Moving from paper-based ordering to electronic decision support

Reflections on radiology’s transition from film to digital
Reflections on radiology’s transition from film to digital

By Stephen Herman, MD

CMS Requirements for Radiology Decision Support

In April, 2014, the PAMA bill was enacted into law in the United States. That law mandates that starting January 1, 2017, physicians ordering advanced diagnostic imaging exams (CT, MRI, nuclear medicine and PET) must consult government-approved, evidence-based appropriate-use criteria, namely through a CDS system. Physicians furnishing advanced imaging services will only be paid if claims for reimbursement confirm that the appropriate-use criteria was consulted, which CDS mechanism was used, and whether the exam ordered adhered or did not adhere to an acceptable CDS rating. It’s important to note that physicians ordering advanced diagnostic imaging services do not have to adhere to the appropriate-use criteria; however, they must confirm that the guidelines have been consulted. Consultation of appropriate-use criteria is required prior to the ordering of advanced diagnostic imaging services in the physician office, hospital outpatient, and emergency department settings.
Radiology professionals have experienced change

Experienced radiology professionals may have varying perspectives about major shifts in diagnostic imaging. Most would likely agree, however, that the move from film to digital has been one of the industry’s more significant transitions. Undoubtedly, this change has yielded valuable clinical and business improvements for patients, providers, and payers alike.

Some healthcare specialists rely heavily on clinical decision support systems. Pharmacy, for example, uses technology to guide physicians in prescribing the right medications, to flag adverse drug interactions, and the like. Use of clinical decision support solutions is expanding across the healthcare industry. Today, we are in the early phases of developing and adopting medical imaging clinical decision support systems. The concept of diagnostic imaging eOrdering is drawing increased attention among payers and providers.

How will users of medical imaging clinical decision support (CDS) systems respond to this technology? Will the evolution and adoption be parallel, at least in some ways, to that of picture archiving and communication systems (PACS?)

To better answer these questions, it’s important to understand the concepts surrounding the evolution of medical imaging CDS.

Paper chase leads to RBMs

Physicians often rely on expertise and experience when making decisions about diagnostic testing. Rapid innovation of advanced MR and CT has created confusion and subsequently a proliferation of unnecessary and inappropriate tests (as well as, in isolated instances, abuse of the system for financial gain.) With medicine’s rapidly expanding knowledge base, individual physicians can no longer assimilate and retain vast amounts of information about specific indications for ordering diagnostic imaging tests.

When a physician is uncertain about which test to order, he or she may consult with colleagues, or secure information from clinical resources (books, journals, etc.) Recently, in the case of diagnostic imaging, many physicians have sought guidance from the American College of Radiology (ACR) which publishes Appropriateness Criteria for over 130 topics.
Once a physician makes a determination about a diagnostic imaging procedure, he or she will likely place the order using a paper-based system. A prescription is written and given to the patient with instructions for scheduling. Or, the physician office calls in or sends an order (via postal mail or fax) to the radiology service provider.

Managed care’s evolution has impacted this ordering process, with radiology benefit management (RBM) being added as a “middle-man.” While the RBM model exists for various reasons, finances served as a major driver. The RBM evaluates the appropriateness of an order and “kicks the order back” to the ordering physician with a recommendation for a less costly imaging study if clinically indicated.

Medical imaging clinical decision support systems leverage technology as a replication of RBM’s manual processes. CDS software is easily used by physicians at the point of care within their EMR, or within a CPOE. Instead of RBM staff members reviewing orders, the CDS system electronically reviews the order and the patient’s clinical indicators, and makes comparisons to the system’s rule sets (based on Appropriateness Criteria from the ACR and other clinical associations.) Information is immediately returned to the physician to facilitate ordering of the most medically appropriate procedure.

Parallels to PACS

In the case of PACS, technology replaced the manual processes of processing and managing film. In the case of CDS, technology is replacing manual processes to review appropriateness of diagnostic imaging procedures and to “approve” an order or suggest an alternative.

When PACS was first introduced in the 1980s, early adopters jumped on the bandwagon. Many organizations hesitated and some flat out resisted. Some predicted that film would always be used; that digital images would never fully replace film. Some believed it would take several decades for “the masses” to move to digital.

Certainly, as physicians were asked to use PACS solutions, many shared comments and questions such as: “I’m used to film and it serves my purposes. Why do I have to change? Will there be a return on the investment if we incur the costs of a PACS?”

Over time (in less time than many had initially predicted) PACS evolved to become the norm. Today, physicians do not say, “Remember how much easier it was when we used film? Why can’t I go back to reading images on a viewing box?” Though behavior change can be challenging, the upside of digital images (usability, portability, etc.) far outweighed the downside of the changes required to make PACS happen.
Recently, early adopters have started jumping on the CDS bandwagon. Minnesota is moving to a model that expands its successful trial with CDS.

Will medical imaging clinical decision support become the norm?

In the same way physicians initially showed resistance to PACS, some physicians are likely to resist CDS systems. Why? This, perhaps, has less to do with physicians questioning the technology and more to do with the process of change and going from a known to an unknown.

From a pure financial standpoint, there is value in adopting medical imaging clinical decision support solutions. Providers and payers will face increasing pressure to reduce costs. Studies by the Institute for Clinical Systems Improvement in Minnesota and several major health systems have documented the positive impact of CDS on quality of care through appropriate advanced imaging ordering at the department, health system, and community levels.

Starting with the CMS mandate, experts predict a rapid uptick in the use of medical imaging clinical decision support systems. What will impact this timeline? CDS adoption will increase as:

- healthcare providers and payers become more aware of CDS solutions
- early adopters prove cost-reduction benefits
- users realize the value of eliminating the “hassle factor” and reducing expenses associated with RBMs
- increasing numbers of physicians use a CDS system, especially as accountable care organizations (ACOs) become more widespread
- government programs mandate CDS use

The evolution of medical imaging CDS systems will follow a path similar to PACS. What’s now mainstream technology for radiologists -- PACS -- was at one time resisted because it required change. Medical imaging clinical decision support systems will become the norm because they will help health care payers and providers improve patient care, avoid unnecessary procedures, reduce inappropriate utilization, and mitigate costs. The most important factor, however, will be physician adoption, which requires a CDS system that is fast and easy to use and makes clinical sense to the referring physicians.

Once clinical decision support becomes the practice standard, physicians will one day look back and wonder how they practiced without this technology.

What do medical imaging decision support solutions tell physicians?

In many cases, especially for routine care, the medical imaging CDS system will affirm the physician’s decision. (“Yes, Dr. Smith. It is appropriate to order a CT of the pulmonary arteries when a patient has suspected..."
pulmonary embolism.)

In some instances, the CDS will recommend that the ordering physician consider an alternative test. (“Caution, Dr. Smith. Instead of ordering an MRI for suspected infective endocarditis it is better to order an echocardiogram.)

When suggesting that another test may be more appropriate, advanced CDS systems will provide additional information to the physician. This includes links to ACR criteria and the clinical documentation upon which the criteria are based. The physician can use this information to understand the reasoning behind the CDS recommendations as well as potentially guide additional decision-making.

In response to recent industry concerns about overexposure to radiation, some newer CDS solutions provide information about the level of radiation exposure associated with the procedure being considered. Based upon data from the ACR, a scoring metric is displayed for individual procedures so physicians know with precision what the expected radiation dose will be.

Some CDS systems can take into account variables such as age and prior radiation history to personalize the radiation dose for patients. For example, since a young person has longer to live and thus more chance of developing long-term complications from radiation exposure than a senior, a CDS system could adjust its recommendation based upon this data. Physicians could, for example, be made aware that they could get the answers they need by using ultrasound instead of CT, and thus no ionizing radiation, if this is clinically sound.

In addition to embedding criteria from leading clinical associations (such as the ACR), some decision support solutions provide tools for organizations to create and use their own rule sets. This can be useful because some physicians may not agree with the recommendations in the system (e.g. because of local expertise.) Additionally, physicians in general want to feel empowered to have the system work the way they want and not be constrained by it.

Radiation decision support systems can be deployed on single workstations, typically via Web browser, or integrated into existing computerized physician order entry and electronic health records systems.

1 Effect of Computerized Order Entry with Integrated Decision Support on the Growth of Outpatient Procedure Volumes: Seven-year Time Series Analysis, Christopher L. Sistrom, MD, MPH; Pragya A. Dang, MD, Jeffrey B. Weilburg, MD, Keith J. Dreyer, DO, PhD, Daniel I. Rosenthal, MD and James H. Thrall, MD: Radiology, 251, 147-155, April 2009

2 Decision-Support for More Appropriate Ordering of High-Tech Diagnostic Imaging Scans, Institute for Clinical Systems Improvement Whitepaper, 2010
Stephen Herman, MD, is an associate professor of radiology at University Health Network in Toronto, Ontario, Canada. In addition to dedicating more than half time to medical practice, Herman is CEO of MedCurrent, developer of decision support systems that provide information to physicians at the point of care to facilitate their ordering of the most medically appropriate procedures.