The Economics of Infection Prevention
and Making the RIGHT Business Case
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APIC President, 2007
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

Note: costs in 1985 dollars
HAIs: Scope of the Problem

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

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
• 4.5 HAI/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*


Death from HAI in the U.S. 2002

Number Deaths in Thousands

N = 98,987

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

HAIs: 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

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

<table>
<thead>
<tr>
<th>Type HAI</th>
<th>Attributable Costs</th>
<th>Range</th>
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</thead>
<tbody>
<tr>
<td>Surgical Site</td>
<td>$25,546 (39,875)</td>
<td>$1783 – 134,602</td>
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<tr>
<td>Bloodstream</td>
<td>$36,441 (37,078)</td>
<td>$1822 – 107,156</td>
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<tr>
<td>Vent. Associated Pneumonia</td>
<td>$9669 (2920)</td>
<td>$7904 – 12,034</td>
</tr>
<tr>
<td>Urinary Tract (UTI)</td>
<td>$1006 (503)</td>
<td>$650 - 1361</td>
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</table>

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

**NOTE.** BSI, bloodstream infection; CABG, coronary artery bypass graft surgery; SSI, surgical site infection; UTI, urinary tract infection; VAP, ventilator-associated pneumonia.
Comparison of Economics – Patients with and without Catheter-related Bloodstream Infection

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

Shannon et al. *Amer J Med Quality* Nov/Dec 2006; pgs 7S-16S
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.

*Modified from: Perencevich, Stone, Wright
### MRSA Infection = Increased Cost/LOS

<table>
<thead>
<tr>
<th>Study</th>
<th>HAI with MRSA</th>
<th>Additional hospital LOS</th>
<th>Additional hospital charges</th>
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<tr>
<td>Cosgrove (2005)</td>
<td>Bacteremia</td>
<td>2 days (p=.045)</td>
<td>$7,212 (p = .008)</td>
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<tr>
<td>Reed (2005)</td>
<td>Bacteremia</td>
<td>2 days (p&lt;.001)</td>
<td>$7,273 (p=.012)</td>
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<td>Engemann (2003)</td>
<td>SSI</td>
<td>5 days (p&lt;.001)</td>
<td>$39,572 (p&lt;.001)</td>
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</table>

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:

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

### EXCESS COST OF CABG SSI

- **none**
  - Hospital charges: $25,000
  - Hospital days: 10

- **deep leg**
  - Hospital charges: $75,000
  - Hospital days: 30

- **deep chest**
  - Hospital charges: $150,000
  - Hospital days: 50

*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 $

- 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

Source: D. Murphy, 2006
Impact of Occupational Exposures (OE)

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.)

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

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***)


*MMWR, May 15, 1998; 47 (RR-7)
The language of healthcare economics...
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: 6/98 - 12/98
- Surgical procedure: Gastric Bypass
- Number of procedures performed in 1998: 70
- Reported “benchmark” SSI rate/100 procedures: 2.7-5.1
- Operating unit endemic rate/100 procedures: 2.86% (2 SSI / 70 procedures)
- Operating unit epidemic rate/100 procedures: 22.6% (7 SSI / 31 procedures)
- Average LOS for uninfected vs. infected: 4 days vs. 22 days
- Mean excess LOS per SSI: 18 days
- Average cost for uninfected vs. infected: $7,816 vs. $44,963
- Mean excess cost per SSI: $37,147
- Rate reduced to baseline/ benchmark (date): 3.0% (4/99 through 4/2000)
- Projected # procedures 2000: 70 cases
- Expected # SSI based on endemic (3.0) rate: 2 SSI
- Expected # SSI based on epidemic (22.6%) rate: 16 SSI
- # SSI avoided (based on *reduced rate): 14 SSI annually

**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

**Estimated cost avoidance 1999 - 2000**
- $520,058 ($37,147 x 14)

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

- Fewer CABG SSI resulted in fewer I&D cases in OR;
- Opportunity for more 1st 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
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)*

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
Organizational cost is not just about $$$

Understand Total Organizational Impact

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
• Executives can't always find the savings on the organization's bottom line:
  ¾ Fixed costs don't change with reduction in HAIs
  ¾ Many variable costs are "sticky" – don't decrease with reduction in HAI either – still need staff
Reimbursement May Dictate Whether $$$ are Saved or Lost

- 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

Rhinehart, AJIC, 2000; 28:25-9
Know Who Pays for HAI

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**

<table>
<thead>
<tr>
<th>Excess cost of HAIs</th>
<th>$1 million*</th>
</tr>
</thead>
<tbody>
<tr>
<td>% preventable with effective IC</td>
<td>32%</td>
</tr>
<tr>
<td>Costs prevented</td>
<td>$320,000</td>
</tr>
<tr>
<td>Cost of program</td>
<td>$200,000</td>
</tr>
<tr>
<td>Net Benefit</td>
<td>$120,000</td>
</tr>
</tbody>
</table>

*Must always subtract program costs from potential cost savings!

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

<table>
<thead>
<tr>
<th>Component</th>
<th>Annual Cost(s)</th>
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<tbody>
<tr>
<td>Personnel</td>
<td></td>
</tr>
<tr>
<td>0.5 Physician</td>
<td>70,000</td>
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<tr>
<td>1 Nurse</td>
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</tr>
<tr>
<td>1 Secretary</td>
<td>15,000</td>
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<tr>
<td>0.5 Computer Programmer</td>
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<tr>
<td>Supplies, fax. Etc.</td>
<td>20,000</td>
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<tr>
<td>Fringe benefits and overhead</td>
<td>50,000</td>
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<tr>
<td>Total</td>
<td>$200,000*</td>
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</tbody>
</table>

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

*Wentzel. J Hosp Inf 1995; 31: 79-87; *1992*
## Plan for the Resources You Need!

### Sample IPC Program Budget

<table>
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<tr>
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**2005 BUDGET TOTAL 250,392**

*Staff = 2 ICPs; 1 Secretary; 1 Medical Director*
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:**

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

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

Staffing Requirements for NNIS Hospitals based on minimum requirement of 100 occupied beds

2001 Delphi Study

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

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\(^1\)
- 1995: British Hospital Infection Working Group stated that about 30% of HAIs could be avoided by better application of existing knowledge\(^2\)

---


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

# 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

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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 @ $23/16 hrs. = $12,000
600 RNs @ $23/1 hr. = $13,800
100 PCTs @ $12/1 hr. = $1,200
52 MDs @ $100/1 hr. = $5,200

$32,200

**Development & Implementation costs = $36,812**
**Cost Benefit Analysis**

**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 x 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

### CABG Surgical Site Infections (SSI)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>Impact of Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#SSI</td>
<td>116</td>
<td>86</td>
<td>-30</td>
</tr>
<tr>
<td>%SSI</td>
<td>5.21%</td>
<td>4.26%</td>
<td>-26%</td>
</tr>
<tr>
<td>Excess Cost</td>
<td>$2,440,000</td>
<td>$1,737,945</td>
<td>-$801,340</td>
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</table>

### Spinal Surgical Site Infections (SSI)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>Impact of Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#SSI</td>
<td>64</td>
<td>58</td>
<td>-6</td>
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<tr>
<td>%SSI</td>
<td>1.7%</td>
<td>1.5%</td>
<td>-10%</td>
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<tr>
<td>Excess Cost</td>
<td>$716,345</td>
<td>$659,394</td>
<td>-$90,000</td>
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</table>

### Bloodstream Infections (BSI)

<table>
<thead>
<tr>
<th></th>
<th>2000</th>
<th>2001</th>
<th>Impact of Interventions</th>
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</thead>
<tbody>
<tr>
<td>#BSI</td>
<td>564</td>
<td>542</td>
<td>-22</td>
</tr>
<tr>
<td>BSI/1,000 patient days</td>
<td>3.5/1,000</td>
<td>3.4/1,000</td>
<td>-4%</td>
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<tr>
<td>Excess Cost</td>
<td>$2,639,520</td>
<td>$2,639,540</td>
<td>-$107,140</td>
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</table>

### Ventilator Associated Pneumonia (VAP)

<table>
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<th>2000</th>
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<th>Impact of Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>#VAP</td>
<td>294</td>
<td>160</td>
<td>-134</td>
</tr>
<tr>
<td>VAP/1,000 ventilator days</td>
<td>7.5/1,000</td>
<td>3.9/1,000</td>
<td>-46%</td>
</tr>
<tr>
<td>Excess Cost</td>
<td>$2,449,020</td>
<td>$1,385,600</td>
<td>-$1,160,440</td>
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</tbody>
</table>

### Total Cost of All HAI tracked

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cost of All HAI tracked</td>
<td>$8,244,885</td>
<td>$6,422,479</td>
<td>-$2,822,406</td>
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</tbody>
</table>
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

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

Costs of Infection Control VS. 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

BSI Rate (per 1000 line days)

Source: Barnes Jewish Hospital Epidemiology and Infection Prevention Department
104 ICU Ventilator Utilization and Ventilator Associated Pneumonia
2006 through Present

Source: Barnes Jewish Hospital Epidemiology and Infection Prevention Department
Barnes-Jewish Hospital
Excess Cost of HAI
2000 to YTD 2007

Excess Cost

<table>
<thead>
<tr>
<th>Year</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>YTD 2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost</td>
<td>$3,000,000</td>
<td>$4,000,000</td>
<td>$5,000,000</td>
<td>$7,000,000</td>
<td>$7,000,000</td>
<td>$6,000,000</td>
<td>$5,000,000</td>
<td>$0</td>
</tr>
</tbody>
</table>
Barnes-Jewish Hospital
Excess Length of Stay Associated with HAI
2000 to YTD 2007

Excess Length of Stay (Days)
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

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:
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

FOCUS ON INTERVENTIONS:
Shannon et al. Amer J Med Quality Nov/Dec 2006; pgs 7S-16S

BUSINESS CASE FOR IPC PROGRAMS
References for Perenchovich Cost/LOS Table


