Infection Prevention – The Unappreciated Return on Investment

Patient Lives and the Bottom Line
HOSPITAL MEDICAL ERRORS KILL 98,000 AMERICANS EACH YEAR. -- HEARST NEWS INVESTIGATION
Objectives

• Compare the cost of infection prevention versus treatment and control.
• Describe the cost benefits of transmission based precautions
• Relate the impact of infection prevention on Value Based Purchasing
“To Err is Human”

Landmark Institute of Medicine report (1999)

- 2 large studies:
  - Estimated hospitalizations: 33.6 million
  - Colorado/Utah
    - 6.6% of adverse events led to death
  - New York
    - 13.6% of adverse events led to death
  - Estimated death toll: 44,000-98,000 patients
    - The 8th leading cause of death

“To Err…” - Healthcare Acquired Infections

Centers for Disease Control and Prevention (CDC) (2002)

• 1.7 million HAIs
  – The entire city of Austin, TX
  – Almost 3x the population in Denver

“To Err…” - Healthcare Acquired Infections

CDC (2002)

- 98,987 deaths
  - 271 deaths EVERY SINGLE DAY or 11 deaths/hour
  - 6th leading cause of death in the US
  - Pneumonia: 95,967
  - Bloodstream infection: 30,665
  - Urinary tract infection: 13,088
  - Surgical site infection: 8,205 (likely under reported)

2009 Healthcare Numbers

American Medical Association (2009)

• 34.7 million adults received inpatient care
  – 165.1 million patient days
• 96.2 million device days
• 8 million operations

Surgical Site Infection

In United States Acute Care Hospitals (2009)

- SSI
- Incidence: 160,000 patients
- Deaths: ~3%; 4,800 patients
- Cost (2012 dollars):
  - $3.0 billion-$3.6 billion

4,491 service members killed in Iraq 2003-2013
174,000 Iraqis killed during the same time.

Clostridium difficile

In United States Acute Care Hospitals (2009)

- **C. diff**
- Incidence: 134,000 patients
- Deaths: 23.7%; 31,800 patients
- Cost (2012 dollars):
  - $1.2 Billion - $1.8 Billion

Catheter Associated Urinary Tract Infection

In United States Acute Care Hospitals (2009)

- **CAUTI**
  - Incidence: 77,100 patients
  - Deaths: 2.3%; 1,800 patients
  - Cost (2012 dollars):
    - $18.7 million – $37.0 million

Hurricane Katrina – 1,833 deaths

Central Line Associated Bloodstream Infection

In United States Acute Care Hospitals (2009)

- **CLABSI**
  - Incidence: 40,400 patients
  - Deaths: 18.5%; 7,500 patients
  - Cost (2012 dollars):
    - $1.2 Billion - $2.6 Billion

Dec 22, 2014 · The death toll from Ebola in the three West Africa countries hardest hit by the epidemic has risen to 7,518 out of 19,340 confirmed cases

Ventilator Associated Pneumonia

In United States Acute Care Hospitals (2009)

- VAP
  - Incidence: 31,100 patients
  - Deaths: 13.4%; 4,200 patients
  - Cost (2012 dollars):
    - $2.8 Billion - $3.4 Billion

In 2012, 4,743 pedestrians were killed in traffic crashes in the United States, and another 76,000 pedestrians were injured.

Impact of inexpensive oral care

The total cost of the oral care protocol was $2187.49

There were 14 fewer cases of ventilator-associated pneumonia

Decrease in cost of $140,000 to $560,000

In Total...

In United States Acute Care Hospitals (2009)

• Incidence: 1 in 20 inpatients
• Deaths: ?
• Cost (2012 dollars):
  – $8.3 Billion - $11.5 Billion

Haiti 2010 Earthquake - $7.8 billion, or about 120 percent of its gross domestic product, or $11.5 billion in investment over a 3-year period to recover.
Cost of Infection Prevention

- $1.98 every time a HCW fails hand hygiene
- SSI - The direct costs of SSI include a longer hospital stay, readmission, outpatient and emergency visits, further surgery, and prolonged antibiotic treatment.
  - $400 for superficial > $30,000 for organ/space
- each CLABSI carries excess health-care costs of $16,550
- Reduce catheter days - CAUTI cost calculator: http://cauti.umms.med.umich.edu/PHP/CAUTI_input.php
Prevention is Cheaper and Better than Control

• Gloves, gowns, and hand hygiene are inexpensive!!!

• In 2008 the profession was renamed and we were no longer Infection Control Professionals, we became Infection Preventionists.

• Prevention saves $$$$$$ and LIVES!
What You Can Do to Help

• Wash your hands
• Have lunch with your facility’s Infection Preventionist
• Remember the costs in lives and dollars of HAIs
• Follow isolation precautions
• Follow evidence based guidelines for the prevention of infections
• Wash your hands again, please
1. Review the journey to VBP.

2. Understand what Value Based Purchasing (VBP) is.

3. Review the measures included in VBP and how points are calculated.

4. Understand what this means to your hospital and ways to improve your performance.

5. What’s next?
How did we get here?

**<2011**
- NHSN Rate table

**2011**
- Start of SIRs (2006-2008 baseline)
- CMS Reporting-ICU CLABSI (VBP baseline)

**2012**
- NHSN major definition changes
- CMS Reporting- ICU CAUTI, COLO, HYST
- VBP-CLABSI, CAUTI, COLO and HYST Baseline period for 2014

**2013**
- More NHSN definition changes
- CMS Reporting LabID MRSA, CDI, HCW Influenza Immunization
- First year of VBP-CLABSI Performance Period

**2014**
- VBP- CLABSI, CAUTI, COLO and HYST Performance Period
The Moving Target

- A 44 percent decrease in central line-associated bloodstream infections between 2008 and 2012
- A 20 percent decrease in infections related to the 10 surgical procedures tracked in the report between 2008 and 2012
- A 4 percent decrease in hospital-onset MRSA bloodstream infections between 2011 and 2012
- A 2 percent decrease in hospital-onset C. difficile infections between 2011 and 2012
- A 3 percent increase in catheter-associated urinary tract infections between 2009 and 2012
The number of states performing better than the national SIR by infection type:

- **CLABSI** – 16 states
- **CAUTI** – 15 states
- **SSI, colon** – 7 states
- **SSI, abdominal hysterectomy** – 6 states

<table>
<thead>
<tr>
<th>Infection Type</th>
<th>National SIR</th>
<th>Change in Infection vs. National Baseline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Line-associated Bloodstream Infections (CLABSI)</td>
<td>0.56</td>
<td>↓ 44%</td>
</tr>
<tr>
<td>Catheter-associated Urinary Tract Infections (CAUTI)</td>
<td>1.03</td>
<td>↑ 3%</td>
</tr>
<tr>
<td>Surgical Site Infections, colon Surgery (SSI)</td>
<td>0.80</td>
<td>↓ 20%</td>
</tr>
<tr>
<td>Surgical Site Infections, Abdominal Hysterectomy Surgery (SSI)</td>
<td>0.89</td>
<td>↓ 11%</td>
</tr>
<tr>
<td>Hospital-onset Infections</td>
<td>0.98</td>
<td>↓ 2%</td>
</tr>
<tr>
<td>Hospital-onset MRSA Bloodstream Infections</td>
<td>0.96</td>
<td>↓ 4%*</td>
</tr>
</tbody>
</table>
What is Value Based Purchasing?

- Hospital Value-Based Purchasing Program
  - Hospitals will be paid for inpatient acute care services based on the *quality* of care, not just *quantity* of the services provided
- Funded by reductions from participating hospitals’ Diagnosis-Related Group (DRG) payments

<table>
<thead>
<tr>
<th>Fiscal Year</th>
<th>Percentage Withhold</th>
</tr>
</thead>
<tbody>
<tr>
<td>FY 2013</td>
<td>1.00%</td>
</tr>
<tr>
<td>FY 2014</td>
<td>1.25%</td>
</tr>
<tr>
<td>FY 2015</td>
<td>1.50%</td>
</tr>
<tr>
<td>FY 2016</td>
<td>1.75%</td>
</tr>
<tr>
<td>FY 2017 and beyond</td>
<td>2.00%</td>
</tr>
</tbody>
</table>
Domains and Measures/Dimensions FY 2015

**Clinical Process of Care**
- AMI-7a
- AMI-8a
- HF-1
- PN-3b
- PN-6
- SCIP-Inf-1
- SCIP-Inf-2
- SCIP-Inf-3
- SCIP-Inf-4
- SCIP-Inf-9
- SCIP-VTE-2
- SCIP-Card-2

**Patient Experience of Care**
- Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) Survey

**Outcome**
- MORT-30-AMI
- MORT-30-HF
- MORT-30-PN
- AHRQ PSI-90
- CLABSI

**Efficiency**
- MSPB-1

**Domain Weights**
- Efficiency: 20%
- Clinical Process of Care: 20%
- Outcome: 30%
- Patient Experience of Care: 30%

Spreading knowledge. Preventing infection.
CLABSI and CAUTI are in adult, pediatric and neonatal ICUs
SSI are in colon and abdominal hysterectomy patients
Evaluating Hospitals Achievement vs. Improvement

• Achievement Points
  Awarded by comparing an individual hospital’s rates during the performance period with all hospitals’ rates from the baseline period.*
  – Rate equal to or better than the benchmark: 10 points
  – Rate worse than the achievement threshold: 0 points
  – Rate equal to or better than the achievement threshold and worse than the benchmark: 1–10 points

• Improvement Points
  Awarded by comparing an individual hospital’s rates during the performance period to that same individual hospital’s rates from the baseline period.
  – Rate equal to or better the benchmark: 9 points
  – Rate equal to or worse than the baseline period rate: 0 points
  – Rate between the baseline period rate and the benchmark: 0–9 points

* Please note that unlike the other measures, the MSPB measure compares a hospital’s rates during the performance period with all hospitals’ rates from the performance period.
## Threshold and Benchmark

<table>
<thead>
<tr>
<th>Measure</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>AHRQ PSI-90 Measure</td>
<td>Lower is better</td>
</tr>
<tr>
<td>CLABSI Measure</td>
<td>Lower is better</td>
</tr>
<tr>
<td>MSPB Measure*</td>
<td>Lower is better</td>
</tr>
</tbody>
</table>

* Please note that unlike the other measures, the MSPB measure’s benchmark and threshold are based on hospital data from the performance period.
Evaluating Hospitals Unweighted Domain Scores

- Measure Score: Greater of earned improvement points or achievement points for each measure.
- Unweighted Domain Score: Sum of measure scores included in the domain, normalized to take into account only the measures a hospital was eligible for during the performance period based on minimum cases counts.

Measure Score: 8

Unweighted Domain Score: 83

- CLABSI: 8
- CAUTI: 6
- SSI: 8
- PSI-90: 9
- Mort30-AMI: 10
- Mort30-HF: 7
- Mort30-PN: 10

Domain Score: \( \frac{58}{70} \times 100 = 83 \)
Evaluating Hospitals Total Performance Score

• A hospital’s unweighted domain scores are converted to a Total Performance Score in two steps: The unweighted domain scores are multiplied by the applicable domain weights to create weighted domain scores.

• The weighted domain scores are summed to calculate the Total Performance Score.

Clinical Process (45%) + Patient Experience (30%) + Outcome (25%) = Total Performance Score

60 x 45% = 27 + 50 x 30% = 15 + 80 x 25% = 20 = 27 + 15 + 20 = 62
Two Options: Achievement or Improvement

\[
\begin{align*}
\text{Achievement Range} &= 9 \times \left( \frac{\text{Hospital’s Performance Period Rate} - \text{Achievement Threshold}}{\text{Benchmark} - \text{Achievement Threshold}} \right) + 0.5 \\
\text{Achievement Range} &= 10 \times \left( \frac{\text{Hospital’s Performance Period Rate} - \text{Hospital Baseline Period Rate}}{\text{Benchmark} - \text{Hospital Baseline Period Rate}} \right) - 0.5
\end{align*}
\]
Hospital USA had an overall ICU CLABSI standardized infection ratio (SIR) of 0.425 in 2013. Their baseline SIR in 2011 was 0.470.

CMS Benchmark SIR is 0.00 and threshold SIR is 0.465

Achievement Score is
\[ 9 \times \frac{0.425 - 0.465}{0.00 - 0.465} + 0.5 = 1.274 \]

Improvement Score is
\[ 10 \times \frac{0.425 - 0.470}{0.00 - 0.470} - 0.5 = 0.457 \]

Hospital USA receives higher of two scores, or 1 out of 10 points for CLABSI.
<table>
<thead>
<tr>
<th>Hospital</th>
<th>2011 Baseline</th>
<th>2013 Performance (Feb-Dec)</th>
<th>CMS Benchmark</th>
<th>CMS Threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIMC</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BGFMC</td>
<td>N/A</td>
<td>N/E</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BBMC</td>
<td>0.938</td>
<td>0.647</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BBHH</td>
<td>0.476</td>
<td>0.294</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BGM C</td>
<td>0.470</td>
<td>0.425</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BDMC/CCMC</td>
<td>0.305</td>
<td>0.619</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BGSMC</td>
<td>0.601</td>
<td>0.610</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BEMC</td>
<td>0.308</td>
<td>0.578</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BTMC</td>
<td>0.070</td>
<td>0.617</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BBWMC</td>
<td>0.405</td>
<td>0.546</td>
<td>0.00</td>
<td>0.465</td>
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<tr>
<td>BDWMC</td>
<td>0.801</td>
<td>0.535</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>Page</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>NCMC</td>
<td>0.292</td>
<td>0.000</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>MMC</td>
<td>0.000</td>
<td>0.000</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>SRMC</td>
<td>N/E</td>
<td>N/E</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>EMCH</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>TCH</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>PCMH</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>WMC</td>
<td>N/E</td>
<td>N/E</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>OCH</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BCCH</td>
<td>N/E</td>
<td>N/E</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>BLMC</td>
<td>NO ICU</td>
<td>NO ICU</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>FMH</td>
<td>N/E</td>
<td>N/E</td>
<td>0.00</td>
<td>0.465</td>
</tr>
<tr>
<td>Hospital</td>
<td>No. of Infections Reported (A)</td>
<td>Central Line Days (CLDs)</td>
<td>Predicted No. Infections (B)</td>
<td>Standardized Infection Ratio (SIR) (A/B)</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------------------------------</td>
<td>--------------------------</td>
<td>-------------------------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>Denver Health Medical Center</td>
<td>5</td>
<td>Not Available</td>
<td>18.564</td>
<td>0.256</td>
</tr>
<tr>
<td>Presbyterian St. Lukes Medical Center</td>
<td>11</td>
<td>Not Available</td>
<td>22.145</td>
<td>0.497</td>
</tr>
<tr>
<td>Centura Health-Porter Adventist Hospital</td>
<td>3</td>
<td>Not Available</td>
<td>5.664</td>
<td>0.530</td>
</tr>
<tr>
<td>Banner Boswell Medical Center</td>
<td>5</td>
<td>Not Available</td>
<td>11.980</td>
<td>0.417</td>
</tr>
<tr>
<td>Banner Gateway Medical Center</td>
<td>0</td>
<td>Not Available</td>
<td>2.531</td>
<td>0.000(^8)</td>
</tr>
<tr>
<td>Banner Heart Hospital</td>
<td>1</td>
<td>Not Available</td>
<td>4.323</td>
<td>0.231</td>
</tr>
</tbody>
</table>
# FY2016 Performance Thresholds

**Finalized Performance Standards for the FY 2016 Hospital VBP Program Clinical Process of Care, Outcome, and Efficiency Domain Measures**

<table>
<thead>
<tr>
<th>Measure ID</th>
<th>Description</th>
<th>Achievement threshold</th>
<th>Benchmark</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMI-7a</td>
<td>Fibrinolytic Therapy Received Within 30 Minutes of Hospital Arrival.</td>
<td>0.91154</td>
<td>1.00000</td>
</tr>
<tr>
<td>IMM-2</td>
<td>Influenza Immunization</td>
<td>0.90607</td>
<td>0.98875</td>
</tr>
<tr>
<td>PN-6</td>
<td>Initial Antibiotic Selection for CAP in Immunocompetent Patient.</td>
<td>0.96552</td>
<td>1.00000</td>
</tr>
<tr>
<td>SCIP-Inf-2</td>
<td>Prophylactic Antibiotic Selection for Surgical Patients.</td>
<td>0.99074</td>
<td>1.00000</td>
</tr>
<tr>
<td>SCIP-Inf-3</td>
<td>Prophylactic Antibiotics Discontinued Within 24 Hours After Surgery End Time.</td>
<td>0.98086</td>
<td>1.00000</td>
</tr>
<tr>
<td>SCIP-Inf-9</td>
<td>Urinary Catheter Removed on Postoperative Day 1 or Postoperative Day 2.</td>
<td>0.97059</td>
<td>1.00000</td>
</tr>
<tr>
<td>SCIP-Card-2</td>
<td>Surgery Patients on Beta-Blocker Therapy Prior to Arrival Who Received a Beta-Blocker During the Perioperative Period.</td>
<td>0.97727</td>
<td>1.00000</td>
</tr>
<tr>
<td>SCIP-VTE-2</td>
<td>Surgery Patients Who Received Appropriate Venous Thromboembolism Prophylaxes Within 24 Hours Prior to Surgery to 24 Hours After Surgery.</td>
<td>0.98225</td>
<td>1.00000</td>
</tr>
<tr>
<td>CAUTI</td>
<td>Catheter-Associated Urinary Tract Infection.</td>
<td>0.801</td>
<td>0.000</td>
</tr>
<tr>
<td>CLABSI</td>
<td>Central Line-Associated Blood Stream Infection.</td>
<td>0.465</td>
<td>0.000</td>
</tr>
</tbody>
</table>
| SSI        | Surgical Site Infection.  
                 - Colon  
                 - Abdominal Hysterectomy | 0.668 | 0.000  
                 0.752 | 0.000  |
## FY2016 Baseline and Performance Periods

### Fiscal Year 2016 Baseline and Performance Periods

<table>
<thead>
<tr>
<th>Domain</th>
<th>Baseline Period</th>
<th>Performance Period</th>
</tr>
</thead>
</table>
What’s Next?

- LabID MRSA and CDI
- CLABSI and CAUTI all units
- Influenza Immunization
- Retirement of HACs
Next Steps

• Educate Infection Preventionists and Medical Directors on VBP and performance targets
• Perform system analysis of infections for common factors and improvement opportunities
• Develop and implement improvement strategies at a system level through existing CCGs
• Charter new improvement teams if warranted
• Provide routine status reports
QUESTIONS?

https://youtu.be/rUjE664C-Z4