life expectancy by 8 months.¹ At the same time, the imaging revolution has led to concerns regarding costs, whether unnecessary imaging studies are being ordered, and the dangers posed by accumulation of potentially unnecessary exposure to radiation.

The present challenge is to capture the health care quality and safety improvements as well as cost savings that advanced imaging services provide while obviating the adverse impacts that can result from the inappropriate use of imaging services -- whether through unnecessary ordering or through the ordering of inappropriate tests. For the purposes of this discussion, advanced imaging includes computed tomography (CT), magnetic resonance (MR), nuclear medicine (NM) and positron emission tomography (PET) imaging.

Currently, there is extensive speculation regarding whether advanced imaging services are being overutilized and, if so, for which conditions. The issue is further complicated by the fact that rapid clinical and technical progress in the use of imaging can negate the usefulness of past utilization data in

¹ Lichtenberg, F.R., "The Quality of Medical Care Behavioral Risk Factors, AND Longevity Growth, National Bureau of Economic Research,, June 2009, <http://www.nber.org/papers/w15068>

drawing meaningful conclusions. While a number of studies show a significant spike in imaging utilization during the time period prior to 2007, it is unclear the extent to which that spike represents the advent and practitioner adoption of new diagnostic and interventional services versus an increase in the ordering of established imaging studies. Most of these studies do not capture recent trends in utilization, which based on an examination of Medicare claims data from 2007-2009, has stabilized in recent years. However, established research does point to a lack of sophistication among some providers in the ordering of advanced imaging services that can lead to both unnecessary or duplicative testing and/or the potential ordering of the wrong test.

Contributing Factors

Several factors are commonly recognized as contributing to the potential inappropriate ordering of advanced imaging studies by referring physicians. One is fear of medical professional liability, which leads providers to order tests to rule out possible conditions regardless of how remote or unlikely. Another factor is the rapid pace of innovation in imaging technology, which has occurred over the past several years. This trend has placed many ordering practitioners in the difficult situation of knowing that there are modalities that can aid in diagnostic processes but lacking awareness in ordering the most appropriate exam. While radiologists and cardiologists, among others, have extensive experience in the use of imaging studies and procedures, the referring physicians who order the majority of advanced imaging services lack specialized training regarding when and whether to order an exam and, if so, which test is the right test. There are also several other potential contributing factors currently being studied.

Addressing the Utilization of Imaging Services

A blizzard of differing approaches to address the utilization of advanced imaging services have been implemented over the past several years. Initial efforts can be traced to inclusion of imaging services as part of the “Stark” physician self-referral statute. CMS began packaging advanced imaging services beginning with the Multiple Procedure Payment Reduction Rate (MPPR) discount in 2006, which lowered payments. The most dramatic impact in reducing advanced imaging volume occurred through the severe reimbursement reductions implemented via the Deficit Reduction Act (DRA), which took effect in 2007 and did not distinguish impacts on radiologists despite their not being responsible for referring physician ordering patterns.

As a result of the DRA, advanced imaging stakeholders began advocating for policies that would address the root cause issues driving improper utilization; site accreditation and advanced imaging appropriateness criteria, which were included in the Medicare Improvements for Patients and Providers Act of 2008 (MIPPA).

Despite year over year declining growth rates since 2006², additional cost cutting provisions were also incorporated into the Affordable Care Act, including changes in the utilization factor assumption for Medicare Part B, and new reporting and disclosure requirements related to the “Stark” self-referral statute.

The use of radiology benefit managers (RBMs) requiring prior authorization also gained currency in the private health insurance market since the 1990s, predominately as a cost control measure, and has been considered for use in the Medicare program. These approaches all have their inherent limitations and drawbacks for both physicians and patients.

² AMIC analysis of Medicare Part B data by The Moran Company, October, 2009.

The Role of Evidence-Based Medicine in Imaging Ordering

Advanced imaging services by their nature are well suited to the application of evidence-based medical guidance. This is fundamentally a reflection of the simple fact that -- like prescription medications, lab tests and pathology exams -- imaging services must be ordered by a referring physician. The ordering process presents a discrete moment in time when evidence based medicine can be applied to guide the physician's decision making. Generally speaking, the evidence basis supporting imaging ordering consists of national medical specialty society developed guidelines (some of which are also incorporated into quality reporting programs under Medicare and the Health Information Technology for Economic and Clinical Health (HITECH) Act), peer reviewed medical literature, and physician experience. The American College of Cardiology (for cardiac imaging studies and other cardiology procedures) and the American College of Radiology (for all diagnostic imaging studies and other radiological procedures), among others, are the primary source of formal medical guidelines on ordering imaging studies for their respective disciplines.

The Use of Imaging Results to Drive Evidence-Based Ordering

Another distinguishing feature of diagnostic imaging services is that they produce an ascertainable result -- namely, the presence or absence of a condition in the patient, the potential presence of which was the basis for the initial ordering decision. This does not mean, of course, that every imaging study that produces a negative result was unnecessary or inappropriate given what is often a critical necessity to rule out a condition in order to obtain an accurate diagnosis. However, in combination with evidence-based medicine, it does allow for an overall picture to be drawn of a physician's ordering behavior. The extent to which the physician's ordering conforms to the evidence basis and the extent to which the physician's orders generate evidence supporting the presence of a suspected condition or circumstance can collectively identify the extent to which the physician's ordering activity conforms to that of his or her peers and the extent to which it suggests either the underuse or overuse of diagnostic imaging relative to the evidence base. There may, of course, be an appropriate clinical basis for such a divergence -- for example, a physician handling situations that present a great difficulty of diagnosis -- but the divergence may also strongly suggest inappropriate ordering and therefore present an opportunity for applicable education or other modification in the behavior of the ordering physician.

Diagnostic Imaging and Electronic Health Records (EHRs)

Diagnostic imaging services also mesh quite well with the current push to promote the nationwide use of certified electronic health records technology. As mentioned previously, diagnostic imaging involves an ordering decision and this decision can be electronically captured through computerized provider order entry (CPOE). The ongoing development and refinement of standardized vocabularies, transmission standards, certification criteria, implementation specifications and use cases are paving the way for interoperability in the ordering and the reporting of diagnostic imaging. And the imaging results themselves, often digital in nature, are amenable to incorporation into the patient's electronic health record. Indeed, Radiology Information Systems (RIS) and Picture Archiving and Communication Systems (PACS) have often been the first electronic records systems adopted by hospitals and the first electronic connectivity established by other medical providers.

Computerized Decision Support for Imaging Ordering

In recent years, a path-breaking approach to promote the proper ordering of imaging services has emerged -- the use of electronic clinical decision support (CDS) tools that provide physicians with

immediate access to evidence-based clinical guidance in the ordering of advanced diagnostic imaging services.

There are several different products of this nature available in the marketplace, but what they generally have in common is that they are algorithm-driven technologies that apply evidence-based medicine at the point of order. At a minimum, this evidence base incorporates transparent national specialty society medical guidelines which inherently incorporate peer reviewed medical literature. While such technologies can be employed in a prior authorization context, they are more generally used as a tool to educate and guide the clinician regarding the appropriateness of the ordering decision. In so doing, CDS for imaging ordering promotes the rapid clinical adoption of new evidence-based standards of care and thereby helps to counteract the well recognized problem of substantial delay between the identification of standard of care improvements and their incorporation into widespread medical practice.

CDS systems for advanced imaging ordering have demonstrated a positive impact in reducing the inappropriate utilization of such services by guiding ordering physicians to avoid unnecessary tests and to select the most appropriate test. Evidence accumulated from major studies by the Institute for Clinical Systems Improvement (ICSI) in Minnesota, Brigham and Women's Hospital in Boston and Massachusetts General Hospital are among a number of pioneering efforts that have documented the positive impacts of CDS on quality of care through appropriate advanced imaging ordering at the department, health system and community levels.

In the context of electronic health records, CDS systems for imaging ordering can and frequently are readily incorporated into hospital and physician group practice electronic health records (EHRs) allowing for prospective feedback before the study is ordered. And, when combined with retrospective analysis of the imaging orders, examination of results and feedback to providers, a powerful capability to analyze and identify issues in physician ordering activity is created. This capability can drive substantial improvements in quality of care. And the capturing of this information allows for the building of databases of information that facilitate comparative analysis and, thereby, continuous process improvement approaches.

The federal government is currently studying the value of CDS for advanced imaging through the Medicare Imaging Demonstration (MID) project, which was authorized in MIPPA. MID will select approximately six "conveners" – organizations that will recruit and enroll a diverse population of physicians into the pilot. The physicians will use approved decision support technologies to guide their ordering behavior, and their pre- and post-ordering patterns will be compared. The recently-enacted Affordable Care Act also instructs HHS, through the newly created CMS Innovation Center to take the next step in evaluating the use of CDS in advanced imaging ordering by evaluating approaches that would vary physician payment based on ordering appropriateness.

Clinical Decision Support Advances the Legacy RBM Model

CDS for imaging ordering to help guide appropriate utilization constitutes an advancement over the RBM cost containment approach to utilization currently in use by private carriers. RBMs ordinarily employ a prior authorization scheme that requires providers to obtain express approval before they may order (and potentially bill for) an imaging service. Typically, such authorization requires telephone communication with the RBM. In some cases, the interaction can be managed over the internet – but even then, through a separate access site that is not enabled within the electronic health record where computerized provider order entry (CPOE) is possible.

Most RBMs use the same peer-reviewed, transparent national specialty society approved guidelines, but may customize that information to their own internal guidelines via closed processes. Providers have registered concerns about the lack of guideline transparency by some RBM vendors. The major issue physicians face with RBMs is the process that is employed in securing prior authorization. Initial consultation with providers and their clinical staff is usually undertaken by RBM personnel with minimal formal medical education or training and authorization denials lead to a cascading series of further conversations that eventually escalate to a conversation between the ordering physician and the RBM's medical officer. Typically the imaging study is authorized at this point, which strongly suggests that the preliminary denials had only resulted in the delay of necessary care for the patient.

CDS for advanced imaging ordering advances appropriate image ordering in three fundamental ways compared to the current RBM Model. First, CDS eliminates the excessive time, cost and effort that must be devoted by physicians and their staff in navigating the RBM approval process. Second, CDS enables collaboration, from the ability to assess their ordering compared to the evidence base, as well as to compare their ordering proficiency, targeted in delivering appropriate care, versus denial of care. Idealistically, the ordering physician would have the opportunity to consult with his or her local, highly trained, imaging specialist to make the determination of appropriate exams if the ordering physician has a question not explicitly addressed by appropriateness guidelines. By contrast, the RBM "authorization" process typically allows access to radiology consultants only after a provider runs an administrative gauntlet characterized by several levels of denial. Finally, CDS allows the ordering physician to manage the risk associated with not ordering an exam, since an initial denial of authorization by an RBM is not a recognized basis for establishing a clinician's adherence to the standard of care in a medical professional liability action.

In addition, there is often no integrated electronic record of the RBM's decision or the decision making process that was followed, thus making it difficult to document the encounter in an EHR. And RBMs provide little or no constructive educational benefit to the provider and ordinarily do not provide real time feedback, resulting in inconvenient and potentially dangerous delays for patients.

Comparison of Decision Support to RBM

CDS for advanced imaging ordering has numerous advantages over the RBM approach. Viewed from a workflow and care delivery process perspective, the key differences are well summarized in the following analysis conducted by ICSI as part of their High-tech Diagnostic Imaging (HTDI) CDS pilot³.

Prior Notification (RBM)	ICSI HTDI Option
<ul style="list-style-type: none"> • Provider orders HTDI test • Patient leaves but may be unclear if test will be covered by insurer 	<ul style="list-style-type: none"> • Provider runs patient's clinical indications through EMR or Web-based appropriateness criteria
<ul style="list-style-type: none"> • Provider's administrative staff contacts vendor 	<ul style="list-style-type: none"> • Provider views appropriateness of test and notes if there are higher utility options
<ul style="list-style-type: none"> • Vendor approves test or asks for more data • Provider staff waits on phone or vendor calls 	<ul style="list-style-type: none"> • Provider receives immediate feedback on the utility of scans they are ordering and are offered

³ http://www.icsi.org/overview_of_icsi_s_htdi_solution/htdi_brochure.html

back later that day or the next <ul style="list-style-type: none"> Some cases require a provider-to-provider consult 	alternatives to low-utility scans; can show appropriateness of test to patient if desired
<ul style="list-style-type: none"> If exam is not covered by insurer: <ul style="list-style-type: none"> Clinic contacts patient Patient pays for exam or... Original test is cancelled and a different test can be scheduled 	<ul style="list-style-type: none"> Test is ordered and scheduled using the organization's radiology ordering process
<ul style="list-style-type: none"> Appropriateness criteria is not available for community-based review and enhancement 	<ul style="list-style-type: none"> Criteria updates are recommended by ICSI's Appropriateness Criteria Work Group and done by vendor to reflect current evidence, national guidelines and community standards of practice
<ul style="list-style-type: none"> No link between outcomes data and clinical indications 	<ul style="list-style-type: none"> Outcomes data can be correlated with ordering provider's clinical

Other key differences are also summarized by the following table:

Attribute	RBM	Decision Support
Timely Feedback	Usually Delayed	Immediate
Evidence Based	Usually	Yes
Continuously Updated	Unknown	Yes
Educates Provider	No	Yes
Ordering Appropriateness can be Mapped to Results for Quality Improvement Purposes	No	Yes
Facilitates Database Development for Continuous Process Improvement	No	Yes
Provider Overhead Reduced	No	Yes
Can Incorporate into EHR	No	Yes
Confirms Adherence to Standard of Care	Unclear	Yes
Electronic Documentation	Sometimes	Yes
Inappropriate Authorization Denials lead to Withholding of Medically Necessary Care	Yes	No

Conclusion

The use of electronic computerized decision support tools to help guide ordering physicians in the selection of advanced diagnostic imaging services represents a substantial breakthrough in the ability of providers to employ real time, evidence based medicine at the point of care. This approach promotes highest quality of care as well as efficiency and avoids numerous shortcomings inherent in other approaches to ensuring the appropriateness of advanced diagnostic imaging test ordering.

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