Action

- Endorsement of CPOE
- Establish CPOE as an Institutional Commitment and Goal
- Identify CPOE as a Quality and Safety Improvement Initiative

Definitions

- EMR (Electronic Medical Record) – the set of databases (lab, pharmacy, radiology, clinical notes, etc.) that contains the health information for patients within a given institution or organization

- CDS (Clinical Decision Support) component - software that makes relevant information available for clinical decision-making (clinical data, references, clinical guidelines, situation-specific advice)

- CPOE (Computerized Physician Order Entry) component – enables clinicians to enter orders (tests, meds, dietary, etc.)

- CCR (Computerized Clinical Reminder) – just-in-time reminders at the point of care that reflect evidence-based medicine guidelines

Advantages

- Improve communication
- Make knowledge more readily accessible
- Assist with calculations
- Perform checks in real time
- Assist with monitoring
- Provide decision support
- Require key pieces of information (dose, e.g.)

CPOE

- In 2005, only **4%** of hospitals are in full compliance with CPOE; 17% have made good progress.

- Government and larger teaching hospitals are more likely to have implemented CPOE.

Source: Cutler EM, Feldman NE, Hurwitz JR. US Adoption of Computerized Physician Order Entry Systems. Health Affairs 2005 Nov/Dec;24(6):1654 – 1655.

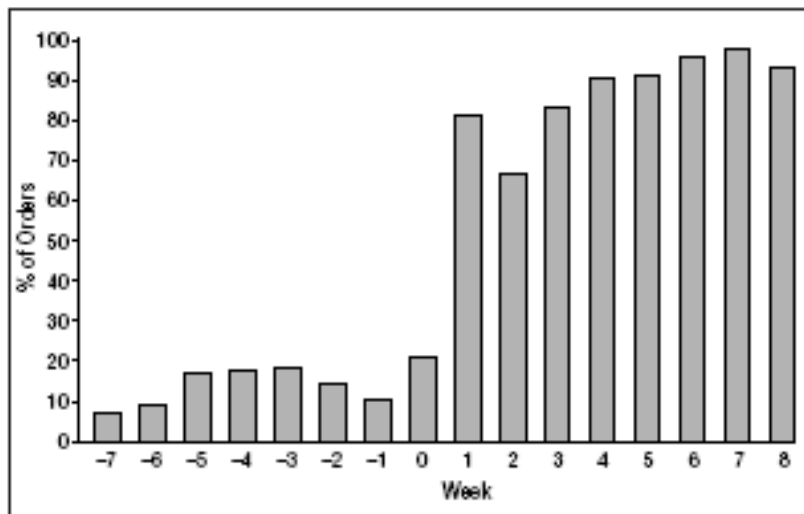# Example CPOE improves adherence to guideline

Figure 3. Change in use of nizatidine, as a percentage of all oral histamine₂-blocker orders, after the computer intervention was introduced (Week 0).
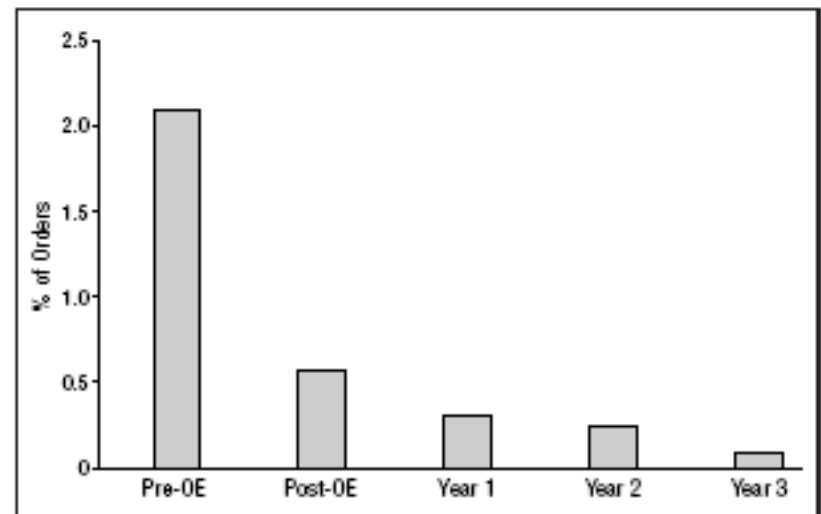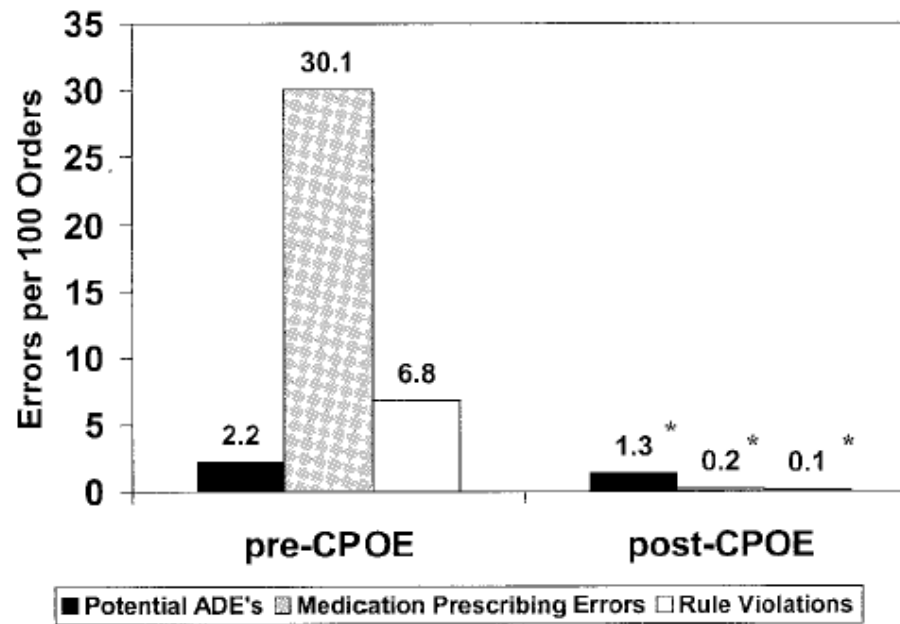
Figure 5. Percentage of medication orders with doses exceeding the recommended maximum.

Teich JM et al. Arch Intern Med. 2000 Oct 9;160(18):2713-4.

Example CPOE reduce errors

- Potts studied ADE rates in 13,828 medication orders before/after CPOE implementation at Vanderbilt Children's PICU:

Potts AL, Barr FE, et al. Pediatrics. 2004 Jan;113(1 Pt 1):59-63.

CPOE

- Effective in reducing the rate of serious medication errors.
- Reduction in antibiotic-related ADEs after implementation of decision support for these drug.
- Length of stay at Wishard Memorial Hospital in Indianapolis fell by 0.9 days, and hospital charges decreased by 13% after implementation of CPOE.
- A 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.
- Research estimates that implementation of CPOE systems at all non-rural U.S. hospitals could prevent three million adverse drug events each year.

Example CPOE introduces errors

- Brigham and Womens' Hospital, Boston introduced a CPOE

	pre	period1	period2	period3
Potential ADEs/1000 pt-days	15.8	31.3	59.4	0.5

- After implementation, the rate of intercepted Adverse Drug Events (ADE) doubled!
- Reason: The system allowed to easily order much too large dosages of potassium chloride without clear indicating that it be given in divided doses.

- Bates et al The impact of computerized physician order entry on medication error prevention. JAMIA 1999, 6(4), 313-21.

Example CPOE introduces errors

- Association with increased PICU mortality:
  - 2.8% 14 months before CPOE
  - 6.4% 5 months after CPOE

Han YY, Carcillo JA, et al. Pediatrics. 2005 Dec;116(6):1506-12.
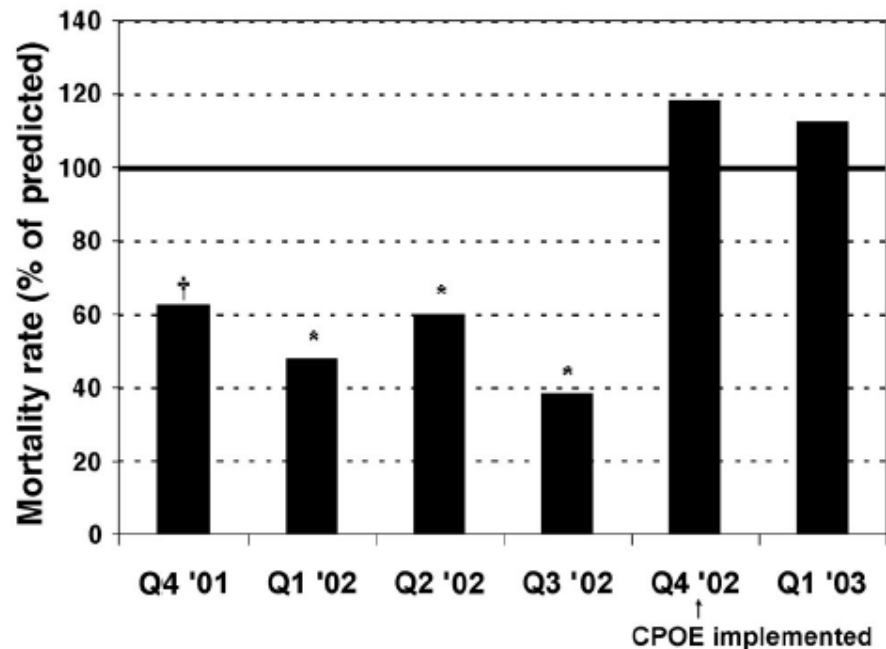
Example CPOE reduce costs

Brigham and Women's Experience: Cost-Effective

- $3.7 million implementation
- $ 600,000 to $1.1 million operational costs
- Results:
  - Decreased drug costs
  - ADE cost is approximately $4,700
  - The return on initial investment has been $5 to $10 million in annual savings.

Kausal R et al. J Am Med Inform Assoc. 2006; 13(3): 365-7
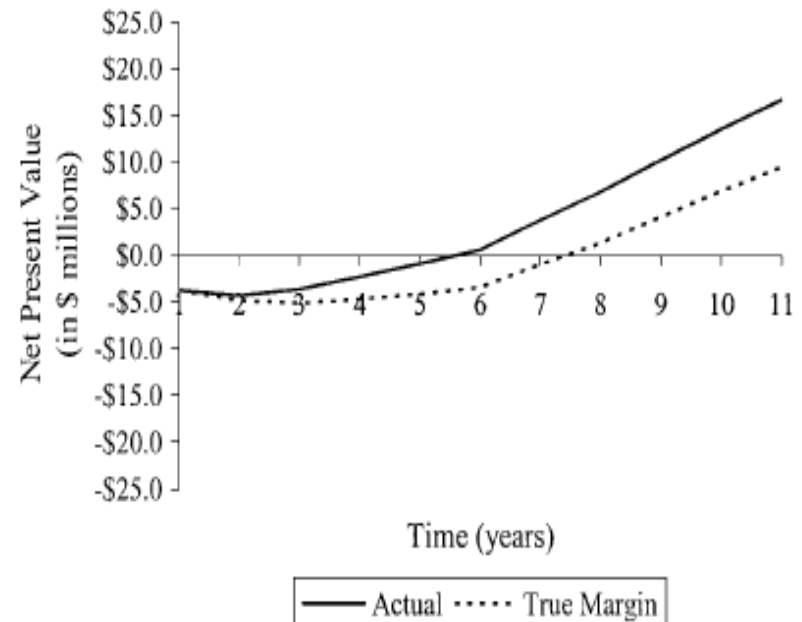
- Full implementation of computerized physician order entry and medication related quality outcomes: a study of 3364 hospitals in 2013

- Only 8% of US hospitals have fully implemented CPOE systems.

Challenges

- The upfront cost of implementing CPOE is one major obstacle for hospitals. At Brigham and Women's Hospital, the cost of developing and implementing CPOE was approximately $1.9 million, with $500,000 maintenance costs per year since.

- Installation of even "off the shelf" CPOE packages requires a significant amount of customization for each hospital and can be very expensive.

- Integration with other systems, cost, time, technical

- Cultural obstacles to CPOE implementation. For example, some physicians resist utilizing computerized decision-support tools, relying instead on practice experience

CPOE:
Lessons From Other Institutions

1. ## Leadership
   - ➢ Physicians need to lead the effort as the primary users
   - ➢ However, CPOE is an interdisciplinary project that requires input and coordination with all clinical groups (nursing, PT/OT, Case Management, Pharmacy, Lab, Radiology, etc.) and I.T.

2. ## Commitment
   - ➢ CPOE affects the workflow and process of **all** caregivers and ancillary departments, not just physicians
   - ➢ Success requires commitment to change at all levels

3. ## Support
   - ➢ Responsiveness and Flexibility are key
   - ➢ Must be ongoing, not just at rollout

The Need for CPOE

- Improved patient safety
- Improved quality
- Improved efficiency
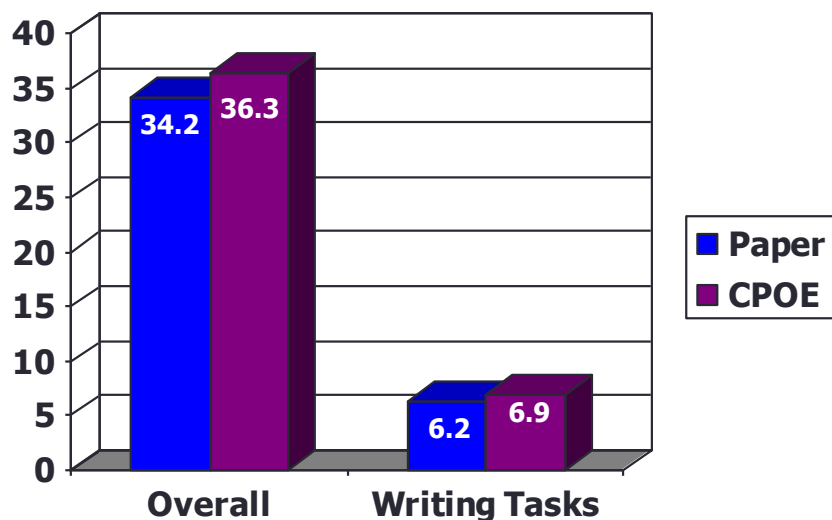- Reducing operating costs

CPOE

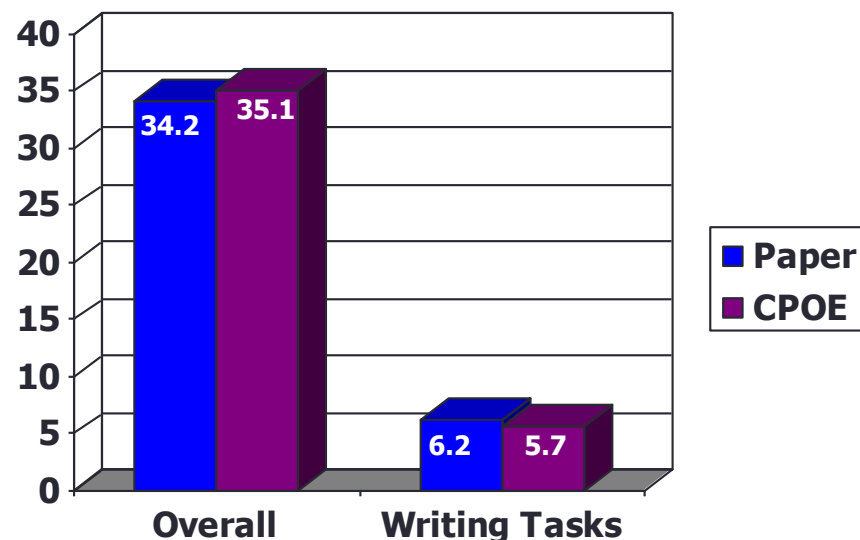Physicians are concerned that CPOE will take too much time

Does CPOE Take More Time?

Time Spent/Patient Encounter (minutes)

Time Spent/Patient Encounter—Duplicate Tasks Removed (minutes)

Evidence shows that CPOE adds less than one minute to the time physicians spent writing orders and overall only added 1-2 minutes per patient encounter. As physicians gained experience with the system, the time for orders actually decreased.

(Overhage JM, et al *J Am Med Informatics Associ* 2001;8:361-371)

CPOE

The clinical benefits for improved patient care clearly outweigh the perceived concerns.

What Is Needed For Success?

- Clinicians
  - End-users (clinicians) must be willing to champion the implementation of CPOE
  - Clinicians must be involved in design and implementation of the system
  - Clinicians must be flexible and willing to change workflow processes

What Is Needed For Success?

- Information Technology (I.T. Department)
  - Ensure fast, reliable, and easily accessible system
  - Provide ongoing support
  - Train, educate users
- Institution
  - Commitment to workflow changes

CPOE--Summary

- CPOE is a key component to improve Patient Safety and Quality of Care

- The focus needs to be on workflow and process of care changes that are necessary for optimal patient care, Not on implementing a new computer system

- Commitment from clinicians to help with process design and implementation is critical for success.

CPOE--Summary

CPOE is a clinical based process development to improve patient care, **not** an I.T. project

THANK YOU

Professor Ahmed Al Barrak