INSIDE IE EDGE

Clinical Decision Support: Building Your Clinical IQ

EXECUTIVE SUMMARY Clinical decision support is all about intelligence: medical knowledge applied intelligently at the point of care. While measuring clinical IQ is still a work in progress, that's largely because the building of clinical IQ is also a work in progress. In this issue of Inside Edge we examine how far some leading hospitals and health systems have come in implementing key building blocks of clinical IQ: order sets and clinical decision support (CDS).

Given the 2009 publication of "Improving Medication Use and Outcomes with Clinical Decision Support: A Step-by-Step Guide" by Jerry Osheroff, MD, et al, (published by HIMSS and co-sponsored by Scottsdale Institute), this mid-stream review seems even more germane. Osheroff, chief clinical informatics officer at Thomson Reuters, is currently updating the 2005 book, "Improving Outcomes with Clinical Decision Support: An Implementer's Guide," which he also coauthored and which provided the basis for the 2009 book on medication use.

You might say that even the leading organizations are in the hunter-gatherer stage: hunting down evidence-based best practices and gathering them in their IT-enabled clinical workflow. That's too simplistic, of course, given the sophistication and hard work the process has required to date. We interviewed experts at Ascension Health, Adventist Health

System and ColumbiaDoctors (affiliated with NewYork-Presbyterian) to better discern how far we've traveled—and how far we still must go—in this complex but critical interplay of healthcare IT, quality and patient safety. We also talked to industry research firm KLAS, which is undertaking an industry survey of commercial offerings in the CDS space.

Ascension Health

"CDS is an expansive term and one for which I don't have a strict definition," says Jeff Rose, MD, Executive Vice President for Clinical Excellence, Informatics at St. Louis-based Ascension Health. "It's any information you can make available to a caregiver about their patients and conditions to help them provide the best care for their patients."

That said, Rose offers a second, more specific category that encompasses tools like checklists (documentation templates), order sets, care plans and pre-evaluated sets of clinical guidelines. "The ability to provide on-the-spot, just-in-time, digestible information based on best practices at the point of care—that's the ultimate in effective and helpful decision support. Such pointed and well-integrated, brief 'pushed' information is better than long-winded algorithms or detailed papers that can be read at home, in books or current literature," he says. "If a physician is getting ready to place an order and has at disposal an order set preprogrammed with best practice choices, then one can

influence the way clinicians order. This approach ultimately can make it easier for clinicians to do the right things, reliably."
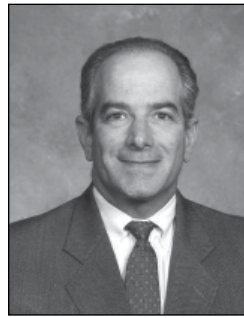
ASCENSION HEALTH

Jeff Rose, MD, EVP, Ascension Health

A third CDS category, Rose notes, involves rules, guidelines and guardrails that allow the clinical system to actually look at information flow in the EHR and alert clinicians when they may be about to make a mistake. "This category is comprised of reminders and suggestions that make up the most sophisticated form of CDS, ranging from basic to complex assessments. The downside with these is over-doing them can cause people to suffer from alert fatigue," he says, adding that it's difficult to understand when that happens and when alerts are troublesome or unnecessary. This stage of CDS also applies to evaluations of populations of patients with relevant disorders for whom routine procedures may enhance wellness. This is a fundamental part of population disease management.

"We've learned a lot over the last five years about when alert fatigue tends to kick in, but we also need more human-factors design for individual providers. Simply building in all the alerts or lengthy order sets makes workflow tedious and unproductive," Rose says.

Holy Alliance

Rose notes that an increasing number of organizations are collaborating to share CDS best practices. Ascension Health, San Francisco-based Catholic Healthcare West and Orlando, Fla.-based Adventist Health System opted to form just such a collaborative partly because they are all large, faith-based organizations using a mix of EHR systems and do not compete with each other.

That's not to say they implement CDS in the same way. At Ascension Health for example, each facility is responsible for implementing its own EHR but relies on central multidisciplinary content managers and clinical teams to ensure compliance with national regulations, quality reporting requirements and ARRA. Ascension Health centralizes what it calls Foundation order sets but allows adoption to be voluntary, and implementations to remain flexible.

"We don't require their use. We make them available to adopt and socialize in their formularies and individual workflows," says Rose. "To keep 34 Health Ministries [79 hospitals] on five different EHR platforms using current best practice knowledge without a central source would be outrageously expensive and impossible to manage. Creating good order sets in even a single repository is very expensive, and maintaining them is a vital and costly effort as well."

This strategy allows Ascension Health to maintain the integrity of the information. "CDS is essentially knowledge and must be IT-platform neutral. The capabilities of each platform to 'do' CDS vary so you have to manage operationalizing CDS as a separate entity," says Rose.

"We maintain the central source in natural language which clinicians from multiple disciplines can review and comment upon, and rely on our clinical IT system colleagues to integrate the knowledge into the particular platform or medium

being used to deliver the knowledge. We call this central process with distributed input and promulgation 'clinical content management,' which entails integration of knowledge from literature and experience into actionable work-flow enhancing materials that free providers to use greater wisdom in making choices about patient care," he says.

"The sad fact in healthcare is that we've not collected granular, accurate and clinically relevant—as opposed to administratively relevant—data to enhance real-time learning from practices and outcomes. So we're really managing information at the base, presenting it as a choice in the context of care, measuring results and then modifying the knowledge sources accordingly," Rose says.

A team sport

Ascension Health began building its Foundation knowledge with physician order sets and nursing plans based on a patient-centered care plan for acute care providers four years ago. "Healthcare is a team sport. Just having order sets doesn't guarantee implementing best practices across the continuum of care. But if you can distribute it in a centralized manner you can narrow variation," he says. These are now being expanded across multiple important venues of care and the continuum of places where patients seek medical help.

In the last four years in partnership with the vendor Zynx, Ascension Health, CHW and Adventist developed 1,200 order sets that are shared among all three organizations. These order sets cover the vast majority of conditions most often seen in hospitals, and are in use in various ways across all three health systems. Evidence-based order sets from the vendor account for a base of about 60 percent of content.

The other 40 percent were created by lead clinicians with less evidence at the core to allow for efficiency and convenience in clinical workflow. They are also now available commercially because they are required for adoption of CPOE despite a lack of strong evidence. "We had a lot of sharing among the collaborating organizations of different clinical content," says Rose.

Ascension Health's success in CDS adoption will depend on the culture of each facility. However, the Foundation tools have allowed the organization to move much more quickly than otherwise, he says. "The first thing we did was collect what was being used already, rationalize it and offer it as version 1.0. The evidence is piling up. The ROI is enormous if you do this right."

Adventist Health System

"Given the pressure we were all under to develop content for CPOE," says Loran Hauck, MD, Chief Medical Officer of Orlando, Fla.-based Adventist Health, the three organizations believed it was best to learn from each other and avoid reinventing the wheel. However, a year-long delay occurred while lawyers from all three health systems grappled with intellectual-property issues. "We shared best practices and ideas before legally launching the collaborative," he says.

All three organizations used the vendor's order-set templates except for areas like neonatology, which the health systems developed in 18 months from scratch using an approximate 20-member team of neonatologists and associated caregivers. "They built a whole collaborative library of neonatal order sets that the vendor has adopted," says Hauck. Now that the order sets are completed, each organization is embedding them into its own unique

continued

Avera's regional facilities include:

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- Avera Marshall Regional Medical Center, Marshall, Minn.
- Avera Queen of Peace Hospital, Mitchell, S.D.
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- Avera Sacred Heart Hospital, Yankton, S.D.

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EHR implementation. "This is a huge Collaborative success story," he says.

Adventist HEALTH SYSTEM

Loran Hauck, MD, CMO, Adventist Health

The collaborating health systems also created a library of AMI order sets on the vendor's website accessible to all members of the collaborative. "We openly shared content and a lot of best practices related to our implementation experiences," says Hauck, who estimates Adventist invested $3.3 million over three years in the effort to develop order sets and decision support. "It's very expensive."

Hauck classifies decision support into two groups. The first is from companies like Waltham, Mass.-based UpToDate, an evidence-based, peer-reviewed information source on the web that answers questions from doctors. The company's website claims that users research more than 80 million patient-related problems a year, covering more than 8,300 topics in 16 medical specialties and including more than 97,000 pages of text plus graphics, links to Medline abstracts, more than 385,000 references and a drug database.

Push vs pull clinical decision support
"It's what I call 'pull' technology. If you know the clinical problem, you can go into UpToDate and find the answer, but you have to know the question first," he says.

Not surprisingly, the second type of CDS is 'push,' which includes commer-cial vendors like Zynx and SI Corporate Sponsor Thomson Reuters. The challenge with push is to take new guidelines—like those published last December by the American College of Cardiology—and get that information in front of doctors "so the evidence confronts them in their natural workflow," Hauck says.

Similarly, if the electronic order set for AMI requires a new protocol, Adventist can create one-sentence "evidence prompts" suggesting the doctor also give Plavix along with an aspirin to a patient after PCI. Should physicians or nurses desire more explanation, they can click on an evidence link that calls up a dialogue box with more detailed background information.

"We've taken the brand-new evidence that changes practice and pushed it to the workflow—clinical decision support at the point of decision making. As a doc, if I don't even know the evidence has changed, then it's unlikely I would even question the conventional protocol. They'll say, 'I didn't know that,' and it prompts them to change their practice. Evidence put in front of the physician within their workflow is the ultimate, most effective kind of CDS. Where better to confront the physician? In the old days you wrote orders with a ballpoint pen. Today, with embedded decision support I can read the embedded evidence pushed into my natural work flow and say, 'OK, I'll do that,'" Hauck says.

And we thought they were fast learners
He cites the widely accepted notion that it takes about 17 years for Class 1 clinical evidence to become adopted as a standard of care, probably due to medicine's traditionally poor system of incorporating new knowledge.

"You hold CME courses that depend on if the doctor was awake at 6 PM at night

after a hard day of working in the office, hospital, OR or ED. Classroom-lecture style CME has very little impact on changing physician behavior," says Hauck.

"We started 14 years ago developing paper order sets. When new changes came out as evidence-based medicine, the old paper versions of the order set were scattered like leaves throughout the hospital. It was very laborious to change the order sets and find all the old, outdated paper copies. Now with the advent of an electronic EHR and CPOE we have a schedule for systematically revising every order set no less frequently than every three years. Now we have an electronic platform that allows us to embed the latest evidence-based practice on a weekly basis if we want," says Hauck.

Adventist determined in a 2004 study published in the Annals of Epidemiology that even with paper order sets it was able to reduce LOS and mortality and achieve higher levels of quality and safety. The health system plans to publish another study when they have collected enough data for analyzing outcomes based on physicians using the new electronic order sets and using metrics it has identified from its robust clinical data repository. With five of its 37 hospital campuses having implemented CPOE (as of May 2010), Adventist is making a major push to have every hospital live with CPOE containing evidence-based CDS by August 2011.

Adventist's order sets cover approximately120 separate diagnoses and surgical procedures, from preadmission to the operating room, post-op and ED services. "We will end up building nearly 500 order sets to support those 120 categories. It's a monumental amount of work," Hauck says, even with the vendor's updates every six months. "The content work is still there

for our doctors, nurses, pharmacists and therapists."

ColumbiaDoctors

When it comes to clinical decision support, it's difficult to find a clinician more steeped in the subject than Peter Stetson, MD, MA. His titles alone tell the story: Chief Medical Informatics Officer at ColumbiaDoctors in New York; assistant professor of clinical medicine and clinical biomedical informatics at Columbia University; co-chair of the CDS committee at NewYork-Presbyterian Hospital.

ColumbiaDoctors is the 1,000-physician organization (3,000 total staff) that serves Columbia University Medical Center and admits patients to NewYork-Presbyterian Hospital. Stetson launched the alerts committee in 2003 at NewYork-Presbyterian's west campus at Columbia University at 168th St. It expanded in 2005 to the east campus of Cornell University Medical at 68th St. Stetson and Gil Kuperman, MD, then director of quality informatics, presented their CDS success to date at SI's 2006 Fall Forum "The IT Quality Link," hosted by NewYork-Presbyterian.

One of the challenges since then has been to harmonize and standardize a process for alert request and maintenance. There are often may requestors and setting the priorities of which alerts get priority for development is a challenge.

To ensure that clinically important alerts were prioritized, the informatics team developed a structured alerts-request process, whose objectives were to ensure that requested alerts were really necessary, could be integrated into the clinical workflow and weren't similar to ones already in the system. "We struggled hard to get that in place. The challenge was demand that outstripped capacity. We initially got

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Improving the Bottom Line
- Kent Giles, partner, CSC

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HITECH Final Rule: Standards and the EHR Certification Process
- Eric Finocchiaro, consulting specialist leader, Deloitte Consulting, LLP
- Mitchell Morris, MD, principal, Deloitte Consulting, LLP

October 18
SI-Cerner Users Collaborative No. 27
- Judy Van Norman, senior director, Care Transformation, Banner Health
- Joel Shoolin, DO, VP, Clinical Information, Advocate Healthcare

October 20
Memorial Hermann, CDS Case Study
- Robert Murphy, MD, medical director, Information Systems, Memorial Hermann Healthcare System
- Sirajuddin Anwar, MD, M.B.B.S, M.S., lead clinical decision support analyst, Memorial Hermann Healthcare System

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overwhelmed with requests until NYP could hire more alerts programmers," Stetson says.

Backlog of alert requests

As a result, the health system was able to recently clear out many of the alert requests that had become backlogged and to tackle big ones like drug/drug interactions, an initiative that has recently gone live at NewYork-Presbyterian with a "clinically relevant, pruned list" of prioritized drug-drug interactions. The CDS Committee is focusing next on adding additional duplicate order alerts. After that, drug/condition (drug/disease) will become the focus at NewYork-Presbyterian.

ColumbiaDoctors
The Physicians and Surgeons
of Columbia University

**Peter Stetson, MD,
CMIO, ColumbiaDoctors**

"Prior to turning on Drug-Drug Interaction alerts, we were firing at 3 percent of all orders, but we also have high override rates, in many cases up to 80 percent of the alerts are overridden. When we added drug/drug interaction alerts, the firing rate rose to 5 percent," he notes. "Now the focus is improving the alert specificity even further while we actively track the override rates."

EHR software has improved too, becoming much more configurable. It's now possible to turn off alerts for individual drugs in the formulary like aspirin or warfarin that are sometimes administered together to cardiac patients. This is an example of improving the specificity of the alert that reduces alert fatigue for providers.

"We did a huge amount of work over the years to prune our list of alerts. If you just turned on all of the Drug-Drug Interaction alerts, we'd have about 10,000 possible interactions that could trigger. We got the number down to 2,000 or 3,000, but even that was too frequent," says Stetson, adding that the health system ran the alerts in silent mode first to determine which to deactivate.

Alert fatigue

Failure to perform such pruning results in alert fatigue, which causes clinicians to simply ignore or override even the most critical alerts. This is an important focus of NewYork-Presbyterian's CDS Committee, because at the west campus alone, 3,000 individual alerts per month in 34 alert categories were triggered; a 4.7 percent rate. Most of them were for potential drug/drug interactions. For the 2,000 inpatient beds at its two campuses, 50,000 alerts were fired on one million orders in that month.

Despite such granularity of focus, Stetson sees decision support as an expanding universe. "In addition to alerts and order sets, there are other forms of decision support that are part of ambulatory electronic health records," he says, including reminders that show up in flow sheets to help patients comply with best-practice guidelines for yearly mammograms, PAP and hemoglobin A1c exams.

KLAS' view

It may be indicative of the growing maturity of CDS software that Orem, Utah-based KLAS, which conducts research on healthcare-IT vendors, has turned its attention to the CDS space. Jason Hess, KLAS' general manager for clinical applications, is in the early assessment phase of a survey of C-level executives—CMOs, CMIOs and CIOs—about prospective third-party CDS vendors.

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Jason Hess, General Manager, KLAS

Part of the driver for the survey is that Stage 1 Meaningful Use requires that hospitals employ five or more CDS rules including diagnostic test orders. Because KLAS traditionally measures customer satisfaction following implementation of an IT application—and evaluating content is a bit different—the firm chose to conduct a perception study to sketch out what are perceived to be the key components of CDS.

The first CDS component is a *drug information database*, which provides information about drug/drug and drug/allergy interactions. *Order sets* from firms like Thomson Reuters comprise the second component. The survey is trying to clarify how well those order sets are integrated with CPOE. To do that well still requires hospitals to build their own sets even if based upon basic ones from third-party vendors, Hess notes.

Raising more questions

Stages 2 and 3 of Meaningful Use require hospitals to demonstrate evidence-based order sets, which raises several questions. "What does that mean?" he asks. "If you build them yourselves, how do you keep them on course for the next stages? How do they scale?"

The third component of CDS that C-level executives cite is a *nursing evidence-based care plan.* Vendors like CPMRC offer such products.

Fourth is *evidence-based reference content*, sold by companies like UpToDate and MDConsult, which provide evidence-based, peer-reviewed information resources avail-able via the Web, desktop/laptop computer and mobile devices. Typically viewed as a utility tool for use in conjunction with the EHR, the big question associated with evidence-based reference content is just how often hospitals use it. That, says Hess, depends on how well it is tied into clinical workflow and to what extent it is championed by the hospital's physician leaders.

Fifth is *multi-parameter alerting*, which constitutes more complex alerting than, say, a simple lab value. KLAS hopes to determine to what extent hospitals have adopted multi-parameter alerting and whether particular physicians or third-party entities are driving its implementation. Home-grown CDS systems sometimes incorporate real-time tracking of Never Events like central line infections and pressure ulcers. Some vendors are going beyond infection control by using reminders to nurses to wash their hands.

Conclusion

It should probably not be surprising that the definition of clinical decision support would be a bit murky. After all, our healthcare environment is such that on any given day numerous clinical decisions are made by multiple caregivers for even a single patient.

Hess asserts that CDS is often such a nebulous a concept—"Like nailing Jello to a wall," described one midwestern executive—that just discussing it in a survey helps frame it better. "People love to talk about this because it's really valuable just to walk through it in their minds. It's still evolving to the point that we've had to revise the questionnaire twice."

When Hess asked a CMO which of the five CDS components had the biggest impact on LOS, quality and mortality measures, the CMO replied, "Really, none of them by themselves. It's the people, processes and software tool used by those involved in case management. It's not just the software." ◈

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