PATIENT SAFETY

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Patient Safety

Definition of Patient Safety;

- Freedom from injury or illness resulting from the processes of care

- Patient safety is the avoidance and prevention of patient injuries or adverse events resulting from the processes of healthcare delivery
    - Defined by AHRQ (Agency for Healthcare Research and Quality) and NQF (National Forum for Quality Measurement and Reporting)
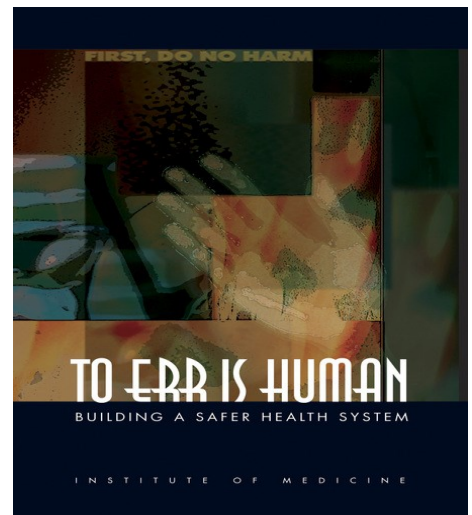
Patient Safety Issues

- There are many patient safety issues: **medication errors**, **wrong site** surgery, **restraint** injuries, **falls**, retained foreign objects, **delay** in diagnosis, infant **abduction**, **misdiagnosis**, **communication** errors, transfusion errors, surgical site **infection**, **critical** lab results, **skin tears**, awareness during OR, OR fires, **MRI safety**, **infections**, **Inpatient suicides**

What is Medical Error?

- Definition according to IOM
  - Failure of a planned action to be completed as intended or the use of a wrong plan to achieve an aim

  - Examples:
    - adverse drug events
    - surgical injuries and wrong-site surgery
    - restraint-related injuries or death
    - falls
    - pressure ulcers

Do No Harm

Medical Errors !

The Harvard study of Patient Safety

- A Study of the impact of medical errors:

- Harvard Medical Practice Study
    - Reviewed >30,000 charts from randomly selected patients in acute and non-acute hospitals in New York
    - 3.6% of hospitalized patients experienced adverse events resulting in harm
    - 70% of these events resulted in disability lasting less than 6 months, 13.6% resulted in death, 2.7% permanent disability

The Australian study of Patient Safety

- Quality of Australian Health Care Study in 1995

  - Placed greater emphasis on **quality of care** than negligence, i.e., could the adverse event be prevented?

  - Reviewed >14,000 charts from 28 hospitals
    - 16.6% of hospitalized patients experienced adverse events
      - 77.1% of those had disability lasting less 12 months
      - 13.7% with permanent disability
      - 4.9% ended in death
    - 51% of the adverse events were considered preventable

The History of Patient Safety

- In early 1995 an epidemic of errors flash up

  - Michigan --a surgeon performing a mastectomy on a 69-year-old patient removed the wrong breast
  - New York--a woman died when a doctor mistook her dialysis catheter for a feeding tube and ordered food to be pumped into her abdomen
  - Tampa --a 51-year-old diabetic had the wrong foot amputated and a 73-year-old retired electrician died when a therapist mistakenly disconnected his ventilator

Err is Human;

- The Institute of Medicine (IOM) study "To Err is Human; Building a Safer Healthcare System"
- Adverse events occur in **2.9 to 3.7%** of all hospitalizations
- 44,000 to **98,000** patients dies a year as a result of medical errors
- Source at http://books.nap.edu/openbook.php?isbn=0309068371

- Institute of Medicine (IOM) estimated that around 98,000 patients die each year as a consequence of preventable errors. Likewise, a study of two UK hospitals found that 11% of admitted patients experienced adverse events of which 48% of these events were most likely preventable if the **right knowledge was applied**.

- The **under-utilization** of healthcare data- information - knowledge contributes to improper clinical decisions, medical errors, under-utilization of resources and raise in healthcare delivery costs

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Annual Accidental Deaths
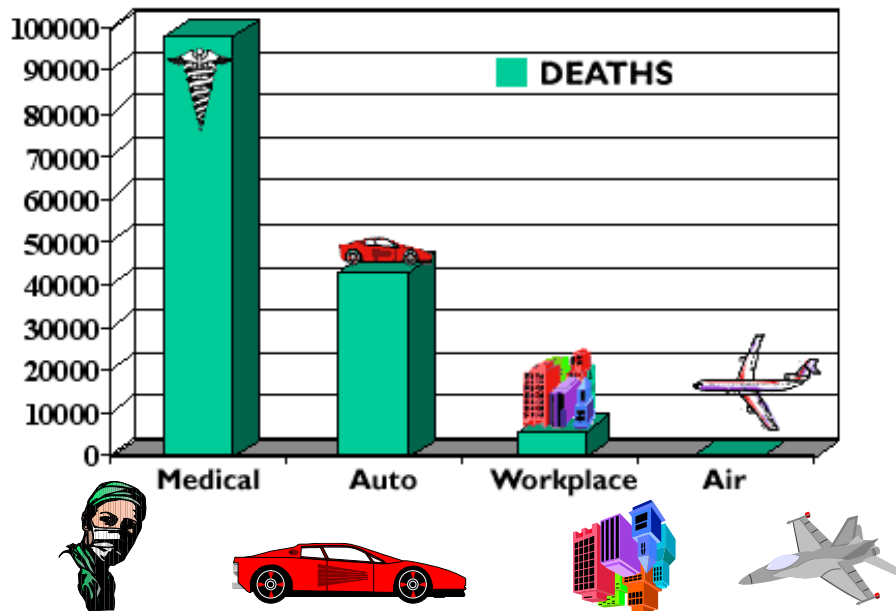
3rd

leading cause of Death in USA ?

Medical Errors

1200 per day / **50** per hour

- The total number of Americans dying prematurely from medical errors was about **400,000 per year***

- The **epidemic of patient harm in hospitals** must be taken more seriously if it is to be curtailed**

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- **One in 5** patients discharged from the hospital end up sicker within 30 days and **half** are medication related
- **One of 10** inpatients suffers as a result of a mistake with medications cause significant injury or death
- Preventable medical errors cost the US $17 to $ **29** billion dollars a year

  - Source: Safe Practices for Better Healthcare Why Implement Practices to Improve Safety at http://www.qualityforum.org/News_And_Resources/Press_Kits/Safe_Practices_for_Better_Healthcare.aspx

Cost of Medical Error

- Estimated direct cost of medical error in US $17 billion

- Preventable adverse events to Medicare patients estimated to cost in excess of $880 million annually

- A study from 2008 revealed overall cost of medical error in the US to be >$19.5 billion
  - Total cost per error approx. $13,000
  - >2500 avoidable deaths
  - >10 million days of lost productivity at work, costing $1.1 billion in short-term disability claims

Type of Errors

Preventive	Diagnostic	Treatment	Other
• **Failure to provide prophylactic treatment** • **Inadequate monitoring or follow-up of treatment**	• **Error or delay in diagnosis** • **Failure to employ indicated tests** • **Failure to act on results of monitoring or testing**	• **Error in the performance of an operation, procedure, or test** • **Error in administering the treatment** • **Error in the dose or method of using a drug** • **Avoidable delay in treatment or in responding to an abnormal test**	• **Failure of communication** • **Equipment failure** • **No Policy/ procedure** • **Other system failure** • **Poor coordination in the care plan**

Estimation for Cost of Most Common Medical Errors

Event	Number of injuries 2008	% considered due to error	Medical cost per event	Total cost per event
Pressure ulcers	394,699	>90	$8730	$10,288
Post-operative infections	265,995	>90	$13,312	$14,458
Mechanical complication of device, implant or graft	268,353	10-35	$17,709	$18,771
Hemorrhage complicating procedure	156,433	35-65	$8,665	$12,272

Something significant
is wrong or missing
in Healthcare

"Modern healthcare is the **most complex human activity** *there is, due to interpersonal relationships between many different clinicians with different expertise and interests, and we haven't figured out how to make that work well.*

We have come to a full stop against a complex environment that resists accepting change on the scale clearly required"

Lucian Leape, MD
Founder of the Modern Patient Safety Movement
Adjunct professor of health policy at Harvard University
"Error in Medicine," published in JAMA, 1994

- "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.

Why is Healthcare Prone to Error?

- Multiple and varied interactions with technology, tools, and devices
- Many individuals involved in care
- Multiple hand-offs
- High acuity of illness
- Distracting work environment
- Rapid, time-pressured decisions
- High volume, unpredictable patient flow
- Multiple step processes

Flood of Information

- Huge gap in data acquisition and information → knowledge capacity
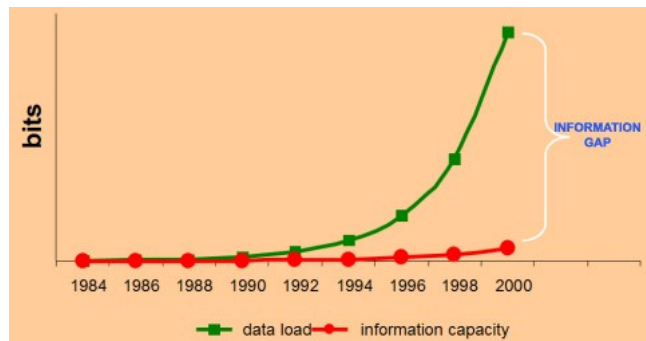
Data – knowledge - utilization
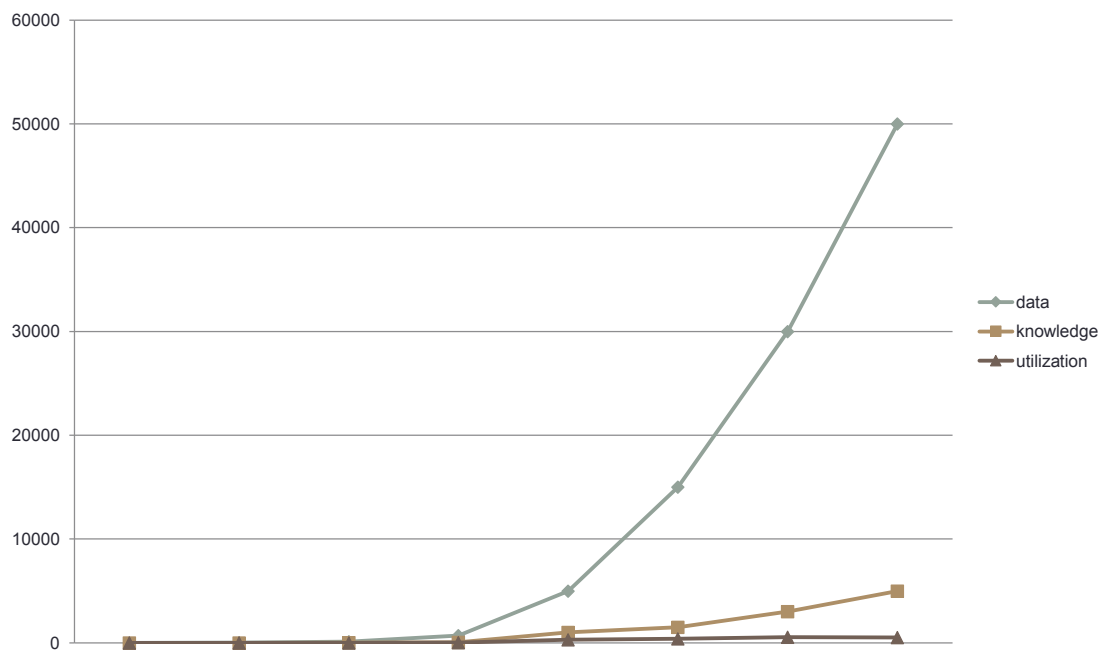
What Medical Informatics tools can?…

- 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.)
- And more….

Local study on medications error

Methodology:

Study setting:

The study took place at King Khalid University Hospital in the outpatient and inpatient pharmacies from October 2011 to April 2012.

Study subject:

The target population for this study was handwritten and electronic prescriptions.

Study design:

Prospective study of randomized collection of prescriptions.

Methodology:

Data collection:

• **Handwritten prescriptions were taken in the morning and in the afternoon of all the five working days.**

• **All e-prescribed orders were taken from inpatient pharmacy for one week.**

• **All handwritten prescriptions were assessed for:**
   ✓ **completeness using a checklist based on the hospital prescription.**
   ✓ **Legibility using 3-point legibility scoring Likert scale [7] by two pharmacists.**

• **Both handwritten and electronic prescriptions were assessed for prescribing errors using checklist of errors adapted from previous studies.[2,9,10]**

No of prescription	First pharmacist			Second pharmacist		
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐
	1 ☐	2 ☐	3 ☐	1 ☐	2 ☐	3 ☐

Table 1: Assessment of Handwritten Prescriptions completeness

Information assessed	No. of prescription with omission (%)
Patient name	0 (0.0%)
Hospital no.	0 (0.0%)
Sex	64 (32.2%)
Age	132 (66.3%)
National ID	171 (85.9%)
Diagnosis	39 (19.6%)
Generic name	85 (42.7%)
Frequency	3 (1.5%)
Dose	20 (10.1%)
Duration	2 (1.0%)
Route of administration	29 (14.6%)
physician's name	12 (6.0%)
Extension and bleep	25 (12.6%)
physician's signature	7 (3.5%)
Date	12 (6.0%)
Clinic name	1 (0.5%)
Total of prescriptions were evaluated: 199 (100%)	

Table 2: Assessment of Handwritten Prescriptions Legibility

Scale*	No. of prescription (%)		% of average scale
	Pharmacist A	Pharmacist B	
1	195 (98.0%)	156 (78.4%)	**88.2**
2	3 (1.5%)	27 (13.6%)	7.5
3	1 (0.5%)	16 (8.0%)	4.3
Total	199 (100%)	199 (100%)	100%
Total of illegible and partially illegible !	4 (2.0%)	43 (21.6%)	11.8%

*1= Legible, 2= legible with effort, 3= illegible
^ pharmacist 1= expert
~ pharmacist2= new
! scale of 2 and 3

Results:

- **Regarding prescribing errors, 85.9% of handwritten prescriptions had prescribing errors whereas only 3.5% in E-prescription system.**

- **Comparing the incidence of prescribing errors between electronic and handwritten prescriptions, the incidence of age errors (66.3%), unapproved abbreviation (46.7%), route of administration errors (15.1%) and dose errors (12.1%) were statistically significant.**

Table 3: The Incidence and Comparison of Prescribing Errors in handwritten and Electronic prescriptions

Type of errors	Count (% within prescription type)		P-value
	E-prescription prescription	Handwritten	
Patient`s name	1 (0.5%)	0 (0.0%)	1.000
Hospital no.	1 (0.5%)	0 (0.0%)	1.000
Age	0 (0.0%)	132 (66.3%)	0.000 +
Dose	2 (1.0%)	24 (12.1%)	0.000 +
Frequency	3 (1.5%)	6 (3.0%)	0.503
Route of administration	0 (0.0%)	30 (15.1%)	0.000 +
Treatment duration	0 (0.0%)	5 (2.5%)	0.061
Medication duplication	0 (0.0%)	4 (2.0%)	0.123
Drug/drug interaction	0 (0.0%)	2 (1.0%)	0.499
Unapproved abbreviation	0 (0.0%)	93 (46.7%)	0.000 +

Results:

figure1" :The distribution of prescribing errors in handwritten prescriptions among outpatient departments.

0.6%

14.0%

47.4%

38.0%

- ■ MOPD
- ■ PCC
- ■ SOPD
- ■ unknown

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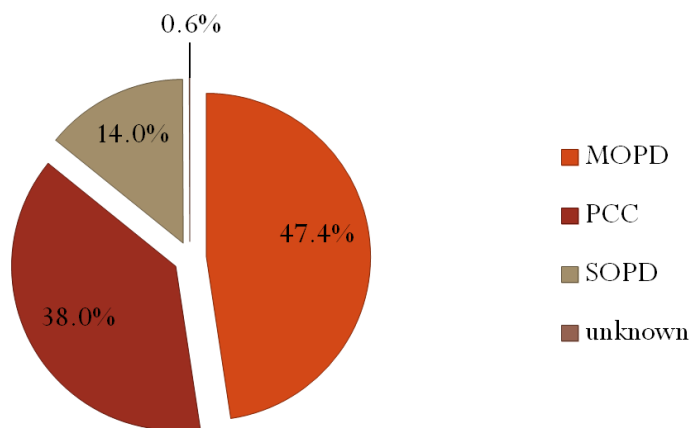
" MOPD: Medicine Out-Patient Department, PCC: Primary Care Clinic, SOPD: Surgery Out-Patient Department

Benefits of CPOE

- **≥50% of none-intercepted serious MEs rate decreased significantly (Bates et al, 1998).**

- **81% reduction of medication errors (Bates et al, 1999).**

- **Decreased patients LOS (Rothschild, 2004).**

- **Improves medication reconciliation process (Vira et al, 2006).**

- **Improves the prescribers' compliance (Cunningham et al , 2008).**

- **Decreases mortality rate by 20% per month (Longhurst et al, 2010).**

- **Improves patients satisfaction (Spalding et al, 2011).**

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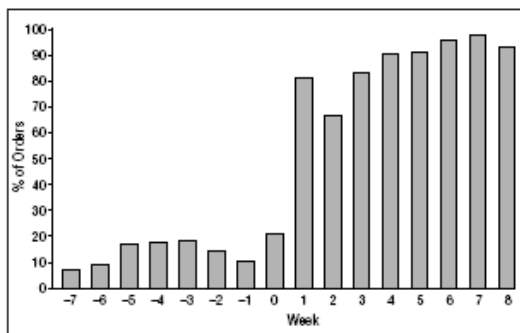
Figure 3. *Change in use of nizatidine, as a percentage of all oral histamine₂-blocker orders, after the computer intervention was introduced (Week 0).*
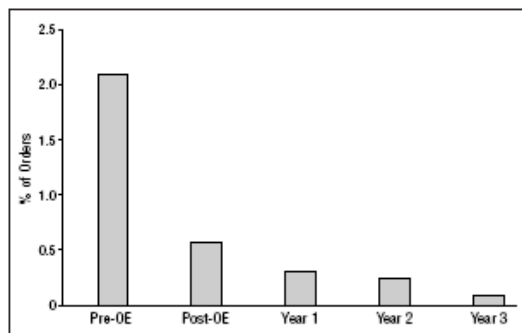
Figure 5. *Percentage of medication orders with doses exceeding the recommended maximum.*

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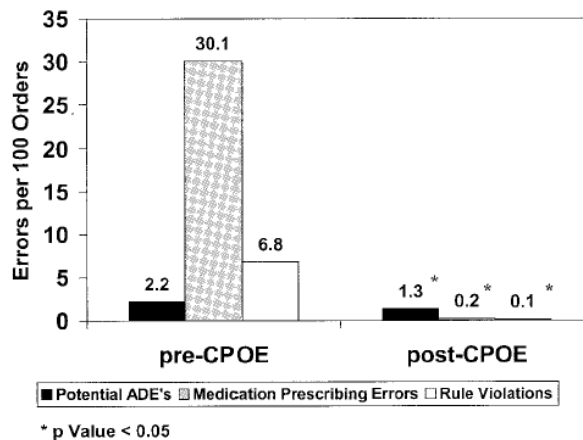
Potts AL, Barr FE, et al. Pediatrics. 2004 Jan;113(1 Pt 1):59-63.

Example CPOE reduce costs

Brigham and Women's Experience: Cost-Effective

- Cost:
  - $3.7 million implementation
  - $ 600,000 to $1.1 million operational costs
- Results:
  - Decreased drug costs
  - ADE cost is approximately $4,700
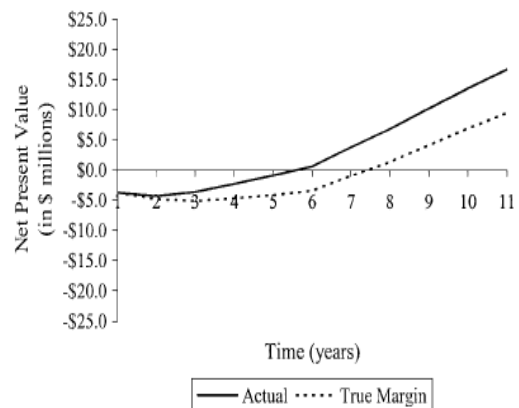
Kausal R et al. J Am Med Inform Assoc. 2006; 13(3): 365-7

Does CPOE Take More Time?

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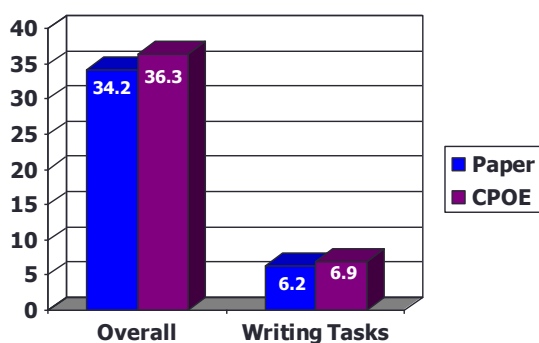
**Time Spent/Patient Encounter—
Duplicate Tasks Removed (minutes)**
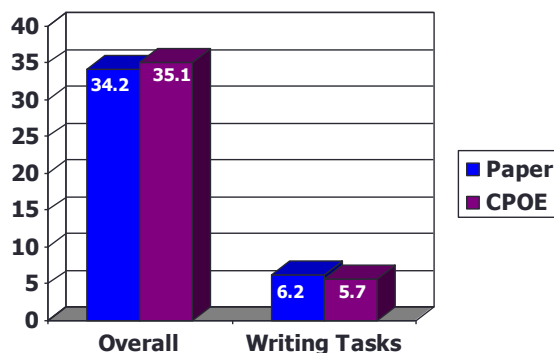
Evidence shows that CPOE adds less than one minute to the time physicians spent writing orders and overall only added 1-2 minutes per patient encounter. As physicians gained experience with the system, the time for orders actually decreased.

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

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Just a Culture Principles

- **Values** and expectations-what is important to the organization
- **System** design and continual redesign of system and address processes and systems so it does not happen to someone else
  - Coaching and open environment
- **Peer to peer** coaching where helping one another to stay safe and make sure things are being done correctly
  - Just culture algorithms can help
- Patient safety needs to be viewed as a **strategic** priority
- The entire hospital needs to be focused on patient safety if a culture of safety is to be established

Dekker S. *Just Culture: Balancing Safety and Accountability*. Burlington, VT: Ashgate Publishing;; 2008.
Marx D. *Patient Safety and the Just Culture: A Primer for Health Care Executives*. New York, NY: Trustees of Columbia University;; 2001.

Examples:

- Having a patient safety **plan**
- Doing an **annual** report card, use **trigger** tools
- Have a patient safety committee
- Many also have separate medication management committee from safety committee (more **attention**)
- **Education** for staff to make sure they know near misses must be included in definition of medical error
- Doing patient safety walkabout **rounds** by senior leaders

Examples:

- Having safety department **champion**
- Provide **literature** and articles on patient safety on intranet
- Considering patient safety week **fair** with local articles in newspaper and patient safety literature
- Board **report** at least yearly, consider more frequent, written reports of sentinel events, and whether patient informed
- Considering **training** & development

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Key success of a Culture of Safety

- **Acknowledgment** of the high-risk nature of an hospital's activities and the determination to achieve consistently safe operations
- A **blame-free** environment where individuals are able to report errors or near misses without fear of reprimand or punishment
- **Encouragement** of collaboration across ranks and disciplines to seek solutions to patient safety problems
- Organizational **commitment** and resources to address safety concerns

Types of Error

- Diagnostic
  - Failure to order appropriate test
  - Delay in diagnosis
  - Failure to act on results or monitoring
- Treatment
  - Error in the performance of an operation, procedure, or test
  - Error in administering the treatment
  - Error in the dose or method of using a drug
- Preventative
  - Failure to provide appropriate monitoring or follow-up
  - Failure to provide prophylactic treatment
- Others
  - Failure of communication
  - Equipment failure
  - Other system failure

People Factors in Error

- Fatigue
- Interruptions
- Unfamiliar situations
- Miscommunication
- Heavy workload

Event 'Management'

Action in order:
- **Prevent** failure but if you can't,
- Make failure **visible** and
- Prevent **adverse** effects of failure or
- **Mitigate** the adverse effects
- **Learn** from all events

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Patient Safety and Quality Improvement Act of 2005

- Signed into Law 7/29/05
- Nationwide Goals
  - "To encourage the voluntary reporting of medical errors"
  - Report to "Certified Patient Safety Organizations"
- Many providers fear repercussions
  - Act provides federal legal privilege and confidentiality protection

Errors Provide Useful Information

- We can learn more from our failures than from success

- Our processes can be improved when studied

"Give me a fruitful error anytime, full of seeds, bursting with its own corrections. You can keep your sterile truth to yourself."
Vilfred Pareto

Root Cause Analysis Basics

Symptom of the problem.
"The Weed"
Above the surface
(obvious)

The <u>Underlying Causes</u>
"The Root"
Below the surface
(not obvious)
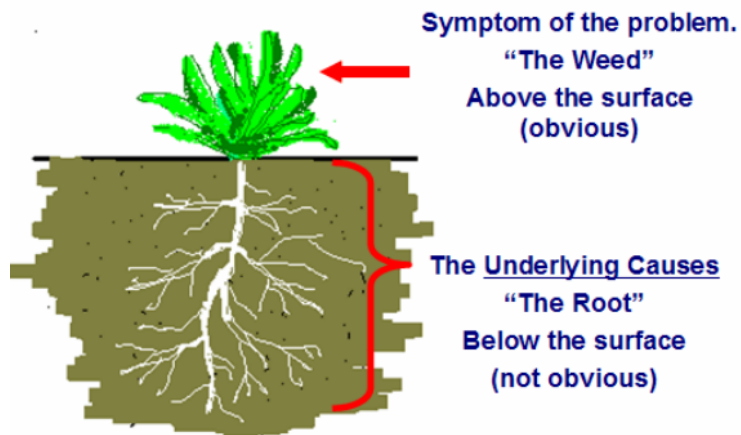
The word root, in root cause analysis, refers to the underlying causes, not the one cause.

Which patients are most at risk of medication error?

- patients on **multiple** medications
- patients with **another** condition, e.g. renal impairment, pregnancy
- patients who **cannot communicate** well
- patients who have **more than one doctor**
- patients who do not take an **active role** in their own medication use
- **children** and babies (dose calculations required)

Examples of Analysis Tools

- Root **Cause** Analysis (RCA)
  - causal or risk trees
- Data **Mining** and Case-Based Reasoning (CBR)
  - trend and cluster analysis

  Failure Mode and Effects Analysis (FMEA)

  Probabilistic Risk Assessment (PRA)
- **Sense-Making**

Systems Process Changes
Structure, Environment, and People

- Simplification
- Standardization
- Process design includes prompts
- Elimination of sound/look-alikes
- Environment/product improvements
- Training
- Teamwork
- Communication

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Why health Informatics?

➢Improve the access of care

➢Access to educational opportunities for health professionals as well as consumers

➢Efficient communications and documentations

➢Cost effective

➢Consumer (patient) engagement

➢Prompt alerts and notifications

➢Decision support system

➢Manage data and store information

➢Secured access and defined privileges

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Why health Informatics?

➢Protocol guided and standardized practices

➢Accessible documentations

➢Legible orders, requests, and reports

➢Integrated care delivery

➢Support Lean processes toward more efficient workflows

➢Facilitate productivity measurements and monitoring

➢Reinforce clinicians compliance on evidence-based practices.

➢Others …….

Selected Resources for Patient Safety Information

- Agency for Healthcare Research and Quality www.ahrq.gov
- Institute of Medicine of the National Academies www.iom.edu
- The Joint Commission www.jointcommission.org
- Institute for Safe Medication Practices www.ismp.org
- National Patient Safety Foundation http://npsf.org/
- JCAHO "Speak Up" program
  - http://www.jcaho.org/general+public/patient+safety/speak+up/index.htm

National Academy of Science's Institute of Medicine (IOM)

- In 2001, the IOM laid out six dimensions of quality for health care.
- According to the IOM, health care should be
  - **Safe**
  - Effective
  - Patient-centered
  - Timely
  - Efficient
  - Equitable

Why is Patient Safety Important to Me?

- It can save lives
- It can make **YOU** a better physician
- It is part of every hospital plan – no matter where you work
- You can help others in your team/hospital save lives and be better physicians/staff
- Required by accreditation bodies
- **It is a required part in most resident education curriculum worldwide**
- **Etqan** (إن الله يحب إذا عمل أحدكم عملا أن يتقنه)

Thank you

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