Reducing Errors and Saving Lives with Health IT

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Agenda for Today

- Understanding quality
- Scope of the problem
  - Focus on medication errors
- Health IT (HIT) to reduce medication errors
- Leadership challenges
- Breakthroughs on the horizon

Understanding Quality

- Dimensions
  - Misuse of services – Medical errors
  - Underuse of services
  - Misuse of services
  - Variation in use of services

The challenge and potential..www.ahrq.gov/qual/21stcena.htm

The Knowing-Doing Gap

How Smart Companies Turn Knowledge into Action

Jeffrey Pfeffer and Robert I. Sutton

HARVARD BUSINESS SCHOOL PRESS

Scope of the Problem: Focus on Medication Errors

Disturbing Numbers Ahead!!

If medical errors were included among leading causes of death

LEADING CAUSES OF DEATH[1]	
Diseases of the Heart	726,974
Cancer (malignant neoplasms)	539,577
Cerebrovascular Disease	159,791
Chronic Obstructive Pulmonary Disease	109,029
Medical Errors[2]	44,000–98,000
Accidents and Adverse Effects (motor vehicle accidents = 43,458; all others = 52,186)	95,644
Pneumonia and Influenza	86,449
Diabetes	62,636
Suicide	30,535
Kidney Disease	25,331
Liver Disease	25,175

SOURCES: 1. Centers for Disease Control and Prevention, 1997. 2. IOM, *To Err Is Human: Building a Safer Health System*, 2000.

Medical errors

- HealthGrades
  - – 2004: no. of deaths due to med errors upto 200,000
  - – 2005: widening gap between best and worst hospitals
- Large teaching hospital
  - – 62.4 errors per 1,000 med orders
  - – 31% clinically serious

Preventing Medication Errors. Institute of Medicine, 2006

Medication Errors

- A hospital patient is subjected to at least one medication error per day.
- At least ¼ of all ADEs are preventable.
- At least 1.5 million preventable ADEs occur each year in the United States.

Preventing Medication Errors. Institute of Medicine, 2006

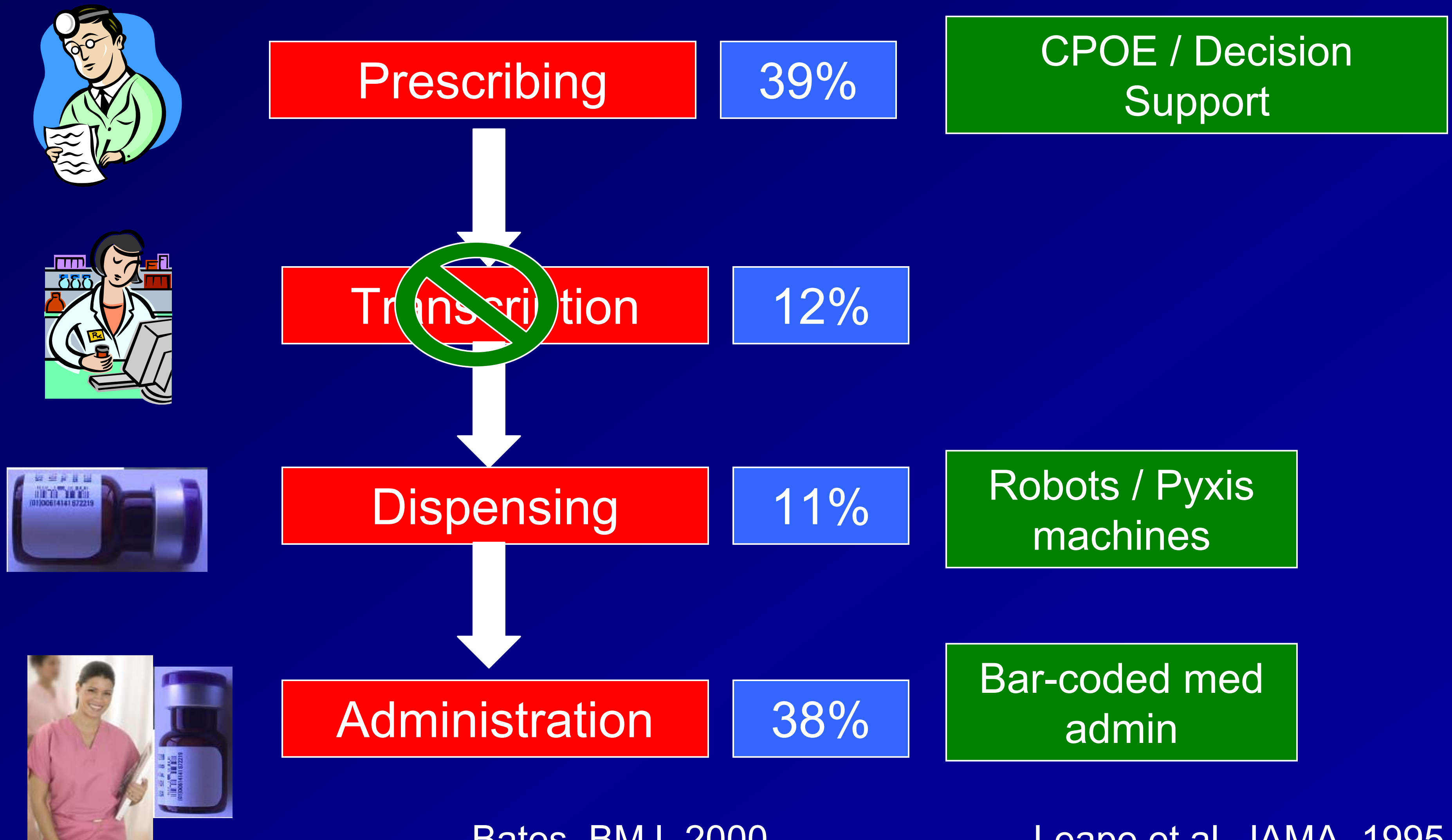
1.5 Million Preventable ADEs

- Hospitals: 380,000 – 450,000
- Long-term care: 800,000
- Ambulatory care: 530,000

The above does not include errors of omission

Preventing Medication Errors. Institute of Medicine, 2006

HIT to Reduce Med Errors



Common Prescribing Errors

- Dose adjustment in patient with renal or hepatic dysfunction
- History of allergy to the same medication class
- Using the wrong drug name, dosage form or abbreviation
- Incorrect dose calculation, decimal points or units.

Lesar et al. JAMA. 1997

CPOE: Typical Dose Options

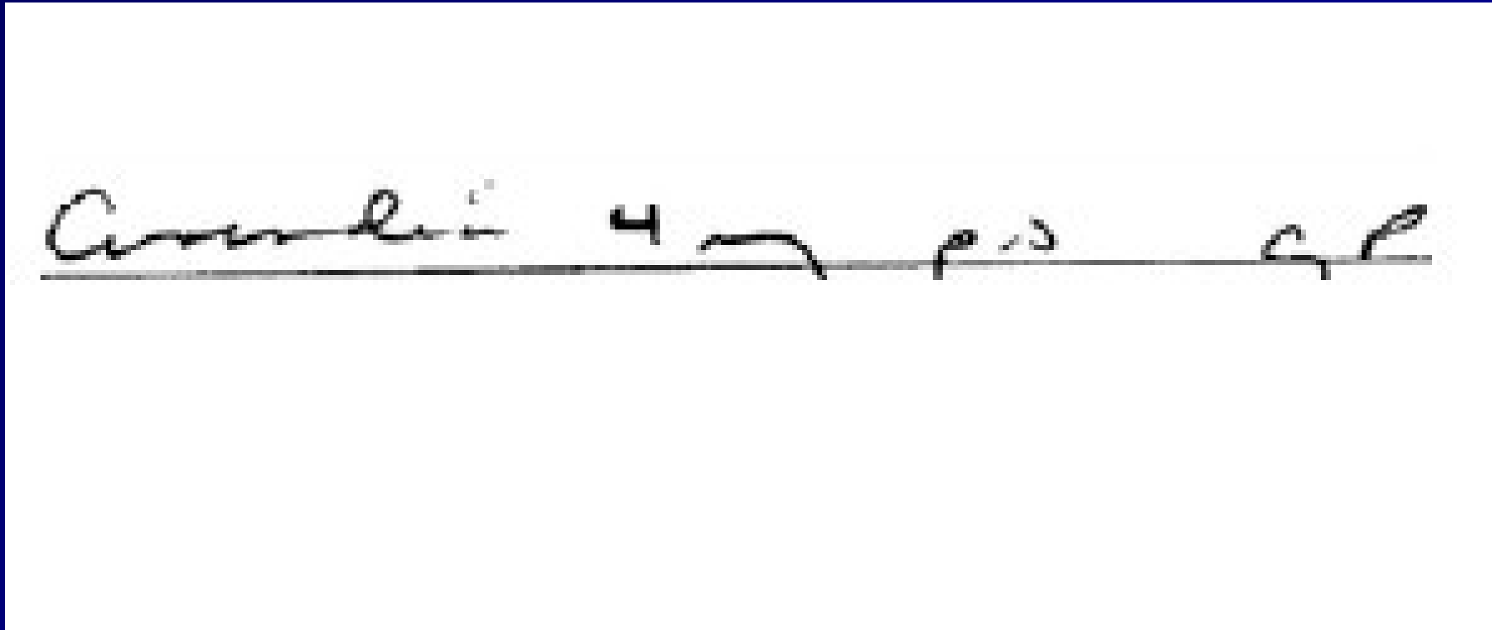
Metformin Hydrochloride New Order

#	Typical Order Options
1	500 mg po bid
2	1000 mg po bid
3	500 mg po tid
4	500 mg po bid @ 07:30 & 17:30
5	500 mg po tid @ 07:30, 12:30 & 17:30

Metformin Is (

1	
2	
3	
4	500 mg po bid @ 07:30 & 17:30

CPOE Produces Legible Orders



Drug-allergy Alert

Number: **1708** Location: **D3S09-A** Gender: **Female**
Visit Number: **1708-1** Crnt Loc: Age: **62Y**

UST FIRST REVIEW PATIENT'S MEDS

Ht ** Est(

Interactio
Previous
Prescrib
Sympton otassium)
administ

Interaction Monograph

Ampicillin	Metampicillin	Penicillin V Benzathine
Azlocillin	Methicillin	Phenethicillin
Bacampicillin	Mezlocillin	Piperacillin
Carbenicillin	Nafcillin	Pivampicillin
Cloxacillin	Oxacillin	Sultamicillin
Cyclacillin	Penicillin G Benzathine	Talampicillin
Dicloxacillin	Penicillin G Procaine	Ticarcillin

Discussion: Treatment of some penicillin-allergic patients with cephalosporins (CSP) can result in allergic symptoms. The frequency of allergic reactions to cephalosporins in patients without a history of penicillin (PCN) allergy is 1.4% to 1.9%; the incidence of CSP allergy in patients with known sensitivity to PCN is 5 times greater (8.2%)(3,5,11). Rates as high as 15% to 20% can be found for the PCN allergic group (2). It has not been possible to determine if this higher frequency is due exclusively to immunologic cross-reactivity.

CPOE: Drug-drug Interactions

Interaction Options

Drug-Drug Interaction
Losartan Potassium with Spironolactone
Onset: delayed Severity: major Documentation: suspected
The risk of hyperkalemia may be increased when Spironolactone are co-administered with Losartan Potassium.

Previous Adverse Reaction
Prescribed drug: Losartan Potassium
Symptom swelling reported with prior Fosinopril administration.

CHF Order Sets

CHF ORDERS

	Nursing Orders
1	Inpatient Admit Status
2	Vital Signs
3	Activity
4	Daily Weight
5	Fingerstick Glucose Approval
6	Intake and Output
7	Oxygen Therapy
8	Pulse Ox Continuous
9	Pulse Ox Spot
10	Elevate Head
11	Notify Provider
	Nutrition
12	Diet
	Reminder
	Document Allergies
13	Nicotine Patch: 21 mg
[illegible]	[illegible]tine Patch: 14 mg daily
15	Nicotine Patch: 7 mg daily
16	Non-smoker
17	Patient refused

	Diuretic/Supplements
18	Furosemide
19	Metolazone
20	Spironolactone
21	HydrochloroTHIAZIDE
22	POTassium Chloride
23	POTassium Chloride (IV) Riders
24	Magnesium Oxide
25	MAGnesium Sulfate
	Inotrope
26	Milrinone Lactate
27	Nesiritide
28	DOButamine Hydrochloride
29	DOPamine Hydrochloride
	ACEI/ARB
30	Captopril
31	Fosinopril Sodium
32	Irbesartan
33	Losartan (Cozaar)
34	Losartan 50 mg / HCTZ 12.5 mg
35	Losartan 100 mg / HCTZ 25 mg

Post-op Surgical Prophylactic Antibiotics

Cefazolin Sodium (Prophylaxis) New Order

Typical Order Options

Surgical Prophylactic Orders	
IV Piggyback	
1	1 gm IVPB x1
2	____ gm IVPB x1
Intramuscular	
3	1 gm IM x1
4	____ gm IM x1
IV Push	
5	1 gm IVP x1
6	____ gm IVP x1

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FDA Alert in Promethazine Order

ochloride) New Order

s

FDA ALERT

/// PROMETHAZINE SHOULD NOT BE USED FOR CHILDREN LESS THAN TWO YEARS ///

//// OF AGE BECAUSE OF THE POTENTIAL FOR FATAL RESPIRATORY DEPRESSION ///

Preferred Parenteral Route Of Administration is deep IM Injection

Intramuscular ONLY

STAT

Evidence for CPOE

- Brigham and Women's Hospital, Boston
  - 55% relative reduction in non-intercepted serious medication errors[1].
  - Follow up: 85% relative reduction in non-intercepted serious medication errors[2]

1 Bates DW et al. JAMA. 1998;280:1311-6
2 Bates DW et al. J Am Med Inform Assoc. 1999; 6:313-21

Percentage of Medication Orders with Doses Exceeding the Maximum

Percentage of Orders

2.5
2.0
1.5
1.0
0.5
0.0

During 1 mo before Computerized Order Entry
During 1 mo after Computerized Order Entry
Year 1
Year 2
Year 3

Bates D and Gawande A. N Engl J Med 2003;348:2526-2534

The NEW ENGLAND JOURNAL of MEDICINE

Evidence for CPOE

- LDS Hospital, Utah
  - Statistically significant decrease in antibiotic-associated ADEs (28 to 4 events)
  - Decreased length of stay (13 to 10 days)
  - Reduction in total hospital costs
    - $35,283 to 26,315

Evans RS et al. Ann Pharmacothe. 1999;33:1026-31

Evidence for CPOE

- Community Hospital in Phoenix, Arizona
  - 37 specific drug-related alerts
  - In 6 months, system fired 1,116 alerts.
  - Of these 596 were true positive (PPV 53%)
  - 44% (264) alerts were unrecognized by the physician prior to alert notification.

Raschke et al. JAMA. 1998

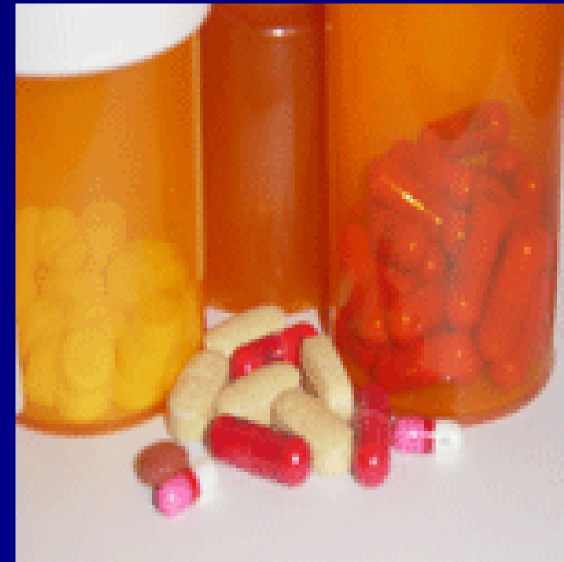
Prescribing Errors

Prescribing

Transcription

Dispensing

Administration



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Patient's Home Meds

Medication Reconciliation

ADVANCED SEARCH | CONTACT US |

Joint Commission
on Accreditation of Healthcare Organizations
Setting the Standard for Quality in Health Care

Setting the Standard for Quality in Health Care

HOME | ACCREDITATION PROGRAMS | CERTIFICATION PROGRAMS | STANDARDS | PATIENT SAFETY | SENTINEL EVENT

Printer-Friendly

"Do Not Use" List
Eisenberg Award
Infection Control
National Patient Safety Goals

Home > Patient Safety ... als

National Patie...

2007 Hospital/... ital

2007 National Patient ... ss H...
Implementation Expe...

2007 National Patient ... sion

"Do Not Use" List
Eisenberg Award
Infection Control
National Patient Safety Goals
Patient Safety Practices
Speak Up
Universal Protocol

Electronic Medication Reconciliation System

Gather Home Meds Hx from ALL sources

Documents 'intended' action for each med

Write orders in CPOE

'MedRecon' action

Admission orders

Reconciliation & discrepancy documentation

Medication Reconciliation Research Study

- 3-month period – Aug to Oct ’06
- Analyzed 3,426 unique events
- Primary: discrepancy rate between home meds and admission orders
- Secondary: positive and negative correlating factors

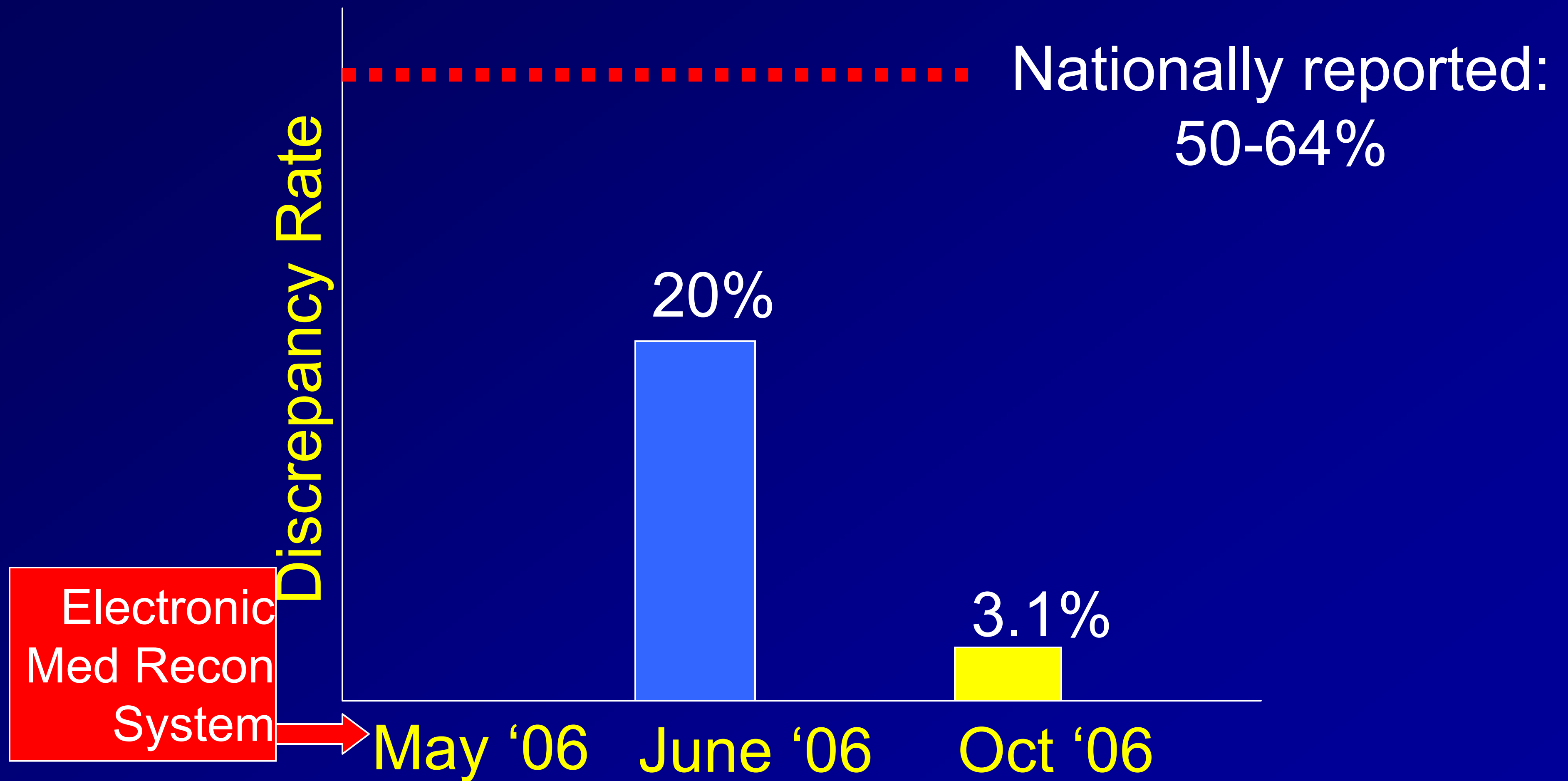
Agrawal A, et al. 2006. Submitted to World Congress in Health Informatics

Results

Total events with discrepancies: 107 (3.12%)

Omission of a home med	65	56.5%
Ordering a ‘discontd med”	12	10.4%
Dose discrepancy	11	9.5%
Frequency discrepancy	1	.9%
Therapeutic	4	3.48%
Other	22	19.13%
	115	

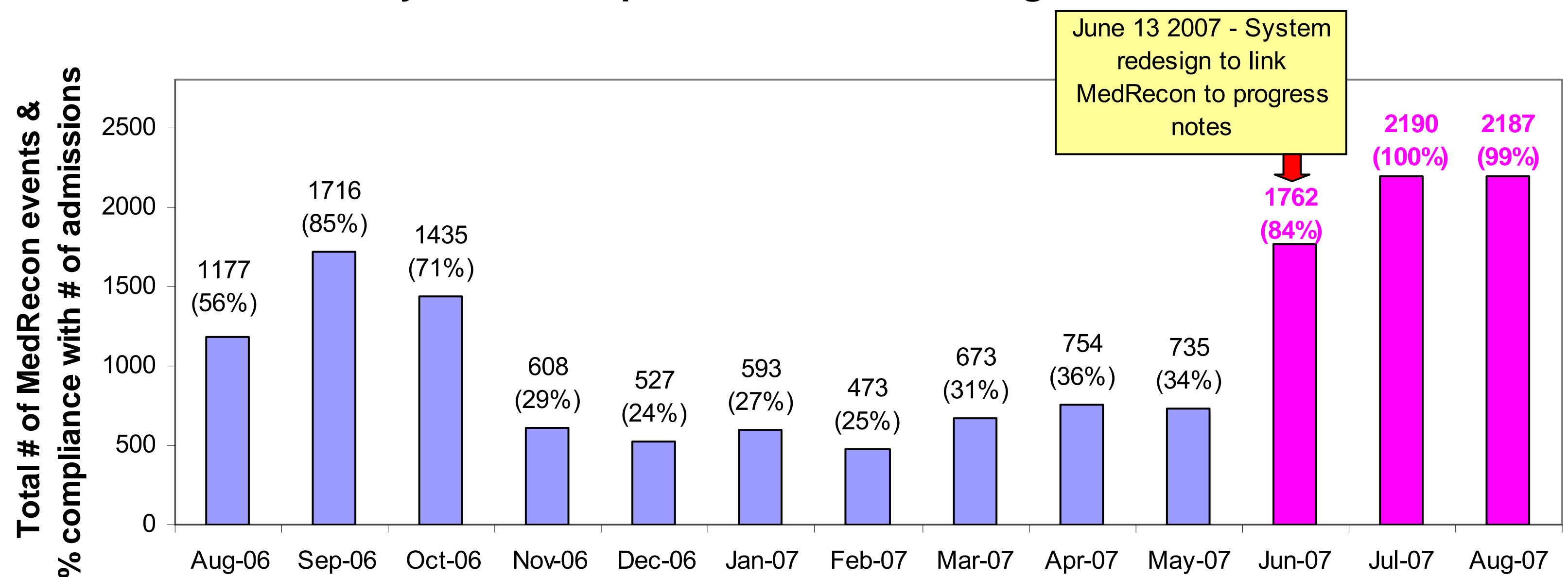
Low Discrepancy Rate



Improving systems reliability

- Using IT to improve systems reliability
- IHI's 3-step model
  - Step 1:
  - Step 2:
  - Step 3:

MedRecon Compliance



Benefits and Risks of HIT

- Systematic review of HIT – 2006
- Clear benefits
  - Adherence to guidelines (esp preventive health)
  - Enhanced surveillance and monitoring for disease
  - Reduction in medication errors
  - Decreased utilization of care
- Mixed results
  - Efficiency of care
  - Physician productivity

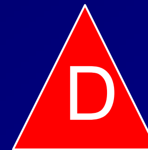
Chaudhry el al. Ann Int Med 2006;144:742-752

While implementing systems..

- Keep in mind the unintended consequences of IT
- Consider “Certified” EHRs – CCHIT
- Remember the “human element”

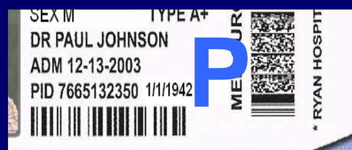
The "Human Element"

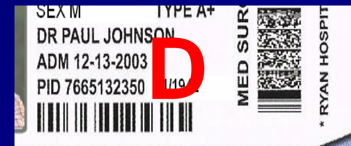
Elderly with pneumonia

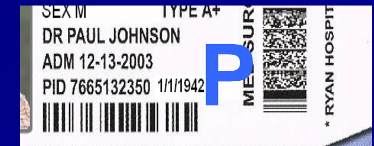


Elderly with diabetes

Clerk switches wrist bands at admission







Nurse performs fingerstick

Draws blood from D

Scans P wristband

Intern reviews labs

P's glucose >600

Intern ready to order insulin for Mr. P

The resident intervenes

McDonald C. Annals of Intern Med. 2006; 144:510-16

The Intervention that Saved Mr. P's Life

“Talk with the nurse taking care of Mr. P to find out

why the team had not been notified of this blood glucose level

and why it was ordered in the first place.”

Challenges in Implementation

My Job

Part of the culture	**How do you write a paper order?**
Embracing	You can’t take the computer down!
Commitment	When are you going to get to my unit?
Letting go	Might work if you built me an order set
Introspection	Well! It might work for some orders.
Delusion	I’ll believe it when I see it in my unit!
Uncertainty	This will never work in my area!

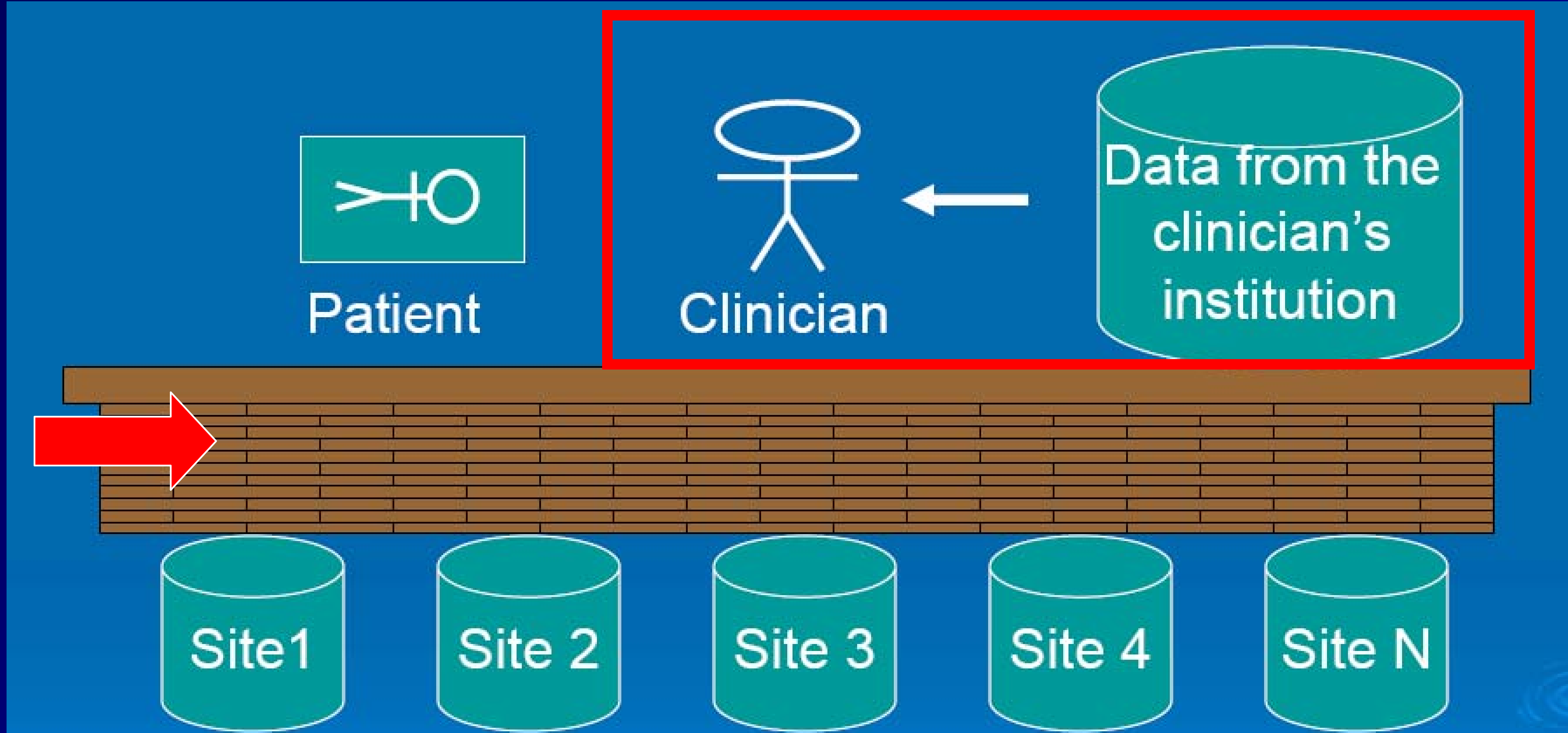
Breakthroughs

- Health information exchange between various health care facilities.

Health Information Exchange

Resident of a nursing home	72 y/o man with DM, COPD, HTN, ESRD	
March 23, 2006	ED with swollen face and lips	
Sent back to nursing home	Dx: Angioedema sec. to Fosinopril. Discontinue Fosinopril	Disposition note includes allergy to Fosinopril
June 19, 2006 in nursing home	CHF worsening, started on Fosinopril	
June 22, 2006	ED: angioedema, respiratory distress	Resuscitated, remained vent dependent
July 1, 2006	Patient died	

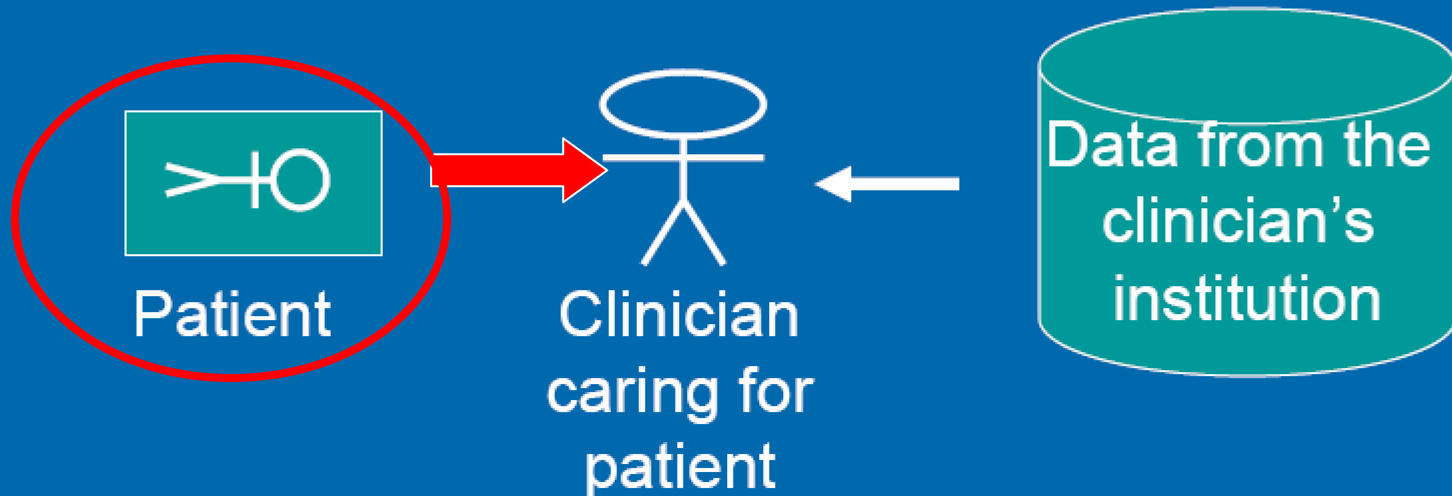
Current State

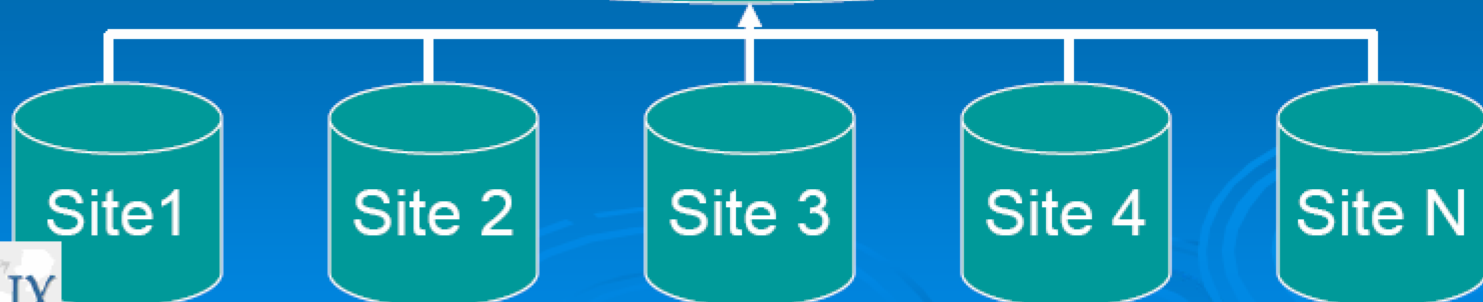


Data about the patient at other sites not available to the clinician

RHIO – Regional Health Information Exchange Organization

NYCLIX





Data about the patient at other institutions

Breakthroughs

- Health information exchange
- Personal health records (PHRs)

Personal Health Records

www.ihealthrecord.org

www.myphr.com

www.capmed.com

A Chip "in" the Shoulder

Halamka J. N Engl J Med 2005;353:331-333

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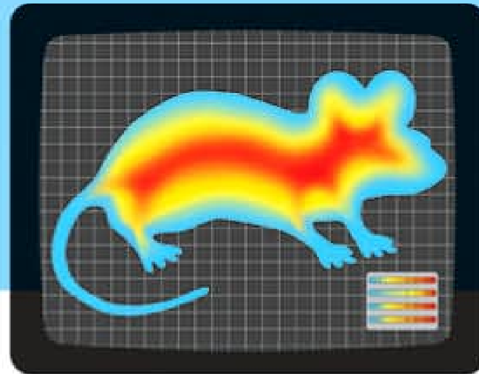
Leading Change



‘Kűbler-Ross’ Stages: Medication Errors

I - Denial	“The data are wrong”
II - Anger	“The data are right, but it’s not a problem”
III - Bargaining	“The data are right; it’s a problem, but it’s not **my** problem”
IV - Depression	“It’s my problem, but there is nothing I can do about it”
V - Acceptance	“I accept the burden of improvement”

Adapted from Donald Berwick, MD, IHI 2004 Frontiers of Healthcare conference

Informatics Education

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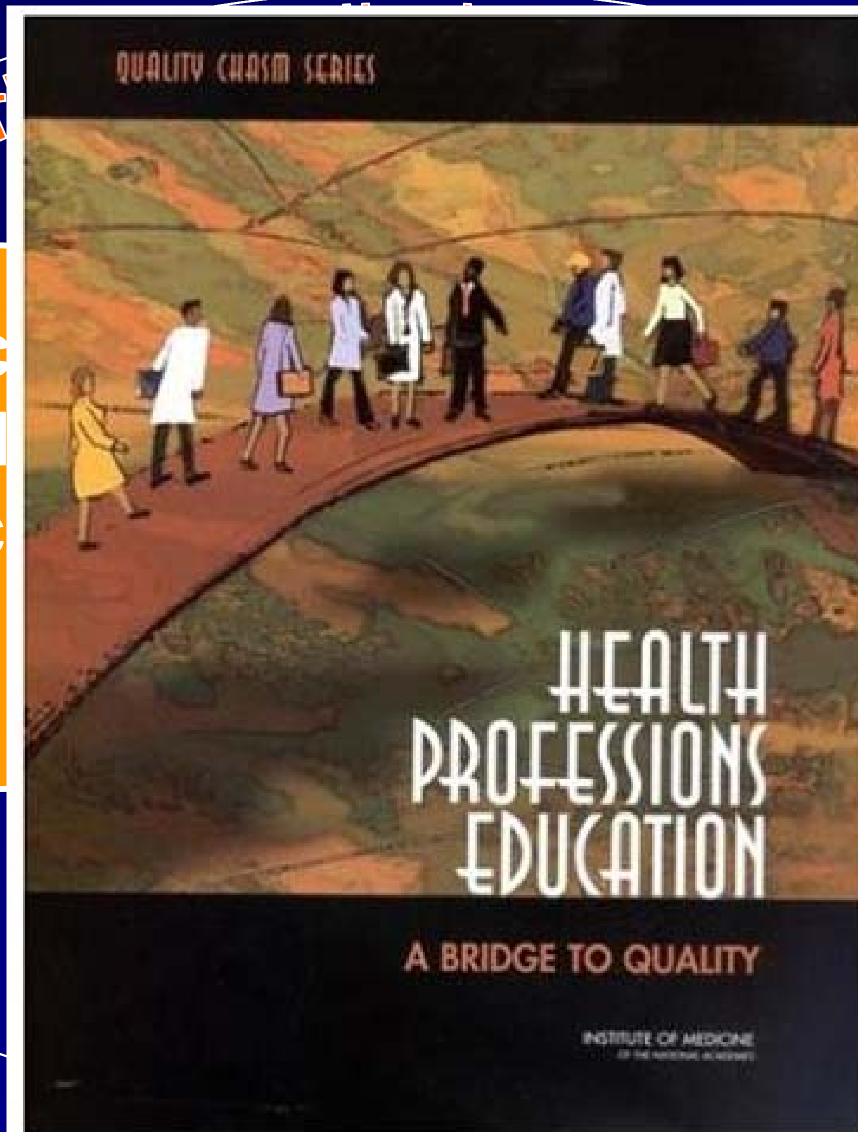

Quality
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Knowing is not enough; we must apply.
Willing is not enough; we must do.

Johann Wolfgang von Goethe.