

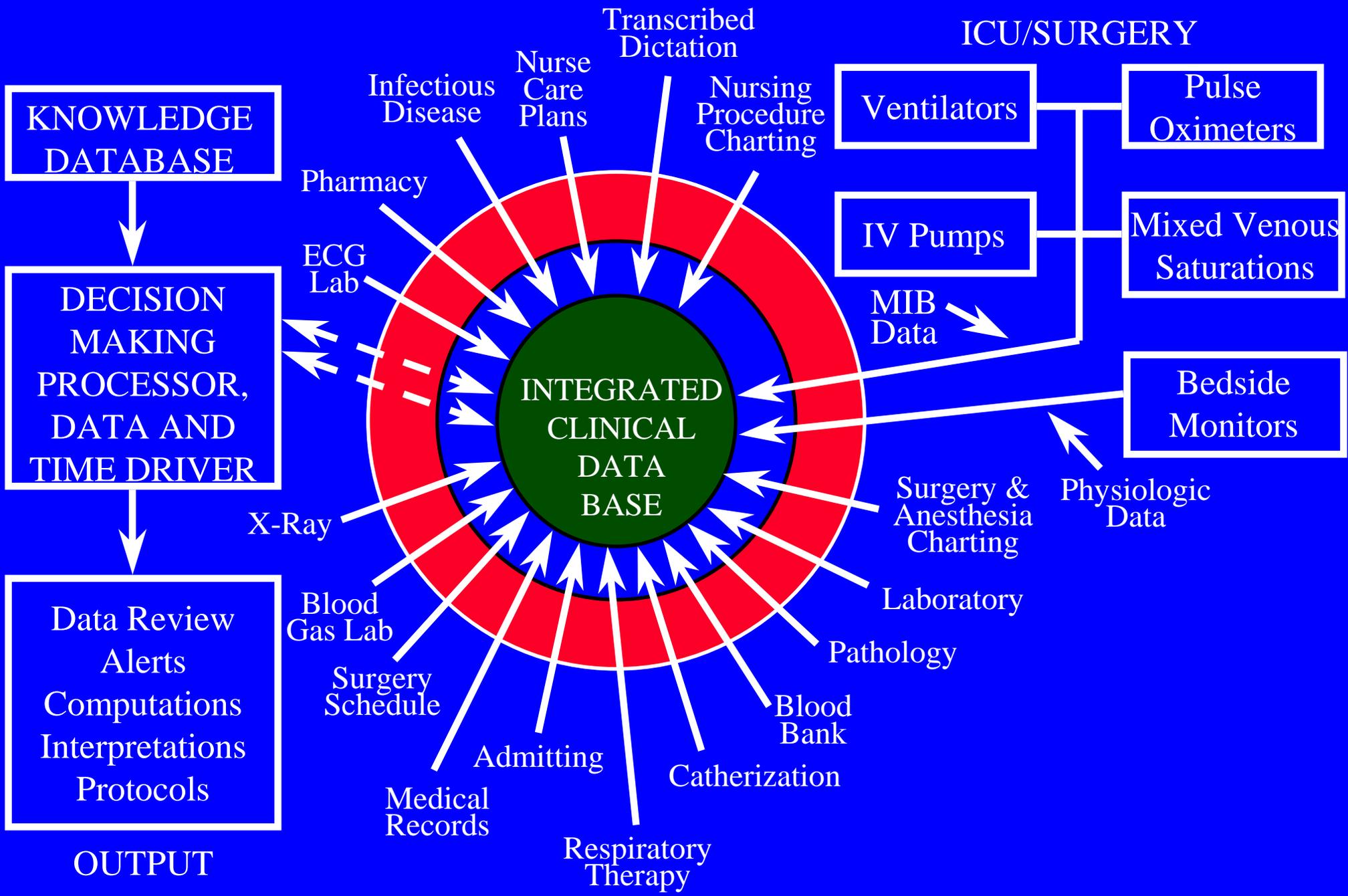
Using the HELP System to Improve Patient Care

NCVHS Workgroup on National Health
Information Infrastructure
San Francisco, CA

REED M. GARDNER, Ph.D.
LDS Hospital & University of Utah
Salt Lake City, UT

30 October 2000 9:30 AM to 10:15 AM

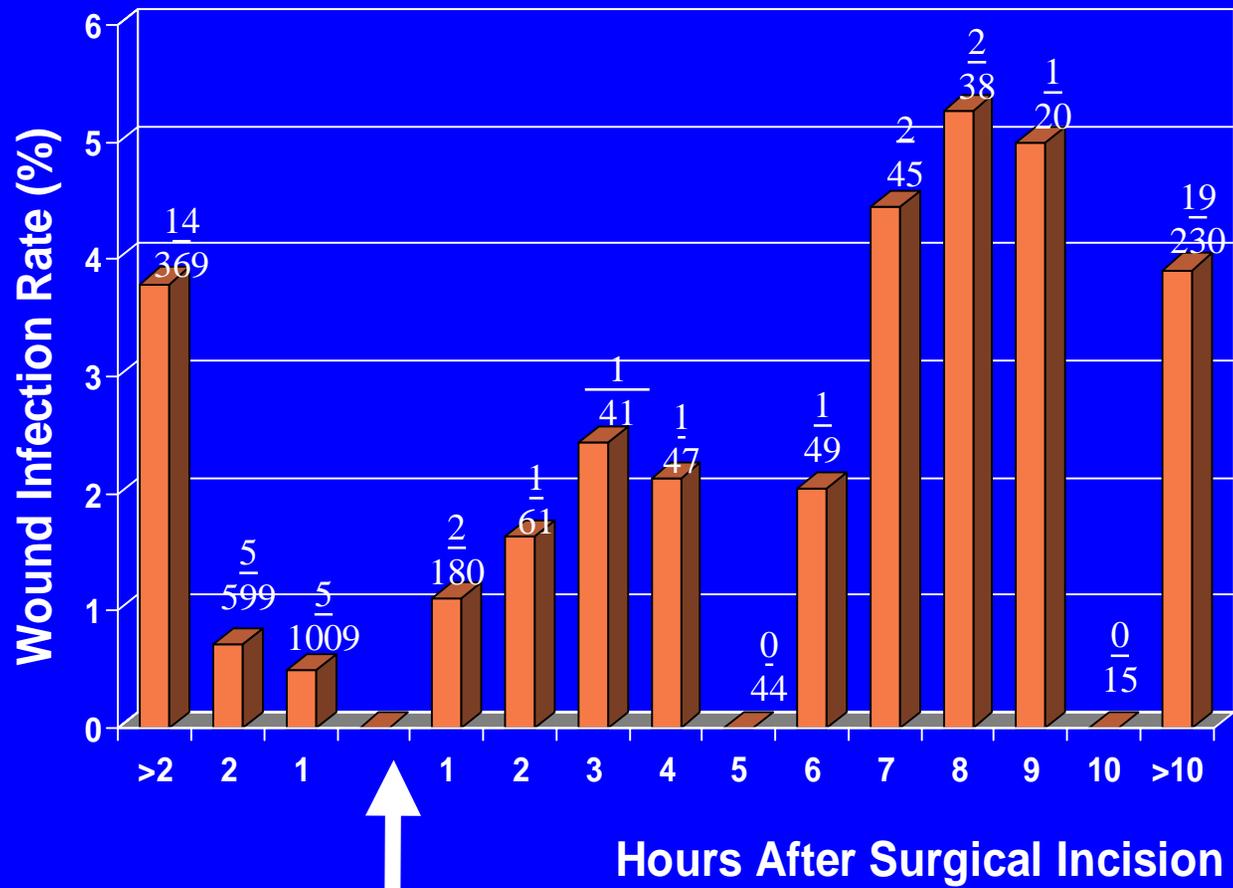
Reed.Gardner@hsc.utah.edu





Two Examples of Improved Care using the HELP Clinical Information System

1. Antibiotic Use
2. Adverse Drug Event Monitoring



Incision

NEJM 1992; 326:281- 286

LDS Hospital O.R. Schedule

Tuesday 1/18/2000 as of 1/18/2000.10:25

OR	Room	Est Time	Age	Pat Name	Procedure	Surg	Anes
5.1	PACU	0836	32F	Patient 1	Argon Laser Cervix	Surg 1	Anes 1
5.2	abx OR5	0955	43F	Patient 2	TAH, Poss BSO	Surg 2	Anes 1
5.3	N3SS	1140	40F	Patient 3	D & C	Surg 2	Anes 1
5.4	abx N3SS	1230	33F	Patient 4	Exc Vag Wall Cyst	Surg 2	Anes 1

abx - A parenteral prophylactic antibiotic is commonly given for this patient's surgery. If given, prophylactic antibiotics should be started 0-2 hrs. before surgery and discontinued within 24 hrs after surgery.

SURGICAL WOUND INFECTIONS

	Mortality (%)	Length of stay (days)	Cost of Hospitalization(\$)
Case patients	6.80	14.53	\$18,621
Matched cohort patients	1.12#	4.66+	\$ 6,030+
Attributable difference	-----	5.34*	\$ 4,935*

#p<.001 by chi square, *p<.00001 by paired t test, +p<.00001 by t test

DC Classen, 1993, Masters Thesis

IHC Antibiotic Assistant & Order Program

000000000 Doe, Jane Q E606 67yr F Dx:ABD SEPSIS

» Max 24 hr WBC=21.0↓ (21.3) Admit:07/27/99.14:55 Max 24hr Temp=38.7↑ (38.2)

Patient's Diff shows a left shift, max 24hr bands = 22 ↑ (11)

» **RENAL FUNCTION:** Decreased, CrCl = 50, Max 24hr Cr= 1.0↓ (1.1) IBWeight: 58kg

» **ANTIBIOTIC ALLERGIES:** Ampicillin,

» **CURRENT ANTIBIOTICS:**

1. 07/29/99 5DAYS TROVAFLOXACIN (TROVAN), VIAL 300. Q 24 hrs

2. 08/01/99 2DAYS AMPHOTERICIN B (FUNGIZONE), VIAL 35 Q 24 hrs

Total amphotericin given = 70mg K= 3.6mg/dl 08/03/98 MAG= 2.5mg/dl 08/03/99 » » »

IDENTIFIED PATHOGENS

SITE

COLLECTED

p Gram negative Bacilli

Peritoneal Fluid

07/27/99.17:12

Yeast

Peritoneal Fluid

07/27/99.17:12

Torulopsis glabrata

Peritoneal Fluid

07/27/99.17:12

» **THERAPEUTIC SUGGESTION**

DOSAGE ROUTE

INTERVAL

Imipenem 500mg

IV

*q12h (infuse over 1hr)

Amphotericin B 35mg

IV

q24h (infuse over 2-4hrs)

Suggested Antibiotic Duration: 10 days

*Adjusted based on patient's renal function.

P=Prelim; Susceptibilities based on antibiogram or same pathogen w/ suscept.

<1>Micro <2>OrganismSuscept, <3>Drug Info, <4>ExplainLogic, <5>Empiric Abx,

<6>Abx Hx <7>ID Rnds, <8>Lab/Abx Levels, <9>Xray, <10>Data Input Screen,

<Esc>EXIT, <F1>Help, <0>UserInput, <.>OutpatientModels, <+orF12>Change Patient

↑↓, ORDER:<*>Suggested Abx, <Enter>Other Abx, </>D/C Abx, <->Modify Abx,

LOGIC USED TO HELP SELECT SUGGESTED ANTIBIOTICS

Patient should receive IV antibiotics.

Suggested antibiotics are not one of patient's known antibiotic allergies.

Renal function dictates that dosage should be adjusted.

Coagulase negative Staph. In sputum or urine was not considered a pathogen.

Cultures show fungi or yeast that were not considered pathogens.

Aminoglycosides potentiate ototoxicity if administered with loop diuretics.

Amphotericin B is suggested for serious fungus infections.

S. maltophilia is generally not pathogenic unless found in sterile site.

A staph or gram+ cocci reported in the blood was considered a contaminant.

*Ceftazidime is usually suggested until gram negative bacillus is identified.

Suggested antibiotics should include Rx for possible abdominal anaerobes.

Suggest fluconazole for *C. albicans* in non immunosuppressed patients.

Prophylactic antibiotics are not suggested for this patient at this time.

Identified pathogens are covered by the suggested antibiotic(s).

Suggested antibiotic(s) are least expensive of the appropriate antibiotics.

The antibiotic suggestions should not replace clinical judgement.

Press the 'Enter' key for next screen. . .

LDS HOSPITAL EMPIRIC ANTIBIOTIC ASSISTANT

000000000 Doe, John Q E605 22yr M Dx:TRAUMA, MULTIPLE FX
 SITE = Blood

Inpatient / Hospital-acquired

	PAST 5 YEARS			PAST 6 MONTHS	
ORGANISM	#	(%)		ORGANISM	# (%)
Staph. Coagulase neg.	208	(61)		Staph. Coagulase neg.	14 (50)
Enterococcus	28	(8)		Escherichia coli	8 (29)
Escherichia coli	27	(8)		Enterobacter cloaca	2 (7)
Staph. Aureus	18	(5)		Staph. Aureus	1 (4)
Pseudomonas aeruginosa	13	(4)		Pseudomonas aeruginosa	1 (4)
TOTAL	294	(86)		TOTAL	26 (94)

ANTIBIOTIC	(%)	COST/24hr	ANTIBIOTIC	(%)	COST/24hr
Vancomyc+Amikacin	(99)	\$116.33	Vancomyc+Tobramyci	(100)	\$ 46.67
Vancomyc+Ticar/cla	(99)	74.53	Vancomyc+Amikacin	(100)	116.33
Vancomyc+Tobramyci	(98)	46.67	Vancomyc+Piperacil	(100)	74.97
Vancomyc+Ceftazidi	(98)	57.03	Vancomyc+Ceftazidi	(100)	57.03
Vancomyc+Aztreonam	(98)	60.24	Vancomyc+Aztreonam	(100)	60.24

EMPIRIC ANTIBIOTIC SUGGESTION: Vancomyc+Tobramyci

»ANTIBIOTIC ALLERGIES: None reported

»RENAL FUNCTION: Normal, CrCl: >120, Max 24hr Cr= .6↓ (.7) IBWeight: 67kg

Enter <*> to order suggested antibiotics, press <Enter> to continue. . .

Computerized Antibiotic Assistant

Took only 3.5 seconds for computer to gather data while it took a human 14 minutes using usual methods

Antibiotic allergies decreased from 13% to 6%

Adverse **D**rug **E**vents (**ADEs**) decreased 2.5% to 0.7%

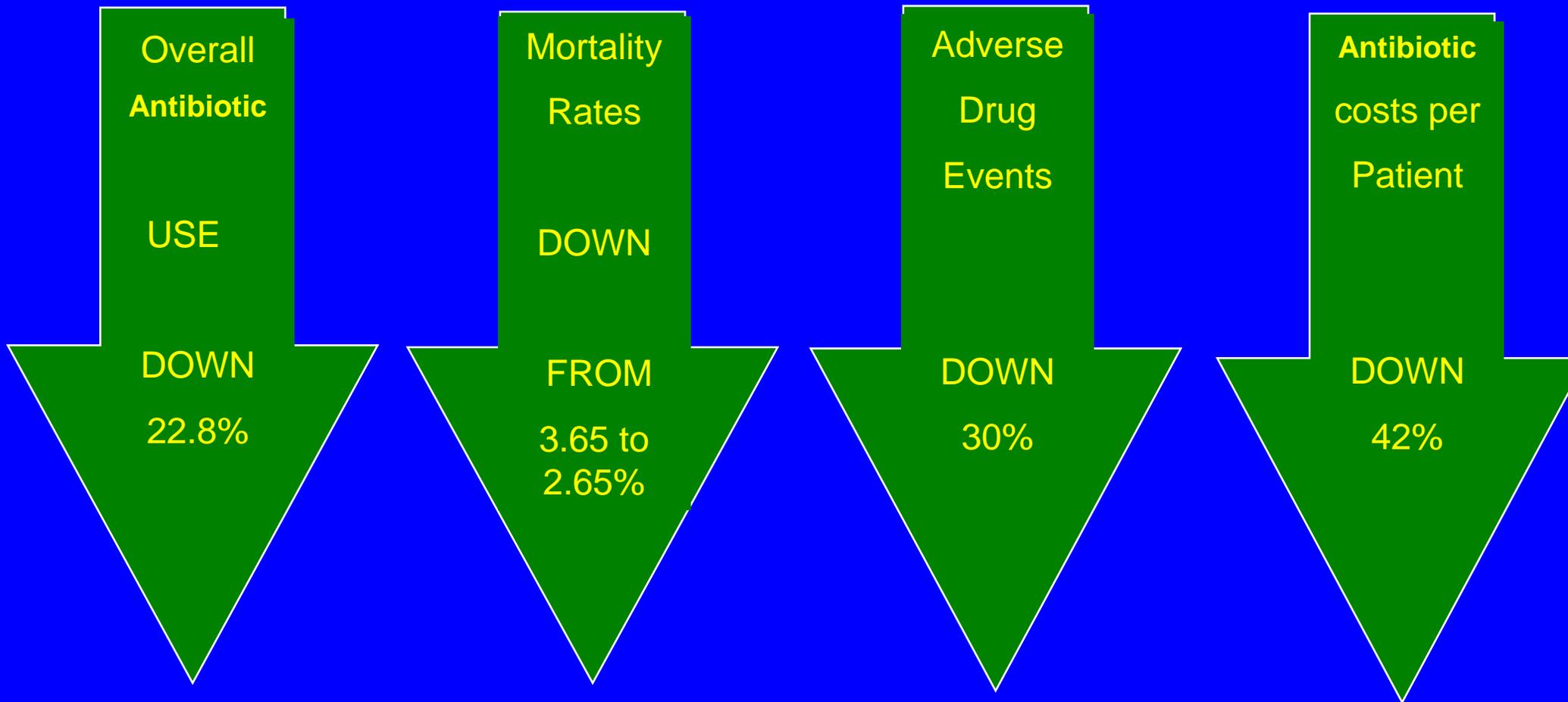
Excess doses decreased from 36% to 16%

Mismatched micro-lab susceptibility went from 18% to 2%

Excess time on antibiotics decreased from 5.9 to 2.7 days

Computer-Assisted Antibiotic Management

Ann Intern Med 1996; 124:884-890



Adverse Drug Events

Most common adverse event in hospitals

Generic screen for quality

Low voluntary reporting (U.S.)

Costly to system and patients

Agencies Use - WHO, FDA, JCAHO

Many are Preventable

Identification of ADEs

<u>Period</u>	<u>ADEs</u>	<u>PATs</u>
May 88 - April 89	9 (0.04%)	25,142
May 89 - April 90	373 (1.6%)	23,297
May 90 - April 91	560 (2.3%)	22,247
May 91 - April 92	509 (2.3%)	21,963

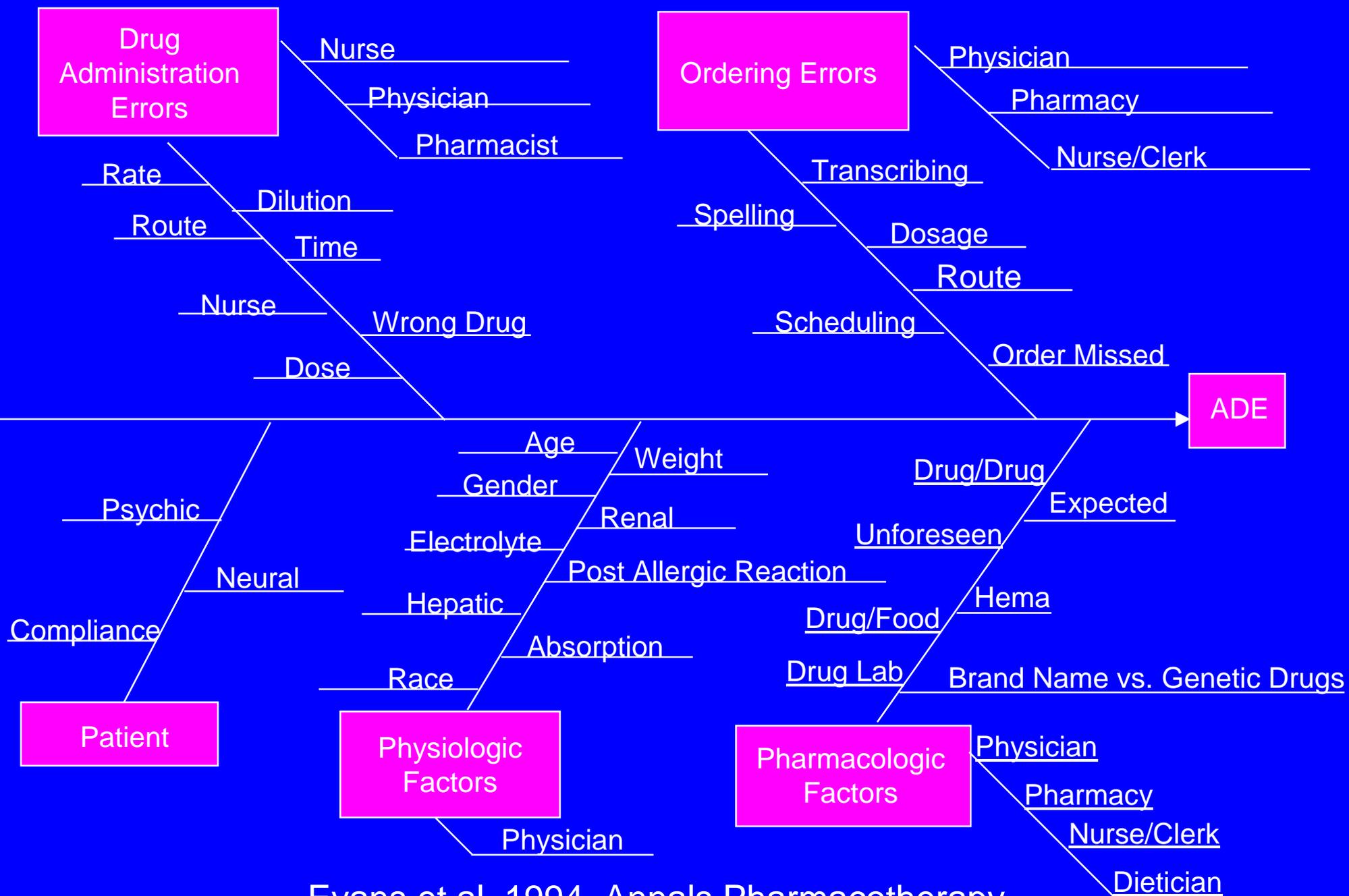
Evans et al, 1993 AMIA Fall Meeting

Adverse Drug Events

	Mortality (%)	Length of stay(days)	Cost of Hospitalization(\$)
Case patients	3.50	8.19	\$10,584
Matched cohort patients	1.05#	4.36+	\$ 5,350+
Attributable difference	-----	1.94*	\$ 1,939**

#p<.001 by chi square, *p<.062 by paired t test, **p=.147 by paired t test, +p<.05 by t test

Evans et al, 1994, AMIA Fall Meeting



Evans et al, 1994, Annals Pharmacotherapy

ADE and DOSING ERRORS

42% of ADEs are a result of drug-dosing errors
Leape et. al. N Engl J Med 1991

Dosing errors occur in 45% of pts with renal failure
Cantu, et. al. Am J hosp Pharm 1992

Renal failure is a major risk factor for ADEs
Jick. Am J Med 1977

30% of Type A ADEs due to over doses in renal failure.

Evans, et. al. SCAMC 1992

