

WORKING PAPER SERIES

DOES “MEANINGFUL USE” LEAD TO EFFECTIVE EHR IN AMERICAN HEALTHCARE?

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Abstract

Use of Electronic Health Records (EHR) by American healthcare providers is accelerating, largely due to government regulations and incentives tied to “Meaningful Use”. While evidence suggests EHRs improve the quality of care, Meaningful Use guidelines have not, thus far, advanced a set of features that will truly realize the full potential of EHRs. In fact, published research suggests that featuring Clinical Decision Support (CDS) in EHRs is *critical* for the adoption of “evidence-based care” as well as the hoped-for quality and cost improvements, yet it is minimally represented in federal Meaningful Use guidelines. This paper discusses CDS in the context of Meaningful Use, suggesting policy adjustments that can further promote its widespread use in order to achieve the full potential of EHRs.

Background

American hospitals and clinics are adopting Electronic Health Record (EHR) systems very rapidly. One reason is that, as part of the American Recovery and Reinvestment Act of 2009, the U.S. government has tied financial incentives to “Meaningful Use”. The Patient Protection and Affordable Care Act may further encourage healthcare care providers to adopt EHR systems with the intention of improving quality and patient outcomes. Published research^{1,2,3} presents significant differences in patient health outcomes when EHRs are used. Proponents claim significant benefits in healthcare quality and cost reduction when EHRs are widely used particularly with a feature set that produces results (Kawamoto et al. 2005). A literature study⁴ by Chaudhry et al. (2006), in particular, has found that increased adoption of guideline-based care improves surveillance and reduces medication errors through the use of health information technology.

EHRs consist of several subsystems that provide various clinical and administrative functions. The Clinical Decision Support feature (CDS) is known, in particular, to help increase the quality and reduce the cost of care.⁵ For example, it is reported that only 55% of adults receive the recommended, evidence-based care,⁶ and roughly 44,000 deaths are caused annually by clinical process errors and the

¹ Haynes, R.B., and Wilczynski, N.L. Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes: Methods of a Decision-Maker-Researcher Partnership Systematic Review. *Implement Sci* 5(February 5, 2010): 12.

² McCullough J, 2010. The Effect of Health Information Technology on Quality in U.S. Hospitals. *Health Affairs*, 29 (4):647-654.

³ Parente, S. T., J. S. McCullough. 2009. Health information technology and patient safety: Evidence from panel data. *Health Affairs* 28(2) 357–360.

⁴ Chaudhry B, Wang J, Wu S, et al. Systematic review: impact of health information technology on quality, efficiency, and costs of medical care. *Ann Intern Med* 2006;144:742e52

⁵ Stafford, S.R, and Romano, M.J, Is Clinical Decision Support the Missing Link in Prevention?. *Arch Intern Med*. 2011;171(19):1745-1746

⁶ McGlynn EA, Asch SM, Adams J, et al. The quality of healthcare delivered to adults in the United States. *N Engl J Med*2003;348:2635– 45.

failure to provide recommended treatments. These mistakes and the associated costs add a significant burden to healthcare systems and burden the larger society (McCullough J, 2010). Another estimate puts the savings opportunity at \$44 billion per year if CDS systems are in place within the EHR systems⁷ when used in all ambulatory care encounters. CDS can help reduce errors and costs when its use is properly facilitated.

Given the uncertainty in outcomes improvement and the acceleration of EHR adoption, this paper takes on the question of whether the current Meaningful Use criteria are really driving the U.S. healthcare providers toward EHRs with the most effective feature sets. Analysis will demonstrate that CDS are underemphasized.

EHRs and Clinical Decision Support

Kateryna Fonkych and Roger Taylor⁸ have defined an Electronic Health Record as “a set of applications including a computerized patient record with a clinical data repository and some clinical decision support capabilities. Clinical decision support provides treatment recommendations based on patient-specific clinical information and treatment guidelines. It is most frequently used to help physicians make medication decisions.” Typically, EHR systems consist of functions/modules related to computerized physician order entry, medication systems, diagnostic images, laboratory systems, clinical documentation, clinical decision support, audio/voice recognition, vocabulary/terminology, HL7

⁷ Johnston J, Pan E, Walker J, Bates D, Middleton B. The Value of Computerized Provider Order Entry in Ambulatory Settings. Boston, MA: Center for Information Technology Leadership, 2003.

⁸ Fonkych K, Taylor R. The state and pattern of health information technology adoption. Santa Monica (CA): RAND Corporation; 2005.

interface, and patient administrative data.⁹ As Fonkych and Taylor point out, Clinical Decision Support is one of the essential features of an EHR.

Haynes et al. go further in defining CDS¹⁰ as “...information technology-based systems designed to improve clinical decision-making. Characteristics of individual patients are matched to a computerized knowledge base, and software algorithms generate patient-specific information in the form of assessments of recommendations.” This definition ties CDS to personalized medicine with the intent to improve clinical decision-making.

Going into even further detail, Goldberg et al. analyzed the taxonomy¹¹ of the Clinical Decision Support Systems and identified the following functional categories as the most common feature sets implemented in CDS systems:

- Triggers: The events that cause a decision support rule to be invoked. Examples of triggers include prescribing a drug, ordering a laboratory test, or entering a new problem on the problem list.
- Input data: The data elements used by a rule to make inferences. Examples include laboratory results, patient demographics, or the problem list.
- Interventions: The possible actions a decision support module can take. These include such actions as sending a message to a clinician, showing a guideline, or simply logging that an event took place.
- Offered choices: Many decision support events require users of a clinical system to make a choice. For example, a rule that fired because a physician entered an order for a drug the patient is allergic to might allow the clinician to cancel the new order, choose a safer alternative drug, or override the alert and keep the order as written but provide an explanation.

In this taxonomy, basic CDS systems offer features like drug-drug interaction alerts, while advanced systems offer features that integrate patient treatment history, diagnosis, and risk factors to suggest patient-specific interventions and choices. These help clinicians practice evidence-based medicine by

⁹ U.S. Ambulatory EHR Market, Frost and Sullivan, December 2009

¹⁰ Haynes, R.B., and Wilczynski, N.L. Effects of Computerized Clinical Decision Support Systems on Practitioner Performance and Patient Outcomes: Methods of a Decision-Maker-Researcher Partnership Systematic Review. *Implement Sci* 5(February 5, 2010): 12.

¹¹ Wright A, Goldberg H, et al. A Description and Functional Taxonomy of Rule-Based Decision Support Content at a Large Integrated Delivery Network. *J Am Med Inform Assoc.* 2007 Jul-Aug;14(4):489–96

providing complementary information and an additional layer of checking—they offer, in their way, a “second opinion”.

As clinicians and hospitals adopt these systems and data repositories grow, CDS systems can begin to provide longitudinal data and become even more valuable. Also, as the data interchange¹² formats and protocols become more standardized, data repositories can be supplemented with data from outside health systems. With the successful completion of the human genome project early in the last decade and the wide availability of low cost genome tests, for example, there is a great opportunity for patient specific genomic analysis to be integrated into clinical decision-making through CDS.

The research published in the last decade brought out several pressing issues in the U.S. healthcare system¹³ including pervasive medical errors, underuse, overuse, and misuse of care, along with significant cost pressures. One of the causes mentioned is the gap between the latest evidence-based clinical knowledge and the decision-making that occurs every day in the physician-patient interactions. It is suggested that it could take up to 17 years for research knowledge to be utilized in patient care, and, as medical research findings are accelerated by genomic knowledge, this gap is expected to widen significantly. CDS is the best hope for closing it. Kawamoto et al.¹⁴ report that more than 90% of clinician-directed CDS interventions significantly improved patient care, when the decision support was provided automatically as part of the clinician workflow at the point of decision-making and provided a

¹² Department of Health and Human Services. Notice of availability: secretarial recognition of certain Healthcare Information Technology Standards Panel(HITSP) interoperability specifications as interoperability standards for health information technology. *Fed Regist.* 2008;73(15):3973-3977.

¹³ Berwick DM, Hackbarth A. Eliminating waste in U.S. health care [published online ahead of print March 14, 2012]. *JAMA*.doi:10.1001/jama.2012.362.

¹⁴ Kawamoto K, Houlihan CA, Balas EA, Lobach DF: Improving clinical practice using clinical decision support systems: a systematic review of trials to identify features critical to success. *BMJ* 2005, 330:765-768.

specific course of action. With evidence like this, CDS could be the “killer app” that really helps providers (and EHRs) deliver personal, optimized care for every patient.

Meaningful Use Guidelines, Level 2 & 3

The Centers for Medicare and Medicaid Services (CMS) is requiring U.S. health providers to comply with Meaningful Use guidelines to receive incentive payments for the use of EHRs. The Meaningful Use program is being implemented in 3 stages; at this point, Stage 2 rules have been proposed and are on track to be finalized in the summer of 2012 (they will take effect in 2014). As seen in the Meaningful Use Stage 2 document, Notice of Proposed Rule-making,¹⁵ CMS is advocating for the following benefits through the Meaningful Use guidelines:

Use of certified EHR technology to

- Improve quality, safety, efficiency, and reduce health disparities
- Engage patients and families in their health care
- Improve care coordination
- Improve population and public health
- All the while maintaining privacy and security

It is clear that quality, safety, and efficiency appear to be primary goals for CMS and they align with the benefits provided by CDS. The Meaningful Use guidelines expand these goals into a minimum required feature set for the various functional areas of EHRs. The following is a summary listing of core objectives from Stage 2 rules:¹⁶

¹⁵ Meaningful Use stage 2: Notice of proposed rulemaking, <http://www.gpo.gov/fdsys/pkg/FR-2012-03-07/pdf/2012-4430.pdf>

¹⁶ Meaningful Use Stage 2 Proposed rule: <http://www.gpo.gov/fdsys/pkg/FR-2012-03-07/pdf/2012-4443.pdf>

Meaningful Use Stage 2: Eligible Professional Core Objectives

1. Use CPOE for more than 60% of medication, laboratory and radiology orders
2. E-Rx for more than 50%
3. Record demographics for more than 80%
4. Record vital signs for more than 80%
5. Record smoking status for more than 80%
6. Implement 5 clinical decision support interventions + drug/drug and drug/allergy
7. Incorporate lab results for more than 55%
8. Generate patient list by specific condition
9. Use EHR to identify and provide more than 10% with reminders for preventive/follow-up
10. Provide online access to health information for more than 50% with more than 10% actually accessing
11. Provide office visit summaries in 24 hours
12. Use EHR to identify and provide education resources more than 10%
13. More than 10% of patients send secure messages to their EP
14. Medication reconciliation at more than 65% of transitions of care
15. Provide summary of care document for more than 65% of transitions of care and referrals with 10% sent electronically
16. Successful ongoing transmission of immunization data
17. Conduct or review security analysis and incorporate in risk management process

Meaningful Use Stage 1 required only one decision support rule. Stage 2 rules go further in requiring five decision support interventions (objective #6 in the above table) related to five clinical quality measures. Stage 2 also requires that drug-drug and drug-allergy interaction checks be implemented (CMS left the decision rules somewhat open so that healthcare providers could choose the interventions that would be applicable to them). In addition to the above criteria, CMS requires the reporting of Clinical Quality

Measures (CQMs), though it is not listed as a core objective for Meaningful Use. Though all of these features, taken together, can be called CDS, they constitute only a minimal, bare-bones feature set, as seen from industry analysis.

HIMSS: Electronic Medical Records Adoption Model (EMRAM)

HIMSS is a not-for-profit EHR and health informatics advocacy organization. HIMSS has put together an adoption model for healthcare providers through which it annually surveys and ranks American healthcare organizations on a 0 to 7 scale, depending on the maturity of their EHR implementations.

Lower numbers correlate to rudimentary systems, while higher numbers indicate advanced systems. The following list highlights the CDS capabilities in the EMRAM model and an increased focus on quality, safety and efficiency can be seen in the advanced stages:

Stage 2: The clinical decision support/rules engine (CDS) for rudimentary conflict checking.

Stage 3: The first level of clinical decision support is implemented to conduct error checking with order entry (i.e., drug/drug, drug/ food, drug/lab conflict checking normally found in the pharmacy information system).

Stage 4: Second level of clinical decision support capabilities related to evidence based medicine protocols.

Stage 5: Maximize point of care patient safety processes for medication administration.

Stage 6: Level three of clinical decision support provides guidance for all clinician activities related to protocols and outcomes in the form of variance and compliance alerts.

Stage 7: Data warehousing is being used to analyze patterns of clinical data to improve quality of care and patient safety and care delivery efficiency.

HIMSS

HIMSS's 2011 survey of U.S. healthcare institutions showed only 1% of institutions operating at the highest level, with most (72%) operating at Stage 3 or lower. This is functionally equivalent to the Meaningful Use Stage 2 guidelines—an early stage of utility for Clinical Decision Support.¹⁷

US EMR Adoption Model SM			
Stage	Cumulative Capabilities	2011 Q3	2011 Final
Stage 7	Complete EMR; CCD transactions to share data; Data warehousing; Data continuity with ED, ambulatory, OP	1.1%	1.2%
Stage 6	Physician documentation (structured templates), full CDSS (variance & compliance), full R-PACS	4.4%	5.2%
Stage 5	Closed loop medication administration	7.1%	8.4%
Stage 4	CPOE, Clinical Decision Support (clinical protocols)	13.2%	13.2%
Stage 3	Nursing/clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology	46.1%	44.9%
Stage 2	CDR, Controlled Medical Vocabulary, CDS, may have Document Imaging; HIE capable	12.6%	12.4%
Stage 1	Ancillaries - Lab, Rad, Pharmacy - AI Installed	5.9%	5.7%
Stage 0	All Three Ancillaries Not Installed	9.6%	9.0%

Data from HIMSS AnalyticsTM Database © 2012

N = 5,299 N = 5,337

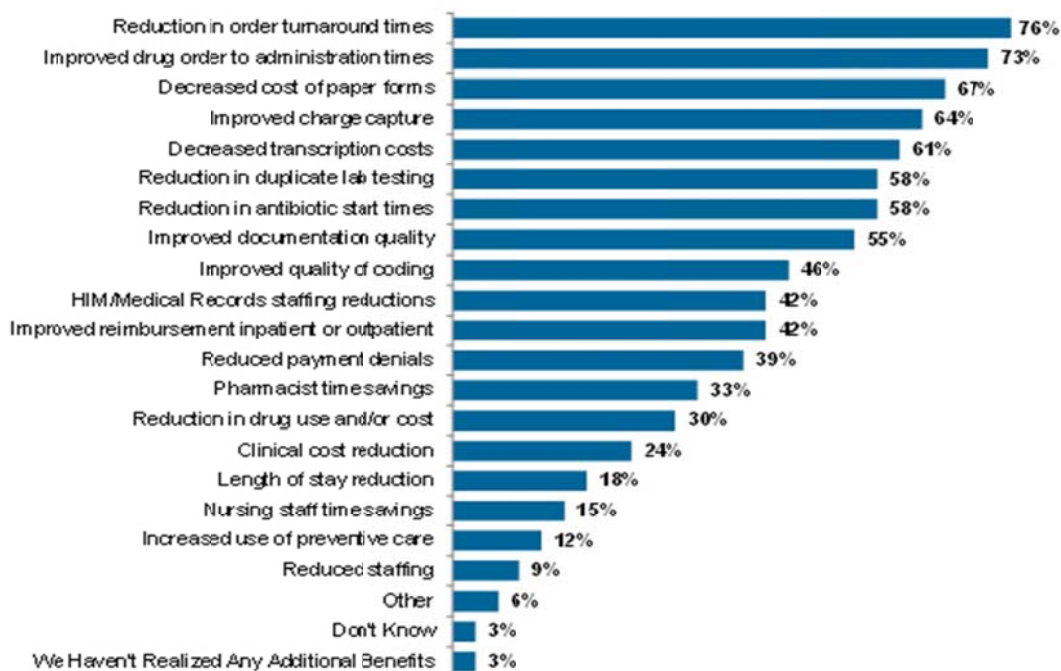
HIMSS EMRAM and the Case for CDS

EMRAM is more advanced and forward-looking than the government's Meaningful Use guidelines,¹⁸ recent HIMSS analysis reports significant benefits in clinics/health systems that reach higher levels of

¹⁷ U.S. EMR Adoption Model, <http://www.himssanalytics.org/stagesGraph.asp>

¹⁸ Hoyt, JP. The HIMSS Analytics EMR Adoption Model and Meaningful Use <http://www.youtube.com/watch?v=m046KBPXdfQ>

adoption.¹⁹ Specifically, HIMSS data from organizations that reached Stages 6 & 7 revealed benefits for the individual hospitals, but also for the whole healthcare system. Hospitals with the most mature implementations, HIMSS found, target very specific clinical objectives like improvement in quality measures such as venous thromboembolism (VTE) (73%), stroke (70%), congestive heart failure (CHF) (64%), pneumonia (61%), and acute myocardial infarction (AMI) (55%). They also report a significant percentage (91%) of such “upper-Stage” hospitals targeted general safety measures like reduction in Adverse Drug Effects (ADE) and significant number (79%) reported improvements in multiple core and safety objectives. Commonly reported benefits included a 73% reduction in ADE, a 55% reduction in VTE, a 48% improvement in CHF metrics, and improvements in various administrative and operational measures as shown below.



¹⁹ HIMSS Analytics and Advisory Board Report Shows Hospitals with Advanced EMR Systems Report Numerous Benefits <http://www.himssanalytics.org/about/NewsDetail.aspx?nid=79557>

Berwick et al. (2012) report²⁰ that, for “overtreatment, failures of overtreatment, failures of care coordination, failures in execution of care processes, administrative complexity, pricing failures, and fraud and abuse—the sum of the lowest available estimates exceeds 20% of total health care expenditures.” It may not be a coincidence that HIMSS’s results address those same issues; advanced EMRs with CDS should be considered a serious solution.

Even though this overwhelmingly positive data came from an EHR industry advocacy organization and should be viewed with caution, academic research also provides strong supporting evidence for CDS, as described earlier. Due to the widely varying nature of studies published (short term indicators vs. longitudinal studies, differing metrics like outcomes, quality indicators, lack of parity in feature sets in the EHRs, variety of disease conditions studied, etc.), on-par comparison of study results appears to be a general problem in this area of study.

CDS support in commercial EMR systems

There is significant variability in CDS capability support in commercially available EHR systems.²¹ Adam Wright et al. studied 9 widely used EHRs and characterized them in the “Deficiencies by the System” table presented below. The systems studied were,

- Cerner Millennium PowerChart 2007 with Discern Expert
- Eclipsys Sunrise Clinical Manager 5.0
- Epic Systems EpicCare Ambulatory Summer 2006
- GE Centricity Practice Solution 2006
- GE Centricity/Carecast v5.1.8 (formerly IDX)
- MEDITECH MAGIC 5.4 SR3
- McKesson Horizon Expert Orders 7.6 SP1
- McKesson Practice Partner v9.2.2

²⁰ Berwick DM, Hackbarth A. Eliminating waste in U.S. health care [published online ahead of print March 14, 2012]. JAMA.doi:10.1001/jama.2012.362.

²¹ Wright A, Sittig DF, Ash JS, Sharma S, Pang JE, Middleton B. Clinical Decision Support Capabilities of Commercially-available Clinical Information Systems, Journal of the American Medical Informatics Association, Volume 16, Issue 5, September–October 2009, Pages 637-644, ISSN 1067-5027, 10.1197/jamia.M3111.

- NextGen EMR 5.5

The product names were concealed in the following table to protect vendor confidentiality.

Table 7 ■ Deficiencies by System (Count of Capabilities Lacking in Each System Across the Four Axes)

	Trigger (9 Functions)	Input Data Element (14 Functions)	Intervention (7 Functions)	Offered Choice (12 Functions)	Total (42 Functions)
System 1	0	0	0	3	3
System 2	1	1	2	5	9
System 3	2	5	3	8	18
System 4	0	0	0	3	3
System 5	0	1	0	0	1
System 6	0	0	0	4	4
System 7	0	0	0	4	4
System 8	4	6	2	6	18
System 9	0	0	0	6	6

The trigger, input data element, and intervention features were, in this study, supported by the most systems, but choices were not supported to the same extent. Offering choices at the point of care, however, is critical for the successful use of a CDS. Lack of choice represents a serious deficiency. Another point of interest from their study is that those systems with more decision support capabilities were self-developed.

The results above were published in 2009, but more recent analysis by Wright et al. (2011)²² has confirmed the wide variability and general lack of CDS capabilities in commercial EHR systems. They have also reported that most common CDS tools are the simplest (for example, drug-drug interaction checking), while the least common included advanced expert systems like treatment planning and diagnostic support. Ambulatory EHRs had less CDS functions than the hospital EHRs.

Is Meaningful Use really helping U.S. healthcare providers adopt the most effective EHRs?

Based on the data presented so far, Meaningful Use is not helping healthcare providers adopt the most effective EHRs available. There are a number of reasons behind this discrepancy.

²² Wright A, Sittig DF, Ash JS, Feblowitz J, Meltzer S, McMullen C, Guappone K, Carpenter J, Richardson J, Simonaitis L, Evans RS, Nichol WP, Middleton B. Development and evaluation of a comprehensive clinical decision support taxonomy: comparison of front-end tools in commercial and internally developed electronic health record systems. J Am Med Inform Assoc. 2011 May 1;18(3):232-42. Epub 2011 Mar 17.

1. Meaningful Use Stage 1 & Stage 2 guidelines are not assertive enough in advancing evidence-based care through proven features like CDS. CMS (the Center for Medicare and Medicaid Services) appears to have taken a slow, incremental approach by focusing on the broad acceptance of basic systems with a long time line (extending until 2015). While this may certainly leave time to allow for widespread adoption, it is unclear what incentive healthcare providers would have to adopt advanced systems in the later years of implementation, especially in an industry known to resist change. The fact that most Medicare incentive payments are tied to early stages (Meaningful Use 1 & 2)²³ does not help this situation. The stated primary goal of “Improved Outcomes” for Meaningful Use Stage 3 is certainly promising, but not enough information is available to determine how well those guidelines will be received and adopted by the healthcare providers when they are rolled out.

2. Meaningful Use framework is not comprehensive enough to address issues like the lack of CDS support in commercial tools and physician and hospital malpractice fears that may be a major barrier to widespread use.

Lack of CDS support in commercial tools

There are no good commercial tools with comprehensive CDS support. The significant resources that are required to create, maintain, and prove an effective CDS are a stumbling block in this area. If federal agencies set up a national infrastructure that includes standards and policies, it may alleviate this burden. Standards could help set the nomenclature for data and rule representation, transport, and exchange. A proven and interoperable CDS could be integrated into a clinical workflow effectively without impacting the efficiency and associated concerns about reduced productivity. Further, clinician concerns like “cookbook” medicine and “lack of business case” can be addressed through evidence gathering studies.

²³ EHR Incentive Payment Timeline. <http://www.healthit.gov/providers-professionals/ehr-incentive-payment-timeline>

HIMSS has shown that there are healthcare systems with internally-developed tools that have already implemented more comprehensive CDS support. The federal government could procure this intellectual property and make it licensable to various vendors. Funding private organizations to advance open source CDS efforts like OpenCDS²⁴ and industry efforts like CDS consortium²⁵ are other possible avenues.

Fear of malpractice barrier

While EHRs and CDS systems offer great potential, the use of these advanced decision-influencing technologies does carry a fear of malpractice lawsuits.²⁶ For instance, physicians worry about “alert fatigue”—the sort of “autopilot” they may experience if they must routinely override alerts which may cause them to mistakenly override an important alert. Since some of the current generation CDS systems provide alerts for thousands of drug interaction types (and not all of them are actionable), such fatigue is a very real possibility. Instead, the alert lists, rules, and suggested interventions might be standardized and reduced to a manageable list based on severity, which would certainly help physicians and institutions mitigate the fears around risk and realize the maximum potential offered by these systems. Certification of CDS systems by an independent organization and the creation of software design standards²⁷ are other policy options that might make the systems more palatable.

3. Complexity barrier: too many federal agencies?

²⁴OpenCDS. <http://www.opencds.org/>

²⁵ CDS Consortium. <http://www.partners.org/cird/cdsc/default.asp>

²⁶Greenberg M, Ridgely MS. Clinical decision support and malpractice risk. JAMA. 2011;306(1):90–1

²⁷ Kesselheim AS, Cresswell K, Phansalkar S, Bates DW, Sheikh A. Clinical Decision Support Systems Could Be Modified To Reduce 'Alert Fatigue' While Still Minimizing The Risk Of Litigation. Health Affairs, 30, no.12 (2011):2310-2317

A significant amount of Meaningful Use related standards and policy activity is driven by the CMS, the AHRQ (Agency for Healthcare Research and Quality), and the ONC (Office of the National Coordinator for Health Information Technology), among other agencies, through a variety of channels to advance health IT and CDS efforts. When reviewing documentation from federal agencies, it is very difficult, if not impossible, to discern who produced a given document and what agency is ultimately responsible for driving the vision. Activities may be streamlined by assigning the CDS strategy, development, and marketing responsibilities to a single agency to drive unified, results-focused vision while establishing appropriate public-private partnerships.

Conclusion

In 2006, an ONC-sponsored paper titled “A Roadmap for National Action on Clinical Decision Support” listed the following ideas as pillars for realizing the full potential of CDS. These topics are still valid and as important today:

1. Best knowledge available when needed
2. High adoption & effective use
3. Continuous improvement of knowledge & CDS methods

ONC appears to have taken steps in the right direction in the six years since the paper was published by funding various academic and industry efforts, but the results have not translated into actions rapidly (insofar as can be understood from the adoption history and the current industry situation). It is imperative that policy adjustments and acceleration efforts be implemented if different results are to be expected.

The Meaningful Use guidelines are setting the basic foundation, but they are not really encouraging healthcare providers to choose advanced EHR systems that could offer even more benefits. The next iteration (Stage 3) of Meaningful Use guidelines are proposed to be implemented in 2015 and later; this is a great opportunity to really push for widespread CDS adoption. To make it a reality, federal agencies

must hasten the “CDS national infrastructure efforts” and put the right incentives and standards in place to guide healthcare providers and EHR vendors (who can further develop and promote standardized CDS).

Meaningful Use Stage 3 also offers the chance to advance genomics-based, personalized medicine. Since Meaningful Use Stage 3 rules are not yet finalized and their implementation is still several years in the future, there is a window of time to establish standards. The standards might be adapted to help capture genomics-related data from a multitude of sources, including clinical trials, pharmacological analysis of medicines, and patient lab results and aggregate them into CDS rules and triggers so that the decision-making that happens in a physician-patient interaction allows for truly personalized, up-to-date medicine.

Given the magnitude of the healthcare costs problem the U.S. is facing, solutions with significant savings potential should be a priority for policy makers. EHRs with advanced CDS support fit this bill and advancing them through Meaningful Use Stage 3 is a viable option, assuming policy-makers seize the opportunity.