



Computerized Physician Order Entry In Community Hospitals: Lessons from the Field

The Quality Initiative

June 2003

Computerized Physician Order Entry In Community Hospitals: Lessons from the Field

Prepared by

CALIFORNIA HEALTHCARE FOUNDATION

and

FIRST CONSULTING GROUP

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Acknowledgments

This research was sponsored by the California HealthCare Foundation and First Consulting Group. This report was prepared by Jane Metzger and Jason Fortin of First Consulting Group. Other assistance with review and production was provided by Erica Drazen and Barbara Kendall of FCG; Jennifer Eames and Sally Mudd of the California HealthCare Foundation; and Susan Anthony.

First Consulting Group is a provider of consulting, technology, and outsourcing services for health care, pharmaceutical, and other life sciences organizations in North America and Europe. More information about FCG is available at: www.fcg.com.

ISBN 1-932064-32-X

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Interview Acknowledgments

Interviews with physicians and others working on computerized physician order entry (CPOE) provided the real-world view of effective approaches.

The authors wish to thank all the individuals who generously shared advice and lessons learned.

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Executive Summary

Implementing CPOE is hard work.

PATIENT SAFETY HAS RECEIVED RENEWED attention since publication of the Institute of Medicine's 1999 report *To Err Is Human*, which found that up to 98,000 individuals die each year in U.S. hospitals from preventable mistakes. As part of efforts to enhance patient safety, many hospitals have committed to implementing computerized physician order entry (CPOE), a process in which physicians write medical orders for their hospitalized patients using a clinical software application. For most of these hospitals, CPOE represents the first time the hospital has applied information technology (IT) to interdisciplinary clinical processes on such a large scale, introducing major changes to physicians' workflow.

Implementing CPOE brings change on a large scale because order management is an extremely complex process that affects nursing units and ancillary departments, as well as every physician who writes an order. Yet industry experience with CPOE implementation is limited, and hospitals have struggled to engage physicians in mastering a process that takes more time than writing orders with pen and paper. That some CPOE efforts have stalled or failed is well known in the industry, including the recent, well-publicized pullback of CPOE at Cedars Sinai Medical Center in Los Angeles.

Existing research on CPOE implementation is focused almost exclusively on academic medical centers, where residents write most of the medical orders. But, in fact, some 89 percent of U.S. hospitals are community hospitals, where most physicians who admit patients have independent practices in the community. Not employed by the hospital, these physicians often admit patients to several hospitals and spend limited time at the hospital each day. This more independent relationship to the hospital adds to the challenge of bringing physicians on board with CPOE and providing the necessary training to make it successful.

About this Research

The California HealthCare Foundation (CHCF) and First Consulting Group (FCG) sponsored this research to provide medical executives, physician leaders, and others interested in CPOE with practical information about what it takes to

implement CPOE in a community hospital setting. The research focuses on how community hospitals can best:

- Work toward universal CPOE adoption by physicians.
- Incorporate CPOE effectively in order management throughout the hospital.

The research is based on indepth interviews with key staff in ten community hospitals that have made significant progress in implementing CPOE.

- Abington Memorial Hospital (Abington, PA)
- Alamance Regional Medical Center (Burlington, NC)
- Community Medical Center (Toms River, NJ)
- Frankford Hospital (Philadelphia, PA)
- Lehigh Valley Hospital (Allentown, PA)
- Medical Center of Ocean County (Neptune, NJ)
- The Medical Center at Princeton (Princeton, NJ)
- Penobscot Bay Medical Center, Northeast Health (Rockport, ME)
- Queens Medical Center (Honolulu, HI)
- Sarasota Memorial Hospital (Sarasota, FL)

To provide a perspective based on working in multiple hospitals, CPOE implementation specialists from the following companies whose systems were used in the ten hospitals were also interviewed: Eclipsys, IDX, MEDITECH, Per-Se, and Siemens.

Organizing for CPOE

CPOE is one of the later stages of a comprehensive clinical information system initiative. Interviewees cited all of the following organizational factors as critical for implementation and ongoing management of CPOE:

- Visible, active roles for medical executives;

- Physicians as leaders and decision-makers;
- Direct linkage to the work of clinical performance improvement; and
- Active involvement of nursing, pharmacy, and other departments in decision making.

In the ten hospitals studied, CPOE teams and committees that made decisions and did the work of implementation were physician-led but multidisciplinary. Three key physician roles/teams were typical:

- Physician advisory group, which oversaw the project, made many of the necessary decisions, and recommended policy to the medical executive committee,
- Physician executive, an influential leader who marshaled support and pushed adoption, and
- Physician champion, who spent considerable time and energy serving as the point person for the project and the liaison between the Information Systems (IS) Department and the medical staff.

Typically the physician champion headed the project team and chaired the physician advisory group. The project team included another individual serving as project manager and a group of clinical analysts from the IS Department, as well as representatives from nursing, pharmacy, and other areas.

Incentives and Mandates

One of the central questions regarding the implementation of CPOE is how to frame, and whether to enforce, expectations about physician use. In all of the hospitals studied, the plan for moving toward universal physician adoption has evolved over time. Several had eased up on an initial mandate; others had established one but then backed away. Many CPOE project leaders cautioned against using the term mandate at all. Instead they recommended working toward a hospital-wide policy for universal CPOE.

Eight of the hospitals began with CPOE years ago and renewed their push for universal physician adoption due to the recent focus on patient safety. The two others began more recently, also to meet patient safety objectives. Key staff in these hospitals recommended starting with a firm commitment to CPOE, delivering a consistent message to build a consensus that CPOE is the right thing to do, and working within the professional culture of the medical staff toward the goal of universal adoption. The right time for hospital policies requiring CPOE appeared to come when a critical mass was achieved on three fronts:

- A significant number of physician adopters demonstrated by their example that CPOE was workable and encouraged peers,
- Verifiable progress was made toward patient safety objectives, and
- Consensus was achieved among the medical staff that CPOE was the right thing to do.

In the interest of building momentum, the CPOE team typically focused first on the most interested physicians and those writing the highest volume of orders, and then targeted other groups for outreach as the project moved ahead.

The ultimate fear—that community physicians who admit to the hospital would take their business elsewhere—has not played out even in the two hospitals that are closest to universal CPOE. In fact, no example was identified in any of the interviews, although it was mentioned as a possibility.

Staging the Project for Success

Each hospital started with a pilot and made a big investment not only in sorting out CPOE-related workflow in each nursing unit but also in making CPOE as easy as possible for physicians to learn and use. Actual CPOE roll-out in the hospital and to physicians can be staged in different ways, and the hospitals provide examples of diverse

approaches. The general advice on phasing roll-out to ease the transition for physicians boils down to the following:

- Give physicians Clinical Information System (CIS) functions such as diagnostic results management and electronic signature first. Physicians already have mastered basic system navigation and integrated the system into their workflow.
- Involve physicians in a second wave of roll-out *after* CPOE has been implemented throughout the hospital with unit clerks and nurses. This staging provides an opportunity to sort out all workflow issues on the nursing units before focusing on CPOE implementation with physicians.
- Make coaching and assistance readily available to physicians as they start using CPOE. Resources to provide this support are an important factor in decisions about phasing of roll-out.

Physician Training

Classroom training was much less effective than one-on-one coaching in helping physicians to master CPOE. Much of the work of coaching fell to clinical analysts on the CPOE project team who made it as easy as possible for physicians to receive assistance—anywhere, any time, for 20 minutes at a time. Nurses on the units, “super users,” and physician peers were also important resources in helping physicians master their electronic tasks. Typically, physician progress was tracked via usage logs maintained by the system, with low-volume users targeted for additional outreach. Several hospitals required minimal classroom or one-on-one training before granting user access to the system.

Communication

CPOE teams put a great deal of effort into communicating with physicians, nurses, and the general hospital community to build the case for CPOE, set expectations, and keep everyone informed during roll-out. In every hospital, multiple modes of communication were used to reach individuals and groups of physicians because no single channel was sufficient; mechanisms included newsletters, special mailings, signs and posters, presentations at staff meetings, and even special events such as fairs and celebrations. Email communication was rarely used in the hospitals because not all of the physicians used email regularly and some did not use it at all.

Tracking Progress

Hospitals tracked progress on two fronts: physician adoption and achieving the safety and quality targets they had set.

Once all orders were being processed through the CPOE application, the CIS could provide management reports on physician participation — daily, weekly, monthly, or any other frequency. Project teams distributed this information widely and sometimes publicly. In addition to this main gauge of progress, some hospitals tracked use of order sets, remote accesses of the CIS, verbal orders (as opposed to handwritten), and unsigned orders.

Measuring performance in targeted safety areas was useful in the early stages of CPOE roll-out to counter the perception of some physicians that safety was not an issue in their hospital. Because most hospitals were already tracking adverse events and other important indicators of patient safety as part of the patient safety program, very little extra effort was required. The same types of measures were critical in validating the effectiveness of CPOE in improving safety and quality. In addition, hospitals often tracked other metrics

such as lag times between order and service delivery to build the case for CPOE and to track the implementation process. Making this evidence available to physicians was important in increasing momentum toward adoption.

Several hospitals also made use of CPOE reports related to physician acceptance of advice displayed about allergies, drug-drug interactions, medication therapeutic overlaps, or duplicate laboratory tests. These provided a view of potential errors and adverse events that CPOE had intercepted — powerful evidence of its benefit.

Managing the Technology

The technology of CPOE must be managed so that system use can be successfully incorporated into the routine work of those participating in ordering and order management. There are two fundamental requirements for performance: system reliability and instant responsiveness to each keystroke and screen flip.

Gaining the value from CPOE requires that physicians write their orders in the system *and* that the hospital employs clinical decision support (CDS) tools to guide and critique orders. Hospitals in this study were all employing tools such as order sets and basic medication checking; several were applying more advanced tools to improve safety or quality. Use of decision support was defined by a combination of how long the system had been in use and the interest of hospital committees such as pharmacy and therapeutics or patient safety in actively pushing adoption. Several hospitals planning CPOE system upgrades were poised to take advantage of more advanced CDS tools.

Managing the CDS in CPOE is a new responsibility for hospitals. Therefore, the hospitals developed new processes for suggesting, approving, and setting up new uses of tools; for testing and sign-off before release; and for informing the medical staff. Several were

establishing a physician-led committee to manage decision support.

All of the hospitals were adamant about the importance of providing physicians with sufficient access to the system to eliminate wait times. A variety of fixed devices and mobile laptops or subnotebooks were provided on nursing units and in other physician work areas. In every case, project leaders expected to increase the use of mobile devices soon, once the rapidly evolving devices became more suited to physician use.

Remote access was universally popular with physicians, enabling them to check on patients more frequently without going to the hospital. Because physicians typically decide to admit patients while in their office, remote access is also critical for achieving CPOE for most physician orders. Most of the hospitals had a growing number of physicians using remote access and were actively encouraging more to do so. Interviewees considered remote access a requirement, not an option, for ultimate success with CPOE.

The Help Desk function in IS has new challenges when the system users calling for assistance are physicians and nurses. Nurses and physicians need 24-hour access to support and often have detailed questions about the clinical application, which a typical Help Desk clerk cannot handle. In the study hospitals, help was available from a clinical analyst by telephone 24 hours a day, 7 days a week. This support was supplemented by help from designated “super user” nurses on patient care units, clinical analysts rounding on the units, and, of course, physician peers. Some hospitals set up a hot line where physicians could leave suggestions or questions not requiring an urgent response. Project teams responded quickly to every physician who had a request or question.

Keys to Success

Physicians and project leaders were asked to consider what they would look for before accepting leadership of a CPOE implementation effort in another hospital. Their responses, centered around the findings discussed above, built a picture of the critical elements for success:

- Executive vision, support, and involvement.
- A mindset that CPOE is the right thing to do for patient safety and quality.
- Strong medical executive committee, committed medical staff leadership, physicians leading the effort, and community physicians at the table.
- Spirit of collaboration among medical staff, hospital administration, pharmacy, nursing, and IS.
- Sufficient resources committed to sustain a multi-year effort.

The CPOE implementation specialists interviewed added the following elements in their checklist of indicators:

- CPOE is the top priority for the hospital.
- Involved, positive physician champion(s) are already in place.
- Executives and project leaders have a realistic strategy for gaining physician commitment.
- Members of the IS staff have a strong clinical background.
- Physicians and nurses are comfortable using computers.

Implementing CPOE is hard work. Participants in this study were among the first community hospitals in the United States to tackle CPOE; because they had few peers with whom to compare challenges and successes, theirs has been a journey of discovery. Their experiences should help other hospitals gain a better sense of what lies ahead and how to organize the effort.

I. Introduction

Some 89 percent of U.S. hospitals are community hospitals, where most physicians are “voluntary.”

AS PART OF EFFORTS TO ENHANCE PATIENT safety, many U.S. hospitals have committed to implementing computerized physician order entry (CPOE), a process in which physicians write medical orders for their hospitalized patients using a clinical software application. For most of these hospitals, CPOE represents the first time the hospital has applied information technology (IT) to interdisciplinary clinical process on such a large scale, introducing major changes in the way physicians do their work.

Industry experience with CPOE is still limited, and the small, but slowly growing literature on its implementation is focused almost exclusively on academic medical centers, where residents write most of the medical orders. But, in fact, some 89 percent of U.S. hospitals are community hospitals, where most physicians admitting patients and writing orders are “voluntary.” Not employed by the hospital, these attending physicians practice solo out in the community or in small groups, often admitting patients to several institutions and spending limited time in the hospital each day. Their relationship with the hospital—more removed than that between academic medical centers and their staff physicians and residents—adds to the challenge of gaining physician participation in training and use of CPOE.

About the Study

The California HealthCare Foundation (CHCF) and First Consulting Group sponsored this study to provide medical executives, physician leaders, and others interested in CPOE with pertinent information about what it takes to implement CPOE in a community hospital setting.

The research is based primarily on telephone interviews with key staff in ten community hospitals currently working on CPOE. For purposes of this study, a “community hospital” is one in which most patients (more than 80 percent) are managed by attending physicians, rather than residents. This definition includes many urban community hospitals that have residents from an external teaching program working on rotations in the hospital. All of the hospitals were engaged in a multi-year CPOE project as part of a larger effort to improve clinical care by implementing a clinical information system

(CIS). Some were farther along in the process than others. Eight of the hospitals studied have used a clinical information system, including CPOE, for as long as 5 to 18 years, but had recently renewed efforts to increase physician participation.

Initially the goal was to base the research exclusively on hospitals that had achieved computerized physician order entry of more than 80 percent of orders. Several hospitals were at this stage. As interviews proceeded, however, a typical pattern of implementing CPOE emerged: initial roll-out with partial success in involving physicians, followed somewhat later by a concerted push toward universal adoption. Therefore, additional hospitals were included that were using the CPOE application to manage all inpatient orders (with some orders still entered by non-physicians) and were now poised for, or engaged in, an aggressive effort to achieve universal adoption.

The hospitals included in this study are:

- Abington Memorial Hospital (Abington, PA)
- Alamance Regional Medical Center (Burlington, NC)
- Community Medical Center (Toms River, NJ)
- Frankford Hospital (Philadelphia, PA)
- Lehigh Valley Hospital (Allentown, PA)
- Medical Center of Ocean County (Neptune, NJ)
- The Medical Center at Princeton (Princeton, NJ)
- Penobscot Bay Medical Center, Northeast Health (Rockport, ME)
- Queens Medical Center (Honolulu, HI)
- Sarasota Memorial Hospital (Sarasota, FL)

Although titles varied somewhat, the two or three interviewees typically played the following roles in their hospitals:

- Physician executive actively involved in leading the CPOE effort.

- Practicing physician acting as a salesperson to physicians and an interpreter of physician needs (“physician champion” or “physician liaison”).
- Project manager responsible for the details of planning, working through process issues, and training (often a clinical analyst in the IS department).

In some cases, the chief information officer (CIO) was included, and the chief medical information officer (CMIO) and director of medical informatics were interviewed for one hospital that belongs to a health system.

CIS vendors were included in the research as well. Two CPOE implementation specialists were interviewed from each vendor with a customer hospital in the study. These individuals provided useful observations based on their experience working with multiple hospitals. Vendors included:

- Eclipsys (Boca Raton, FL)
- IDX (Burlington, VT)
- MEDITECH (Westwood, MA)
- Per-Se (Atlanta, GA)
- Siemens (Malvern, PA)

The main themes of the research focused on how community hospitals can best:

- Work toward universal CPOE adoption by non-employed physicians.
- Integrate CPOE into the complex order management process throughout the hospital.

The first of these themes is particularly challenging in the community hospital setting, where CPOE success is strongly dependent on the response of physicians who function outside the direct control of the hospital and who are not necessarily easy to reach or comfortable with the technology. Engaging physicians is hard work, and the struggle presented can stall or delay the project, as in the recent pull-back of CPOE at Cedars Sinai.¹

II. Organizing the CPOE Effort

“We didn’t have to work hard to build a case around patient safety. Maybe it’s a sign of the times, but physicians read about patient safety in the news all the time.”

— Dr. Deneen Voijsa, chief medical officer
Frankford Hospital

BECAUSE CPOE REPRESENTS SIGNIFICANT CHANGE for the hospital and its staff and physicians, the first steps are establishing a strong clinical case for investing in the initiative and building a physician-led structure and process for implementing it.

The Patient Safety Impetus

Patient safety is at the heart of the CPOE agenda for all of the hospitals participating in this research. They were all influenced by the Institute of Medicine’s 1999 report *To Err Is Human*, which indicated up to 98,000 individuals die in U.S. hospitals each year from preventable mistakes, and by the national attention it generated. Citing the improvements in medication safety that can be achieved with CPOE, The Leapfrog Group, a coalition of purchasers, has been actively promoting CPOE with clinical decision support as one of three recommended safety interventions. Several of the hospitals are in geographic areas targeted by Leapfrog.² State programs to increase patient safety and the awareness of the press and the public have added to the momentum. In one of the hospitals, a local television program on the results achieved with CPOE at the Brigham and Women’s Hospital in Boston raised community awareness.

In the eight hospitals with a CIS already in place and CPOE in use by some physicians, patient safety has provided the impetus for hospital and medical leadership to renew efforts to achieve universal physician adoption. In one of the hospitals where work on CPOE began more recently, the project is part of a larger initiative called “Do No Harm,” which has been adopted by the board and the medical executive committee.

Since CPOE involves a large investment in change and bringing along the entire (and often reluctant) medical staff, verifiable safety improvement is a strong message against which it is difficult to argue. Observes Dr. Donald Levick, physician liaison, Information Services at Lehigh Valley Hospitals, physicians believe: In God we trust; all others bring data. As a result, he constantly brings new published data on errors and on CPOE to the medical staff to build the clinical case.

Governance/Accountability for CPOE

The hospitals had similarities in their overall approach to managing CPOE. Interviewees cited all of the following factors as critical to successful CPOE roll-out and ongoing management of the program.

- Visible, active roles for medical executives.
- Physicians as leaders and decision-makers.
- Direct linkage to the work of clinical performance improvement.
- Active involvement of nursing, pharmacy, and other departments in decision-making.

“Everyone must be on the same page, going in the same direction. This takes steadfast and dogged commitment and a lot of infrastructure in the background supporting the vision.”

— Kathryn B. Collins, VP, CIO
Community Medical Center, Toms River

In each hospital, the medical executive committee (MEC) sets policy about CPOE and determines the level of push (incentives and/or mandates) for physician participation. Within that policy framework, physician executives are active formal and informal leaders. Some of the hospitals have a CMO, others a VP of medical staff and/or VP of medical affairs. These individuals play key roles in delivering a consistent message that the hospital is serious about CPOE. Specific tactics to increase physician adoption are derived from MEC policies.

Physicians lead and have numerous representatives on most working committees, with a special effort to connect with every medical staff constituency. Every hospital has one physician who spends considerable time as the physician champion. Department chairs and other natural

leaders within the medical staff are also part of the structure, with the goal that physicians themselves make the decisions that will affect them.

“The medical staff have every right to expect to be involved—this will greatly affect their workflow.”

— Dr. Donald Levick, physician liaison
Information Services, Lehigh Valley Hospital

Each hospital has a pharmacy and therapeutics committee, and many also have a patient safety committee, a medication variance task force, and a care management committee or similar group that sets and works toward safety/quality goals. The clinical decision support capability built into CPOE is a powerful tool in the initiatives of these groups, which are coordinated with CPOE project management by cross-membership of key players such as the physician champion, department chiefs, and representatives of nursing and pharmacy. Because changes to order management impact many areas of the hospital, representatives of all affected departments participate in project committees to share in planning and decision-making. Unlike many hospital initiatives involving information technology (IT), CPOE is not considered an information system (IS) project, although IS staff are key contributors to all working groups.

Key Group and Individual Roles

CPOE project structures are physician-led but multidisciplinary. The key roles include the physician advisory group, the physician executive, and the physician champion.

The Physician Advisory Group

The physician advisory group oversees CPOE design and implementation, ensuring that system issues are quickly identified and addressed.

Typically chaired by the physician champion, this body includes a representative group of physicians — department chairs, community physicians, intensivists, and hospitalists (if any). In addition, representatives of IS, pharmacy, nursing, and other ancillaries attend. To accomplish coordination with quality and safety initiatives, the chair and, in some cases, additional members, serve on the committees managing those activities. Often such a group is already in place working on the clinical information system long before attention is focused on CPOE.

“Our Physician Advisory Committee is a forum for exploring ideas, brainstorming about solutions, triaging what’s important, and determining next steps. It is the liaison between the medical staff and MIS and is very effective in including the physician voice in decisions.

— Dr. Robert Berger, chair
Physician Advisory Committee, Princeton Hospital

Ideal members have enough interest in CPOE to participate actively, but are not viewed by their peers as too computer savvy to represent the interests of the typical end user. Physician champions often actively recruit members, and some recommend including one or two who are *not yet convinced that CPOE is the right thing to do*, so that their perspective is always at the table.

Membership can be time-consuming during initial roll-out; meetings in some hospitals are held weekly or bimonthly, and some committee members also are heavily involved in pilot implementations or expansion to new patient care areas. Acknowledging physicians’ tight schedules, hospitals often provide meals at the meetings.

Typical Role of the Physician Advisory Group

- Oversee project.
- Participate in system setup.
- Suggest, collect, review and prioritize system change requests.
- Review system enhancements.
- Make policy recommendations to medical executive committee.
- Participate in setting agenda for clinical decision support.
- Push for universal CPOE and encourage doctor utilization.
- Reinforce communication between clinicians and administration.
- Coordinate with the pharmacy and therapeutics committee and other quality improvement committees and task forces.
- Monitor physician training.
- Spearhead education initiatives.
- Identify and address areas of resistance.
- Monitor physician utilization statistics.

“Doctors will work for food.”

— Dr. Keith Sweigard, chief of internal medicine and physician liaison, Abington Memorial

The Physician Executive

The physician executive — a CMO, chief of staff, or influential department chair — heads committees, guides policy through the medical executive committee, and interacts with many individuals and groups throughout the hospital. This individual plays more of a leadership role than the physician champion, with less involvement in day-to-day committee work and project management. In two cases, the leadership of a new CMO led to a renewed push for universal CPOE. The personality and culture of the hospital also influence how this role is played; in some cases the medical executive committee has a stronger hand in the effort than an individual.

Dr. Carl Raso, who was the chief of staff during much of the push to universal CPOE at Community Medical Center, Toms River, provided the following advice to those about to play a similar role:

- Gain the support of the CIO and nursing staff and get a core group of doctors behind you.
- Map out a strategy.
- Give yourself time.
- Ensure that all key players are on board.
- Consciously build enthusiasm.

Within the policy framework set by the medical executive committee, one or more physician leaders also play a role in pushing CPOE compliance, both in closed-door meetings with recalcitrant physicians, as well as staff and department meetings. Department chairs often serve a similar function. Project staff at one hospital prepared formal materials for each department and medical staff meeting to aid physician leaders in their function as coaches and enforcers.

“We had to manage our way through skirmishes around verbal orders. And when we pulled the order sheets from the charts, people would use sheets that they had squirreled away in their briefcases — we even got a few orders on napkins!”

— Dr. Jack Kelly, chief of medicine, director of AMH Physician Network, and physician champion Abington Memorial Hospital

The Physician Champion

Eight of the hospitals had one physician designated as physician champion; the chair of the physician advisory committee played a fairly similar role in the other two. The physician champion serves as the link between the medical staff and IS, heads up much of the committee work, and is the point person for convincing physicians that CPOE is the right thing to do.

“The role of the physician champion is to meet with people, paint a picture of where the hospital is going, find where their resistance points are and how best to overcome them.”

— Dr. Donald Levick, physician liaison Information Services, Lehigh Valley Hospital

Typical Tasks of the Physician Champion/Liaison

- Chair the physician advisory group.
- Spread the word about the clinical case for CPOE.
- Build the consensus that CPOE is the right thing to do.
- Ensure that physician input is sought and reflected in decision-making.
- Ensure timely and thoughtful response to issues raised by physicians.
- Assist with pilots and roll-out.
- Train and coach.
- Act as change agent.

“A critical role for the physician liaison is to convince the physicians that something big is happening, because it will change how they do their work. Thus it is imperative that they get involved.”

—Dr. Dana Goldsmith
pediatrician, physician champion
Penobscot Bay Medical Center, Northeast Health

Involving enough physicians in decision-making is a particular challenge in the community hospital. Many physicians spend only a small portion of their work day at the hospital and most hospital initiatives have minimal impact on their daily routine. One important function of the champion is to make sure the physician viewpoint is adequately represented.

The job of physician champion requires a great deal of time, energy, and enthusiasm. Physicians with personal experience shared their thoughts about the characteristics of the successful physician champion.

Characteristics of the Effective Physician Champion/Liaison

- Practicing physician.
- Well-respected clinician.
- History of leadership roles in hospital.
- Belief that CPOE is necessary and a passion to fully implement it.
- Viewed by the medical staff as reasonable, fair, and not too computer savvy.
- Able to not take interactions personally (“thick skinned”).
- Good listener/interpreter.
- Good skills in individual and group dynamics.

In several hospitals, the champion role was defined as half-time or full-time, reflected in job description and compensation. In others all time was voluntary. In one hospital, the champion declined compensation because he believed it would change the perception of his role from a representative of the medical staff to one of hospital administration.

“It is the most exciting thing I have ever done — it is outrageous fun.”

—Dr. Bruce Berg, patient safety officer
Sarasota Memorial Hospital

Typical Organizational Structures

Examples from three of the hospitals illustrate how the implementation of CPOE has been organized.

The organizational chart from Abington Memorial Hospital is typical of the structures in many of the hospitals that were studied (See Figure 1). The Physician Advisory Group (PAG) is the forum for joint decision-making about CPOE by physicians representing many constituencies within the hospital, as well as representatives from pharmacy, nursing, and other departments. In areas of clinical practice and medication management, the PAG looks to the other committees shown for direction; policy regarding use of CPOE is the purview of the Medical Executive Committee. The Medical Knowledge Implementation Committee, a recent addition to the structure, will assume responsibility for managing the clinical decision-support tools in CPOE, which will be much more extensive once the current CPOE application has been converted to Eclipsys Sunrise Clinical Manager. (Other hospitals are adding this type of work-group to focus on clinical decision support.)

The second example is from a larger hospital—Queens Medical Center—which tackled CPOE and other clinical systems within an overall structure for clinical performance improvement (see Figure 2). Here the Medical Informatics Subcommittee functions similarly to the Physician Advisory Group at Abington, but with additional subcommittees to tackle subsets of issues based on the affected discipline or department.

“We consciously linked performance improvement, operational processes, and IT in a unified management approach.”

—Dr. Daniel C. Davis, Jr.
medical director, Informatics
Queens Medical Center

Queens is the only one of the hospitals with a medical director of Informatics (sometimes called a clinical medical information officer or CMIO), although Medical Center of Ocean County is assisted by a physician with a similar title at the health system level. In both cases, the CMIO role is essentially the physician champion, as described above. During initial CPOE roll-out, Queens also hired six physicians (the original Physicians Clinical Informatics Group in the chart) part-time for two years to work closely with individual clinical departments on all aspects of system set-up and to educate physicians about the potential for CPOE to improve care. Project leaders at Queens attribute some of the success in both physician adoption and actual clinical impacts of CPOE to this investment in physicians working with other physicians. In essence, these physicians also functioned as physician champions, focusing on particular groups of physicians.

The third example illustrates how a clinical system initiative can be organized for a community hospital within a larger health system. Medical Center of Ocean County (MCOC) is one of three hospitals in Meridian Health System. Figure 3 shows how the local committee structure relates to committees and IS resources at the health system level. Roles of the local Medical Executive Committee and the equivalent of the physician advisory committee—here called the Physician’s Clinical Computer Committee—are very similar to those at Abington. MCOC has a chair of this committee who, though not called the physician champion, plays some of that role. In this model, local efforts are supported and coordinated by IS resources at the health system level, including clinical analysts, trainers, and a CMIO.

Figure 1. Organizational Structure for CPOE at Abington Memorial Hospital

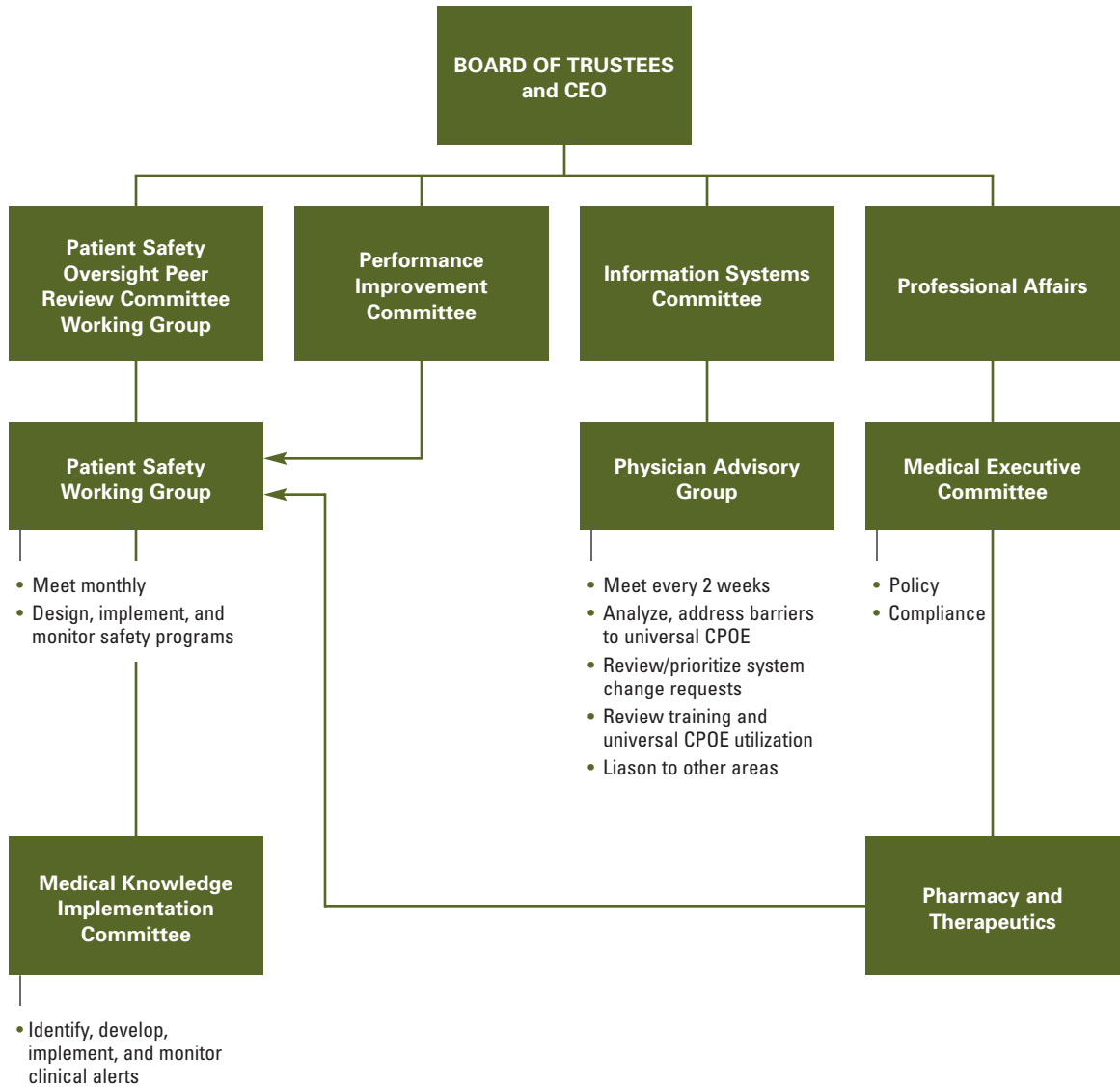


Figure 2. Organizational Structure for CPOE at Queens Medical Center (QMC)

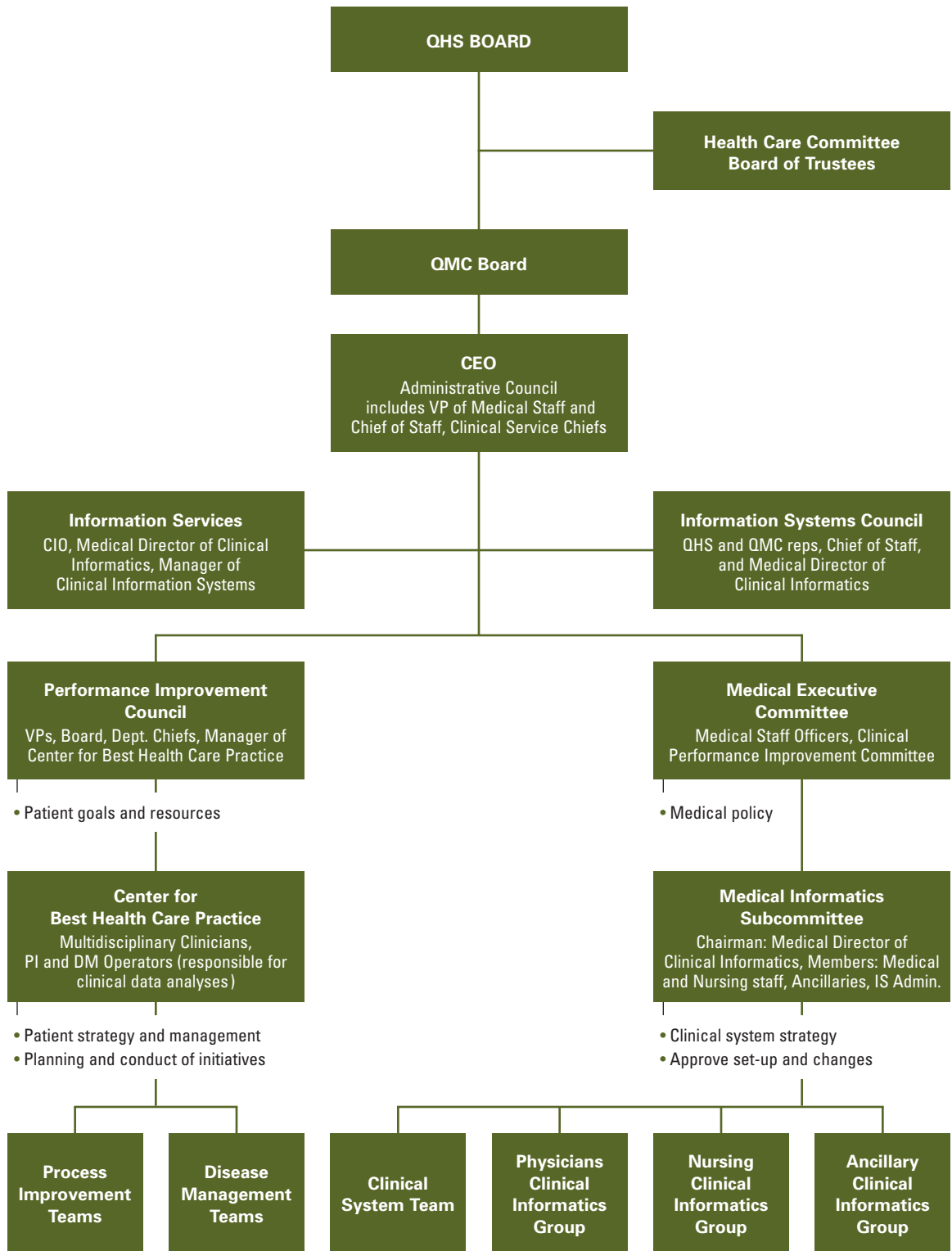
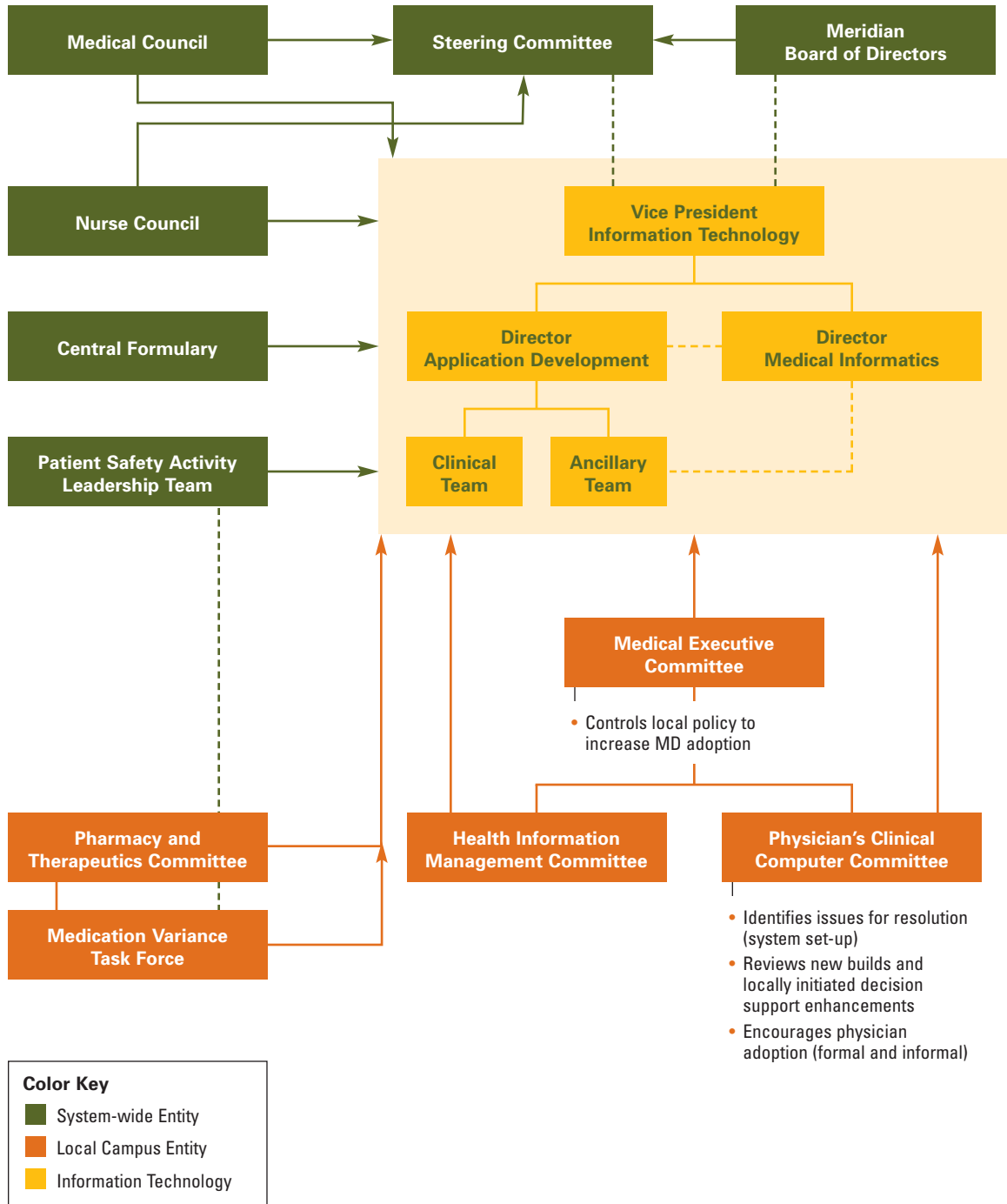


Figure 3. Organizational Structure for CPOE at Medical Center of Ocean County (within Meridian Health System)



III. Policy: Incentives and Mandates

“Determining how hard to push CPOE is a delicate and diplomatic balance between the carrot and the stick. Each hospital has to find the right mix based on science, politics, charisma, and reality.”

—Dr. Robert Berger, chair
Physician Advisory Committee
Princeton Hospital

DESPITE THE STRONG CASE FOR CPOE AS A WAY to enhance patient safety and quality, it should be no surprise that physicians as a group are often not eager to devote the time or effort required to master the system. For many physicians, the value proposition for CPOE is clouded by several realities:

- Mastering the software for CPOE requires some training and a personal investment in learning.
- Even when the hospital invests in system setup to make the system easy to use, writing electronic orders *will* take somewhat more time for physicians than handwriting or verbally communicating orders.
- Interacting with the system as physicians make rounds and write orders changes well-established work patterns significantly.

Expectations and Policy

Any discussion of CPOE policy quickly turns to the issue of physician participation and how hard to push. In differentiating the options, experienced hands with CPOE talk in terms of “carrots” (incentives) and “sticks” (mandates). Following is an overview of the strategies pursued by the ten hospitals interviewed.

At the time of the interviews, the status of physician adoption of computerized order entry could be summarized as follows:

- Following a campaign to achieve universal adoption, physicians entered more than 70 percent of orders electronically (two hospitals).
- Physicians wrote 30 to 60 percent of orders electronically and hospital was planning or was engaged in a campaign to increase adoption (five hospitals).
- Physicians were at lower levels of participation and hospital was actively working on universal adoption (two hospitals), or was in a holding pattern (one hospital).

The project typically moved through several phases of engaging physicians:

Evolving Toward Universal CPOE

PHASE ONE

Physicians engaged in electronic ordering:

- Formal/informal encouragement;
- Training/coaching;
- Investment in setup and issue resolution.

PHASE TWO

Continuing with elements of Phase One, CPOE achieves a critical mass in three areas:

- Physician use;
- Evidence that safety is actually improving;
- Medical staff consensus that CPOE is the right thing to do.

PHASE THREE

Medical executive committee launches more aggressive push to universal CPOE.

- Policy that CPOE is the standard of practice;
- Communication and coaching campaign with outreach to physicians;
- Formal mechanisms for feedback on compliance.

PHASE FOUR

Medical executive committee establishes expectations regarding compliance and consequences for noncompliance.

The ten hospitals were scattered along this continuum:

- One in Phase 1 (initial roll-out to clinical departments)
- One in Phase 2
- Two in Phase 2, but gearing up for a planned Phase 3, following a hiatus to accomplish a clinical system software conversion
- One just beginning Phase 3 and three others pushing to universal CPOE
- Two approaching the end of Phase 3

It was originally intended that Phase One would capture the participation of most physicians. When initial efforts were only partially successful, it became clear that a second phase was needed, with more intense outreach to individual physicians, support, and pressure backed by policy (as was seen in Phase Three).

Dr. Donald Levick, physician liaison at Lehigh Valley Hospital, says he has “heard every reason why we don’t need CPOE: “My handwriting is fine.” “I never get called back by the nurses.” “I don’t make mistakes.” At Alamance Regional Medical Center, a demonstration session for the board about CPOE included the display of a particularly illegible handwritten order to illustrate what CPOE could accomplish.

It should be noted that *eight* of the hospitals spent many years in Phase Two, launching Phase Three as the patient safety agenda became stronger. This multi-year delay is not anticipated in hospitals starting with CPOE today. With the advantages of the patient safety agenda, physicians having more familiarity with computers, and CPOE applications being based on newer technology, hospitals starting today may be able to combine Phases One through Three. Whether this is a viable strategy may not be known for several years.

A Variety of “carrots”

Most hospitals hoped to use a combination of tactics to achieve universal adoption, without going to Phase Four. Their strategies included:

- Convincing physicians of the value;
- Making the system as easy as possible to learn and use; and
- Building peer pressure.

“We didn’t go after physicians in a negative way. Our message was, ‘This isn’t mandatory, it’s just the right thing to do.’”

—Dr. Carl Raso, gastroenterologist, former chief of staff
Community Medical Center, Toms River

At the Medical Center of Ocean County, an experimental program added an external incentive to the mix of incentives for participating physicians. Under a contractual agreement between Meridian Health System and Horizon Blue Cross, physicians who admitted more than five patients a month received a semiannual bonus if they entered 75 percent of their orders electronically. The program is quite new, with the first round of bonuses distributed in December 2002. Notes Dr. Neil Gallagher, an intensivist who chairs the physician clinical computer committee at the hospital: “I am philosophically opposed to a mandate. You have to use ‘carrots’ rather than ‘sticks’ to increase physician adoption in a community hospital.” The challenge, he adds, is to “streamline the process of electronic ordering sufficiently that physicians find it acceptable. Two keys are ease of entry and ease of access.”

Adding “teeth”

A policy becomes a mandate when “teeth” are added. Many project leaders interviewed were skeptical that a mandate could ever work in a community hospital, although a few, with the perspective gained by living through a prolonged campaign for universal adoption, would shift the balance from carrots to sticks sooner. Says Dr. Randy Ely, chief of staff at Alamance, “We hoped peer pressure combined with a slow roll-out and having our board adopt CPOE as the standard of practice would bring all of our doctors into the fold. We got to 85 percent that way, but it took

two years.” If he had to do it again, Ely says, “I would start with a mandate, with the caveat that we would do everything possible to make CPOE efficient and easy.”

All of the studied hospitals recommended avoiding the term “mandate,” even if that is what is intended. Says Dr. Deneen Vojta, CMO, Frankford Hospital: “Universal order entry is less threatening than ‘mandate’ — but equally effective.”

The hospitals provided examples of compliance enforcement:

- Require resident CPOE at the outset from every hospital with rotating residents.
- Remove paper order sheets from patient units, substitute downtime sheet of a different color, and send a copy to a medical staff executive for follow-up.
- Tie new medical staff orientation to CPOE in initial training, require a signed agreement to use CPOE in credentialing process for new physicians. Renew agreements annually.

It can also be argued that including a statement in the bylaws that CPOE is the accepted standard of practice in the hospital already has teeth because any physician who continues to refuse to comply is practicing outside the boundaries of locally accepted practice.

The ultimate fear — that community attending physicians will take their business elsewhere if forced to use CPOE — has not played out even in the two hospitals that are closest to universal adoption. In fact, no example was identified in any of the interviews, although it was stated that the possibility is always in the background. For physicians wishing to avoid CPOE by shifting hospitals, the options are shrinking in some markets. Just before project leaders at one hospital were interviewed, its major competitor announced its plans for CPOE.

Excerpts from Medical Staff Regulations — Abington Memorial Hospital

All orders for treatment shall be directly entered into the hospital order entry system or be in writing.

The medical staff, in the interest of patient safety, will directly enter all orders through the hospital information system. Handwritten, verbal or telephone orders are not to be given to nursing/ancillary staff with the following exceptions:

- 1.** A patient emergency precluding the physician from directly entering his/her orders.
- 2.** The information system is not functional.
- 3.** The physician is physically remote from the hospital and does not have access to the information system or the physician is involved in a procedure precluding direct order entry.
- 4.** The physician is in the process of performing a clinical procedure (e.g., in the operating room, cardiac cath lab, etc.).

IV. Implementing CPOE Across the Hospital

“You have to have a plan for dual (CPOE and paper order) process. It is inevitable at least for some period of time. Dual processes increase the risk. Make this time as short as possible.”

—Donna Jackson, R.N.
clinical systems manager, Special Projects
Sarasota Memorial Hospital

THE WORK OF ROLLING OUT CPOE REQUIRES careful planning and many decisions about timing and tactics.

Major Decisions About Staging

Staging of CPOE roll-out reflected both history and strategy. Sometimes a need to replace another clinical system, for example, drove decisions because sustaining dual computer-assisted processes was not tenable. Nonetheless, there are several inter-related decisions to be made.

One or Two Steps for CPOE

A key decision relates to whether CPOE is rolled out first to nurses and unit clerks to transcribe orders and then to physicians, or whether physicians are involved from the beginning. Importantly, none of the hospitals was able to accomplish full physician use of CPOE on the first pass. In addition, most of the hospitals were still building up remote access capability for physicians—to enter their own orders from outside of the hospital (a requirement for universal CPOE). It should also be noted that there will always be some situations for verbal orders, and the need for all staff to understand downtime procedures (which revert to paper orders for physicians).

When the CPOE application is rolled out first *without* physician involvement, nurses and unit clerks, as well as the CPOE project team, can work out most of the unit workflow issues ahead of time. As physicians become users, they can focus on the nuances of dual process (some physician-entered orders, others written) and coaching physicians.

Teams in each of the ten hospitals found a dual process workable, although not ideal, if policies and procedures are unambiguous. The obvious disadvantages are that some patient orders hit the system sooner than others, the view of current orders in the system may not be totally up-to-date (because the unit clerk is working through a stack of charts), and clinical decision support is delivered to the unit clerk, not the physician who wrote the order.

One or Two Steps for Physicians

Another major decision is how to stage the roll-out of CIS functions to physicians.

Relative Staging Method — Advantage Comparison

RESULTS RETRIEVAL FIRST

- Doctors learn basic skills in system navigation.
- Doctors start integrating computer into routine workflow.
- When combined with e-signature, physicians are involved in another valued function.

COMBINED CIS FOR PHYSICIANS

- Value proposition combines plus (information access) and minus (more time for order writing) with an overall time savings.
- One round of training.
- One round of change in workflow.

Several hospitals originally introduced physicians to the entire set of CIS functions at once. According to Dr. Daniel Davis, medical director for informatics at Queens Medical Center, “We recognized that order entry would be more difficult for physicians than results. Rolling out results first would reduce the incentive for physicians to learn order entry.” The hospital chose to roll out both rapidly during the 18 months from contract signing. Most project leaders recommended starting with clinical results retrieval *plus* electronic signature of dictated reports, such as discharge notes, before moving to CPOE.

Pace of CPOE Implementation

CPOE can be *initially* introduced to patient care units and physicians simultaneously or in a two-step process. Two of the hospitals activated electronic ordering across the hospital very quickly (all orders, all patient care units, on the stroke of midnight).

Roll-Out Method — Advantage Comparison

SIMULTANEOUS

- Minimizes or eliminates challenges of dual process for physicians (some patients on CPOE, some not).
- Minimizes need to transfer patients to/from CPOE units.
- Minimizes dual process for ancillary departments, especially pharmacy.
- Defines a clear end point for all parties.

UNIT-BY-UNIT

- Allows sufficient time to work through unanticipated process issues on each unit.
- Provides maximum support to physicians and nurses as each unit goes live.
- Offers a chance to fine tune an approach to system setup and support at each step.
- Uses success of initial units to build momentum.

At Queens, “Our roll-out was very fast-paced, bringing up all post-pilot units in eight weeks,” says Leslie Morse, CLiQ team leader. “This demonstrates seriousness about not losing time, defines a clear end point, and means that physicians are not working in two worlds for very long.” By contrast, Dr. Donald Levick, physician liaison, Information Services at Lehigh Valley, says, “We knew we would only get one good shot at this. Our goal, therefore, was that a physician never fail to find help nearby.” To meet that goal, Lehigh’s support capabilities dictated rolling out CPOE one unit at a time and for physicians one service line at a time.

Despite operational advantages of minimizing the time CPOE was used only on some patient care units, commitments to providing support to every physician governed the pace of roll-out in most hospitals. Moving one unit at a time allowed more opportunity to attend to issues that arose in each new patient care unit. Even with an aggressive training campaign and attention to every detail of workflow, each unit roll-out required close attention 24 hours a day for days or weeks. In the end, the clinical analysts on the IS team, the physician champion, and other key players could only provide the necessary

level of support if their efforts were more concentrated. Therefore, pace was typically based on resource availability.

Planning for Pilots and Unit-by-Unit

Each hospital used a pilot implementation on one patient care unit to fine-tune both system setup and roll-out support. At Lehigh Valley, this step was termed the “initial unit” to avoid any impression that CPOE would not move forward.

Typical Considerations in Picking Pilot Units

- Patient mix and percentage of patients transferred — (not too complex, few transfers).
- Number of attending physicians (small group managing most patients).
- Physician champion or other advocate admits patients to the unit.
- Well-managed patient care unit.
- Enthusiasm and support of patient care unit manager. A “star floor” preferred by physicians.
- Seasoned, well-respected nursing staff.
- Uses departmental order sets and/or multidisciplinary care pathways.

Hospitals tended to pause, but did not always take down, CPOE on the pilot unit before rolling out CPOE to additional patient care units. The path for further steps in roll-out was influenced by considerations such as similarity of units (e.g., another pediatrics or medicine unit), completing roll-out for a particular department such as medicine or a group of patients (medical ICU), clinical departments asking to be next, and facility considerations such as planned renovation or move of the unit. Areas with highly specialized requirements were often held until later in the sequence to permit accomplishing the necessary setup.

Pre-CPOE Preparation

Over a period of months, each hospital engaged a project team in preparation for CPOE roll-out. Participants included clinical analysts from IS, the physician champion, representatives of nursing,

pharmacy, and other departments, the physician advisory group, and possibly other committees. This effort was primarily invested in two critical areas: sorting out the order management workflow and setting up CPOE for physicians — essentially addressing their workflow. (The next chapter treats preparation to ensure user access.)

Order Workflow

The CPOE team — which always included clinical analysts — typically observed the work process on each unit and then collaborated with unit staff to design the post-roll-out process. They addressed policy and procedures that needed to be changed, training for unit staff, and how order management was to flow in the clinical information system.

“CPOE is a project of work process change. Only about 10 percent is software implementation.”

— Lori Yackanicz, manager, Clinical Applications
Lehigh Valley Hospital

Teams of clinical analysts included nurses and sometimes a pharmacist to facilitate discussion and translation of process issues. Often respected nurses were recruited within the hospital to assume the role of clinical analyst in the IS department — in some cases nurses who worked on the pilot patient care unit were chosen.

The experienced interviewees cautioned that the best planning cannot anticipate every wrinkle. Especially during the first few days, they advised, the team needs to be on the unit, identifying and resolving unanticipated issues as quickly as possible, checking with physician representatives and unit nurse management at least once a day. Lori Yackanicz, manager of clinical applications at Lehigh Valley, lists the tasks of the team before CPOE is brought up on a unit:

- Meet with the unit head, pharmacy, RNs, the physician champion, and the people in charge of education.
- Pull order sheets and look for unique issues.
- Build issues list, ask nurses about medication administration.
- Meet weekly to work on process and design issues.
- Ensure that training is timed with roll-out date.
- Meet with division/unit physicians to review and modify pre-printed order sets to move them to an electronic format for physicians to use at implementation.

Other areas besides nursing are involved in order management. Parallel work addresses all of the hand-offs and process nuances for pharmacy, laboratory, radiology, dietary, respiratory therapy, social work, and other areas.

“I could count on one hand the people in the hospital the CPOE project did not impact. It touched everybody.”

—Leslie Morse, team leader, CLiQ Team
Queens Medical Center

Setup for Physicians

Preparation for physicians occurred on several different levels. The physician advisory group and CPOE project team from IS collaborated in decisions about terminology, screen content and flow, and then tailored it to each clinical department. Representing different constituencies of physicians was especially important. Several project leaders mentioned that physicians with prior experience with CPOE were particularly helpful in this process because they understood the possibilities.

Order sets, the electronic equivalent of pre-printed order sheets used in many hospitals, were critical to speeding up both physician learning

and actual use. Part of the work on each patient care unit was collecting all current pre-printed orders so that they could be set up in the system and ready to use. Department chairs and practice committees were encouraged to collaborate in setting up departmental order sets, and trainers worked with individual physicians to build personal order sets during training or at other opportunities. In addition to making electronic order writing more efficient for physicians, order sets are an important tool for reducing variations in care and errors of omission and commission. (For more discussion of clinical decision support, refer to *Managing the Technology*.)

All of the effort in setup for physicians was geared to making it easier for physicians to learn CPOE and incorporate it into their normal workflow. Several of the physician champions indicated that it also demonstrated their commitment to working *with* physicians on CPOE. Dr. Jack Kelly, chief of medicine and physician champion at Abington Hospital, notes that they had to promise their physicians, ‘this won’t save you time, but we will do everything possible to *not cost you time.*”

Alison Ferren, CIO at Abington Hospital, notes that the Physician Advisory Group went to each department before the targeted date for universal CPOE, and asked physicians, “*What can we do to make this easy for you?*” They looked at every request and invested in system improvements or training that would make physicians more comfortable using the order entry system. A total of 58 system change projects included special order sets for pediatric trauma and other departments, oxygen weaning orders, and coumadin order retrieval. Abington invested 1,130 hours of staff time to do these modifications.

Communication

Communication is the vehicle for building understanding of CPOE — what is involved, why, when — and the consensus throughout the

hospital community that the project is not only important, but the right thing to do. One project manager asserts: “You can’t have too much communication.”

General Advice About Communication

- Start early and keep it flowing.
- Deliver a clear, consistent message.
- Recognize that there are many different audiences and constituencies.
- Target communication to each audience (message and delivery).
- Where possible, include CPOE in regular mechanisms of communication upon which the hospital community relies to stay informed (physician newsletter, regular agenda item in scheduled meetings, electronic bulletin boards).
- Include nursing—they outnumber physicians and change for them is also challenging.
- Communicate with patients, the hospital board, and the community at large.

This is especially true when the primary audience is community practice physicians who can be busy and difficult to reach. Email communication was rarely used because not all of the physicians used email at all or regularly. In every hospital, multiple modes of communication were used to reach individuals and groups of physicians because no single channel was sufficient.

Modes of Communication with Physicians

- Memos.
- Notices in physician lounges.
- Medical staff and/or hospital newsletters.
- Specialized CIS or CPOE newsletter.
- Clocks posted around the hospital with a countdown to universal order management or showing status toward that goal.
- Update messages during system log on.
- Presentations at medical staff and dept. meetings.
- Presentations at physician practices (large group).
- One-on-one and hallway conversations with the physician champion, other physician leaders, and advocates.
- CPOE-related continuing medical education.
- Hospital intranet/electronic bulletin board.
- Signs, posters, buttons.
- Coverage in local newspapers and news stations.

Donna Jackson, clinical systems manager, special projects at Sarasota Memorial Hospital, provided the following description of the multi-faceted communication campaign the hospital planned for the move to universal CPOE:

Clinical Consult. A clinician newsletter, published quarterly.

Messenger. A weekly newsletter sent to the entire hospital.

Monthly Countdown (physician lounge, hallway) A clock counting down to launch, outlining progress made toward mandate.

Pillar Talk. Focuses on hospital pillars of people, service, growth, quality, and finance.

President’s Page. Another weekly hospital-wide publication.

Posters. Displayed throughout the hospital.

Herald Tribune. Articles in the local newspaper.

News Coverage. On “Sarasota News Now,” a local news station.

Email Education. Occasional emails.

Clinical systems newsletter.

Communication was also used in some hospitals to heighten peer pressure, adding the natural competition among physicians to the momentum for CPOE. According to Jo Faccioli, coordinator of physician network services at Community Medical Center in Toms River, a typical issue of a quarterly newsletter, *Clinical Consult* includes:

- CPOE user statistics (featured on first page)
 - Best overall user of CPOE by specialty (of physicians who enter more than 500 orders/month)
 - Most improved physician (4 to 6 a month)
 - How many doctors are maintaining personal order sets
 - How many doctors have order sets
 - How many order sets are in the system
- Explanation of changes to the system

- Help section
 - How to get personal order sets in the system
 - How to print order sets for review
- New Developments
 - Training instructions
 - What was requested, what is being worked on

Copies of the newsletter are sent to department chairs for distribution and left in the physician lounge.

Some hospitals have staged special CPOE-related events. Marie DiFrancesco, lead clinical analyst at Alamance Regional Medical Center, described a number of ways early adopters of CPOE were recognized:

- In 1999, to celebrate a year of CPOE, every doctor who entered an order was invited to a breakfast honoring CPOE pioneers.
- Top Ten lists were posted on a bulletin board in the physician lounge to take advantage of the competition among physicians: Top Ten CPOE Users, Most Improved, New Users, as well as the number of doctors who used the system for: 80 to 100 percent of orders, 50 to 80 percent of orders, 10 to 50 percent of orders, 0 to 10 percent of orders.
- Contests were held giving physicians who work with the CPOE team on their order sets opportunities to win a Palm Pilot or other prizes.

Medical Center of Ocean County conducted two IT Fairs to bring additional physicians into the fold. According to Dr. David Yazdan, medical staff president, “These were festive events in our auditorium, with decorations, food, and a raffle for PCs, cell phones and the like. Trainers were there demonstrating different functions and physicians had a chance to see the system in a pleasant setting and to get to know the trainers.”

One physician at Community Medical Center, Toms River, conducted a CME session in which he demonstrated the use of personal orders and presented his view of the CPOE value proposition.

Typically, many balls are in the air at the same time during CPOE roll-out. At Queens Medical Center, communication tasks were assigned each week to members of the CLiQ Team, tracked in a project management tool used for the project overall, and reviewed at the weekly meetings. Communication tasks included presentations at targeted staff meetings, assignments to track down individual physicians and department chairs, updates to hospital newsletters, new issues of *CLiQ Nursing News*—the entire gamut of the communication program.

Physician Training

Mastering CPOE requires some form of training. But the hospital interviewees pointed to problems with applying traditional approaches such as classroom training to physicians in general, and community physicians in particular. Reasons included:

- Lack of time during community physician’s brief, busy time at hospital each day.
- Difficulty reaching physicians to schedule (some used office staff as allies in scheduling training).
- Physician impatience with spending more than 20 minutes at training, frustration with frequent interruptions.
- Reluctance to appear to be struggling alongside peers.
- CPOE not high on priority list, if at all.
- Wide range in basic computer skills.

General Advice on Training

- Expect classroom training to work better with nurses than physicians.
- Always train using system setup the physician will be using (including personal order sets).
- Worst time to schedule training is when physicians are rounding.
- Make it as easy as possible to obtain training (drop-in, any time, anywhere, go to them if necessary).
- Train physicians in what they need to know at that time and don't expect more than 20 minutes of attention—training is an ongoing program.
- Provide many forms of just-in-time training or coaching.

“Physician computer competency ran the gamut. Some asked why the system did not look more like ‘Doom.’ Then we had one physician who put the mouse on the screen.”

—Leslie Morse, team leader, CLiQ Team
Queens Medical Center

Unit nurses were seen as the first line of support in coaching. They are right at hand on the patient care unit, and they know each physician's personality and may have established a close working relationship. Project leaders at a number of hospitals emphasized the importance of training nurses to be familiar with the many nuances of CPOE and supporting them in their role as coaches.

“In the community hospital, nurses who have bought into the CPOE effort are a trump card. The nurse is right there when the physician is struggling to enter an order.”

—Dr. Joseph Mannion, director, Medical Informatics
Meridian Health System

Forms of Physician Coaching

DURING INITIAL ROLL-OUT

- One-on-one-training.
- 24 hour, 7 day a week support at roll-out for first few weeks.
- Nurse and physician “super users” (experienced users enlisted as coaches) on every shift, every unit.
- Clinical analysts and lead physicians paired with specific physicians to track down (“Adopt-a-Doc”).
- Clinical analysts rounding with physicians to provide JIT coaching.
- Reminders on PCs with numbers to call for additional help.
- User tips booklet at each PC.
- Demo system available in physician lounge.

ONGOING

- New physicians trained as part of orientation.
- Cards near workstations to remind doctors how to obtain help.
- Refresher courses—scheduled and drop-in.
- Clinical analysts round with doctors to provide JIT refresher training.
- Laminated cards (to fit in lab coat pocket) with a list of “tips” for physicians.
- “Adopt-a-Doc” programs for new doctors.
- Trainers available in physician lounge, medical library, for additional help.
- Tips in medical staff or dedicated CIS newsletter.

Interestingly, at Abington Memorial, “We discovered that our nurses were being too helpful,” notes Dr. Keith Sweigard, chief of internal medicine and physician liaison. “After discussing a patient with our physicians, they would run over to the computer and enter the verbal order before the physician could leave the patient's room. Instead we encouraged the RNs to say, ‘How can I help you put the order into the system.’ We also gave nurses pins with the ‘universal no’ sign over the word ‘verbal orders.’”

In the interest of building momentum, the CPOE team typically focused training first on the most interested physicians and those writing the highest volume of orders and then targeted other groups for outreach as the project moved ahead. Dr. Bruce Berg, patient safety officer at

Sarasota Memorial, divided physicians into four groups in terms of CPOE participation:

1. Early adopters/risk takers—those involved in the pilot.
2. Interested observers—those who provided proof that CPOE is workable for regular physicians.
3. Distant observers—those who were not going to be the first to use CPOE but were willing to put their toe in the water.
4. Laggards—those in the “over my dead body” group.

He adds, “We focused our Adopt-a-Doc program on the third group, assigning one of the clinical analysts or myself to track them down and increase their understanding and skills.” Nurses identified physicians needing help and project teams employed CPOE utilization reports and other creative strategies to reach them.

“If physicians are willing to give you an inch, we can give them a mile. I am very persistent in tracking them down. Every Monday, I even hang out in the physician’s lounge to grab a few minutes of their time and teach them one more thing. I usually put a ‘Topic of the Day’ outside the door to catch their attention.”

—Karen Fuller, physician consultant
Sarasota Memorial Hospital

“My office is now in the medical library, steps away from the physician lounge. Physicians come over all the time with specific issues or to request additional training.”

—Jo Faccioli, coordinator, Physician Network Services
Community Medical Center, Toms River

Two of the hospitals have used an interactive CD-ROM for self-training. This has the advantage that physicians can use it anywhere and at their own pace. Although self-training is no panacea, project staff in both hospitals believed that it helped some physicians. “Our physicians asked for an interactive tutorial on CPOE with CME credits,” says Dr. Margaret Quinn, Meridian’s CMIO. “Newly credentialed physicians now have this on their checklist to be moved from provisional to active status.” But, she adds, use as a tool to aid current physicians has not been as successful as they had hoped.

Many people in the studied hospitals played a role in training and coaching. The official duty, however, fell to clinical analysts and trainers usually in the IS department. Effective training required that they be extremely familiar with the CPOE application and the clinical environment. Many, but not all, were nurses who had transitioned into the role from patient care. A history of working as a nurse or nurse/manager in the hospital was widely viewed as a plus.

“I am convinced that trainers need to have a background working in the clinical environment and the thickest skin imaginable.”

—Lori Yackanicz, manager, Clinical Applications
Lehigh Valley Hospital

“Our training mantra is ‘anytime, anywhere.’ We have three dedicated trainers with wireless laptops who can literally train physicians in the cafeteria.”

—Lori Yackanicz, manager, Clinical Applications
Lehigh Memorial Hospital

Tracking Progress with CPOE

Hospitals tracked progress on two fronts: physician adoption and achieving the proposed safety and quality targets.

Once all orders were being processed through the CPOE application, the CIS could provide management reports on physician participation — daily, weekly, monthly, or any frequency. Project teams distributed this information widely. Recipients included the physician advisory group and the medical executive committee. Sometimes detailed results for each physician were widely distributed in newsletters and/or at medical staff meetings. In addition to this main gauge of progress, some hospitals also tracked use of order sets, remote accesses of the CIS, verbal orders (as opposed to handwritten), and unsigned orders. At Medical Center of Ocean County, CPOE adoption is one of the system-wide quality metrics tracked for each hospital in the Meridian Health System.

In addition, progress was measured toward the ultimate goal — targeted safety issues. In fact hospitals used measured performance pre-CPOE to counter a common perception that, “those errors don’t happen here.” The pharmacy and therapeutics or patient safety committee in any hospital already tracks many of the issues that are meaningful and persuasive, as was the case in the 10 hospitals included in this study.

Typical Measures of Gaps in Safety/CPOE-Related Improvements

- Lag time from order to administration of STAT med.
- Lag time from order to administration of antibiotic.
- Lag time from medication order to administration.
- Errors resulting from order transcription.
- Length of stay.
- Medication-related errors and adverse drug events.
- Telephone calls to clarify medical orders.
- Verbal orders not signed.
- Physician response to CPOE order reminders/alerts.

Once physicians use computerized order entry, some of the most powerful evidence of progress is physician acceptance of advice displayed about allergies, drug-drug interactions, medication therapeutic overlaps, or duplicate laboratory tests. Physician response to clinical decision support provides a view of *potential errors and adverse events that CPOE has intercepted*. Several of the hospitals incorporated these types of metrics when tracking the impact of CPOE. (*Lack of physician response* is also an indicator that CDS tools may need to be fine-tuned; for more information refer to the next chapter.)

Once some of the medical staff had adopted CPOE, continuing problems with *handwritten* orders were also powerful evidence of the need for universal adoption.

“We continue to make a big deal about things that go wrong with handwritten orders, making it clear how the system would have helped the physician avoid a problem.”

—Dr. Daniel Davis, medical director, Informatics
Queens Medical Center

Community hospitals rarely have the research resources of the much-cited CPOE pioneers to demonstrate the ability of CPOE to reduce errors and influence physician ordering practices. Nonetheless, the more clinical information is being captured in the CIS, the greater the possibilities for CIS-generated reporting

Queen's Medical Center had two advantages in compiling its portfolio of evidence of the value of CPOE: the effort began in 1995 and a component of the performance improvement model at Queens is to track progress through measured outcomes.³

Examples of CPOE-Related Safety and Quality Improvements at Queen's Medical Center

- 75 percent reduction in transcription errors.
- 30 percent reduction in wrong medication or route.
- 75 percent reduction in inappropriate vancomycin use.
- 60 percent decrease in time to first dose of antibiotic—community-acquired pneumonia.
- Elimination of missed cisplatin IV hydration.
- 98 percent compliance with JCAHO standard for orders for restraints.
- 85 percent reduction in unsigned orders.
- 40 percent reduction in turnaround time for STAT medications (CPOE and auto-page).

Medical Center of Ocean County has been supported by the corporate IS resources of Meridian Health System, including data analysis services, to track progress against both local and system-wide quality and safety goals. However, even hospitals without this type of resource need to examine progress. The primary purpose of measuring outcomes is to support ongoing performance improvement. This collection of evidence also best demonstrates the value of CPOE.

V. Managing the Technology

“The best advice about system downtime is ‘don’t have any.’ Because CPOE is mission critical, be sure that the system provides ‘view-only’ access when it is down.”

— Denis Baker, CIO
Sarasota Memorial Hospital

“We’ve all heard that speed kills. Lack of speed kills CPOE.”

— Dr. Keith Sweigard, chief
Internal Medicine, associate director
AMH Physician Network
and physician liaison
Abington Memorial Hospital

THE ORGANIZATIONAL CHALLENGES OF CPOE implementation are important, but for CPOE to be successfully implemented, the technology also has to be managed.

System Performance

One critical area is technical performance. For CPOE, there are two fundamental requirements for technology performance: system reliability (because of the critical need to access and manage patient orders at all times), and instant responsiveness to each keystroke and screen flip (to minimize the time needed to accomplish electronic tasks).

Clinical Decision Support

Having physicians enter orders is the first step toward success with CPOE. The next step is to use the clinical decision support toolbox in CPOE to guide physicians toward better ordering practices.⁴

Approaches to Applying Clinical Decision Support

CPOE applications include a toolbox for the hospital to use in guiding and critiquing order writing, with the individual hospital determining how quickly and how extensively tools are applied. All of the hospitals were making some use of decision support tools.

Order sets. Used at every hospital to speed up electronic order writing for physicians and to facilitate complete and accurate orders. Clinical departments in some hospitals had established departmental order sets to foster use of standard protocols developed by care management committees in the departments.

Standard medication order checking. Also used in every hospital to screen orders for potential allergies, therapeutic duplication, etc.

Some of the hospitals have newer CPOE applications with a more extensive CDS toolbox at their disposal; Abington, Princeton, and Frankford are already gearing up for increased use of decision support following a planned software upgrade.

Further use of decision support was defined by a combination of how long the system had been in use and the extent to which hospital committees such as pharmacy and therapeutics or patient safety were actively pushing adoption. These hospitals provided numerous examples of further use of CDS beyond the basics:

- At Abington, surveillance of orders was instituted so that physicians and pharmacists were alerted to changes in patient status (i.e., new laboratory results) suggesting a need to review current medication orders.
- Physicians at Medical Center of Ocean County were automatically provided with displays of relevant laboratory results when ordering medications to determine appropriateness or dosing. They were also assisted in determining the appropriate frequency or dosing for a set of high-risk medications.
- At Alamance, physicians were alerted when ordering potentially nephrotoxic drugs and advised of appropriate clinical indications for some interventions.
- Initial uses of decision support at Lehigh Valley Hospital included checking for maximum medication doses and therapeutic substitutions.

General advice about using these tools was consistent from the physicians and project managers interviewed: Tread cautiously and avoid nuisance messages and alerts as much as possible.

“With clinical decision support, we are constantly working to find the right balance where there’s value. We look at how many times physicians accept the advice.”

— Marie DiFrancesco, lead clinical analyst
Alamance Regional Medical Center

Managing Clinical Decision Support Tools

Managing clinical decision support in CPOE requires close coordination with numerous hospital committees. Typical clinical decision support practices are summarized below.

Typical Processes for Managing Clinical Decision Support

AGENDA SETTING/ TARGETS

- Individuals and committees request new application.
- Physician advisory group reviews and prioritizes request.
- Major changes to policy referred to medical executive committee for approval.

SETUP AND TESTING

- Analysts in IS set up and test new CDS in development system.
- One or more physicians may test new CDS in own practice on a provisional basis.

REVIEW

- Physician advisory committee reviews and approves.
- May require sign-off of pharmacy and therapeutics committee or department chair.
- Some hospitals require physician sign-off on personal order sets.

RELEASE

- New order sets available immediately.
- Batches of new CDS released at regular system updates.
- Major (dangerous) situations addressed immediately.
- Physician community notified of major new CDS in advance.

UPDATE

- Responsibility of committee authority.
- Monitoring of physician response.
- Physician feedback may prompt further fine-tuning.

Project managers from several of the hospitals emphasized the importance of formalizing procedures for managing clinical decision support. Dr. Daniel C. Davis, Jr., medical director for Informatics at Queens Medical Center, cites the hospital’s procedures for managing order sets:

- Delete order sets that are not used.
- Facilitate a group review of all departmental order sets at least every two years.

- Refer a few order sets each quarter to the department chair and provide a physician and CLiQ team member to facilitate the process.
- Base priorities on hospital performance improvement (PI) targets, including patient safety.

“We don’t release order sets in the system until the physician author has signed off. This sometimes involves chasing physicians to get them to review, approve, and sign off.”

— Teri Young, clinical system analyst
Penobscot Bay Medical Center, Northeast Health

Initially the work of managing clinical decision support falls to the physician advisory committee and IS staff who build and update templates and rules in the system. As the use of CDS tools grows, however, so does the job of management. Abington Memorial, Lehigh Valley, and Sarasota have, or are establishing, committees of physicians and others who will focus on this responsibility—with significant cross-membership to other committees involved in the management of CPOE.

Physicians should be notified of major changes in system setup and new clinical decision support features ahead of time, rather than being surprised or confused the first time they encounter something new while writing electronic orders. Getting the message out is a challenge, and hospitals in the study have come up with multiple mechanisms for accomplishing the task.

Mechanisms for Making Physicians Aware of Changes to Clinical Decision Support

- Notices on HELLO screen (judicious use).
- Posters, flyers.
- Notices in physician lounge.
- Electronic mail (not used by all).
- Announcements by the committee recommending the change in practice .
- Announcements at department and medical staff meetings.
- Special outreach to affected high-volume users.
- CIS or regular hospital newsletter to physicians (may include screen shots and step-by-step instructions).
- Electronic online bulletin board.

At Meridian Health System, Dr. Margaret Quinn, chief medical information officer, notes that although they use signs in the physician lounge, an online bulletin board, announcements at department meetings, and notices in physician mailboxes to get out the word, “We don’t really get their attention though until it goes live. Then we need to be available to answer questions.”

User Access to the System

Requiring busy physicians to search or wait in line for a terminal is not acceptable, and the hospitals bent over backwards to avoid that situation. In the words of one CIO, “An argument about device access is one you don’t want to have.”

As Lori Yackanicz, manager of clinical applications at Lehigh Valley, put it: “Our mantra from day one was that every physician has access to the device he/she prefers.” To accomplish this, the hospital has plenty of fixed devices and four wireless laptops on each unit and provides a wireless subnotebook computer for every few physicians in a medical group to share. When a physician arrives at the hospital to see patients, he picks up the subnotebook in a locker in the physician lounge. Before leaving, he returns the subnotebook to the special shelf in the locker where it automatically plugs in for recharging.

Adds Yackanicz, “We have physicians who don’t necessarily want to use the system but are entering orders because they don’t want to give up their subnotebook.”

Planning for User Access to CPOE

In some of the hospitals where a CIS had been in use for some time, the original complement of fixed devices was re-evaluated as part of the push for universal CPOE. Where the CIS implementation was more recent, more recent technology, such as mobile devices, was incorporated into the planning from the beginning. A universal goal, however, was never to require physicians to wait in line to access the system. In attempting to meet this goal, project teams encountered problems of too little physical space and far too few desktop spaces available for the necessary devices.

Advice on Planning for Physician Access

- There is no magic formula for device planning that applies everywhere.
- Walk through each patient care unit with local nurses and physicians and follow their recommendations.
- Actual patterns of use on any patient care unit result from a combination of layout, workflow, and personal preferences. Plan carefully, then adjust based on use.
- Plan for the busiest time on the unit—in the morning as physicians are rounding and nurses are at shift change.
- Don’t assume physicians will become heavy users of terminals in patient rooms.
- Always provide space to place a chart.
- For physicians, the term workstation means desktop, PC, telephone, and dictation (if used).
- Assume nurses will make more use of mobile laptops on carts than physicians.
- Include the physician lounge, dictation rooms, conference rooms, and medical library.
- Have printers available—most physicians want to print their patient census and a summary of important patient information.

At Penobscot Bay Medical Center, PCs were installed on platforms mounted on the walls, and strategically placed throughout the halls to prevent doctors from having to go the nurses station to use them. The PCs were accessible

through flip-down keyboard trays, complete with a place for the mouse and the chart. Says Dennis Puls, director of information services and CIO, “The ergonomics of this arrangement have worked very well.”

“We have computers on a cart in every room. Nurses use in-room terminals much more than physicians, albeit for different purposes.”

—Jodi Samsel, clinical systems manager
Princeton Hospital

Mobile Devices

Project teams at every hospital reported intense physician interest in mobile devices, which not only move around with the user but do not require repeated signing on. Dr. Neil Gallagher, intensivist at Medical Center of Ocean County, notes: “I typically have 35 patients and can spend as much as an hour every day just signing on. Hand-helds will solve the competition for terminals and not require physicians to keep signing on because the terminal timed out or they moved to another location. Data access on a Palm Pilot is a first step, but not sufficient if I still have to go to a terminal to write orders.”

A variety of strategies have been tried. Seven of the hospitals had some mobile devices in use, mostly laptops on carts. At Abington, a total of 57 wireless workstations were available. At Community Medical Center, Toms River, an experiment with wireless laptops on carts founded because it was difficult to get them into patient rooms. Physicians at Lehigh Valley Hospital had the option of either a wireless laptop or wireless subnotebook computer in addition to PCs on each patient care unit.

Mobile devices on carts usually stay on the patient care unit. With hand-held devices questions arise as to where to store them, how to make them

available to physicians, and how to prevent them from getting lost. Lehigh Valley committed to making wireless devices available for physicians. According to Dr. Donald Levick, physician liaison, they have assigned one or more wireless subnotebook computers to each physician medical group depending upon the size (i.e., one for four internists to share). He continues, “We set up a locker for the medical group in the physician lounge where the physician picks up the subnotebook upon arrival. Before leaving, he returns the subnotebook to the special shelf in the locker where it automatically plugs in for recharging.”

The advantages of mobility must be balanced against the need for full function. Teams everywhere expressed concerns about the limited display area in personal digital assistants and expected that tablets will turn out to be more functional for physicians. The consensus was that mobile devices will eventually serve physicians very well and relieve congestion at fixed devices on patient care units, but that the dust has not yet settled on the specific device.

Remote Access

Remote access has been a boon for both hospitals and physicians. For the community practice physician it can, in some cases, avoid the necessity of driving to the hospital to check on patient information. Remote access allows physicians to monitor what is going on with their patients much more closely. In addition, once a hospital is pushing for universal CPOE, remote access is the only way to avoid verbal orders phoned in from remote locations. Physicians use remote access both from home and from the office, and once available, potentially from anywhere.

Remote access can even make converts to the system. Dr. Bruce Berg, patient safety officer at Sarasota Memorial Hospital, tells of the physician who was able to check on a patient he was especially concerned about by dialing in from vacation in California. The physician — formerly

a CPOE detractor — used the system so often that he had to resort to checking in from the hotel room closet to avoid upsetting his wife.

Most of the hospitals had a growing number of physicians using remote access and were actively encouraging more to do so. Ease of setup is the key to success with remote access. At Penobscot Bay Medical Center, physicians received a two-page information sheet that explained remote access, what is required, different kinds of connections, whom to contact, rough price estimates, and the advantages and disadvantages of its use.

“We make it very easy to set up remote access to our clinical system:

- The physician requests service.
- Someone from Queens IS visits the access site to set up user ID and password, etc.
- The region is heavily wired with cable service and some physicians have DSL, both of which provide better connectivity than telephone lines.
- We’ve added 100 physicians in remote locations to the 200 in an adjacent office building who have been on the Queens intranet for years.”

— Steve Hurlbut, I/S manager, Applications
Queens Medical Center

User Support/Help Desk

The Help Desk function in IS has new challenges when the system users calling for assistance are physicians and nurses. Not only do they work around the clock, but they often have detailed questions about the clinical application, which a typical Help Desk clerk cannot handle. In the study hospitals, help was available from a clinical analyst by telephone 24 hours a day, 7 days a week. This support was supplemented by help from super users — nurses on patient care units, clinical analysts rounding on the units, and, of course, physician peers. Project leaders in several

hospitals mentioned that residents were also helpful in providing assistance.

Whether clinical analysts actually work at the Help Desk or are available via page, a deep level of understanding of the software is required to be effective. Stickers on workstations and telephone numbers displayed as part of the HELLO screen are used in some hospitals so that users always know where to call. At Queens Medical Center, the hospital extension is HELP. According to Karen Fuller, physician consultant at Sarasota Memorial, clinical analysts respond to queries from some physicians by dropping the phone and rushing upstairs to help them in person.

Some hospitals have set up a hot line where physicians can leave suggestions or questions that do not require an urgent response. Project teams are rigorous about responding to every physician with a request or question, even tracking down the individual physician for a direct conversation. At Princeton, clinical analysts respond to telephone calls within 15 minutes and less urgent issues (submitted via email) within 24 hours.

VI. Bottom Line: Keys to Success with CPOE

“The saying that ‘all politics is local’ applies to healthcare. We employed a fair, deliberate, sensitive, but relentless process to get our hospital to universal CPOE. Every hospital today still has to do that work.”

—Dr. Jack Kelly, chief of medicine
director of AMH Physician Network
and physician champion
Abington Memorial Hospital

TO HELP IN SUMMARIZING WHAT IT TAKES TO BE successful with CPOE in a community hospitals, physicians and project leaders were asked to consider what they would look for before accepting leadership of a CPOE effort in another hospital. Their responses include many common themes.

- Executive support — the CEO is on board.
- Risk-taking capacity — leadership recognizes there will be bumps in the road and will be unwavering.
- A mindset that CPOE is the right thing to do; not focused primarily on return on investment.
- Sufficient resources — a realistic budget, able to sustain a multi-year effort, not expecting immediate results.
- A cohesive medical staff, strong medical executive committee, and robust medical leadership all on board with CPOE.
- Collaborative spirit of the medical staff, hospital administration, and IS.
- Leadership of nursing and pharmacy on board.
- Experience with computer systems and heavy physician experience with those systems.
- Physician champion who is patient, dedicated, collaborative, sees the bigger picture, works well with clinical analysts, and gets actively involved.
- IS staff with “can do” work ethic, support for physician champion, strong collaboration, and some staff with clinical background.

CPOE implementation specialists within CIS vendor organizations have the vantage point of experience in multiple hospitals. All of those interviewed for this study believe they can size up the CPOE readiness in any hospital fairly quickly after interviewing a few key players and attending initial meetings. Their collective checklist is summarized below.

Signs of Likely Success with CPOE
According to Vendor Implementation Specialists

- Vision, support, and involvement starts with upper management.
 - The agenda is patient safety and everyone understands that.
 - CPOE is the top priority for the hospital.
 - Medical leadership — rather than IS — owns the project.
 - Involved, positive physician champion(s) are already in place.
 - Community physicians have been part of the conversation from the beginning (e.g., vendor selection).
 - Executives and project leaders have a realistic strategy for winning physician buy-in.
 - Pharmacy, nursing, and the medical staff are all involved, show up at meetings, and have a positive, supportive attitude.
 - Committees within the hospital have been successful in standardizing care before (e.g., strong policies about verbal orders are enforced).
 - IS works well with, and is trusted by, the medical staff.
 - Members of the IS staff have a strong clinical background.
 - Physicians and nurses are comfortable using computers.
-

Participants in this study were among the first community hospitals in the United States to tackle CPOE implementation. Because they had few peers with whom to compare approaches and successes, theirs has been a journey of discovery. Their experiences should help other hospital teams to start with a better sense of what lies ahead and how to organize the effort. Nevertheless, change of this magnitude will always be hard work.

Appendix A. Hospital Profiles

Abington Memorial Hospital

1200 Old York Road
Abington, PA 19001

NO. OF BEDS: 508

MEDICAL STAFF

- 611 physicians (100 employed, 120 residents)
- Roughly 40 percent of attending physicians admit to one other hospital.
- Collegial relationship between community physicians and administration, long history of collaboration.

CPOE APPLICATION

Vendor: Eclipsys

Product: Eclipsys e7000, migrating to Sunrise XA Clinical Manager in 2003.

CPOE PROJECT

- First roll-out: 1992
- Universal order entry: January 2, 2001.
- Attending physicians and residents using CPOE for 85 percent of all orders and 99 percent of medication orders.

PHASING OF ROLL-OUT

- In 1992, TDS 4000 system was installed.
- Functionality continues to be enhanced.

CPOE POLICY

- Initially strongly encouraged.
- Mandate as of January 2, 2001.

Alamance Regional Medical Center

PO Box 202
Burlington, NC 27216

NO. OF BEDS: 238

MEDICAL STAFF

- 200 physicians
- Current hospital a merger of two smaller ones.
- Most community physicians admit only to Alamance.
- Prior history of clinical pathways starting 7–8 years ago.

CPOE APPLICATION

Vendor: Eclipsys

Product: Sunrise Clinical Manager

CPOE PROJECT

- First roll-out: November 6, 1998, enterprise-wide as of July 2000.
- Today 90 percent of physicians use CPOE for at least some orders and 68 percent enter most of their orders.
- Electronic entry by physicians accounts for 60 to 70 percent of orders.

PHASING OF ROLL-OUT

- All orders, unit by unit.

CPOE POLICY

- Initially voluntary.
- CPOE adopted as recommended best practice by hospital board, January 2002.
- Mandate recommended for January 2003.

Community Medical Center

99 Highway 37 West
Toms River, NJ 08755

NO. OF BEDS: 596

MEDICAL STAFF

- 630 (mostly community physicians)
- Primarily small groups, largest is 5 to 6 physicians
- 20 internists admit 75 percent of patients
- Most physicians admit to 2 to 3 hospitals

CPOE APPLICATION

Vendor: Eclipsys

Product: Eclipsys TDS 7000

CPOE PROJECT

- First roll-out: 1984.
- 59 percent of all orders are entered by physicians.
- 75 to 80 percent of physicians enter some orders.

PHASING OF ROLL-OUT

- One unit at a time.

CPOE POLICY

- Strongly encouraged for 20 years.
- In July 2002 medical staff set goal of no order sheets by January 2003.

Frankford Hospital

Red Lion and Knights Roads
Philadelphia PA 19114

NO. OF BEDS: 544 total*

*Frankford Hospital - Torresdale: 239 beds (main campus)
Frankford Hospital - Bucks County: 184 beds
Frankford Hospital - Frankford: 121 beds

MEDICAL STAFF

- 850 physicians (40 employed)
- Small number of residents on 3-month rotation.
- Small medical groups of 1 to 25 members.
- 200 physicians see 90 percent of patients.
- Some physicians admit to multiple Frankford hospitals.
- One CMO for three hospitals.
- Hospitalists used on one campus.

CPOE APPLICATION*

Vendor: Eclipsys

Product: TDS 7000

*Migrating to Sunrise Clinical Manager, July 2003.

CPOE PROJECT

- First roll-out: 1984
- Depending on the month, physician utilization ranges from 20 to 50 percent.
- Some drop-off in anticipation of conversion.

PHASING OF ROLL-OUT

- Moving to universal CPOE with Sunrise Clinical Manager on all three campuses.

CPOE POLICY

- CPOE is currently voluntary.
- Medical executive committee has voted policy of universal CPOE within a year.

Lehigh Valley Hospital

1200 South Cedar Crest Boulevard
Allentown, PA 18105

NO. OF BEDS: 575

MEDICAL STAFF

- over 1500 physicians (700 regular attendings, 350 active attendings, 170 employed)
- Community/voluntary physicians include cardiologists, surgeons, orthopedists, etc.
- Limited resident coverage.
- Mix of small and large physician practices.
- Significant proportion admit to one other hospital.

CPOE APPLICATION

Vendor: IDX

Product: LastWord

CPOE PROJECT

- 30 percent of physicians currently use the system for CPOE.
- 59 percent of attending physicians trained.

PHASING OF ROLL-OUT

- Slowly, unit by unit.
- All units will be complete by December 2003.

CPOE POLICY

- Required for residents.
- Expected for attending physicians on units active for CPOE.

Medical Center of Ocean County*

425 Jack Martin Boulevard
Brick, NJ 08724

NO. OF BEDS: 237

MEDICAL STAFF

- 400–420 community physicians
- Mostly small practices (1-3 physicians), one 25-member group.
- Only 25-30 physicians admit to other hospitals.
- Local medical executive committee, integrated governance within health system for some functions.

CPOE APPLICATION

Vendor: Siemens

Product: Invision

CPOE PROJECT

- Conversion from TDS in 1998.
- IS and CPOE project support from health system.
- With TDS, 20 percent physician utilization.
- On Invision, initially at 10 to 11 percent physician adoption.
- Current physician utilization is ~20 percent.

PHASING OF ROLL-OUT

- CPOE on all units, all order types.

CPOE POLICY

- Program to increase physician participation to initial goal of 50 percent in 2003 (voluntary).

*One of three hospitals in Meridian Health System

The Medical Center at Princeton

253 Witherspoon Street
Princeton, NJ 08540

NO. OF BEDS: 310

MEDICAL STAFF

- 522 community physicians
- Many live in Princeton and have offices within 10 to 15 miles.
- Many also admit to other hospitals.
- Small number of residents.

CPOE APPLICATION*

Vendor: Per-Se Technologies

Product: Ulticare

*Migrating to Patient1

CPOE PROJECT

- Roll-out in 1996 with residents.
- In 1998 with community physicians after some physicians asked for CPOE.
- Community physicians enter 40 to 50 percent of their orders.

PHASING OF ROLL-OUT

- Rolled out clinical system 10+ years ago.
- CPOE rolled out to residents in 1996.
- CPOE rolled out to community physicians in 1998, department by department.

CPOE POLICY

- Voluntary, but encouraged.
- Executive committee pushing for universal adoption six months after migration to Patient1.

Queens Medical Center

1301 Punchbowl Street
Honolulu, HI

NO. OF BEDS: 486

MEDICAL STAFF

- 1200 community physicians:
- 400 admit exclusively to Queens.
- ~200 practice in adjacent buildings on the hospital campus.
- Also 30 to 40 residents.

CPOE APPLICATION

Vendor: Eclipsys

Product: Eclipsys 7000

CPOE PROJECT

- Roll-out in 1995.
- Currently 40,000 orders per week entered electronically.
- 60 percent are entered directly into computers by physicians.
- Regular admitters who do not use team care (residents) use CPOE for 50 percent of orders.
- ED does not use CPOE.

PHASING OF ROLL-OUT

- Pilot on two units; rapid roll-out to remaining units.

CPOE POLICY

- Medical executive committee adopted CPOE as the principle accepted way of caring for patients.

Penobscot Bay Medical Center, Northeast Health

6 Glen Cove Drive
Rockport, ME 04856

NO. OF BEDS: 113

MEDICAL STAFF

- 90 community practice physicians
- Individual or small practices in surrounding area of rural mid-coast Maine.
- Strong tradition of independent practice.
- Physicians admit only to Penobscot.

CPOE APPLICATION

Vendor: MEDITECH

Product: Provider Order Management

CPOE PROJECT

- Rolled out mid-2001.
- 18 to 20 percent entered by physicians.

PHASING OF ROLL-OUT

- All applications launched simultaneously

CPOE POLICY

- Voluntary, but encouraged.
- Initially many physicians assumed a CPOE mandate; have dropped back.

Sarasota Memorial

1700 S. Tamiami Trail
Sarasota, FL 34239

NO. OF BEDS: 845 beds

MEDICAL STAFF

- 683 physicians (~50 in an employed group, ~350 active attendings)
- Strong tradition of independent practice.

CPOE APPLICATION

Vendor: Eclipsys

Product: Sunrise Clinical Manager

CPOE PROJECT

- Pilot 1997, roll-out January 1, 1998.
- 200 physicians using CPOE for some or all ordering.
- MDs entering approximately 30 percent of all orders.

PHASING OF ROLL-OUT

- Unit by unit.

CPOE POLICY

- Initial mandate was rescinded during roll-out.
- Universal computerized order management will be mandatory as of September 2003.

Appendix B. Additional Resources on CPOE

References on CPOE in the Community Hospital

- Davis, D., Moriyama R., Tiwanak G., et al. "Clinical Performance Improvement with an Advanced Clinical Information System at the Queen's Medical Center." *The Fifth Annual Nicholas E. Davis Award: Proceedings of the CPR Recognition Symposium*; 77–120, 1999. (available for purchase at: http://www.himss.org/ASP/books_media_list.asp)
- Ferren, A. "Gaining MD Buy-In: Physician Order Entry." *Journal of Healthcare Information Management*; 16(2); 66–70, 2002.
- Karow, H. "Creating a Culture of Medication Administration Safety: Laying the Foundation for Computerized Provider Order Entry." *The Joint Commission Journal on Quality Improvement* 28(7); 396–402, July 2002.
- Kelly, B. "Order Entry Gets Out of Hand." *Health Data Management* 9(7); 20–24, July 2001.

Other General References about Implementing CPOE

- Briggs, B. "CPOE: Order From Chaos." *Health Data Management*. 11(2);45–58, February 2003
- Drazen E., Kilbridge P., Metzger J., Turisco F. *A Primer on Physician Order Entry*. California HealthCare Foundation and First Consulting Group, September 2000. http://www.fcg.com/webfiles/pdfs/CPOE_Report.pdf
- McDonald, C., Brill, J., Johnson, K., Stead, W., Pincetl, P. "Implementing a Physician Order Entry System: Perspectives from Five Physicians." *1996 HIMSS Proceedings*. 1;178–188.
- Metzger J., Slye, D. "Inpatient e-ordering." *Healthcare Informatics*; 63-67, May 2001. <http://www.fcg.com/webfiles/pdfs/HealthcareInformatics-eOrdering.pdf>
- Langberg, M. "Challenges to implementing CPOE: A Case Study of a Work in Progress at Cedars-Sinai." *Modern Physician*; 21–22, February 2003.
- Safyer, S. "Highly Evolved: Montefiore Medical Center Rolls Out CPOE Gradually, Successfully." *Modern Physician*; 26–27, 35, February 2003.

Proceedings from the Davies Awards

Full text available for purchase from HIMSS bookstore: http://www.himss.org/ASP/books_media_list.asp

CPOE Related Sessions and Workshops from HIMSS 2003

Proceedings available for purchase from HIMSS bookstore: http://www.himss.org/ASP/books_media_list.asp. Audiotapes of individual sessions available for purchase from ACTS: <http://www.actsconferenceproducts.com/merchant/conf.asp>

Endnotes

1. Langberg, M. "Challenges to implementing CPOE: A Case Study of a Work in Progress at Cedars-Sinai." *Modern Physician*; 21–22, February 2003
2. <http://www.leapfroggroup.org/safety1.htm>
#CPOE
3. Davis, D., Moriyama R., Tiwanak G., et al. "Clinical Performance Improvement with an Advanced Clinical Information System at the Queen's Medical Center." *The Fifth Annual Nicholas E. Davies Award: Proceedings of the CPR Recognition Symposium*; 77–120, 1999.
4. Metzger, J., Turisco, F. "Computerized Physician Order Entry: A Look at the Vendor Marketplace and Getting Started," prepared by First Consulting Group for The Leapfrog Group, December 2001.
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