THE JOURNEY TO ZERO
Innovative Strategies for Minimizing Hospital-Acquired Infections

∞ Sizing the Burden
∞ Establishing Frontline Awareness
∞ Minimizing Pathogen Opportunity
∞ Promoting Long-Term Gains
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_Innovative Strategies for Minimizing Hospital-Acquired Infections_
WITH SINCERE

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<td>Sherrine Eid, MPH</td>
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<td>Dara Som, MPH</td>
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Rising Public Pressure

While infections themselves are certainly no newcomer to the quality agenda, unprecedented levels of scrutiny around performance have truly brought infection control to the forefront of hospitals’ patient safety goals in the recent months. News stories that highlight the devastating toll of infections are sweeping across the nation like wildfire. In response, an ever-increasing number of state and federal mandates have emerged to push the transparency agenda by holding institutions responsible for their performance.

Failing to Deliver

Clinicians and administrators across the nation have whole-heartedly embraced the challenge of perfecting performance. While yesterday’s infections were considered an unavoidable consequence of delivering increasingly sophisticated care to an aging patient population, today, infections are largely regarded as defects—and investigated accordingly. However, despite our collective promises, recently published performance data from the National Healthcare Safety Network (NHSN) suggest that, as an industry, we are falling far short of our goals. The staggering costs of these infections are steadily eroding the hospital bottom line—but more importantly, the associated morbidity and mortality present us with a clear imperative to develop sustainable solutions for elevating performance. In such a complex terrain, the opportunities for improvement—and emulation of top performers—are endless.

**Mean Infection Rate by Type**

<table>
<thead>
<tr>
<th>Type</th>
<th>Rate</th>
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<tbody>
<tr>
<td>CR BSI</td>
<td>3.20</td>
</tr>
<tr>
<td>UTI</td>
<td>4.89</td>
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<tr>
<td>VAP</td>
<td>5.51</td>
</tr>
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</table>

**Median Cost by Infection**

<table>
<thead>
<tr>
<th>Infection</th>
<th>Cost</th>
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</thead>
<tbody>
<tr>
<td>VAP</td>
<td>$17,904</td>
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<tr>
<td>BSI</td>
<td>$15,153</td>
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<tr>
<td>CABG-Associated SSI</td>
<td>$18,057</td>
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<tr>
<td>UTI</td>
<td>$1,257</td>
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**Mean Excess LOS (Days)**

<table>
<thead>
<tr>
<th>Infection</th>
<th>Days</th>
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<tbody>
<tr>
<td>VAP</td>
<td>9.6</td>
</tr>
<tr>
<td>BSI</td>
<td>12.0</td>
</tr>
<tr>
<td>CABG-Associated SSI</td>
<td>25.7</td>
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</table>
IN BRIEF

Identifying the Big Challenges
While each institution will face unique struggles in infection prevention, these challenges generally can be categorized into four larger themes that collectively drive suboptimal performance:

- A lack of measurement that translates to poor understanding of internal infection burden, leaving priorities askew
- Poor dissemination of awareness to frontline staff, necessarily limiting the reach of any infection prevention initiative
- Minimal controls for variability in clinical processes, leaving room for human error and therefore increasing the potential for avoidable infections
- A largely reactive strategy, resulting in short-lived initiatives that target infection flashpoints but fall short of achieving long-term quality gains

Without a program carefully constructed to navigate the above missteps, institutions will not likely deliver on their promises of zero hospital-acquired infections.

Charting a Forward Path
The Clinical Advisory Board herein presents three prerequisites and nine best practices for navigating the journey to zero preventable infections. This effort begins with an overview of the “state of the union” in infection prevention and control, a look at why infections have risen so rapidly to the top of the quality agenda. Next, three ideas to shape executive understanding and lay the groundwork for program (re)design, which we have designated as “prerequisites” before deploying resources in infection control.

We then move on to address the crux of the prevention question itself, with a focus on crafting a multipronged strategy. This begins with elevating frontline staff awareness. Next, we highlight tactics to minimize pathogen opportunities through process improvement across key patient populations, including a special report dedicated to a pathogen that is top-of-mind for many, methicillin-resistant Staphylococcus aureus (MRSA). Finally, we transition from elevating knowledge levels and improving execution of key processes to hardwiring long-term gains through leveraging data and creating a culture of accountability.
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Preamble

A Climbing Sense of Urgency
Infections dotting headlines, elevating public awareness and scrutiny of hospital performance

Across the nation, infection control has recently risen to prominence, in part fueled by the growing media attention surrounding this topic. Devastating stories of patients losing their lives to HAIs abound, not only putting a human face on infections, but also increasing the scrutiny on hospital performance.

**A Blitz of Media Coverage**

Consumers actively campaigning legislators to enact laws requiring disclosure of infection rates

Given this rise in visibility, it is no surprise that consumers are actively campaigning for (and receiving) greater transparency into the prevalence of hospital-based infections. The map below highlights states that, as of September 2008, have mandated public reporting of hospitals’ infection control performance. Alongside pressure from the Consumers Union, the call for transparency swells from the health care industry’s own ranks, with the Association for Professionals in Infection Control and Epidemiology (APIC), the Infectious Diseases Society of America (IDSA), and the Healthcare Infection Control Practices Advisory Committee (HICPAC) all strong bastions of support. As mandatory public reporting rapidly proliferates across the nation, it is clear that transparency around performance has become the new clinical mandate.

Along with mandatory state reporting, rising stakes include pressure from the DRA

Recognizing the need for improved performance in the infection control arena, Centers for Medicare and Medicaid Services (CMS) have taken the lead in linking payment to performance. Recently, a provision of the Deficit Reduction Act (DRA) took the first steps toward preventing Medicare from awarding hospitals higher payment for the additional costs associated with the treatment of reasonably preventable conditions acquired during a hospital stay. The graphic below provides details on the Stop-Pay rule for fiscal year 2008, with three of eight conditions specific to infections. A recent expansion of the ruling incorporates 11 conditions, including surgical site infections following certain elective procedures, such as orthopedic surgeries and bariatric surgery. A healthy number of infection-related conditions are under consideration for inclusion in subsequent updates.

### Legislation Forcing Your Hand

**Deficit Reduction Act of 2005**

<table>
<thead>
<tr>
<th>Medicare P4P Proposal in Brief</th>
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<tbody>
<tr>
<td>• Issued pay-for-performance options in March 2007</td>
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<tr>
<td>• Outlines transition from pay-for-reporting to pay-for-performance beginning FY09</td>
</tr>
<tr>
<td>• Puts to-be-determined percentage of annual DRG payments at risk</td>
</tr>
<tr>
<td>• Submitted to Congress summer 2007</td>
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<table>
<thead>
<tr>
<th>CMS Stop-Pay in Brief</th>
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<tr>
<td>• Selection of reasonably preventable hospital-acquired conditions to receive lower payment beginning October 2008</td>
</tr>
<tr>
<td>• Three of eight conditions specific to infections (CA-UTI, VCAI, Post-CABG mediastinitis)</td>
</tr>
<tr>
<td>• Portion of reimbursement at stake if one of selected conditions is present as secondary diagnosis</td>
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### Will Health Plans Follow Suit?

“Having a financial incentive will increase hospitals’ awareness of the need to make the systematic changes necessary to avoid these errors, which no hospital wants to ever see happen. We are considering making non-payment for never events a standard part of our contract.”

Charles Cutler, MD
Chief Medical Director, Aetna

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1 Catheter-associated urinary tract infection.
2 Vascular catheter-associated infection.
3 Coronary artery bypass graft surgery.

New payment policies spurring innovative changes in practice

As many private payers are following CMS’s lead, some institutions are exploring innovative reimbursement strategies to capitalize on their superior infection-related performance. Geisinger Health System challenged its clinical leaders to explore innovative, provider-driven quality improvement programs based on pay-for-performance (P4P) principles. Coronary Artery Bypass Graft surgery (CABG) emerged as the group’s focus, and a flat rate was set for standard care associated with the procedure, providing a “warranty” of sorts for complications within 90 days of procedure. Impressive results included a reduction in total average length of stay (LOS) for CABG procedures of 16 percent and concurrent reductions in the 30-day readmission rates.

**Putting Money Where Their Mouth Is**

<table>
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<td>© 2008 The Advisory Board Company  17290</td>
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<tr>
<td>New payment policies spurring innovative changes in practice</td>
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<tr>
<td>As many private payers are following CMS’s lead, some institutions are exploring innovative reimbursement strategies to capitalize on their superior infection-related performance. Geisinger Health System challenged its clinical leaders to explore innovative, provider-driven quality improvement programs based on pay-for-performance (P4P) principles. Coronary Artery Bypass Graft surgery (CABG) emerged as the group’s focus, and a flat rate was set for standard care associated with the procedure, providing a “warranty” of sorts for complications within 90 days of procedure. Impressive results included a reduction in total average length of stay (LOS) for CABG procedures of 16 percent and concurrent reductions in the 30-day readmission rates.</td>
<td></td>
</tr>
<tr>
<td>Putting Money Where Their Mouth Is</td>
<td></td>
</tr>
<tr>
<td>System in Brief</td>
<td></td>
</tr>
<tr>
<td>• Large health system in Pennsylvania encompassing three tertiary, quaternary medical centers</td>
<td></td>
</tr>
<tr>
<td>• Operates own health insurance plan with approximately 210,000 members</td>
<td></td>
</tr>
<tr>
<td>• Revamped care, reengineered reimbursement through Geisinger Health Plan</td>
<td></td>
</tr>
<tr>
<td>Clinicians Engaged</td>
<td>Action Plan Set</td>
</tr>
<tr>
<td>Board, leadership challenged clinicians to develop quality initiative based on P4P principles</td>
<td>CABG selected as focus for initiative, best practice guidelines developed</td>
</tr>
<tr>
<td>Reaping the Reward</td>
<td></td>
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<tr>
<td>Total Average LOS in Elective CABG Procedures</td>
<td></td>
</tr>
<tr>
<td>Days</td>
<td></td>
</tr>
<tr>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
</tr>
<tr>
<td>6.3</td>
<td>5.3</td>
</tr>
<tr>
<td>Resulted in a 5% decrease in hospital charges</td>
<td></td>
</tr>
<tr>
<td>Readmission Rate Post-CABG</td>
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<tr>
<td>Percentage</td>
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<tr>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
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<tr>
<td>7.1%</td>
<td>6.0%</td>
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</table>
Changes to reimbursement aside, no secret that HAIs have taken a large toll on quality

While the changing charge and reimbursement climate—both private and public—is reason enough for hospitals to evaluate their current performance, the more pressing driver for change is the significant toll infections exact on patients. Recent estimates suggest that approximately 1.7 million infections occur annually in the U.S., translating to roughly 4.5 infections per 100 admissions and a total of 98,987 deaths per year, dissected below by type.

**Taking a Toll on Quality**

**Infection Burden, U.S.**

- **Annual HAIs:** ~1.7 million
  (4.5 infections per 100 admissions)
- **Deaths associated with HAIs:** 98,987

<table>
<thead>
<tr>
<th>Infection Type</th>
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<tbody>
<tr>
<td>Pneumonia</td>
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<tr>
<td>BSI¹</td>
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<td>UTI</td>
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<tr>
<td>SSI²</td>
<td>8,205</td>
</tr>
<tr>
<td>Other sites</td>
<td>11,062</td>
</tr>
</tbody>
</table>

**Data Sources Referenced**

- National Nosocomial Infections Surveillance (NNIS) system
- National Hospital Discharge Survey
- American Hospital Association Survey

**Coming in a Close Second**

**Partial Distribution of Adverse Events**

- **350-bed hospital**
  - 14,000 admissions
  - 5,500 surgeries

<table>
<thead>
<tr>
<th>Type</th>
<th>Number of Events</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decubitus Ulcers</td>
<td>25%</td>
</tr>
<tr>
<td>Nosocomial Infections</td>
<td>20%</td>
</tr>
<tr>
<td>Adverse Drug</td>
<td>16%</td>
</tr>
<tr>
<td>Procedural Events</td>
<td>12%</td>
</tr>
<tr>
<td>Postoperative Events</td>
<td>11%</td>
</tr>
<tr>
<td>Falls</td>
<td>4%</td>
</tr>
<tr>
<td>DVT/PE³</td>
<td>4%</td>
</tr>
</tbody>
</table>

**Number of Events**

<table>
<thead>
<tr>
<th></th>
<th>952</th>
<th>770</th>
<th>538</th>
<th>455</th>
<th>415</th>
<th>143</th>
<th>140</th>
</tr>
</thead>
</table>

1 Bloodstream infections.
2 Surgical site infections.
3 Deep vein thrombosis/pulmonary embolism.


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APIC analysis confirms infections result in reduction in inpatient net margins

The information below helps to put the magnitude of the nation’s infections in a financial context. To further dissect the impact of costs due to infection, APIC conducted an assessment examining 1.69 million admissions from 77 hospitals. Their analysis revealed an average reduction in inpatient net margins per infected patient of $5,018, with an average incremental direct cost of $8,832. Disturbingly, U.S. expenditure on HAIs exceeds the entire gross domestic product of Niger. Also of note, in comparison to the non-infection patient population, the HAI population was more heavily weighted toward Medicare—a finding that is of particular import, given the recent CMS stop-pay initiative for preventable conditions.

### A Nation’s Worth of Infections

**U.S. HAI Expenses Relative to Niger’s GDP**

<table>
<thead>
<tr>
<th>U.S. Dollars, Billions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Niger’s GDP (2006)</td>
</tr>
<tr>
<td>Annual Spend, HAI Treatment in U.S.</td>
</tr>
</tbody>
</table>

$3.54 | $5.80¹

¹ Represents upper estimate, conservative estimate = $4.50 B.

### Drilling Down on Details

- Analyzed 1.69 million admissions from 77 hospitals
- Estimated average reduction in inpatient net margins per infected patient of $5,018
- Determined average incremental direct cost for patient with HAI as $8,832

### HAI Patient Population Largely Medicare

**Analysis by Payer Mix**

<table>
<thead>
<tr>
<th>Patients Without Infection</th>
<th>Patients With Infection</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercial</strong> 21.4%</td>
<td><strong>Commercial</strong> 17.2%</td>
</tr>
<tr>
<td><strong>Medicare</strong> 36.7%</td>
<td><strong>Medicare</strong> 57.2%</td>
</tr>
<tr>
<td><strong>Other</strong> 28.1%</td>
<td><strong>Other</strong> 14.2%</td>
</tr>
<tr>
<td><strong>Medicaid</strong> 13.7%</td>
<td><strong>Medicaid</strong> 11.4%</td>
</tr>
</tbody>
</table>

Infection control of great importance to hospital leadership

Given the devastating clinical and financial consequences of infections, hospital executives across the nation are making infection control a top institutional priority. Detailed here are results from the 2008 Clinical Advisory Board Topic Poll, which asked CEOs, COOs, CFOs, VPMAs, Directors of Quality, and various VPs to rank the importance of 60 topics. Reproduced below are their top five selections—with “Reducing HAIs” as their second largest concern. Clearly, taking on this topic is very much top-of-mind for many hospital executives around the nation.

“What’s Keeping You Up at Night?”

CEO/COO Top Five Picks, 2008
Advisory Board Topic Poll, Percentage of “As” and “Bs”

Future Distribution Strategy 89%
Reducing HAIs 82%
Overcoming Specialist Shortage 79%
Maximizing ED Capacity, Throughput 76%
Maximizing Hospital Employed Physician Value 68%

All Respondents\(^1\) Top Five Picks, 2008
Advisory Board Topic Poll, Percentage of “As” and “Bs”

Future Distribution Strategy 90%
Reducing HAIs 83%
Overcoming Specialist Shortage 80%
Maximizing ED Capacity, Throughput 78%
Maximizing Hospital Employed Physician Value 74%

\(^{1}\) Respondents’ titles included: CEO, COO, CMO, CFO, VPMA, Director of Quality, Senior VP.

Source: Clinical Advisory Board interviews and analysis.
Similar concern echoed by respondents of Premier survey—placing HAIs as pressing issue

This interest in reducing HAIs was echoed in a recent Premier survey, which asked respondents to gauge the importance of HAIs relative to other patient safety issues that face hospitals today. Sixty-six percent of respondents said that HAIs were the “most serious issue” or a “serious issue” relative to their other safety concerns.

Feeling the Pressure

Importance of HAIs Relative to Other Patient Safety Issues

1 Original survey question: “How large or small of a patient safety problem would you rank HAIs in relation to other patient safety issues that your organization faces today?”

Paradigm shift from acceptable to avoidable defect in care process

The recent focus of hospital leaders on infections is a relatively new—and welcome—phenomenon. Not too long ago, infections were commonly seen by clinicians and administrators alike as an unavoidable byproduct of sophisticated care. Increases to life expectancy created a perception of infection inevitability in older, sicker patient populations, many of whom had conditions necessitating multiple indwelling devices, bypassing the body’s natural line of defense. In light of this mentality, hospital performance targets for infections were set primarily against median national infection rates.

Mentality of the Old Guard

The Dominant View

- Infections remain an unavoidable consequence of increasingly sophisticated care in older, sicker patient populations
- Difficulty mounting response due to inconclusive evidence in published literature
- Acceptable to use median national infection rate data as institutional performance targets
- HAIs lead to outlier payments, which more than compensate for incremental costs, thereby generating revenue

Challenging Precedent

“Health care-associated infections have long been considered a byproduct of health care, an outcome of treating an increasingly older, sicker patient population with an increasingly invasive arsenal of interventions. The costs associated with these infections were thought to be largely offset by reimbursement. But as the methodology of accounting for the costs of HAIs has become more sophisticated, institutions are finding that HAIs are not revenue neutral or positive, that HAIs substantively erode the profit margin of the average hospital. Leading institutions are also finding that significant reductions in many categories of HAIs cannot only be reached but sustained, providing a substantive opportunity for improving patient outcomes and the bottom line as well.”

APIC Briefing
February 2007


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Historical benchmarks set at median national infection rates, new benchmarks set at zero

Thankfully, many executives and clinicians are no longer striving for median performance. Instead, the emerging philosophy hinges on a “push toward perfection,” with the new target squarely focused on achieving zero hospital-acquired infections. Those able to achieve this lofty goal may ultimately be well rewarded by the market. Though it may be too soon to distinguish whether infection rates will be a meaningful differentiator for consumers, recent survey data suggest scrutiny from this sector as well, with 85 percent of respondents considering infection rate a “very important” factor in hospital selection.

Pushing Toward Perfection

“There are people who have been hired on the nursing staff who may never have seen one. They are very much the exception rather than the rule.”
Bacon Hospital

“We have very few infections now, and every one that we have we investigate as a defect. That in itself is a huge culture change, because now, people are saying ‘hey, these are no longer the cost of doing business.’”
Hobbes Hospital

Chasing Zero

“…in health care, the methods must be careful, but the goals should always be aggressive.”
Excerpt from website
Cardinal Health, OH

Impacting Patient Choice

“Please rank infection rate from very important to not important as a factor you would consider in choosing or avoiding a hospital”\(^2,3\)


\(^1\) Pseudonym.
\(^2\) Adapted from Methods, Design in McGuckin, et al.
\(^3\) Percentages do not add up to 100 due to rounding.
Challenge #1: A Dearth of Resources

However, executing on an aggressive infection control strategy is easier said than done. Hospitals face many significant roadblocks on the way to perfection, the first of which is a dearth of resources. Intuitively, devoting more staff to infection control should yield better results. Indeed, the data on the page show a significant inverse association between the number of infection control practitioners (ICPs) per 250 beds and clostridium difficile (c. difficile) rates. Yet, even with such compelling evidence, there is an ongoing shortage of these key personnel, as evidenced by the data shown at the bottom of the page.

A Worthwhile Investment

Clostridium Difficile Rates by Number of ICPs per 250 Beds

New Jersey, 2004

C. Difficile Cases per 1,000 Admissions

Lowest c. difficile rate observed at highest ICP-to-bed ratio

Number of ICPs per 250 beds

Yet An Endless Drought

“Which of the following is the most significant issue that your organization is facing to meet your current infection prevention challenge?”

Recommended Number of ICPs per 250 Beds

Since 1985, ICPs have reported an increase in work activities, though resources have remained static or reduced

Challenge #1: A Dearth of Resources

Inadequate Staffing for Infection Prevention

Lack of Administration Support

Funding, Budget Constraints

Other

47%

12%

34%

7%

Against backdrop of budgetary constraints, role of ICP has increased in quantity and scope of tasks

Adding insult to injury, the existing ICPs are often stretched too thin to make a meaningful dent in any one performance improvement initiative. As ICPs are tasked with sorting through a multitude of competing priorities, the challenge remains for hospitals to provide adequate support for these staff to make the right decisions efficiently and to create sustainable solutions for infection prevention and control.

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**Spreading Themselves Too Thin**

- Conducting epidemiological investigations
- Planning for potential pandemic influenza
- Reporting of infection metrics to internal, external groups
- Preparing for threats of bioterrorism
- Educating staff regarding antibiotic resistance
- Tracking real-time surveillance efforts
- Engaging staff in infection control campaigns
- Liaising between departments

---

**Increasing Footprint of ICPs**

“The field has grown as increasing responsibilities have been added to the infection prevention and control professional’s role over the past 10 years. Active involvement in emergency management, bioterrorism, increasing involvement in construction and renovation projects, and pandemic influenza planning are only some of these activities. At the same time, emergence and reemergence of infectious diseases, public attention to infections and infection rates, and integration of infection control activities into the overall hospital safety and quality program present unique challenges. As more emphasis is placed on infection prevention, there will be greater demands on the ICP’s time and expertise.”

Linda Greene, RN, MPS, CIC
Infection Control Manager
Via Health Rochester General Hospital

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Challenge #2: Growing Problem of Resistance

The second major challenge to eliminating HAIs is the growing issue of antimicrobial resistance. Data from both the CDC and the NHSN indicate that rates of bacterial resistance have risen steadily over the past decade, as illustrated below by the upward tick of third generation cephalosporin-resistant klebsiella pneumoniae. Much of this resistance has been driven by inappropriate or unnecessary antimicrobial use. Additionally, more than 70 percent of pathogens in U.S. hospitals have developed resistance to at least one antimicrobial. This is especially troubling, given that the pipeline of new antimicrobial agents (and resulting approvals) has shrunk dramatically over the past 25 years.

The Effects of Overuse and Misuse

### Third Generation Cephalosporin-Resistant K. pneumoniae, 1995–2004

<table>
<thead>
<tr>
<th>Year</th>
<th>Inappropriate</th>
<th>Appropriate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>1996</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>1997</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>1998</td>
<td>50%</td>
<td>50%</td>
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<tr>
<td>1999</td>
<td>50%</td>
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<tr>
<td>2000</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2001</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2002</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2003</td>
<td>50%</td>
<td>50%</td>
</tr>
<tr>
<td>2004</td>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

Resistance Impacting Quality

<table>
<thead>
<tr>
<th>Organism</th>
<th>Increased Risk of Death (OR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA bacteremia</td>
<td>1.9</td>
</tr>
<tr>
<td>MRSA surgical infection</td>
<td>3.4</td>
</tr>
<tr>
<td>VRE1 infection</td>
<td>2.1</td>
</tr>
<tr>
<td>Resistant Pseudomonas infection</td>
<td>3.0</td>
</tr>
<tr>
<td>Resistant Enterobacter infection</td>
<td>5.0</td>
</tr>
</tbody>
</table>

Nothing New on the Horizon

Total Number of New Antimicrobial Agents Approved

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1983–1987</td>
<td>16</td>
<td>14</td>
<td>10</td>
<td>7</td>
<td>4</td>
<td>?</td>
</tr>
</tbody>
</table>


1 Vancomycin-resistant enterocci.
Considerable clinician knowledge gaps drive broad-spectrum dependence

Perhaps even more troubling than the dearth of new agents is the lack of understanding regarding existing regimens. A 10-item antimicrobial quiz developed by an Infectious Disease (ID) physician at Johns Hopkins Hospital demonstrated serious clinician knowledge deficits with respect to antimicrobial use and resistance, with an average score of 28 percent among physicians. These same physicians acknowledged that their own antimicrobial use was not optimal, both in and outside the ICU. Despite these troubling findings, the majority of physicians reported that they are interested in additional feedback on drug selection. Without a doubt, physicians largely recognize that antimicrobial resistance is an emerging public health problem on a national level. However, these same clinicians perceived resistance as a greater problem nationally than in their own institution or in the ICU.

Demystifying Prescribers’ Mindset

Clinicians’ Self-Reporting of Antimicrobial Use

- Mean antimicrobial quiz score of 28%
- 67% of providers interested in additional feedback on drug selection

Fear of Inadequate Empiric Coverage

“This has led to people adopting a knee-jerk response, picking the broadest-spectrum agents they can think of in pretty much any population, without thinking about which organisms they are trying to cover.”

Hospital Epidemiologist
Hospital on East Coast

Easier to See the Big Picture

Clinicians’ Perceptions of Problem of Resistance

<table>
<thead>
<tr>
<th></th>
<th>n=117</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nationally</td>
<td>94.8%</td>
</tr>
<tr>
<td>In My Institution</td>
<td>77.0%</td>
</tr>
<tr>
<td>In My Practice</td>
<td>65.3%</td>
</tr>
</tbody>
</table>

1 Responses for strongly agreed, agreed combined.

Challenge #3: Finding a Strategic Balance

The final challenge in driving towards zero infections is striking the right balance between investing in programs for behavior change versus technology solutions. Though changing years of habitual practice is no easy task, real and sustainable gains in infection control are dependent upon behavioral changes in a number of arenas. Hand hygiene compliance serves as a prime example. Though the publication dates and authors of the hand hygiene studies below vary, the key message remains relatively constant: compliance hovers around 40 percent.

### Behavior Habits Hard to Break

<table>
<thead>
<tr>
<th>Year</th>
<th>Setting</th>
<th>Average Compliance</th>
<th>Author</th>
</tr>
</thead>
<tbody>
<tr>
<td>1981</td>
<td>Open Ward</td>
<td>16%</td>
<td>Preston</td>
</tr>
<tr>
<td>1981</td>
<td>ICU</td>
<td>30%</td>
<td></td>
</tr>
<tr>
<td>1981</td>
<td>ICUs</td>
<td>41%</td>
<td>Albert</td>
</tr>
<tr>
<td>1981</td>
<td>ICUs</td>
<td>28%</td>
<td></td>
</tr>
<tr>
<td>1983</td>
<td>All Wards</td>
<td>45%</td>
<td>Larson</td>
</tr>
<tr>
<td>1987</td>
<td>PICU</td>
<td>30%</td>
<td>Donowitz</td>
</tr>
<tr>
<td>1990</td>
<td>ICU</td>
<td>32%</td>
<td>Graha</td>
</tr>
<tr>
<td>1990</td>
<td>ICU</td>
<td>81%</td>
<td>Dubbert</td>
</tr>
<tr>
<td>1991</td>
<td>SICU</td>
<td>51%</td>
<td>Pettinger</td>
</tr>
<tr>
<td>1992</td>
<td>NICU/Others</td>
<td>29%</td>
<td>Larson</td>
</tr>
<tr>
<td>1992</td>
<td>ICUs</td>
<td>40%</td>
<td>Doebbeling</td>
</tr>
<tr>
<td>1992</td>
<td>ICUs</td>
<td>40%</td>
<td>Zimakoff</td>
</tr>
<tr>
<td>1994</td>
<td>Emergency room</td>
<td>32%</td>
<td>Meings</td>
</tr>
<tr>
<td>1999</td>
<td>All Wards</td>
<td>48%</td>
<td>Pittet</td>
</tr>
<tr>
<td>2006</td>
<td>Ward</td>
<td>57%</td>
<td>Pittet</td>
</tr>
<tr>
<td>2007</td>
<td>ICUs</td>
<td>56%</td>
<td>Larson</td>
</tr>
<tr>
<td>2008</td>
<td>Ward</td>
<td>36%</td>
<td>Venkatesh</td>
</tr>
</tbody>
</table>

**Simply Difficult**

“Our understanding of behavioral theories and also the inability over several decades to motivate HCWs\(^1\) to achieve a consistently high level of compliance with hand hygiene suggests that changing hand hygiene behavior is a complex task.”

*Journal of Hospital Infection*
September 2004

---

\(^1\) Health care workers.

Technology presents no simple solution to the challenge of behavior change

Given that much of the infection control agenda hinges on the need to alter ingrained behavior, many institutions are exploring technology’s ability to bypass the difficult and time-intensive efforts to change clinician mindset. Though it may seem simpler to purchase impregnated lines or hydrogen peroxide vapor technology, the decision is hardly straightforward. Not only is the applicability of some of these technologies still being actively debated, but the decision to purchase also leads to a labyrinth of its own complex questions, some of which are detailed below.

Technology Far from a Panacea

- Do your infection rates warrant a technology solution?
- Is technology a better ROI than process modification?
- Can you achieve the same results without technology?
- Will technology be viewed as a crutch for poor process?
- Do you have the budget to purchase the technology?
- Is this technology suitable for your patient population?
- How do you choose which technology to purchase?
- Can you accurately determine which evidence is strongest?

No shortage of technologies available in infection control, i.e., minocycline-rifampicin central lines, nitrofurazone Foley catheters, hydrogen peroxide vapor technology

No Easy Out

“If you’re not cleaning the site properly, you’re asking too much of the catheter to fix the problem. Sure, they might be a useful tool, but to use them as the crutch to prevent all infection is not a good idea.”

Hospital Epidemiologist
Hospital on East Coast

Source: Clinical Advisory Board interviews and analysis.
Research uncovered three prerequisites and nine best practices for minimizing HAIs

In hopes of helping to overcome these three challenges to optimizing infection control performance, the flowchart below presents the most promising and newsworthy ideas unearthed during the course of the Clinical Advisory Board’s research.

The first category of research, “Laying the Foundation,” aims to establish a clearer understanding of internal infection burden. The materials demystify the impact of the CMS Present on Admission provision as well as the economics of individual infections before examining a strategy for prioritization. These areas should be considered as prerequisites to be well understood before deployment of resources against infection prevention.

**The Journey**

*Innovative Strategies for Minimizing*

**Laying the Foundation**

I. Sizing the Burden

- Present on Admission Tutorial
- Infectionomics Primer
- Prioritization Compass

**Crafting a**

II. Establishing Frontline Awareness

#1 Hand Hygiene Compliance Assessment
#2 High-Touch Object Spot Check
#3 Central Line Certification

---

**Key Diagnostics**

- Have you quantified true infection burden in terms of both volume and costs?
- Do you understand the financial and operational impact of Present On Admission?
- Do you have a systematic method to prioritize overall quality initiatives?
- Are your infection control priorities tailored to internal burden?
- Are you confident in the accuracy of your hand hygiene compliance data?
- Have you effectively addressed gaps in hand hygiene performance?
- Have you established institutional awareness of the link between environment and infections?
- Have you developed performance improvement strategies targeting environmental stewardship?
- Have you developed institution-specific educational programs for technical skill development such as line insertion?
Best practices organized around three key mandates for strategizing journey to zero

The second category, “Crafting a Multipronged Strategy,” provides best practices for creating frontline awareness across key opportunities and minimizing pathogen opportunity by improving and standardizing core processes. The section concludes with a special report on MRSA, a topic that has recently garnered unprecedented attention by hospital executives. The final section of practices, “Ensuring Sustainable Success,” dedicates attention to hardwiring long-term gains through leveraging data and creating a culture of accountability.

Arrayed across the bottom of these pages are a number of key diagnostic questions to help isolate which of these barriers represent the biggest impediments to institutional progress with infection control.

### TO ZERO

#### Hospital-Acquired Infections

### MULTIPRONGED STRATEGY

#### III. Minimizing Pathogen Opportunity

- #4 Dedicated Insertion Team
- #5 Foley Validity Check
- #6 Clockwork Antibiotic Administration

### SPECIAL REPORT

**Examining MRSA Strategy**

- Surveillance Scan
- Active Surveillance Business Case
- Unit Based Strategy
- Automated Isolation Reminder
- Regionalized MRSA Identification

### ENSURING SUSTAINABLE SUCCESS

#### IV. Promoting Long-Term Gains

- #7 Automated Data Intelligence
- #8 Off-Protocol Physician Pilot
- #9 Real-Time Accountability Enforcer

- Are clinical processes standardized where practice variation may lead to increased risk of infection?
- Are specialized teams deployed to consistently reproduce high quality clinical outcomes?
- Is there a consistent system in place to identify and assess patients with indwelling devices?
- Do you consistently administer prophylactic antibiotics within 60 minutes of incision?
- Are you satisfied with the MRSA prevention strategy in place at your institution?
- Do you have a long-term strategic plan for infection prevention?
- Do you have a system for data capture that provides a comprehensive perspective on institutional performance?
- Do you leverage physician-level data to assess performance improvement opportunities?
- Have you developed well-defined systems of accountability for infection control?
The Journey to Zero
COLUMN I

Sizing the Burden
Prerequisite #1

Present on Admission Tutorial

Prerequisite in Brief

Tutorial provides an overview of the legislation impacting hospital bottom lines as of October 1, 2008, showing a detailed example of changes in reimbursement following a drop in severity tier as well as cumulative impact for certain conditions across the industry. In demystifying the payment mechanics associated with this ruling, hospitals will gain a better sense of the projected impact on their own institutions.
POA served as a catalyst to increase hospital executives’ attention to avoidable infections

Perhaps the greatest trigger for hospitals to better understand the financial impact of HAIs has been Present on Admission (POA), a provision of the DRA. Of the original eight reasonably preventable conditions selected for reduced payment, three include infections. Certain SSIs were added to the list in the most recent update, and several more infections are slated for future consideration. After April 1, 2008, any claims lacking valid POA codes will be returned for revision—necessarily delaying reimbursement. As of October 1, 2008, reimbursement itself is at stake, thus prompting a sense of urgency in tackling infections.

On the Chopping Block

<table>
<thead>
<tr>
<th>Selected for Provision in FY 2008 Final Rule</th>
<th>Not Selected for FY 2009, But to Be Considered in Future</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Object Left in Surgery</td>
<td>• Ventilator-Associated Pneumonia</td>
</tr>
<tr>
<td>• Air Embolism</td>
<td>- coding not unique; CMS pursing with CDC</td>
</tr>
<tr>
<td>• Blood Incompatibility</td>
<td>• Staphylococcus Aureus Septicemia</td>
</tr>
<tr>
<td>• Catheter-Associated Urinary Tract Infections</td>
<td>- must identify subset where preventable</td>
</tr>
<tr>
<td>• Decubitus Ulcers</td>
<td>• Deep Vein Thrombosis, Pulmonary Embolism</td>
</tr>
<tr>
<td>• Vascular Catheter Associated Infections</td>
<td>- must identify subset where preventable</td>
</tr>
<tr>
<td>– code created for FY 2008</td>
<td>• Methicillin Resistant Staphylococcus Aureus (MRSA)</td>
</tr>
<tr>
<td>• Mediastinitis after CABG Surgery</td>
<td>- no consensus on preventability</td>
</tr>
<tr>
<td>– more specific definition than “Surgical Site Infection” proposed earlier</td>
<td>• Clostridium Difficile-Associated Disease</td>
</tr>
<tr>
<td>• Falls</td>
<td>- no prevention guidelines available</td>
</tr>
</tbody>
</table>

Timeline of Events

October 1, 2007  January 1, 2008  April 1, 2008

Short-term, acute care hospitals required to begin reporting POA codes; information not used in claims processing

Hospitals submitting invalid POA code receive remark code on remittance advice; claim still processed

Claims lacking valid POA code for each diagnosis returned to hospital for completion

Practical implications of POA will result in increases to staff workload

Not only will POA result in changes to reimbursement, but there will also be accompanying practical implications affecting staff and patients. Without doubt, coders will have more work and will likely feel the strain of a learning curve as they adapt to new standards. Physicians, too, will feel some pressure from increased dialogue with both coders and nursing staff. That said, nurses will almost certainly bear the brunt of increased initial diagnostics and examinations. Even patients will feel the ramifications of the final rule in potentially elongated time to treatment as clinicians endeavor to establish POA status. With all of these sudden changes, there is understandably confusion and frustration regarding how severely POA will affect hospitals.

**Upping the Ante on Coding, Documentation**

- **Coders**
  - Increase in training, education on new required indicators, guidelines from MS-DRG, POA
  - Drop in productivity due to coders acclimating to new system, greater number of queries to physicians to ensure specificity

- **Physicians**
  - Increase in documentation specificity required under new provision, translating to greater time investment
  - Higher frequency of communication with coding, case management to review documentation
  - Potential for dual penalty of overutilization of diagnostics to establish POA status: elongated time to treatment, increased costs

- **Nurses**
  - Need for more comprehensive admissions notes
  - Increase in initial testing, examination
  - More extensive dialogue with physicians regarding POA status

---

**Robbing Peter to Pay Paul?**

“Rest assured, however, that it will increase spending for those involved with coding and reporting hospital claims. We’ll likely spend more time trying to find documentation validating when the onset of the condition occurred. We’ll spend more time going back to the physicians for clarification when the information isn’t available at coding. We’ll spend more money on billing delays, and we’ll see revenue loss to our facilities. So we hope it will help the federal budget because it’s going to take another bite out of hospital budgets.”

Judy Sturgeon, CCS
Coding Senior Manager
The University of Texas Medical Branch

Source: Sturgeon J. “Budget Killer: The Pending Effects of POA”, For The Record, 19: 6; Clinical Advisory Board interviews and analysis.
Considerable confusion around POA—payment unaffected unless patient drops severity tier

To help clarify how POA alters reimbursement, displayed below are the payment mechanics of mediastinitis. If a claim is submitted that contains a condition selected for the provision as a secondary diagnosis, and that particular condition was acquired during the hospital stay, the claim is processed as if that diagnosis were not present. This potentially results in a drop in severity tier and thus, decreased reimbursement. In essence, hospitals do not get compensated for any conditions that were hospital acquired—but they are still compensated for any other necessary components of care. Despite fears expressed throughout the industry, reimbursement for cases penalized as a result of the provision does not drop to zero.

---

### Cutting Beneath the Surface

<table>
<thead>
<tr>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>---</td>
<td>---</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Dx</th>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coronary Atherosclerosis, of Native Coronary Artery (41401)</td>
<td>—</td>
<td>Coronary Atherosclerosis, of Native Coronary Artery (41401)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Dx1</th>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential Hypertension (4019)</td>
<td>Unknown</td>
<td>Essential Hypertension (4019)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Dx2</th>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypokalemia (2768)</td>
<td>Yes</td>
<td>Hypokalemia (2768)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Secondary Dx3</th>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediastinitis (5192)</td>
<td>Yes</td>
<td>Mediastinitis (5192)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Primary Px</th>
<th>Present on Admission?</th>
<th>Present on Admission?</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Aorto)coronary Bypass of Two Coronary Arteries (3612)</td>
<td>—</td>
<td>(Aorto)coronary Bypass of Two Coronary Arteries (3612)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MS-DRG Assignment</th>
<th>Relative Weight</th>
<th>Basic Payment</th>
</tr>
</thead>
<tbody>
<tr>
<td>235 Coronary Bypass w/o Cardiac Cath w/ MCC</td>
<td>5.1381</td>
<td>$27,831</td>
</tr>
<tr>
<td>236 Coronary Bypass w/o Cardiac Cath w/o MCC</td>
<td>3.7307</td>
<td>$20,208</td>
</tr>
</tbody>
</table>

**Elimination of mediastinitis as secondary diagnosis results in decreased payment due to drop in severity tier**

---

### Making Sense of the Numbers

- If claim includes a condition selected for provision as a secondary diagnosis, and that particular condition is not tagged as having been “present on admission,” claim is processed as if the code is excluded, potentially resulting in assignment to a lower severity tier and reduced payment.
- That said, reimbursement only at stake if condition is sole secondary diagnosis resulting in assignment to higher severity tier.

Source: Clinical Advisory Board interviews and analysis.
Per-case loss not substantial, but advisable to increase attention to coding, documentation

Bearing the specifics of changes to reimbursement in mind, it may be instructive to understand the financial impact of a “worst case scenario” for each infection type. Below, results arrayed from a recent Advisory Board Company analysis performed on MedPAR data to investigate the impact of POA on a per-case and industry-wide basis. In fact, the financial ramifications of POA at the level of the individual institution are fairly minimal. To preempt any potential cash flow consequences from POA, however, it is of paramount importance to ensure thorough and timely coding and documentation. Though the impact of this particular piece of legislation is not as acute as anticipated, it remains to be seen what will happen as more private payers opt to follow suit—clearly, this sort of pay-for-performance principle has become a permanent piece of hospitals’ clinical mandate.

Understanding the Worst-Case Scenario

Reimbursement Impact by Infection Type

<table>
<thead>
<tr>
<th>Condition</th>
<th>(Condition Present) Average Reimbursement/Case</th>
<th>(Condition Absent) Average Reimbursement/Case</th>
<th>Difference in Average Reimbursement/Case</th>
<th>Industry Wide Projected Worst Case Impact1</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-UTI2</td>
<td>$9,539</td>
<td>$9,373</td>
<td>$166</td>
<td>($1,469,338)</td>
</tr>
<tr>
<td>Mediastinitis</td>
<td>$52,759</td>
<td>$50,482</td>
<td>$2,277</td>
<td>($252,677)</td>
</tr>
<tr>
<td>CDAD3</td>
<td>$11,033</td>
<td>$10,941</td>
<td>$92</td>
<td>($9,811,681)</td>
</tr>
<tr>
<td>SAS4</td>
<td>$13,295</td>
<td>$12,590</td>
<td>$705</td>
<td>($16,253,044)</td>
</tr>
</tbody>
</table>

Advisory Board assessment of POA impact on individual hospitals available upon request

Selected for provision in FY 2008 final rule

For most hospitals, POA not likely to have significant financial impact

**Advisory Board Perspective**

- Although individual hospital financial impact not substantial, advisable to anticipate cash flow consequences
- Necessity of timely, detailed documentation is increasingly important; inappropriate documentation may potentially lead to significant Medicare payment lags
- Executives should direct immediate attention to coding, documentation improvement initiatives

---

1 Assumes 100 percent of condition incidence occurs within hospital stay.
2 Catheter-associated urinary tract infection.
3 Clostridium difficile associated disease.
4 Staphylococcus aureus sepsis.
Prerequisite #2

Infectionomics Primer

Prerequisite in Brief

As estimates of the costs and length of stay attributable to individual infections vary widely across publications, hospitals are left without a solid understanding of the bottom line impact. Anchoring internal infection rates to the median published data provided will shed some clarity on the potential spend by infection type, giving institutions a sense of relative financial burden.
Cost variability exists in published reports; studies flawed by imperfect cost accounting practices

Given the current pay-for-performance culture, it is imperative for hospitals to understand the actual cost of infections to best assess impact on hospital margins. Unfortunately, putting a price tag on infections is no straightforward task. Reported costs of infections are truly all over the map—take as one example the estimated costs for an episode of ventilator-acquired pneumonia, which range from a mere $10,398 all the way to $56,749. Compounding the problem, complexities in hospital cost accounting somewhat preempt the possibility of generating more reliable data in-house, leading to an imperfect understanding of the finances at stake.

**Truly All Over the Map**

<table>
<thead>
<tr>
<th>Minimum, Maximum Cost by Infection</th>
<th>VAP(^1)</th>
<th>BSI(^2)</th>
<th>CABG-(^{-3}) Associated SSI</th>
<th>UTI(^4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$56,749</td>
<td>$35,828</td>
<td>$27,767</td>
<td>$1,710</td>
<td>$804</td>
</tr>
<tr>
<td>$10,398</td>
<td>$3,740</td>
<td>$8,199</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Percentage of Total HAIs\(^5\):

- VAP: 15%
- BSI: 14%
- CABG-Associated SSI: 22%
- UTI: 32%

**Estimating Cost No Easy Task**

- Poor understanding of cost-to-charge ratios
- Imperfect coding, lack of data specificity
- Difficult to distinguish between fixed, variable costs
- Challenging to find appropriate patient comparison groups

---

\(^1\) Ventilator-acquired pneumonia.  
\(^2\) Bloodstream infection.  
\(^3\) Coronary artery bypass graft-associated surgical site infection.  
\(^4\) Urinary tract infection.  
\(^5\) All other infections: 17%.

In light of variability, median values likely represent most appropriate cost benchmarks

As there exists a dearth of high-quality cost data with respect to infections, institutions may understandably be in search of approximate benchmarks for infection costs. One of the more compelling pieces of literature surfaced during research included an investigation incorporating cost and prevalence estimates across the state of Massachusetts. In the absence of well-defined internal data, institutions may wish to consider approximating financial burden using the values presented below. In light of the increasing concern and prevalence of resistant organisms, an additional synopsis of the cost and length of stay attributable to some major pathogens are included in the data shown in the chart at the bottom of the page.

**Median Cost by Infection**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Attributable Days</th>
<th>Attributable Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>MRSA bacteremia</td>
<td>2.2</td>
<td>$6,916</td>
</tr>
<tr>
<td>MRSA surgical infection</td>
<td>2.6</td>
<td>$13,901</td>
</tr>
<tr>
<td>VRE infection</td>
<td>6.2</td>
<td>$12,766</td>
</tr>
<tr>
<td>Resistant Pseudomonas infection</td>
<td>5.7</td>
<td>$11,981</td>
</tr>
<tr>
<td>Resistant Enterobacter infection</td>
<td>9</td>
<td>$29,379</td>
</tr>
</tbody>
</table>


1 Not evaluated in study.
Analysis of financial data dispels myth that infections may be profitable

Accompanying the lack of rigorous financial data is a myth that there is money to be made on infections. To dispel this notion and to better understand the actual financial impact of infections, one clinician examined 54 bloodstream infections in the medical intensive care unit (MICU) and critical care unit (CCU) to determine the impact of central line-associated bloodstream infections (CLABs) on the hospital bottom line. Costs associated with two particular patients are shown in the charts below, along with the average financial impact of CLABs on hospital finances across the 54 cases. The $26,839 average loss per case is no doubt attributable in part to the long length of stay of these patients. In only 4 of the 54 cases did the hospital make any money, negating any thoughts of infections being profitable.

Impact of CLABs on Gross Margin

| Comparison of Hospital Economics in Patients A and B: Heart Failure Complicated by CLAB |
|---------------------------------------------|---|---|---|
| Admitting Diagnosis                    | CHF | CHF | CHF |
| CC-ASG                                   | 2.8 | 3   | 3   |
| Age, years                              | 75  | 69  | 78  |
| Principle Diagnosis                     | CHF | CHF | CHF |
| Payer                                    | Medicare FFS | Medicare FFS | Medicare managed care |
| Revenue, $                               | 5,740 | 5,595 | 20,250 |
| Expense, $                               | 5,683 | 30,786 | 21,828 |
| Gross Margin, $                          | 57   | (25,191) | (1,578) |
| Costs Attributable to CLAB, $            | -    | 22,011 | 9,419 |
| LOS, days                               | 5    | 16   | 15   |

CLAB = central line-associated bloodstream infection; CHF = congestive heart failure; CC-ASC = comprehensive clinical admission severity group, severity of illness present on admission; FFS = fee for service; LOS = length of stay.

Putting Individual Patients in Context

Average per Case Financial Impact Across All CLABs

<table>
<thead>
<tr>
<th>Revenue</th>
<th>$64,894</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expense</td>
<td>$91,733</td>
</tr>
<tr>
<td>Gross margin</td>
<td>($26,839)</td>
</tr>
<tr>
<td>LOS (days)</td>
<td>28</td>
</tr>
</tbody>
</table>

• Hospital only made money in four cases
• Represents total loss of operations of $1,449,306

In VAP as well, expenses outpace payments to create unfavorable economics

This study also assessed the economics of VAP. With expense again outweighing payment for an average loss of $24,435 per case, and many additional hospital days at stake, it is clear that there is indeed much to be gained from infection prevention. That said, determining a starting point and a system for prioritization presents its own set of challenges.

Affecting the Bottom Line

Impact of VAP on Margin

<table>
<thead>
<tr>
<th>Average Payment</th>
<th>Average Expense</th>
<th>Average Loss per Case</th>
<th>Total Loss, All VAP Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>$62,833</td>
<td>($87,318)</td>
<td>($24,435)</td>
<td>($2,419,065)</td>
</tr>
</tbody>
</table>

Cost Increase Due in Part to Increased LOS

<table>
<thead>
<tr>
<th>Average LOS Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
</tr>
<tr>
<td>34</td>
</tr>
</tbody>
</table>

Patients Without VAP

Patients With VAP

Prerequisite #3

Prioritization Compass

Prerequisite in Brief

Innovative hospitals think outside of the myopic perimeters of finance and prevalence when designing a strategic approach to achieving quality goals. By incorporating considerations such as length of stay and the clinical outcomes of affected patient populations, institutions can take a broader view of infection impact to select from competing priorities, while drill-down analyses can clarify failure points to dictate action plans.

---

**Clinical Advisory Board Grade**

*Maximum Rating: Five Stars*

- Impact on Burden Assessment ★ ★ ★ ★ ★
- Ease of Implementation ★ ★ ★
- Member Applicability ★ ★ ★ ★ ★
- Prerequisite Grade B+
Infrastructure needed to balance patient safety concerns with overall quality agenda

Truth be told, it is myopic for institutions to look at their infection control priorities in a silo. In order to do justice to the numerous priorities that hospitals continually balance, it is important to place infections into the overall quality context. Shown below is a sample matrix to prioritize quality goals. Generating risk coordinates for safety concerns by assigning a frequency and severity rating to each can help to create a sense of order for subsequent initiatives. This step is crucial in narrowing the field of institution-wide patient safety concerns, and determining where infection control fits into the larger quality context.

**Putting Infections**

**Institution-wide Patient Safety Concerns**

<table>
<thead>
<tr>
<th>Potential Safety Concerns</th>
<th>Frequency Ranking</th>
<th>Severity Ranking</th>
<th>Risk Coordinates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nosocomial Infections</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Decubitus Ulcers</td>
<td>2</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Post-Operative Events</td>
<td>3</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>Adverse Drug Events</td>
<td>4</td>
<td>4</td>
<td>16</td>
</tr>
<tr>
<td>Procedural Events</td>
<td>5</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Deep Vein Thrombosis</td>
<td>6</td>
<td>6</td>
<td>36</td>
</tr>
<tr>
<td>Anesthesia Events</td>
<td>7</td>
<td>7</td>
<td>49</td>
</tr>
<tr>
<td>Patient Falls</td>
<td>8</td>
<td>8</td>
<td>64</td>
</tr>
<tr>
<td>Other:</td>
<td>9</td>
<td>9</td>
<td>81</td>
</tr>
<tr>
<td>Other:</td>
<td>10</td>
<td>10</td>
<td>100</td>
</tr>
</tbody>
</table>

**Completing the Grid**

**Step #1—Assessing Frequency:** Rank the concerns from most (1) to least (10) frequent

**Step #2—Analyzing Severity:** Severity is a subjective measure and may be interpreted in several ways, including severity of harm to patient, cost to hospital, etc.

**Step #3—Creating Coordinates:** Combine rankings from steps #1 and #2 to generate coordinates for each concern

**Step #4—Devising a Risk Matrix:** Plot risk coordinates on graph; label each coordinate with name of potential safety concern

Source: Clinical Advisory Board interviews and analysis.
Criteria-driven prioritization of infection control opportunities provides structure

Once hospitals decide where infection control ranks relative to other patient safety goals, the next step is a prioritization within infection-specific opportunities. Even within infection control, there are any number of places institutions can choose to focus efforts. One institution crafted an infection prioritization matrix to provide an infection-specific framework and to unearth the biggest opportunities, taking into account the volume of each infection, relative impact on patient, and preventability to ensure that proposed efforts focus on those areas where changes can be truly enacted.

**IN CONTEXT**

<table>
<thead>
<tr>
<th>Infection Prioritization Matrix</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infection Type</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Clostridium Difficile</td>
</tr>
<tr>
<td>Viral Respiratory Syndromes–RSV, Influenza</td>
</tr>
<tr>
<td>HSV¹</td>
</tr>
<tr>
<td>Catheter-Related BSI</td>
</tr>
<tr>
<td>VZV²-Zoster</td>
</tr>
<tr>
<td>VRE</td>
</tr>
<tr>
<td>MRSA</td>
</tr>
<tr>
<td>VZV²-Varicella</td>
</tr>
<tr>
<td>Legionella Pneumonia</td>
</tr>
<tr>
<td>Fungal Pneumonia</td>
</tr>
</tbody>
</table>

**Suggestions for Usage**

- In ascribing a value for volume, one potential initial strategy is to compare performance to national benchmarks (e.g., NHSN); alternatively, institution may compare performance to internal historical benchmarks
- Values for infection preventability should take into account pathogenicity, characteristics of affected patient population

¹ Herpes simplex virus.
² Varicella-zoster virus.

Source: Clinical Advisory Board interviews and analysis.
Initiative selection and creation of action plan guided by process improvement principles

Crafting a list of initiatives represents a good first step; the next hurdle is translating the list of prioritized initiatives into a practical action plan. To make that transition, Florida Hospital relied on principles of Six Sigma. The institution began their journey by developing a broad strategic plan with clear focus on understanding process failure points leading to infections. Through that exercise, they identified clostridium difficile as a clear candidate for intervention given the cost variance and attributable length of stay. Spread across the two pages is a copy of their drill-down analysis on potential root causes leading to clostridium difficile.

Drilling Down on

Case in Brief

- An 1,800-bed hospital system with seven campuses in central Florida
- Initiated Six-Sigma project based on internal financial, LOS data
- Selected BSI, UTI, clostridium difficile as institutional foci for infection reduction
- Conducted drill-down to understand process failure points leading to each infection (e.g., clostridium difficile)

Source: Clinical Advisory Board interviews and analysis.
Developing a strategic plan for initiatives is critical in the transition from goals to gains

Through their analysis of process failure points, Florida Hospital isolated environmental contamination as the critical factor for infection reduction, and re-engineered their cleaning processes accordingly. After a successful revamp of their terminal room cleansing process, the institution observed a substantial decrease in clostridium difficile infections accompanied by significant cost savings, as demonstrated by the bars at the bottom of the page.

**Solution in Brief**

- Recognized potential for clostridium difficile spore survival on inanimate surfaces
- Re-engineered terminal cleaning procedures to include surface cleaning with bleach

**Clostridium Difficile**

<table>
<thead>
<tr>
<th>Past Antibiotic Treatments</th>
<th>Influenza and Pneumococcal Vaccinations</th>
<th>Stool Culture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential for Drug Resistant Organism</td>
<td>Not Vaccinated</td>
<td>Clostridium Difficile Screen (potential for false negative)</td>
</tr>
<tr>
<td></td>
<td>Vaccinated</td>
<td>Clostridium Difficile Assay</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inappropriate Antibiotic Treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inappropriate Treatment</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Infection Treated with Antibiotic</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Analysis conducted in 2005 demonstrated savings of approximately $1,473,840**

**Clostridium Difficile Infections**

<table>
<thead>
<tr>
<th>Total Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>2004: 2,039</td>
</tr>
<tr>
<td>2007: 476</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.
COLUMN II

Establishing Frontline Awareness
Practice #1

Hand Hygiene Compliance Assessment

Practice in Brief

Compliance audit sets a strategy for assessing and elevating hand hygiene by operating in two phases, compliance and efficacy. A consistent process for discrete compliance measurement generates truly comparable data, allowing ICPs to target interventions designed to elevate efficacy to units of greatest need. Detailed observation in concert with immediate visual feedback on poor practice creates individual fallibility, elevating staff attention to result in more diligent hand hygiene across the facility.

Clinical Advisory Board Grade

Maximum Rating: Five Stars

Impact on Infections ★ ★ ★ ★
Impact on Staff Awareness ★ ★ ★ ★ ★
Ease of Implementation ★ ★ ★ ★
Practice Grade B+
Hand hygiene compliance found to be key process differentiator between two clinics

Establishing frontline awareness remains a perennial challenge within infection control, and hand hygiene is one area ripe for improvement efforts. Many are familiar with the story of Ignaz Semmelweis, the pioneer physician who famously unearthed the connection between hand antisepsis and infection outcomes. Spurred by a startlingly high maternal death rate, Semmelweis sought to understand the causative factors of puerperal fever in his Viennese clinic. Observation of poor physician compliance to hand hygiene practices led him to hypothesize that the doctors themselves were carrying germs between patients. Consequently, he set out on a crusade to change physician behavior.

The First Major Hand Hygiene Study

Maternal Death Rate from Puerperal Fever

Investigating the Trail

- Observed a stark difference in maternal death rates between two clinics
- Hypothesized one potential reason for difference was staffing at the two facilities (midwives vs. doctors)
- Personally observed doctors’ lack of adherence to hand hygiene between patients

Intervention highlighted relationship between compliance and quality outcomes

Part of what made Semmelweis’s crusade to disseminate his findings so effective was his personal mandate for scrubbing with wire brushes and chlorinated lime soap. The results of his initiative offered incontrovertible proof of his theory in the form of an immediate decline in death rates. To those tasked with improving hand hygiene compliance today, the results of Semmelweis’s intervention are intuitive, but in 1847, his ideas were no less than radical.

Irrefutable Correlation Established

<table>
<thead>
<tr>
<th>Maternal Death Rate, Physician Delivery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Intervention</td>
</tr>
<tr>
<td>20%</td>
</tr>
</tbody>
</table>

Death rates declined immediately to match rates of midwife delivery

Some specialties worse off than others, underscoring need for aggressive, targeted interventions

Despite 160 years of opportunity since Semmelweis’s findings, hand hygiene compliance today still leaves much to be desired. Literature suggests that compliance hovers around 50 percent, but industry experts caution that this figure itself may be optimistic. As depicted in the data below, compliance varies noticeably across specialties, with some far outpacing others. Tellingly, health care workers exaggerate both their own compliance and that of their peers.

### Struggling for 50 Percent

#### Hand Hygiene Compliance by Specialty

<table>
<thead>
<tr>
<th>Medical Specialty</th>
<th>Percent Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internal Medicine</td>
<td>87.3%</td>
</tr>
<tr>
<td>Surgery</td>
<td>36.4%</td>
</tr>
<tr>
<td>Intensive Care Unit</td>
<td>62.6%</td>
</tr>
<tr>
<td>Pediatrics</td>
<td>82.6%</td>
</tr>
<tr>
<td>Geriatrics</td>
<td>71.2%</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>23.0%</td>
</tr>
<tr>
<td>Emergency Medicine</td>
<td>50.0%</td>
</tr>
<tr>
<td>Other</td>
<td>57.2%</td>
</tr>
</tbody>
</table>

“Adherence averaged 57% and varied markedly across medical specialties… certain technical medical specialties (surgery, anesthesiology, emergency medicine, and intensive care medicine) were risk factors for non-adherence.”

*Annals of Internal Medicine*

July 2004

### Inflated Sense of Compliance

#### Health Care Workers’ Perception of Hand Hygiene

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Self-Compliance</th>
<th>Peers’ Compliance</th>
</tr>
</thead>
<tbody>
<tr>
<td>85%</td>
<td></td>
<td>51%</td>
</tr>
</tbody>
</table>

Prime opportunity to reap gains with communicable conditions such as *c. difficile*, MRSA, VRE

Though the impact of compliance on infection burden was established long ago, there is no shortage of more recent studies assessing that correlation. One such study, conducted at the University of Geneva, assessed the correlation between compliance and today’s equivalent of puerperal fever, MRSA. The University of Geneva Hospitals’ longstanding commitment to hand hygiene has resulted in a significant decrease in overall HAI prevalence as well as MRSA transmission, as depicted in the data below. Of note, collection of data for assessing infection burden was extended one year beyond the compliance figures, showing a sustained benefit of their dedicated campaign. MRSA is certainly not alone: other communicable conditions such as *c. difficile* and vancomycin-resistant enterococcus (VRE) can greatly benefit from dedicated attention to effective hand cleansing.

### The Modern Correlate to Puerperal Fever

<table>
<thead>
<tr>
<th>HAI Prevalence, 1994–1998¹</th>
<th>p=0.04</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Program</td>
<td>16.9%</td>
</tr>
<tr>
<td>Post-Program</td>
<td>9.9%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>MRSA Transmission Rate, 1994–1998¹</th>
<th>Episodes per 10,000 Patient Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Program</td>
<td>2.16</td>
</tr>
<tr>
<td>Post-Program</td>
<td>0.93</td>
</tr>
</tbody>
</table>

### Concentrating on Communicability

“I do think that multidrug resistant organisms—MRSA, VRE, multidrug resistant gram-negative organisms—microbes that are spread from person to person largely via hands of health care workers are potentially greatly impacted by hand hygiene. A prime way of combating some of these pathogens is through improved compliance with hand hygiene.”

Mark Rupp, MD
Professor of Infectious Disease
University of Nebraska Medical Center

¹ Authors extended data collection for HAI prevalence, MRSA transmission rate for one year beyond hand hygiene compliance.

Increasing scrutiny on performance and process furthered by Joint Commission’s focus

Clinical literature aside, improving hand hygiene is no longer optional. For the second year, Joint Commission has placed the reduction of health care-associated infections on its National Patient Safety Goals, citing hand hygiene as a prime strategy for infection reduction. Provided below are web addresses for hand hygiene tools created by the World Health Organization (WHO) and the Centers for Disease Control (CDC), which may be useful in elevating compliance.

**Joint Commission Turning Up the Heat**

**World Health Organization**


**Centers for Disease Control**

Resources, guidelines available at: http://www.cdc.gov/handhygiene/

---HARD FOR A HOST OF REASONS---

**Lack of Education:**
- Inadequate education about performance of hand hygiene
- Misunderstanding purpose of hand hygiene (patient vs. self protection)
- Misperception that glove use negates need for hand hygiene
- Inflated sense of hand hygiene compliance

**Unmanageable Workload:**
- Urgent patient needs that take priority
- Lack of sufficient time to perform hand hygiene

**Dislike of Product:**
- Skin irritation from hand hygiene products

**Insufficient Accountability:**
- Lack of formal institutional commitment
- Inadequate organizational structure for accountability

Most observation processes methodologically flawed by infrequency of measurement, lack of efficacy

In light of all of the scrutiny from external organizations, many institutions are re-examining their strategy for assessing compliance. Unfortunately, it can be difficult to even know where to begin with compliance improvement efforts. Compliance measurement is, at best, an imperfect science and fails to accurately assess frequency or quality. To describe how incomplete most observation processes are, one study demonstrated that only 3 percent of hand hygiene opportunities were actually captured by observation. In light of such complexity, one insightful research contact suggested that institutions tackle hand hygiene in two phases: first, by getting staff to the sink, and second, by encouraging staff to cleanse appropriately.

**Neither Seen nor Measured**

**Problem in Brief**

- Interim hand hygiene opportunities may go unseen by compliance observer
- As few as 3 percent of hand hygiene opportunities are captured by observation
- Measuring process often binary in nature, failing to assess efficacy of cleansing performed

**Hand Hygiene Assessment**

<table>
<thead>
<tr>
<th>Wash Yes/No</th>
<th>Efficacy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. yes</td>
<td>?</td>
</tr>
<tr>
<td>2. ?</td>
<td>?</td>
</tr>
<tr>
<td>3. ?</td>
<td>?</td>
</tr>
<tr>
<td>4. ?</td>
<td>?</td>
</tr>
<tr>
<td>5. ?</td>
<td>?</td>
</tr>
<tr>
<td>6. ?</td>
<td>?</td>
</tr>
<tr>
<td>7. ?</td>
<td>?</td>
</tr>
<tr>
<td>8. ?</td>
<td>?</td>
</tr>
<tr>
<td>9. yes</td>
<td>?</td>
</tr>
</tbody>
</table>

* = Hand Hygiene Opportunity

**Two Pieces to the (Strategic) Puzzle**

“We say, get everybody to the sink...that’s the phase. Once you get your compliance up to 70–80 percent, then do observation for whether they are doing it correctly...That model came from over in Belgium. They had a national country-wide program on hand hygiene. The first year was ‘Just do it’. The second year was ‘Do it right.’”

Maryanne McGuckin, ScED
President and Founder
McGuckin Methods International

Source: van de Mortel T, Murgo M, “An Examination of Covert Observation and Solution Audit as Tools to Measure the Success of Hand Hygiene Interventions,” American Journal of Infection Control, 2006, 34: 95–99; Clinical Advisory Board interviews and analysis.
Compliance measurement ideally driven by objective method, such as volume of solution consumed

Starting with the first phase, compliance, some progressive institutions use a concrete measurement system to quantify hand hygiene compliance. By measuring the volume of hand-hygiene solution consumed by unit, institutions eliminate the subjective nature of observation and attain a consistent measure of trended behavior. Outlined below is the process of tying empty containers of solution to a compliance metric, with implementation guidance suggested by an ICP.

**Volume-Driven Measurement Reporting**

**Solution Consumption**
Volume of soap/sanitizer solution drained from container per use; average value of 1.7 mL assigned to each hand hygiene occurrence

**Container Collection**
Facilities management/ES\(^1\) collects, stores empty containers; designated employee tallies containers by type

**Result Tabulation**
Approximate volume consumed derived from empty containers, tied to census data; monthly performance data fed back to floor level staff

**Implementation Guidance**
- Integrate environmental services into dialogue, planning process
- Designate unit-level clinical, environmental services owners for collection process (essential in larger facilities)
- Develop written contingency plans for how collection process will work if owner(s) absent
- Standardize tally sheets, data posting locations across units
- Foster friendly unit competition to elevate staff awareness, encourage improvement

**Generating Compliance Data**

<table>
<thead>
<tr>
<th>Empty Containers</th>
<th>Volume Per Container</th>
<th>Unit Daily Census</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compliance Goal: 72 HH(^2)/patient/day</td>
<td>Compliance Goal: 144 HH(^2)/patient/day</td>
<td></td>
</tr>
</tbody>
</table>

---

1. Environmental services.
2. Hand hygiene opportunities.

Data leveraged to drive behavior change, identify units in need of targeted intervention

Given that improving compliance requires garnering staff buy-in, many successful institutions have turned to motivating staff by sharing unit-trended data. Collecting and preparing findings in an insightful and concise way to share with staff is invaluable to performance improvement, but can require additional time. For those interested in crafting such a program, but lacking the necessary internal resources, the good news is that an external private company provides a number of services, including monthly compliance reports, for a nominal financial investment. Whether data is collected by an internal or external source, the main benefit of this type of program is the ability to motivate staff with unit trends in a non-punitive fashion.

**Data as a Catalyst**

Gettting Assistance from Unbiased Third Party

**Case in Brief**

- A 450-bed hospital in Portland, OR
- Served as pilot institution for volume measurement program for the Oregon Association of Hospitals and Health Systems
- Rolled volume measurement program out housewide after initial pilot in critical care, telemetry units

**Getting Assistance from Unbiased Third Party**

**Services Provided**

- Monthly reports of compliance data at unit level returned within one week of data submission
- Benchmarking data from institutions of similar demographics superimposed on results
- Feedback leverages best practices from other participating institutions

**Program Cost**

<table>
<thead>
<tr>
<th>Units</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>1–5 units</td>
<td>$2,500</td>
</tr>
<tr>
<td>Up to 8 units</td>
<td>$4,500</td>
</tr>
<tr>
<td>Up to 12 units</td>
<td>$6,200</td>
</tr>
<tr>
<td>Up to 24 units</td>
<td>$10,000</td>
</tr>
</tbody>
</table>

Intervention to improve efficacy rooted in outlining process, isolating breakdowns

Moving from compliance to efficacy, Earl K. Long Medical Center in Louisiana has implemented a series of initiatives designed to elevate the quality of their hand hygiene practices. By anchoring secret shopper observations to discrete process metrics, their ICP discovered that employees were most often falling short on appropriately cleansing all portions of their hands. The Clinical Advisory Board has categorized the institution’s 14 hand cleansing steps into four major areas below. Suggestions to tailor an application are also provided, including conducting a global pilot program for a limited time, or targeting a specific sub-group of providers to better understand process breakdowns.

### Process Breakdown Diagnostic

#### Case in Brief

- A 130-bed hospital in Baton Rouge, LA
- Unit manager assigns rotating “secret spy” to perform observations on unit
- Approximately one minute required per observation
- Observation results allow ICP to perform targeted education highlighting importance of thorough cleansing

#### Assessing Hand Hygiene (by Method)

<table>
<thead>
<tr>
<th>Orienting</th>
<th>Scrubbing</th>
<th>Covering All Areas</th>
<th>Finishing</th>
</tr>
</thead>
</table>
| **Soap and Water** | • Turn on faucet  
• Angle hands downward  
• Hands always kept below elbow level | • Use warm water  
• Apply liquid soap  
• Work up generous lather  
• Scrub vigorously  
• Wash for 15 seconds or more | • Clean around knuckles  
• Clean along sides of fingers  
• Clean along sides of hands  
• Rinse completely  
• Pat dry with paper towel  
• Turn off faucet with paper towel |
| **Alcohol-Based Hand Rub** | • Utilize prior to patient contact  
• Apply to palm of one hand | • Rub hands together until dry | • Use after patient contact |

This particular group of steps represents greatest challenge to hospital staff

#### Targeting an Application

- Assessment method can be used housewide in a time-limited diagnostic phase to best target education moving forward, repeated as desired
- Assessment method can be used with sub-groups of providers that are falling behind peers in compliance goals to better isolate process breakdowns

Source: Clinical Advisory Board interviews and analysis.
Indisputable visual proof of GloGerm illuminates flaws in technique, garners staff buy-in

Even with a well mapped out process for observation, there may still be challenges in translating observations into staff awareness. To overcome this hurdle, the ICP at Earl K. Long Medical Center developed a unique application for GloGerm: coating the surfaces of individual units. Picked up by staff during the course of their activities, the fluorescent markings offered visual proof of personal fallibility, elevating staff awareness and attention to hand hygiene practices. Though GloGerm is certainly not a novel educational tool, it retains the power to expose poor process and catalyze behavior change, as supported by the case example referencing one ER physician’s experience.

Challenging Perception

“One by one they came in swearing they had washed their hands, but of course, you found GloGerm all over them…and I would tell them, ‘You thought your hands were clean, but they are not. You’re carrying that to your patients, you’re carrying that to your family’…I had one ER physician who told me ‘I’ve only been on duty 5 minutes, I am clean.’ I put the light on and he was covered [in GloGerm]. I said ‘5 minutes, huh? And what did you touch?’”

Angela Loving, RN
Infection Control Practitioner
Earl K. Long Medical Center

Source: Clinical Advisory Board interviews and analysis.
Summary of strategic guidance presented with focus on compliance and efficacy

Presented across these two pages is a summary of the Clinical Advisory Board’s recommendations for each of the described initiatives aimed at improving hand hygiene.

### Key

<table>
<thead>
<tr>
<th>Phase</th>
<th>Initiative</th>
<th>Methodology in Brief</th>
<th>Advantages</th>
</tr>
</thead>
</table>
| **Compliance** | Volume-Driven Measurement Reporting | • Monthly volume measurements of soap/sanitizer solution consumed approximates hand hygiene compliance | • Objective  
• Efficient  
• Concrete |
| **Efficacy** | Process Breakdown Diagnostic      | • Secret shoppers anchor audits with process-driven tool containing discrete steps  
• Tool specific to method of cleansing (soap and water versus alcohol based rubs) | • Ensures secret shoppers assess compliance of entire process  
• Aggregate data allow isolation of problem steps  
• Data cut by provider role to isolate staff in need of intervention |
| **Efficacy** | GloGerm Secret Hand Audit         | • ICP “infects” surfaces throughout unit, provides one-on-one staff education with black light to demonstrate where hand hygiene practices were insufficient | • Immediate, specific feedback on poor practices  
• Visual cue of personal fallibility  
• Potential to tie into performance review process |

Source: Clinical Advisory Board interviews and analysis.
No “one-size-fits-all” solution for elevating hand hygiene; must employ multipronged approach

Clearly, there is no silver bullet for elevating attention to hand hygiene. The most effective strategies will be multimodal, and their application will almost certainly vary from institution to institution.

## Takeaways

<table>
<thead>
<tr>
<th>Disadvantages</th>
<th>Commentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Does not assess specifics on how or when process breaks down</td>
<td>• May be best method to jump start improvement in hand hygiene compliance</td>
</tr>
<tr>
<td>• No detail on which staff may be most in need of targeted interventions</td>
<td>• Most effective when used in conjunction with initiative that provides more granular detail</td>
</tr>
<tr>
<td>• Slightly cumbersome for soap and water cleansing</td>
<td>• Can be used to target educational efforts, but validity of data dependant on secret shoppers themselves</td>
</tr>
<tr>
<td>• Provides only a snapshot of data</td>
<td>• Easily integrated into any existing secret shopper program</td>
</tr>
<tr>
<td>• Will likely observe learning curve during initial usage</td>
<td>• Results most powerful in aggregate</td>
</tr>
<tr>
<td>• Secret shoppers create potential for Hawthorne effect</td>
<td></td>
</tr>
<tr>
<td>• Opportunities for “in the moment” education limited; no way to standardize these interventions</td>
<td></td>
</tr>
<tr>
<td>• Time consuming for ICP</td>
<td>• Staff generally receptive to process, embarrassment usually balanced by explanation of assessment aims</td>
</tr>
<tr>
<td>• Potential for Hawthorne effect</td>
<td>• No way to extrapolate overall compliance data from results; must be paired with global compliance audit</td>
</tr>
<tr>
<td>• Potential for “Big Brother” factor</td>
<td></td>
</tr>
<tr>
<td>• Potential for staff embarrassment</td>
<td></td>
</tr>
</tbody>
</table>

Please see Appendix for “Excerpt from MMI Compliance Report” and “Hand Hygiene Observation Audit”

Source: Clinical Advisory Board interviews and analysis.
Practice #2

High-Touch Object Spot Check

Practice in Brief

Fluorescent marking solution provides visual proof of high risk, high-touch objects in the patient’s immediate environment that are insufficiently cleaned, allowing hospitals to develop specific educational interventions for environmental services staff. Maximizing cleaning staff performance reduces the potential for environmental contamination and, ultimately, transmission opportunity for virulent organisms.

---

**Clinical Advisory Board Grade**

*Maximum Rating: Five Stars*

- Impact on Infections Rates
  - ★ ★ ★ ★
- Impact on Staff Awareness
  - ★ ★ ★ ★ ★
- Ease of Implementation
  - ★ ★ ★ ★
- Practice Grade
  - B+
Link between environment and prior occupant infection status garnering attention

When considering opportunities to bolster frontline awareness, another hugely important area to take into account is the interplay between the patients and their environment. Rising media attention to acinetobacter outbreaks in military hospitals both in the U.S. and abroad has recently brought the issue of environmental contamination onto executives’ collective radar. As depicted in the data below, a connection between the environment and MRSA is also starting to come to light. In general, however, the potential impact of environmental contamination on patient outcomes is often underplayed, possibly because of scant understanding of how bacterial load translates into patient risk.

An Underappreciated Association

Lingering Risk

“We found a 40 percent increased odds of transmission of MRSA and VRE attributable to the carrier status of prior room occupants, strongly suggesting a role for environmental contamination, despite room cleaning methods that exceeded national standards.”

*Archives of Internal Medicine*
October 2006

<table>
<thead>
<tr>
<th>Patient/Environment Interplay</th>
<th>Transmission Risk for VRE Based on Room’s Prior Occupant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Previous Patient Negative</td>
<td>Previous Patient Positive</td>
</tr>
<tr>
<td>2.8%</td>
<td>4.5%</td>
</tr>
</tbody>
</table>

Accounts for 6.8% of incident VRE

The Shiny Floor (Mis)Perception

“In terms of environmental services, it’s keeping the floors shiny—that’s what really counts. Everyone judges a hospital by how shiny the floors are.”

Phillip Carling, MD
Director, Infectious Disease
Caritas Carney Hospital
Boston University School of Medicine

1 Multidrug-resistant organism.

Pathogens survive on inanimate surfaces; despite evidence, cleaning remains inadequate

This general lack of awareness has spurred researchers to examine just how long various pathogens may survive in the hospital environment. Shown below are results of a recent meta-analysis assessing length of pathogen survival on inanimate surfaces. Though estimates of survival time vary across studies, the general message is clear: pathogens linger. Unfortunately, research assessing surface cleanliness in a variety of settings shows that when it comes to environmental stewardship, results are similar to those of hand hygiene efforts: institutions are struggling for 50 percent compliance.

### Lingering Contamination

**Length of Pathogen Survival on Environmental Surfaces**

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Length of Survival</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acinetobacter</td>
<td>3 days–5 months</td>
</tr>
<tr>
<td>Clostridium difficile</td>
<td>5 months</td>
</tr>
<tr>
<td>Enterococcus, including VSE¹ and VRE</td>
<td>5 days–4 months</td>
</tr>
<tr>
<td>Klebsiella</td>
<td>2 hours–&gt;30 months</td>
</tr>
<tr>
<td>Staphylococcus aureus, including MRSA</td>
<td>7 days–7 months</td>
</tr>
</tbody>
</table>

### Cleaning Largely Inadequate

<table>
<thead>
<tr>
<th>Study Description</th>
<th>Thoroughness of Environmental Cleaning Prior to Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hayden MK et al., 2006: Investigated effects of interventions to improve environmental cleaning, hand hygiene on VRE transmission</td>
<td>48% of test sites cultured negative for VRE¹</td>
</tr>
<tr>
<td>Eckstein BC et al., 2007: Used VRE as marker organism to assess surface cleanliness before and after educational intervention</td>
<td>12 of 17 rooms (71%) of VRE-positive patients cultured positively for VRE after housekeeping cleaning</td>
</tr>
<tr>
<td>Carling PC et al., 2008: Examined overall thoroughness of surface cleaning across 23 acute care hospitals</td>
<td>Across all institutions, 49% (range: 35%–81%) of surfaces found to be free of marker substance</td>
</tr>
</tbody>
</table>

¹ Vancomycin-susceptible enterococci.

Environmental services staff often powerless to stand up for cleaning standards

Many factors contribute to why most institutions are falling short in environmental cleanliness. However, the one consistent theme that repeatedly surfaced during research was the cultural divide between the clinical staff of the hospital and those that are tasked with maintaining its cleanliness. Environmental services staff face any number of obstacles to achieving optimal performance, but glaringly among them are the gaps in training, education, and understanding that leave them without a quality context for their role. As described by one hospital epidemiologist, this often translates to suboptimal performance, and an inability to stand up for standards of cleanliness. Sadly, the consequence of poor integration of environmental services is that critical pieces of equipment are not appropriately cleansed.

Understanding Those That Do the Job

“Housekeepers are often pressured to clean a room in under the national standard of 20 to 30 minutes. Often, they do not feel empowered to challenge the hospital staff (nursing, admitting) who are providing that pressure and will do the best they can in the lesser allotted time. The result of this is that the room is inadequately cleaned. Addressing cultural issues around empowerment and reporting is essential to ensuring proper cleaning standards.”

Hospital Epidemiologist
Hospital on the West Coast

Source: Clinical Advisory Board interviews and analysis.
Establishing Frontline Awareness

Certain pieces of equipment in patient environment at elevated risk for harboring pathogens

While there should be enhanced attention to all surfaces, there are certain surfaces deserving heightened awareness. Using CMS recommendations for high-risk objects, Dr. Philip Carling developed the list of high-risk, high-touch objects shown below. An equipment ownership grid, incorporating these and other “orphaned” pieces of clinical and electronic equipment may be helpful in reducing pathogen reservoirs. Increasing regulatory oversight, as evidenced by the recent expansion to the environmental stewardship component of CMS’s “Conditions for Participation” in infection control, lends urgency to the issue of environmental contamination.

Paying the Price

Contamination of Inanimate Surfaces by Pathogen

<table>
<thead>
<tr>
<th>Pathogen</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clostridium Dificile</td>
<td>58%</td>
</tr>
<tr>
<td>MRSA (Burn Unit)</td>
<td>64%</td>
</tr>
<tr>
<td>MRSA (Nonburn Unit)</td>
<td>18%</td>
</tr>
<tr>
<td>VRE</td>
<td>37%</td>
</tr>
</tbody>
</table>

High-Risk, High-Touch Objects

- Sink
- Toilet top
- Tray table
- Bedside table
- Toilet handle
- Call box
- Telephone
- Side rails
- Toilet hand hold
- Room door knob
- Bathroom door knob
- Bed pan cleaner

Increasing Regulatory Requirements

§482.42 Condition of Participation: Infection Control

“...The hospital must provide and maintain a sanitary environment to avoid sources and transmission of infections and communicable diseases. All areas of the hospital must be clean and sanitary...The infection prevention and control program must include appropriate monitoring of housekeeping maintenance (including repair, renovation and construction activities), and other activities to ensure that the hospital maintains a sanitary environment...”


1 Maximum reported percentage.
2 Objects chosen based on CDC recommendations for high-touch objects at risk of contamination.
Framework developed to elevate purpose, performance of environmental services staff

Given the evidence of lingering pathogen survival along with the increased regulatory oversight, successful organizations have sought to approach environmental stewardship with more strategy. Dr. Carling’s method, outlined below, leverages an initial performance audit using a novel targeting solution developed in-house to illuminate specific areas where cleaning practices are deficient. This audit informs a subsequent didactic educational session to elevate the importance of environmental services in infection control and patient safety. It may not come as a surprise that for many environmental services staff, this session represented their first clinician-led training opportunity. Subsequent performance feedback, both immediately following the education and periodically thereafter, continues to direct staff attention to the high-risk, high-touch surfaces previously listed.

Elevating Their Purpose

1. Surprise Audit
   - ICPs marked 12 standardized locations across patient rooms
   - Results tabulated, baseline compliance determined

2. General Education
   - ICP provided didactic educational session for environmental services staff
   - Environmental services role placed in clinical context of patient care, emphasis on infection prevention

3. Spot Check
   - ICP returned to subset of rooms for thoroughness assessment
   - Performance improvement or decline noted

4. Specific Feedback
   - Graphs compiled for presentation to environmental services manager, feedback relayed to staff
   - Performance reassessed every four to six months to ensure sustainability

Case in Brief

- Two multiservice community hospitals and one acute care, short-term rehabilitation hospital located in Massachusetts
- Developed targeting solution that visualizes under black light, disappears after application of appropriate pressure, moisture
- Evaluated 157 rooms and 1,404 high-touch objects over several months for baseline assessment

Room cleansing must be treated as other process improvement efforts: with clear structure

The investments in bridging the divide between environmental services staff and the hospital have clearly paid off. Across three participating hospitals, baseline performance, expressed as a percentage of surfaces found clear of the targeting solution, rested at 47 percent—frightening, but exactly on par with the rate recently documented in an expanded sample of 38 sites. Enhancing attention resulted in dramatic improvements over baseline performance at all three sites. Though neither infection nor contamination itself were quantified as outcome measures in this study, the results certainly speak to the potential process gains of bringing environmental services into the quality fold.

Raising the Bar on Thoroughness

<table>
<thead>
<tr>
<th>High-Risk, High-Touch Objects Cleaned</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Entire Sample</strong></td>
</tr>
<tr>
<td>p ≤ 0.001</td>
</tr>
<tr>
<td>47%</td>
</tr>
<tr>
<td>83%</td>
</tr>
<tr>
<td><strong>Individual Sites</strong></td>
</tr>
<tr>
<td>p ≤ 0.001</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>92%</td>
</tr>
<tr>
<td>64%</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>82%</td>
</tr>
<tr>
<td>53%</td>
</tr>
<tr>
<td>C</td>
</tr>
<tr>
<td>76%</td>
</tr>
<tr>
<td>44%</td>
</tr>
</tbody>
</table>

Seeing the Forest Through the Trees

“It’s not the cleaning solution, folks, it’s the entire process. It deserves a structure.”

Philip C. Carling, MD
Director, Infectious Disease
Caritas Carney Hospital
Boston University School of Medicine

Practice #3

Central Line Certification

Practice in Brief

Hospital establishes a comprehensive education program for central line insertion technique, requiring both written and practical demonstration of knowledge and skills for insertion “privileges.” Through ensuring a baseline level of competence, the certification program elevates adherence to safe, sterile insertion technique and thereby decreases the opportunity for central-line associated bloodstream infections.

Clinical Advisory Board Grade

Maximum Rating: Five Stars

<table>
<thead>
<tr>
<th>Rating</th>
<th>★ ★ ★ ★ ★</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impact on Infections Rates</td>
<td>★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Impact on Staff Awareness</td>
<td>★ ★ ★ ★ ★</td>
</tr>
<tr>
<td>Ease of Implementation</td>
<td>★ ★ ★</td>
</tr>
<tr>
<td>Practice Grade</td>
<td>B</td>
</tr>
</tbody>
</table>
Cross-industry comparison reveals contrasting requirements for hands-on training

There also exists ample opportunity to improve frontline awareness regarding device insertions. Before exploring how one institution improved their central line insertion practice, it is quite instructive to step out of industry. In an effort to understand how two industries (where skills are of paramount importance) measure up on staff training, Clinical Advisory Board analysts assessed contact hours, supervision level, and competency testing required for commercial airplane flight and central line insertion. Clinicians expressed frustration with the persistence of the “see one, do one, teach one” philosophy. One passionate physician looked at this comparison and asked, “Why can’t we do what they do? They may be rocket scientists, but we’re brain surgeons!”

Looking Out of Industry

<table>
<thead>
<tr>
<th>Skill Set</th>
<th>Flying a Plane</th>
<th>Inserting a Central Line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Contact Hours</strong></td>
<td>250 hours</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Supervision Level</strong></td>
<td>20 hours supervised and instructed flight</td>
<td>Unknown</td>
</tr>
<tr>
<td><strong>Competency Test</strong></td>
<td>• 100 questions • Oral test • Flight test</td>
<td>Unknown</td>
</tr>
</tbody>
</table>

Last Vestiges of “See One, Do One, Teach One”

“...this action is the product of a widely accepted form of a maladaptive behavior entrenched in medical tradition and training. 'See One, Do One, Teach One' is the axiom often quoted in this context. It implies that after minimal exposure and the completion of a procedure once (just once!), you will have mastered the skill and will be capable of teaching the next novice. In the minds of many of the uninitiated, any deviation from this streamlined pattern of training is unacceptable and is equivalent to failure. The more seasoned trainees recognize this as a severely flawed design, but they fail to convey a more realistic view to junior colleagues.”

Eileen Rattigan, MD
Fellow
Columbia University College of Physicians and Surgeons

---

1 Commercial pilot training, part 61.

Inadequate training process stymies progress in consistent line insertion technique

When examining the health care example, the dearth of standardized training for central line insertions is especially troubling when considering the impact a catheter-related bloodstream infection (CRBSI) has on quality as well as hospital finances. These infections dramatically increase length of stay, cost, and risk of death from an event that is generally considered largely avoidable when the right processes are put in place. However, the practical question remains—just how should such a training program be deployed, especially when clinicians often have varying levels of skill?

### Too Costly to Ignore

<table>
<thead>
<tr>
<th>Length of Stay</th>
<th>Cost</th>
<th>Mortality Increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Days</td>
<td>U.S. Dollars, 2000</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
<td>p&lt;0.001</td>
</tr>
<tr>
<td>No CRBSI</td>
<td>CRBSI</td>
<td>11</td>
</tr>
<tr>
<td>$23,803</td>
<td>$83,544</td>
<td>11</td>
</tr>
</tbody>
</table>


1 Catheter related bloodstream infection.
Didactic session introduces first part of baseline competency training

Recognizing the disparity in skills across their largely resident-driven staff, Allegheny General Hospital set out to rectify these gaps in standards—and minimize opportunity for infection—by establishing a program to ensure that safe, sterile practices were replicated every time a central line was inserted in their institution. This was accomplished first by establishing a baseline level of competence. The theoretical understanding of central line practices was addressed through an online module, followed by a 20-question examination that required a passing grade of 90 percent. Leveraged primarily as a method to ensure module completion, the test itself was not difficult and usually only yielded a failing mark when the resident tried to bypass the instructional materials themselves.

Laying the Foundation

<table>
<thead>
<tr>
<th>Online Training Module</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Provides guidance for selection of anatomically appropriate insertion site</td>
</tr>
<tr>
<td>✓ Outlines expectations for performance of hand hygiene, PPE use</td>
</tr>
<tr>
<td>✓ Prepares viewers for potential medical, mechanical complications</td>
</tr>
<tr>
<td>✓ Presents algorithms for treatments</td>
</tr>
</tbody>
</table>

20-Question Multiple Choice Test

| ✓ To pass, viewer must achieve 90 percent correct responses |
| ✓ Clinician required to re-take test if passing score not achieved |

Case in Brief

- A 488-bed hospital located in Pittsburgh, PA
- Clinical leadership recognized wide variation in education, experience with central line practices in physician population
- Designed educational program targeting nurses, residents in MICU/CCU
- Success prompted progressive roll-out to entire physician population across all units

Source: Clinical Advisory Board interviews and analysis.
Interactive-based session introduces second part of baseline competency training

Following the demonstration of theoretical understanding, the program then progressed to skill acquisition itself: a video demonstrating insertion techniques followed by a mannequin based practical session with coaching. The educational approach proved so successful in the MICU and CCU that after a year, hospital leadership was able to expand the approach housewide—to all physicians that could insert a central line, across all units, irrespective of their field of expertise or level of experience with performing the procedure.

Translating Theory into Practice

<table>
<thead>
<tr>
<th>Video Demonstration</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Emphasizes compliance with bundle measures</td>
</tr>
<tr>
<td>✓ Provides example of correct line insertion technique</td>
</tr>
<tr>
<td>✓ Delineates documentation requirements</td>
</tr>
<tr>
<td>✓ Highlights hospital policies for “time-outs”</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insertion Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>✓ Requires clinician to perform insertion on mannequin</td>
</tr>
<tr>
<td>✓ Initial evaluation incorporates one-on-one instruction, assessment</td>
</tr>
<tr>
<td>✓ Renewal sessions conducted in groups of four</td>
</tr>
</tbody>
</table>

No Need to Reinvent the Wheel

- Partnership between Allegheny General Hospital and APIC
- Toolkit includes comprehensive materials including video presentation, assessment module, program set-up guidance
- Vascular access educational module available to Clinical Advisory Board members for $149

Source: Clinical Advisory Board interviews and analysis.
Success contingent upon unyielding stance from physician champion on mandatory training

Though Allegheny General was able to make central line education compulsory through their didactic and interactive sessions, this process was not easy. What seemed like a logical approach to elevating central line practices was not universally accepted by the physicians. A smattering of physicians who frequently inserted central lines, had significant prior experience, or were in units not part of the initial pilot, were resistant to the mandatory training requirements. In response, the physician leadership at Allegheny General firmly established that training was not optional; in their own words: “This is not a democracy!”

Not Taking No for an Answer

Litany of Struggles

- Physician Ego
- Resistance Across Units
- Gap in Medical Training

The Ultimate Response

Any resistance to educational initiative met with uncompromising directive, no element of choice in undertaking central line education

Creating a Safety Net in Nursing Staff

- Nurse-targeted educational modules emphasize thorough understanding of bundle importance, application
- Key focus on authorizing nurses to act as “whistle blowers” on physicians not compliant with expectations
- Establishes nurses as stakeholders in elevating quality of care, empowers them with a voice in patient-related safety matters.

Source: Clinical Advisory Board interviews and analysis.
Education and standardization led to dramatic and sustained decrease in CLABs

This shift in awareness and understanding of correct insertion practices, championed by such a strong institutional commitment, has resulted in dramatic reductions in central line infection rates. The bar charts below present both the rate and total number of infections seen in the MICU and CCU. Though these numbers may seem redundant at initial glance, those familiar with Allegheny General are likely aware of their interest in examining the actual numbers of infections, known by their leaders as “decoding the data”—not only making performance accessible to all, but also humanizing each complication.

Efforts Achieved Zero

<table>
<thead>
<tr>
<th>Infection Rate, MICU/CCU</th>
<th>Total Infections, MICU/CCU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Per 1,000 Line Days</td>
<td></td>
</tr>
<tr>
<td>p&lt;0.05</td>
<td>p&lt;0.05</td>
</tr>
</tbody>
</table>

- **Infection Rate, MICU/CCU**
  - 2003: 10.5
  - 2006: 0.39
  - 2007: 0

- **Total Infections, MICU/CCU**
  - 2003: 49
  - 2006: 3
  - 2007: 0

---

**Untested Waters**

“Nobody (in community hospitals) is doing this yet—but it’s coming, because of CMS.”

Jerome Granato, MD
Director, CCU
Allegheny General Hospital

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1 CCU only.

COLUMN III

Minimizing Pathogen Opportunity
Practice #4

Dedicated Insertion Team

Practice in Brief

Clinicians are recruited to a dedicated line placement team, where they undergo an intensive training period including an introduction to bundle measures, clinical decision-making paradigms for line choice, and supervised line placement. By bringing the benefits of a “focused factory” approach to line insertion, the dedicated insertion team ensures clinician comfort, competence, and skills, reducing the opportunity for potentially dangerous variation in technique.

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**Clinical Advisory Board Grade**

*Maximum Rating: Five Stars*

- Impact on Infections Rates: ★ ★ ★ ★ ★
- Impact on Process Variability: ★ ★ ★ ★ ★
- Ease of Implementation: ★ ★ ★
- Practice Grade: B+
Catheter practice enhanced by reducing process variability, re-engineering insertion bundle

In a similar vein to Allegheny General, Sutter Health made expertise a cornerstone of their CRBSI initiative. Recognizing the inherent variability in peripherally inserted central catheter (PICC) insertions, one nurse management leader turned to principles of process automation and improvement to reduce CRBSIs in the ICU through two key process enhancements. First, she recognized that by reducing the number of individuals inserting PICC lines, she could likely reduce variability and defects in insertion techniques—bringing the benefits of a focused-factory approach to the patient population. Second, the insertion bundle was re-engineered, with new steps and a checklist to ensure that the essential steps were complied with each and every time a PICC line was placed. The steps depicted below outline how Sutter significantly expanded the maintenance portion of the existing IHI bundle.

**Taking a Focused-Factoy Approach**

**Case in Brief**

- A 225-bed Hospital in Roseville, CA
- Nurse leader recognized opportunity to reduce CRBSI rate
- Conducted review of evidence, implemented nurse-based pilot program to standardize line insertion

**An Elite Unit**

Nurse manager hand-selects 30 nurses for insertion team

**Customizing a New Baseline**

<table>
<thead>
<tr>
<th>Hand Hygiene</th>
<th>Maximal Barrier Precautions</th>
<th>Chlorhexidine Antisepsis</th>
<th>Optimal Catheter Site Selection</th>
<th>Daily Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ultrasound Guided</td>
<td>Maximal Barrier Precautions</td>
<td>Central Line Kit Revision</td>
<td>Change from Positive Pressure Connector</td>
<td>IV Connector Septum Disinfection</td>
</tr>
</tbody>
</table>

- Aids appropriate venous location, reduces number of insertion attempts
- Limits provider-to-patient transmission through use of glove, gown, mask, drape, etc.
- Expanded to include Chloraprep®, Statlock®, Biopatch®
- Neutral connector system prevents line blood-reflux, reducing colony opportunity
- Vigilant cleaning of septum and change after each blood draw
- Routine 8 hourly, 10ml saline flush
- Ongoing evaluation of line necessity

Consistency ensured through focused hands-on training for specialized nurse team

Though the bundle extension no doubt played a role in their improvement, what really cemented the success of the standardized approach to line insertion was the intensely focused training that the specialized nurse team received. Once selected for the PICC team, each nurse underwent a four to six week initiation, during which they inserted a minimum of 25 lines under supervision—some inserted as many as 50. These trained nurses were also provided with central line kits, which contained prompt cards outlining every step of line insertion and maintenance practices along with details of possible complications.

Accelerating the Learning Curve

Didactic Session

Supervised Insertion

Nurse “Graduate”

Week 6

Typically 25–50 lines inserted under supervision during training period

Program Highlights

- PICC line team composed entirely of nursing staff
- Intensive four to six week training period
- Nurses trained in early patient recognition for appropriate central line insertion
- Bundle compliance reinforced with customized prompt cards located at nurse stations, central line carts

Unit-level success prompted housewide roll-out of strategy with support from physicians

This solid baseline of practical training quickly translated to improved clinical outcomes within the ICU. With growing confidence in the nurses’ skills, physicians increasingly deferred insertions to the nurse team in conditions that did not specifically require centrally inserted venous catheters. The new standard practice became to treat patients with central lines who transferred in from the ED as if their lines were contaminated, replacing the lines with nurse-inserted PICCs with the physician’s permission. The team maintained a PICC infection rate of zero for an entire year after the approach went live. No wonder, then, that the hospitalwide rollout of the relevant bundle steps was met with minimal resistance from physicians.

**Emulating Success**

**Focusing Practice**
- Initial practice exclusively used by specialized line team
- Efficacy of method illustrated potential for larger scale impact

**Achieving Gains**
- Infection rate success encouraged bundle adoption by physicians
- CRBSI achievement drove internal awareness of compliance necessity

**Expanding Domain**
- Demonstrated benefit expands scope of PICC use
- Physicians endorsed increase in volume of lines inserted by dedicated team

**Increasing Compliance**
- Infection rate success encouraged bundle adoption by physicians
- CRBSI achievement drove internal awareness of compliance necessity

**Seeing Is Believing**

“‘The trauma docs didn’t believe it at first because they didn’t think (the specialized line team) could get all these lines in. However after doing it month after month… they started to say ‘This works for me’ and they began asking ‘Why do I have to do this? They can do this and they do a great job and there is the added benefit of reduced infections’. The trauma docs think this is terrific, but the buy-in took about a year.”

Sophie Harnage BSN, RN
Nurse Infusion Therapy Services Manager
Sutter Health

Source: Clinical Advisory Board interviews and analysis.
Global implementation of standardized approach yielded sustained reduction of CRBSIs

As clinicians across the hospital took note of the PICC team’s success, they increasingly emulated the standardized approach. In 2005, when expanded bundle steps were followed only by the PICC insertion team, the hospital experienced eleven central line infections—none of which were attributable to the PICC team. However, once the appropriate bundle steps were employed house-wide (across all insertions), Sutter completed a full year with no central line infections, a trend that continues even today.

**Bringing Down the House**

Incidence of CRBSI, in ICU

*January 2005–March 2007*

Bundle compliance for line insertion exclusively adhered to by specialized team

Standardized approach of maximal barrier precautions expanded to all practitioners hospitalwide

“A Win-Win

“The success of this bundle in preventing CRBSI has improved patient care and promoted advance practice for our PICC nurse team.”

Sophie Harnage BSN, RN
Nurse Infusion Therapy Services Manager, Sutter Health
*The Journal of the Association for Vascular Access*
September 2007

Practice #5

Foley Validity Check

Practice in Brief

Integrating initial device justification with subsequent clinical assessment and device tracking allows institutions to tackle catheter-associated UTIs on two fronts: reducing unnecessary Foley catheter insertions and ensuring prompt device removal. By decreasing device exposure through written prompts and clinical algorithms to keep Foley status top of mind, hospitals reduce avoidable risk for UTIs in catheterized patient populations.

Clinical Advisory Board Grade

Maximum Rating: Five Stars

- Impact on Infections Rates: ★ ★ ★ ★ ★
- Impact on Process Variability: ★ ★ ★ ★
- Ease of Implementation: ★ ★ ★
- Practice Grade: B
Despite overall volume, modest per-case financial impact of UTIs reduce institutional priority

Though CRBSIs rightly capture industry-wide attention, UTIs actually represent the biggest portion of the total hospital-acquired infection burden. However, the costs associated with UTIs are relatively low, making them pale in comparison to less frequent but more costly infections. Furthermore, UTIs are often asymptomatic, and estimates of increases to length of stay rest at a mere one to two days. Though UTIs affect more than one million patients annually, the relatively small financial and quality consequences have left them in the dark. That is—until recently.

A Significant Burden

Accounting for up to 40% of all HAIs, UTIs affect more than one million patients annually.

CMS spotlight (and consequences of POA) has elevated concern of catheter-associated UTIs

In the heightened scrutiny of today’s regulatory environment, UTIs are coming up aggressively on the radar. Spurred by reimbursement implications of POA, administrators are devoting more attention to this previously underappreciated complication. Recent survey data published by Premier show that UTIs outrank mediastinitis, catheter-associated bloodstream infections, and pressure ulcers to take the dubious honor of the CMS Stop-Pay condition of most concern.

The Power of Scrutiny

<table>
<thead>
<tr>
<th>CMS Stop-Pay Conditions of Most Concern</th>
<th>Percentage of Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mediastinitis Following CABG Surgery</td>
<td>4%</td>
</tr>
<tr>
<td>CA-BSI1</td>
<td>18%</td>
</tr>
<tr>
<td>Pressure Ulcers</td>
<td>30%</td>
</tr>
<tr>
<td>CA-UTI2</td>
<td>49%</td>
</tr>
</tbody>
</table>


1 Vascular catheter-associated bloodstream infection.
2 Catheter-associated urinary tract infection.
Unnecessary exposure to catheters creates avoidable risk for CA-UTIs

Though an overwhelming number of factors create elevated risk for a UTI, one stands head and shoulders above the rest: catheterization. UTIs are much more frequently associated with catheters than otherwise and each day of catheterization increases the risk of infection, with virtually all patients developing bacteriuria by 30 days. Given the strong association between catheterization and subsequent infection, the mandate is clear—insert Foleys only when necessary, and remove catheters as promptly as possible.

Unnecessarily Driving Infections

- UTI, by Device Association
  - Not Catheter-Associated: 20%
  - Catheter-Associated UTI: 80%

- Catheter Appropriateness
  - Appropriate: 80%
  - Inappropriate: 20%

Each Day Increases Risk

- UTI Incidence per Day
  - By 30 days, virtually all patients develop bacteriuria. Of these, approximately 3% will develop bacteremia

As a prime location of catheter placement, ED presents first opportunity for intervention

To best target an intervention to decrease unnecessary insertions, it may be helpful to understand where the majority of Foley catheters are placed. At Sparrow Health, 64 percent of indwelling catheters in elderly patients had been placed in the emergency department (ED). Considering the acuity of the typical elderly ED patient, it is easy to understand why Foley catheters were not top of mind. Dr. Ramana Murthy Gokula, today best known by his colleagues as “Foley Murthy,” made it his mission to make the right choice for Foley placement the easy choice by placing an indicator sheet in patients’ charts. This simple step, in concert with informal weekly education sessions, resulted in a dramatic decrease in the number of Foley’s placed.

**Where It All Begins**

<table>
<thead>
<tr>
<th>Foley Catheter Placement by Location¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>ED</td>
</tr>
<tr>
<td>64%</td>
</tr>
<tr>
<td>Outside ED</td>
</tr>
<tr>
<td>36%</td>
</tr>
</tbody>
</table>

**SLIPPING THROUGH THE CRACKS**

“Due to the acuity of illness with which patients present [in the ED], most people focus on the acute issues and give less importance to Foley catheters… there are missing orders for catheter placement… there are no systems in place to track who got a Foley, and continuous care and monitoring are not done meticulously.”

Ramana Murthy Gokula, MD
Assistant Professor
Department of Family Medicine
University of Toledo

**Elevating Awareness in the ED**

**Case in Brief**

- A 560-bed hospital affiliated with Sparrow Health System in East Lansing, MI
- Conducted weekly educational sessions, included Foley indicator sheet in patient charts
- Observed dramatic decrease in number of Foley catheters placed in ED

**Number of Foley Catheters Placed in ED 2002–2005**

<table>
<thead>
<tr>
<th></th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Intervention</td>
<td>2,188</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Post-Intervention</td>
<td>1,000</td>
<td>300</td>
<td>512</td>
<td></td>
</tr>
</tbody>
</table>

¹ Patients age 65 and older.

Prompt Foley removal compromised by lack of awareness due to poor documentation

Tackling appropriate insertion is only the first step to decreasing unnecessary catheter days. A look at the data below provides some insight as to why the second opportunity, ensuring timely removal of Foleys catheters, remains difficult. In a full 33 percent of cases at Sparrow Health, patient charts lacked orders for Foley catheters. Bearing this in mind, it will come as no surprise that clinicians are often unaware of the presence of indwelling urinary catheters in their patients.

If A Tree Falls in the Forest...

Documentation for Foley Catheters

<table>
<thead>
<tr>
<th>Order Present</th>
<th>No Order Present</th>
</tr>
</thead>
<tbody>
<tr>
<td>67%</td>
<td>33%</td>
</tr>
</tbody>
</table>

Provider Awareness of Catheters

<table>
<thead>
<tr>
<th>Percentage Aware</th>
<th>Students</th>
<th>Interns</th>
<th>Residents</th>
<th>Attending Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>79%</td>
<td>78%</td>
<td>73%</td>
<td>62%</td>
<td></td>
</tr>
</tbody>
</table>

Lost in the Shuffle

“It’s the small things where you tend to lose track, and most hospitals take the perspective that catheters aren’t a big deal.”

Ramana Murthy Gokula, MD
Assistant Professor, Department of Family Medicine
University of Toledo

---

1 Patients age 65 and older.

Device assessment driven by required Foley justification and daily monitoring

To build in a fail-safe for clinician awareness at the next level of care, Morristown Memorial Hospital put assessment algorithms in place to tackle both appropriate insertion and prompt removal of Foley catheters. Updated Foley order sheets incorporated a space for catheter indication, thus keeping device appropriateness top of mind, while daily evaluation of all patients with indwelling Foleys ensures that devices are removed as soon as clinically appropriate. As shown at the bottom of the page, these redundancies generated not only a decrease in exposure, but also a reduction in UTIs.

**Asking the Question, “Why?”**

**Nurse-Driven Algorithm**
- Patient checked for Foley upon ICU admittance; Foley appropriateness assessed
- Nurse follows-up with physician as needed to obtain appropriate order for removal, insertion

**Updated Orders**
- New line on ICU admission order sheet requests indication for catheter
- Intended to have physicians question necessity before writing order

**Daily Checklist**
- Daily nurse checklist used for all patients with Foley catheters
- If patient fails criteria, nurse contacts physician to discontinue order

---

**Case in Brief**
- A 629-bed regional trauma center in Morristown, NJ
- Evaluated performance relative to NNIS benchmarks, discovered potential for improvement on device days
- Targeted appropriate placement, timely removal of Foley catheters; established goal of no more than three device days in ICU

---

**Increasing Appropriateness, Decreasing Infections**

Foley Catheters Removed Before Transfer from ICU

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>6%</td>
<td>20%</td>
</tr>
</tbody>
</table>

UTI Infection Rate¹

Per 1,000 Catheter Days

<table>
<thead>
<tr>
<th></th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before</td>
<td>6.4</td>
<td>1.9</td>
</tr>
</tbody>
</table>

¹ ICU only.
² Fourth quarter 2003.

National data highlights scant monitoring of catheterized patients

Morristown Memorial has designed redundancies in their care pathways to keep Foley’s top of mind, but recent national data reveals a key reason why keeping track of Foley’s is difficult: the majority of institutions do not have systems in place to track catheterized patients or catheter duration. A recent study by Dr. Sanjay Saint assessed UTI prevention strategies in a national sample of over 516 Veteran’s Affairs and non-federal hospitals. Only 44 percent of institutions reported the use of a formalized system for tracking catheterized patients, and a mere 26 percent of respondents continued on to track the duration of catheterization. Finally, despite their demonstrated efficacy in reducing the length of exposure, only 9 percent of institutions nationwide leverage reminders, including stop orders.

**Device Tracking Not Commonplace**

<table>
<thead>
<tr>
<th>Tracking Systems Leveraged Nationally</th>
<th>Presence of Urinary Catheter Reminder(^1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Have Reminders</td>
</tr>
<tr>
<td>Catheterized Patients</td>
<td>44%</td>
</tr>
<tr>
<td>Catheter Duration</td>
<td>26%</td>
</tr>
<tr>
<td></td>
<td>Do Not Have Reminders</td>
</tr>
<tr>
<td></td>
<td>9%</td>
</tr>
<tr>
<td></td>
<td>91%</td>
</tr>
</tbody>
</table>

\(^1\) Includes stop orders.

In Need of an Alert

“When the unjustified use of many catheters is considered, coupled with frequent lack of physician awareness of catheter presence, techniques that alert physicians to the catheter status of their patients may help reduce inappropriate catheterization. Several studies support the use of catheter reminders.”

*Clinical Infectious Diseases*

January 2008

Standardized order set within CPOE automates a stop for Foley catheters

The good news for those institutions with CPOE is that simple modifications to an existing system can incorporate catheter reminders. One such institution, VA Puget Sound, investigated the potential for a standardized order set to decrease device exposure. These orders tackled both areas of infection opportunity: first, by requiring an indication for placement and second, by leveraging urinary catheter reminders, including a stop order. This automation resulted in a significant reduction in the duration of urinary catheterization in their study unit. An important secondary gain of this tracking system was an outstanding increase in documentation—an area with which many institutions struggle.

CPOE as an Enabler

Case in Brief

- A 536-bed facility in Seattle, WA
- Developed standardized order within CPOE system: required indication for placement, set default stop date, automated a reminder for discontinuation at 72 hours

### Secondary Gains

**Documentation of Indwelling Urinary Catheters**

\[ p < 0.001 \]
Database monitors Foley days, captures data for mandatory state reporting

For almost 90 percent of institutions, CPOE is not yet a reality. Fortunately, success in tracking Foleys, or any device for that matter, is not restricted to those with CPOE, as shown by Hamot Medical Center. In light of their institutional price tag of one million dollars per year on UTI related costs, Hamot leveraged the expertise of their clinical informatics team to build a specialized database for tracking Foley catheters. Patient level data is aggregated to the unit level, and is automatically updated daily. In light of ever-increasing reporting requirements, it is no small gain that the database captures and synthesizes the Foley data required for mandatory Pennsylvania state reporting.

**Preventing Orphan Catheters**

**Case in Brief**

- A 343-bed hospital in Erie, PA
- Financial analysis revealed $1 million in UTI-associated costs, prompted institutional commitment to reduction efforts
- Specialized informatics team developed homegrown central line, Foley catheter databases
- Housewide initiative resulted in units achieving 30 percent reduction in infection burden on average from baseline

**Source:** Clinical Advisory Board interviews and analysis.
Feedback to frontline staff raises awareness of unnecessary device days

To truly enhance performance, data must also be disseminated to clinical staff. At Hamot Medical Center, rate data, device days, and clinical indicators gathered from their homegrown database and automated surveillance tool are shared with frontline staff monthly to engage them in prevention efforts. With a 30 percent average reduction in infections across units, the effort has resonated well. Though the homegrown database has the capability to allow for alert functionality (i.e., when catheterization length passes a certain threshold), with Foleys in particular, institutions should be wary of potential physician pushback of mandated stops and work to engage physicians early on in development of such systems.

Harnessing the Power of Data

- ICP prepares report with information gathered from automated tool, homegrown catheter tracking database
- Includes rate data, related clinical indicators
- Monthly data presentations engage, enfranchise staff in prevention initiatives

What About Automating a Stop?

- Central line database flags lines indwelling beyond recommended length of time
- Similar technical capabilities of Foley catheter database allow for alert replication

Source: Clinical Advisory Board interviews and analysis.
Practice #6

Clockwork Antibiotic Administration

Practice in Brief

A “constant” clinician in the perioperative process is designated to take ownership of initial and continual antimicrobial prophylaxis, while an automated stop at 24 hours post-operative ensures timely discontinuation. Assigning responsibility ensures consistency and responsibility in the administration process and hugely increases the likelihood of antimicrobial delivery within 60 minutes of incision time, a well-proven strategy to reduce the potential for surgical site infections.
Though many hospitals participate in SCIP, SSIs continue to pose challenge

Joining UTIs on the most recent update to the CMS Stop-Pay ruling are certain surgical site infections (SSIs). Certainly, SSIs already occupy an important place on the quality agenda—the Surgical Care Improvement Project (SCIP) measures form a critical component of the IHI’s 5 Million Lives campaign and 62 percent of U.S. hospitals are already registered participants in this initiative. Nevertheless, the number of surgical site infections remains significant, with more than 600,000 procedures complicated by an infection every year across the U.S.

A Common Response

<table>
<thead>
<tr>
<th>New Interventions Targeted at Harm</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Prevent Harm from High-Alert Medications... starting with a focus on anticoagulants, sedatives, narcotics, and insulin</td>
</tr>
<tr>
<td>• Reduce Surgical Complications... by reliably implementing all of the changes in care recommended by SCIP, the Surgical Care Improvement Project (<a href="http://www.medqic.org/scip">www.medqic.org/scip</a>)</td>
</tr>
<tr>
<td>• Prevent Pressure Ulcers... by reliably using science-based guidelines for their prevention</td>
</tr>
<tr>
<td>• Reduce Methicillin-Resistant Staphylococcus aureus (MRSA) infection... by reliably implementing scientifically proven infection control practices</td>
</tr>
<tr>
<td>• Deliver Reliable, Evidence-Based Care for Congestive Heart Failure... to avoid readmissions</td>
</tr>
<tr>
<td>• Get Boards on Board... by defining and spreading the best-known leveraged processes for hospital Boards of Directors, so that they can become far more effective in accelerating organizational progress toward safe care</td>
</tr>
</tbody>
</table>

Performance Still Not Perfect

“Of the nearly 30 million operations in the United States each year, more than 2 percent are complicated by an SSI.”

Archives of Surgery
February 2005

1 Calculation: number of participants in IHI 5,000,000 Lives Campaign as of January 3, 2008, divided by total number of hospitals.

Timely pre-surgical administration of antibiotics challenges even SCIP participants

One possible reason for the persistence of these surgical site infections is the difficulty in actually translating the SCIP measures into process changes. One surgical process consistently posing challenge is timely administration of antibiotics. No surprise that antibiotic timing is difficult to achieve, given all of the processes that must be synchronized—one administrator summarized his sentiments by saying, “It’s like nailing Jell-O to a wall.”

Yet Still a Persistent Problem

SCIP-INF 1. Prophylactic antibiotic received within one hour prior to surgical incision
SCIP-INF 2. Prophylactic antibiotic selection for surgical patients
SCIP-INF 3. Prophylactic antibiotics discontinued within 24 hours after surgery end time (48 hours for cardiac patients)
SCIP-INF 4. Cardiac surgery patients with controlled 6 a.m. postoperative serum glucose (#200 mg/dL)
SCIP-INF 5. Postoperative wound infection diagnosed during index hospitalization
SCIP-INF 6. Surgical patients with appropriate hair removal
SCIP-INF 7. Colorectal surgical patients with immediate postoperative normothermia

Still an Enormous Challenge

“(It’s difficult because) it’s working backwards. It would be great if you could give the incision and then give the antibiotics, but to try to time the antibiotics appropriately when people are in different holding areas or coming from the emergency room, outside the hospital, into a short stay, and then the operating field, it’s just a nightmare trying to get everything coordinated.”

Ward Robinson, MD
Chief of Infection Prevention
Moses Cone Health System

Assigning responsibility for antibiotic initiation key to process improvement efforts

There is, however, a clear opportunity to streamline the initiation process. After analyzing their entire pre-surgical preparation process, Baystate Medical Center recognized that by assigning ownership for antibiotic administration to a designated member of the surgical team—in this case, the anesthesiologist—they could improve the consistency of their antibiotic approach. Baystate garnered buy-in by providing staff with published evidence. Next, they made the process as easy for the anesthesiologist as possible. With the pharmacist owning drug preparation and the nursing staff responsible for getting the line ready, the anesthesiologist’s only task was to actually initiate drug administration and to provide any necessary re-doses during surgery.

Finding the Constant

Case in Brief

- A 684-bed hospital in Springfield, MA
- Isolated antibiotic administration inconsistency as a barrier to surgical outcome success
- Identified constant variable in process to reduce variability in antibiotic administrative practice

Leveraging the Constant Provider

- Anesthesiologist identified as ideal owner for antibiotic administration
- Initial, re-dose remains under anesthesiologist purview

Gaining Buy-In Through Data

- Quality case through established published evidence
- Dedicated time allotted for physician discussion

The Power of Data

“When the nurse presented me with the idea (of anesthesiologist administering antibiotic), my immediate reaction was, ‘We already have enough work to do in the OR—unless the evidence has shown to be effective, why are we doing this?’ However, after looking at the lit, the question really became, ‘Why aren’t we doing this?’”

Gary Kanter, MD
Chief of Pre-admission Clinic
Baystate Medical Center, MA

Source: Clinical Advisory Board interviews and analysis.
Tapping the competitive element of physicians motivates laggards, increases compliance

With one provider owning the administration process, Baystate was able to implement targeted interventions to ensure an on-time start. To ensure compliance, blinded rates of physician administration times were posted quarterly. Individual data, given to each physician, allowed for comparison of performance against the group. Given physicians’ competitive nature, the time to administration quickly improved as the laggards aimed to be on par with their high-performing peers. The results of rates in timely administration, shown in the data below, demonstrate the success of Baystate’s efforts.

**Addressing Untimely Dosage**

- Quarterly posting of drug administration times with identifiers removed
- Physician outliers determined through analysis of dosage times
- Each physician receives envelope revealing own performance data
- Posted data displays blinded rate by physician, available for individuals to compare
- Competitive nature of physicians leads to improved physician antibiotic rates overall

**Timely Administration Reduces Infections**

<table>
<thead>
<tr>
<th>Time to Administration</th>
<th>Within 60 Minutes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All (Excluding CV)</td>
<td>Pre-Intervention</td>
</tr>
<tr>
<td>All</td>
<td>11%</td>
</tr>
<tr>
<td>CV</td>
<td>97%</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.
Multiple causes for poor compliance with 24-hour antibiotic discontinuation

Initiation of prophylaxis is only the first half of the equation. On the back end, antimicrobial discontinuation is important to prevent the development of resistant organisms. The causes for the overly prolonged use of antibiotics are many, ranging from surgeon preference to process related issues such as a lack of tracking and enforcement. And, despite the fact that many physicians recognize the issue of incorrect antibiotic use on a global level, far fewer recognize it as a problem in their own practice.

Understanding Contributing Factors

24-Hour Antibiotic Discontinuation

Drill Down

Failure Analysis

Physician

Hospital

Physician preference and habit

Lack of tracking

Order form overrides

Lack of feedback and enforcement

A Problem of Recognition

“Despite this growing problem, physicians aren’t attentive to the potential impact of their individual prescription habits on global antimicrobial resistance. Though they recognize that antimicrobial resistance is a problem, they consider it a national issue rather than one localized at their own institution (95 percent versus 75 percent) and results are even lower for individual practices (95 percent national versus 65 percent at practice).”

Archives of Internal Medicine
March 2004

Data sharing and peer pressure combined to elevate compliance with timely discontinuation

At Baystate, however, administrators would be hard pressed to argue the negative impact of inappropriate antimicrobial use. Prolonged prophylactic antibiotic use wreaked havoc on Baystate’s joint program ranking when SCIP initiated compulsory reporting measures in 2005. To reduce the likelihood of unchecked extended use, Baystate moved from paper orders to electronic orders with an automatic stop at 24 hours. To remedy the issue of surgeons modifying electronic order sets, Baystate implemented a process that may look and feel familiar—individual performance data partnered with peer pressure to elevate compliance.

Falling in Line

Transforming Practice Habits

“A community hospital that has no CPOE is no more limited in their ability to (improve discontinuation rates) than a large academic medical center. The bigger factor is making surgeons understand that 24 hours has been demonstrated to have the better effect as far as antimicrobial stop time.”

Gary Kanter, MD
Chief of Pre-admission Clinic
Baystate Medical Center

Please see Appendix for “Tools for Appropriate Antibiotic Prophylaxis”
SPECIAL REPORT

Examining MRSA Strategy
Report in Brief

Report covers the rise of the superbug MRSA, from its ever increasing prevalence and media attention to its impact on patients. After segmenting the effects of community- and hospital-acquired MRSA cases, presentation of case studies provides tactics for surveillance selection and deployment with the goal of decreasing opportunity for pathogen transmission.
Steady rise in MRSA rate grabbing attention across the nation and abroad

Though inappropriate antimicrobial use is driving increased resistance rates across pathogens, MRSA represents one particularly threatening consequence. As a bit of background on the bug that has garnered so much mindshare in the recent months, MRSA first appeared in European hospitals around 1961 and in the U.S. around 1968. The data on the bar chart below show that today’s interest is not unwarranted—the steadily increasing percentage of Staphylococcus aureus resistant to methicillin reached as high as 58 percent in 2005, and mid-size hospitals of 200 to 500 beds have borne much of the weight of this increase.

Creeping Up on Us

MRSA Growth, 1999–2005

Percentage of Staphylococcus Aureus

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2000</th>
<th>2001</th>
<th>2002</th>
<th>2003</th>
<th>2004</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>43%</td>
<td>46%</td>
<td>49%</td>
<td>51%</td>
<td>54%</td>
<td>57%</td>
<td>58%</td>
</tr>
</tbody>
</table>

Populations Hit Hardest by Increase

NNIS’ Growth Data

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Persons ≥ 65 Years</td>
<td>39.7</td>
<td>72.3</td>
</tr>
<tr>
<td>Coronary Units</td>
<td>22.7</td>
<td>62.3</td>
</tr>
<tr>
<td>Hospitals 200–500 Beds</td>
<td>30.1</td>
<td>69.1</td>
</tr>
</tbody>
</table>

1 National Nosocomial Infection Surveillance System.

Considerable focus to control MRSA in Europe, prompted by legal and media pressure

The frightening percentage of Staphylococcus aureus isolates resistant to methicillin in the U.S. is largely paralleled in Europe, where there has been similarly high growth. This bug has received incredible media attention overseas—particularly in the UK, where front pages have been dedicated to stories about rampant infection rates, patient deaths, and subsequent CEO firings. Many may wonder whether this is indicative of action to come in the U.S.

### Beyond Our Borders

**Staphylococcus Aureus Blood Infections Due to MRSA (Europe)**

<table>
<thead>
<tr>
<th>Country</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ireland</td>
<td>41%</td>
</tr>
<tr>
<td>UK</td>
<td>44%</td>
</tr>
<tr>
<td>Belgium</td>
<td>33%</td>
</tr>
<tr>
<td>Germany</td>
<td>20%</td>
</tr>
<tr>
<td>Poland</td>
<td>20%</td>
</tr>
<tr>
<td>France</td>
<td>29%</td>
</tr>
<tr>
<td>Austria</td>
<td>14%</td>
</tr>
<tr>
<td>Hungary</td>
<td>17%</td>
</tr>
<tr>
<td>Czech Republic</td>
<td>9%</td>
</tr>
<tr>
<td>Greece</td>
<td>44%</td>
</tr>
<tr>
<td>Portugal</td>
<td>46%</td>
</tr>
<tr>
<td>Spain</td>
<td>27%</td>
</tr>
<tr>
<td>Italy</td>
<td>40%</td>
</tr>
</tbody>
</table>

State reporting and media coverage spreading awareness from coast to coast

Clearly, attention is on the rise even within the U.S., where a surge of headlines and media coverage is driving increased public awareness of the MRSA issue. In turn, consumer unions are placing pressure on lawmakers and State Departments of Health to mandate state-reporting for MRSA infections. A glance at the map highlighting states with current or pending MRSA reporting legislation shows that these laws are spreading from coast to coast, with many more states taking the idea under consideration.
Debate on the benefits of transparency-driven reporting aside, public reporting here to stay

Even the legal profession is weighing in on the matter, with one piece in the New York Law journal going so far as to proclaim MRSA as “The Next Asbestos.” While many in the field question the benefit of this increased scrutiny—opinions on the topic range from “beneficial” to “merely a report of a host of unrelated community acquired cases”—the fact remains that public reporting is here to stay.

THE RISE

MRSA driving costly additions to length of stay, total cost per case

Alongside rising scrutiny, many hospital leaders have growing concerns regarding the financial implications of acquiring this particular bug. The bar charts below depict the results of an analysis that one physician from Evanston Northwestern Healthcare (ENH) conducted to examine the economic implications of hospital-acquired MRSA. At ENH, MRSA-positive patients typically acquire this pathogen approximately eight days into their hospital stay. To account for this, the analysis compared MRSA patients to all other patients with a length of stay greater than eight days to find that they outpace their non-infected peers by $23,000 per patient. For those patients with MRSA bloodstream infections in particular, the difference increases to $31,000 dollars—even when controlling for the pre-infection LOS of 13 days.

Negatively Affecting Margins

<table>
<thead>
<tr>
<th>Mean Total Cost</th>
<th>Matched by Diagnosis (Bloodstream)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOS&gt;8 Days¹</td>
<td>LOS&gt;13 Days¹</td>
</tr>
<tr>
<td>No MRSA²</td>
<td>No MRSA³</td>
</tr>
<tr>
<td>HA-MRSA⁴, ⁶</td>
<td>HA-MRSA⁵</td>
</tr>
<tr>
<td>$50,013</td>
<td>$86,202</td>
</tr>
<tr>
<td>$73,795</td>
<td>$117,702</td>
</tr>
<tr>
<td>Difference of $23,782</td>
<td>Difference of $31,500</td>
</tr>
</tbody>
</table>

¹ Comparison groups accounted for LOS and diagnosis.
² n=5,796.
³ n=178.
⁴ Hospital-acquired MRSA.
⁵ n=1,190.
⁶ n=30.

Beyond jarring financial impact, MRSA patients are also at increased risk for mortality

Though the dollars associated with MRSA paint a grim picture, the much more important piece of the equation is the deadly toll MRSA is taking on quality. The mortality associated with MRSA is now at the highest it has ever been in U.S. history. To put this number in the context of a familiar benchmark, according to the CDC, MRSA outpaced HIV in terms of coding at time of death in 2005. Not only has there been a significant leap in deaths from Staphylococcus aureus-related infections across the six years, but the percentage of those infections that are attributable to MRSA has also jumped nearly 15 percent.

### Taking a (Deadly) Toll on Quality

**Estimated Deaths, Staphylococcus Aureus-Related Discharge Code 1999–2005**

<table>
<thead>
<tr>
<th>Year</th>
<th>Staphylococcus Aureus</th>
<th>MRSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>24,715</td>
<td>11,240</td>
</tr>
<tr>
<td>2005</td>
<td>29,164</td>
<td>17,260</td>
</tr>
</tbody>
</table>

Increase in percentage of estimated presence of MRSA at death from 45.5% to 59.2%

### Mortality, Selected Conditions 2005

<table>
<thead>
<tr>
<th>Condition</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motor Accident</td>
<td>43,000</td>
</tr>
<tr>
<td>Breast Cancer</td>
<td>40,000</td>
</tr>
<tr>
<td>MRSA</td>
<td>19,000</td>
</tr>
<tr>
<td>HIV/AIDS</td>
<td>17,000</td>
</tr>
</tbody>
</table>

Extensive publicity of CA-MRSA possibly masking true impact of HA-MRSA

Without doubt, the MRSA story is complex. Many professionals understandably question whether the rise in community-acquired MRSA is largely responsible for the ever increasing numbers of MRSA-related illness and death. This opinion is certainly not without merit, especially considering that CA-MRSA grabs the lion’s share of the headlines. In fact, in an analysis of over 100 articles that referenced MRSA, the majority of stories focused on community-acquired MRSA. Clearly, the community-acquired cases are of great concern.

**Hiding Behind CA-MRSA**

**Analysis in Brief**

- Searched leading newspaper websites with key term “MRSA”
- Categorized, tabulated responses according to focus (CA or HA)

**MRSA Media Coverage**

Vast majority of MRSA coverage focused on community-acquired cases

<table>
<thead>
<tr>
<th></th>
<th>69%</th>
<th>31%</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-MRSA</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HA-MRSA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**You Can’t Control It All**

“Community-acquired MRSA is a huge threat to hospitals…it’s all the more difficult because institutions don’t communicate….We can’t be responsible for all the CA-MRSA out there.”

Director, Department of Antibiotic Management
Hospital on the East Coast

---

1 Community-acquired MRSA.

Source: Clinical Advisory Board interviews and analysis.
Justifiable focus on CA-MRSA, though HA-MRSA accounts for majority of deaths

Perhaps the focus on CA-MRSA is understandable, given the reservoirs of pathogens at so many of the places that community members frequent every day. Though shifting the blame to community-acquired cases may seem the natural choice, the reality is that health care-associated MRSA accounts for an overwhelmingly greater percentage of invasive infections and deaths. To prevent transmission leading to HA-MRSA cases, perhaps the best place to begin is with a plan to manage the potential barrage of pathogens coming from the community to the front doors of hospitals.

**A Slew of Community Hotspots**

```
<table>
<thead>
<tr>
<th>Hospital</th>
<th>Jail</th>
<th>Barracks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary School</td>
<td>Sports Clubs</td>
<td>Ambulatory Surgical Center</td>
</tr>
<tr>
<td>High School</td>
<td>Nursing Homes</td>
<td></td>
</tr>
</tbody>
</table>
```


**A Dose of Reality**

**Cases and Deaths Due to Invasive MRSA**

- **Invasive MRSA Cases**
  - 15% Community-Acquired MRSA
  - 85% Health Care-Associated MRSA

- **Invasive MRSA Deaths**
  - 8% Community-Acquired MRSA
  - 92% Health Care-Associated MRSA
Three primary methods of surveillance strategies: passive, targeted, and universal screening

In an effort to contain spread resulting from hospital admission of colonized community members, many institutions are turning to patient surveillance. Hotly debated across the industry, there is no “perfect” method that applies to all institutions. However, most programs rely on one of the three methods displayed below. Across these two pages are the main components of these methods, along with a case study and recommendations to be considered for each method.

### Evaluating Your Options

<table>
<thead>
<tr>
<th>Screening Method</th>
<th>Benefits</th>
<th>Drawbacks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Passive Surveillance</strong></td>
<td>• Low cost</td>
<td>• Large volume of colonized or infected patients likely to be missed</td>
</tr>
<tr>
<td></td>
<td>• Minimal staff engagement required</td>
<td></td>
</tr>
<tr>
<td>Anterior nares cultures</td>
<td></td>
<td></td>
</tr>
<tr>
<td>performed only in event of</td>
<td></td>
<td></td>
</tr>
<tr>
<td>unexpected infection</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **(Targeted) Active Surveillance** | • More comprehensive than passive screening | • Costlier than passive surveillance |
|                                  | • Catches patients in highest risk category, enables unit to apply barrier precautions | • Increases need for isolation, lab resources |
| Nasal swab cultures performed on selected high-risk populations, including ICU, nursing home, those with known prior history of MRSA infection; may also include rapid testing |                                               |                                                             |

| **(Universal) Active Surveillance** | • Identifies colonized patients more quickly | • Most expensive option, almost certainly requires infrastructure investments in additional staff, lab equipment, possible unit expansion |
|                                   | • Allows hospital to fully assess and analyze housewide infection burden | • No reimbursement for more expensive tests |
| All entering patients undergo anterior nares screening on admission, typically using rapid PCR-based testing with decreased turnaround time relative to standard cultures |                                               |                                                             |

1 Polymerase chain reaction.
Strategies vary by size of patient pool, necessary resources, and projected results

Optimal strategy selection is highly dependent on a number of institutional characteristics, including the local patient population. Passive surveillance employs an approach that is largely reactive to infection, performing nasal swabs on patients only on clinical indication of infection. Targeted surveillance screens a select population of patients who are deemed to be high risk for introducing MRSA colonies into a unit, such as in the ICU and MICU. Finally, universal surveillance screens all patients in all units on admission, without exception. Realistically, passive surveillance is unlikely to be sufficient for true gains for infection reduction. Though circumstances do of course vary by care setting, given resource constraints, most institutions will find targeted surveillance to be their best option.

### FOR SURVEILLANCE

<table>
<thead>
<tr>
<th>Case Study</th>
<th>Clinical Advisory Board Recommendations</th>
</tr>
</thead>
</table>
| **Descartes Hospital** | • Compared costs and efficacy of different surveillance programs  
  • Passive surveillance program cost only $1,140 annually; nearly 28 times less than standard active surveillance  
  • Passive surveillance estimated to reduce MRSA cases by 4.2 percent when appropriate precautions taken for patients with positive cultures  
  • Unlikely to be sufficient for true gains in infection reduction except in hospitals where existing MRSA burden is low and risk of transmission is small |
| **Howard County General Hospital** | • Performed active surveillance on all ICU patients  
  • Chose ICU because of the highest patient risk, dedicated staff  
  • Decreased HA-MRSA cases in ICU by ~60 percent across first six months of program  
  • Targeted approach best option for most hospitals; increased detection and more rapid precaution measures create potential for hospitals to recoup program costs through avoided infections.  
  • May yield additional gains through the use of preemptive isolation until cultures return negative |
| **Veterans Affairs Pittsburgh** | • Piloted universal screening for MRSA in 2004  
  • Infrastructure costs totaled ~$120,000–$140,000  
  • Achieved 40 percent decrease in transmission rates, 70 percent decrease in MRSA infection (compared to 1998 data)  
  • Most relevant for organizations with high or rising rates of community-acquired MDRO strains; unlikely to be cost-effective for hospitals with low infection rates |

---

1 Pseudonym.  

Source: Clinical Advisory Board interviews and analysis.
Overwhelming majority of hospitals rely on targeted surveillance

As these results from the recent Clinical Advisory Board hospital-acquired infections survey show, targeted surveillance is, in fact, the strategy of choice for member hospitals. The universal approach, which is more common in Europe, is used by only 9 percent of the membership. The overwhelming success of this strategy in certain European countries may lead some to wonder why it is not more often leveraged here—truth be told, it can be quite difficult to draw comparisons from over the pond.

Targeted Surveillance Popular...

“What type of MRSA surveillance is in use at your institution?”

n=586

- Targeted: 62%
- Universal: 20%
- Passive: 9%
- None: 9%

An Impossible Standard

“To extrapolate the situation from Europe to America is problematic: they have national health care systems, they have communication from institution to institution and when they attacked the problem 20 years ago, they didn’t have endemic MRSA in the hospital or community.”

Director of Department of Antibiotic Management
Hospital on the East Coast

Source: Clinical Advisory Board 2008 Survey;
Clinical Advisory Board interviews and analysis.
Selection should be guided by evaluation of MRSA burden and available resources

For those getting started with tackling MRSA surveillance selection, critical factors for decision making are outlined in the chart below. In essence, there are two key areas to take into account: institutional burden of MRSA and resources that are available to be dedicated to surveillance. The preliminary questions below may help guide infection control teams in making an informed choice.

Making an Informed Decision

Key Questions

- What is my overall MRSA burden?
- What is my CA versus HA burden?
- What is my average cost per infection?
- Which units face the greatest burden?
- Do I have staff available for increased workload?
- Can existing lab resources handle greater volumes?
- Is our facility capable of expansion for isolation?
- Do we need to cohort patients?
- If so, do we have appropriate microbiology resources to cohort?
- At what point do I break even on testing equipment?
- What will the extra costs amount to for additional PPE?
- How many cases will surveillance prevent?

Source: Clinical Advisory Board interviews and analysis.
Request for resources prompts assessment of cost savings potential for proposed program

Necessary financial investments represent one critical lever to consider during a strategy evaluation; thus, a good place to begin is with a financial assessment. Sentara Healthcare conducted a small scale pilot of targeted active surveillance to determine the MRSA burden in one of their ICUs. Following this pilot, they performed a matched-pair analysis to estimate the impact of this MRSA burden on the direct contribution per case. After taking into account the incremental expenses of surveillance related to the initial pilot, they arrived at the direct contribution opportunity generated by surveillance within this unit.

**Doing the Math**

**CASE IN BRIEF**

- A six-hospital system in Norfolk, VA
- Piloted ICU active surveillance in one unit, tracked inpatients with MRSA between January and December 2006
- Used matched-pair analysis to estimate return on housewide active surveillance roll-out

**Conducting a Matched-Pair Analysis**

<table>
<thead>
<tr>
<th>MRSA</th>
<th>No MRSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reimbursement</td>
<td></td>
</tr>
<tr>
<td>Direct Expense</td>
<td></td>
</tr>
<tr>
<td>$A</td>
<td>$B</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.

1 Based on age (within five years), gender, MDC, APR-DRG, severity index, mortality index, primary discharge diagnosis, and discharge disposition.
Translation of cost data into opportunity bolsters business case for surveillance program

The chart below presents a breakdown of the line items that factored into Sentara’s financial analysis. Incremental expenses account for the costs of additional supplies associated with the program, including gloves, apparel, and environmental cleaning supplies. By dividing these expenses by an estimated number of prevented infections, the total cost was disaggregated to the individual patient level. With this information in hand, along with their previously calculated contribution impact, Sentara established the opportunity per patient in their proposed surveillance program. Though cost-justification methodologies may differ, the key message is that a systematic approach to delineating potential program gains provides invaluable support for proposed screening initiatives.

Translating Analysis to Impact

<table>
<thead>
<tr>
<th>Incremental Expense</th>
<th>Cost to Prevent</th>
<th>Per-Patient Opportunity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Gloves</td>
<td>$___</td>
<td></td>
</tr>
<tr>
<td>• Environmental</td>
<td>$___</td>
<td></td>
</tr>
<tr>
<td>• Apparel</td>
<td>$___</td>
<td></td>
</tr>
<tr>
<td>Lab Cultures</td>
<td>$___</td>
<td></td>
</tr>
<tr>
<td>Total Incremental Expense</td>
<td>$</td>
<td></td>
</tr>
<tr>
<td>Incremental Expenses $___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Estimated Number of Infections Prevented</td>
<td>___</td>
<td></td>
</tr>
<tr>
<td>Cost to Prevent $___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost to Prevent –$___</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Per-Patient Opportunity $___</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Proving the Value

“In an era where volumes are flattening and fixed costs are rising, it can be difficult to ask for a program that requires additional fixed costs. However, our active surveillance business case more than proved the value of such a program to our leadership team.”

Corporate Vice President, Finance
Sentara Healthcare

Source: Clinical Advisory Board interviews and analysis.
No “one-size-fits-all” solution—selective expansion should be based on unit-specific requirements

Though a global financial assessment can serve as an initial program justification, the incremental benefits of screening programs will almost certainly vary across a facility. In the case of Newark Beth Israel Medical Center, the NICU presented itself as a prime candidate for targeted screening when a 25 percent increase in hospital-acquired MRSA was paired with a plummeting average time to infection onset. Infant screenings confirmed that the babies were carriers, but to determine the source of this neonate MRSA, staff expanded their screening to find that 30 percent of mothers were MRSA carriers. Suspecting that this rate was likely indicative of the community at large, they expanded their screening to the adult ICU, and followed positive results with mupirocin decolonization. Their efforts produced excellent results—a 50 percent decrease in positive cultures after one year.

**Case in Brief**

- A 673-bed, regional care, teaching hospital of the St. Barnabas Health Care System in northern New Jersey
- Piloted active surveillance in NICU, ICU
- Rolled out targeted active surveillance across remaining system hospitals using risk assessment to target units with highest potential yield

**Responding to an Outbreak**

<table>
<thead>
<tr>
<th>Average Time to Onset, Days</th>
<th>Patients Testing Positive for Asymptomatic MRSA¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>NICU</td>
<td>Non-carriers: 70% Carriers: 30%</td>
</tr>
<tr>
<td>Team begins screening mothers for MRSA upon admission</td>
<td>Team begins screening all adult ICU admissions in September 2006, decolonizing positive cases with mupirocin</td>
</tr>
<tr>
<td>74</td>
<td>41</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HA-MRSA as a Fraction of Total MRSA Cases</th>
<th>Patients Testing Positive for Asymptomatic MRSA¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>25% increase attributed to rise in CA-MRSA</td>
<td>Decrease attributed to active surveillance</td>
</tr>
<tr>
<td>2002</td>
<td>2004</td>
</tr>
<tr>
<td>178</td>
<td>63</td>
</tr>
<tr>
<td>September 2006</td>
<td>September 2007</td>
</tr>
<tr>
<td>30%</td>
<td>14%</td>
</tr>
</tbody>
</table>

¹ Adult ICU.

Source: Clinical Advisory Board interviews and analysis.
Examination of unit-specific burden ensures surveillance strategy is matched to need

In light of the impressive results at Newark Beth Israel, St. Barnabas Health Care System evaluated the potential of a screening expansion across all facilities. First, they created a risk assessment process to identify the highest-yield units at individual sites. Each hospital’s ICP was charged with examining MRSA burden at the unit-level, and asked to disaggregate hospital- versus community-acquired MRSA infections using the traditional 48 hour divider. An active surveillance approach was directed to the units with the highest rates of hospital-acquired MRSA—where the hospital could achieve the most attractive ROI.

**Selective Expansion**

- Establish infections over three-month period
- Remove OP, ED non-admits
- Remove duplicates, nasal/colonization cultures

---

<table>
<thead>
<tr>
<th>Pt. ID</th>
<th>Ward</th>
<th>Admit Date</th>
<th>Collect Date</th>
<th>Received Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>000000</td>
<td>B6</td>
<td>10/10/06</td>
<td>1/4/07</td>
<td>1/5/07</td>
</tr>
<tr>
<td>111111</td>
<td>D7</td>
<td>1/4/07</td>
<td>1/4/07</td>
<td>1/4/07</td>
</tr>
<tr>
<td>222222</td>
<td>A7PP</td>
<td>1/26/07</td>
<td>1/27/07</td>
<td>1/29/07</td>
</tr>
<tr>
<td>000000</td>
<td>B6</td>
<td>10/10/06</td>
<td>1/4/07</td>
<td>1/5/07</td>
</tr>
<tr>
<td>111111</td>
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<td>1/4/07</td>
<td>1/4/07</td>
<td>1/4/07</td>
</tr>
<tr>
<td>222222</td>
<td>A7PP</td>
<td>1/26/07</td>
<td>1/27/07</td>
<td>1/29/07</td>
</tr>
</tbody>
</table>

Inpatient MRSA Infections

- Number Patients

- Categorize infections among <48 or >48 hours following admission, on a unit-specific basis

---

**Unit Distribution of Inpatients, MRSA Infections**

B4 is a med-surg unit with rapid turn-over, short length of stay; analysis reveals patients may have been infected on admission but were not cultured early enough

Risk assessment analysis suggests starting the MRSA screening, surveillance in C6, C8 units based on highest rates of HA-MRSA

---

1 Lab information system.

Source: Clinical Advisory Board interviews and analysis.
Efforts begin with identification of high-risk populations, anticipated logistical challenges

Assessing potential financial impact is only one component of designing a unit-based strategy. One other critical factor to consider when designing an implementation is the operational aspects of screening in each proposed unit. When evaluating the feasibility of a surveillance strategy, institutions must pair the consideration of high-risk populations with logistical concerns for screening processes. Danbury Hospital in Connecticut chose the ICU as their first step, based not only on risk for MRSA infection, but also on their ability to manage screening and subsequent isolation in this contained environment. To achieve staff buy-in, infection staff raised awareness among clinical leaders of each hospital area affected by the implementation of screening—in this case, the ICU, the ED, and the lab—using data and documented experiences from other institutions to garner support.

**Targeting a Practical Application**

**Defining High-Risk Populations**

<table>
<thead>
<tr>
<th>At-Risk</th>
<th>Practicality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ICU</td>
<td>✔</td>
</tr>
<tr>
<td>2. Surgical patients</td>
<td>✗</td>
</tr>
<tr>
<td>3. Hip/knee implants</td>
<td>✗</td>
</tr>
<tr>
<td>4. Open-heart patients</td>
<td>✔</td>
</tr>
<tr>
<td>5. Patients from multi-resident facilities</td>
<td>✔</td>
</tr>
<tr>
<td>6. Chronic dialysis unit</td>
<td>✔</td>
</tr>
<tr>
<td>7. Incarcerated populations</td>
<td>✔</td>
</tr>
<tr>
<td>8. Vascular surgery</td>
<td>?</td>
</tr>
</tbody>
</table>

- ICP conducted literature search to define high-risk populations
- Considered downstream effects (logistics) of surveillance practices
- Targeted ICU based on ease of implementation

**Gaining Buy-In**

- Targeted education to relevant unit leaders
- Addressed feasibility, validity of surveillance program through relevant literature
- Underscored importance of program by sharing preliminary screening results: 2% of patients screened were unexpected MRSA carriers

**Case in Brief**

- A 371-bed hospital in Danbury, CT
- Evaluated potential screening methods, committed to targeted active surveillance
- Program success measured in terms of transmissions; of 300 screens, only two conversations to MRSA positive observed

Source: Clinical Advisory Board interviews and analysis.
Once process tested, efforts selectively expanded beyond ICU to other small populations

Once staff buy-in had been secured, Danbury also outlined specific processes to support their surveillance efforts—taking away confusion to make the process as easy as possible on their staff. Patients are screened in the ED, prior to ICU admission. A “guilty until proven innocent” approach is taken, with all patients isolated until testing negative for MRSA. Rapid nasal swabs help to reduce turnaround time for results, aiding more efficient ICU bed management. Decolonization is applied only in select orthopedic surgical cases. Having laid the foundation with their ICU population, Danbury plans to expand to other small, high-risk groups that can be easily managed, such as incarcerated, chronic dialysis, and mentally disabled patient transfers.

### Executing on Strategy

#### Setting Screening Processes
- All patients considered positive until proven otherwise, placed in pre-emptive isolation
- Implemented rapid PCR testing in ED; restructured lab staffing accordingly
- Apply decolonization only in select surgical cases

#### Strategizing the Roll-Out
- All involved parties meet regularly to discuss surveillance strategy; meetings always include ID physicians, ICPs
- Subsequent roll-out determined by feasibility within chosen population
- Immediate targets include incarcerated, chronic dialysis, transfers from managed care

### A Work in Progress

“We did a lot groundwork. We were concerned that unless we went very small, and very slowly up front, we could not do an adequate job. The struggle now becomes how to get that foundation we built [in the ICU] expanded to these other small populations.”

Laurie Brentlinger
Infection Control Practitioner
Danbury Hospital

Source: Clinical Advisory Board interviews and analysis.
Identification of positive culture leads to next obvious debate—whether or not to isolate

Setting an institutional strategy for surveillance is the first step toward MRSA containment, but surveillance itself is almost worthless without an appropriate response to positive cultures to minimize transmission. In the U.S., institutional resources such as the number of single rooms remain the rate-limiting step to isolation. Resource considerations aside, there remains a fair amount of debate around the utility and safety of isolation. Current isolation evidence remains inconclusive, though typical arguments against isolation include patient neglect and compromised care, while supporting arguments focus on the potential for isolation to reduce MRSA transmission, even in high endemicity situations. Contradictory opinions aside, the words of one hospital epidemiologist sum up the dilemma well: inaction is not an option.

Shades of Grey

**Cons: Patients Ignored, Safety Compromised**

<table>
<thead>
<tr>
<th>Non-isolated</th>
<th>Isolated</th>
</tr>
</thead>
<tbody>
<tr>
<td>13%</td>
<td>26%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Preventable Adverse Events</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Percentage</strong></td>
</tr>
<tr>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>Preventable Adverse Events Per 1,000 Days</strong></td>
</tr>
<tr>
<td>p&lt;0.001</td>
</tr>
<tr>
<td><strong>Transmission Rates</strong></td>
</tr>
<tr>
<td><strong>Monthly</strong></td>
</tr>
<tr>
<td><strong>Yearly</strong></td>
</tr>
</tbody>
</table>

**Pros: Transmission Contained**

Inaction Not an Option

“You can’t do nothing, and sometimes you need to make decisions without the best level of evidence—that’s the problem that everyone is facing.”

Anthony Harris, MD, MPH
Associate Epidemiologist
University of Maryland Medical Center

Though evidence remains inconclusive, isolation plays core role in the Dutch approach

Though isolation may be contentious in the United States, a small group of countries, including the Scandinavian countries and the Netherlands, have wholeheartedly embraced it as a core strategy in their commitment to MRSA reduction. The first two steps of the Dutch Working Party guidelines for MRSA incorporate isolation practices, and the astoundingly low proportion of Staphylococcus aureus bloodstream infections due to MRSA certainly suggest that their strategies for containment are effective—particularly compared to the 60 percent proportion in the U.S.

The Secret to Their Success?

A Commitment to Isolation

“The most effective way (to contain spread) is to put a patient in a room, close the door and make sure nobody goes in unless necessary. This is okay, as long as patient care is not actually compromised.”

Marc Bonten, MD, PhD  
Professor of Molecular Epidemiology of Infectious Diseases  
Utrecht University Medical Center, Netherlands

Source: Clinical Advisory Board interviews and analysis.
Typical status notification fraught with process inefficiencies, delays time to response

Of course, the Dutch represent only one side of the argument, and the question of whether or not to isolate MRSA positive patients remains under active debate. However, any containment approach will no doubt benefit from a more rapid identification of those patients in need of increased precautions. As MRSA patients are often re-hospitalized, many institutions maintain logs tracking previously identified positive cases in order to reduce potential exposure secondary to subsequent admissions. However, these precautions are only as effective as the speed with which they are applied. A look at the typical isolation process laid out below immediately reveals a number of process inefficiencies limiting timely isolation. In the case of Wishard Memorial Hospital, those limitations included manual tracking systems that necessitated multiple steps to communicate need for isolation.

## Automated Isolation

### A Familiar Notification Process

<table>
<thead>
<tr>
<th>Paper Reference List</th>
<th>MDRO Status Check</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICP manually tracks MDRO positive patients; sends list to bed control</td>
<td>Bed control matches each admission against list; communicates to ward nurse</td>
</tr>
</tbody>
</table>

### A Broken System

“Processes that require continued human attention and effective communication of information are prone to failure. Despite institutional knowledge of the infection status of patients, failure to transmit this data, and failure to act on this data, prevented a majority of patients from being placed in contact isolation in a timely fashion.”

Abel Kho, MD, MS
Assistant Professor, Division of General Internal Medicine
Northwestern University

<table>
<thead>
<tr>
<th>Isolation Order</th>
<th>Nurse-Physician Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physician orders isolation if history of MDRO evident per nursing or medical record</td>
<td>Patient status communicated to physicians; isolation orders requested</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.
Existing CPOE leveraged to decrease time to isolation, resulting in dramatic decrease in MRSA

Wishard used their CPOE system to speed up their MDRO-positive identification process. They developed a set of electronic rules that suggested contact isolation orders for patients based on clinical information entered into the CPOE. This reminder was generated upon admission, and again every single time the physician entered orders until the isolation was accepted or the patient was discharged. The practice realized a dramatic increase in the proportion of patients receiving appropriate isolation—all the way to 89 percent—as well as an impressive 16-hour reduction in median time to isolation orders. The combination resulted in a nearly 50 percent reduction in MRSA infection rates after just six months of operation.

REMINDER

CASE IN BRIEF

- A 264-bed hospital in Indianapolis, IN
- Identified slow isolation of known MDRO carriers as potential transmission risk
- Harnessed existing electronic resources to decrease time to isolation

Mechanics of Reminder

1. G-Care rules created to suggest contact isolation orders for patients meeting criteria
2. Reminders generated for appropriate patients on physician order entry
3. Canned order presented with reminder
4. Reminder appears with every new order until acceptance or patient discharge

Physician Acceptance Improves Timely Isolation Orders

- Patients Receiving Appropriate Isolation
  - Pre-Intervention: 33%
  - Post-Intervention: 89%
- Median Time to Writing Isolation Orders
  - Pre-Intervention: 16 hours
  - Post-Intervention: 0 hours

Unpublished data revealed a 50% decrease in MRSA rate

Itinerant nature of patients underscores need for regionalized strategy

Most facilities can no doubt attest to the transient nature of their patient population, particularly in urban areas where patients have access to a number of different facilities. To account for the itinerant nature of patients alongside existing communication challenges, the Regenstrief Institute, the Indiana Network for Patient Care, and the Agency for Healthcare Research and Quality (AHRQ) established a community patient monitoring system. This patient identification system harnesses the power of data from 17 hospitals across five health systems in Indianapolis. Naturally, this process was strung with many complexities. It took one full year for project leadership to lay the appropriate groundwork, including the essential step of establishing a business agreement signed by the CEOs of all participating hospitals. The Regenstrief Institute took responsibility for managing all the central data and technical support and played a critical role in the development of unique patient identifiers which ensured that patients were matched with correct medical record information.

Recognizing Itinerant Nature of Patients

Case in Brief

- Collaboration between Regenstrief Institute and Indiana Network for Patient Care
- Recognized itinerant nature of patients as potential problem for MRSA transmission
- Established patient monitoring system enables rapid identification of known MRSA carriers

286 unique MRSA positive patients were admitted 587 times to hospitals that did not know their status; average LOS of 7.2 days per patient

Three patients accounted for 17 admissions across three hospitals

Overlap of Identified Patients

<table>
<thead>
<tr>
<th></th>
<th>A:B</th>
<th>A:C</th>
<th>B:C</th>
<th>A:B:C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals</td>
<td>1.8%</td>
<td>0.6%</td>
<td>1.2%</td>
<td>0.03%</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.
Data sharing prompts identification of known MDRO carriers

These unique patient identifiers have played a critical role in streamlining the isolation process at participating facilities. As previously MDRO-positive patients present, their admission papers trigger an automatic e-mail to hospital staff, enabling rapid identification with information culled from the systems of all participating hospitals. This initiative is very new and results are still pending, but, bearing in mind impressive gains realized at Wishard from their internal system, it is easy to imagine the potential impact of having such an expanded set of patient information.

Creating a Citywide Network

Flagging Entry of Known Carriers

Quickly Gaining Popularity

1,100 e-mail alerts sent in just five months

Source: Clinical Advisory Board interviews and analysis.
Though contentious debate remains, clinical consequences of MRSA demand action

The case studies outlined in this special report make clear that MRSA is forcing hospitals to break out of traditional prevention strategies. Across these next two pages are summary points detailing the Clinical Advisory Board’s perspective on MRSA. First, an overview of the state of the union of this pathogen du jour.

Key Takeaways

1. Despite the seemingly overblown public focus on CA-MRSA, studies demonstrate MRSA growth is not insignificant and the majority of invasive cases causing death are heavily weighted at the hospital-acquired end of the spectrum. With this quality consideration compounded by vast economic impact of HA-MRSA infections, hospitals should aim to place emphasis on strategies to reduce the burden of resistant Staphylococcus transmission and infection in their institutions.

2. Regardless of the dearth of conclusive scientific evidence and lack of definitive CDC recommendations for surveillance, institutions are not absolved from their responsibility to provide quality care and reduce potential for infection. MRSA surveillance strategies need to be chosen based upon baseline MRSA burden and institutional financial capability. A good starting point is an analysis of MRSA impact and the economic opportunity associated with a given surveillance approach.

3. Irrespective of the surveillance strategy selected, efficacy will be limited without an appropriate intervention to follow. The choice to cohort or isolate patients needs to be based upon considerations of institutional resources. Financial considerations will likely limit most institutions from implementing a Scandinavian-Dutch style “search and destroy” model, and with evidence of efficacy in a typical U.S. hospital inconclusive, it is not yet a recommended approach.
To enact meaningful reductions in MRSA burden, a comprehensive, strategic approach is required

Next, the Clinical Advisory Board’s perspectives on strategy design and deployment. With these key takeaways in mind, institutions may wish to consider a holistic view of their approach to infection prevention, with an eye toward promoting long-term gains.

**Key Takeaways**

1. Though MRSA has a high profile, institutions must not risk overlooking other potentially infective organisms. A solid baseline strategy, including hand hygiene, PPE use, and staff education is beneficial for reducing all pathogen transmission.

2. In order to most effectively apply surveillance strategies to individual units, hospitals may consider a strategic expansion, first to units where patients are likely to be high risk and therefore where the most benefit to the unit population lies. Once strategy is tested and staff buy-in is achieved, a further expansion throughout the hospital may occur if deemed appropriate.

3. Although not without difficulty, collaboration between hospitals to share patient MRSA (and other MDRO) status has demonstrated benefit in reducing exposure through a vastly improved response to affected patient populations. Where feasible, hospitals should consider a regional collaboration as a significant commitment to the reduction of MRSA and other potentially infective pathogens.
COLUMN IV

Promoting Long-Term Gains
**Practice #7**

**Automated Data Intelligence**

**Practice in Brief**

Automating an integration of disparate hospital IT systems generates an opportunity for concurrent understanding of patients in real-time, enhancing infection detection and management efforts. Expedited analysis bypasses laborious manual processes and enables clinicians to better target daily efforts, while unit-specific and longitudinal analyses of data help to unearth previously unidentifiable trends.

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**Clinical Advisory Board Grade**

*Maximum Rating: Five Stars*

- Potential for Sustainability ★★★★★
- Impact on Infection Reduction ★★★★★
- Ease of Implementation ★★★
- Practice Grade B+
Current manual data management results in frustration for already over-extended staff

Cumbersome data management is unfortunately a persistent theme throughout infection control. Unlike many other areas of medicine, in infection control the problem is too much data: ICPs spend an inordinate amount of time tracking information. According to a recent Premier survey, timely and efficient tracking of HAIs poses the greatest infection control challenge for many programs. The recent Clinical Advisory Board survey further quantifies that time sink, with surveillance efforts alone consuming greater than 50 percent of ICPs’ time.

### Not Enough Hours in the Day

#### A Frustrating Task

As you flip through, you look at admit date, culture date, result, then location, then physician…I would say that ICPs are exceptional sorters...You spend so much energy doing all of this, it’s amazing.

Former Infection Control Practitioner

300-Bed Hospital on the East Coast

#### Poor Investment of Talent

#### A Problem for Many

<table>
<thead>
<tr>
<th>Greatest HAI Challenge</th>
<th>Proportion of ICP Time Dedicated to Surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td>n&gt;790</td>
<td>n=423</td>
</tr>
<tr>
<td>Other</td>
<td>3.5%</td>
</tr>
<tr>
<td>State-Mandated Public Reporting</td>
<td>9.5%</td>
</tr>
<tr>
<td>Measuring Compliance with Hand Hygiene</td>
<td>21.1%</td>
</tr>
<tr>
<td>Control of Resistant Organisms (Active Surveillance and Related)</td>
<td>32.1%</td>
</tr>
<tr>
<td>Timely and Efficient Tracking of HAIs Across the Entire Hospital Population</td>
<td>33.8%</td>
</tr>
</tbody>
</table>

Time to intervention delayed by inefficient access to data and flawed process

Bearing this in mind, it comes as no surprise that many administrators are in dire need of a centralized resource combining disparate data elements to support real-time infection detection and management efforts. One proposed solution: automating surveillance of lab; pharmacy; and admissions, discharge, transfer (ADT) data. This offers two immediate benefits: first, expedited analysis shows clinicians where to target daily efforts, bypassing laborious manual processes; second, the depth of analysis presented helps unearth previously unidentifiable events.

Stuck in the Silos of Sorting

Feeling the Pressure

“The intensivists, the nurse manager, the CMO, the CNO would get really frustrated wanting to know, ‘What is the infection rate in this unit in the last month?’ and you’re thinking to yourself, ‘I don’t even know what it was the past six months’…”

Former Infection Control Practitioner
300-Bed Hospital on the West Coast

Source: Clinical Advisory Board interviews and analysis.
High-level dashboard presents concise summary for executive leadership

The executive dashboard shown below combines high-level and drill-down views to capture infection rate data for leadership review. It also helps efficiently isolate areas for greatest performance improvement.

**Concurrent Understanding**

*Executive Dashboard*

Source: The Advisory Board Company, Washington, DC.
Granular drill-downs detail infection rates by type, location, financial impact

Providers can follow a number of the hyperlinks from the executive dashboard to arrive at more granular data. A sample “Positive Culture Report” is shown in the screenshot below: it provides organism and specimen detail in addition to geographic location for individual patients. This is particularly helpful in situations where positive culture results necessitate isolation. The sample antibiogram, shown at the bottom of the page, provides continually updated antibiotic susceptibility data to improve appropriate antimicrobial selection.

Source: The Advisory Board Company, Washington, DC.
Automated system reduces run-around time with focus on problem solving

The greater purpose of automated tools is to improve clinical management with in-the-moment information. A former ICP outlined the radical difference in workflow between her original manual surveillance and her updated automated process. Rather than spending two to four hours per day manually creating reports, she was able to craft reports within 20 to 30 minutes—leaving her free to spend more time discussing the data and generating plans with the clinical team.

Significant Return on ICP Time

<table>
<thead>
<tr>
<th>Manual Surveillance Process</th>
<th>Automated Surveillance Process</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensivist</td>
<td>Intensivist</td>
</tr>
<tr>
<td>Pharmacist</td>
<td>Pharmacist</td>
</tr>
<tr>
<td>ID Doctor</td>
<td>ID Doctor</td>
</tr>
<tr>
<td>Infection Control Officer</td>
<td>Infection Control Officer</td>
</tr>
</tbody>
</table>

Daily Time Required

- 2–4 hours for manual report creation
- 45 minutes–1 hour 15 minutes for communication with providers
- 20–30 minutes for report creation
- 0–1 hour 30 minutes for communication

Case in Brief

- A 300-bed hospital in California
- Implemented an automated data intelligence solution to reduce surveillance-related ICP workload, elevate understanding of clinical data
- Technology enabled rapid response to emerging clostridium difficile outbreak

1 Pseudonym.

Source: Clinical Advisory Board interviews and analysis.

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Data intelligence facilitates efficient management of outbreak

Having efficient data management systems in place was especially helpful when Plato Hospital faced a clostridium difficile outbreak last January. A particularly mindful pharmacist noticed a trend in antibiotic prescriptions and immediately alerted the ICP, who investigated the matter using their surveillance system. Leveraging the power of control-charts, the ICP was able to identify the source of the outbreak, along with a need to make improvements in environmental stewardship. Fortunately, in this case, the c. difficile outbreak was quickly contained, protecting patients from additional unnecessary exposure. Ultimately, armed with data, the ICP was able to rapidly diagnose problems and direct process improvement efforts.

**Containing a Clostridium Difficile Outbreak**

![Diagram showing the containment of a clostridium difficile outbreak](image)

**Reducing Unnecessary Exposure**

“Real-time surveillance enables the ICP to identify an issue, rapidly intervene, and mitigate exposure to staff, patients, and visitors.”

Former Infection Control Practitioner
300-Bed Hospital on the West Coast

Source: Clinical Advisory Board interviews and analysis.
**Practice #8**

**Off-Protocol Physician Pilot**

**Practice in Brief**

Data-driven standardization of practice allows physicians who disagree with evidence-based medicine to conduct six-month trials benchmarking their performance against that of on-protocol peers. Basing individual practice decisions on physician-specific data ensures that clinicians are engaged in process improvement efforts and creates a culture of ownership over clinical outcomes, thus setting the stage for long-term success.

---

**Clinical Advisory Board Grade**

*Maximum Rating: Five Stars*

- Potential for Sustainability ★★★★★
- Impact on Infection Reduction ★★★★★
- Ease of Implementation ★★★

**Practice Grade** B
In order to sustain quality gains, physicians must own process improvement efforts

Data plays a key role not only in outbreak containment, but also in obtaining physician buy-in—and changing practice patterns. In light of individual practice preferences, McLeod Health developed a systematic way to ensure that the best ideas were leveraged across the facility. Each quarter, an infection control initiative is selected, and key personnel form a committee to review evidence for protocol development. However, if physicians disagree with a suggested protocol, they may continue with personal preference—with the understanding that after six months, their data will be benchmarked against that of on-protocol peers.

Garnering Physician Buy-In

Case in Brief

• A three-hospital system in South Carolina, one of five recipients of the AHA 2007 “Quest for Quality” award
• Unique approach to clinical effectiveness, quality initiated in 1998
• Established a physician off-protocol pilot to drive physician compliance with evidence-based guidelines

Initiative Selection

• One infection control project chosen per quarter
• Physician champion, executive champion, nurse performance improvement advisor convene committee

Planning Phase

• Committee reviews evidence, agrees upon protocol for department
• Physicians provided individual baseline data
• Best practice techniques encouraged, not enforced

Outcomes Evaluation

• After six months, performance data evaluated across all physicians, outliers identified
• Data fed back to outliers, provides impetus for practice change

Recipe for Long-Term Success

“What we found back 10 years ago was that physicians needed to own their own practices, and what did not work well for us were care maps, and care plans, and all those protocols that were created by the hospital and handed to the physicians. Because, even if it was the best thing in the world, they just weren’t going to buy that. We found over the years that if you let physicians solve their own problems in a collegial environment, you get better buy-in.”

Susan Pickle, RN, BSN
Assistant VP, Clinical Effectiveness, Quality and Safety
McLeod Health

Source: Clinical Advisory Board interviews and analysis.
Collaborative process elevates performance for timely antimicrobial discontinuation

In light of concerns about rising resistance rates, timely antimicrobial discontinuation was selected as an infection control improvement initiative at McLeod Health. Even after receiving individual performance data, a few orthopedic surgeons were reluctant to discontinue antibiotics at 24 hours. Rather than forcing their hands, McLeod allowed dissenting surgeons to continue with their individual practice patterns and scheduled a performance comparison after six months. When data revealed that these surgeons’ outcomes were no better than those who had discontinued antibiotics at 24 hours, the remaining outlier physicians switched practice on their own accord.

**Bringing Laggards on Board**

- Antimicrobial discontinuation selected as systemwide focus
- Priority announced to all physicians

- Individual physician discontinuation, outcomes data evaluated
- Feedback, suggested practice shared in one-on-one meeting

- Surgeons shown that outcomes not compromised with 24-hour discontinuation
- Increased cost, resistance data shared with skeptical surgeons
- Outlier surgeons switched practice on own accord

**Impressive Results Within One Year**

24-Hour Antimicrobial Discontinuation

<table>
<thead>
<tr>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50%</td>
<td>&gt;95%</td>
</tr>
</tbody>
</table>

Source: Clinical Advisory Board interviews and analysis.
Practice #9

Real-Time Accountability Enforcer

Practice in Brief
Staff members who are found non-compliant with hospital policies for hand hygiene are issued an on-the-spot violation ticket. Involving the human resources department and leveraging a pre-existing disciplinary structure presents a consistent message for failure to comply with performance expectations.

Clinical Advisory Board Grade

Maximum Rating: Five Stars

- Potential for Sustainability ★★★★★
- Impact on Infections ★★★★
- Ease of Implementation ★★★★
- Practice Grade A
As accountability measures are selected, downstream implications should be anticipated

Certainly, bringing staff fully on board with performance improvements is no easy task—and, unfortunately, at times administrators will find themselves in the position of having to take a strong stance. Implementing a disciplinary process requires a balancing act between the benefits and ramifications of proposed campaigns. A well-designed program will need to take into account the considerations detailed in the chart below.

### Targeting Disciplinary Efforts

#### Contenders for Accountability

- Justification for device insertion
- Timely device removal
- Bundle compliance
- Required education
- Hand hygiene
- Environmental cleanliness
- Equipment sterility
- Initiation, discontinuation of surgical prophylaxis

#### Action and Reaction

- What is the required financial, time investment?
- Who will shoulder the responsibility of program initiation?
- Who will own compliance monitoring?
- What is the appropriate consequence?
- Is pushback likely? From which staff members?

Source: Clinical Advisory Board interviews and analysis.
Administrators should not shy away from taking a stronger stance to achieve compliance

When thinking through areas that can be improved through checks and balances, the primary focus should be on initiatives generating global impact. Certainly, it is hard to envision an initiative with more far reaching impact than those designed to elevate hand hygiene compliance—or, a more appropriate candidate for disciplinary enforcement. Many of the strategies leveraged to elevate hand hygiene compliance have been “warm and fuzzy” in nature and, truthfully, have not offered much in terms of return. Moving from left to right on the “severity spectrum” below are three ideas to bolster compliance. Harkening back to the nation’s 50 percent average compliance, it is clear that these institutions’ strong stances have achieved truly impressive gains.

**Going for Global Impact**

**Spectrum of Strategies in Hand Hygiene**

<table>
<thead>
<tr>
<th>Tactic in Brief</th>
<th>Case Study</th>
<th>Results</th>
</tr>
</thead>
</table>
| **Employee Contract** | • North Shore-Long Island Jewish Health System, a 12-hospital system in Long Island, NY  
• Supported institutional commitment to hand hygiene with new safety contract  
• Active ingredient: formalization of compliance expectations for all employees | Recent implementation of contract (2007), impact on compliance yet to be determined |
| **Screen Saver Reminder** | • Cedars-Sinai Medical Center, an 875-bed hospital in Los Angeles, CA  
• In response to suboptimal performance, set target compliance of 90%  
• Active ingredient: shock value of graphic keeps hand hygiene top of mind |  

**Hand Hygiene Compliance**

<table>
<thead>
<tr>
<th>All Health Care Workers</th>
<th>Physicians</th>
</tr>
</thead>
<tbody>
<tr>
<td>65% 92%</td>
<td>49% 88%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/04 12/05–2/06</td>
<td>9/04 12/05–2/06</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hand Hygiene Compliance, 2005</th>
</tr>
</thead>
<tbody>
<tr>
<td>71% 87% 88% 97% 100%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>8/05 9/05 10/05 11/05 12/05</th>
</tr>
</thead>
</table>

Non-compliant staff taken to task through ticketing system that climbs existing disciplinary ladder

Moses Cone Health System has implemented a unique ticketing system to put the power of Human Resources behind their commitment to hand hygiene. The consequences of each violation are worked into the pre-existing disciplinary structure, keeping the institutional disciplinary message consistent. As level advancement creates increasingly severe consequences with movement up the ladder, the relationship between tickets and level advancement is not necessarily one-to-one, especially at the higher end of the spectrum. Regardless, the impact of these tickets on staff behavior is clear: to date, there have been no repeat offenders at Moses Cone.

**A Range of Consequences**

**Case in Brief**

- A 1,122-bed facility in Greensboro, NC
- Instituted ticketing system for failure to comply with hand hygiene requirements
- Nine tickets issued across multiple units and roles, no repeat offenders to date

Issued tickets result in incremental elevation through disciplinary structure

Source: Moses Cone Health System, Greensboro, NC; Clinical Advisory Board interviews and analysis.
Hardwiring accountability translates to positive impact on compliance, MRSA reduction

This systemwide dedication to holding staff accountable has truly paid off. Not only has the institution realized a dramatic increase in hand hygiene compliance, but they have also observed a concurrent 50 percent reduction in MRSA infection—particularly remarkable, given their low baseline rate. Moses Cone serves as an inspirational ending note for this publication—an example of the gains achievable when an institution commits to the journey to zero.

**Well Worth Your While**

<table>
<thead>
<tr>
<th>Hand Hygiene Compliance</th>
<th>MRSA Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-Intervention</td>
<td>Post-Intervention</td>
</tr>
<tr>
<td>50%</td>
<td>0.49</td>
</tr>
<tr>
<td>&gt;95%</td>
<td>0.20</td>
</tr>
</tbody>
</table>

**Time to Get Tough**

“Look, we need to be doing this here. Because for the last 15 years, we have been pleading, and cajoling, and educating, and telling everyone—and our rates were about 50 percent...we went to the Medical Executive Committee. We said, ‘These are the policies on our books, these are the standards we expect of our employees and our physicians, yet there are no consequences when they don’t do it. Let’s implement the ticket system.’...we went live in August. It took us months of education to tell people that we were serious, but our hand hygiene adherence now is close to 100 percent. We’ve only had to give a few tickets, no-one has gotten more than one, and MRSA rates are half of what they were before.”

Ward Robinson, MD
Chief of Infection Prevention
Moses Cone Health System

Source: Clinical Advisory Board interviews and analysis.
Coda
Creating a Culture of Quality
Four key themes surface as primers for institutional success

There is clearly much to be gained from emulating the strategies of successful organizations such as Moses Cone. At this juncture, it seems appropriate to take a step back and examine consistent themes that resonated across successful institutions. The first critical mandate—empower frontline staff. UMass Memorial Medical Center has made frontline staff empowerment one of their core strategies in monitoring compliance with recommended practices to good effect. The second mandate—make the right choice the easy choice. At Swedish Medical Center, leaders made memory recall easier by developing tools to reinforce prior training.

Lesson #1: Empower Frontline Staff

**Case in Brief**

- A 751-bed hospital in Worcester, MA
- Selected CRBSI as a top institutional priority
- Empowered nurses to stop procedures when physicians not compliant with recommended practices

<table>
<thead>
<tr>
<th>CRBSI Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-</td>
</tr>
<tr>
<td>Post-</td>
</tr>
<tr>
<td>6.4</td>
</tr>
<tr>
<td>3</td>
</tr>
</tbody>
</table>


Lesson #2: Make the Right Choice the Easy Choice

**Case in Brief**

- A 703-bed hospital in Seattle, WA
- Selected VAP as a top institutional priority
- Placed tools in highly accessible locations to provide real-time guidance

<table>
<thead>
<tr>
<th>VAP Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pre-</td>
</tr>
<tr>
<td>Post-</td>
</tr>
<tr>
<td>26</td>
</tr>
<tr>
<td>6</td>
</tr>
</tbody>
</table>

Success hinges on understanding process vulnerabilities and securing executive backing

Though the first two key lessons will certainly bolster performance, creating a culture of quality rests on learning from experience. Thus, the third key mandate—learn from close calls. In recognition of the opportunity to learn from errors, Detroit Medical Center developed a database to capture episodes that could have resulted in adverse events. The final mandate in crafting a sustainable program—garner executive attention. Leading institutions such as North Shore-Long Island Jewish ensure top-level support for program advancement by aligning the quality agenda with executive performance goals.

**Commitment to Zero**

**Lesson #3: Learn from Close Calls**

- **Case in Brief**
  - A 2,095-bed hospital in Detroit, MI
  - Developed near-miss error database to track opportunities for process improvement

- **Database accessible at all workstations across hospital**
- **Promise of nonpunitive action promotes staff reporting without fear of repercussion**
- **Entries trigger report to department representative, quality department performs trended analysis**

**Lesson #4: Garner Executive Attention**

- **Case in Brief**
  - A 958-bed hospital in Long Island, NY
  - Elevated visibility of infection control to executives through data feedback, financial incentives

- **Dashboards displaying trended infection rates by type, location shared with executives**
- **Data promotes discussion with leadership, increases executive understanding of hospital performance**
- **Executive Bonus**
  - Portion of bonus tied to hospital hand hygiene compliance score

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### Sizing the Burden

1. Do you understand the true impact of Present on Admission?  
2. Are you well attuned to your most pressing infection burdens, in terms of cost and LOS?  
3. Do you have a method to regularly evaluate infection-related financial impact and react swiftly?  
4. Have you had any recent outbreaks of MDROs?  
5. Do you have a concerning rate of transmissible infections?  
6. Have you clearly defined your pathogen burdens and infection priorities?  
7. Are central line infections a significant burden at your institution?  
8. Is the national median rate for VAP, CLAB considered your institutional target for success?

### Elevating Frontline Awareness

9. Have you established hand hygiene as an institutional priority?  
10. Do you have high infection rates despite addressing hand hygiene performance?  
11. Are comprehensive protocols in place to accurately measure hand hygiene?  
12. Does your institution have the capability to effectively measure and analyze hand hygiene compliance?  
13. Do you have a high rate of infection in rooms previously occupied by patients with a MDRO?  
14. Has the efficacy of environmental services cleanliness been assessed?  
15. Has environmental services’ importance to infection prevention been recognized?  
16. Have you established baseline standards of competency for central line insertions?  
17. Do a significant number of your physicians avoid participation in infection-related educational initiatives?  
18. Are central line practices standardized, well known, and periodically assessed by staff?  
19. Are residents a significant proportion of your physician population?  
20. Do residents largely develop central line skills variably on a case-by-case basis?  
21. Are nurses empowered to stop physicians not compliant with recommended central line practices?

### Minimizing Pathogen Opportunity

22. Do you have a large number of clinical personnel inserting central lines?  
23. Are catheter-associated UTIs a significant problem at your institution?  
24. Is there a system in place to monitor and track all inserted Foley catheters?  
25. Are any surgical units facing concerning spikes or overall rates?  
26. Is there a system in place to ensure consistent and timely, pre-surgical antibiotic administration?  
27. Has antimicrobial discontinuation been monitored across your surgeon population?
## “Red Flags”

### Examining MRSA Strategy
- #28 Are you aware of surrounding community pathogens that exert pressure on your institution?  
- #29 Do you have a significant MRSA infection rate?  
- #30 Have you fully assessed the clinical impact of MRSA infections in your institution?  
- #31 Have you created a business case to examine potential cost savings of MRSA surveillance?  
- #32 Are you certain your institution is identifying all incoming patients with MRSA?  
- #33 Have you determined the most appropriate MRSA surveillance method for your institution?  
- #34 Does your institution have an appropriate response to prevent MRSA transmission to uncolonized patients?  
- #35 Do you have a system in place to rapidly identify previously known MDRO colonized patients?  
- #36 Can you more effectively use existing electronic systems to prompt physicians to isolate known MDRO carriers?  
- #37 Is your community seeing a significant rise in MDROs across multiple institutions?  
- #38 Have you collaborated with geographically proximal institutions to identify all known MDRO carriers on admission?

### Promoting Long-Term Gains
- #39 Do your physicians lead collaborations on strategies to improve infection rates?  
- #40 Does your institution provide opportunity for real-time analysis of infection causes?  
- #41 Do you have regular infection-themed meetings to highlight root causes of infections?  
- #42 Does your nursing staff have a voice in infection control initiatives across all units?  
- #43 Is surveillance highly time consuming for your ICPs?  
- #44 Are surveillance methods largely paper based and dependent on multiple ICP “shufflings”?  
- #45 Is your ICP-to-bed ratio lower than the recommended national ratio?  
- #46 Is infection control staff implementing proactive strategies to prevent infections?  
- #47 Can you quickly mine data to identify infection trends?  
- #48 Does your staff recognize hand hygiene as an essential infection control strategy?  
- #49 Has your institution embedded accountability in infection control initiatives?  
- #50 Are accountability measures for infection-related violations significant enough to change staff behavior?
# Contract for Hand Hygiene

## Criteria-Based Competency Assessment & Guideline for Hand Hygiene

<table>
<thead>
<tr>
<th>Employee Name:</th>
<th>Job Title:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Unit:</td>
<td>Department:</td>
</tr>
</tbody>
</table>

**Competency Statement:** Complies with hand hygiene guideline.

**Reason(s) for Assessment:**
- ✓ Risk- volume
- □ Age related
- □ Patient satisfaction
- □ Learner’s needs
- □ New scope of practice
- □ Risk- volume
- ✓ Regulatory
- ✓ Infection control
- □ Policy change
- □ Professional development
- □ Risk- volume
- ✓ Safety
- ✓ Quality related
- □ Performance issue
- □ New Equipment
- □ Others:

**Recommended Validation Methods:**
- ✓ Direct observation of actual behaviors in work environment
- ✓ Direct observation in simulated laboratory
- ✓ Indirect observation through superiors, peer reports, document reviews
- ✓ Documented results of test: oral or written

**Skill Set:**
- ✓ Critical Thinking
- ✓ Technical Skills
- □ Interpersonal Skills

**Reference(s):**
- ✓ Infection Control Policy & Procedure Manual
- □ Professional Organization’s Standards Manual
- □ Medical Records
- ✓ Regulatory Agency Guidelines
- □ Others:

### Commitment to Patient Safety through Compliance with Hand Hygiene Protocol

1. I am dedicated to patient safety.
2. I will adhere to established infection control protocol on hand hygiene.
3. I will perform hand hygiene with soap and water when my hands are visibly soiled.
4. I will perform hand hygiene with soap and water, or with alcohol-based hand sanitizer, as indicated in the following situations:
   - Before and after each physical contact with patient;
   - After contact with blood, bodily fluids, mucous membranes, secretions, and non intact skin even if gloves are worn;
   - After eating, coughing, sneezing, or using the bathroom;
   - Before and after wearing gloves;
   - After contact with an object that is potentially contaminated;
   - Before and after handling food.
5. If I have direct patient contacts, I will adhere to the following:
   - I will maintain natural nails.
   - I will maintain short nails of not more than ¼” beyond fingertips.

**Signature:** ___________________________________________  **Date:** __________________

Source: North Shore-Long Island Jewish Health System, Manhasset, NY.
Behavioral Criteria Assessment

<table>
<thead>
<tr>
<th>Behavioral Criteria</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Proper hand hygiene with soap and water is demonstrated as follows:</td>
<td>Met</td>
</tr>
<tr>
<td>1. Turns on water, adjusts temperature.</td>
<td></td>
</tr>
<tr>
<td>2. Wets hands and wrists before applying soap.</td>
<td></td>
</tr>
<tr>
<td>3. Keeps hands downward so water will run into sink and not down the arms.</td>
<td></td>
</tr>
<tr>
<td>4. Applies soap and scrubs vigorously on hands, all fingers, and wrists surfaces for 15 seconds.</td>
<td></td>
</tr>
<tr>
<td>5. Rinses thoroughly under running water while keeping hands in a downward position.</td>
<td></td>
</tr>
<tr>
<td>6. Dries hands with paper towel, discards paper towel after use.</td>
<td></td>
</tr>
<tr>
<td>7. If using sink with hand controls, turns off faucet using a clean paper towel.</td>
<td></td>
</tr>
<tr>
<td>8. Discards used paper towel.</td>
<td></td>
</tr>
<tr>
<td>B. Proper hand hygiene with alcohol-based hand sanitizer is demonstrated as follows:</td>
<td></td>
</tr>
<tr>
<td>1. Applies the sanitizer to the palm of one hand and rubs hands together.</td>
<td></td>
</tr>
<tr>
<td>2. Covers all surfaces of the hands and fingers with sanitizer.</td>
<td></td>
</tr>
<tr>
<td>3. Rubs hands until dry.</td>
<td></td>
</tr>
</tbody>
</table>

*Complete below for behavioral criterion assessed as “Not Met”*

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Corrective Action(s)</th>
<th>Target Date For Completion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Employee Signature:_________________________________________ Date: __________________

Reviewer’s Name (manager or his/her designee): ____________________________  (Print name)

Reviewer’s signature:_________________________________________ Date: __________________
1 Report explanations

1.1 Graphical displays

Four graphs and a table are presented for each unit. They are:

1. Hand Hygiene/patient bed day for Soap for the unit for the entire time period the unit has been reporting data.
2. Hand Hygiene/patient bed day for Sanitizer for the unit for the entire time period the unit has been reporting data.
3. Total Hand Hygiene/patient bed day for Soap and Sanitizer for the unit for the entire time period the unit has been reporting data.
4. Hand Hygiene/patient bed day (Bar Graph) for Soap, Sanitizer and Soap + Sanitizer for the entire time period the unit has been reporting data.
5. A table for Hand Hygiene/patient bed day (or patient visit in the case of ER-OP or CLINIC) with columns for soap, sanitizer, combined soap and sanitizer usage and percent compliance.

The Vertical axis in each graph displays Hand Hygiene/patient bed day. For units that are classified as either ICU, NON-ICU or PEDIATRICS the events are calculated for each patient bed day. If the unit is classified as an ER-OP or CLINIC then it is displayed as per patient visit.

The Horizontal axis in each graph displays the time period. The baseline is represented by time period “0” and each subsequent intervention period is numbered starting from “1.”

1.2 How Comparisons Are Made

Comparative Benchmark

Where sufficient data is available Graphs 1, 2 and 3 also display comparative benchmarks. These benchmarks are drawn at the average over all comparable units and at the 10th and 90th percentiles.

The comparisons are made against similar unit types and hospitals with similar numbers of beds. Specifically there are five unit types: CLINIC, ER-OP, ICU, NON-ICU and PEDIATRICS. Bed sizes are placed into one of the four categories: “0–100,” “101–300,” “301–500,” “500+.” This cross-classification generates 20 different possible reference groups for the benchmarks. Currently until sufficient data has been collected these benchmarks are only available for the ICU and NON-ICU categories.

Benchmarking

The benchmarks are calculated using data from every hospital and unit in the program. The methodology used for the benchmarking is a linear regression model, and the percentile benchmarks are drawn from the same model, using prediction intervals calculated at the 10th and 90th percentiles.
2.3 Unit: A. Hygiene method: Soap + San Combined

A Soap + San Combined
(Beds: 101–300, Category: NON-ICU)

Intervention Period (Baseline = Period 0)
Data Current to March 2006

Hand Hygiene Observation Audit

2007–Handwashing Monitor
LSUHSC-Earl K. Long Medical Center

<table>
<thead>
<tr>
<th>Date</th>
<th>Unit</th>
<th>Staff</th>
<th>Status</th>
<th>ALCOHOL-BASED HAND WASH</th>
<th>STEPS</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Prior to patient contact
2. Apply to the palm of one hand
3. Rub hands together till hands are dry
4. After patient contact

<table>
<thead>
<tr>
<th>WATER-BASED HAND WASH</th>
<th>STEPS</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Turn on faucet
2. Hands are angled downwards under the faucet
3. Hands are always kept below elbow level
4. Use warm water
5. Apply liquid soap on hands
6. Work up generous lather
7. Scrub vigorously
8. Wash time 15 seconds or more
9. Clean around knuckle
10. Clean along side of fingers
11. Clean along sides of hands
12. Rinse hands completely
13. Pat dry hands with a paper towel
14. Turn off faucets with a dry paper towel

STAFF STATUS KEY
R = RN
L = LPN
A = Aide
M = MD
LT = Lab Tech
XT = X-ray Tech
O = Others (explain)

Nail enhancement
Chipped nail polish
Short nails, not > one fourth of an inch

Number of times observed: 1 2 3 4 Number of times correct: 0 1 2 3 4

Source: Earl K. Long Medical Center, Baton Rouge, LA.
Hand Hygiene Violation Ticket

Hand Hygiene Failure Notification

Date of Occurrence

Occurrence Location (unit/department):

Employee Name:

Employee Signature:

Failure Before / After (circle) touching patient or environment

Name of Trained Observer:

Source: Moses Cone Health System, Greensboro, NC.
Prompts for Catheter Care

Catheter-Related Blood Stream Infection
Care Team Checklist

Purpose: To work as a team to decrease patient harm from catheter-related blood stream infections
When: During all central venous or central arterial line insertions or re-wires
By whom: Bedside nurse

1. Today’s Date

2. Procedure:

3. Is the procedure:

4. Before the procedure, did the housestaff:
   - Wash hands (chlorhexidine or soap) immediately prior
   - Sterilize procedure site
   - Drape entire patient in a sterile fashion

   During the procedure, did the housestaff:
   - Use sterile gloves
   - Use hat, mask, and sterile gown
   - Maintain a sterile field
   - Did all personnel assisting with procedure follow the above precautions

   After the procedure:
   - Was a sterile dressing applied to the site

Please return completed form to the designed location in your ICU.

PICC Line Flush

1. All PICC lines at SRMC should be flushed every 8 hours and after each use with 10ml of NS, using the following pulsatile (push-pause) technique.

2. Prior to flush cleanse hub vigorously with alcohol wipe.

3. Attach 10ml syringe filled with NS into injection cap. Inject NS using the pulsatile (push-pause) technique.

4. The technique for flushing should be pulsatile (push-pause) technique to remove residue and fibrin buildup.

5. Never force a flush. Some natural resistance should be felt because of the length of the catheter.

**Note:** Flush only with 10ml syringe or larger to prevent rupture/fracture of the PICC or midline.

<table>
<thead>
<tr>
<th>Type of IV Device</th>
<th>Pre-Use</th>
<th>Post-Use</th>
<th>Minimum Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>All PICCs and MIDLINES</td>
<td>10ml Saline</td>
<td>10ml Saline</td>
<td>10ml Saline every 8 hr and PRN For flushing each lumen whenever the lumen is locked (with no IV currently infusing)</td>
</tr>
<tr>
<td>Power PICCs dual &amp; triple lumen</td>
<td>10ml Saline</td>
<td>20ml saline flush: post TPN or anytime there is blood in tubing</td>
<td></td>
</tr>
<tr>
<td>Groshong PICCs single &amp; dual lumen</td>
<td>10ml Saline</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Labs</td>
<td><strong>Flush with 20ml saline</strong></td>
<td></td>
<td>Follow this protocol for Midlines and all PICCs regardless of the reason for blood reflux, e.g., lab draw, blood return verification, inadvertent reflux, etc.</td>
</tr>
</tbody>
</table>

Developed and distributed by Sutter Roseville Infusion Therapy Services

Source: Sutter Roseville Medical Center, Roseville, CA.
PROMPTS FOR FOLEY CARE

**Urinary Catheter Indication Sheet (UCIS)**

<table>
<thead>
<tr>
<th>Patient Identifier:</th>
<th>Age:</th>
<th>Gender: M / F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Admit Date:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service:</td>
<td>Diagnosis:</td>
<td></td>
</tr>
<tr>
<td>Catheter Insert Date:</td>
<td>Catheter Insert Unit:</td>
<td></td>
</tr>
</tbody>
</table>

**Appropriate Indications**

1. Obstruction of the Urinary tract distal to the bladder
2. Alteration in the blood pressure or volume status requiring continuous, accurate urine volume measurement
3. A need to measure urine output accurately in an uncooperative patient (e.g. Intoxication, Altered mental status)
4. Preoperative catheter insertion for patient going directly to the operating room
5. Continuous bladder irrigation for Urinary Tract Hemorrhage
6. Urinary Incontinence posing a risk to the patient (e.g. major skin breakdown or protection of nearby operative site)
7. Palliative care for the terminally ill
8. To permit urinary drainage in neurogenic bladder and urinary retention
9. Morbid obese patient (400- 800 lbs), if patient cannot ambulate and is bed bound to help with hospital care during acute illness.
10. Patients request during hospital admission if a safety risk present (e.g. unsteady gait or transfer issue,) Incontinence, diapering or timed voiding causing undue emotional stress, Painful voiding, use of paralytic agents
11. Continuous Lumbar Epidural Anesthesia
12. Inability to perform self-catheterization or intermittent catheterization
13. Congenital urological abnormalities
14. Patient managed with a chronic Foley catheter prior to admission

**Inappropriate Use of Catheters:**

1. Nursing convenience
2. Continuing the use of the catheter when no longer needed
3. Use of the catheter for reasons not defined as appropriate as above.
4. Urinary incontinence with no skin breakdown
5. No clear reason for placement of urinary catheter
6. No order from physician for urinary catheter placement
7. Neurogenic bladder when self intermittent catheterization possible

*IF YOUR REASON FOR URINARY CATHETER IS NOT LISTED IN THE APPROPRIATE INDICATIONS, PATIENT MAY NOT NEED A URINARY CATHETER. PLEASE RECONSIDER YOUR DECISION. IF YOU STILL THINK HE OR SHE NEEDS A URINARY CATHETER PLEASE STATE THE REASON BELOW:*

After reading the criteria for appropriate use of urinary catheters:

I will not order a urinary catheter: **YES/NO**
I would like to use the indication sheet routinely: **YES/NO**

Source: Sparrow Health System, Lansing, MI.
ICU Foley Catheter Decision-Making Algorithm

Patient admitted to ICU

- Is there an order?
  - Yes: Nurse obtains appropriate order.
  - No: No order obtained.

- Does the patient meet criteria for Foley catheter use?
  - Yes: Foley catheter is inserted by nurse.
  - No: Patient is reevaluated daily using criteria for use.

- Does the patient have a Foley catheter?
  - Yes: Foley catheter in place. Patient is reevaluated daily using criteria for use.
  - No: D/C order is obtained.

- Does patient meet criteria for Foley catheter use?
  - Yes: Physician is contacted for D/C order. Foley catheter is removed. Appropriate toileting and skin protection precautions initiated.
  - No: D/C order is obtained.

- Is there an order?
  - Yes: Nurse obtains appropriate order.
  - No: No order obtained.

Source: Morristown Memorial Hospital, Morristown, NJ.
TOOLS FOR APPROPRIATE ANTIBiotic PROPHYLAXIS

**SURGERY**

<table>
<thead>
<tr>
<th>Type of Surgery</th>
<th>If No Penicillin Allergy</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>cefazolin or cefoxitin</td>
<td>If anaphylaxis to penicillin or Cephalosporin or documented high risk for resistant organism</td>
</tr>
<tr>
<td></td>
<td>1 gm (&lt;70Kg) 2 gm (≥70 Kg) IV</td>
<td></td>
</tr>
</tbody>
</table>

- **Colecotomy/rectal resection**
  - Appendectomy Non-perforated
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: clindamycin IV 600 mg PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

- **Biliary Tract and Pancreas/ Gastro duodenal/small intestine**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: vancomycin IV 1 gm IVPB PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

- **Breast; Hernia**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: vancomycin IV 1 gm OR clindamycin IV 600 mg

- **Orthopedic**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: vancomycin IV 1 gm OR clindamycin IV 600 mg

- **Head/neck procedures Neurosurgery; Kidney transplant**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: clindamycin IV 600 mg PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

- **Hysterectomy**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: vancomycin IV 1 gm IVPB PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

- **Urologic**
  - If No Penicillin Allergy: levofloxacin 500 mg PO OR IV
  - Alternative: vancomycin IV 1 gm IVPB PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

- **Urologic Robotic Procedure (radical prostatectomy)**
  - If No Penicillin Allergy: cefazolin IV give 1 gm if wt < 70 Kg or 2 gm if wt ≥ 70 Kg
  - Alternative: vancomycin IV 1 gm IVPB PLUS gentamicin IV 80 mg if pt wt < 70 K or 120 mg ≥ 70 K

**DVT PROPHYLAXIS:** (select chemical prophylaxis based on patient existing co-morbidities)
- Enoxaparin 40 mg subcutaneous x1 in Pre op Holding Unit. Hold for patients receiving epidural catheter
- Unfractionated Heparin 5000 units subcutaneous x1 in Pre op Holding Unit.
- Pneumatic compression device (if not lower extremity vascular procedure) in cases >30 minutes of general anesthesia

**HAIR REMOVAL:** ❌ Clip or ❌ None OTHER: ❌ Confirm Advanced Directives

PRE OPERATIVE MEDICATIONS: ______________________________________________________________________

________________________________________________________________________________________________________

_________________________________________________________________________________

________________________________________________________________________________

Allergies: _____________________________________________________________________________________________

_________________________________________________________________________________

_________________________________________________________________________________

Patient states none ❌

**PRE OPERATIVE ORDERS** include IV fluids, selected medications and laboratory tests including Type and Screen will be ordered according to Baystate Medical Center Preadmission Evaluation Guidelines. No additional laboratory requests are necessary.

**SPECIAL LABORATORY TESTS PER MD REQUEST:**

Physician signature: ____________________________________________________________ Date: _____________________

H&P Dictated by________________ Date: ______ Where sent: ___________________

FAX COMPLETED AND SIGNED FORM TO PAE (413) 794 1856 OR (413) 794 4875

Source: Baystate Medical Center, Springfield, MA.
Division of Healthcare Quality

June, 2006

Dear Doctor __________________:

Healthcare Quality at Baystate Health System is a top priority for our patients and for our organization. Since May 2002, we have been participating in a number of national projects to improve the quality of care provided to patients admitted to BMC for surgical procedures.

Two of the quality measures we monitor are prophylactic antibiotic selection and duration. Our goal is to achieve 100% compliance with appropriate selection (based on the latest recommendation to prevent surgical infections from national organizations and local experts) and short duration (stopping antibiotic within 24 hours of end time). It has been shown that prophylactic antibiotic use greater than 24 hours conveys no advantage than short term antibiotic (<24 hours) to decrease the rate of post operative surgical infections, and in some case will contribute to increases in development of resistant organisms. Since 2002, BMC has been working on correct selection and stopping antibiotic dosing within 24 hours of surgery end time. Currently, our rate is at the state average for selection and less than the state average for duration for Massachusetts teaching hospitals.

Recently, you and your colleagues cared for __________________ at BMC (___/___/200_), whose chart was flagged as having the:

- incorrect antibiotic selection based on document in the medical record
- duration of prophylactic antibiotics > 24 hours of surgery end time

We want to call your attention to this recent hospitalization to emphasize the current quality improvement measures we are tracking for some of your patients. If you believe there was an error in this determination, please contact Jan Fitzgerald, MS, RN at 794-2531 or Gina Trelease, MEd, RN at 794-2432. Attached to this letter is a list of quality measures we are tracking that may involve your patients.

Thank you for participating in the quality improvement process. Please let us know how we can help you to provide the highest quality care to your patients admitted to BMC.

Source: Baystate Medical Center, Springfield, MA.
Citations


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