Keystone ICU: Eliminating Central Line Associated Blood Stream Infections

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Session Objectives

- Identify risk factors for the development of central line associated blood stream
- Define key care practices based on the SHEA/IDSA practice recommendations and other evidence to reduce CLABSI
- Discuss strategies to work on a safety culture as care practices are changed.

Keystone Project

- Statewide initiative - 75 Hospitals, 127 ICUs
- In Collaboration with Johns Hopkins' Quality and Research Institute
- Reduce errors and improve patient outcomes in ICUs
- Combination of evidence based medicine and quality improvement
- 5 interventions implemented over a 2 year Grant funded period
- Still going strong after 10 years!!!!

Keystone: ICU

- CUSP
- BSI
- VAP
- Daily Goals
- Sepsis
- Oral Care
- Delirium
- Progressive Mobility

Why HAI's?

Protecting Patients From Harm

<table>
<thead>
<tr>
<th>Estimates: 183 Hospitals in 10 States</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAI: 722,000/year</td>
</tr>
<tr>
<td>HAI-related deaths: 75,000/year</td>
</tr>
<tr>
<td>Hospitalized patients develop infection: 1 out of 25 (4%)</td>
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<tr>
<td>Death due to sepsis/septic shock: 700/day</td>
</tr>
<tr>
<td>Money spent: $45 billion/year</td>
</tr>
<tr>
<td>Increase risk of readmission: 27 days vs. 59 days</td>
</tr>
</tbody>
</table>

Health Care Associated Infection Data

<table>
<thead>
<tr>
<th>Measurement</th>
<th>NHSN 2012</th>
<th>Estimated # of Infections</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAP/per 1000 patient days</td>
<td>3742 hospitals in US</td>
<td>157,500</td>
</tr>
<tr>
<td>Range of pooled means 0.2 (Ped CVICU) - 4.4 (Burn ICU)</td>
<td></td>
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<tr>
<td>VAP/per 1000 vent days</td>
<td>49,900</td>
<td></td>
</tr>
<tr>
<td>Range of pooled means 0.7 (Peds Surgical) - 5.0 (Neuro ICU)</td>
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<tr>
<td>0.0 (Well Baby) – 4.1 (Peds rehab)</td>
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<tr>
<td>CA-UTI/per 1000 cath days</td>
<td>35,600</td>
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<tr>
<td>Range of pooled means 0.0 (Well Baby) - 6.5 (Burn ICU)</td>
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<tr>
<td>0.0 (Well Baby) – 4.1 (Peds rehab)</td>
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<tr>
<td>CLABSI/per 1000 cath days</td>
<td>15,600</td>
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<tr>
<td>Range of pooled means 0.8 (CVICU) - 3.4 (Burn ICU)</td>
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<tr>
<td>Step-down Ward 0.3 (Adult Rehab) - 2.4 (Burn)</td>
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Technical and Adaptive Change

“One of the most common leadership mistakes is expecting technical solutions to solve adaptive problems...”


How can we achieve sustainable change?

Key concepts: Adaptive and Technical Work

<table>
<thead>
<tr>
<th>Technical Work</th>
<th>Adaptive Work</th>
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<tbody>
<tr>
<td>CLABSI Prevention</td>
<td>Comprehensive Unit-based Safety Program (CUSP)</td>
</tr>
<tr>
<td>Insertion bundle</td>
<td>Work that shapes the attitudes, beliefs, and values of clinicians, so they consistently perform tasks the way they know they ‘should’</td>
</tr>
<tr>
<td>Maintenance bundle</td>
<td>Culture change is not a checklist</td>
</tr>
<tr>
<td>Additional interventions</td>
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<tr>
<td>Work that lends itself to standardization (e.g., checklists and protocols)</td>
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The differences between technical and adaptive change

<table>
<thead>
<tr>
<th>Technical Work</th>
<th>Adaptive Work</th>
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<tbody>
<tr>
<td>Premise: There is knowledge to implement a solution</td>
<td>Premise: Can only be addressed through changes in people’s priorities, beliefs, habits, and loyalties</td>
</tr>
<tr>
<td>Patient safety &amp; quality methods, processes: a focus on tasks</td>
<td>Effects of context on the successful application of these methods/processes: a focus on unit &amp; organizational change</td>
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</table>

Grading of the Quality of Evidence

Grade Definition

I. **High**
- Highly confident that the true effect lies close to that of the estimated size and direction of the effect. Evidence is rated as high quality when there is a wide range of studies with no major limitations, there is little variation between studies, and the summary estimate has a narrow confidence interval.

II. **Moderate**
- The true effect is likely to be close to the estimated size and direction of the effect, but there is a possibility that it is substantially different. Evidence is rated as moderate quality when there are only a few studies and some have limitations but not major flaws, there is some variation between studies, or the confidence interval of the summary estimate is wide.

III. **Low**
- The true effect may be substantially different from the estimated size and direction of the effect. Evidence is rated as low quality when supporting studies have major flaws, there is important variation between studies, or the confidence interval of the summary estimate is very wide, or there are no rigorous studies, only expert consensus.

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Note: Based on Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) and the Canadian Task Force on Preventive Health Care.
Blood Stream Infection (BSI) Insertion Prevention Bundle

- Remove/Avoid unnecessary lines (II)
- Hand hygiene (II)
- Maximal barrier (II)
- Chlorhexadine for skin prep (I)
- Avoid femoral lines (I)

Education & Culture of Safety


It’s More Than Just a Checklist

Maintenance Bundle

- Dressing Care (II)
- Accessing the line (II)
- Administration set changes (II)
- Assessing each day if line is necessary (II)

- Additional strategies:
  - CHG Baths (I)
  - CHG Dressings (I)
  - Disinfection caps (I)
  - Antimicrobial locks (I) (in special populations only)
  - Antibiotic impregnated catheters (I)

Dressing Care

- Use a transparent or gauze dressing to cover site (IA)
- Change transparent dressing and perform site care with a CHG based antiseptic every 7 days (IB) or more frequent if the dressing is soiled, loose, or damp; (IB)
- Change gauze dressings every 2 days or more frequent if the dressing is loose, soiled or damp (II)
- Use a chlorhexidine-impregnated dressing for temporary short-term catheters in patients older than 2 months of age if the CLABSI rate is not ↓ despite EBP (1B)

St. Joseph Mercy Hospital Central Line Associated Blood Stream Infection Rate: Infections per 1000 Line Days

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<tbody>
<tr>
<td>Ann Arbor</td>
<td>7.8</td>
<td>2.12</td>
<td>1.11</td>
<td>1.13</td>
<td>0.9</td>
<td>0.70</td>
<td>0.84</td>
<td>0.78</td>
<td>0.80</td>
<td>0.15</td>
<td>0.26</td>
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<td>#</td>
<td>31 (Mar-Dec)</td>
<td>13</td>
<td>8</td>
<td>0</td>
<td>7</td>
<td>5</td>
<td>6</td>
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- Additional strategies:
  - CHG Baths (I)
  - CHG Dressings (I)
  - Maintenance Bundle
  - Disinfection caps (I)
  - Antimicrobial locks (I) (in special populations only)
  - Antibiotic impregnated catheters (I)


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Only 2 CLABSI in past 32 months in 3 ICUs
CUSP & CLABSI Interventions

<table>
<thead>
<tr>
<th>Technical</th>
<th>Adaptive /Cultural</th>
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</thead>
<tbody>
<tr>
<td><strong>CLABSI</strong></td>
<td></td>
</tr>
<tr>
<td>1. Insertion</td>
<td>1. Educate on the Science of Safety</td>
</tr>
<tr>
<td>2. Maintenance</td>
<td>2. Identify Defects (Staff Safety Assessment)</td>
</tr>
<tr>
<td>a. Assessment &amp; Site Care</td>
<td>3. Senior Executive Partnership</td>
</tr>
<tr>
<td>b. Tubing, Injection Ports, Catheter Entry</td>
<td>4. Learn from Defects</td>
</tr>
<tr>
<td>3. Additional interventions</td>
<td>5. Implement Teamwork &amp; Communication Tools</td>
</tr>
<tr>
<td>a. CHG bathing</td>
<td></td>
</tr>
<tr>
<td>b. CHG dressings</td>
<td></td>
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<tr>
<td>c. Disinfection caps</td>
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</table>

Errors Provide Useful Information

- We can learn more from our failures than from success
- Our processes can be improved when studied

“Give me a fruitful error anytime, full of seeds, bursting with its own corrections. You can keep your sterile truth to yourself.” Vilfred Pareto

Learning from Defects

- What happened?
- Why did it happen (system lenses)?
- What could you do to reduce risk?
- How do you know risk was reduced?

Each CLABSI is considered a DEFECT, and you must learn from each one

Learning from Defects

- What happened?
- 6 CLABSI
- Why did it happen (system lenses)?
  - Reviewed compliance with insertion and maintenance bundles on each of these patients—done well
  - Common theme in patients: inconsistency with scrubbing the hub
- What could you do to reduce risk?
  - Review of literature and found research use of disinfection caps to reduce CLABSI
  - Implement disinfection caps as an intervention to reduce CLABSI in the ICU
- How do you know risk was reduced?
  - Auditing compliance with use of disinfection caps on all ports
  - Monitor for reduction in CLABSI rate

Translating Evidence into Practice (Johns Hopkins model)

4 E’s: Implementation Framework

<table>
<thead>
<tr>
<th>Frontline Staff</th>
<th>Team Leaders</th>
<th>Senior Executives</th>
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</thead>
<tbody>
<tr>
<td><strong>Engage</strong> (adaptive)</td>
<td></td>
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<tr>
<td>Ask, how does this make the world a better place?</td>
<td>Help staff understand the preventable harm</td>
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</tr>
<tr>
<td>Educate (technical)</td>
<td></td>
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</tr>
<tr>
<td>What do I need to do?</td>
<td>Convert evidence into behaviors</td>
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</tr>
<tr>
<td>Execute (adaptive)</td>
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<tr>
<td>How can I do it?</td>
<td>Learn to resist</td>
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<tr>
<td>Evaluate (technical)</td>
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<td></td>
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<tr>
<td>How do I know we made a difference?</td>
<td>Regularly assess measures</td>
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</table>
Potential Sources of Infection for Intravascular Devices

St. Joseph Mercy Hospital Central Line Associated Blood Stream Infection Rate: Infections per 1000 Line Days

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</thead>
<tbody>
<tr>
<td>CLABSI Ann</td>
<td>7.6</td>
<td>2.12</td>
<td>1.11</td>
<td>1.13</td>
<td>0.9</td>
<td>0.7</td>
<td>0.4</td>
<td>0.0</td>
<td>0.0</td>
<td>0.26</td>
<td>0.15</td>
</tr>
<tr>
<td>#</td>
<td>31</td>
<td>13</td>
<td>8</td>
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<td>0</td>
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</tbody>
</table>

Only 2 CLABSI in past 32 months in 3 ICUs

Implementing Disinfection Caps

- Identified defect:
  - inconsistency of ‘scrubbing the hub’
- TRIP:
  - Literature/evidence review of potential strategies
  - Identify local barriers to implementation—walk current process
  - Measurement
- 4 E’s
  - Engage
  - Educate
  - Execute
  - Evaluate
  - Measurement
  - Continual learning and refinement
- Recognizing impact of human factors
- Presentation to value analysis team

Continuous passive disinfection of catheter hubs prevents contamination and bloodstream infection Wright, M et al American Journal of Infection Control, Jan, 2013

- 3-phased, multifacility, quasi-experimental study
- 3 periods
  - Period 1 (P1): baseline: standard disinfection of hub before accessing
  - Period 2 (P2): passive disinfection cap on all central lines
  - Period 3 (P3): standard disinfection of hub before accessing
- Assessed intraluminal contamination in PICC patients only, with PICC lines in > 5 days
- CAUTI used as a concurrent control
- CLABSI rate change p= 0.05
- Results:
  - Period 1: 12.7% contamination
  - Period 2: 5.5% (p=0.002)
  - Period 3: 12% (p=0.88)
  - CLABSI rate:
    - Period 1: 1.43/1000 catheter days
    - Period 2: 0.69/1000 catheter days (p= 0.04)
    - Period 3: 1.31/1000 catheter days
- CAUTI rates
  - Period 1: 1.42 /1000 urinary catheter days
  - Period 2: 1.41/1000 urinary catheter days
  - Period 3: 1.04/1000 urinary catheter days (p> 0.03)

Impact of alcohol-impregnated port protectors and needleless neutral pressure connectors on CLABSI and contamination of blood cultures in an inpatient oncology unit Sweet MA Amer J of Inf Control 2012

- Observational study: before-after design
- Tertiary care hospital, oncology unit
- Methods:
  - Before: cleansing hub with alcohol wipes Jan-Dec 2009)
  - After: use alcohol impregnated port protectors with neutral pressure connector (Jan-July 2010)
- Results:
  - CLABSI rate change p= 0.03
    - Before: 2.3/1000 catheter days
    - After: 0.3/1000 catheter days
Reducing Bloodstream Infection Risk in Central and Peripheral IV lines: Initial Data on Passive Intravenous Connector Disinfection
DeVries, M et.al. Journal of the Assoc of Vascular Access, 2014

- 2 community based hospital
- Methods: compared pre-post implementation of disinfection cap (pre- Sept 2009 to May 2011; post-Dec 2011 to Aug 2013)
  - First did trial to pick best method for disinfection of hub: Disinfection cap vs device that friction scrubs with alcohol
- Results:
  - 49.3% reduction for CLABSI
  - 43% reduction in BSI from peripheral lines

Measure Performance

- Outcome:
  - CLABSI rate
- Process:
  - % ports with caps
  - % of patients with all ports capped

Identify local barriers to implementation

- Cost
- Access to caps
- Preventing waste
- Which ports to place them on

4 E’s: Implementation Framework
Implementing Disinfection Caps

<table>
<thead>
<tr>
<th></th>
<th>Frontline Staff</th>
<th>Team Leaders</th>
<th>Senior Executives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage</td>
<td>Ask, how does this make the world a better place?</td>
<td>- CLABSI rate not at zero, preventable form - Cost based purchasing, but reimbursement</td>
<td></td>
</tr>
<tr>
<td>Educate</td>
<td>What do I need to do?</td>
<td>- Review all of the evidence and that even with proper protocols — still bugs grown - Convert evidence into behaviors: put caps on all ports during admission process</td>
<td></td>
</tr>
<tr>
<td>Execute</td>
<td>How can I do it?</td>
<td>- Listen to resisters: why won’t this work - Standardize all possible ports — peripheral and central lines - Create independent checks: discuss at huddles, techs rounding - Make it easy to do the right thing: stock bedside and add cap with flush - Learn from mistakes: investigate when compliance not achieved</td>
<td></td>
</tr>
<tr>
<td>Evaluate</td>
<td>How do I know we made a difference?</td>
<td>- Measure: compliance &gt;75% - Measure: measure, monthly</td>
<td></td>
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</tbody>
</table>

Implementation

- ICU’s in January, 2011
  - Decreased rate from 0.78/1000 catheter days to Zero
- Housewide Pilot: May, 2012 to December 2012
  - Followed same process
  - Infection Prevention Committee oversee implementation using through 4E’s
- VAT proposal
  - ROI: what was the spend and what were we going to avoid
    - What did a CLABSI cost our institution in $ |
  - Discussed Human Factors/error reduction strategies

Return on Investment (ROI)

- Current impact of non-ICU CLABSI
  - 7 times cost per case
  - 10 times longer LOS
  - 0% patients went home (either had home care, went to ECF or Hospice)
- CLABSI in our institution—marginal cost(lab, radiology, CSR, pharmacy)--$11,700
- Cost of product for housewide implementation: $99,934
- Need to prevent 8.5 CLABSI in 8 months to offset costs
Human Factors

- Human Factors is concerned with the application of what we know about people, their abilities, characteristics, and limitations to the design of equipment they use, environments in which they function, and jobs they perform.

- Human Factors is a body of knowledge about human abilities, human limitations, and other human characteristics that are relevant to design. Human factors engineering is the application of human factors information to the design of tools, machines, systems, tasks, jobs, and environments for safe, comfortable, and effective human use.

- Uses scientific methods to improve system performance and prevent accidental harm.

**Rank Order of Error Reduction Strategies**

- Forcing functions and constraints
- Automation and computerization
- Standardization and protocols
- Checklists and double check systems
- Rules and policies
- Education / Information
- Be more careful; be vigilant

**9E PCU**

**Human Factors: Separating Fact from Fiction**

<table>
<thead>
<tr>
<th>Fact</th>
<th>Fiction</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Human factors is about designing systems that are resilient to unanticipated events</td>
<td>Human factors is about eliminating human error</td>
</tr>
<tr>
<td>#2 Human factors addresses problems by modifying the design of the system to better aid people</td>
<td>Human factors addresses problems by teaching people to modify their behavior</td>
</tr>
<tr>
<td>#3 Human factors work ranges from the individual to the organizational level</td>
<td>Human factors is focused only on individuals</td>
</tr>
<tr>
<td>#4 Human factors is a scientific discipline that requires years of training; most hold relevant graduate degrees</td>
<td>Human factors consists of a limited set of principles that can be learned during brief training</td>
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<tr>
<td>#5 Human factors professional are bound together by the common goal of improving design for human use, but represent different specialty areas and methodological skills sets</td>
<td>Human factors scientists and engineers all have the same expertise</td>
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</table>

**Measurement September, 2012**

**Drilling down to the details**

<table>
<thead>
<tr>
<th>Room</th>
<th>Compliance to Protocol (Average)</th>
<th>Hospital Compliance (Average)</th>
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</thead>
<tbody>
<tr>
<td>931</td>
<td>80.0%</td>
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<td>932</td>
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<td>928</td>
<td>80.0%</td>
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<td>901</td>
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**Comments**

- Room 932: All valves covered; compliant with DCs.
- Room 931: All valves covered; compliant with DCs.
- Room 928: All valves covered; compliant with DCs.
- Room 927: All valves covered; compliant with DCs.
- Room 925: All valves covered; compliant with DCs.
- Room 924: All valves covered; compliant with DCs.
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- Room 912: All valves covered; compliant with DCs.
- Room 911: All valves covered; compliant with DCs.
- Room 909: All valves covered; compliant with DCs.
- Room 907: All valves covered; compliant with DCs.
- Room 906: All valves covered; compliant with DCs.
- Room 904: All valves covered; compliant with DCs.
- Room 901: All valves covered; compliant with DCs.
CENTRAL LINE ASSOCIATED BLOOD STREAM INFECTIONS
Non-ICUs

<table>
<thead>
<tr>
<th>Year</th>
<th>Interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
</tr>
<tr>
<td></td>
<td>May-Dec 2011: 14 maintenance CLABSI</td>
</tr>
<tr>
<td></td>
<td>May-Dec 2012: 2 maintenance CLABSI</td>
</tr>
</tbody>
</table>

86% Reduction Housewide in first 6 months after implementation

Continuous Improvement and Sustainability

- Measurement
- Learn from defects
- Review literature
- Tests of change

Process Measures

- Insertion bundle
  - % of line insertions with 100% compliance
- Maintenance bundle
  - Dressing intact
  - Dressing time and dated
  - Dressing changed per policy—every 7 days or if soiled or loose
  - Central line anchored properly
  - CHG dressing for femoral or PICC lines
  - All open ports capped with disinfection caps
  - All IV tubing changed per policy (every 96 hours, except for TPN, lipids or propofol)

Ongoing Process Measures

- Valves Compliance
- Patient Compliance

What to Measure and How Often?

- Outcome measure: CLABSI rate
- Process measures:
  - Insertion bundle
    - Collect the Insertion checklist and summarize compliance. Share data at team meetings and with all staff
    - Deal real time with compliance issues—chain of command
  - Maintenance bundle
    - Audit line care: dressings dated and time; occlusive; CHG dressing as appropriate
  - Frequency of measurement

Potential Barriers

- Perception of lack of time or the importance
- Lack of evidence based education...just do it!!!!
- Absence of a define protocol/procedure
- Staff turnover/Replacement staff
- Inaccessibility of needed supplies
- No real clinical lead on the unit
- Lack of feedback on progress
- Lack of accountability/responsibility

Interventions To Ensure Patient Receive Evidence & Sustain Benefit

- Education...to all caregivers...it works*
- Ask Daily if line is needed
- Checklist, nurse
- Empower nurses
- Products/Processes that make it easy for the frontline caregiver to provide the care
- Measurement/Feedback**
- Setting targets/Celebrating successes
- Placement of new practice/education in orientation
- Products/Processes that make it easy for the frontline caregiver to provide the care


Can we change practice through process improvement alone?

OR

Will successful change require an altering of the value structure within the unit?

Teamwork Climate Across Michigan ICUs

The strongest predictor of clinical excellence: caregivers feel comfortable speaking up if they perceive a problem with patient care

<table>
<thead>
<tr>
<th>Time period</th>
<th>Median CLA-BSI Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baseline</td>
<td>2.7</td>
</tr>
<tr>
<td>Intervention</td>
<td>1.6</td>
</tr>
<tr>
<td>0-3 months</td>
<td>0</td>
</tr>
<tr>
<td>4-6 months</td>
<td>0</td>
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<tr>
<td>7-9 months</td>
<td>0</td>
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<tr>
<td>10-12 months</td>
<td>0</td>
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<tr>
<td>13-15 months</td>
<td>0</td>
</tr>
<tr>
<td>16-18 months</td>
<td>0</td>
</tr>
</tbody>
</table>

Results

- Lives Saved – 1,729*
- Patient Days Saved – in excess of 127,000*
- Dollars Saved – Over $246 Million*
- Culture of Safety improved 28%
- Teamwork improved 15%

* Based on the Johns Hopkins Opportunity Calculator

Intervention to Decrease CLA-BSI Statewide Collaborative-Keystone ICU

- 103 ICU’s in state of Michigan reported data
- Examine 375,757 catheter days
- Implementation of the BSI Bundle/checklist
- Results
  - Median rate of CLA-BSI per 1,000 catheter days went 2.7 to 0 at 3 months (p<0.002)
  - Mean rate of CLA-BSI’s per 1,000 catheter days went 7.7 to 1.4 at 18 month follow up (p<0.002)


36 Months Post Initial Implementation: 96 of original 103 ICU’s evaluated
Results: Median rate 1.1 per 1,000 catheter days/ Median: Zero
2009: mean 88 per 1,000 catheter days (personal communication)
Statewide Mortality Reduction When Compared to Other Mid-West States

**Methodology**
- Retrospective comparative study using Medicare claims from Michigan and Mid-west region
- Looked at data 2 years before keystone up to 22 months after implementation
- 95 study hospitals (238,937 adm) in MI vs. 364 hospitals (1,091,547 adm) in surrounding Midwest region
- Measured: Hospital Mortality & Hospital LOS

**Results**
- Mortality outcomes differ significantly between the two groups with implementation of the project (p=0.033)
  - 1-12 months: .83 (.79 to .87) vs. .88 (.85 to .90), p=0.041
  - 13-22 months: .76 (.72 to .81) vs. .84 (.81 to .86), p = 0.007
- No difference in LOS data (not powered sufficiently to show significance)


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On the CUSP: Stop HAI
A National Initiative

- AHRQ government funded 3 year initiative
- HRET and American Hospital Association
- John Hopkins Quality & Safety Research Group
- MHA’s Keystone Center for Patient Safety & Quality
- Goals:
  - Eliminate CLA-BSI: <1/1000 catheter days, median 0
  - Improve safety culture by 50%
  - Learn from 1 defect a month
  - Build an infrastructure for future efforts
- Baseline and monthly CLA-BSI rate, hospital survey on patient safety & monthly survey on teamwork barriers

http://www.onthecusptophai.org/

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On the CUSP: Stop CLABSI A National Initiative

- Forty-four states, the District of Columbia, and Puerto Rico all enrolled hospitals in On the CUSP: Stop BSI, and collectively
- More than 1,055 hospitals and 1,775 hospital unit teams have participated in the program.
- By September 2012, there had been an overall relative reduction of 40 percent in CLABSI rates in participating intensive care units
- More than 2,000 CLABSIs had been prevented.
- More than 500 CLABSI-related deaths were prevented.
- More than $34 million in health care costs were avoided.

http://www.onthecusptophai.org/

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A multicenter, phased, cluster-randomized controlled trial to reduce CLABSI in ICUs

- Methods:
  - Multicenter, phased, cluster RCT
  - Multifaceted intervention: CLABSI prevention bundle and CUSP program
- Results:
  - Control group: 2.7/1000 catheter days to 2.2/1000 catheter days
  - Intervention group: 4.5/1000 catheter days to 1.3/1000 catheter days
  - Intervention group achieved an 80% reduction at 19 months post implementation—0.85/1000 catheter days

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Be Courageous

We all are responsible for the safety of our patients……Own the Issues

- “If not this, then what??”
- “If not now, then when?”
- “If not me, then who??”