

COMPUTERIZED PHYSICIAN ORDER ENTRY: WAY FORWARD

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ABSTRACT

CPOE is seen by most renowned organizations worldwide as the answer to reducing medical errors by bringing in a major breakthrough in the area of patient safety. CPOE standards came into being primarily as a result of the Institute of Medicine's 1999 report on medical errors and the subsequent coming together of Fortune 500 employers to form the "The Leapfrog Group". The Leapfrog Group preferentially directs the employees' healthcare to those institutions that install clinical systems compliant to CPOE standards. Adoption of CPOE has resulted in benefits to some; however there is considerable skepticism in the market against CPOE. This paper discusses the potential benefits of CPOE in a clinical system. At the same time, it shows that the computer systems in hospital environment need to evolve to enable CPOE deliver on its promise.

KEY WORDS

CPOE, The Leapfrog Group, Institute of Medicine (IOM)

Introduction

44,000 - 98,000 people die in the USA hospitals each year as a result of medical errors that could have been prevented.¹ These facts were cited in the Institute of Medicine's report of 1999, which was based on estimates from two major studies in the USA. Even using the lower estimate, preventable medical errors in hospitals exceed attributable deaths to such feared threats as motor-vehicle wrecks, breast cancer, and AIDS. As a result of the IOM report, Fortune 500 employers in the USA found that though a lot of healthcare standards were being put in place, but patient safety still remained an area where focus was needed to reduce errors and thereby control the spiralling medical costs and premiums. This led to the formation of The Leapfrog Group with the aim of improving patient safety. Developing Computerized Physician Order Entry (CPOE) standards is one of the many initiatives from The Leapfrog Group to improve patient safety.

It has been found that lot of deaths happen due to human error at the physician's order entry stage itself. CPOE is aimed at alerting the physician about potentially dangerous/erroneous orders before the orders are really executed, thereby facilitating a solution for this long-standing issue in medical set up. The testimony to the benefits of CPOE is that more than 10% of U.S. hospitals now have CPOE.

The CPOE concept has existed for a long time and now The Leapfrog Group is laying down the standards to give it a proper direction. Large Healthcare-IT vendors are already putting efforts to make their clinical systems CPOE compliant. However the obstacle is that many clinical systems from different vendors still do not talk to each other. The Computer systems in hospital environment have to evolve a lot before the true benefits of CPOE can be realized. Large Healthcare-IT vendors have to play a responsible role in integrating the Health delivery industry, and thereby move towards a greater patient safety.

IOM study and CPOE

The starting point of thought provoking discussions on patient safety has been the Institute of Medicine's (IOM's) report '*To Err is Human, Building Safer Health Systems*'^{1, 2}. The IOM pointed out that 44,000 to 98,000 deaths happen every year in the USA due to preventable medical errors. Errors are costly in terms of psychological discomfort, diminished satisfaction and loss of trust in the healthcare system by patients, and loss of morale and frustration in health professionals. More US citizens die in a given year as a result of medical errors than from motor vehicle accidents, breast cancer, or AIDS. Beyond their cost in human lives, preventable medical errors have been estimated to cost (including the expenses of additional care necessitated by errors, lost income and household productivity, and disability) between \$17-29 billion per year in hospitals in USA.¹

Shortly after this report was made public, the Business Round Table founded The Leapfrog Group, a national association of Fortune 500 chief executive officers

(CEOs). The Leapfrog Group focuses on 3 main areas of patient safety — CPOE, ICU Staffing and Evidence based hospital referrals. The Leapfrog Group was created to “help save lives and reduce preventable medical mistakes by mobilizing employer purchasing power to initiate breakthrough improvements in the safety of health care and by giving consumers information to make more informed hospital choices.”²

The intent of The Leapfrog Group is to preferentially direct their corporate members’ health care to those organizations that adhere to patient safety standards specified in the guideline documents based primarily on the IOM report².

The IOM study has had its fair share of criticism especially from the physicians. However it has been the principal argument for the push for adoption of patient safety standards like CPOE.

What is CPOE?

Computer physician order entry (CPOE) systems are electronic prescribing systems that intercept errors when they most commonly occur — at the time medications are ordered. With CPOE, physicians enter orders into a computer rather than on paper; these orders are then integrated with patient information, including laboratory and prescription data. The order sets are automatically checked for inappropriate/dangerous orders before they are executed. Over a period of time many clinical decision support systems have come out with CPOE concepts. However, The Leapfrog Group has now laid down a set of standards for the computer programs for alerting health care providers to potentially harmful therapeutic decisions before orders are processed.

The Leapfrog Group includes the following language in their CPOE Fact sheet. “In order to fully meet Leapfrog’s CPOE Standard, hospitals must:

1. Assure that physicians enter at least 75% of medication orders via a computer system that includes prescribing-error prevention software;
2. Demonstrate that their in-patient CPOE system can alert physicians of at least 50% of common, serious prescribing errors, using a testing protocol now under development by First Consulting Group and the Institute for Safe Medication Practices;
3. Require that physicians electronically document a reason for overriding an interception prior to doing so.”³

Why CPOE?

One of the IOM report’s main conclusions is that the majority of medical errors do not result from individual recklessness or the actions of a particular group – this is

not a “bad apple” problem. More commonly, errors are caused by faulty systems, processes, and conditions that led people to make mistakes or fail to prevent them.¹

Errors happening due to illegibility of Physician notes in the clinical setting have been a long-standing and ever present complaint from the paramedical staff (pharmacists, nurses & other ancillary staff). Electronic Medical Records (EMR) solves the illegible physician notes issue to a large extent. However, EMR leaves scope for human error at the stage of physician order entry itself. This is where CPOE standards fill the gap to prevent erroneous or dangerous orders to get past the Physician stage.

Mistakes can be best prevented by designing the healthcare systems in a way that makes it more difficult for people to do something wrong and easier for them to do it right. Medication process provides an example where implementing better systems will yield better human performance and reduce errors.

CPOE Evolution

Decentralized and fragmented nature of healthcare delivery system has been the oft-cited problem that has contributed to medical errors. When patients see multiple providers in different settings, none of whom have access to complete information, it becomes easier for things to go wrong.¹ Fully integrated Hospital IT infrastructure, EMR, and computer based data capture and data storage are pre-requisites for institutionalizing CPOE standards.

Computer systems have evolved in the hospital environment over a period of time. The early computer systems in the hospitals were essentially stand-alone islands of patient data that could not communicate with other systems in the same department, let alone the other systems in the hospital.

Nowadays, most hospitals are investing time and effort for integrating various stand-alone systems across departments to reduce errors during double entry of patient data and enable physician order execution in near real-time.

Fig. 1 below shows that the computer systems in hospitals are evolving from stand-alone data collection mode to an integrated healthcare enterprise (IHE). Once the systems are integrated the stage is set to institutionalize CRM (consumer relationship management), evidence based medicine and the topmost layer of patient safety-- CPOE.

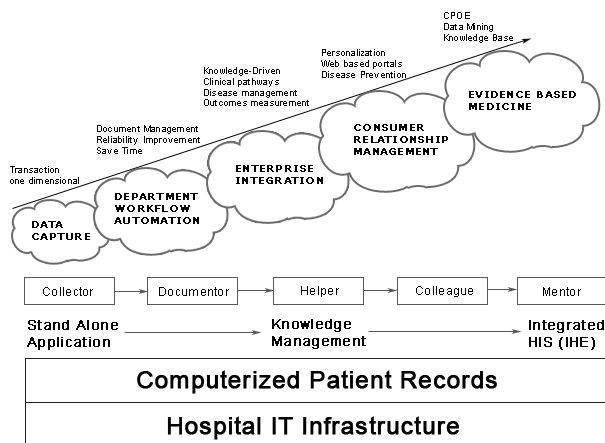


Fig 1: Evolution of CPOE

Today all of the large clinical systems vendors are making sincere efforts to make their own products CPOE compliant. However the reality is that the hospital can have islands of computer systems installed/ built at various periods of time by different product vendors. Large Healthcare-IT vendors have to come out of business silos and move to open standards to help Health delivery industry for integrating the stand-alone systems and tiding over the chasm. Only then, true CPOE can be implemented enterprise wide.

CPOE Alerts

CPOE standards recommend that alerts be given to the Physician for basic to expert level warnings. The range of alerts varies from the drug allergy and drug overdose (basic alert) to contraindication based on individual's laboratory studies (expert alert).

Basic level alerts are simple alerts for allergy to penicillin and overdose of antihistamine. Whereas alerts for unusual drop in blood clotting time and prothrombin laboratory values in patient's charts due to increasing dose of anti-coagulant like warfarin is an expert level alert.

Alerts need a huge enterprise-wide knowledge base to operate in the backend. Some of the medical knowledge is readily available whereas some of it is still state, region and hospital specific. Expert/ Advance level alerts e.g. drug-lab-document alert will need data from across different hospital systems. These systems need to be integrated to yield full benefits of CPOE.

Potential Benefits of CPOE

CPOE systems can be remarkably effective in reducing the rate of serious medication errors. A study led by David Bates MD, Chief of General Medicine at Boston's Brigham and Women's Hospital, demonstrated that CPOE reduced error rates by 55% — from 10.7 to 4.86 events per 1000 patient days. Preventable ADEs declined

17% from 4.69 to 3.88 per 1000 patient days, while non-intercepted potential ADEs declined 84% from 5.99 to 0.98 per 1000 patient days. The prevention of errors was attributed to the CPOE system's structured orders and medication checks.^{3,4}

CPOE has paid other dividends. Length of stay at Wishard Memorial Hospital in Indianapolis fell by 0.9 days, and hospital charges fell by 13% after implementation of CPOE. A recent study at Ohio State University also identified substantial reductions in pharmacy, radiology, and laboratory turn-around times, and there was a reduction in length of stay in one of the two hospitals studied.³

Some of the benefits of CPOE include:

- Prompts that warn against the possibility of drug interaction, allergy, overdose etc.
- Accurate, current information that helps physicians prescribe the new drugs as they are introduced into the market
- Drug-specific information that eliminates confusion among drug names that sound alike
- Improved communication between physicians and pharmacists
- Reduced healthcare costs and hospital stay due to improved efficiencies.

CPOE Evaluation application by FCG

First Consulting Group (FCG) had developed the methodology to help hospitals evaluate whether their CPOE systems meet the Leapfrog CPOE standards. Now FCG has also developed the CPOE evaluation application for The Leapfrog Group. This web-based application is expected to be used by 5000 hospitals across US to test their CPOE compliance.

Flip Side of CPOE

Physicians and medical staff need real time access to data that is relevant to the case at hand. They need to be able to record a maximum amount of information in a minimum amount of time and in such a way that it is most useful to other health care professionals involved in the handling of this patient. It is totally unacceptable if the alerts do not appear real time and increases the physician's time per patient.

Decision support systems also suffer from the problem of an overdose of reminders, alerts, or warning messages. This delay can be dangerous in emergency situations. CPOE compliant systems are infamous for "...causing cognitive overload by overemphasizing structured and 'Complete' information entry"⁵.

There is a rather large grey zone of informal management, which can be entirely rational given the everyday organization and exigencies of health care work. In emergency and some other special situations, orders may be entered after the order execution. For example, while transferring a patient between the emergency department and ward, orders could not be transferred or new orders could not be entered in the system because the patient was not yet “in the system”.

In the case of urgent medication orders, nurses can give a medication before the physician formally activates the order. During nightly routine medication administration, nurses can initiate distribution without waking up the junior doctor who is formally responsible for signing the order. Within this same grey zone, there could lay many practices that would contribute to unsafe medication routines such as doctors actively discouraging nurses to call them for medication requests or nurses taking too many liberties with dosing.⁵ All of these practices exist within the current paper medication systems, but many CPOE systems do not leave room for such practices.

Inexperienced computer users can face issues like a slip of the mouse on a data entry form leading to an order for the right medication for the wrong patient. Such errors due to inexperience lead to arguments that pen and paper are simpler and better. However expert level alerts in CPOE systems are expected to take care of such issues to some extent.

Conclusion

The Institute of Medicine’s report has had its desired effect. Formation of The Leapfrog Group and coming out with the CPOE standards is a right step towards patient safety.

CPOE systems can reduce unnecessary repetitive orders and also significantly cut down the delays between writing and completing orders. They can also cut staff costs directly by reducing the time spent by nursing, pharmacy, and other ancillary services on callbacks to clarify orders and by eliminating the personnel time of transcribing orders. So, health care institutions have much to gain in efficiency and cost savings from CPOE systems.

In the late 1980s and 1990s, some people criticized that no one else used or ever would use CPOE. Whereas more than 13% of U.S. hospitals have CPOE today.⁶

To derive the true benefits of CPOE the challenge is to create user-friendly, seamless systems that integrate all critical disparate systems throughout the enterprise-including patient records, order entry, pharmacy, radiology and Lab.

To completely replace legacy clinical systems with a single-vendor, monolithic solution would be expensive and cumbersome. As an alternative, taking the application integration approach to meet CPOE requirements will typically cost less in terms of time and material.

Large Healthcare-IT vendors should focus on larger benefits by integrating the health delivery industry rather than competing with each other for the same piece of the pie.

Acknowledgements

I wish to thank FCG for giving me the opportunity to design and develop the CPOE evaluation application. I am thankful to my wife Dr Savita for putting on the editor’s cap and editing the content of this paper. Dan Coate and Vaishali Bhide gave me valuable inputs to improve the presentation of the content in the paper. Like always, Vishal Kirplani helped me in putting the images and formatting as per specifications.

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