DEVELOPMENT OF AN INFECTION CONTROL PROGRAM FOR ACUTE CARE FACILITIES

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https://spice.unc.edu/ask

OBJECTIVES

- Describe the problem of healthcare-associated infection
- Review factors influencing the evolution of infection control/prevention programs
- Discuss core components of an effective infection prevention program
  - Administrative support
  - Written program
  - Surveillance Plan
  - Data validation and feedback
  - Staff Training and Education

BURDEN OF HEALTH CARE-ASSOCIATED INFECTION (HAI)

- At any given time 7% of patients in developed and 10% in developing countries will acquire at least one HAI
- Death for HAI occurs in about 10% of affected patients
- European estimates:
  - > 4 million affected
  - 4.5 million episodes of HAI annually
  - 16 million extra days of hospital stay
  - 37,000 attributable deaths and contributing to an additional 110,000

BURDEN OF HEALTH CARE-ASSOCIATED INFECTION (HAI)

- One out of thirty-one patients in U.S. hospitals has at least one healthcare-associated infection (HAI)¹
- Two million acquire annually²
  - # of hospitals reporting zero HAIs has dropped significantly since 2015
  - 90,000 deaths²
  - Cost range $1,000 to nearly $50,000²
  - Hospitals spend $28 to $45 billion annually on HAI cost³

RISK FACTORS

- Invasive procedures
- Severity of Illness
  - Not adhering to best practices for prevention
  - Overuse or improper use of antibiotics

NC STATEWIDE HEALTHCARE-ASSOCIATED INFECTIONS-(2019-2020)

<table>
<thead>
<tr>
<th>Metric</th>
<th># Observed Infections</th>
<th># Predicted Infections</th>
<th>Compare to National Experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABSI</td>
<td>499</td>
<td>541</td>
<td>Same</td>
</tr>
<tr>
<td>CAUTI</td>
<td>478</td>
<td>522</td>
<td>Better</td>
</tr>
<tr>
<td>Abd Hysterectomy (SSI)</td>
<td>65</td>
<td>70</td>
<td>Better</td>
</tr>
<tr>
<td>Colon (SSI)</td>
<td>304</td>
<td>264</td>
<td>Same</td>
</tr>
<tr>
<td>MRSA LabID</td>
<td>274</td>
<td>294</td>
<td>Better</td>
</tr>
<tr>
<td>C diff LabID</td>
<td>1898</td>
<td>1430</td>
<td>Better</td>
</tr>
</tbody>
</table>
COVID-19 IMPACT ON HAIs IN 2020

- **CLABSI**: 47% increase in Q4 across all location types
  - 65% increase in intensive care units (ICUs)
  - 16% increase in select inpatient wards
- **CAUTI**: 19% increase in Q4 across all location types
  - 30% increase in ICUs
- **VAE**: 45% increase in Q4 across all location types
  - 44% increase in ICUs
  - 35% increase in adult inpatient wards

Significant decreases were observed in *C. difficile* throughout 2020, compared to 2019.

IMPACT OF COVID-19

- **Measured:**
  - Volume of calls to the IPC program
  - Changes in HAI rates
  - Team member perceptions
- **Findings:**
  - Pre-COVID-19 had a median of 71 calls/month (range: 50-119)
  - During COVID-19 median call increased to 368/month (range: 149-829)
  - 50% related to isolation
  - CLABSI incidence increased significantly
- **Conclusions:**
  - 500% increase in consultation requests
  - Ambiguity and conflicting guidance were major challenges

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EVOLUTION OF SURVEILLANCE PROGRAMS

- **1958**: AHA recommended in response to outbreaks of *Staphylococcus aureus* infections in hospitals.
- **1960's**: CDC recommended hospital base programs include surveillance
- **1976**: TJC first included infection surveillance, prevention and control standards in its accreditation manual
THE SENIC PROJECT: STUDY ON THE EFFICACY OF NOSOCOMIAL INFECTION CONTROL.

- CDC undertook in 1974
- Three primary objectives:
  - To determine whether (and, if so, to what degree) the implementation of infection surveillance and control programs (ISCPs) has lowered the rate of nosocomial infection,
  - To describe the current status of ISCPs and infection rates, and
  - To demonstrate the relationships among characteristics of hospitals and patients, components of ISCPs, and changes in the infection rate.

HEALTHCARE FACILITY HAI REPORTING TO CMS VIA NHSN:

<table>
<thead>
<tr>
<th>HAI Event</th>
<th>Facility Type</th>
<th>Start Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLABSI</td>
<td>Acute Care Hospitals Adult, Pediatric, and Neonatal ICUs</td>
<td>January 2011</td>
</tr>
<tr>
<td>CAUTI</td>
<td>Acute Care Hospitals Adult and Pediatric ICUs</td>
<td>January 2012</td>
</tr>
<tr>
<td>SSI</td>
<td>Acute Care Hospitals Cervical and abdominal hysterectomy procedures</td>
<td>January 2012</td>
</tr>
<tr>
<td>MRSA Bacteremia LabID Event</td>
<td>Facility Wide Inpatient</td>
<td>January 2013</td>
</tr>
<tr>
<td>C difficile LabID event</td>
<td>Facility Wide Inpatient</td>
<td>January 2013</td>
</tr>
<tr>
<td>HCP Influenza Vaccination</td>
<td>All Inpatient HCP</td>
<td>January 2013</td>
</tr>
<tr>
<td>Medicare Beneficiary Number</td>
<td>All Medicare Patients Reported into NHSN</td>
<td>July 2014</td>
</tr>
<tr>
<td>CLABSI</td>
<td>Adult and Pediatric Medical Surgical Units</td>
<td>January 2015</td>
</tr>
<tr>
<td>CAUTI</td>
<td>Adult and Pediatric Medical Surgical Units</td>
<td>January 2015</td>
</tr>
</tbody>
</table>

SENIC FINDINGS

- SENIC found that hospitals reduced their nosocomial infection rates by approximately 32% if their infection surveillance and control program included four components:
  - Appropriate emphases on surveillance activities and vigorous control efforts,
  - At least one full-time infection-control practitioner per 250 beds,
  - A trained hospital epidemiologist, and
  - For surgical wound infections (SWIs), feedback of wound infection rates to practicing surgeons.

EVOLUTION OF TERMINOLOGY

Program Terminology
- Infection Control
- Infection Prevention
- Nosocomial
- Hospital acquired
- Healthcare-associated infection
- Health care-associated epidemiology

Staffing Terminology
- Infection Control Nurse
- Infection Control Officer
- Infection Control Professional
- Infection Preventionist
- Infectious Disease Physician
- Hospital Epidemiologist

EVOLUTION OF THE PROFESSION

- APIC founded in 1972 by a small group of infection control nurses
- Now serves >15,000 members across 48 countries
- IOM report “To Err is Human” shed light on healthcare associated adverse events, including infections
- CMS mandatory reporting regulations
- Movement from targeted (CLABSIs in ICUs) to total house (CLABSIs all locations) surveillance
- Expansion of role outside the hospital (clinics, LTCFs etc.,)

A systematic approach to quantifying infection prevention staffing and coverage needs; R. Bartles et al. // American Journal of Infection Control 46 (2018) 487-91
**OBJECTIVES**

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**WHAT ARE THE CORE INFECTION PREVENTION PRACTICES?**

- The core set of infection prevention and control practices should be implemented in all healthcare settings
- Applies to inpatient settings, outpatient settings, and non-traditional healthcare settings (e.g., homes, pharmacies, health fairs)
- There are eight core practices:
  - Leadership Support
  - Education and Training of Healthcare Personnel on Infection Prevention
  - Patient, Family and Caregiver Education
  - Performance Monitoring and Feedback
  - Standard Precautions
  - Transmission-Based Precautions
  - Temporary Invasive Medical Devices for Clinical Management
  - Occupational Health

[https://www.cdc.gov/hicpac/pdf/core-practices.pdf](https://www.cdc.gov/hicpac/pdf/core-practices.pdf)

**CORE PRACTICE: LEADERSHIP SUPPORT**

- Infection prevention programs require visible and tangible support from all levels of leadership
  - Ensure the Governing body (Board of directors, Administration) is accountable for the success of infection prevention activities
  - Allocate sufficient human and material resources (e.g., personnel, space, equipment, supplies)
  - Assign qualified individuals with relevant training to manage the program (e.g., course, certification)
  - Empower and support for those managing the program (e.g., authority, continuing education)
  - Authority statement included in the written program

**INFECTION PREVENTION PROGRAM**

- Effective infection control programs prevent HAIs
- A comprehensive infection control program consists of numerous elements including:
  - Evidence-based written policies and procedures
  - Training and education
  - Healthcare personnel safety
  - Surveillance and disease reporting
  - Activities should reflect the type of care provided, infection risks, and population served
  - Conducting infection control program assessments can help to identify program strengths and weaknesses
  - Assessment findings can be utilized for staff education and improved patient outcome

**INFECTION PREVENTION TEAM**

- Infection prevention committee
  - Multi-disciplinary
  - Not required by TJC but some states do require
  - Dissemination of information is critical
- Infection preventionist
  - Daily collaboration with all facets of healthcare
  - Functions as consultant, educator, role model, researcher and change agent
- Healthcare epidemiologist
  - May be the chair of committee or be technical advisory
  - Often physician with special training in healthcare epidemiology and infection prevention

**INFECTION PREVENTIONIST**

- Collection and analysis of infection data
- Evaluation of products and procedures
- Development of policies
- Consultation
- Education
- Implementation of mandated changes
- Application of epidemiologic principles
  - outbreak management
- Antimicrobial management
- Research
- High quality services in a cost-efficient manner
STAFFING

- 1969
  - CDC recommended 1 FTE per 250 occupied beds (SENIC) acute care
- 2004
  - Health Canada model projected 3 FTE per every 500 beds in acute care
- Netherlands
  - 1 FTE per 178 beds acute care
- APIC’s Delphi project
  - 0.8-1 IP for every 100 occupied beds, acute care

QUANTITATIVE NEEDS ASSESSMENT

- Conducted a quantitative needs assessment care settings:
  - Inpatient, Long-term care, ambulatory, rehab, home care
- Assessed activities pertinent to the setting:
  - Inpatient and LTCF
    - Activity, times per year conducted, hours required per each activity, total number of units or areas included and hours per week
  - Ambulatory:
    - Clinic name, # of rooms, HLD, sterilization, endoscopy, TB, Surgery, Pt visits per month, IP travel time, visits per year, hours per visit, hours per week

STAFFING CHALLENGES

- Recruitment and hiring practices in U.S. infection prevention and control departments: Results of a national survey
  - Vacant IP position reported by 25%
  - 56% reported positions vacant < 3 months; 24% 3-6 months and 15% 6-12 months
- Retirements
  - 52% anticipate in the next 1-2 years
- Non-acute care settings
  - Less than 50% of time officially dedicated to IPC

FINDINGS

- The IPC FTE needs of the system as a whole were underrepresented by 66% when using the lower staffing ratio benchmark of 0.5 FTE per 100 beds - 37.435 versus actual 108.40
- By 31% when using the higher staffing ratio benchmark of 1.0 FTE per 100 beds - 74.82 versus actual 108.40
- When aggregated across the organization, the comprehensive review results yielded a new benchmark of 1.0 IPC FTE per 69 beds for the enterprise, including all care settings requiring IPC oversight.

RECOMMENDATIONS

- Develop next-generation Universal Personal Protective Equipment (PPE)
- Normalize the use of mask by the general public
- Address supply chain failures
- IPC Expertise on Healthcare System Incident Command and Emergency Response Teams
  - CMS requires:
    - IPs serve on HI facility incident command and emergency preparedness teams
    - IP be consulted on policies/protocols that have any impact on disease transmission
    - IP lead or be a member of every team that develops crisis standards of care protocols related to PPE, anti-infective therapy and vaccinations
    - IP be involved in developing infectious disease surveillance (testing plans for patients, employees, and visitors)
    - IP in collaboration with the statistical/analytical team be responsible for analyzing and reporting pandemic surveillance data
**RECOMMENDATIONS**

- Properly trained personnel in long-term care, nursing homes and other high-risk settings:
  - CMS requires:
    - Each nursing home have at least one full-time dedicated IP; should be certified when possible and should have ongoing education
    - Additional NH staff be trained in the foundations of IP-reinforce the plan for surge capacity
    - Mandatory surveillance for HAIs be expanded

- Build surge capacity
- Increase capacity for testing and contact tracing

**WRITTEN POLICIES AND PROCEDURES**

- Approved by the infection prevention committee
- Reviewed and/or revised on a regular basis
- CMS annual review
- TJC every three years
- Facility wide policies
  - Hand hygiene
  - Transmission-based precautions
  - High level disinfection
- Department specific policies
  - Based on unique characteristics of the department (pharmacy, environmental services etc.,)

**EDUCATION AND TRAINING OF HEALTHCARE PERSONNEL ON INFECTION PREVENTION**

- Training should be adapted to reflect the diversity of the workforce and the type of facility, and tailored to meet the needs of each category of healthcare personnel trained
  - Job-specific, infection prevention education and training
  - Processes to ensure that personnel are competent
  - Written policies and procedures
  - Training before duties can be performed and at least annually
  - Additional training to recognized lapses in adherence

**ESSENTIAL ELEMENTS TO ADDRESS**

- All relevant healthcare personnel included in training
- Training conducted upon hire, before provision of care/specific procedures
- At least annually and when new equipment or protocols are introduced
- Include specific elements of competency by domain
- Require HCP to demonstrate competency following each training
- System of documentation of competency for each healthcare personnel

**COMPETENCY**

Assessment (return demonstration)
- Initial or Core Competency
- Orientation
- Ongoing competency
- Annually or when new skills/knowledge is introduced
- Specialized competency
- Related to area of specialization, such as infection prevention, disinfection/sterilization etc.

Competency-Based Training Tools
- CDC Targeted Assessment for Prevention (TAP) Implementation Tools
- Hand hygiene and gloving
- Urinary catheter insertion and maintenance
- Environmental cleaning
- World Health Organization
- Hand hygiene training kit
**MONITORING PERFORMANCE: AUDITS**

- Quality audits are performed to verify conformance to standards through objective review.
- Should be an opportunity for improvement and not punitive.
- Audits can assist the facility in:
  - Establishing a baseline of performance for each activity.
  - Identifying what needs to be improved, and
  - Targeting educational needs.

**WHAT IS HEALTH CARE QUALITY?**

- Department of Health and Human Services (HHS) established the National Quality Strategy.
- Priorities:
  - Better Care: patient-centered, reliable, accessible.
  - Healthy People/Healthy Communities: Support proven interventions.
  - Affordable Care: Reduce the cost of quality health care for individuals, families, employers and government.
- Agency for Healthcare Research and Quality (AHRQ) defines quality health care:
  - "as doing the right thing for the right patient, at the right time, in the right way to achieve the best possible results."

**INSTITUTE OF MEDICINE (IOM) [NATIONAL ACADEMY OF MEDICINE]**

- To Err is Human
  - Released in 1999 concluded that it is not acceptable for patients to be harmed by the healthcare system that is supposed to offer healing and comfort—a system that promises “first do no harm.”
- Crossing the Quality Chasm
  - Released in 2001 noted between the healthcare that we now have and the healthcare that we could have lies not just a gap but a chasm.
- Improving Diagnosis in Health Care
  - Released in 2015 stated “improving the diagnostic process is not only possible but also represents a moral, professional, and public health imperative.” The committee concluded that most people would experience at least one diagnostic error in their lifetime, sometimes with devastating consequences.

**HEALTH CARE QUALITY .. INFECTION PREVENTION**

- **Safe**: Patients should not be harmed by the care that is intended to help them.
- **Effective**: Services based on scientific knowledge.
- **Patient-Centered**: Care that is respectful and responsive.
- **Timely**: Reducing wait times and harmful delays.
- **Efficient**: Avoiding waste of supplies, resources.
- **Equitable**: No variation because of patient characteristics.

**INFECTION PREVENTION**

- **Safe**: Patients should not acquire a SSI as the result of a surgical procedure.
- **Effective**: Femoral site should not be used for CI access; surgical prophylaxis appropriate and timely.
- **Patient-Centered**: Patients on transmission-based precautions should not receive a lower standard of care.
- **Timely**: Antibiotics should be administered as ordered.
- **Efficient**: Appropriate use of PPE; identification and disposal of regulated medical waste; antibiotic stewardship.
- **Equitable**: Foley catheters should not be placed solely due to patient incontinence.

**WHY MEASURE PERFORMANCE?**

- There are many reasons why an organization should measure performance:
- **Quality Improvement.**
  - Measuring performance can tell you what you’re doing well so you can share your successes and reveal areas where you need to adjust. Measuring performance tells you whether you are achieving your goal of improving patient outcomes.
- **Transparency.**
  - Stakeholders outside of the organization—patients, funders, patient advocates—want to know about the quality of care being provided. Patients want information that allows them to make informed choices about their healthcare services. Sharing performance information can also help an organization gain support and funding for its programs.

U.S. Department of Health and Human Services Health Resources and Services Administration

**PATIENT, FAMILY AND CAREGIVER INFECTION PREVENTION EDUCATION**

- Include information about . . .
  - How infections spread
  - How they can be prevented
  - What signs or symptoms should prompt reevaluation and notification of the patient’s healthcare provider
  - Instructional materials and delivery should address varied levels of education, language comprehension, and cultural diversity
  - Provide education to patients, family members, visitors, and their caregivers.
KEY ELEMENTS – EMPLOYEE HEALTH

Immunize
Immunize against vaccine-preventable diseases
- Hepatitis B
- Influenza
- MMR
- Varicella
- Tetanus, diphtheria, pertussis
- COVID-19

Establish
Establish sick leave policies that encourage:
- Healthcare personnel to stay home when they are ill
- Reporting of signs, symptoms, and diagnosed illnesses that may represent a risk to their patients and coworkers

Adhere
Adhere to federal and state standards and directives applicable to protecting healthcare workers against transmission of infectious agents

INFECTION PREVENTION RISK ASSESSMENT

INFECTION CONTROL RISK ASSESSMENT IS ESSENTIAL TO INFECTION CONTROL PLAN

Infection Control Risk Assessment

Priorities

Goals

Infection Control Plan

https://www.cdc.gov/infectioncontrol/guidance/hospital.pdf

DETERMINE YOUR EVENTS

Scoring Each Event/Risk
- Probability- How likely is it to happen/occur?
- Risk Level- What degree of harm could occur; potential impact?
- Change Needed- Will treatment be needed for patient/staff?
- Preparedness- Are control measures in place, policies written, staff educated?

Final Risk Level
- Determine by adding score from each category (some tools multiply)
- Rank by top 3-5 highest scores to determine priorities and goals
What are your opportunities?

- Employee influenza vaccination compliance: 40% in 2019 (Goal 75%)

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**COMPREHENSIVE HOSPITAL PREPAREDNESS CHECKLIST FOR CORONAVIRUS DISEASE 2019 (COVID-19)**

All U.S. hospitals should be prepared for the possible arrival of patients with COVID-19. All hospitals should ensure their staff are trained, equipped and capable of practices needed to: (1) Prevent the spread of COVID-19 within the facility; (2) promptly identify and isolate patients with possible COVID-19 and inform the correct facility staff and public health authorities; (3) care for a limited number of patients with confirmed or suspected COVID-19 as part of routine operations; (4) Potentially care for a larger number of patients in the context of an escalating outbreak while maintaining adequate care for other patients; (5) monitor and manage any healthcare personnel that might be exposed to COVID-19; and (6) communicate effectively within the facility and plan for appropriate external communication related to COVID-19.


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**RISK ASSESSMENT TIPS**

- Proactive...prioritize risk or events that can cause harm
- No less than annual and/or revised during year as needed
- Multi-disciplinary approach
- Helps anticipate potentially preventable events and evaluate population served
  - Flu outbreak, hurricane (water/power loss), high number of oncology patients, use of central lines
- Use previous years data and regulatory requirements to begin
- Included in Infection Prevention Plan to assist with goal development

*Living, breathing document*
SURVEILLANCE PLAN

KEY CONCEPTS

- Surveillance is an essential component of an effective infection prevention program.
- Should be based on sound epidemiological and statistical principles.
- Should be designed in accordance with current recommended practices and consist of defined elements.
- Plays a critical role in identifying outbreaks, emerging infectious disease and bioterrorist events.

DEFINITION CONT’D

- “Surveillance is a comprehensive method of measuring outcomes and related processes of care, analyzing the data, and providing information to members of the healthcare team to assist in improving those outcomes and processes.”

WHY DO SURVEILLANCE?

- Education of HCP
- Reduce Infection Rates
- Establish Baseline Data (endemic)
- Select outcome or process
- Detection of Outbreaks
- Risk Stratify
- Report
- Recommended Practices for Surveillance
- Collect data
- Use Surveillance definitions
- Analyze
- Validate

ELEMENTS REQUIRED FOR AN INFECTION

- Chain of Infection:
  - Infectious agent
  - Reservoir
  - Portal of Exit
  - Portal of Entry
  - Means of Transmission
  - Susceptible host
- All of these factors are present in all healthcare settings.
TYPES OF SURVEILLANCE

• Total (or Whole) House Surveillance
• Targeted Surveillance
• Combination Surveillance Strategy

TOTAL (WHOLE HOUSE)

▶ Monitor:
  ▶ All infections
  ▶ Entire population
  ▶ All units

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monitor all infections</td>
<td>Overall rate not sensitive or risk-adjusted</td>
</tr>
<tr>
<td>Include entire population</td>
<td>No trends or comparison</td>
</tr>
<tr>
<td></td>
<td>Labor intense and inefficient use of resources</td>
</tr>
<tr>
<td></td>
<td>Not based on risk assessment</td>
</tr>
</tbody>
</table>

PRIORITY DIRECTED (TARGETED)

▶ Focus on:
  ▶ Care units
  ▶ Infections related to devices
  ▶ Invasive procedures
  ▶ Significant organisms – epidemiologically important
  ▶ High-risk, high-volume procedures
  ▶ Infections having known risk reduction methods

TARGETED SURVEILLANCE

<table>
<thead>
<tr>
<th>Pros</th>
<th>Cons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk-adjusted rates</td>
<td>May miss some infections</td>
</tr>
<tr>
<td>Can measure trends and make comparisons</td>
<td>Limited information on endemic rates</td>
</tr>
<tr>
<td>More efficient use of resources</td>
<td></td>
</tr>
<tr>
<td>Can target potential problems</td>
<td></td>
</tr>
<tr>
<td>Identify performance improvement opportunities</td>
<td></td>
</tr>
<tr>
<td>Can evaluate effectiveness of prevention activities</td>
<td></td>
</tr>
</tbody>
</table>

COMBINATION

▶ Monitor:
  ▶ Targeted events in defined populations and
  ▶ Selected whole-house events
▶ Pros:
  ▶ Rates are risk-adjusted
  ▶ Measure trends
  ▶ Target potential problems
  ▶ Track selected events house-wide
▶ Cons:
  ▶ May miss some infections

SELECTION OF PROCESSES AND OUTCOMES

Processes
  ▶ Hand hygiene
  ▶ Urinary Catheter insertion/maintenance

Outcomes
  ▶ Acute respiratory infections
  ▶ Urinary tract infections
  ▶ Skin/Soft Tissue Infections
  ▶ Gastroenteritis
WHAT SHOULD BE INCLUDED?

- Mandatory/required
- Frequency (incidence) of the infection
- Communicability
- System/patient cost (↑ morbidity, ↑ LOS, ↑ morbidity)
- Early Detection

**Surveillance activities should be re-evaluated annually as a component of the IP risk assessment**

COLLECTING SURVEILLANCE DATA

- Train personnel in data collection methods
- Develop a data collection form to fit the surveillance objective
- Determine the appropriate approach to surveillance concurrent (prospective) and/or retrospective
- Incorporate post-discharge surveillance for certain outcomes
- Collect data from a variety of sources (communication with caregivers)
- Be aware that passively obtained data may be biased

ORGANIZATION-SPECIFIC SOURCES OF POPULATION INFORMATION

- Medical records
- Financial services
- Quality/utilization management
- Surgical database
- Administrative/management reports
- Risk management
- Public health reports
- Community agencies
- Occupational Health
- Human resources records

APIC POSITION PAPER: THE IMPORTANCE OF SURVEILLANCE TECHNOLOGIES IN THE PREVENTION OF HEALTHCARE-ASSOCIATED INFECTIONS (HAIs)

- Streamline and facilitate efficient review of relevant data, promoting rapid identification of sentinel events and detection of outbreaks
- Expand and better define the scope of infection prevention activities
- Reduce infection prevention department time spent on surveillance and clerical tasks
- Improve response to public health issues
- Regulatory compliance
- Financial performance
- Potential to enhance antibiotic stewardship programs

CLINICAL DISAGREEMENT?

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Semiautomated</th>
<th>Fully Automated</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical data</td>
<td>Accurate, reliable (clinical data)</td>
<td>Accurate, reliable (clinical data)</td>
</tr>
<tr>
<td>Definition</td>
<td>Standardized; not specifically adapted to automation</td>
<td>Standardized; adapted to automation (healthcare-associated infection metric)</td>
</tr>
<tr>
<td>Initial ascertainment</td>
<td>Chart review required; some room for clinical judgment</td>
<td>No chart review; subjective interpretation impossible</td>
</tr>
<tr>
<td>Performance characteristics</td>
<td>High sensitivity, high negative predictive value</td>
<td>High specificity, high positive predictive value</td>
</tr>
<tr>
<td>Features</td>
<td>Clinical acceptance; room for adaptation within hospitals remains</td>
<td>Possible reduction in clinician burn-out; standardization, trade-off with sensitivity, specificity</td>
</tr>
</tbody>
</table>

**Surveillance Definitions** | **Clinical Diagnosis**

<table>
<thead>
<tr>
<th>Purpose</th>
<th>Identify trends within a population for prevention</th>
<th>Identify disease in, and treatment for, individual patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Components</td>
<td>Limited predetermined data elements</td>
<td>All diagnostic information available</td>
</tr>
<tr>
<td>Clinical Judgment</td>
<td>Excluded if possible</td>
<td>Valued</td>
</tr>
</tbody>
</table>

**Bottom Line:** At times clinical judgment and surveillance determinations will not match. Surveillance determinations always “trump” in epidemiologic surveillance.
THE ESSENTIALS OF SURVEILLANCE

- Know the protocol/criteria
- Consistently apply the criteria
- Report events meeting criteria; exclude those that don’t
- Others may be trained to screen data sources, but the IP must make the final determination
- Retrospective chart review should only be used when patients are discharged before all information can be gathered
- Concerns about the criteria should be sent to NHSN-NOT addressed by non-reporting of events or facility adjudication


STANDARDIZED DEFINITIONS

KEY TERMS

**NHSN Infection Window Period:**

The 7-day period: in which all site-specific infection criteria must be met. It includes the collection date of the first positive diagnostic test that is used as an element to meet the site-specific infection criterion, the 3 calendar days before and the 3 calendar days after.

For site-specific infection criteria that do not include a diagnostic test, the first documented localized sign or symptom that is an element of NHSN infection criterion should be define the window

Summary of NHSN Components

- Healthcare-associated Infections
- Outpatient Setting...
- Hospital Acquired Infections
- Nosocomial Infections

Purpose of NHSN

**Original**
- Collect data from a sample of US healthcare facilities
- Analyze and report collected data to permit recognition of trends
- Provide facilities with risk-adjusted data
- Assist facilities in developing systems to recognize safety problems and intervene
- Conduct collaborative research

**Ongoing**
- Data repository for CMS and State mandates for reporting of healthcare associated infections

Chapter 1: National Healthcare Safety Network (NHSN) Overview
Chapter 2: Monitoring Healthcare-associated Infections (HAI) for NHSN Surveillance
Chapter 3: Infection Control Plan and Annual Summary
Chapter 4: Healthcare-associated Infections, Level of Care (LOC), and their associated Healthcare-associated Infections (HAI)
Chapter 5: Central Line Infection Practices (CLIP) Adherence Monitoring
Chapter 6: Pneumonia (Vanderbilt-associated)/VAP and non-vanderbilt-associated Pneumonia (PNSU) Event
Chapter 7: Urinary Tract Infection (UTI) and non-UTI (Urinary Tract Infection UTI) and other Urological System Infections (USI) Events
Chapter 8: Surgical Site Infection (SSI) Event
Chapter 9: Healthcare-associated Infections (HAI)
Chapter 10: Central Line Infection Practices (CLIP)
Chapter 11: Multidrug-resistant Organism & Categorization (MRSA) Infections (MRSO) Module
Chapter 12: CDC Locations and Descriptions and Instructions for Mapping Patient Care Locations
Chapter 13: (General) Key terms
**KEY TERMS**

- **Date of Event (DOE)**
  - The date the first element used to meet an NHSN site-specific infection criterion occurs for the first time within the seven-day infection window period

  Note: The element MAY have been present before the infection window period

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<table>
<thead>
<tr>
<th>Hospital Day</th>
<th>RIT</th>
<th>Infection Window</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3 DOE</td>
<td>3</td>
<td>Fever &gt;38.0°C</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>Urine culture + &gt;10³ cfu/ml E. Coli</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td></td>
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<tr>
<td>6</td>
<td>6</td>
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<td>13</td>
<td>13</td>
<td></td>
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<tr>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td></td>
<td>SUTI-HAI E. Coli</td>
</tr>
</tbody>
</table>

**PRESENT ON ADMISSION CONT’**

- Acceptable documentation:
  - Patient-reported signs or symptoms documented in the medical record by a healthcare professional (must be in your facility medical record documentation).
  - Example documented in the current facilities medical record
    - Patient states measured fever > 38.0°C or >100.4°F occurring in the POA timeframe
    - Nursing home reports fever prior to arrival at the hospital and occurring in the POA timeframe
    - Patient complains of dysuria
    - Copy of laboratory test result from another facility
  - Physician diagnosis can be accepted only when physician diagnosis is an element of the specific infection criteria

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**KEY TERMS**

- Healthcare-associated infection (HAI)
  - The date of event occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission is calendar day 1

---

**KEY TERMS**

- **Present on Admission (POA)**
  - When the date of “event” occurs during the POA time period.
  - Defined as the day of admission to an inpatient location (calendar day 1), the 2 days before admission, and the calendar day after admission.

<table>
<thead>
<tr>
<th>Hospital Day</th>
<th>Date of Event</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 days admit</td>
<td>Hospital Day 1</td>
<td>POA</td>
</tr>
<tr>
<td>1 day admit</td>
<td>Hospital Day 1</td>
<td>POA</td>
</tr>
<tr>
<td>Admission</td>
<td>Hospital Day 1</td>
<td>POA</td>
</tr>
<tr>
<td>Day 2</td>
<td>Hospital Day 2</td>
<td>HAI</td>
</tr>
<tr>
<td>Day 3</td>
<td>Hospital Day 3</td>
<td>HAI</td>
</tr>
<tr>
<td>Day 4</td>
<td>Hospital Day 4</td>
<td>HAI</td>
</tr>
<tr>
<td>Day 5</td>
<td>Hospital Day 5</td>
<td>HAI</td>
</tr>
</tbody>
</table>

**Location of Attribution (LOA)**

- The inpatient location where the patient was assigned on the day of event is the LOA. Non-bedded patient locations (OR, IR) not eligible.

**Transfer Rule:**

- If the date of event (not all elements) is on the date of transfer or discharge or the next day, the infection is attributed to the transferring, discharge location.

**Vital Signs:**

- For fever use the temperature documented in the patient’s medical record.
- If a specific value for a vital sign is not stated in a CDC/NHSN HAI definition criterion, (hypotension) the facility should use the vital sign parameters as stated in its policies and procedures for clinical practices.
KEY TERMS

- **Repeat Infection Timeframe (RIT)**
  - A 14-day timeframe during which no new infections of the same type are reported.
  - The date of event is Day 1 of the 14-day RIT.
  - Additional pathogens recovered during the RIT from the same type of infection are added to the event.
  - Applies during a patient’s single admission including the day of discharge and the day after.
  - May have negative cultures during RIT
  - Do not change device-association determination during RIT

SUTI identified, Foley placed and while still in RIT meets definition for CAUTI. Add pathogen to initial event and do not change the SUTI to CAUTI.

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KEY TERMS

- **Secondary BSI Attribution Period (SBAP):**
  - Is the period in which a positive blood culture must be collected to be considered as a secondary bloodstream infection to a primary site infection
  - This period includes the Infection Window Period combined with the Repeat Infection Timeframe (RIT). It is 14-17 days in length depending upon the date of event.
  - For SSI surveillance a 17-day period that includes the date of SSI event 3 days prior and 13 days after, is still used to attribute a BSI as secondary to an SSI

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TIDBITS OF INTEREST

- Additional pathogens recovered during the RIT from the same type of infection are added to the event
  - Example: SUTI with E. coli; during RIT SUTI with S. aureus; add S. aureus to initial event
- BSI pathogens may be assigned to more than one infection source at the same time
  - Example: SUTI and IAB
- In instances where a patient has been transferred to more than one location on the date of an infection, or the day before, attribute the infection to the first location in which the patient was housed the day before the infection’s date of event
  - Example: 3/22: Unit A 3/23: Unit A, Unit B, Unit C 3/24: Unit C, Unit D (Definition of CAUTI met). Assign to Unit A

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APPLYING RISK STRATIFICATION METHODOLOGY

- Foster understanding and acceptance by recipients of the data
- Explain how the data has been stratified by risk
- Allows comparisons to be made
- Facilitate validity of interventions
**NHSN 2006-2008 SUMMARY:**

**CLABSI IN LEVEL III NICUS**

Central line-associated BSI rate

<table>
<thead>
<tr>
<th>Birth Weight</th>
<th>Central line days</th>
<th>No. of CLABSI</th>
<th>Pooled Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤750 g</td>
<td>122,272</td>
<td>481</td>
<td>3.9</td>
</tr>
<tr>
<td>751-1000 g</td>
<td>111,293</td>
<td>373</td>
<td>3.4</td>
</tr>
<tr>
<td>1001-1500g</td>
<td>112,926</td>
<td>276</td>
<td>2.4</td>
</tr>
<tr>
<td>1501-2500g</td>
<td>90,384</td>
<td>216</td>
<td>2.4</td>
</tr>
<tr>
<td>&gt;2500g</td>
<td>82,677</td>
<td>157</td>
<td>1.9</td>
</tr>
</tbody>
</table>

AJIC 2009;37:783-805

**REPORTING AND USING SURVEILLANCE INFORMATION**

- A plan for the distribution of surveillance information should be incorporated into the development of each surveillance component
- Surveillance (should) go to those health care providers who are most able to impact and improve patient care

**VALIDATE SURVEILLANCE DATA**

“In the context of powerful inducements for facilities to “look good”, meaningful external validation is essential to assure that NHSN surveillance meets the requirements for which it was intended; that outcomes for reporting facilities are appropriate, that NHSN data are credible, and that the focus of NHSN surveillance will be better patient care.”

**WHY WE SHOULD VALIDATE**

- State Health Department validations of central line-associated bloodstream infection events reported to NHSN-as of July 30, 2017
- 23 state health departments:
  - Sensitivity 82.9%
  - Specificity of 98.5%
- Reasons:
  - Incorrect secondary BSI attribution
  - Misapplication of CLABSI definition
  - Missed case finding
  - Misapplication of LCBSI 2 definition and general NHSH definition
  - Clinical judgement over surveillance criteria

AJIC Volume 46, Issue 11, November 2018 Pages 1290-1295

**WHY WE SHOULD VALIDATE**

- Accuracy of catheter-associated urinary tract infections reported to NHSN January 2010 – July 2018
- 19 state health departments:
  - Sensitivity 88.3%
  - Specificity of 98.8%
- Among misclassification:
  - 66% were underreported
  - 34% overreported
- Reasons:
  - Misapplication of CAUTI definition
  - Misapplication of general HAI definition
  - Clinical judgement over surveillance criteria

AJIC Volume 48, Issue 2, February 2020 Pages 207-211

**NORTH CAROLINA VALIDATION STUDY**

*FOUR PHASES; 7/2009-6/2011*

**Sensitivity estimate (95% C.I.)**

- CLABSI: 72.6% (69.2%, 75.9%)
- CAUTI: 73.8% (68.2%, 79.4%)

**Specificity estimate (95% C.I.)**

- CLABSI: 97.1% (96.5%, 97.7%)
- CAUTI: 91.4% (90.1%, 92.8%)

Unpublished data
NORTH CAROLINA VALIDATION STUDY
CONDUCTED IN 2015

Sensitivity estimate
• CLABSI: 79%
• C difficile: 53%

Specificity estimate
• CLABSI: 100%
• C difficile: 88%

Unpublished data

“Good surveillance does not necessarily ensure the making of the right decision, but it reduces the chances of wrong ones.”

Alexander D. Langmuir

Unpublished data

“Science is bound, by the everlasting vow of honour, to face fearlessly every problem which can be fairly presented to it.”

Lord Kelvin

Data: Analysis and Presentation—April 26th

Emily Sickbert-Bennett, M.S., PhD., CIC
Director for Hospital Epidemiology, UNC

It’s QUESTION TIME!!