Win Big
With Hospital-Acquired Infection Rate Reduction

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115: General Session
Thursday, January 26
Improvement in Patient Safety

* National goal for more than a decade
  * High cost of care
  * Low quality

* Agency for Health Care Research & Quality finds
  * Little progress on quality of care
  * Declining patient safety
Story of Success on Hospital-Acquired Infections (HAI)

* Catheter-Associated Urinary Tract Infections (CAUTI)

* Central Line-Associated Blood Stream Infections (CLABSI)

* Ventilator-Associated Pneumonia (VAP)
There are about 1.7 million HAIs reported annually

- HAI are the 5th leading cause of death in U.S. hospitals
  * ~100,000 deaths/year

- Treatment costs $17- $20 billion annually
  * Much of which is not reimbursed
VAP is leading cause of death among patients who acquire HAI (IHI,)

46% of patients who acquire VAP die in the hospital

Compared with 32% of ventilated patients who do not acquire VAP
If best practices in infection control were applied to all U.S. hospitals, reduction in

* CLABSI could save 5,520-20,239 lives annually
* VAP could save 13,667-19,782 lives annually
"Hospitals make impressive progress in driving down certain infections in critical care units through implementing CDC prevention strategies"  CDC Director Thomas Frieden, MD, MPH, 10/19/2011

* 33% reduction in CLABSI since 2008 &
* 7% reduction in CAUTI

CLABSI in critical care units.
CAUTI throughout hospital.
Why Have HAI Improved?
Follow Donabedian’s QI Model

Structure  Process  Outcomes
Structural Factors

1. National policy influence
2. National dissemination of best practices
3. Patient populations
4. Nursing workforce characteristics
National Policy Initiatives

National Dissemination of EBP
Change in Patient Populations
Nursing Workforce Characteristics
Leadership of CDC’s NHSN

* National Healthcare Safety Network (NHSN)
  * Established 2005—Integration of CDC surveillance activities
  * NHSN standardized definitions of hospital acquired infection and methods of data collection
  * Develop and disseminate prevention bundles
  * Encouraged mandated public reporting
October 2008—Centers for Medicare & Medicaid Services (CMS) no longer reimbursed hospitals for certain preventable hospital-acquired conditions

* Including HAI
Krein et al. (2011) found that the majority of non-federal hospitals reported moderate or large increases in the priority of prevention activities for HAI:

- 58% reported increase in preventing CLABSI
- 54% reported increase in preventing VAP
- 65% reported increase in preventing CAUTI
National Policy Initiatives
National Dissemination of EBP
Change in Patient Populations
Nursing Workforce Characteristics
Most, but not all, HAI preventable with evidence-based practices (Umscheid, 2011)

- 65%-70% of CLABSIs preventable
- 55% of VAP preventable
Nurses Have Critical Role in HAI Prevention

* Responsibility for performing procedures that can result in infection, e.g.
  * Insertion and removal of urinary catheters
  * Observation and maintenance of central lines
  * Observation and maintenance of ventilators
CAUTI Prevention

* Avoid unnecessary urinary catheters
* Insert catheters using aseptic technique
* Maintain catheters based on recommended guidelines
* Review catheter necessity daily against criteria
CLABSI Prevention

- Hand hygiene
- Maximal barrier precautions upon insertion
- Chlorhexidine skin antisepsis
- Optimal catheter site selection
  - Avoidance of femoral vein
- Daily review of line necessity with prompt removal of unnecessary lines
VAP Prevention

- Elevation of the head of the bed
- Daily “sedation vacations” and assessment of readiness to extubate
- Peptic ulcer disease prophylaxis
- Deep venous thrombosis prophylaxis
- Daily oral care with chlorhexidine
Recent upsurge in efforts to prevent HAIs (Flanagan, 2011)

* Education to increase awareness
  * Infection control professionals, CDC, IHI

* Systems redesign

* Hospitals reported:
  * Hand hygiene most frequent initiative
  * Most frequent challenge—sustaining behavioral change
Awards given by Department of Health & Human Services and Critical Care Societies Collaborative

2011 Awardees

* Mercy Hospital, Coon Rapids MI
* Children’s Hospital and Clinics of Minnesota, Minneapolis/St. Paul
* St. Joseph Mercy Hospital, Ann Arbor, MI
* Riverside Methodist Hospital, Columbus, OH
What Did They Think Worked?

* **Attitude Change**
  * “We get angry when we’re not at 0. It energizes us.”

* **Multidisciplinary Teams**
  * Generally chaired by staff nurses
  * Unit-based Patient Champions

* **Regular Team Meetings:**
  * Sometimes daily
  * Huddle boards where staff ask “why did that infection occur and what can we do to prevent this in the future?”
What Were Their Obstacles?

* Long journey to change culture
  * One winner said nearly a decade

* Hard to keep “eye on ball”

* For VAP—culture change needed to adopt light sedation
  * High sedation patients have more PSTD than light sedation patients

* Physicians who don’t buy into prevention bundles—“cookbook medicine”
What Is Their Advice?

* Talk it up!

* Find champion to promote change who is really excited about it

* Post signs in break rooms—how many days since the last HAI

* Responsibility has to be with bedside nurse
**Medical Center of the Rockies, Loveland, CO**
- Saturated education strategy

**Cook Children’s Medical Center, Ft. Worth, TX**
- Real-time feedback on infection-free days
- Hired 2 RNs dedicated to line insertion and dressing changes
National Policy Initiatives
National Dissemination of EBP
Change in Patient Populations
Nursing Workforce Characteristics
Patient Populations

* Hospitalized patients now more acutely ill

* APACHE scores & nursing acuity scores not related to HAI in multivariate models (Cho et al., 2003))

* Patient acuity is related to use of devices that may lead to HAI
National Policy Initiatives
National Dissemination of EBP
Change in Patient Populations
Nursing Workforce Characteristics
Factors Related to LOWER HAIs

* **Higher staffing**, lower CLABSI & VAP
  (Stone, 2007 & 2008; Cho, 2003)

* **Higher skill mix**, lower CAUTI & VAP
  (Needleman, et. al, 2002)
Factors Related to Higher HAIs

* More **overtime** related to higher CAUTI (Stone, 2007)

* More **agency staff**, higher HAI (Stone, 2008)

* Higher **float staff**, higher CLABSI (Stone, 2008)
∗ Sufficient RN staffing important

∗ Nurses not well oriented to critical care or the unit team (float or agency) may not provide high quality care

∗ Or units that need float or agency may have quality problems that lead to turnover or absenteeism

∗ Under pressure of increased workload (short staffing or overtime), clinicians may not be complying with infection control measures
NEW
Analysis of HAIs
Using NDNQI Data
# HAI Rates Higher in Academic Medical Centers

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<tr>
<th></th>
<th>AMCs</th>
<th>Teaching</th>
<th>Non-Teaching</th>
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<tbody>
<tr>
<td>CAUTI</td>
<td>3.46</td>
<td>1.95</td>
<td>1.34</td>
</tr>
<tr>
<td>CLABSI</td>
<td>1.67</td>
<td>1.31</td>
<td>0.96</td>
</tr>
<tr>
<td>VAP</td>
<td>5.66</td>
<td>1.93</td>
<td>1.28</td>
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## Similar HAI Rates for Magnets and Non-Magnets

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<thead>
<tr>
<th>Indicator</th>
<th>Magnet</th>
<th>Non-Magnet</th>
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<tbody>
<tr>
<td>CAUTI</td>
<td>1.98</td>
<td>1.91</td>
</tr>
<tr>
<td>CLABSI</td>
<td>1.30</td>
<td>1.19</td>
</tr>
<tr>
<td>VAP</td>
<td>1.65</td>
<td>2.47</td>
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1. What characteristics of the nursing workforce related to CAUTI, CLABSI, and VAP rates?

2. What is the relationship between mandated public reporting and CLABSI?
Value of NDNQI Data

- Large Sample
- National Coverage
- High data quality
Sample

* Adult critical care units that submitted HAI data to NDNQI for 2010 and participated in the RN Survey

* Compared with all NDNQI hospitals

  * More large hospitals
  * More academic medical centers (AMCs) & teaching facilities
  * More Magnet facilities
## Sample Sizes

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<tr>
<th></th>
<th>CAUTI</th>
<th>CLABSI</th>
<th>VAP</th>
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<tbody>
<tr>
<td>Hospitals</td>
<td>354</td>
<td>420</td>
<td>409</td>
</tr>
<tr>
<td>Adult CC Units</td>
<td>619</td>
<td>750</td>
<td>730</td>
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Dependent Variables

* **CAUTI, CLABSI, VAP**

* Data collected using NHSN standardized definitions
  * Infection determined with laboratory test, X-rays, or clinical symptoms
  * Infection not present on admission
  * Infection occurred in patient with a device or within 48 hours of discontinuance of device
Independent Variables

* **Required State Reporting (CLABSI only)**

* **Hospital Characteristics**
  * Teaching status
  * Staffed bed size
  * Magnet status

* **Unit Staffing Characteristics**
  * RN HPPD
  * % RN hours from Agency staff
  * RN Certification
Analytic Design

* Hierarchical Poisson regression
* Random term included to account for clustering of units within hospitals
* Device Days used as exposure variable
Confirmed beneficial effect of RN HPPD on CLABSI

Did not find a beneficial effect of RN HPPD on VAP

Confirmed deleterious effect of Agency RNs on VAP
New from NDNQI Analysis

* Demonstrates for first time the beneficial effect of specific RN certifications on HAI
Study Limitations

* Sample restricted to NDNQI hospitals participating in the RN Survey
* NDNQI hospitals are more likely to be AMCs, larger, Magnets, and not-for-profit than non-NDNQI hospitals
* Methodology measures association, not causation
What Have We Learned About Reductions in HAI?
Policy Effects

- Some evidence of the beneficial effect of mandated reporting
- Effectiveness of CMS non-payment rule merits additional investigation

Widespread adoption of prevention practices

- Multiple organizations disseminating
- Aided by on site infection control staff
Nurse Staffing

* Higher RN HPPD associated with lower CLASBI & CAUTI rates

* More certified RNs on CC units

* Detrimental effect of % Agency on VAP
Looking Forward: Can the HAI Lessons be Translated to Other Outcomes?
For HAI, the “Stars Were Aligned”

- National Policies to promote prevention
- Solid EBP guidelines
- Multiple organizations disseminating EBP
- On-site infection control personnel
- Critical care units more likely others to have higher RN HPPD and higher RN certification rates
Potential Reducing Hospital Acquired Pressure Ulcers

**Have**

- Solid EBP
- CMS non-payment for HAPU III & IV

**May Lack**

- Equivalent EBP dissemination campaign
- Sufficient RN HPPD
- Unit-based RNs w/relevant certifications
- Hospital counterpart to investigative infection control staff
Potential Reducing Falls

**Have**

* CMS non-payment for serious injury falls

**May Lack**

* Solid EBP
* Multi-organization dissemination campaign
* Sufficient RN HPPD
* A relevant certification?
* **Great** to see progress on HAI
* **Delighted** that there are so many drivers and supports for improvement in HAI
* HAI experience may be a guide as to “what it takes”
* **Thankful** that you in the audience collect the data used for looking at relationships between staffing characteristics and outcomes
Thank You for Your Commitment to Safe Patient Care!
References


