



# *The Economics of Infection Prevention*

## and Making the RIGHT Business Case

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*Denise Murphy, RN, MPH, CIC*  
*Vice President, Safety and Quality,*  
*Barnes-Jewish Hospital, St. Louis, MO USA*  
*APIC President, 2007*

# *Know the Business Case for Infection Prevention and Control*

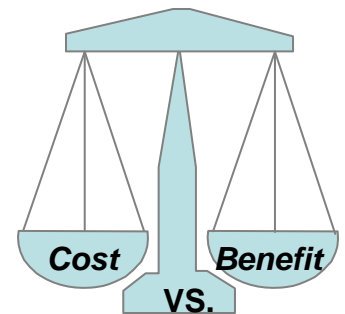
The impact of healthcare associated infections (HAI) and occupational exposures (OH) makes the best case:

- Clinical impact: morbidity & mortality
- Cost of infections & exposures

The cost benefit of IPC

Cost-effectiveness of IPC interventions

How to quantify the return on investment (ROI)...  
then negotiate for resources!



***IN GOD WE TRUST...***

***ALL OTHERS MUST PROVIDE DATA!***

# Making the Business Case for Preventing HAI

*We all know this...do our healthcare executives know this?*

- HAI are responsible for more deaths in the US than the top ten leading causes of death (PH Report - CDC)
- SENIC study estimated 32% of HAI are preventable if effective ICHE program in place\*
  - *Possibly 50% preventable today!*
- Preventing 35% - 50% HAI would save a minimum of \$260K - \$440K
  - Savings = budget for IPC program with ~ 6 FTEs



Source: \*Haley, et al. Am J Epidemiol 1985;121:159-67, 182-205  
Note: costs in 1985 dollars

# HAI: Scope of the Problem

At any time, over 1.4 million people worldwide suffer from infectious complications acquired in a hospital



Source: Kathleen M. Arias, APIC President 2006 from:  
Tikhomirov E. WHO Programme for the Control of Hospital Infections.  
*Chemiotherapia*, 1987, 3:148–151.

# U.S. Burden of HAI – 2002 Statistics

***TOTAL = 1.7 million HAI***

- 1.3 million adults & children outside of ICU
- 418,000 adults and children in ICU
- 33K newborns in high-risk nurseries
- 19K newborns in well-baby nurseries
  
- 9.3 HAI/1,000 pt. days
- 4.5HAI/100 admissions



***Excess LOS: 7.5 million days***

***Excess charges: >\$6.5 billion***

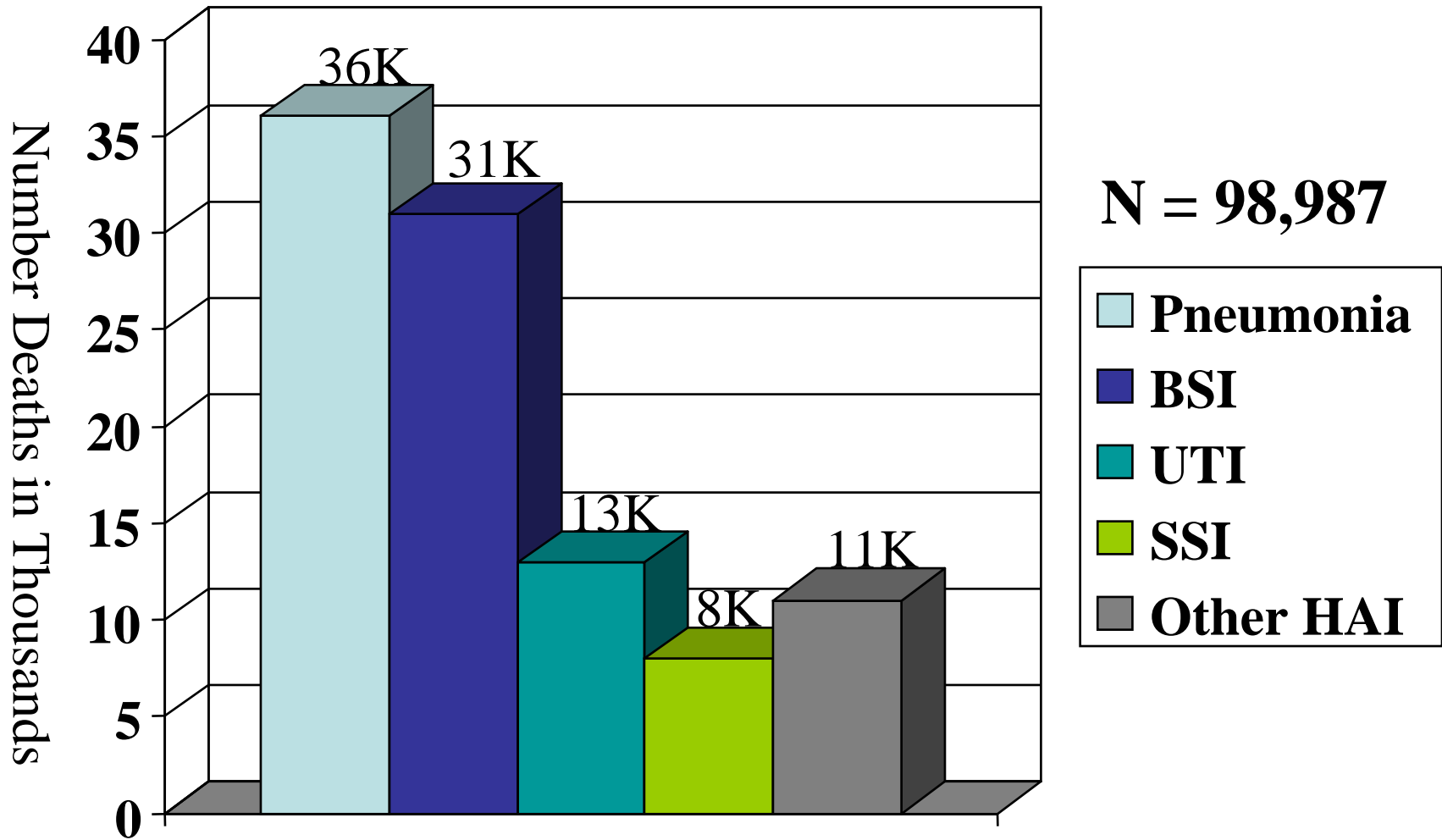
- Mean cost attributable to BSI = \$38,703\*
- Mean cost of MRSA infection = \$35,367\*

Source: Klevens, Edwards, Richards et al. *Pub Health Report*. 2007;122:160-6

\*Nicolas Graves. *Economics of Preventing Hospital Acquired Infections*.  
March 2004. Perspectives: cdc.gov

*Most important bottom line...*

## Death from HAI in the U.S. 2002



Source: Public Health Report/March-April 2007/Volume 122

# HAI: Scope of the Problem

Prevalence survey in 55 hospitals in 14 countries in Europe, Eastern Mediterranean, South-East Asia and Western Pacific showed average of 8.7% of hospital patients had HAIs

Source: WHO. *Prevention of hospital-acquired infections. A practical guide* 2nd edition, 2002

# HAI: Scope of the Problem - England

- 9% inpatients have HAI at any time
- Equivalent to at least 100,000 infections a year
- May cost as much as £1 billion/year

Source: Kathleen Arias from *Management and Control of HAI in Acute NHS Trusts in England*. Feb 2000

# Attributable Costs

- Best to use: local administrative data or literature (adjusted for inflation)
- **Attributable cost** is one that would not have occurred during a hospitalization that is identical to the one being analyzed *except* for the absence of the complication (or infection) of interest.
- Example: Patient with CABG SSI is compared to “matched” patient who underwent CABG...all is identical except for the CABG SSI.
- Even these are estimates – why? Hard to prove patient conditions are “identical” at any given time!

# Attributable Costs

## *HAI Cost Analysis January 2001 – June 2004*

Type HAI	Attributable Costs	Range
	Mean (SD)	
Surgical Site	\$25,546 (39,875)	\$1783 – 134,602
Bloodstream	\$36,441 (37,078)	\$1822 – 107,156
Vent. Associated Pneumonia	\$9669 (2920)	\$7904 – 12,034
Urinary Tract (UTI)	\$1006 (503)	\$650 - 1361

*70 studies: 39 US, 17 Europe, 4 Australia/New Zealand, 10 other. Analysis includes only those studies that calculated individual (vs. aggregate) cost of patient outcomes.*

# Attributable Costs and *Excess Length of Stay* Associated with HAI

TABLE 1. Representative Reports of Attributable Costs and Excess Length of Stay (LOS) Associated With Various Hospital-Acquired Infections

Infection type	Attributable costs, mean (range), 2005 US\$	Excess LOS, mean (range), days	Reports
VAP	22,875 (9,986-54,503)	9.6 (7.4-11.5)	[19-23]
Catheter-related BSI	18,432 (3,592-34,410)	12 (4.5-19.6)	[24-26]
CABG-associated SSI	17,944 (7,874-26,668)	25.7 (20-35)	[27-30]
Catheter-associated UTI	1,257 (804-1,710)	...	[31, 32]

NOTE. BSI, bloodstream infection; CABG, coronary artery bypass graft surgery; SSI, surgical site infection; UTI, urinary tract infection; VAP, ventilator-associated pneumonia.

SOURCE: Eli N. Perencevich, MD, MS; Patricia W. Stone, PhD, MPH, RN; Sharon B. Wright, MD, MPH et al.  
*Infect Control Hosp Epidemiol* 2007;28:1121-1133

# Comparison of Economics – Patients with and without Catheter-related Bloodstream Infection

	N = 20	Patient
Admit diagnosis	Respiratory failure	Respiratory failure
Age	71	75
Payer	Medicare + commercial	Medicare + commercial
Revenue \$	20,792	20,417
Expense \$	19,501	37,075
<b>Gross margin \$</b>	<b>+1,291</b>	<b>-16,658</b>
<b>Costs attributable to BSI</b>		<b>13,696</b>
LOS (days)	10	15 ←

# Volumes and patient flow = \$\$\$

- Patients without HAI are discharged sooner
- New patients move into those beds
- Assuming fixed costs stay the same (building, utilities, etc.), available “bed-days” *increase volumes and revenue, reimbursement.*
- Example: Table 1. shows CABG SSI mean excess LOS = 26 days. \*Preventing 10 CABG SSI would open up 260 “bed-days”. If average LOS without complication is 4 days, then 65 new patients could be admitted.

# MRSA Infection= Increased Cost/LOS

Study	HAI with MRSA	Additional hospital LOS	Additional hospital charges
Cosgrove (2005)	Bacteremia	2 days (p=.045)	\$7,212 (p = .008)
Reed (2005)	Bacteremia	2 days (p<.001 )	\$7,273 (p=.012)
Engemann (2003)	SSI	5 days (p<.001)	\$39,572 (p<.001)

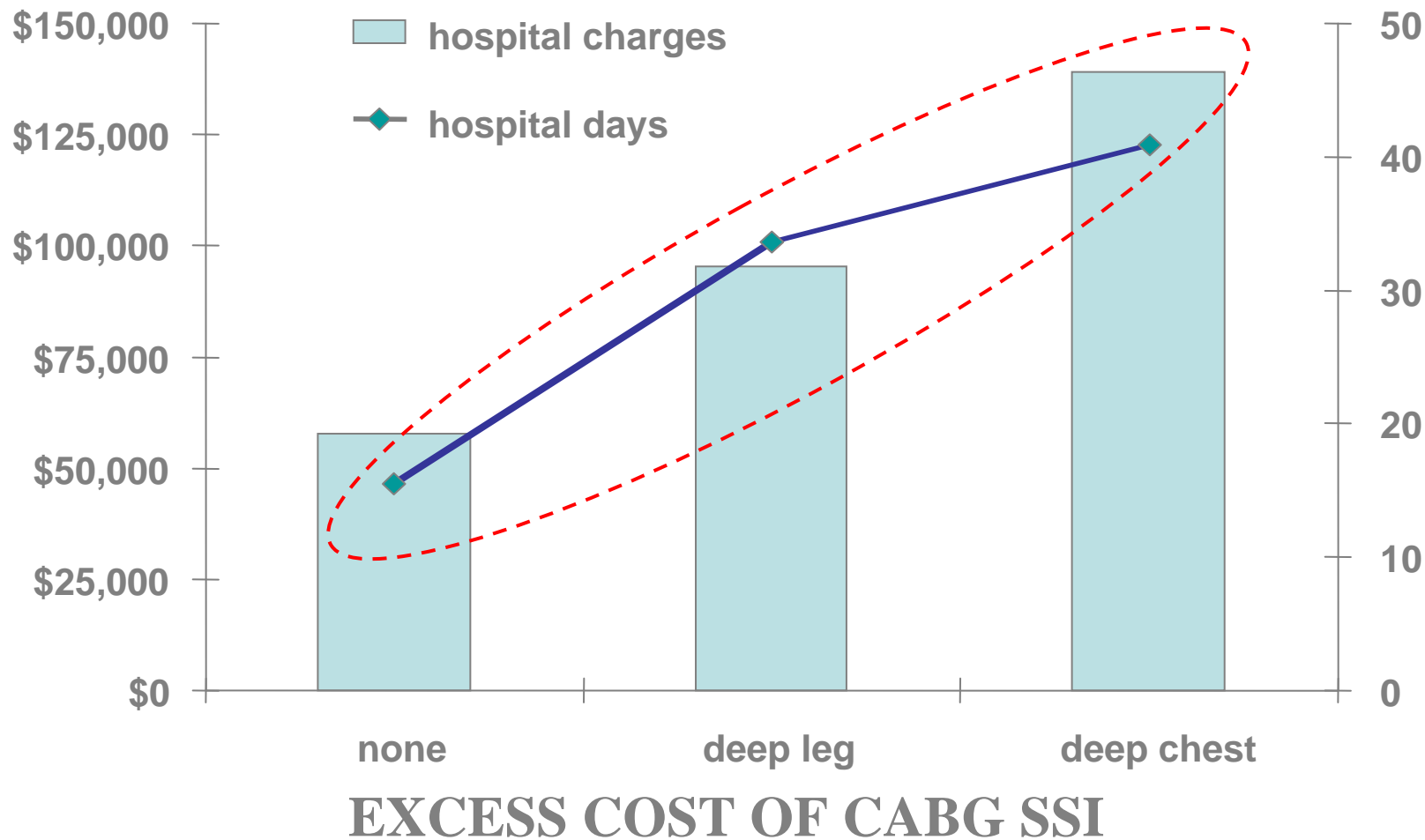
Source: Cosgrove SE et al. *Infect Control Hosp Epidemiol* 2005;26:166-74; Reed SD et al. *Infect Control Hosp Epidemiol* 2005;26:175-83; Engemann JJ et al. *Clin Infect Dis* 2003;36:592-8

# VRE Infection = Increased Morbidity/Mortality

13-study meta-analysis of patients w/ vancomycin-resistant enterococci (VRE) vs. vancomycin-sensitive enterococci (VSE) bacteremia found:

- Increased risk of death w/VRE (RR=2.57; 95% CI, 2.27- 2.91);
- 30% attributable mortality due to vancomycin resistance
- 2.9 - 27 days longer hospital LOS after infection

# Local Impact of HAI gets attention:

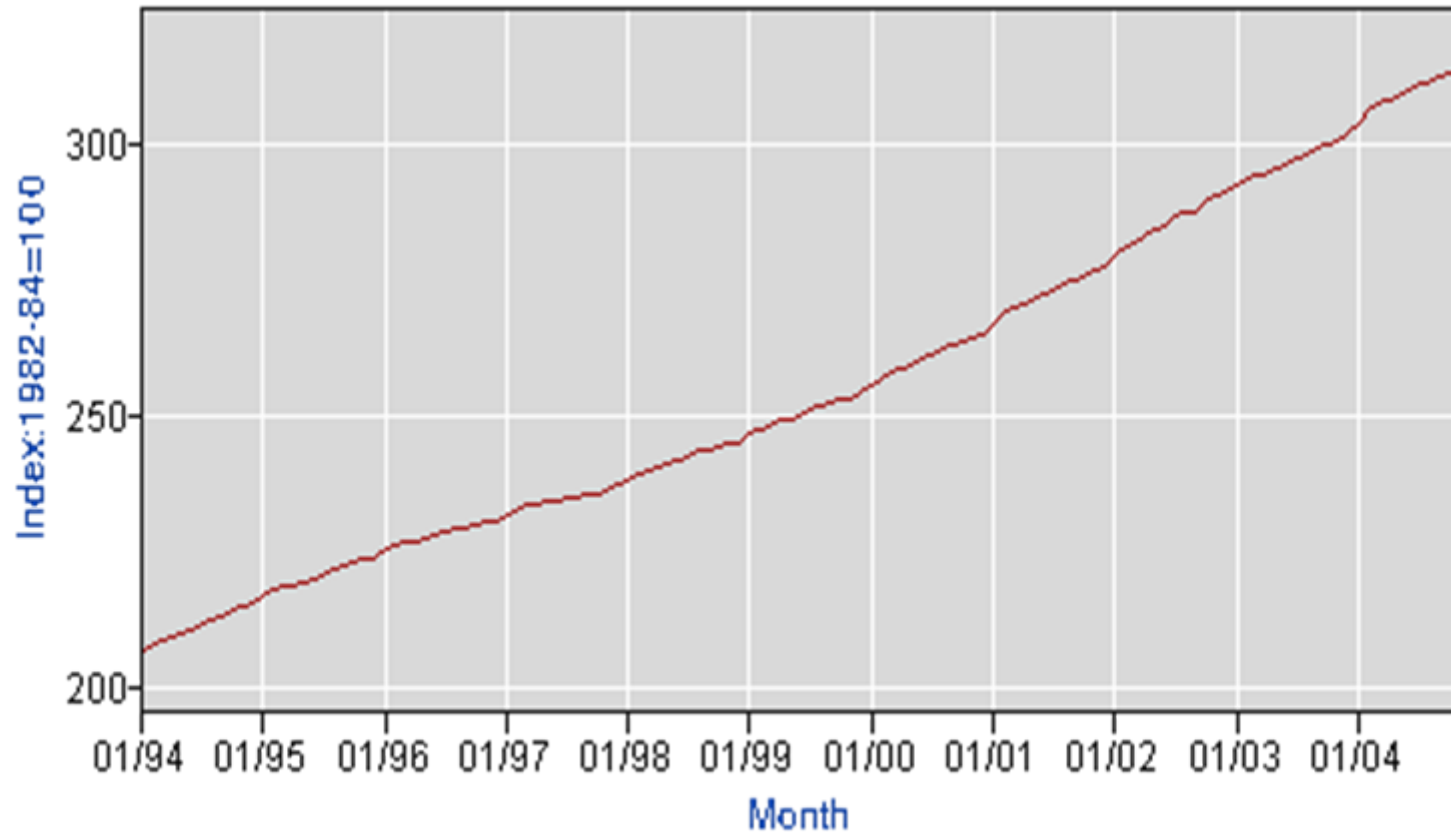


Source: Hollenbeak, Murphy, Dunagan et al. CHEST 2000;118:397-402.  
Barnes-Jewish Hospital, BJC HealthCare

SO WHAT DO YOU USE? –  
Getting local information is powerful  
*but complicated.*

Pick something, be able to explain it,  
then stick to it!

# If You Cannot Obtain Organizational Costs, Use Cost Estimates from the Literature *Adjusted for Inflation...*





# *Converting Old \$ to New \$*

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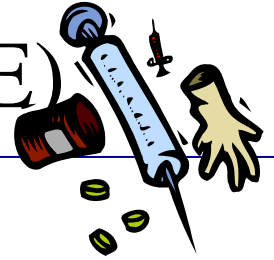
- Healthcare inflation rate is ~ 4 % or more annually, so 1985\$ ~ adjusting up to 2007\$ means multiplying EACH YEAR between 1985-2007 by the inflation rate. This is a very crude adjustment.
- (Unadjusted 12 mos. ended August 2007 = 4.5%)
- Adjusted for inflation, a bloodstream infection that cost 18,432 in 2005 will cost 4.5% more/year or \$19,261 in 2006 and 20,128. in 2007.

*Source: Consumer Price Index, Bureau of Labor Statistics for the US Medical Care Inflation*

*<http://146.142.4.24/cgi-bin/surveymost?cu>*

# Impact of Occupational Exposures (OE)

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The CDC estimates 385,000 needlesticks and other sharps-related injuries are sustained by hospital-based healthcare personnel annually

- Average of 1,000 sharps injuries per day

Since 12/01, 57 confirmed & 138 possible cases of HIV in HCWs from occupational injury\*\*

- 84% of documented transmission was due to needlestick injuries.

\*<http://www.premierinc.com/all/safety/resources/needlestick/>

\*\*<http://www.cdc.gov/sharpssafety/>

# Impact of OE (cont.)

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Several hundred HCWs still acquire hepatitis B virus annually, despite available vaccine

🔴 *95% decrease in HBV since 1983 as a result of OSHA mandating HBV vaccine\*\**

The average risk of hepatitis C virus transmission following needlestick exposure to an HCV infected patient is 1.8%

🔴 *There is no vaccine for prevention of HCV*

Cirrhosis & death frequently result from these infections

*(\*\*Mahoney, Arch Intern Med 1997; 157 (22):2601-05)*

# Financial Impact of OE

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National costs: average \$300-3,000/needlestick injury (depending on risk); if infection results, costs can reach \$1 million/case\*\*

Costs include patient & employee f/u:

- post-exposure testing (HIV, HBV, HCV, toxicity screen)
- prophylaxis (largely cost of new anti-retrovirals)
- occupational health nurse (&/or physician) time
- employee lost work time, cost of illness, productive years lost
- worker's compensation costs
- potential for litigation (Yale MD awarded \$12.2 million\*\*\*)

\*\* *G. Pugliese, Proceedings of Committee On Safer Needle Devices, N*

\*\*\* *Pugliese, Salahuddin, Eds., "Sharps Injury Prevention Program: Sharps*

*The language of  
healthcare economics...*

*Learning...*  
*from a Healthcare Economist*

WHAT IS COST? *Depends upon perspective*

- Patient
- Provider
- Payer
- Society
- Infection Prevention and Control Professional
- Hospital Leadership/Executive Team

# Components of Total Costs

## Direct Costs

- Direct payment for health care goods and services

## Indirect Costs

- Lost work productivity

## Intangible Costs

- Cannot easily assign a monetary value

## Opportunity Costs

- What you give up when you use a resource

# Other Dimensions of Costs

## Fixed costs

- Costs incurred for fixed inputs
- Cannot easily be eliminated in the short run
  - Buildings

## Variable costs

- Costs incurred for variable inputs
- Can easily be eliminated in the short run
  - Labor

# Estimation Methods

- Compare costs for patients with infections to patients without infections (matched comparison; like case-control study)
- Problem: are the patients who get infection just like those who do not?
  - Age
  - Gender
  - Diabetes
  - Smoking
  - Weight

# Where Can You Start?

- Select type of infection to estimate; SSI easiest
- Use accounting dept to obtain individual costs and LOS for patients undergoing specific surgical procedure
- List patients who developed SSI.
- Use accounting to calculate additional costs: readmission, return to OR, ICU stay, antibiotics, etc.
- Compare cost of patients without SSI to patients with SSI who had procedure during same time period
- Compare length of hospital stay, including readmission for SSI, for those with infection

# *Applying....what we learned*

## Direct cost savings:

- No routine ventilator circuit changes
- \$1M savings across BJC (equipment/supplies)

## Indirect cost savings

- Increase in Respiratory Therapist productivity due to fewer vent circuit changes (focus on reducing VAP)
- 25% increase in flu vaccine (lower RN absenteeism/agency costs)

# *Examples...*

## Cost (or revenue loss) avoidance

- Outbreak of SSI: difference in observed vs. expected SSI rates/excess cost & LOS (\$37K & 18 d.)\*
- Reduced excess cost and LOS (reimbursement lower after 3-5 days of re-admission for SSI)
- Reduce adverse outcomes on CMS list of “conditions not present on admission” that will no longer receive reimbursement
  - CR-BSI
  - Mediastinitis, Total Joint Replacement, and Bariatric SSI
  - UTI

## Comparison of Endemic vs. Epidemic SSI Rates

### BJC Operating unit:

Period of increased SSI

Surgical procedure

Number of procedures performed in 1998

Reported "benchmark" SSI rate/100 procedures

Operating unit endemic rate/100 procedures

Operating unit epidemic rate/100 procedures

Average LOS for uninfected vs. infected

Mean excess LOS per SSI

Average cost for uninfected vs. infected

Mean excess cost per SSI

Rate reduced to baseline/ benchmark (date)

Projected # procedures 2000

Expected # SSI based on endemic (3.0) rate

Expected # SSI based on epidemic (22.6%) rate

# SSI avoided (based on \*reduced rate)

**\*Estimated cost avoidance 1999 - 2000**

\*Estimated cost avoidance is based on the #SSI avoided annually when rates remain at baseline (endemic) compared to epidemic rates.

### Hospital A

6/98 - 12/98

Gastric Bypass

70

2.7-5.1

2.86% (2 SSI / 70 procedures)

22.6% (7 SSI / 31 procedures)

4 days vs. 22 days

18 days

\$7,816 vs. \$44,963

\$37,147

3.0% (4/99 through 4/2000)

70 cases

2 SSI

16 SSI

14 SSI annually

**\$520,058 (\$37,147 x 14)**

**SAMPLE REPORT**

# *Examples...*

## Lost opportunity costs

- Fewer CABG SSI resulted in fewer I&D cases in OR;
- Opportunity for more 1<sup>st</sup> time CABG surgery cases brought higher reimbursement

## Intangible costs

- Lessen risk for negative PR (impact on referrals)
- Impact on societal trust
- Changes in insurance premiums due to high cost of HAIs
- Impact on status with accreditation and regulatory agencies

# Examples...

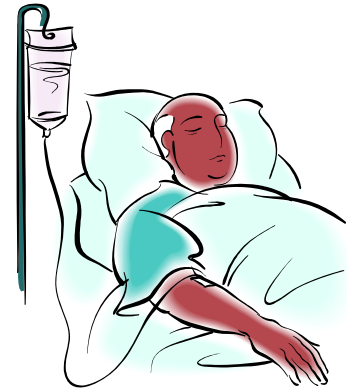
## Attributable Cost

- Much better estimate of cost attributable to infection
- Use economic modeling to tease out in-pt. cost of other co-morbidities\*
  - diabetes costs include glucose monitoring, insulin
  - CHF costs include Rx with ACE/ARB/beta blocker
- Much easier to do with surgical patients: readmission/re-operation purely due acquisition of SSI
- Found attributable cost of CABG SSI ~\$20K in our study; (\$35K deep chest; 15K non-deep SSIs)\*

\*Source: Hollenbeak CS, Murphy DM, Dunagan WC, Fraser VJ.  
*Chest* 2000; 118:397-402.

# Personal/Individual Costs

- Physical pain and discomfort
- Mental and financial stress
- Increased length of stay in hospital
- Prolonged or permanent disability
- Disruption to patient and family
- Time lost from work for patient and caregivers
- Death





# Understand Total Organizational Impact

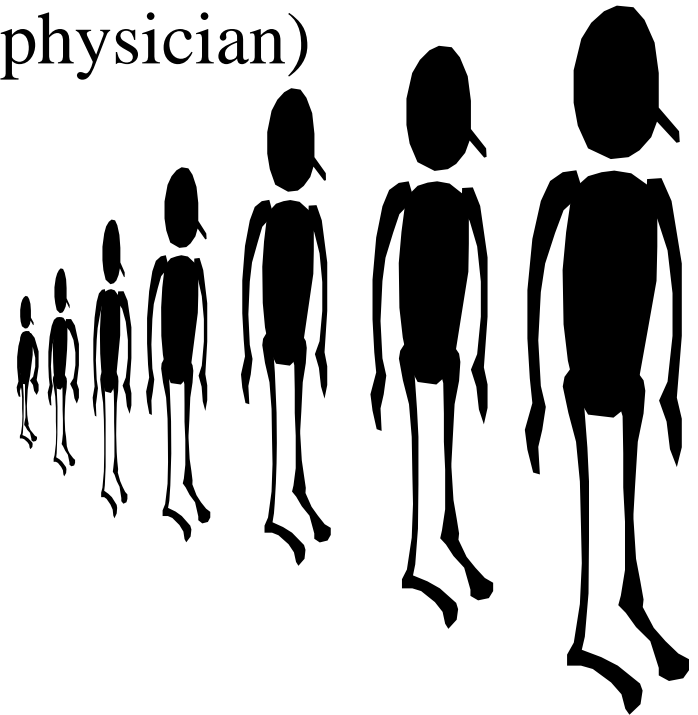
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Hidden opportunity costs

Impact on referrals (hospital, physician)

Organizational reputation

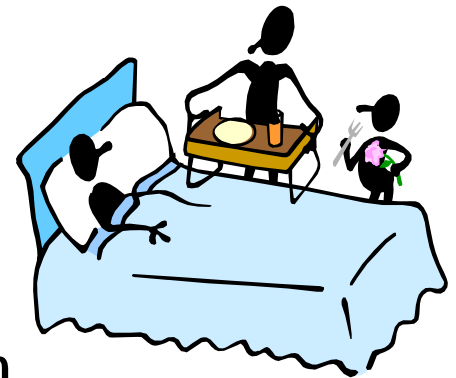
- Community
- Staff
- Third party payers



# Societal Impact of HAI

## *Beyond excess healthcare costs...*

- Indirect costs to family and caretakers
- Years of productive life lost
- Emotional/social burden
- Decreased trust in the healthcare system
- Increased use of antibiotics



# Communicating Financial Impact

- Display cost and LOS data graphically
- Approach Clinical Leadership and Senior Executives to demonstrate financial impact of HAI
- Use \*literature to show cost-benefit of Infection Prevention – impact of interventions to reduce HAI – Demonstrate *your* value!
- You then argue for a larger investment in Infection Prevention...

*\*Raising Standards While Watching the Bottom Line: Making a Business Case For Infection Control.* Eli N. Perencevich, MD, MS; Patricia W. Stone, PhD, MPH, RN; Sharon B. Wright, MD, MPH; Yehuda Carmeli, MD, MPH; David Fishman, MD, MPH; Sarah Cosgrove, MD, MS. *Infect Control Hosp Epidemiol* 2007; 28:1121-1133

# Communicating Financial Impact

*Executives in the U.S. think in terms of*

- Avoidable cost
- Variable cost
- Opportunity cost

*What do executives in YOUR country care about most?*

# Understand CAVEATS:

## *Does Reducing HAIs Benefit the Organization?*

- IPs must be careful claiming there are always *actual* savings related to prevention

### *WHY?*

- Executives can't always find the savings on the organization's bottom line:

➤ Fixed costs don't change with reduction in HAIs

➤ Many variable costs are "sticky" — don't decrease with

# Reimbursement May Dictate Whether \$\$ are Saved or Lost

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- *Fee for service insurers may pay for longer hospitalization & readmission; therefore, the organization is making money on the HAI*
- *Managed care organization contracts result in losses to the organization if the cost of caring for a patient is increased by an infectious complication*
  - Organization is paid a fixed fee per member per month; prevention *saves* money in this environment

# Know Who Pays for HAI

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In the short-run, determined by the payer and the contract

Over the long haul, it's always the same

- Patients – out of pocket expenses & lost wages
- Employees – increased health premiums / lower salaries
- Tax-payers – increased taxes
- Consumers – higher product & service prices



**Who pays in YOUR COUNTRY and what is the greatest “payment”?**

# *Demonstrating The Value of Infection Prevention and Control*

# Know the Cost-Benefit of IPC

## *Impact of Prevention*

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Excess cost of HAIs	\$1 million*
% preventable with effective IC	32%
Costs prevented	\$320,000
Cost of program	<u>\$200,000</u>
Net Benefit	\$120,000

***Must always subtract program costs  
from potential cost savings!***

# Know the Cost of an Effective *Infection Prevention and Control Program*

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<u>Component</u>	<u>Annual Cost(s)</u>
Personnel	
0.5 Physician	70,000
1 Nurse	30,000
1 Secretary	15,000
0.5 Computer Programmer	15,000
Supplies, fax. Etc.	20,000
Fringe benefits and overhead	50,000
Total	<hr/> \$200,000*

*\*Add computer & adjust for inflation, this cost would be >\$260,000 in 2008*

# Plan for the Resources You Need!

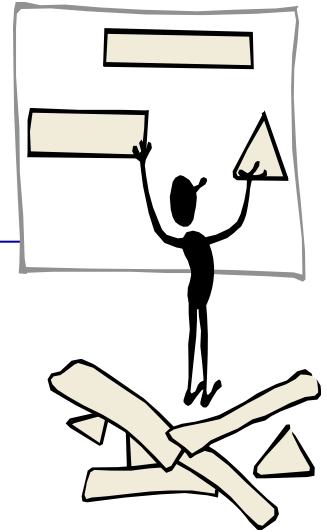
## Sample IPC Program Budget

Acct. Desc.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
<b>Salaries (Professional)</b>	7,084	7,084	7,084	7,084	7,084	7,084	7,084	7,084	7,084	7,084	7,084	7,084	95,008
<b>Salary (Clerical)</b>	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	2,083	24,996
<b>Misc. Benefits</b>	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	2,291	37,492
<b>Minor Equip.</b>			1,000										1,000
<b>PCs</b>						5,000							5,000
<b>Software</b>						1,000							1,000
<b>Office Supp.</b>	100	100	100	100	100	100	100	100	100	100	100	100	1,200
<b>Publications</b>					200				200				400
<b>Telephone</b>	72	72	72	72	72	72	72	72	72	72	72	72	864
<b>Education</b>	2,400			2,400									4,800
<b>Postage</b>	10	10	10	10	10	10	10	10	10	10	10	10	120
<b>Travel</b>	100	100	100	100	100	100	100	100	100	100	100	100	1,200
<b>Special Events</b>	584					2920	3504						7,008
<b>Printing Purchased</b>	25	25	25	25	25	25	25	25	25	25	25	25	300
<b>Purchase MD Services</b>	5,417	5,417	5,417	5,417	5,417	5,417	5,417	5,417	5,417	5,417	5,417	5,417	65,004
<b>Lab</b>	416	416	416	416	416	416	416	416	416	416	416	416	5000
										<b>2005 BUDGET TOTAL</b>			<b>250,392</b>

# Show the VALUE of IPC:

## *Functional value includes:*

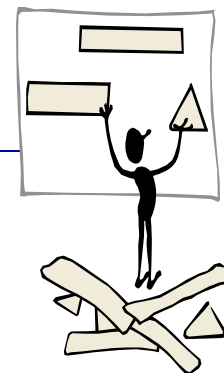
- *Eliminating waste/improving productivity through*
  - ✓ *Wise product selection*
  - ✓ *Appropriate application of expensive technology*
  - ✓ *Sensible policies & procedures*
  - ✓ *Protection of employees from injury*
- *Maintaining regulatory compliance*
- *Creating effective collaboration between clinicians and administration*
- *Creating a safer environment for patients and staff, increasing satisfaction*
- *Helping to maintain organizational reputation for service excellence*



# Show the VALUE of IPC:

*Strategic value includes:*

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## Supporting organization's strategic plan

- *To grow volumes:*
  - *Empty out ICU beds more quickly by reducing*
- *To grow services:*
  - *Show how interventions to reduce HAI rates on specific services can be utilized to plan and design new programs and services*
  - *Gastric bypass surgery new for your organization? Use literature and experience of others to build in risk reduction strategies.*
- *To hit target on 100% of quality scorecards!*
  - *Same skills used for outbreak investigation can help PI teams get to root causes of poor performance.*

# *Secure Resources to Support Effective Programs*

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IC resources should be allocated based on:

- Demographics of population
- Most common diagnosis
- High risk populations
- Services offered
- Type and volume of procedures performed
- *What is NOT BEING DONE due to inadequate resources THAT SHOULD BE DONE to improve patient care*

*\*O'Boyle C, Jackson MM, Henly SJ. Staffing requirements for infection control programs in US Health care facilities: Delphi project. AJIC 2002;30;6:321-33.*

# Staffing Requirements for NNIS Hospitals

*based on minimum requirement of 100 occupied beds*

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## 2001 Delphi Study

- \*0.8 to 1.0 ICP per 100 occupied beds acute and long-term care
- Physician time not measured

*O'Boyle C, Jackson MM, Henly SJ. Staffing requirements for infection control programs in US Health care facilities: Delphi project. AJIC 2002;30;6:321-33.*

# Resources (continued)

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*How did we get more IPC resources at my hospital?*

- Constant assessment and relentless annual negotiations.
- Looking outside of hospital: WUSM contract for IPC services, BJH Foundation grants support temporary resources (MPH students), SLU SPH internship program support.
- Proving our value year after year; increasing visibility of program; focusing on interventions = ***REDUCING HAIs!***

# FOCUS ON INTERVENTIONS!

# What Percent of HAIs are Preventable?

- In 1985 SENIC study estimated 32% of HAIs preventable if effective IC program in place<sup>1</sup>
- 1995: British Hospital Infection Working Group stated that about 30% of HAIs could be avoided by better application of existing knowledge<sup>2</sup>

Sources: Haley, et al. Study on the Efficacy of Nosocomial Infection Control. *Am J Epidemiol* 1985;121:159-67, 182-205

*Management and Control of HAI in Acute NHS Trusts in England.* Feb 2000

# What Percent of HAIs are Preventable?

- 10-70% HAIs preventable with appropriate infection control depending on setting, study design, baseline infection rates and type of infection
- Concluded at least 20% of all healthcare-associated infections probably preventable

Source: Harbarth S, et al. *J Hosp Infect* 2003;54:258-266



# Successful Interventions

## What's Standard?

- Targeting zero is culture change
- Strong Sr. Leader support/CHAMPIONS/multidisciplinary teams
- Bundle approach/EBM
- Transparency/data feedback
- Analysis – real time
- Personalize HAI
- Communication!
- Celebrate
- Market value of IP

## What's Different?

- Critical event analysis
- Daily assessment of device use/reminders to remove
- Rapid Response Teams linked to IP
- Board involvement
- IC Liaisons “Link Nurses”
- Weekly Executive Report
- Web-based education
- Empowered staff *Stop The Line*
- Human Factors training

Source: APIC Presidential Address, D. Murphy, June 2007

# Cost Benefit Analysis

*Example: Intervention Modules to Prevent BSI – 2 ICUs @ BJC*

## Development costs:

6 ICPs @ \$23/2 hrs./12 mos. = \$3,312

Graphics & printing = \$1,300

\$4,612

## Implementation costs:

20 ICPs @ \$23/16hrs. = \$12,000

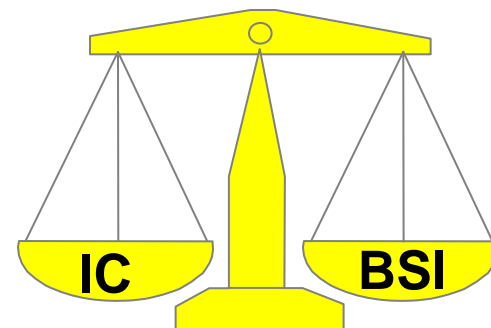
600 RNs @ \$23/1hr. = \$13,800

100 PCTs @ \$12/1hr. = \$ 1,200

52 MDs @ \$100/1hr. = \$ 5,200

\$32,200

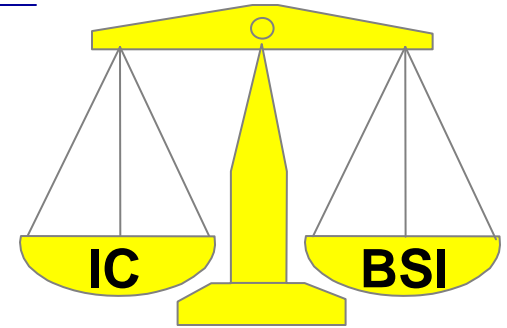
**Development & Implementation costs = \$36,812**



# *Cost Benefit Analysis*

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**BSIs prevented** (in 2 ICUS) in 2000



Expected BSI = 90 (based on previous two years rates)

Observed BSI = 45

BSI prevented post intervention = 45

Estimated cost savings =  $\$4,500 \times 45 = \$202,500$

**Cost Savings - Intervention Costs = Net Savings**

**\$202,500 - \$36,812 = \$165,688**

# BJC HealthCare - *Impact of Interventions to Decrease Healthcare Associated Infections*

<b>CABG Surgical Site Infections (SSI)</b>	<b>2000</b>	<b>2001</b>	<b>Impact of Interventions</b>
#SSI	116	86	-30
%SSI	5.21%	4.26%	-26%
Excess Cost	\$2,440,000	\$1,737,945	-\$801,340
<b>Spinal Surgical Site Infections (SSI)</b>			
#SSI	64	58	-6
%SSI	1.7%	1.5%	-10%
Excess Cost	\$716,345	\$659,394	-\$90,000
<b>Bloodstream Infections (BSI)</b>			
#BSI	564	542	-22
BSI/1,000 patient days	3.5/1,000	3.4/1,000	-4%
Excess Cost	\$2,639,520	\$2,639,540	-\$107,140
<b>Ventilator Associated Pneumonia (VAP)</b>			
#VAP	294	160	-134
VAP/1,000 ventilator days	7.5/1,000	3.9/1,000	-46%
Excess Cost	\$2,449,020	\$1,385,600	-\$1,160,440
<b><i>Total Cost of All HAI tracked</i></b>	<b><i>\$8,244,885</i></b>	<b><i>\$6,422,479</i></b>	<b><i>-\$2,158,920</i></b>

# Cost-Effectiveness Analysis

- Comparison of 2 or more interventions
- Costs are measured in monetary units
- Outcomes are measured in natural units  
(e.g., patients surviving, years of life saved, infection prevented/avoided)

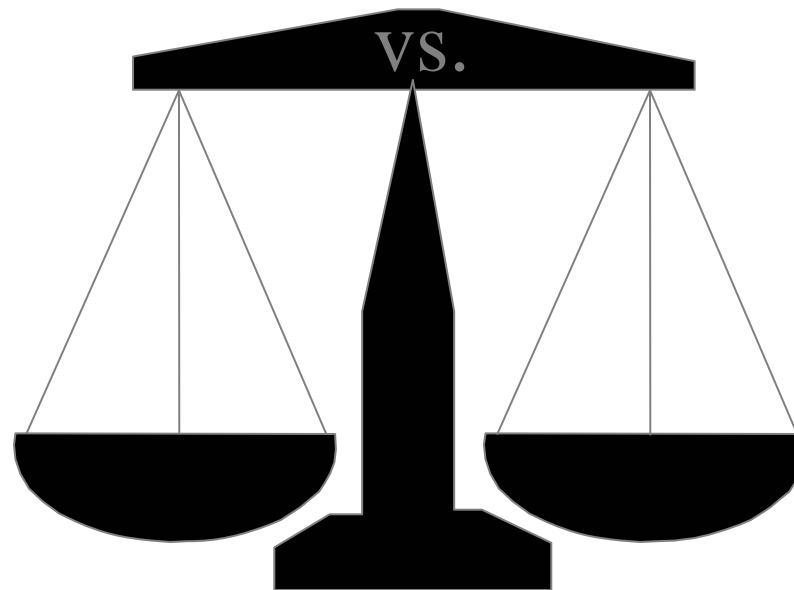
EXAMPLE: Comparing *cost* of silver-coated catheters vs. standard urinary catheters and the *effectiveness* in reducing UTI.

# Making the Business Case for Infection Control

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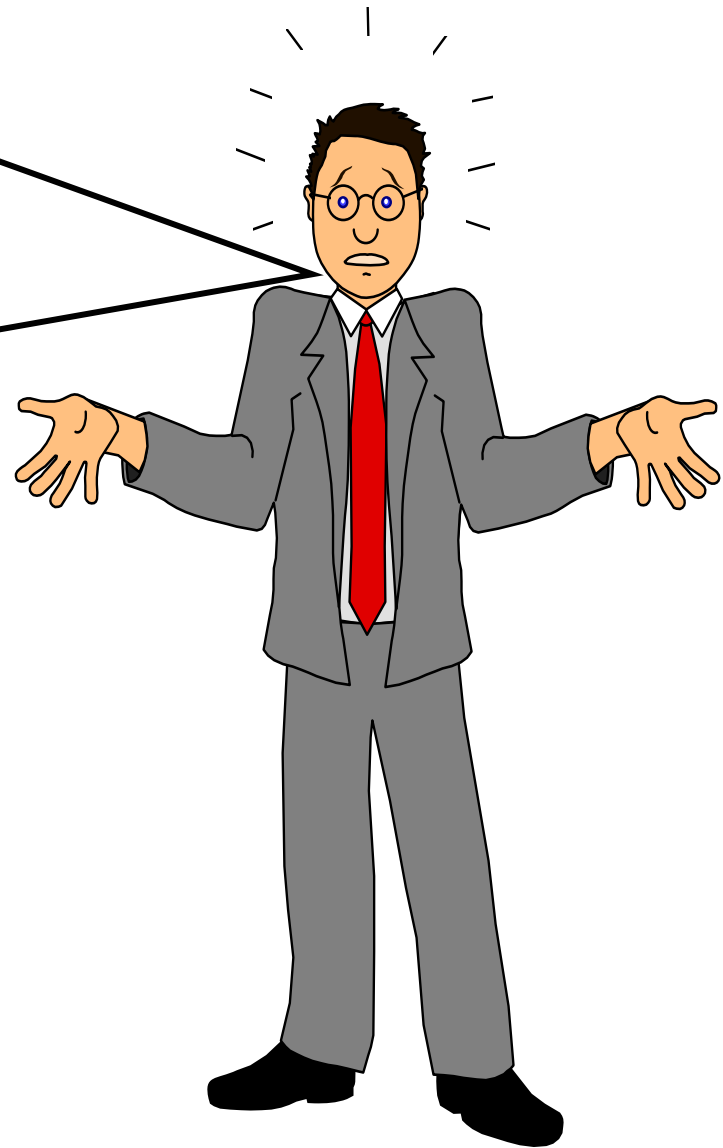
*Ultimately a question of the balance between...*

**Costs of  
Infection  
Control**



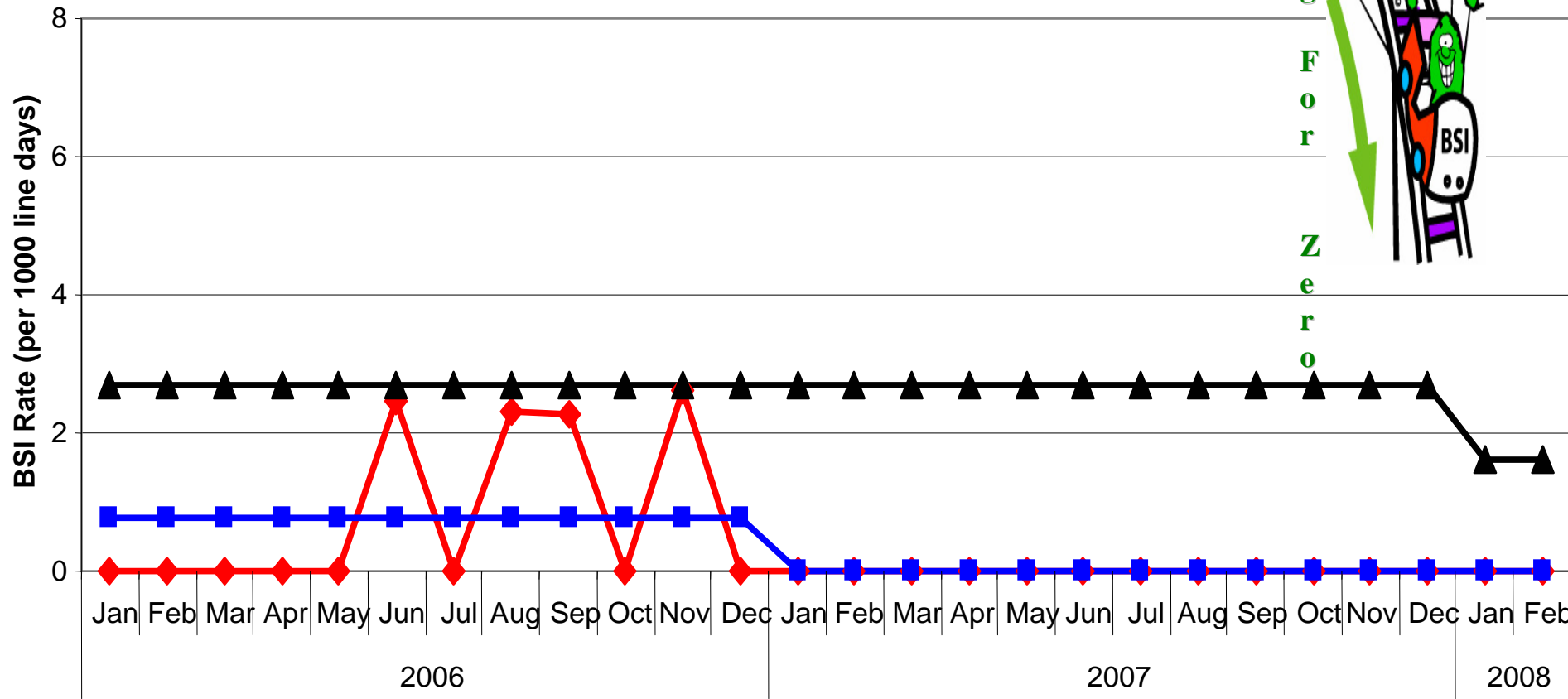
**Benefits of  
Infection  
Control**

*So what's my  
real return on  
investment?*



**NOTE: Once our value was established, we didn't have to keep proving it to executives (in dollars saved!)  
We changed the way they think about ICHE! We just have to keep reducing infections!**

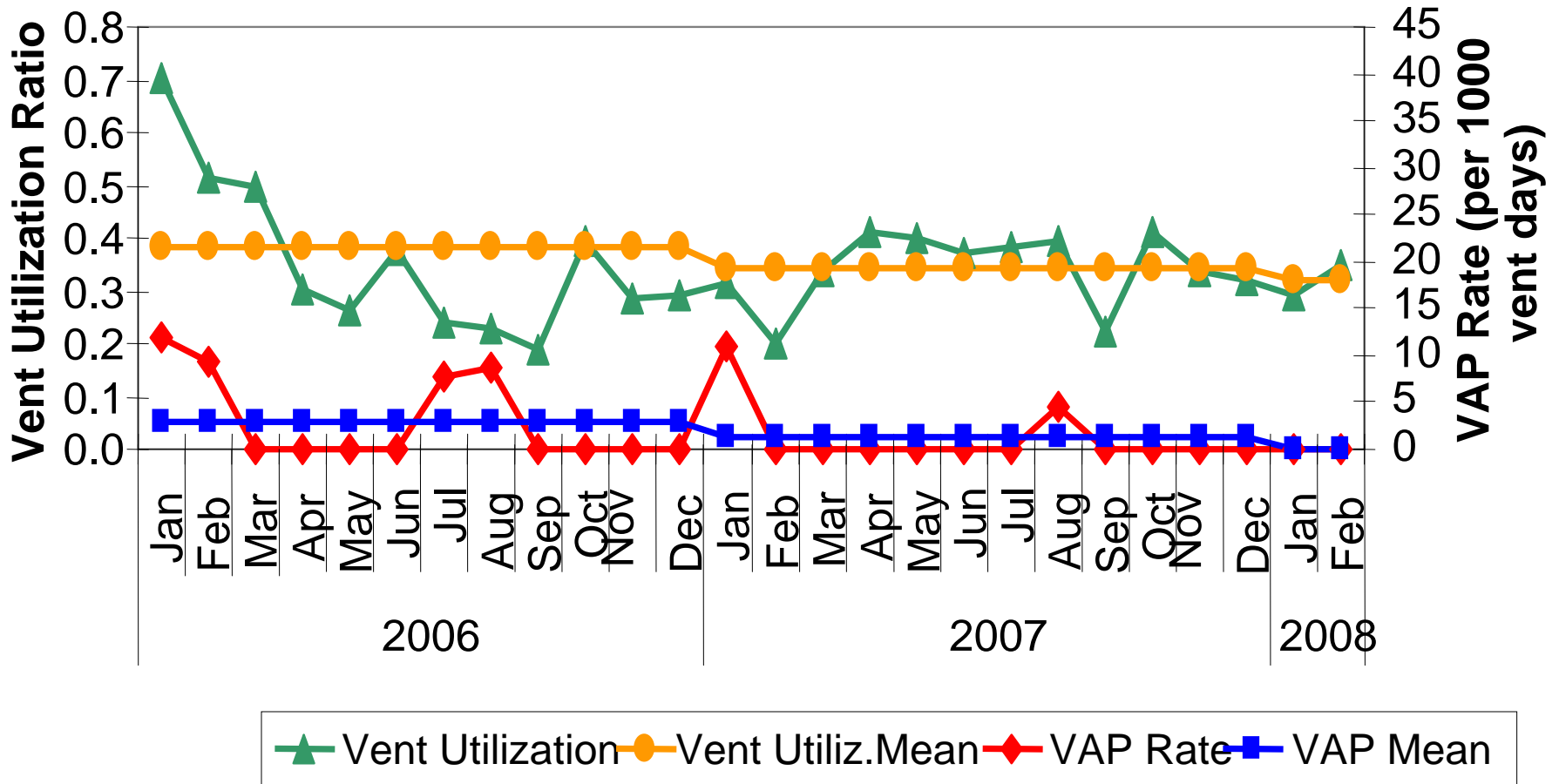
# 56ICU Primary Bloodstream Infection Rates 2006 Through Present



Source: Barnes Jewish Hospital Epidemiology and Infection Prevention Department

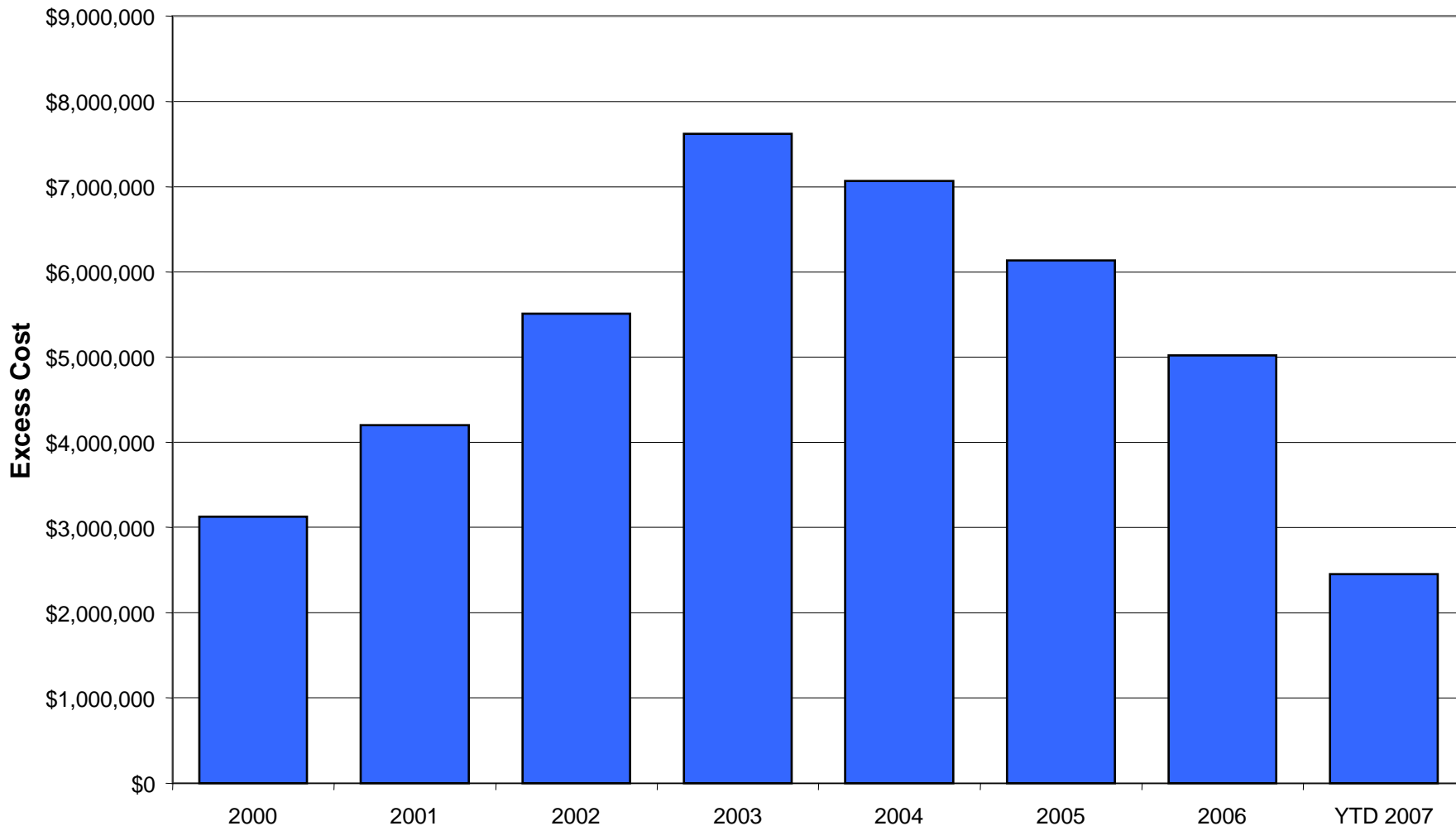
Legend: ◆ Rate ■ Mean ▲ NHSN

# 104ICU Ventilator Utilization and Ventilator Associated Pneumonia 2006 through Present



# Barnes-Jewish Hospital Excess Cost of HAI

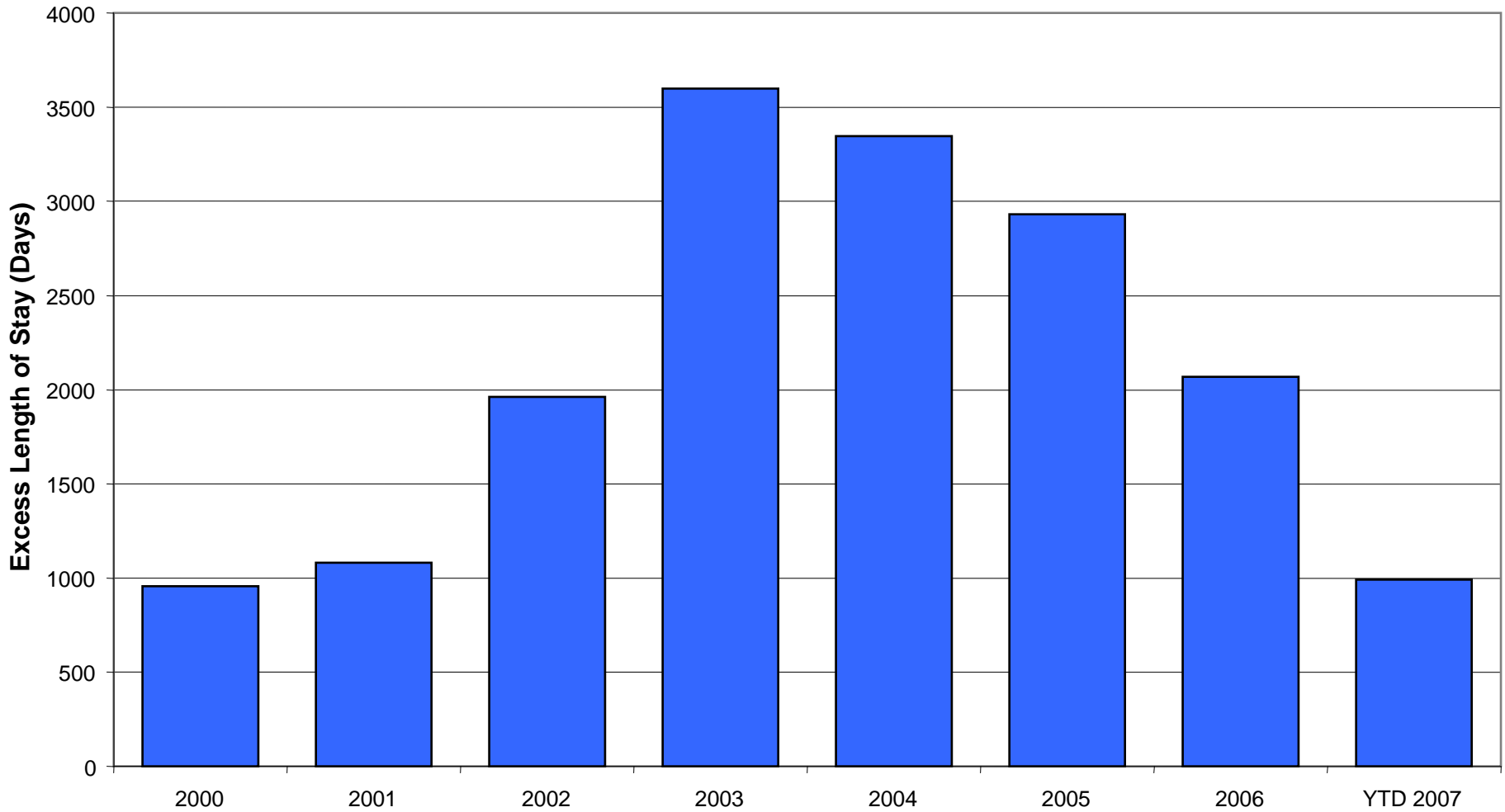
2000 to YTD 2007



# Barnes-Jewish Hospital

## Excess Length of Stay Associated with HAI

### 2000 to YTD 2007



*So should cost savings support enhancing resources?*

# Enhancing Resources - Option #1



Add 1 FTE – experienced

- \$75K: salary/benefits, computer, equipment, training

Dedicated medical director (0.5 FTE)

- \$75K: purchased services; *plus* \$2,500 training

Secretarial support (1.0 FTE)

- \$20K

Negotiate with PI to support 2 IC-related improvement projects/yr. to reduce HAI or OE

Support intern from School of Public Health

***Financial Impact = \$172,500***

# Enhancing Resources - Option #2

Add 1 FTE – experienced

- \$75K: salary/benefits, computer, equipment, training

Contract for physician leadership for committee, review data, recommendations for interventions, meet with med staff leadership prn (8-10 hrs./ month)

- \$10-12K: contract services; *plus* \$2,500 training

Secretarial support - share OH's secretary

- Barter: we will assist with their data mgt./reporting functions
- Share IC liaisons to assist with flu vaccine campaign

Negotiate with PI to support 1 IC-related improvement project /yr. to reduce HAI or OE

Support intern from School of Public Health

***Financial Impact = \$89,500***



# Enhancing Resources - Option #3



Add 1 FTE for IC and OH to share – experienced

- \$75K: salary/benefits, computer, equipment, training

Contract for physician leadership for 1x/month meeting to prepare for IC committee, review data, make recommendations for interventions. (4 hrs./ month)

- \$5K

Negotiate with laboratories to pick up communicable disease reporting functions to free up time for clerical work.

Negotiate with PI to support 1 IC-related improvement project /yr. to reduce HAI or OE

Support intern from School of Public Health

***Financial Impact = \$80,000***

## *In Summary*

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*Do know and share the impact of HAI and all benefits of IP*

*Don't do your own cost-benefit studies; use estimates from the literature... adjust for inflation*

*Do understand the caveats (economics of IP) and what is most important to your healthcare and governmental leaders!*

*Don't base your case on solely on reducing costs of HAIs avoided*

*Do focus on interventions to reduce HAI...and demonstrate, market your value*

*Don't forget: Infection Prevention is the right thing to do!*

# References and Helpful Resources

## **HAI Statistics and IPC PROGRAMS:**

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*Eli N. Perencevich, MD, MS; Patricia W. Stone, PhD, MPH, RN; Sharon B. Wright, MD, MPH et al.*

*Infect Control Hosp Epidemiol 2007;28:1121-1133*

*Horan-Murphy E, Barnard B, Chenowith C, Friedman C, Hazuka B, et al. APIC/CHICA-CanadInfection Control and Epidemiology: Professional and Practice Standards. Am J Infect Control. 1999 Feb; 27 (1):47-51*

*Scheckler WE, Brimhall D, Buck AS, Farr BM, Friedman C, Garibaldi R, et al. Requirements for Infrastructure and Essential Activities of Infection Control and Epidemiology in Hospitals. Am J Infect Control. 1998 Feb;26 (1):47-60.*

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## **FOCUS ON INTERVENTIONS:**

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*Garcia R, Barnard B, Kennedy V. The Fifth Evolutionary Era in Infection Control: Interventional Epidemiology. Am J Infect Control. 2000 Feb; 28 (1):30-43.*

*Eli N. Perencevich, MD, MS; Patricia W. Stone, PhD, MPH, RN; Sharon B. Wright, MD, MPH et al.*

*Infect Control Hosp Epidemiol 2007;28:1121-1133.*

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## **BUSINESS CASE FOR IPC PROGRAMS**

*Dunagan WC, Murphy DM, Hollenbeak CS, Miller SB. Making the Business Case for Infection Control: Pitfalls and Caveats. Am J Infect Control. 2002 Apr;30 (2):86-92.*

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# References for Perenchovich Cost/LOS Table

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