COMPUTERIZED PHYSICIAN ORDER ENTRY (CPOE)

301 Medical Informatics

Outline

- Definition and context
- Advantages of CPOE
- Disadvantages of CPOE
- Outcome measures and examples
- Same system other outcome

What is Computerized Physician Order Entry (CPOE)?

- Ordering of tests, medications, and treatments for patient care using computers
- Involves electronic communication of the orders
- Often use rules-based methods for checking appropriateness of care

Definitions

- Information system—an arrangement of—
  - Data
  - Processes
  - People
  - Technology

  interact to collect, process, store, and provide as output the information needed to support the organization.

CPOE

CPOE is a solution to a current human system problem that focuses on achieving improved quality and safety for all patients

CPOE, EHR and DSS

EHR	Documentation	DSS
	Medication	
	Test reports (EKG, PFT)	
	Radiology, lab results	
	CPOE	

Technical Infrastructure

- EHR
- Drug information database
- DSS

Current Objectives

1. Endorsement of CPOE

2. Establish CPOE as an Institutional Commitment and Goal

3. Identify CPOE as a Quality and Safety Improvement Initiative

Example DSS in CPOE – medication prescription

- Allergy
- Age (check drug name and dose)
- Duplicate drugs on active orders, not one-time
- Severe drug interactions
  - Drug-drug, drug-food
- Dose maximum
- Drugs with opposite actions

Patient Safety

- ## Institute of Medicine

  Report on medical errors released 1999

  Estimated that between 44,000 and 98,000 hospital deaths/year are due to medical errors

  Some question the accuracy of the estimates but has raised public awareness and concern

Top 10 Causes of Death 1998

1.	Heart Disease	724,269
2.	Cancer	538,947
3.	Stroke	158,060
4.	Lung Disease	114,381
5.	Medical Errors	98,000*
6.	Pneumonia	94,828
7.	Diabetes	64,574
8.	Motor Vehicle	41,826
9.	Suicide	29,264
10.	Kidney Disease	26,295

* Estimated

Adverse Drug Reaction (ADE's)

- Several studies have found a serious medication error in 3.4%-5.3% of inpatients
- The cost of a single preventable ADE is $4,685
  - $1.3 million annually for an average 300 bed hospital

Bates et al. *JAMA* 1997;277:307-311

Bates et al. *JAMA* 1998;280:1311-1316

Bates et al. *J Am Med Informat Assoc* 1999;6:313-321

Lesar et al. *Arch Intern Med* 1997;157:1569-1576

Medication Errors

- Two recent Harvard studies found that physician ordering errors accounted for 56%-78% of all preventable Adverse Drug Events

Bates et al. *JAMA* 1997;277:307-311

Kaushal et al. *JAMA* 2001;285:2114-2120

Medication Errors

- Physician drug ordering errors are most often due to one of two causes:

  1. Lack of knowledge about the drug
     - Wrong dose
     - Wrong frequency
     - Drug-drug interaction
  2. Incomplete patient information
     - Documented allergies
     - Recent lab results

CPOE—National Perspective

Why Now?

- November 1999:

  Report from the Institute of Medicine

  To Err is Human: Building a Safer Health System

  - 44,000-98,000 patient deaths/year in U.S. hospitals due to medical errors

- Increased focus on patient safety and on quality of care

- CPOE is viewed as an important tool to improve patient safety and quality of care delivered

- "the science and technologies involved in healthcare -- the knowledge, skills, care interventions, devices and drugs – have advanced more rapidly than our ability to deliver them safely, effectively, and efficiently"

  - IOM. 2001. Crossing the Quality Chasm: A New Health System for the 21st Century.

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

Medical Informatics tools can

- 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, What Is It?

- CPOE is a computer application that accepts physician orders
  - Meds
  - Laboratory Tests
  - Diagnostic Studies
  - Ancillary Support
  - Nursing Orders
  - Consults

CPOE, What It Does?

- Provides Decision Support
- Warns of Drug Interactions
  - Drug-Drug
  - Drug-Allergy
  - Drug-Food
- Checks Dosing
- Reduces Transcription Error
- Reduces number of lost orders
- Reduces duplicative diagnostic testing
- Recommends cost effective, therapeutic alternatives

Example CPOE reduce errors

- Potts studied ADE rates in 13,828 medication orders before/after CPOE implementation at Vanderbilt Children's PICU:
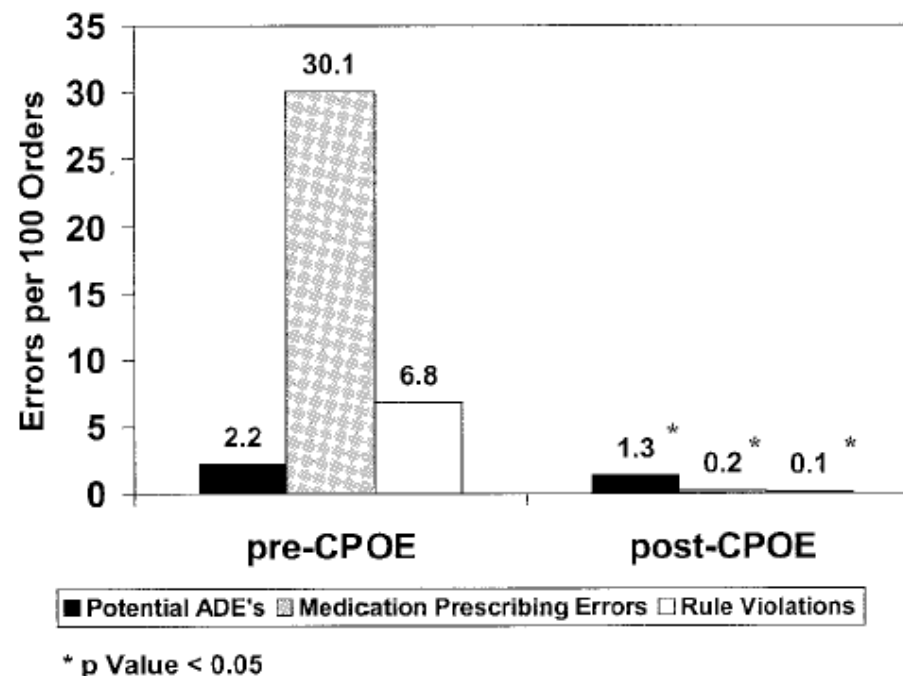
Potts AL, Barr FE, et al. Pediatrics. 2004 Jan;113(1 Pt 1):59-63.

CPOE:
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

- Bobb A, et al. The epidemiology of prescribing errors: The potential impact of CPOE. Arch Intern Med 2004;164:785 – 792.

  - A CPOE with an advanced level of CDS is needed to prevent many of the prescribing errors with the greatest potential to lead to patient harm.
    - Basic = drug-allergy, drug-drug interaction & duplicate therapy checking, basic dosing guidance, formulary decision support
    - Advanced = dosing for renal insufficiency and geriatric patients, guidance for medication-related lab testing, drug-pregnancy and drug-disease contraindication checking

Reasons for CPOE

- **Order Communication**
  - Clarity of Orders
  - Ease of Identifying the Ordering Physician
- **Standardization of Care**
  - Clinically validated order sets for
    - Clinical diagnoses
    - Procedures
    - Situations (post-op order sets)
- **Alerts and Reminders (Real Time Decision Support)**
  - Drug Safety Database (Conflict Checking)
  - Clinically validated rules

Does CPOE Take More Time?

Time Spent/Patient Encounter (minutes)
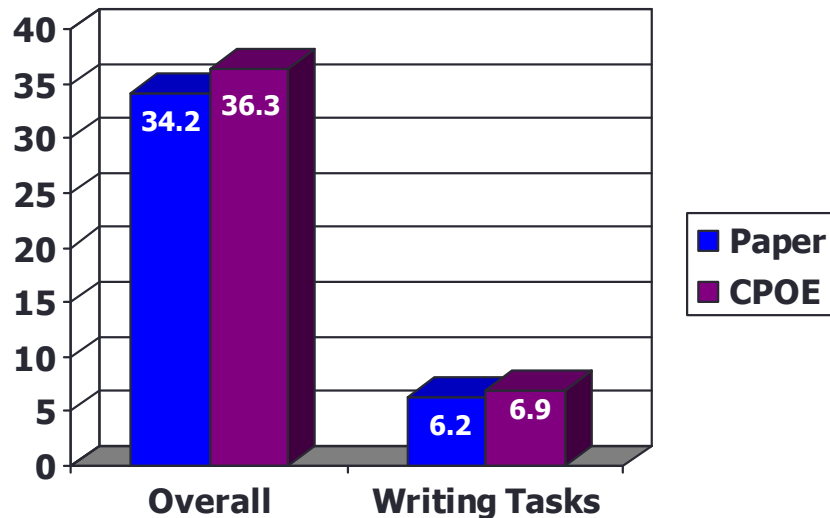
**Time Spent/Patient Encounter—
Duplicate Tasks Removed (minutes)**
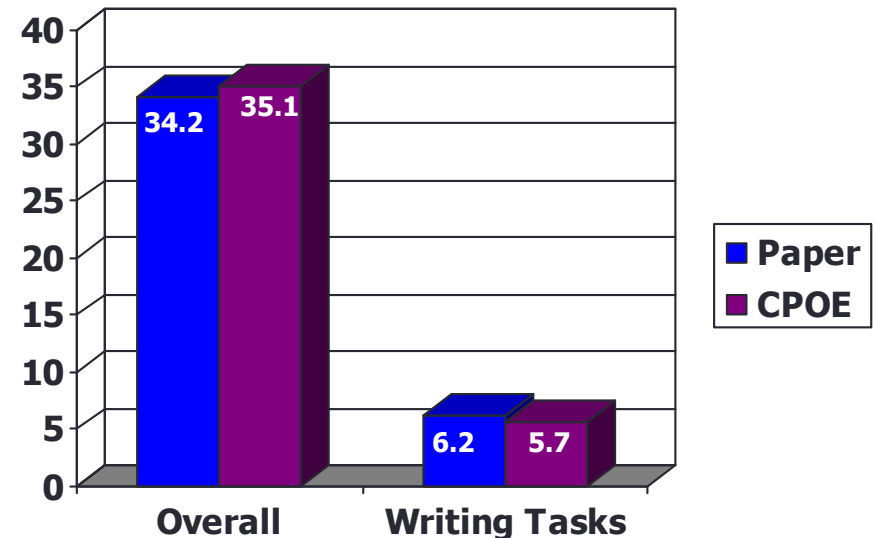
Evidence shows that CPOE adds less than one minute to the time physicians spent writing orders and overall only added 1-2 minutes per patient encounter. As physicians gained experience with the system, the time for orders actually decreased.

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

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 to improve Patient Safety and Quality of Care
- The focus needs to be on workflow and process of care 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 process to improve patient care, **not** an I.T. project

CPOE was approved by the Medical Board as the institutional direction in May 2001

Best luck

ksuahmed@yahoo.com