A CPOE Primer for Nursing

Dan Morgenstern, MD, MBA
Principal
Computer Sciences Corporation
Introduction

What is CPOE?
How Does CPOE Work?
Orders in CPOE
Concerns with CPOE
Benefits of CPOE
Success Factors for CPOE
Comments and Discussion
Who am I?

Dan Morgenstern, MD
Simple Country Doctor

85 Axemns Road
PO Box 1789
Conway, New Hampshire 03818
(603) 447-8888
Who am I?

- Dan Morgenstern, MD, MBA
  - MD, Albert Einstein College of Medicine
  - 25 years of practice:
    - Private solo as well as group
    - Academic – US, Israel
    - Cardiac, thoracic, vascular, trauma and general surgery, wound care
  - “Recipient” of a failed Hospital Clinical Information System Installation - *twice*
  - MBA, Auburn University-Montgomery Al
    - Major course of study: Information Systems
  - Left practice in 2003 – result of the malpractice crisis
  - Health Care Consulting since September, 2003
    - Clinical Transformation
    - Workflow Process Analysis and Redesign
    - Clinical Master Plan Development
    - Medical and Clinical Staff Education
    - Clinical Issues Resolution, Implementation Support (go-live)
    - Vendor Selection Assistance
    - Clinical Content Development
    - Physician/Clinician Adoption
Who are you?

• Name
• Institution
• Role in your institution’s CPOE project
• Your goals for this session
• How did a nice guy/gal like you end up in a place like this?
• Your goals for this session
Where are you vis a vis others?

**EMR Adoption Model**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Cumulative Capabilities</th>
<th>2007 Final</th>
<th>2008 Final</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 7</td>
<td>Medical record fully electronic; HCO able to contribute CCD as byproduct of EMR; Data warehousing in use</td>
<td>0.0%</td>
<td>0.3%</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Physician documentation (structured templates), full CDSS (variance &amp; compliance), full R-PACS</td>
<td>0.3%</td>
<td>0.5%</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Closed loop medication administration</td>
<td>1.9%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Stage 4</td>
<td>CPOE, CDSS (clinical protocols)</td>
<td>2.2%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Clinical documentation (flow sheets), CDSS (error checking), PACS available outside Radiology</td>
<td>25.1%</td>
<td>35.7%</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Clinical Data Repository, Controlled Medical Vocabulary, Clinical Decision Support, may have Document Imaging</td>
<td>37.2%</td>
<td>31.4%</td>
</tr>
<tr>
<td>Stage 1</td>
<td>Ancillaries – Lab, Rad, Pharmacy – All Installed</td>
<td>14.0%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Stage 0</td>
<td>All Three Ancillaries Not Installed</td>
<td>19.3%</td>
<td>15.6%</td>
</tr>
<tr>
<td></td>
<td><strong>Total Hospitals</strong></td>
<td><strong>n = 5073</strong></td>
<td><strong>n = 5166</strong></td>
</tr>
</tbody>
</table>

[http://www.himssanalytics.org/stagesGraph.html](http://www.himssanalytics.org/stagesGraph.html)
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What is CPOE?

• Computer-based Provider Order Entry - CPOE - is the portion of a clinical information system that enables a patient’s care provider to enter an order for a medication, clinical laboratory or radiology test, or procedure directly into the computer.

• The system then transmits the order to the appropriate department, or individuals, so it can be carried out.

• The most advanced implementations of such systems also provide real-time clinical decision support such as dosage and alternative medication suggestions, duplicate therapy warnings, and drug-drug and drug-allergy interaction checking
  

What is CPOE?

• A more detailed examination of the definition – and its consequences
  – “The portion of a clinical information system” (CIS)
  – The portion of a clinical information system” (CIS)
• Is but a part of the overall CIS – and does not include
  » Nursing documentation
  » Flow sheets
  » eMAR
  » Lab
  » Physician documentation
What is CPOE?

- A more detailed examination of the definition – and its consequences
  
  “That enables a patient’s care provider to enter an order for a medication, clinical laboratory or radiology test, or procedure directly into the computer”

- Physicians enter most of the orders – but not all
- All necessary information for a complete order is entered by physicians
- “Transcribing” of physician orders by nurses, clerks, unit secretaries ends
- Errors of handwriting, dosage, drug name, administration route virtually disappear
- Financial consequences of lost charges are erased
What is CPOE?

• A more detailed examination of the definition – and its consequences
  – “The system then transmits the order to the appropriate department, or individuals, so it can be carried out”
    • Direct and instantaneous transmission to the correct place, without intermediary of fax, runner, “carbon copy”, phone call, paging, etc
    • Automatic and relentless “audit trail” which precludes
      » Lost orders
      » “I wasn’t aware”
      » “The fax never came through”
      » Questions of delay and time
    • Automatic notification of all who need to know about an order
What is CPOE?

• CPOE Implementations represent a sea-change for the institutions that undertake them

• Traditional order writing
  – Distribution of responsibility and “turf” (physician, nurse, clerk, etc.)
  – Profusion of forms and formats (medications, labs, radiological exams, and others)
  – Diffuse data-input structure (progress notes, problem list, medication list, lab results, x-rays, all manner of ****grams etc)
    • All potentially housed in different venues and formats
What is CPOE?

- Migration from paper-driven, data source-fragmented and “task-diffuse” environment to an electronic, information-centralized, and task-focused one
  - Affects all patient-care processes — no matter how indirect or supportive
  - Edifice of clinical workflow, built over practitioners’ years and even decades of experience and training, is significantly changed even as the bedrock foundations remain the same.
What is CPOE?

• **CPOE is a tool and as such**
  – Is and will be in constant evolution and improvement
  – Comes in different styles and models
  – Comes with different prices and features
  – Will be of assistance only insofar as it is accepted and used

• **There is no “perfect”**
  – Heart-lung machine
  – Stethoscope
  – Monkey wrench
  – Calculator
What is CPOE?

- There is no perfect CPOE system
  - Each has strong – and weak points
  - Each has “gee whiz” and “ugh” features

An excellent implementation of a mediocre system will always trump a mediocre implementation of an excellent system
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How Does CPOE Work?

- CPOE Harnesses the Power of the Enterprise Computer Database to
  - Present all relevant patient information to the ordering physician
    - Age, location, problems, allergies, conditions, formulary, etc
  - Facilitate the entry of all information relevant to the order at the point and time of order
    - Dose, route, schedule, type, time, priority, justification, etc
  - Notify all relevant users of the order
    - Pharmacy, lab, radiology, nursing, dietary, etc
  - Offer real time, instantaneous error checking through Clinical Decision Support
    - Lab/drug interaction, drug allergy interaction, drug contraindication, dosage calculations, protocols, etc
  - Modify all database entries affected by the order
    - Inventory, PIXIS, billing, coding, admissions, other nursing units, etc
How Does CPOE Work?

Health Management Technology; February 2003; p.24
Features of CPOE

- **Incorporates**
  - Safety alerts (allergies/drug-drug interactions)
  - *Real-time* clinical decision support
    - Error checking
    - Latest clinical information availability
  - Formulary compliance
  - Weight-based dosing calculations

- **Requires order sets for standardization and ease of use**
  - Easier said than done

- **Requires standardization of vocabulary**
  - Easier said than done
Features of CPOE

- Is - or needs to be - customizable by physician (subject to local policy decisions)
- Captures charges at point of ordering
- Bypasses nurse or clerk ordering
- Eliminates nurse and pharmacy calls to physicians
- Has the potential to leave nurses “out of the loop”

Requires workflow redesign in all clinical and business areas
Workflow Analysis and Redesign

- CPOE requires workflow redesign in ALL clinical and business areas

- Workflow analysis of present-state ordering reveals:
  - True steps in order placement
  - Work-arounds that exist
  - Inefficiencies
  - Redundancies
  - Safety Flags

- Permits careful and honest analysis of chaotic, inefficient and sometimes even dangerous processes

- Is the *sine qua non* of proper future-state design and improvement in
  - Information flow
  - Efficiency
  - Patient Safety
  - Clinical Results
  - Regulatory Compliance
  - Reimbursement (P for P)
  - Quality of institutional and personal practice
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What Really Constitutes an Order?

- **Example: Chest X-Ray (hypothetical paper system)**
  - Physician input:
    - CXR written on order sheet
    - May specify portable versus departmental.
  - Nurse input:
    - Positional mode (supine, upright, etc.)
    - Transport mode (stretcher, chair)
    - Monitor mode (yes or no)
    - Oxygen therapy mode (yes, no, mask, prongs etc.)
    - Diagnostic information (what is this for?)
  - Unit Secretary input:
    - Enter order into computer
    - Coordinate scheduling (other lab, imaging tests)
What Really Constitutes an Order?

- In the totality of time and effort required to successfully complete a Chest X-Ray order, the time and effort expenditure of the physician is the *smallest* component

<table>
<thead>
<tr>
<th>Physician’s component</th>
<th>Nurse’s component</th>
<th>Unit secretary’s component</th>
</tr>
</thead>
<tbody>
<tr>
<td>CXR written on order sheet</td>
<td>Positional mode (supine, upright, etc.)</td>
<td>Enter order into computer</td>
</tr>
<tr>
<td>May specify portable versus departmental</td>
<td>Transport mode (stretcher, chair)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>Diagnostic information (what is this for?)</td>
<td></td>
</tr>
</tbody>
</table>
• However, since the time of hieroglyphics and clay tablets, physicians have equated “order time” with “their time”

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<th>Unit secretary’s component</th>
</tr>
</thead>
</table>

• This has definite and direct consequences in the implementation of CPOE:
  – Additional MD time required in CPOE will be measured by docs against the MD component time, not the true, complete order time
  – Transfer of “nurse’s and clerk’s components” to the physician is seen as “making me a unit secretary”
    • Not cost effective
    • Not time efficient
    • Not terribly rewarding or appropriate
    • Not a warm fuzzy
What Really Constitutes an Order?

- The intended results of a written order
  - Administer a therapy or medication
  - Obtain a test result
  - Intervene in some fashion in the patient’s course

- Physicians do not see “nursing, unit clerk, pharmacy, lab, radiology, etc” time as their responsibility but they certainly are concerned about and are held responsible for those delays

- Workflow analysis unmasks this and makes clear
  - Clinical care givers’ responsibility and vulnerability
  - Delays, redundancies, inefficiencies, errors etc in the ordering AND order fulfillment process

| MD component | Nurse’s component | Unit secretary’s component | Transmission comp. | Pharmacy, lab, X ray * therapy comp. | Administration/documentation component |
What Really Constitutes an Order?

- CPOE puts all this under the physician’s control:

  ![Diagram of CPOE components]

- And turns it into this:
The CPOE Grand Bargain

• If
  – Physician time and effort expenditure in a CPOE CXR order are now measured against the total time and effort expenditure in a paper system CXR order and *not just the CXR quickly written on the order sheet*

• And If
  In CPOE, some nursing and clerk order tasks are transferred to the physician *by definition*

• Then
  – CPOE must give the physician something more than just additional work and lost time. *It must offer increased safety and efficiency through Order Sets and Clinical Decision Support*

• Else
  – *Forget about widespread physician adoption*
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What are Order Sets?

- **What is an order set?**
  
  *An Order Set is “any collection of orders that are entered into the patient record in a single step.”*

- **Classification of order sets**
  - “Complete” versus “pick and choose from a list”
  - Departmental versus personal
### Heart Failure Admission Orders

**Allergies**
- Admit to MICU - Green; Attending: SGP YETT, HARRIS; Condition: Good;

**Vitals/Monitoring**
- Vital signs: q4
- Telemetry: Yes
- Weight: on admission x1, qam @0500 on standing scale in KG.
- I & O: Yes
- Call HO if: T > 38.5°C; HR < 60 or > 110; SBP < 80 or > 150; RR < 10 or > 24;

**Activity**
- Activity: Activity as tolerated
- Encourage progressive ambulation

**Oxygen Therapy**
- Oxygen Therapy: Nasal cannula for CP, SOB, SaO2 < 93%

**Nutrition**
- Diet: Low sodium (2 gm NA)
- Fluid restriction: ml
- Nutrition consult: Heart Failure patient

**Cardiology**
- If EF not known, consider echocardiogram/doppler study.
- Echo: Surface echo; When: Today Indications: Heart failure - evaluate left ventricular function.
- Cardiology ECG

**General Xray**
- Radiology General Xray

**Consults**
- Physical Therapy Consult: Reason: Other Considerations (HF/ Cardiac Rehab) Diagnosis: HF

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**Sample Order Set**

*Courtesy of John Halamka, MD*
**Sample Order Set**

**Consults**
- Physical Therapy Consult: Reason: Other Considerations (HF/ Cardiac Rehab) Diagnosis: HF

**Other**
- BIDMC/JCAHO requirement
  - MD to document known LV EF% in initial progress note.
- BIDMC/JCAHO requirement
  - Give patient HF teaching packet and initiate HF teaching protocol.
- Cardiology HF consult: MD must call 632-7750 to arrange.
- Cardiology Electrophysiology Consult: MD must call page operator (7-4700) and page the "EP fellow On Call".

**IV access**
- IV access: Peripheral saline lock

**IV fluids**
- **Medication**
  - Order Diuretics
  - Order Potassium Chloride
  - Order Nesiritide IV
  - Order ACE Inhibitors
  - Order AREB only if patient allergic or intolerant to ACEI
  - Angiotensin II Receptor Blockers
  - Order Beta Blockers
  - Order Spironolactone 12.5 mg PO DAILY
  - Order Isosorbide Dinitrate
  - Order Hydralazine HCl 25 mg PO Q6H
  - Order Digoxin 0.125 mg PO DAILY
  - Order Warfarin
  - Order Heparin
  - Order Aspirin EC

**Lab**

**Blood tests**

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**Courtesy of John Halamka, MD**

**Beth Israel Deaconess Medical Center**
What are Order Sets?

- **Order sets**
  - Need not only encompass long lists of orders
  - May be built for any repeatable and repeated group of orders, no matter how short the list
  - Are designed to enhance standardization, completeness and efficiency
  - Provide the “volume discount” in order entry
    - Assume 4 clicks to enter an individual order
    - An order set of 12 orders may be entered in as little as 10 clicks
    - Savings of dozens of clicks
    - Clicks are time, time is efficiency
    - Efficiency \(\rightarrow\) increased physician adoption
      greater accrual of benefits from CPOE
Order Sets – Personal vs Departmental or Institutional

- **Types of Order sets:**
  - Departmental/Institutional
    - Standard across the department/house
    - Perceived by administration as a step towards institutional/system standardization
    - Perceived by most physicians as an attempt to decrease autonomy
  - Personal
    - Compiled and maintained by a single physician or group
    - Maximizes the owners’ efficiency
    - Perceived by administration as a step away from institutional/system standardization
    - Perceived by most physicians as the logical way to practice (“What works well for me and my patients”)

- Each has advantages and disadvantages
Order Sets – Personal vs Departmental or Institutional

• **Departmental or Institutional:**
  - Usually product of group consensus and “peer review”
  - Reflect departmental as well as recognized/reviewed best practices
  - Designed for maximum inclusivity and standardization, not necessarily efficiency
  - Maintained by department or specifically tasked committee - faster, more up-to-date inclusion of updates/advances
  - Eliminates multiple sets for same procedure, disease process, clinical process

• **Personal:**
  - Completely customized to suit the physician and his/her manner of practice
  - Reflect personal as well as (sometimes) recognized best practices
  - Designed for maximum speed and efficiency of the “owner”
  - Maintained by owner – updates and advances at the discretion of the individual practitioner
  - Multiple sets (by different physicians) for the same procedure, disease process, clinical process
Order Sets – Personal vs Departmental or Institutional

• **Policy considerations**
  – Standardization versus personal preference
  – Inclusivity versus efficiency
  – Value of greater completeness versus increased order time and unused functionality
  – Maintenance: assigned task versus personal

• **Neither ensures increased physician adoption**
  – Data and studies on both sides of the issue

**Decision should be physician - and not software or administration - driven**
Order Sets – Personal vs Departmental or Institutional

• Order sets are not cookbooks

• They are compendia of orders
  – Multiple medication choices
  – Multiple lab/radiology choices
  – Multiple diets, nursing orders etc
Advantages of Order Sets

- CPOE resulted in
  - Physicians taking 25 seconds longer to enter orders (albeit with significantly reduced duplicative and administrative task time)
  - **Use of order sets resulted in 37% decrease in ordering time.**

Controlled Trial of CPOE:
Effects on Physicians’ Time
Utilization in Ambulatory Internal Medicine Practices
JAMIA 2001;8:367-371
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What are Alerts?

• Alerts are part of an electronic cross-referencing system known as clinical decision support

• Constitute a large benefit to all if properly constructed and deployed

• Can and should be
  – Built and customized at your institution
  – Based on common, clinically-accepted best medical practices that reflect wisdom and practice patterns of
    • Outstanding authorities
    • Your medical, clinical and pharmacy staff
  – Turned on or off, fine tuned, as per the practice patterns and wishes of the medical staff
Clinical Decision Support and Alerts

• Decision support creates algorithms that cross-reference orders in general and drugs in particular for:
  – Allergies
  – Lab findings
  – Drug interactions
  – Correct dosing
  – Contraindications
  – Best practices

• Alerts result from a variance vis a vis the algorithm
  – Example: Digoxin ordered with serum K = 1.4
  – Example: Ampicillin ordered in a Pen Allergic patient
  – Example: Gentamicin ordered without a creatinine-based dosage calculation
  – Example: Heparin ordered in a fully “coumadinized” patient
• **Your institution is in control**
  – Decision support algorithms can be created by the institution itself
  – Levels at which alerts “fire” are set by institution:
    • Avoid alert overload
    • Avoid dogmatic, arbitrary thresholds set by outside entities
    • Avoid patterns and “electronic interference” at odds with local practice norms
  – Override policies are set by the institution
  – Override option and responsibility rest with the ordering physician
    • The “system” does not practice medicine, doctors do
    • Clinical evaluation and decision-making rest with the physician - within the boundaries that the medical staff has defined
Clinical Decision Support and Alerts

• Decision support is not:
  – Cookbook medicine
  – “Big brother” deciding the how and what of patient care

• Decision support is a tool that:
  – Brings “best practices” to users’ fingertips
  – Brings gentle reminders to users’ attention
  – Allows all care-givers to practice the best medicine that is available
  – Allows patients to benefit from everything their physicians, nurses, techs, pharmacists ever learned but may have momentarily forgotten
Clinical Decision Support and Alerts

• Alerts are electronic reminders
  – That are germane to good patient care
  – That have been locally vetted
  – That take the form of
    • Facts forgotten
    • Facts unknown
  – That in virtually all instances are not “dictates”
  – That in virtually all instances can be overridden for acceptable clinical reasons

• Not so much this
  
  ![STOP]
  
  You can’t do that!

  ![SLOW]
  
  Have you thought about this?

As this
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Physician Concerns with CPOE

• Fear of a negative impact on productivity with increased ordering time:
  – Physicians took 25 seconds longer to enter orders, but significantly reduced duplicative and administrative task time
  – Use of order sets resulted in 37% decrease in ordering time

Controlled Trial of CPOE: Effects on Physicians’ Time Utilization in Ambulatory Internal Medicine Practices
JAMIA 2001;8:367-371
Physician Concerns with CPOE

• Fear of being forced to practice “cookbook” medicine.
  – CPOE does NOT equal clinical pathways.
  – Physicians strive for “best practices” but often fall short

Physicians Only Follow ‘Best Practices’ Half the Time; NEJM 06/27/03

• “The machine will tell me what I must do.”
  – A reminder from a “dumb machine” is only a reminder, not a command
Physician Concerns with CPOE

CPOE is a tool that can help physicians do what they know is right, not force them to do something with which they don’t agree.
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Nursing Concerns with CPOE

- Fear of communication breakdown
  - Computer system will act as intermediary between physician and nurse as physician order entry becomes entirely “self-contained”
  - Doctors no longer need to be in any physical proximity to nurses to enter orders
  - Orders can be entered remotely – *really remotely*
  - “Illusion of communication” – system entry of an order *ipso facto* ensures that proper people will see it and act upon it
  - Lessening of face-to-face communication regarding patient care may increase likelihood of errors

Nursing Concerns with CPOE

**Workflow Issues**
- Many (if not most) CPOE implementations are accomplished without adequate understanding of present state processes
  - Present state workflow analysis is seen as
    » Redundant (“we know how we do things”)
    » Time consuming to undertake
    » Not as exciting and sexy as “the future state”
  - A particular clinical workflow is perceived, designed, acted upon, by multiple players
    » Physicians
    » Nurses
    » Techs
    » Pharmacists
  - These players have varied views and needs as far as documentation, efficiency etc
Nursing Concerns with CPOE

• **Workflow Issues**
  – No single clinical information system
    • Fits ALL workflows within a hospital
    • Requires constant vigilance to adapt to changing clinical processes
  – Careful design of future state based on thorough, even exhaustive knowledge of present state can mitigate these potential issues

• **Additional work**
  – Increased “automation” breeds increased
    • Data capture, entry and documentation
    • Information availability
    • CIPS (Clinical Information Pack-rat Syndrome)
  – Alerts may add multiple steps to a process with resultant drop in efficiency (aka more work)

Types of Unintended Consequences Related to Computerized Provider Order Entry; Emily M. Campbell RN, MS, Dean F. Sittig PhD, Joan S. Ash PhD, Kenneth P. Guappone MD and Richard H. Dykstra MD JAMIA2006; 13; 547-556
Nursing Concerns with CPOE

- **Unit/Service line fissures**
  - Needs of critical care versus standard nursing units come to the fore
    - Workflow
    - Displays
    - Documentation
    - Security (e.g. psych)
    - Standardization
      » Time
      » Data
• **Paper**
  – Paper records will – and should disappear
  – Paper in clinical care will not
    • Ubiquitous
    • Easy to use and customize
    • Creature of several thousand years of habit
  – CPOE systems put great pressure on the “paper habit”
    • Not designed for printing
    • Will overwhelm any printing
      “solution” while simultaneously providing little benefit
    • Poster child for GIGO
  – Solution lies in careful delineation of paper usage and adequate design of system reports
Nursing Concerns with CPOE

- **Unintended patient care errors**
  - Common to all systems, all vendors
  - Function of
    - Information overload
    - Increased documentation requirements
    - Design to real world mismatch
    - Rigidity of presentations, formats etc inherent in electronic systems

- **Over-reliance on technology**
  - Systems failures and down time
  - Attrition of non-electronic care skills in the “older generation”
  - Absence of non-electronic care skills in the “younger generation”
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Benefits of CPOE

• Improvement in clinical cycle time:
  – Medication delivery: 65% reduction
  – Radiology procedure completion: 45% reduction
  – Laboratory results reporting: 25% reduction

• Improvement in length of stay:
  – 0.9 days reduction in LOS
  – 13% reduction in hospital charges

• Improvement in formulary compliance:
  – Use of CPOE rules increased use of the recommended histamine 2 blocker from 15.6% to 81.3%

From a literature review in
Computer Physician Order Entry: Benefits, Costs and Issues
Gilad Kuperman, MD, PhD, and Richard Gibson, MD, PhD.
Annals of Internal Medicine 2003; 139: 31-39
Benefits of CPOE

• Improvement in adoption of evidence-based best practices:
  – % of eligible patients receiving pneumococcal vaccination increased from 8% to 36% with CPOE reminder.

• Reduction in errors:
  – Beth Israel reduced errors by 55% from 10.7 to 4.9 per 1000 patient days.
  – Subsequent study showed 88% reduction in serious errors.
  – LDS Hospital showed 70% decrease in A.D.E’s with CPOE.

From a literature review in
Computer Physician Order Entry: Benefits, Costs and Issues
Gilad Kuperman, MD, PhD, and Richard Gibson, MD, PhD.
Annals of Internal Medicine 2003; 139: 31-39
Benefits of CPOE

- Hospitals with automated notes and records, order entry, and clinical decision support had fewer complications, lower mortality rates, and lower costs.
  - 167,233 patients > 50 years admitted between December 1, 2005, and May 30, 2006

- Results:
  - 10-point increase in automation of notes/records → 15% decrease in adjusted odds of fatal hospitalization
  - Higher scores in CPOE → 9% and 55% decreases in adjusted odds of death for MI and CABG, respectively
  - For all causes of hospitalization, higher scores in decision support [CDS] → 16% decrease in adjusted odds of complications

Clinical Information Technologies and Inpatient Outcomes A Multiple Hospital Study
Ruben Amarasingham, MD, MBA; Laura Plantinga, ScM; Marie Diener-West, PhD; Darrell J. Gaskin, PhD; Neil R. Powe, MD, MPH, MBA
Arch Intern Med. 2009;169(2):108-114
The benefits of CPOE are a direct function of the clinical adequacy of design.

Absent detailed, comprehensive and sustained clinical involvement and leadership, such adequacy will not exist and the benefits will be non-existent.
Introduction
What is CPOE?
How Does CPOE Work?
Orders in CPOE
Concerns with CPOE
Benefits of CPOE
Success Factors for CPOE
Comments and Discussion
CPOE Success Factors

- Fast, customizable systems
- Dedication on the part of the hospital of a great deal of time, training, and ongoing support for the systems
- Hospital willingness to make changes once the system is in place
- The ability to group orders into sets
- Clinical pathways made available to the staff at the time of order entry
- Ability to enter orders remotely

Journal of the American Medical Informatics Association, Feb. 2003
What do These Success Factors Mean for Clinical Personnel?

- In the words of the first advertising campaign of NYC Off-Track Betting (c. 1970)

“To win it, ya gotta be in it”
• **Overall efficiency:**
  – Will decrease initially as new technology and workflow processes are assimilated.
  – Will return to baseline thereafter with real possibility of increase above pre CPOE level
    • as technology, speed, organizational attributes and *practitioner buy-in* are leveraged.
  – No Pain, no Gain
There will be some physicians who will remain here

- Consider “work-around” for those who are
  - Highly productive
  - High admitters/volumes of procedures
  - “Respected elders” who hold sway with others
• **Order writing:**
  – True time cost of order writing, legibility, safety issues and non-standardization of practice patterns becomes apparent

• **Clinical Processes**
  – Reality of work-arounds, redundancies, “worse practices” and clinically indefensible variation sets in

• **Telephone/verbal orders:**
  – Alerts and clinical decision support will mandate drastic reduction in verbal orders.
  • Daytime versus nighttime orders.
Critical Considerations

- Medical staff computer literacy
- Workflow redesign
- Development of departmental-level order sets
- Design of alerts
- Careful, close and constant nursing-medical staff cooperation
- Development of pilot criteria
- Organizing governance structure
- Leadership stamina
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