HOSPITAL ACQUIRED INFECTIONS
DOING IT BETTER FOR PATIENTS AND OURSELVES

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ASSOCIATE DIRECTOR SURGICAL CRITICAL CARE
WEST VIRGINIA UNIVERSITY

• I HAVE NO FINANCIAL DISCLOSURES
• WHAT I HOPE YOU WILL TAKE HOME AND USE TO PROVIDE GREAT CARE TO YOUR PATIENTS
  • DISCUSS RELEVANCE OF HOSPITAL ACQUIRED INFECTIONS – FINANCIAL AND PERSONAL COSTS
  • DEFINING HAI’S – SPEAKING THE SAME LANGUAGE ACROSS CLINICAL AND PI ENVIRONMENTS
  • WHO ARE THE PLAYERS – REVIEWING THE BACTERIOLOGY AND EPIDEMIOLOGY
  • PUTTING INTO PRACTICE – GETTING IT RIGHT FOR YOUR PATIENTS
    • LOOKING AT HOW YOU DO IT – DOES ANYTHING NEED TO CHANGE
    • LOOKING FORWARD – EVIDENCE-BASED

HOUSEKEEPING
IF PATIENT SATISFACTION WAS A FUNCTION OF RESTORING HEALTH & PREVENTING COMPLICATIONS WE WOULD LEAD THE WORLD IN HEALTHCARE VALUE AND QUALITY.

What is a healthcare-associated infection?

- HAIs are defined as infections not present and without evidence of incubation at the time of admission to a healthcare setting.
- Most infections that become clinically evident after 48 hours of hospitalization are considered hospital-acquired.
- Infections that occur after the patient is discharged from the hospital can be considered healthcare-associated if the organisms were acquired during the hospital stay.

Source: Mirza, A. Hospital-Acquired Infections.
What does CMS consider a hospital-acquired condition (HAC)?

- Conditions that are high cost or high volume or both;
- Result in the assignment of a case to a DRG that has a higher payment when present as a secondary diagnosis; and
- Could reasonably have been prevented through the application of evidence-based guidelines.

State HAI Reporting Laws

- States with study laws
- Mandates public reporting of infection rates
- Voluntary

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RESULTS  Using Monte Carlo simulation, we generated point estimates and 95% CIs for attributable costs and length of hospital stay. On a per-case basis, central line-associated bloodstream infections were found to be the most costly HAIIs at $45,814 (95% CI, $30,919-$65,245), followed by ventilator-associated pneumonia at $40,144 (95% CI, $36,286-$44,220), surgical site infections at $20,785 (95% CI, $18,902-$22,667), *Clostridium difficile* infection at $11,285 (95% CI, $9,118-$13,574), and catheter-associated urinary tract infections at $8,986 (95% CI, $6,033-$11,189). The total annual costs for the 5 major infections were $9.8 billion (95% CI, $8.3-$11.5 billion), with surgical site infections contributing the most to overall costs (33.7% of the total), followed by ventilator-associated pneumonia (31.6%), central line-associated bloodstream infections (18.9%), *C difficile* infections (15.4%), and catheter-associated urinary tract infections (<1%).

Table 1. Estimates of Costs and LOS Attributed to the 5 Major Health Care-Associated Infections for the US Adult Inpatient Population at Acute Care Hospitals

<table>
<thead>
<tr>
<th>Health Care-Associated Infection Type</th>
<th>Cost, 2012 $US (95% CI)</th>
<th>LOS (as Total, ICU), d</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical site infections</td>
<td>20,785 (18,902-22,667)</td>
<td>11.2 (10.5-11.9)</td>
</tr>
<tr>
<td>MRSA</td>
<td>42,300 (40,065-82,670)</td>
<td>23.0 (14.3-31.7)</td>
</tr>
<tr>
<td>Central line-associated bloodstream infections</td>
<td>45,814 (30,919-65,245)</td>
<td>10.4 (6.9-15.2)</td>
</tr>
<tr>
<td>MRSA</td>
<td>58,614 (16,760-174,755)</td>
<td>15.7 (7.9-36.5)</td>
</tr>
<tr>
<td>Catheter-associated urinary tract infections</td>
<td>896 (603-1189)</td>
<td>NR</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia</td>
<td>40,144 (36,286-44,220)</td>
<td>13.1, 8.4</td>
</tr>
<tr>
<td>Clostridium difficile infections</td>
<td>11,285 (9,118-13,574)</td>
<td>3.3 (2.7-3.8)</td>
</tr>
</tbody>
</table>
Table 2. Epidemiology of Health Care-Associated Infections Among US Adult Inpatients (Including ICUs) at Acute Care Hospitals, 2009a

<table>
<thead>
<tr>
<th>Health Care-Associated Infection Type</th>
<th>Incidence Rate</th>
<th>Population at Risk</th>
<th>Cumulative Incidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Surgical site infections</td>
<td>1.98%</td>
<td>8 020 658</td>
<td>158 639</td>
</tr>
<tr>
<td>MRSA</td>
<td>0.29%</td>
<td>8 020 658</td>
<td>23 417</td>
</tr>
<tr>
<td>Central line-associated bloodstream infections</td>
<td>1.27%</td>
<td>16 020 922</td>
<td>40 411</td>
</tr>
<tr>
<td>MRSA</td>
<td>0.21%</td>
<td>31 695 922</td>
<td>6638</td>
</tr>
<tr>
<td>Catheter-associated urinary tract infections</td>
<td>1.87%</td>
<td>41 115 000</td>
<td>77 079</td>
</tr>
<tr>
<td>Ventilator-associated pneumonia</td>
<td>1.33%</td>
<td>23 392 785</td>
<td>31 130</td>
</tr>
<tr>
<td>Clostridium difficile infections</td>
<td>3.85%</td>
<td>34 716 079</td>
<td>133 657</td>
</tr>
<tr>
<td>Total health care-associated infections</td>
<td>NA</td>
<td>NA</td>
<td>440 916</td>
</tr>
</tbody>
</table>
NATIONAL ACTION PLAN TO PREVENT HEALTH CARE-ASSOCIATED INFECTIONS: ROAD MAP TO ELIMINATION (APRIL 2013)

- 1:20 INPATIENTS HAVE AN HAI
- > 1 MILLION HAI’S ANNUALLY
- $28-$33 BILLION IN PREVENTABLE EXPENDITURES ANNUALLY

https://www.healthypeople.gov/2020/topics-objectives/topic/healthcare-associated-infections

- FRONTLINE CLINICIANS
  - ↓ DEVICE USE
  - HAND HYGIENE & BARRIER PRECAUTIONS
  - ANTIMICROBIAL STEWARDSHIP

- CLINICAL LEADERS & ADMINISTRATORS
  - SUPPORT FROM HIGHEST LEVELS
  - CULTURE OF SAFETY (ROLE OF $$$)

- GOV’T, ADVOCATES, & ADMINISTRATORS
  - FINANCIAL INCENTIVES & REGULATORY OVERSIGHT
  - SYSTEM-BASED APPROACHES
  - TECHNOLOGY
  - PUBLICLY REPORT CREDIBLE DATA
  - INTERPROFESSIONAL PARTNERSHIPS
BUYER BEWARE

- Hospital based initiatives to promote quality and efficiency of care
- Preventable hospital acquired conditions provision
- Present on admission (POA) indicator reporting
- Hospital pay-for-reporting

$$$ FOR PERFORMANCE

- Beginning FY 2015 under Affordable Care Act
- Hospitals lose 1% reimbursement if in top quartile for HAC’s

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Table 1. Hospital-Acquired Conditions as Outlined by CMS

- Air embolism
- Blood incompatibility
- Catheter-associated UTI
- Falls and trauma
- Foreign object retained after surgery
- Manifestations of poor glycemic control
- Pressure ulcers, Stage III or IV
- Vascular catheter-associated infection
- DVT/PE following knee or hip arthroplasty

*“No pay” condition, but not reported on Hospital Corroso website.*
CMS REQUIREMENTS FOR SURGICAL SITE INFECTION

• DEFICIT REDUCTION ACT OF 2005 → WITHHOLD MEDICARE PAYMENTS UNLESS REQUIRED QUALITY DATA SUBMITTED TO CMS
• HOSPITAL INPATIENT QUALITY REPORTING SYSTEM (IQR) – CMS REQUIRES INPUT OF 7 SCIP QUALITY METRICS
• NHSN REPORTING OF SSI RATES FOR ABDOMINAL HYSTERECTOMY AND COLORECTAL SURGERY
• SCIP PERFORMANCE NOW IMPACTS VALUE-BASED PURCHASING PAYMENTS.

LONG TERM CARE FACILITY METRICS

• ENROLL IN NHSN FOR NURSING HOME INFECTION SURVEILLANCE
• C. DIFF INFECTION RATES
• VACCINATIONS FOR RESIDENTS (INFLUENZA, PNEUMOCOCCAL)
• HCP INFLUENZA VACCINATION
• UTI/CAUTI & CATHETER CARE PROCESS

• AFFORDABLE CARE ACT REQUIRES A QA/PI PROGRAM FOR ALL SNF BY 2013
## Table 1. Current HAI Metrics and Targets Five-Year Goals (2009-2013)

<table>
<thead>
<tr>
<th>Priority Area</th>
<th>Measure/Metric</th>
<th>Five Year (2013) Goal</th>
<th>National Baseline Period</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Clostridium difficile Infection</em></td>
<td>Hospitalizations with <em>Clostridium difficile</em></td>
<td>30% reduction</td>
<td>2008</td>
</tr>
<tr>
<td></td>
<td><em>Clostridium difficile infections</em></td>
<td>30% reduction</td>
<td>2010-2011</td>
</tr>
<tr>
<td>Central Line-Associated Bloodstream Infection</td>
<td>Central line-associated bloodstream infections</td>
<td>50% reduction</td>
<td>2006-2008</td>
</tr>
<tr>
<td>MRSA Infection</td>
<td>MRSA invasive infections (population)</td>
<td>50% reduction</td>
<td>2007-2008</td>
</tr>
<tr>
<td></td>
<td>MRSA bacteremia (hospital)</td>
<td>25% reduction</td>
<td>2010-2011</td>
</tr>
<tr>
<td>Surgical Site Infection</td>
<td>Surgical site infections</td>
<td>25% reduction</td>
<td>2006-2008</td>
</tr>
<tr>
<td></td>
<td>Adherence to CMS Surgical Care Improvement Project (SCIP) processes</td>
<td>95% adherence</td>
<td>2006-2008</td>
</tr>
<tr>
<td>Ventilator-Associated Events (formerly VAP)*</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

*A new surveillance definition of ventilator-associated events (VAE) has been developed and will be used in place of the surveillance definition of VAP in NHSN beginning in 2013.*

## Table 2: 2013 Targets and Progress Made by 2014

<table>
<thead>
<tr>
<th>Measure (and data source)</th>
<th>Original target for 2013 (from 2009 baseline)</th>
<th>Progress made by 2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABSI (NHSN)</td>
<td>50% reduction</td>
<td>![emoji with smiley face] 50% reduction</td>
</tr>
<tr>
<td>CAUTI (NHSN)</td>
<td>25% reduction</td>
<td>![emoji with small face] No change</td>
</tr>
<tr>
<td>Invasive MRSA (NHSN/BT)</td>
<td>50% reduction</td>
<td>![emoji with smiley face] 36% reduction</td>
</tr>
<tr>
<td>Facility-acquired MRSA (NHSN)</td>
<td>25% reduction</td>
<td>![emoji with small face] 13% reduction</td>
</tr>
<tr>
<td>CDI (NHSN)</td>
<td>30% reduction</td>
<td>![emoji with small face] 8% reduction</td>
</tr>
<tr>
<td>SSIs (NHSN)</td>
<td>25% reduction</td>
<td>![emoji with small face] 19% reduction</td>
</tr>
<tr>
<td><em>Clostridium difficile</em></td>
<td>30% reduction</td>
<td>![emoji with circle and red exclamation point] 10% increase</td>
</tr>
</tbody>
</table>

### Table 2: New Targets

<table>
<thead>
<tr>
<th>Measure (and data source)</th>
<th>2020 Target (from 2015 baseline)</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABSI (NIHSN)</td>
<td>50% reduction</td>
</tr>
<tr>
<td>CAUTI (NIHSN)</td>
<td>25% reduction</td>
</tr>
<tr>
<td>Invasive MRSA (NIHSN/EP)</td>
<td>50% reduction</td>
</tr>
<tr>
<td>Facility-onset MRSA (NIHSN)</td>
<td>50% reduction</td>
</tr>
<tr>
<td>CDI (NIHSN)</td>
<td>30% reduction</td>
</tr>
<tr>
<td>SSI (NIHSA)</td>
<td>30% reduction</td>
</tr>
<tr>
<td>Clostridium difficile hospitalizations (HCIP)</td>
<td>30% reduction</td>
</tr>
</tbody>
</table>


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### Vital Signs: Estimated Effects of a Coordinated Approach for Action to Reduce Antibiotic-Resistant Infections in Health Care Facilities — United States

**Methods:** Data from CDC's National Healthcare Safety Network and Emerging Infections Program were analyzed to project the number of health care–associated infections from antibiotic-resistant bacteria or *C. difficile* both with and without a large scale national intervention that would include interrupting transmission and improved antibiotic stewardship. As an example, the impact of reducing transmission of one antibiotic-resistant infection (carbapenem-resistant *Enterobacteriaceae* [CRE]) on cumulative prevalence and number of HAI transmission events within interconnected groups of health care facilities was modeled using two distinct approaches, a large scale and a smaller scale health care network.

**Results:** Immediate nationwide infection control and antibiotic stewardship interventions, over 5 years, could avert an estimated 619,000 HAIs resulting from CRE, multidrug-resistant *Pseudomonas aeruginosa*, invasive methicillin-resistant *Staphylococcus aureus* (MRSA), or *C. difficile*. Compared with independent efforts, a coordinated response to prevent CRE spread across a group of inter-connected health care facilities resulted in a cumulative 74% reduction in acquisitions over 5 years in a 10-facility network model, and 55% reduction over 15 years in a 102-facility network model.

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Hospital Acquired Infections

- **HAI**
  - SSI (Surgical Site Infection)
  - CAUTI (Catheter-Related Urinary Tract Infection)
  - VAE (Ventricular Assisted Device Infection)
  - CLABSI (Central Line-Related Bloodstream Infection)

Pennsylvania Acute Care Hospitals

- **CLABSI**
  - **59%**
  - **Surgical Site Infections (50%)**
  - **50%**

- **CAUTI**
  - **3%**
  - **Surgical Site Infections (5%)**

- **MRSA**
  - **21%**
  - **Surgical Site Infections (21%)**

Other important infections include:

- SSI: **SSIs**
  - **Surgical Site Infections**
  - **MRSA** (Methicillin-resistant Staphylococcus aureus)

- CAUTI: **Catheter-Related Urinary Tract Infections**

- VAE: **Ventricular Assisted Device Infections**

- CLABSI: **Central Line-Related Bloodstream Infections**

Infections are reported by individual hospitals and the data is compiled to provide a comprehensive overview of the incidence and trends in hospital-acquired infections. The reported rates and trends help in identifying areas for improvement and implementing strategies to reduce infections.
SURGICAL SITE INFECTIONS

- 2-5% of inpatient surgeries
- 160-300K SSI annually
- Most common & most costly
- Up to 60% preventable
- 7-11 additional postop hospital days
- 2-11x greater risk of death
- 77% of deaths among SSI patients are directly attributable to SSI
SSI SURVEILLANCE

- DIRECT OBSERVATION ➔ LOOK AT WOUND
- POST-HOC CHART REVIEW
- NO STANDARDIZED OR RELIABLE METHOD FOR POST-DISCHARGE SURVEILLANCE HAS BEEN ESTABLISHED
  - RURAL PATIENTS PRESENTING TO PCP OR WITHOUT PCP PRESENTING TO URGENT CARE
  - NON-INTEGRATED HEALTH SYSTEM AND EMR
- ANTIBIOTICS CONTINUED BEYOND PERI-OP OR AT DISCHARGE
- READMISSIONS
NATIONAL SURGICAL OUTCOMES METRICS

• SURGICAL CARE IMPROVEMENT PROJECT (SCIP)
  • ABX WITHIN 1 HOUR OF INCISION
  • USE ABX APPROPRIATE FOR THE PROCEDURE
  • DISCONTINUE ABX WITHIN 24 HOURS OF SURGERY

• NATIONAL SURGICAL QUALITY IMPROVEMENT PROGRAM (NSQIP)
  • PROPER HAIR REMOVAL
  • POST-CABG GLUCOSE CONTROL (GOAL < 180 MG/DL)
  • PERIOPERATIVE NORMOTHERMIA

SSI PREVENTION STRATEGIES

• PREOP ABX
• APPROPRIATE HAIR REMOVAL
• EUGLYCEMIA
• NORMOTHERMIA
• OPTIMIZE TISSUE OXYGENATION
• ALCOHOL-CONTAINING SKIN PREP
• WOUND PROTECTORS FOR GI/HBP SURGERY
• BEST PRACTICES CHECKLIST
• SURVEILLANCE FOR SSI
• EDUCATE PROVIDERS, PATIENTS, AND FAMILIES REGARDING SSI
CATHETER ASSOCIATED URINARY TRACT INFECTION (CAUTI)

- 70-80% OF HAI
- 1/7 INPATIENTS HAVE URINARY CATHETERS – DAILY RISK OF BACTERIA IS 3-7%
- SOURCE FOR 20% OF BLOODSTREAM INFECTIONS
- GU TRAUMA OCCURS IN 1.5% OF CATHETER-DAYS
- TREATING ASYMPTOMATIC BACTURIA PROMOTES ABX RESISTANCE AND C. DIFF
- DRAINAGE BAGS ARE BACTERIAL RESERVOIRS – RESISTANT GN ORGANISMS
CAUTI PREVENTION

- DAILY REMINDERS
- RN-DRIVEN REMOVAL PROTOCOL
- CPOE – ACTIVE SELECTION OF CONTINUED INDICATION – CATHETER ‘STEWARDSHIP’ PROGRAM
- PREWRITTEN STOP ORDERS
- RECONSIDER INTRAOPERATIVE INDICATIONS – “VOCTOR”
- BLADDER SCANNERS
- MOBILIZE PATIENTS

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Documentation of catheter insertion</td>
<td>C</td>
<td>ND</td>
<td>Yes</td>
</tr>
<tr>
<td>Trained personnel</td>
<td>Yes</td>
<td>ND</td>
<td>Yes</td>
</tr>
<tr>
<td>Train patients and family</td>
<td>Yes</td>
<td>ND</td>
<td>Yes</td>
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<tr>
<td>Hand hygiene</td>
<td>Yes</td>
<td>ND</td>
<td>Yes</td>
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<tr>
<td>Evaluation of necessity</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Evaluation of alternative methods</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Regular review of ongoing need</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<td>Choice of catheter</td>
<td>U</td>
<td>U</td>
<td>U</td>
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<tr>
<td>Use smallest gauge catheter</td>
<td>Yes</td>
<td>ND</td>
<td>Yes</td>
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<tr>
<td>Aseptic technique/sterile equipment</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Barrier precautions for insertion</td>
<td>Yes</td>
<td>ND</td>
<td>ND</td>
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<tr>
<td>Antiseptic cleaning of meatus</td>
<td>U</td>
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<td>No</td>
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<td>Secure catheter</td>
<td>Yes</td>
<td>ND</td>
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<td>Closed drainage system</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Obtain urine samples aseptically</td>
<td>Yes</td>
<td>ND</td>
<td>Yes</td>
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<tr>
<td>Replace system if break in asepsis</td>
<td>Yes</td>
<td>ND</td>
<td>ND</td>
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<tr>
<td>No routine change in catheter</td>
<td>Yes</td>
<td>U</td>
<td>Yes</td>
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<td>Routine hygiene for mental care</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Avoid irrigation for purpose of preventing infection</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td>Separate patients with catheters</td>
<td>U</td>
<td>U</td>
<td>ND</td>
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<tr>
<td>Use of preconnected system</td>
<td>C</td>
<td>C</td>
<td>ND</td>
</tr>
<tr>
<td>Performance feedback</td>
<td>C</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Rates of CAUTI and bacteremia</td>
<td>C</td>
<td>C</td>
<td>ND</td>
</tr>
</tbody>
</table>
CAUTI Prevention Bundle Steps

Proper Insertion and Maintenance

Insertion
Securement
The Drainage Bag
Hygiene

Alternatives
Indications
Review for Need
Prompt Removal
Intervention

By taking these steps, your hospital can eliminate CAUTI and save costs for patients.

Your unit team can monitor steps, can be done simultaneously by doing audits, observations, and assessments.

CAUTI

Catheter-Associated Urinary Tract Infections are among the most common HAIs in the United States.

At any given time, HAIs affect one out of every 20 hospital patients.

On the CUSP: Stop CAUTI

CAUTI

V A E
VENTILATOR ASSOCIATED EVENTS (VAE)

- TRUTHS
  - MECHANICAL VENTILATION ABSOLUTELY ASSOCIATED WITH INFECTIOUS AND OTHER COMPLICATIONS
  - PNEUMONIAS DEVELOP IN 5-20% OF MECHANICALLY VENTILATED PATIENTS
  - ASSOCIATED COMPLICATIONS INCLUDE:
    - PULMONARY: ARDS, PNEUMOTHORAX, PULMONARY EMBOLISM, PULMONARY EDEMA
    - GENERAL: DELIRIUM, DECUBITI, DECONDITIONING/IMMOBILITY
  - MORTALITY OF VENTILATOR ASSOCIATED INFECTIONS ≈ 10%

VAE SURVEILLANCE FRAMEWORK

- VENTILATOR-ASSOCIATED CONDITIONS (VAC)
  - STABLE/DECREASING VENT SETTINGS X 2 DAYS
  - INCREASE IN PEEP ≥ 3 CM/H2O OR FIO2 ≥ 0.20
  - HARLINGER OF COMPLICATIONS OR INFECTIONS

- IVAC
  - PRESENCE OF POSSIBLE INFECTION INDICATORS (SIMILAR TO SIRS)
  - ABNORMAL TEMPERATURE OR WBC AND NEW ABX THAT CONTINUE FOR ≥ 4 DAYS
**VAE SURVEILLANCE FRAMEWORK**

- **POSSIBLE & PROBABLE VAP**
  - BAL SHOWS PMN’S/WBC’S OR + CULTURE
  - POSITIVE TEST FOR RESPIRATORY VIRUSES, LEGIONELLA, PLEURAL CULTURES, OR + HISTOPATHOLOGY ON BX

- **REPORTING**
  - PUBLIC REPORTING – VAC/IVAC
  - INTERNAL QI - VAP

- **VAE CALCULATOR**
  - WWW.CDC.GOV/NHSN/VAE-CALCULATOR/INDEX.HTML

**DETECTING VAE**

- **CURRENT METHODS INADEQUATE AND SUBJECTIVE**
- **IMPROVEMENTS IN PNEUMONIA RATES DO NOT CORRELATE WITH IMPROVED OUTCOMES**
- **BROAD FOCUS ON VAE’S…PNEUMONIA IS ONLY PART OF THE STORY**
- **NEW DEFINITIONS FROM CDC FOCUS ON OBJECTIVE AND QUANTIFIABLE CRITERIA**
  - SUSTAINED INCREASES IN VENTILATOR SUPPORT / SETTINGS AFTER A PERIOD OF STABILITY
  - CONSISTENTLY PREDICT [NEGATIVE] OUTCOMES
  - IDENTIFY FACTORS THAT ARE PREVENTABLE/REVERSIBLE
PREVENTING VAE

- AVOID INTUBATION WHEN POSSIBLE
- MINIMIZE SEDATION/MANAGE PAIN
- MAINTAIN AND IMPROVE PHYSICAL CONDITIONING
- MINIMIZE SUBGLOTTIC SECRETIONS
- ELEVATE HOB
- MAINTAIN INTEGRITY OF VENTILATOR CIRCUIT

AVOIDING INTUBATION

- RAPID RESPONSE TEAMS
- FUNDAMENTAL CRITICAL CARE SUPPORT COURSE (FCCS)
- NON-INVASIVE VENTILATION
  - HIGH-FLOW NASAL CANNULA
  - CPAP/BIPAP
- ATTENTION TO CHF RISK-FACTORS – MONITOR I/O
EVERYTHING ELSE

- SUBGLOTTIC SUCTIONING
- CHANGING VENTILATOR CIRCUITS
- PUD & DVT PROPHYLAXIS WERE ADDED 'JUST BECAUSE'

MINIMIZING SEDATION

- FOCUS ON ANALGESIA FIRST
- MONITOR PAIN, AGITATION, AND DELIRIUM SERIALLY
- RECOGNIZE HOME NARCOTIC AND BENZO USE
- DAILY SPONTANEOUS AWAKENING TRIAL (SAT)
- DAILY SPONTANEOUS BREATHING TRIAL (SBT)
- COMBINE SAT & SBT
MAINTAIN AND IMPROVE PHYSICAL CONDITIONING

- MOBILITY SAFETY SCREEN
- EARLY EXERCISE IS NOT DIFFICULT
  - FAMILY, RN, PT/OT, PHYSICIANS
  - PROM/AROM
  - DOCUMENT OOB
  - MOBILITY CHALLENGES
    - EQUIPMENT
    - OBESITY
    - MECHANICAL VENTILATION
    - SCHEDULING

ELEVATE HOB

HOB UP 30 DEGREES OR HIGHER

- HOB improves patients’ ventilation
- Supine patients have lower spontaneous tidal volumes on PS
- than those seated in upright position
- ↑HOB may aid ventilatory efforts and minimize atelectasis
VAE

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People™

National Healthcare Safety Network (NHSN)

Cdc • NHSN • Inpatient Hospital Facilities

VAE Ventilator-Associated Event (VAE) Calculator Ver. 4.0

Welcome to the Ventilator-Associated Event Calculator. Version 4.0 operates based upon the currently posted VAE protocol. It is strongly encouraged that you read and study the VAE protocol.

- The calculator recognizes PEEP values ≤ 5 and corrects entries according to the VAE protocol prior to making a VAE determination.
- For periods of time where a patient is on APRV or a related type of mechanical ventilation for a full calendar day, a daily minimum PEEP value should not be entered into the calculator (i.e., do not enter zero).
- The calculator finds multiple VAEs per patient as long as they conform to the 14-day rule.

To get started, enter a date below that corresponds to the first day the patient was placed on mechanical ventilation during the mechanical ventilation episode of interest. You may type in: date or use the calendar pop-up when it appears. You may only enter dates within the past year. If the patient has been on mechanical ventilation for more than one year during the current mechanical ventilation episode, choose a start date that is more recent but is at least 7 days before the period of interest. more...

Mechanical Ventilation Start Date: [mm/dd/yyyy]

Print Close

VAE

NHSN Ventilator-Associated Event (VAE) Calculator Ver. 4.0

No VAEs were found for this patient. You should report the event as a VAC. Click on the "Explains..." button for an explanation of how this determination was made.

Start Date Calculate VAC Explain... Add... QAD

MV Day Date Hadc... Min. PEEP (cm H2O) Psed... Min. FIO2 (%) VAE ≤-5 or V≥-9 T >-30 WBC ≥ 10,000 or WBC ≤ 4,000 or neutrophils ≤ 1,000

Choose a Drug

cephalexin

CEPF

5

2/23/2017

2/24/2017

2/25/2017

2/26/2017

2/27/2017

2/28/2017

3/1/2017

3/2/2017

Legend: # VAE Window # VAE Date # Qualifying Antimicrobial Day (QAD)

Print Close
CLABSI

Process of Catheter-Related Infections

Skin Organisms
Endogenous Flora
Extrinsic Flora
Contaminant Disinfectant
Invading Wound

Contamination of Catheter Hub
Extrinsic (HCW)
Endogenous (Skin)

Contaminated Infusate Fluid Medication
Extrinsic Manufacturer

Contamination of Device Prior to Insertion
Extrinsic >> Manufacturer

Fibrin Sheath Thrombus
Hematogenous From Distant Local Infection
CENTRAL LINE-ASSOCIATED BLOODSTREAM INFECTIONS (CLABSI)

- MAJORITY OCCUR IN NON-ICU PATIENTS AND OUTPATIENTS
- COMORBID CONDITIONS PREDISPOSE TO CLABSI – IMMUNOVULNERABLE
- PERIPHERAL IV’S AND ARTERIAL LINES CONTRIBUTE TO CLABSI RATES

Arterial Catheters as a Source of Bloodstream Infection: A Systematic Review and Meta-Analysis*

O’Horo, John C. MD†; Make, Dennis G. MD, MSP®, Knupp, Anna E. RN§; Safdar, Nasir MD, PhD#††

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CLABSI RISK FACTORS

- PROLONGED HOSPITALIZATION/PATHOGEN EXPOSURE BEFORE LINE INSERTION
- DURATION OF CATHETERIZATION
- DIRTY INSERTION SITES
- DIRTY CATHETER HUBS
- IJ LINES
- NEUTROPENIA
- NURSE RATIOS IN ICU
- TPN
- FREQUENT BREAKS IN CIRCUIT
- FEMORAL LINES (ADULTS)
CLABSI PREVENTION

- EDUCATE
- REMOVE CATHETERS
- CREDENTIAL
  - FOCUS MORE THAN JUST CATHETER INSERTION
- CHLORHEXIDINE
- IV THERAPY TEAMS FOR PIVS AND PICCS
- REMOVE CATHETERS
- TRANSPARENT DRESSINGS – CHANGE REGULARLY
- CHANGE IV TUBING Q96 HOURS
- REMOVE CATHETERS
- ANTIMICROBIAL OINTMENT FOR HD CATHETERS

Five steps to prevent central line infections

1. Wash hands using soap or alcohol prior to placing the catheter.
2. Wear sterile gloves, hat, mask and gown.
3. Completely cover the patient with sterile drapes. Avoid placing the catheter in the groin, if possible.
4. Clean the insertion site on the patient’s skin with chlorhexidine antiseptic solution.
5. Remove catheters when they are no longer needed.

SOURCE: Safe Patients, Smart Hospitals, Peter Pronovost
Checklist for Prevention of Central Line Associated Blood Stream Infections

Based on 2011 CDC guideline for prevention of intravascular catheter-associated bloodstream infections:

For Clinicians:
Promptly remove unnecessary central lines

- Perform daily audits to assess whether each central line is still needed

Follow proper insertion practices

- Perform hand hygiene before insertion
- Adhere to aseptic technique
- Use maximal sterile barrier precautions (i.e., mask, cap, gown, sterile gloves, and sterile full-body drape)
- Perform skin antisepsis with >0.5% chlorhexidine with alcohol
- Choose the best site to minimize infections and mechanical complications
  - Avoid femoral site in adult patients
- Cover the site with sterile gauze or sterile, transparent, semipermeable dressings

Handle and maintain central lines appropriately

- Comply with hand hygiene requirements
- Scrub the access port or hub immediately prior to each use with an appropriate antiseptic (e.g., chlorhexidine, povidone iodine, an iodophor, or 70% alcohol)
- Access catheters only with sterile devices
- Replace dressings that are wet, soiled, or dislodged
- Perform dressing changes under aseptic technique using clean or sterile gloves

For Facilities:

- Empower staff to stop non-emergent insertion if proper procedures are not followed
- "Bundle" supplies (e.g., in a kit) to ensure items are readily available for use
- Provide the checklist above to clinicians, to ensure all insertion practices are followed
- Ensure efficient access to hand hygiene
- Monitor and provide prompt feedback for adherence to hand hygiene
  http://www.cdc.gov/handhygiene/Measurement.html
- Provide recurring education sessions on central line insertion, handling and maintenance

Supplemental strategies for consideration:

- 2% Chlorhexidine bathing
- Antimicrobial/Antiseptic-impregnated catheters
- Chlorhexidine-impregnated dressings
GINNY’S STORY

“CHANGE THE PARADIGM OF ROUNDING... IF YOU FOCUS ON THE QUALITY OF CARE, SATISFACTION WITH CARE WILL IMPROVE”
BRASS TACKS

• HYGIENE - WASH YOUR HANDS & PATIENTS
• AVOID PUTTING PLASTIC IN ORIFICES
• ABCDEF BUNDLE TO LIBERATE FROM MECHANICAL VENTILATION AND ICU
• PRESCRIBE ANTIBIOTICS APPROPRIATELY
• KEEP PATIENTS AMBULATORY