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UNM Medicine Grand Rounds Presentation: Medical Informatics —- What is the Evidence?

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Medical Informatics – What is the Evidence?



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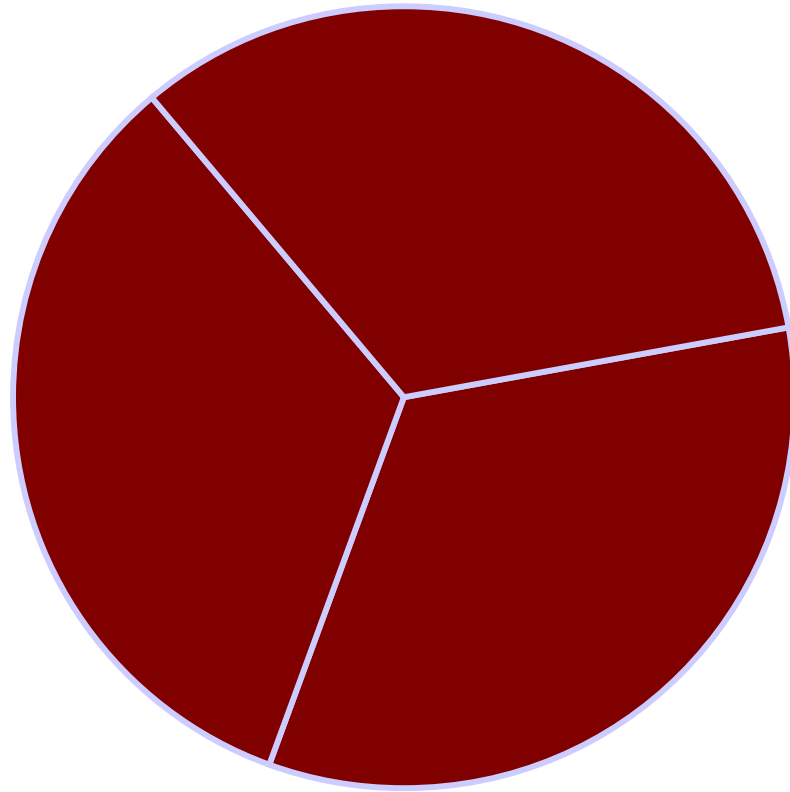
Overview

- What is Medical Informatics?
- How are we doing?
- What is computerized physician order entry (CPOE)?
- Does it improve quality?
- Does it save money?
- Does it save time?
- Questions

What is Medical Informatics?

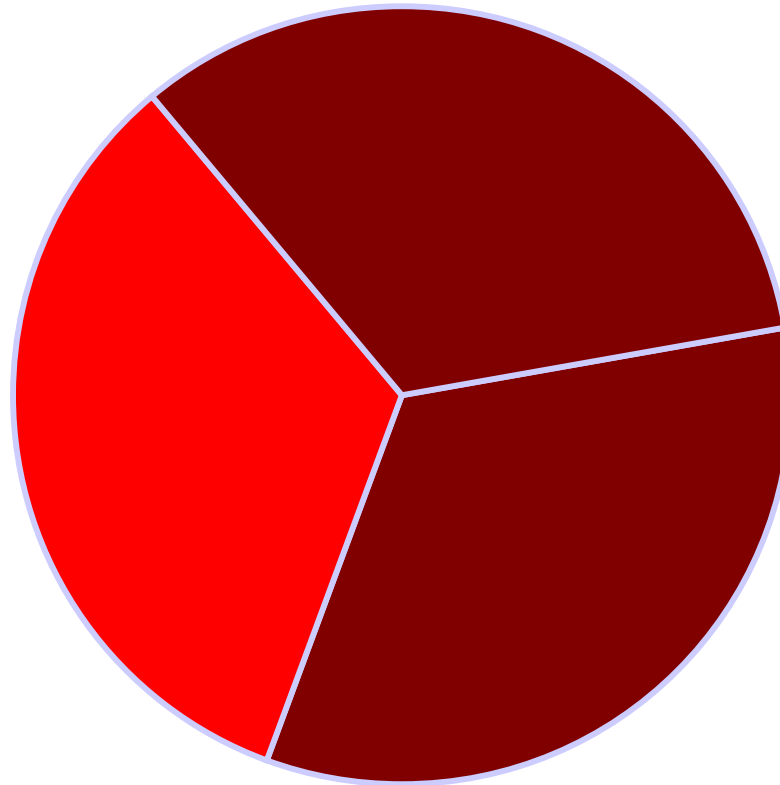
- Informatics: the study of the application of information technology (of all kinds)
- Medical Informatics: the study of the application of information technology to medical science and health care delivery.

Practical Definition

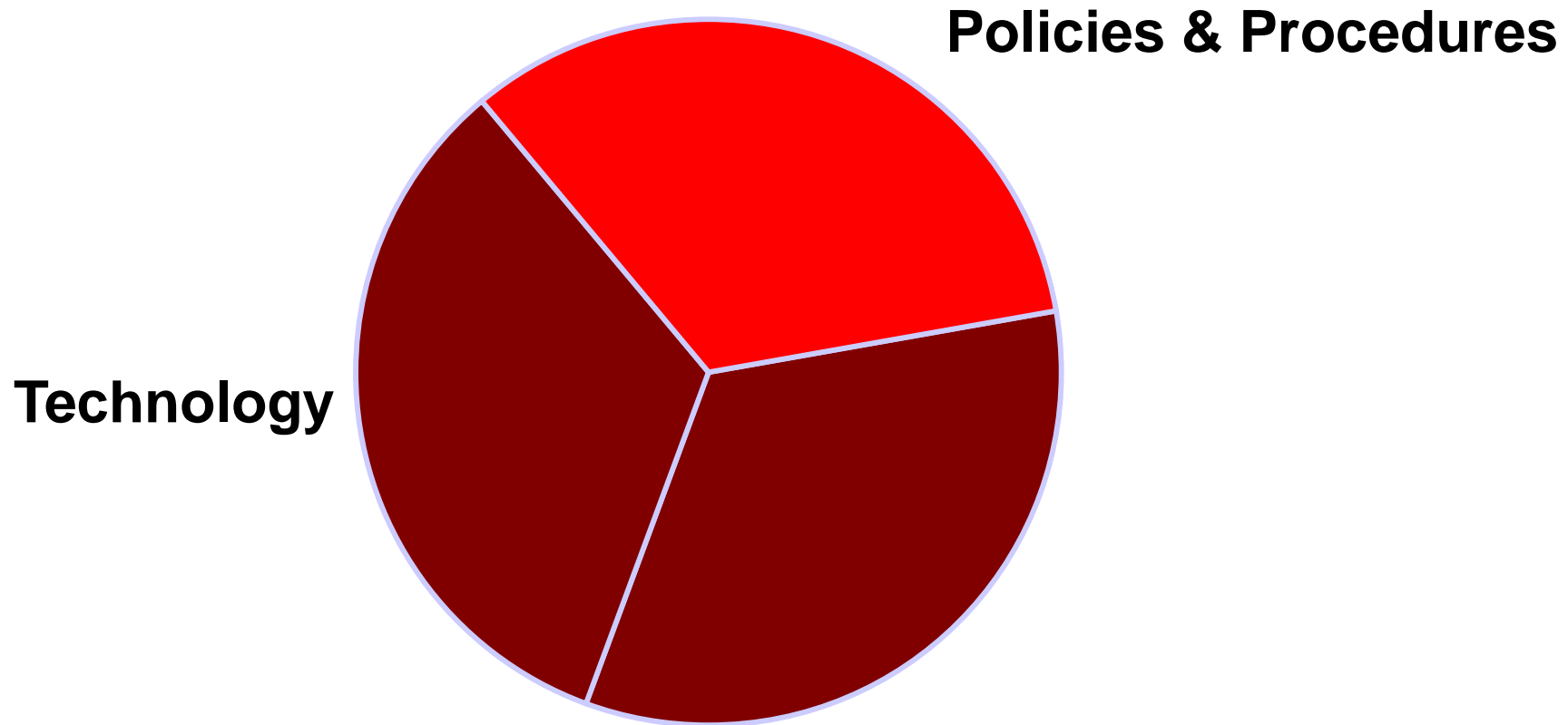


Practical Definition

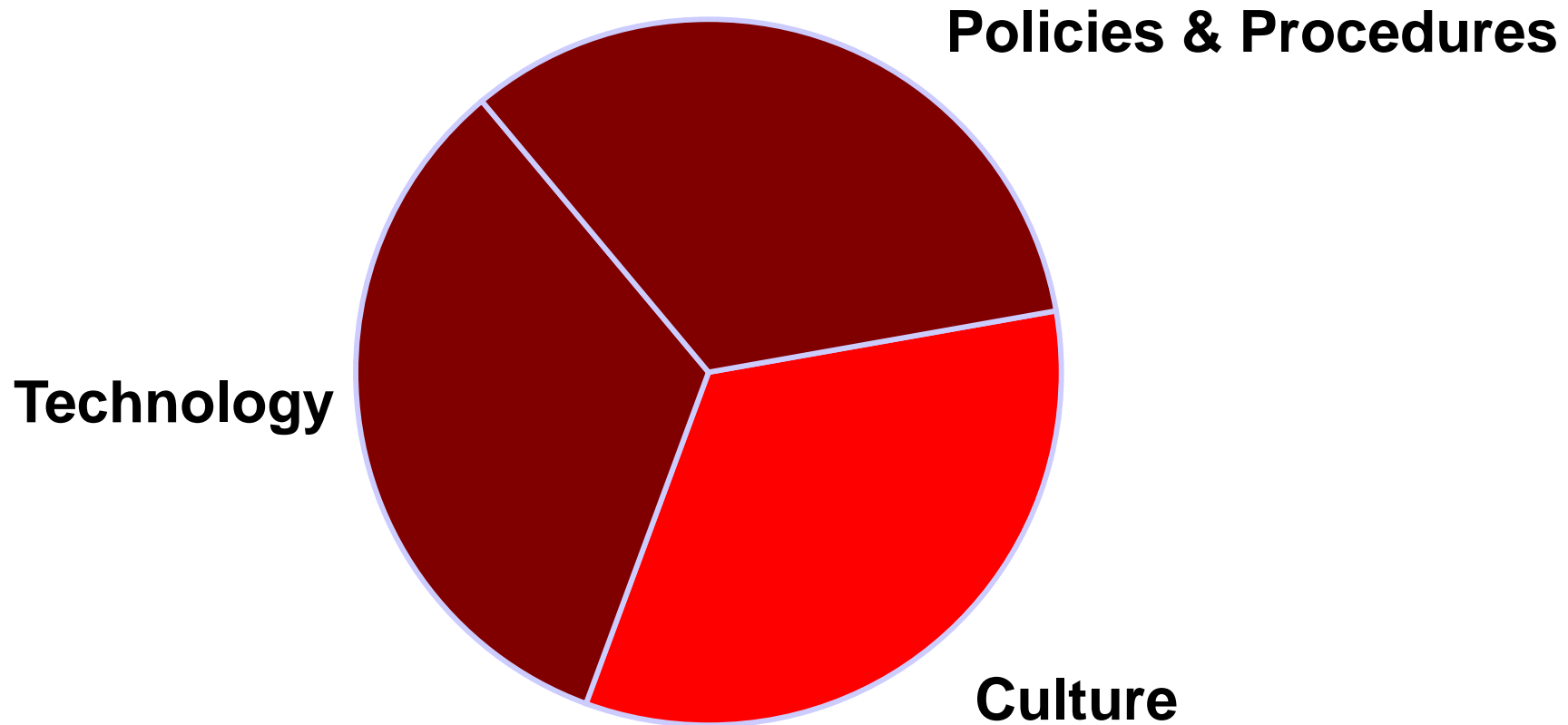
Technology



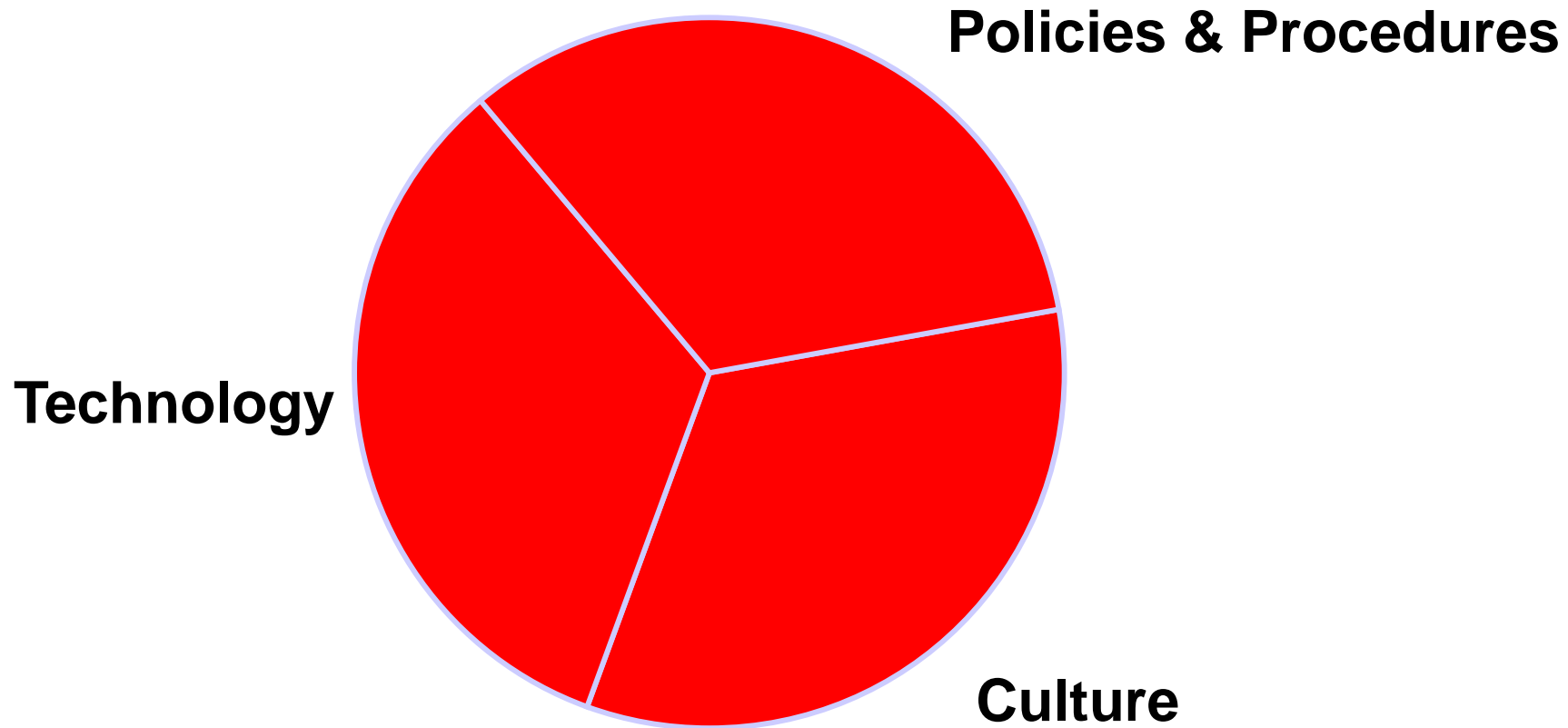
Practical Definition



Practical Definition



Practical Definition



My Definition

The science of managing information for health care, research, education, and administration by applying, integrating, and evaluating information technology along with its associated policies, procedures, and organizational cultures

Medical Informatics Myths

- MI is IT
- Paper is evil
- MI is application support

Practical Definition

Technology > Culture > Policy > Standards

Levels of Evidence

1. Systematic reviews of RCT's (highest level of evidence)
2. Individual RCT (with narrow confidence interval)
3. Systematic review of cohort studies
4. Individual cohort study (and low quality RCT)
5. Outcomes research
6. SR (with homogeneity*) of case-control studies
7. Individual Case-Control Study
8. Case series
9. Expert opinion (lowest level of evidence)
 - Centre for Evidence Based Medicine, Oxford

Practical Definition

The least evolved part of all is
the science of how to manage
this change!

How are we doing?

- **Lousy!**
- *To Err is Human* (44-98K people die as a result of “medical errors” each year)
- Why are we doing so poorly (From *Crossing the Quality Chasm*):
 1. Growing complexity of the science
 2. Increase in chronic conditions
 3. Poorly organized delivery system
 4. Constraints on exploiting IT

What is Computerized Physician Order Entry (CPOE)?

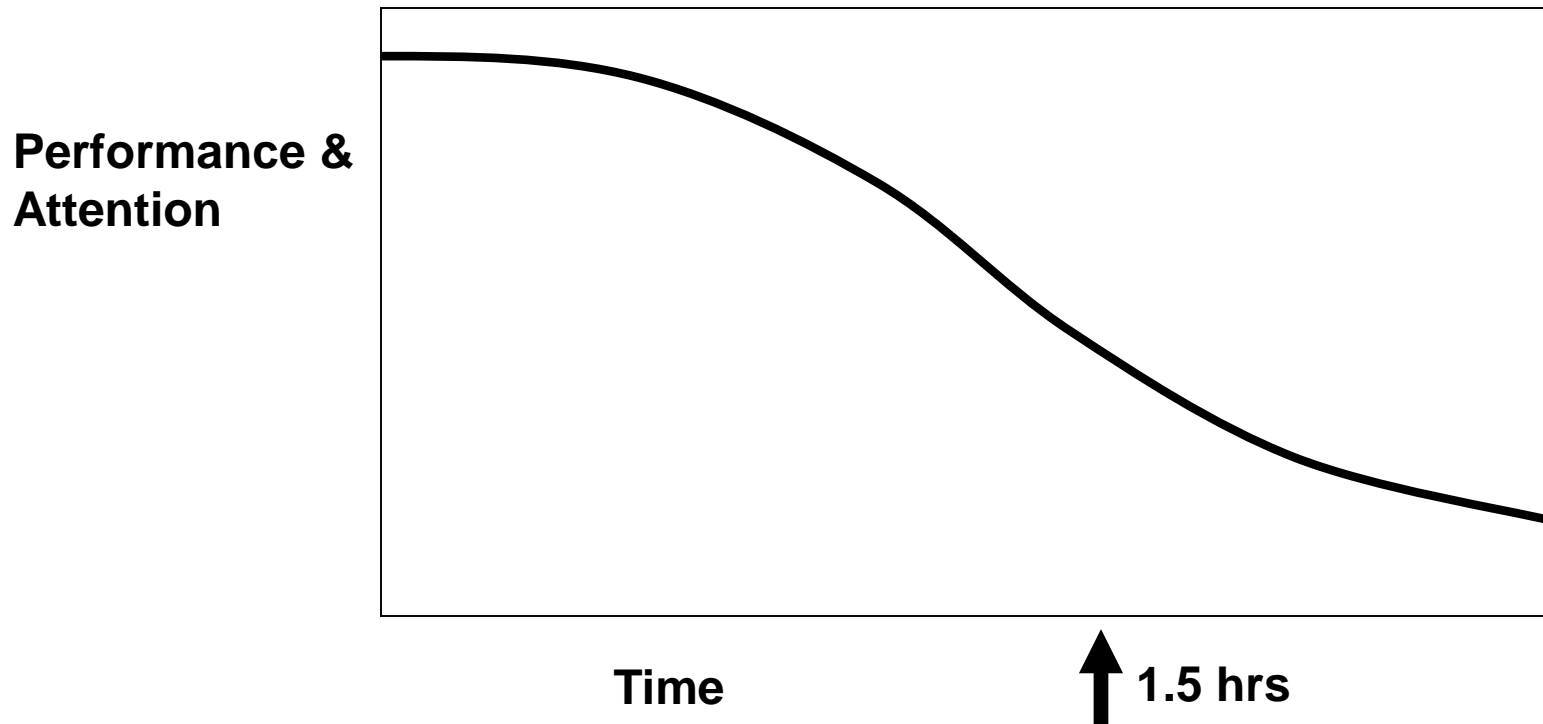
- Physician prescribing their orders using an electronic means with interactive feedback
- The feedback is often just reminding the physician to do what they already know they need to do!
- (We don't have anything like this yet at UNM)

Advantages of CPOE

- Can dramatically improve treatment outcomes
- Can reduces cost
- Improves performance of preventative medicine
- Reduces “medical errors”
- Is a teaching tool

Why does CPOE work?

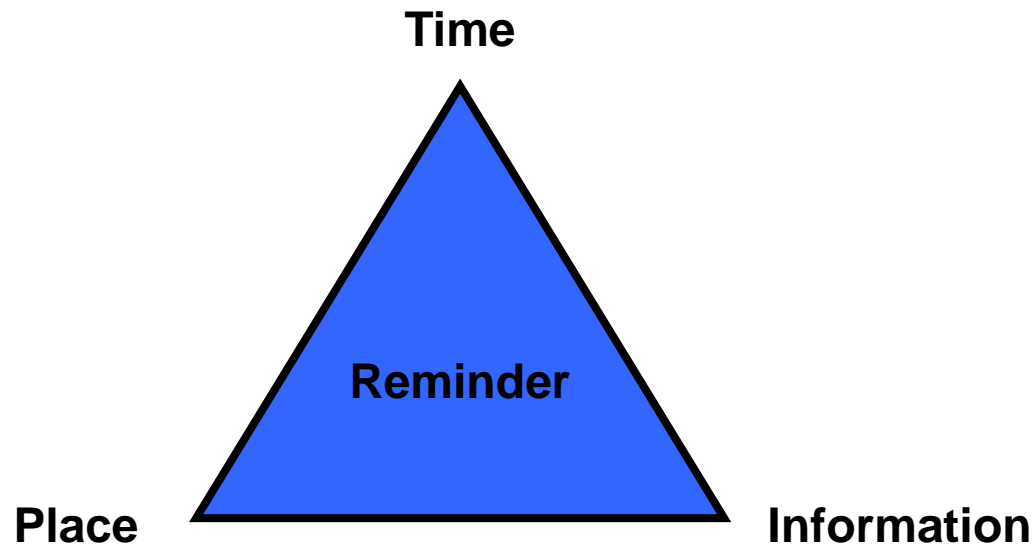
**Time-Performance Curve
For Monitoring a Continuous Process**



How do we make CPOE work in the clinical setting?

- Get physicians' attention
- ..at the **right time**
- ..at the **right place**
- ..using the **right amount of information**

How do we make CPOE work?



Components of Good CPOE System

How do we make it work?

- Computerized Physician Order Entry (CPOE)
 - Order entry is a good time and place for decision support
 - Instantaneous processing of orders
 - Real-time checking of orders
 - More than one person can enter orders at the same time
 - Universal Availability – all orders can be accessed from multiple locations/users simultaneously
 - Improves adherence to protocols
 - Provide new opportunities for clinical research

How do we make it work?

- The down-side to CPOE:
 - It takes more time (scientifically proven)
 - Physicians (generally) don't like or want to use it
 - It is expensive
 - It is complex and difficult to manage
 - It is never “done” and requires continuous evolution

Examples/Proof

- CPOE can work:
 - Can improve the quality of care
 - Can reduce cost of care
 - But does take more time to use

Can it improve quality?

McDonald Study – NEJM Dec 9, 1976

- Purpose: “To determine whether clinical errors can be reduced by prospective computer suggestions..”
- Paper-based, computerized system
- Physicians wrote their notes on computer generated forms
- After the patient visit, data added to the forms by physicians was data entered by clerks into computer system

Can it improve quality?

McDonald Study – NEJM Dec 9, 1976

- The encounter form for the next clinic visit would be printed out the night prior to the scheduled visit
- The computer would “consider” all available clinical, laboratory, and pharmacy data and include a number of suggestions printed on the encounter form
- Logic was set up for 390 medical protocols

Can it improve quality?

McDonald Study – NEJM Dec 9, 1976

- Study conducted in outpatient IM clinic
- All physicians had a 9-month run-in period before reminders were “turned on”
- Cross-over design with 9 physicians total
- 17-wk study, cross-over after week 7
- 712 events needing attention by protocol in 256 patient visits by 189 different patients

Can it improve quality?

McDonald Study – NEJM Dec 9, 1976

- Physicians receiving the paper-based reminders reacted to 51% of events when vs. only 22% when they were in the control phase of the cross-over trial

Can it save money?

Tierney Study – JAMA Jan 20, 1993

- Objective: “To assess the effects on health care resource utilization of a network of microcomputer workstations for writing all inpatient orders”
- Design: Randomized controlled trial of 5219 patients, 68 IM teams of house officers, students, and faculty
- Setting: IM inpatient service at a teaching/county hospital

Can it save money?

Tierney Study – JAMA Jan 20, 1993

- Teams randomized to either write orders electronically (intervention) or on paper (control)
- All teams had electronic access to patients' EMR's
- 12 study rotations, 22 intervention teams, 46 control teams, 68 teams total
- On-call and cross coverage was arranged to be provided by a team with the same study status.
- No significant demographic differences between intervention and control groups

Can it save money?

Tierney Study – JAMA Jan 20, 1993

- Results: Total charges per admission were less for teams using electronic order entry -- \$887, 12.7% less ($p=0.02$)
- Drug charges per admission were \$180 less (15.5% - $p=0.008$)
- Testing (lab, radiology) per admission were \$231 less (12.5% - $p=0.006$)
- Days in hospital were not significantly different

Does it take more time?

Overhage Study – JAMA Aug 2001

- Objective: Does CPOE take more time in the outpatient setting?
- Methods: Time-motion study of physicians before and after the implementation of a CPOE system, at 11 different outpatient practice sites

Does it take more time?

Overhage Study – JAMA Aug 2001

Ambulatory Care Study
11/01/1999 9:25 AM

Provider: Sample,
Observer: Sample, Student

Battery
Sleep

9:21	Talking, patient history
9:21	Walking, inside
9:23	Writing, notes
9:24	Walking, inside
9:24	Examine/read, chart

Begin/End	Writing
Looking	Forms
Talking	PH
Examine/Read	On the phone
Walking	patient
Procedure	getting results
Computer	scheduling tests
	dictating
	paging
	personal
	other

Does it take more time?

Overhage Study – JAMA Aug 2001

- 34 physicians studied
- 110 observation periods
- 3.5 hours of observation/period average
- 382 hours of observation total

Does it take more time?

Overhage Study – JAMA Aug 2001

- Results: Physicians spent an average 2.12 minutes (6.2%) longer per patient when using CPOE
- Research noticed physicians while in intervention group continued to perform tasks the computer performed automatically for them

Other Studied MI Topics

- Inpatient antibiotics – more appropriate utilization
- Automatic ventilator management – weans patients faster than pulmonologists can
- Data sharing between institutions – Sharing laboratory data between ER's can reduce costs
- Improved/increased preventative therapies
- Improved/increased use of advanced directives

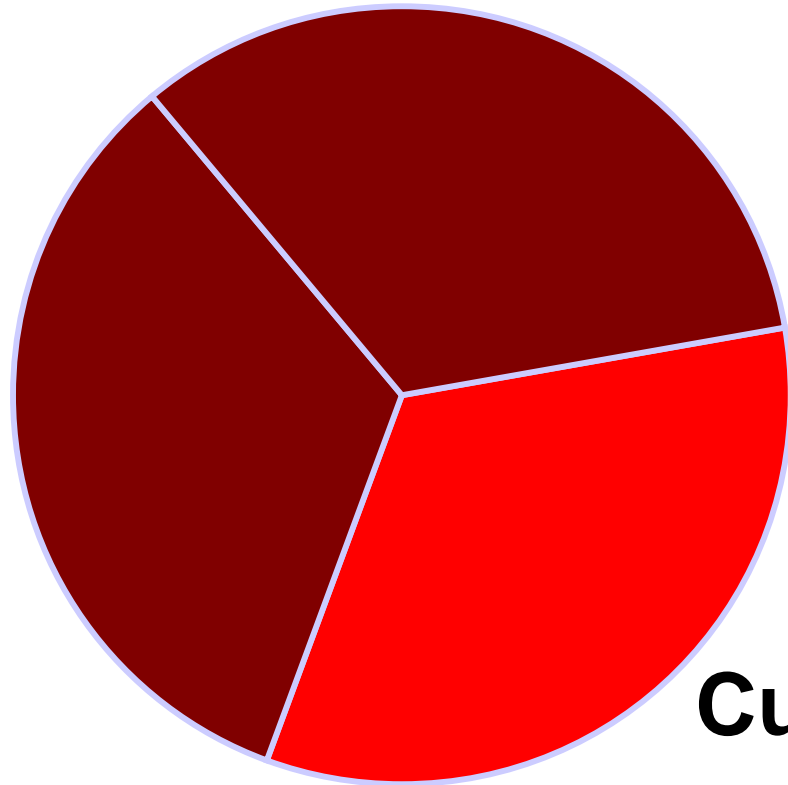
Final Thoughts on CPOE

- It is not perfect, cheap, or easy
- It is not about the need for more or better training
- It is not about having the “right” technology or computer system

Final Thoughts on CPOE

- It definitely can improve care
- It definitely can reduce cost
- We've know about this for decades!!!!

It's about us!



Culture, i.e. us

Questions?

- Bibliography of interesting MI articles:

<http://hsc.unm.edu/library/kmit/informatics/Recommended%20MI%20Papers.pdf>

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