SCOTTSDALE INSTITUTE

information edge

May 2005
Volume 11, Number 4

CPOE: Where are we today?

EXECUTIVE SUMMARY

CPOE is the ugly acronym with the split personality: it represents healthcare's most promising tool of change and its greatest challenge in terms of cost and complexity. At the very heart of the care process, it can both empower clinicians and befuddle them, but it is useless without them. Perhaps the key component in the clinical IT-enabled transformation of healthcare to a safer, more effective and, hopefully, more efficient system of care, CPOE also has the power to amplify the worst aspects of a care delivery system.

One of the conundrums about CPOE is that, while its benefits are multifold, they are often difficult to quantify and are dependent on complex factors. In many ways, CPOE validates the old chestnut that all healthcare is local because so much about CPOE's success depends on the local care environment, how it is implemented and how well it is integrated with other tools and processes. Like nature, CPOE abhors a vacuum: it is not a solution in and of itself but must be integrated with an EHR, clinical decision support (CDS) and medication administration.

CPOE is ineffective unless supported by the often painstaking decision process that determines how care should be managed. Organizations must then translate the agreed-upon best practices into CDS rules, alerts and reminders *and* institutionalize a process for managing, maintaining and evolving these care practices. This is a continual process, not an implementation per se.

Over the past five years leading healthcare organizations, many of them Scottsdale Institute members, have addressed these factors and clarified—if not always quantified—CPOE's benefits. In an effort to provide a quick sketch of where we are today with CPOE, this issue of Information Edge explores the CPOE experience of three early-adopter healthcare organizations—University of Pennsylvania Health System, Philadelphia; Trinity Health, Novi, Mich.; and New York Presbyterian Health System, New York. We also talked to three leading "expert witnesses" to help us better put CPOE into an up-to-date context.

CPOE is a powerful tool for positive change in healthcare, but it can also become the bane of an organization's existence if not done carefully and within the framework of larger organizational change. Here follows current thinking and lessons from the field on a tool that is changing the way healthcare is delivered.

SCOTTSDALE INSTITUTE

Membership Services Office:
1550 Utica Avenue South
Suite 550
Minneapolis, MN 55416
T. 952.545.5880
F. 952.545.6116
E. scottsdale@scottsdaleinstitute.org
W. scottsdaleinstitute.org

Handsome payoff

"The preponderance of reports from the field demonstrates that CPOE has paid-off handsomely via both quality and efficiency gains," says Arnold Milstein, MD, co-founder of the Leapfrog Group and U.S. Health Care Thought Leader at Mercer Human Resource Consulting, San Francisco. "Though it's no mean feat to make the transition, the vast majority of CPOE implementations to date have succeeded. Physician users would not consider returning to paper."

Arnold Milstein, MD, co-founder of the Leapfrog Group and U.S. Health Care Thought Leader, Mercer Human Resource Consulting, San Francisco

In his experience, the primary lesson from the leaders has been to "over-invest" in preparation before the CPOE system goes live. Milstein cites Vince Lombardi's dictum that most games are won or lost before the opening kick-off. Critical elements of advanced preparation include: (1) utilizing clinicians from multiple specialties to thoroughly stress-test the decision support software; (2) requiring physicians to participate in easily accessed CPOE "flight certification" training and testing; and (3) making plenty of helpers available, especially for physicians—both during training and during the first seven to 10 days after start-up.

"Finally, hold fast to pre-set implementation policies," says Milstein, noting that one of the most successful CPOE implementations observed by the Leapfrog Group strictly enforced a prohibition on order-writing by physicians who had not passed CPOE flight training before the go-live date of the CPOE system.

Not surprisingly, psychologically nuanced executive leadership is another key to successful CPOE implementation. "Successful CEOs achieve buy-in among board and physician leaders," says Milstein, "using powerful motivational images, such as identifying specific patients who died in their own institutions due to errors that could have been prevented by CPOE."

Patchwork quilt

Doug Thompson, a senior manager at FCG, Long Beach, Calif. who developed FCG's CPOE-benefits model, notes some vagueness in the industry about the benefits of the EHR versus CPOE. But he says CPOE needs to be linked to the EHR in order to be effective, and he's seeing an increasing effort across the industry to integrate both.

Doug Thompson, senior manager, FCG, Long Beach, Calif.

"Provider organizations," Thompson says, "want to know what they're going to get out of it. They need financial benefits for the board, and clinical benefits for the clinicians." In searching the literature three years ago, FCG found "a patchwork

Upcoming Events

For information on any of these teleconferences, please contact the Scottsdale Institute office at 952.545.5880 or register on our Website scottsdaleinstitute.org

June 1
Trends & Glimmers: The State of Healthcare IT
- Dave Garets, president and CEO, HIMSS Analytics, Chicago
- Mike Davis, EVP, HIMSS Analytics, Chicago

June 7
Software Contracting and Negotiating: Successful Strategies
- Diana J.P. McKenzie, chair, Information Technology Group, Neal Gerber & Eisenberg, Chicago

June 9
Northwestern Memorial: The NCQHC Award Journey and Results
- Julie Creamer, VP, operations and quality, Northwestern Memorial Hospital, Chicago
- Sally Szumlas, RN, MS, quality program director, Northwestern Memorial Hospital, Chicago
- Nicole Paulk, director of corporate strategies, Northwestern Memorial Hospital, Chicago

June 15
Integrating Genomics and Pathology: Blood Center of Southeastern Wisconsin
- Dan Bellisimo, MD, director of Molecular Diagnostics, Blood Center of SE Wisconsin, Madison
- Mark Hoffman, PhD, director, Genomics/Infectious Disease Solution Management, Cerner Corporation, Kansas

more events on next page

quilt of evidence" for those benefits. "There were a lot of missing patches and, while many have been filled, there are still many gaps out there," he says.

The key lesson learned: an organization must understand its own processes to understand the specific benefits possible with CPOE. Based on FCG's experience, those benefits fall into a few general categories:

1) *First and foremost, a reduction in practice variation*. This doesn't happen just because of CPOE, but through the use of electronic order sets and alerts delivered via CPOE. Getting physicians to agree to use the order sets, of course, requires a great deal of background work. But the implications are improved clinical quality and outcomes, and reduced costs. CPOE also prepares an organization for what most experts predict will be the next payment model: pay for performance (P4P). For some indications, reducing variability is cut and dried; others require judgment calls and use a smaller range of variation. The overall goal, however, is to reduce variation and move toward evidence-based care.
2) *A second major benefit arises from a reduction in adverse drug events (ADEs)* by using automated alerts that notify users when a particular drug is bad for the patient due to a potential allergic reaction or because the drug may have an adverse reaction to another drug the patient is taking. CPOE can also reduce transcription errors that cause ADEs. Unfortunately, says Thompson, it's difficult to measure an actual reduction in ADEs because 95% of hospitals only do self reporting, which detects one to two orders of magnitude fewer ADEs than actually occur. Hospitals committed to implementing CPOE are misguided if they believe they can rely on voluntary reporting of ADEs. "You need to adopt a more reliable method of measuring ADEs than self-reporting," he warns.
3) A less significant but still important benefit is *a reduction in turnaround time*. If a doctor orders a test or a drug for a patient via CPOE, for example, it gets to the laboratory or pharmacy faster than a handwritten one.
4) Other benefits are related to *reduced variation* from the enhanced ability of pharmacists to automatically set up ordering forms to automate drug utilization, which allows better use of more effective and less-costly drugs.
5) Finally, there are *reduced duplicate laboratory tests*.

NewYork-Presbyterian

"CPOE is a key component of our quality improvement strategy," says Gil Kuperman, MD, director of quality informatics at NewYork-Presbyterian Health System, a 2,400-bed system with five sites in New York City and Westchester County, N.Y. "We view it as a critical enabler of several quality programs. Specifically, CPOE helps NewYork-Presbyterian address many regulatory issues, improve patient safety,

Upcoming Events continued

June 21
Incorporating Genomics into Clinical Decision Support: Personalized Medicine at Marshfield Clinic
- Carl Christensen, chief information officer, The Marshfield Clinic, Marshfield, Wis.
- Catherine McCarty, PhD, senior research scientist and director, The Marshfield Clinic, Marshfield, Wis.

June 28
The ASTM Continuity of Care Record (CCR) — Can the Doctors Order Up Interoperability in the Near Term?
- David Kibbe, MD, director, Center for Health Information Technology, American Academy of Family Physicians, (AAFP) Leawood, Kan., and Co-Chair, Physicians' EHR Coalition

June 29
Workflow in the all-Digital Hospital
- Susan Lorkovic, Alegent Health, Omaha, Neb.

July 11
Using Six Sigma and Information Technology to Improve Performance
- Mary Reich Cooper, MD, J.D., vice president & chief quality officer, New York-Presbyterian Hospital, New York

more events on next page

support our pay-for-performance efforts, support our Six Sigma initiatives and standardize care, including changing workflow to improve quality and efficiency," he says.

NewYork-Presbyterian
The University Hospital of Columbia and Cornell

NewYork-Presbyterian has implemented its Eclipsys inpatient CPOE at four sites; it will complete installation at the fifth one this year and at all of its ambulatory clinics, says Kuperman. "We've learned how to roll these out," he says, because training issues are better understood, many technical issues have been resolved and the impact on workflow is better understood.

Still, Kuperman acknowledges certain provisos. "It's pretty hard to measure certain CPOE benefits, for example the benefit of standardization or complying with JCAHO regulations. Also, sometimes you're reducing medical errors but don't know how many would have turned into adverse events. It's difficult to measure how many preventable injuries we are actually preventing." NewYork-Presbyterian previously demonstrated that physicians change their orders in response to suggestions to adjust doses based on renal function. "So, we know CPOE changes physician behavior, but we don't have any data on prevented events," says Kuperman.

One reason that tracking the impact of CPOE on adverse events is difficult is that NewYork-Presbyterian recently converted from paper-based incident reporting process to a web-based incident reporting system. "It's been hard to track medication errors over time because we've changed measurement systems," says Kuperman.

"We accept the benefits of CPOE that have been well-documented in the literature. In general, it's a real challenge to carry out primary research analyses as part of day-to-day business although we carry out projects where we think we have an opportunity to contribute to the literature. For example, currently we are analyzing the impact of an automated weight-based heparin dosing algorithm and a pediatric dosing advisor."

Still, there's no debate at NewYork-Presbyterian on the value of CPOE. "We wouldn't be able to carry out our quality improvement agenda without it—reducing errors, standardization and collecting data for analysis," says Kuperman.

With Six Sigma as the basis of its quality improvement, NewYork-Presbyterian has undertaken several cycle-time projects to improve turn-around time for medication administration and radiology tests and results and to reduce overrides in automated medication warehouses. Most of these initiatives rely on CPOE directly or indirectly.

In the end, however, "We expect CPOE to support our pay for performance initiatives, patient safety initiatives, regulatory requirements for JCAHO core measures as well as our internal Six Sigma efforts. That's where we think the benefits are."

Trinity Health

Novi, Mich.-based Trinity Health—with 45 hospitals, 400-plus outpatient clinics

Upcoming Events continued

July 13
Scottsdale Institute – HIMSS Analytics Healthcare Leadership Report: The Changing Landscape of Healthcare IT Management and Governance, sponsored by Lawson Software.
- Dave Garets, president and CEO, HIMSS Analytics, Chicago
- Thomas Royer, MD, president & CEO, CHRISTUS Health, Dallas
- Dave Link, executive VP, Sioux Valley Hospitals & Health System, Sioux Falls, S.D.
- Arlyn Broekhuis, CIO, Sioux Valley Hospitals & Health System, Sioux Falls, S.D.

July 14
Scottsdale Institute – HIMSS Analytics Healthcare Leadership Report: The Changing Landscape of Healthcare IT Management and Governance, sponsored by Lawson Software.
- Dave Garets, president and CEO, HIMSS Analytics, Chicago
- Glenn Galloway, CIO, Children's Hospitals and Clinics, Minneapolis

July 18
Scottsdale Institute – HIMSS Analytics Healthcare Leadership Report: The Changing Landscape of Healthcare IT Management and Governance, sponsored by Lawson Software.
- Dave Garets, president and CEO, HIMSS Analytics, Chicago
- George Conklin, senior VP and CIO, CHRISTUS Health, Dallas

For information on any of these teleconferences, please contact the Scottsdale Institute office at 952.545.5880 or register on our Website scottsdaleinstitute.org

and 7,600 physicians—launched its first CPOE site two years ago as part of four-year-old Project Genesis, its enterprise-wide, IT-enabled clinical transformation. After taking a nine-month hiatus to update the Oracle database and Cerner applications, enhance the network and Citrix server farm to handle higher volume, Trinity has built up enough experience and momentum to reach rapid-implementation for its CPOE and the related clinical systems.

"Now we're implementing a new system every two months," says Donald Crandall, MD, Trinity's VP for clinical informatics.

TRINITY HEALTH

Donald Crandall, MD, VP for clinical informatics, Trinity Health, Novi, Mich.

Other sites are lined up for June, July, September and October. Each site is a member organization comprised of two to three hospitals and several ambulatory clinics and receives a portfolio of applications, including patient documentation, physician order entry, new medical records with e-signature, new pharmacy system, plus a new patient administration from McKesson. "That's our Big Bang," says Crandall. After that package come radiology system and an ER suite.

"One thing we've learned in many conversations and debates with the sites is that the Big Bang—implementing an entire facility or department at a time—is the right way to go. Two years ago there was a lot of discussion in the literature about phasing in applications one floor or service at a time. We found it was difficult," he says.

"There's a huge transformation on the weekend. We found when we delayed CPOE it was difficult to get the same excitement. So, at the last two sites we brought up CPOE as part of the Big Bang across the entire organization. It was always difficult for me to tell doctors to use CPOE on only one floor. We found adoption rates much more rapid this way. We're seeing within two weeks 60% to 65% adoption and 95% adoption in the ER," says Crandall.

"So, we're strong advocates of the Big Bang. People are transforming together. Physicians and nurses are going through it all at the same time. Their whole workflow, including their roles and relationships, has changed." When a facility cuts over to the new system Trinity makes sure there's a large contingency team of IT people onsite for the first two to three weeks. Then, should doctors find the new system isn't working to their satisfaction, it's possible to tweak the system.

"The advantage of doing everything all at once early in go-live is that you can pour huge resources into it. After two to three weeks, when the team leaves, they can begin preparing a new site," says Crandall. A phased-in approach, on the other hand, generates ongoing competition among go-live sites for scarce resources.

CPOE impact at Trinity

Since its inception Project Genesis Phase

"We're strong advocates of the Big Bang. People are transforming together. Physicians and nurses are going through it all at the same time."

"The bottom line is that CPOE is an incredibly powerful tool. When you apply it to certain inefficient work processes you can actually make them less efficient. On the other hand, if you take it carefully and apply CPOE in a well-thought-out strategy you can have a dramatic positive impact on care."

One (data repository, rules engine and ADE alerts) in May 2001, more than 25,000 medication orders have been changed by Trinity Health physicians following system-generated alerts. A study of more than 159,000 patient episodes across seven Trinity facilities found a positive impact on clinical outcomes and direct drug costs:

- Severity-adjusted mortality was reduced by 7.4%;
- Length of stay was reduced 2.4%;
- Variable drug costs reduced more than $18 million annually.

In a study of a Project Genesis Phase II (clinical documentation, CPOE, medical records application, pharmacy system, and expanded decision support applications) alpha site in May 2003, the system resulted in significant improvement in several core clinical indicators:

- Time to first dose of antibiotic;
- ACE inhibitor at discharge;
- Beta blocker within 24 hours of MI;
- Discharge instructions;
- LVF (left ventricular failure) assessment;
- Pneumococcal vaccination;
- Misidentification rate.

It doesn't end there. Trinity estimates that when Project Genesis is fully implemented it will accrue annual financial benefits of $72 million to $106 million.

Says Crandall, "Benefits realization is the critical component. It's important in advance to identify and agree upon specific metrics. When you start collecting metrics it's best to automate that process; you need to build data capture in the application. We spent a lot of time developing a decision-support database that takes querying of information off the main transactional system and puts it on a separate database."

University of Pennsylvania

Eric Pifer, MD, CMIO at the University of Pennsylvania Health System, Philadelphia, says CPOE is revolutionizing healthcare—and we're still grappling with the ripple effect it is creating across care.

Eric Pifer, MD, CMIO, University of Pennsylvania Health System, Philadelphia

"Are we seeing benefits from CPOE is a complicated question," he says. "Yes, we are definitely seeing benefits, but also some problems. The bottom line is that CPOE is an incredibly powerful tool. When you apply it to certain inefficient work processes you can actually make them less efficient. On the other hand, if you take it carefully and apply CPOE in a well-thought-out strategy you can have a dramatic positive impact on care."

In a very specific example of its power, CPOE has enabled the Hospital of the University of Pennsylvania to track the number of patients given pneumococcal vaccine, raising that number four-fold in two months using fairly simple interventions in order sets. Process changes made via CPOE propagate throughout the health system. "You have power to change the way care is delivered. It's unbelievable. Everybody who has an order entry system knows that," says Pifer.

However, he cautions, it's necessary to prepare the software to work well. "Sometimes there are well-ingrained processes that don't translate that well to a CPOE environment. CPOE is so powerful that you better be able to focus it. It's like a big bazooka."

Pifer compares the rollout of CPOE to the introduction of automobiles in America. Cars made it possible to go fast and travel long distance, while introducing new risks to people and the environment—completely changing the lifestyle paradigm. CPOE is the same way, enabling Penn, for example, to entirely rethink the way it administers insulin to patients. The old way was to check a patient's blood sugar and write an order for the nurse to give the patient a certain amount of insulin. Now it's much more sophisticated, using an algorithm that factors in the patient's body mass and other physical characteristics.

"We're integrating the new insulin protocol into our order-entry system, which will lay out the orders in a step-by-step approach. Then we'll all order through that order set; it will focus all care. That will be the only way you can order insulin," he says, except under very specific conditions to allow some flexibility. "There's essentially no way around it."

Conclusion

As organizations build experience with CPOE, more and more tools and methodologies are becoming available to help navigate the path to successful implementation.

David Classen, MD, VP, FCG and associate professor of medicine, University of Utah, Salt Lake City

David Classen, MD, VP at FCG and associate professor of medicine at the University of Utah, Salt Lake City, for example, is leading a project to develop a CPOE Flight Simulator that will enable healthcare systems to assess how ready they are for the technology and better design their implementation strategy.

He says CPOE benefits are keyed to two factors: 1) adoption—you have to get people to use it; and 2) decision support, which must be built in to the system. "Then, you need to ask how you know if it's working. The decision is complicated because there's a technology challenge—what rules and alerts do you put in and how do you make sure they flow through the system without overwhelming the doctors? For example, do you have doctors look at every single drug interaction alert? That's very hard to do. There's also the organizational challenge: How do you decide what to focus on? Is it medication safety or public reporting? That becomes a challenge for building the infrastructure. It's like having a brand-new organization. A lot of people have to build clinical decision support infrastructures that don't currently exist to make it work," says Classen.

"CPOE is like having a brand-new organization. A lot of people have to build clinical decision support infrastructures that don't currently exit to make it work."

After the infrastructure is created to handle decision support, it's necessary to determine content and how effectively it's implemented. That's where the CPOE Flight Simulator comes in. It is a web-enabled, interactive tool that will be released in fourth quarter 2005 for both inpatient and outpatient settings to help meet Leapfrog Group requirements for CPOE standards. Watch for an upcoming teleconference presentation for SI members during which Classen will review this tool and its benefits.

Regulatory compliance, benefits measurement and implementation issues aside, however, it's worthwhile to step back and acknowledge just what a revolutionary new tool CPOE—embedded in clinical decision support and the electronic medical record—is and why at its core it implies deep cultural change. Perhaps the best way to understand this shift is to take stock of terms associated with CPOE. Terms like "flight simulator" and "flight certification" tell us that we're taking off from familiar ground and flying into the wild blue yonder.

Scottsdale Institute Conferences 2005/2006

Fall Conference 2005
Sept. 15-16, 2005
Spectrum Health
and Trinity Health
Grand Rapids, Mich.

Spring Conference 2006
April 6-8, 2006
Camelback Inn
Scottsdale, Ariz

Scottsdale Institute/HIMSS Analytics Healthcare Leaders Report: The Changing Landscape of Healthcare IT Management and Governance, sponsored by Lawson Software.

This free, 39-page report, unveiled at SI's spring conference, covers recent groundbreaking research conducted by SI and HIMSS Analytics, addressing issues such as:

- What models of IT governance and reporting are being utilized? What are some of the successful practices?
- Who typically drives IT-enabled business projects? Who should be?
- What is the role of the CIO vs. operational leaders?
- What is the role of the CEO and Board in healthcare IT decision making?
- What are the top factors for IT success?
- What do the top-performing healthcare organizations do differently with respect to IT management and governance?

A full report of these surprising and thought-provoking findings is available at scottsdaleinstitute.org, himssanalytics.com and lawsonsoftware.com

Register for three Webinars

Please join us as Dave Garets, President and CEO, HIMSS Analytics, presents the findings on three different webcasts: July 13, 14 and 18th from 1:00 – 2:30 PM CDT.

Also participating will be executives from the report's case-study leaders:

- **July 13:** Thomas Royer, MD, president & CEO, CHRISTUS Health, Dallas; Dave Link, executive VP, and Arlyn Broekhuis, CIO, Sioux Valley Hospitals & Health System, Sioux Falls, S.D.;
- **July 14:** Glenn Galloway, CIO, Children's Hospitals and Clinics, Minneapolis;
- **July 18:** George Conklin, senior VP & CIO, CHRISTUS Health, Dallas.

Registration begins June 6 at scottsdaleinstitute.org