

Welcome to *California*



Building Confidence in Reported HAI Data: Success and Challenges from State-based Validation Efforts in California and Beyond

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The views expressed in this presentation do not necessarily reflect the position of the California Department of Public Health

Nothing to Disclose



Today's Presentation

1. Describe the 2011 HAI data validation process in 100 California hospitals
2. Compare and contrast to other states' validation efforts
3. Propose a set of expectations for HAI data validation in the current public reporting era



HAI Data Validation Defined

For this discussion

- Assessment of the accuracy and completeness of HAI surveillance and reporting
- Surveillance based on a standardized protocol and case definitions
- External oversight



HAI Liaison Program

- Launched January 2010, funded by ARRA grant through CDC
- Developed as the prevention and outreach arm of the newly formed CDPH Healthcare-Associated Infections program
- Implement state-mandated HAI surveillance and reporting via NHSN
 - April 2010: Facility-wide CLABSI, CDI, MRSA & VRE BSI
 - April 2011: SSI, 2 procedures (June 2011: 29 procedures)
- Experienced IPs regionally located throughout state to provide consultation and support to California's 400 hospitals

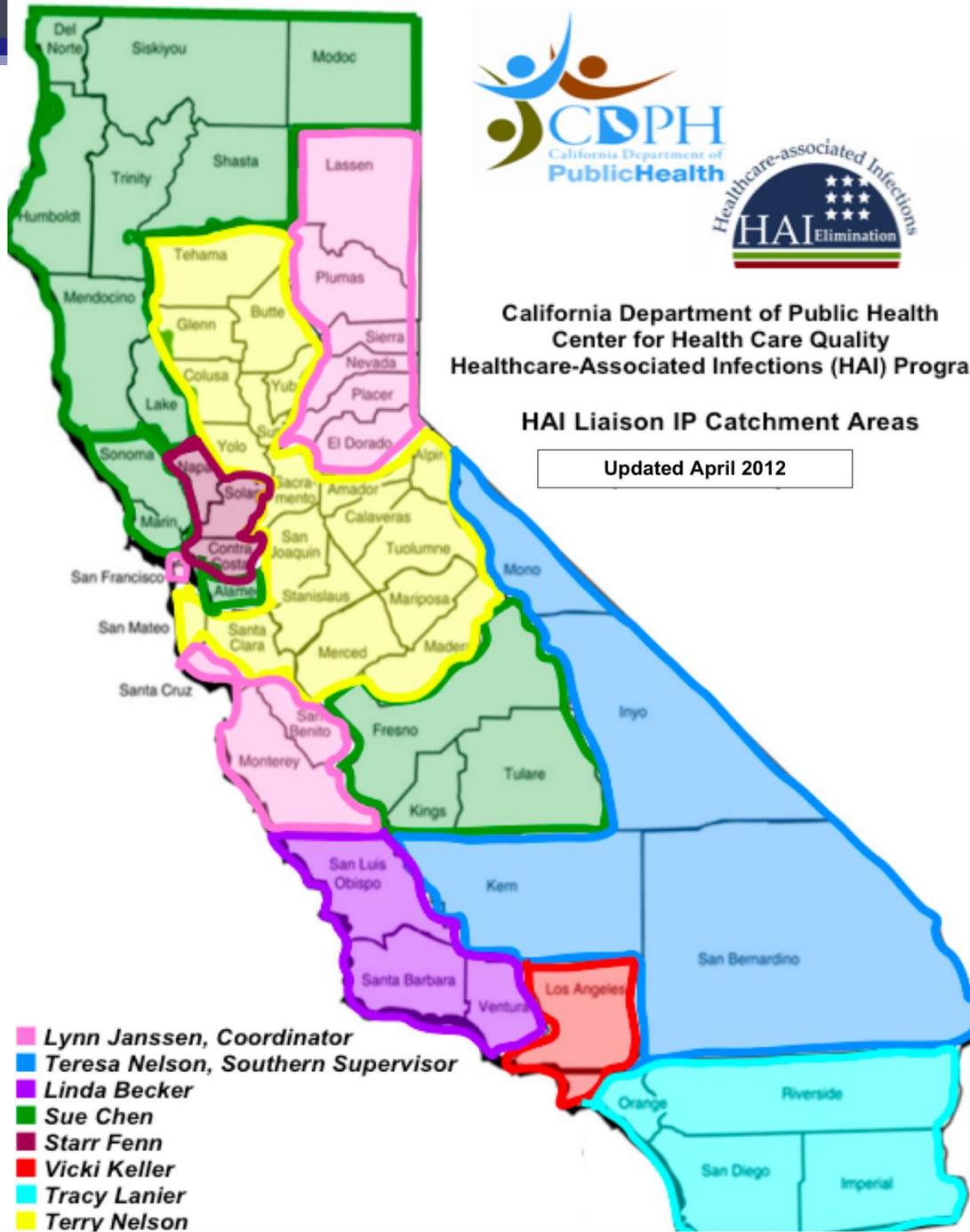




California Department of Public Health
Center for Health Care Quality
Healthcare-Associated Infections (HAI) Program

HAI Liaison IP Catchment Areas

Updated April 2012



- Lynn Janssen, Coordinator
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- Linda Becker
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Surveillance Objectives of CDC Grant, 2011-2012

- Enhance participation in the **National Healthcare Safety Network** (NHSN) for HAI surveillance and reporting
- Support the **use of NHSN data** for local HAI prevention efforts
- Develop and implement protocols for **NHSN data validation**



Common Steps for HAI Data Validation

- 1) Select hospitals
- 2) Develop sampling framework
- 3) Select patient population for review
- 4) Abstract data from medical records
- 5) Use findings to improve surveillance

CDC, 2009



Our Objectives of HAI Data Validation, 2011

HAI Program Liaison IPs performed onsite data validation to

- Gain a better understanding of how NHSN surveillance protocols were understood and being applied
- Provide immediate one-on-one education and coaching to volunteer hospitals
- Develop targeted education and training to all CA hospitals based on common errors, identified gaps, misinterpretations

What this validation process was NOT:

- A research study
- Formal evaluation of HAI reporting implementation

Findings may not be generalizable



Our Validation Tenets

- External *Performed by CDPH HAI Liaison IPs*
- Independent *Reviews done by CDPH reviewers working alone*
- Voluntary *Non-regulatory, learning & quality improvement process*
- Reproducible *Validation process can be duplicated by hospital*
- “Real practice” model *Follows a process hospital IPs should use to perform HAI surveillance*
Comprehensive review of positive labs for 3 month time period
“Census” sample (no records targeted a priori)

Validation Process

- All CA hospitals invited to participate; >100 volunteers
- 1-2½ day onsite review by 1-2 experienced CDPH IPs
 - 3-months laboratory data (positive blood cultures and tests for *C. difficile*)
 - Access to medical records
 - Standardized process and forms
- Assessed completeness and accuracy of reporting for
 - CLABSI
 - CDI (LabID)
 - MRSA BSI (LabID)
 - VRE BSI (LabID)

For LabID, we did not distinguish between (nor collect information on) community-onset vs. hospital-onset cases

Determining # Months of CLABSI Review

STEP 1: From positive blood cultures from **Inpatients only**, indicate total each **MONTH**:

Month _____ # _____ Month _____ # _____ Month _____ # _____

STEP 2: Determine number of months to include in CLABSI validation.

| <i>If total inpatient positive blood cultures in 3 mo. is</i> | <i>Perform review for</i> | |
|--|----------------------------------|--|
| ≤ 60 | <i>all 3 months</i> | |
| >60 and <120 | <i>2 months</i> | <i>Select the month with the greatest #, then a 2nd month that makes a 2-month total closest to 60</i> |
| ≥ 120 | <i>1 month</i> | <i>Select the month with the greatest #</i> |

In general, starting with 60 positive blood cultures results in approximately 40-55 infectious event "clusters" and will result in in-depth chart review of 10-15 records. The remaining generally require only cursory review to identify or rule out CLABSI (often accomplished using data available through EMR systems). The likelihood of identifying CLABSI is based on your underlying rate and the number of positive blood cultures you include in your validation.

Completing the Validation Process

- Results of validation findings reviewed and left with the hospital prior to exit
 - Presented to hospital IP/epidemiologist and leadership
 - Provided immediate onsite education, coaching, and discussion to improve HAI surveillance and reporting
 - Hospitals expected to correct data in NHSN based on validation findings
- No hospital identifiers recorded on any validation forms or materials
 - Date and reviewer's initials removed from all forms immediately following data entry
 - Identifiable hospital results not maintained by CDPH
 - Only aggregate findings

Findings Presented

- **Sensitivity**
 - Proportion of HAI identified – measures case-finding
- **Specificity**
 - Proportion appropriately not identified – measures ability to “rule out”
- **Positive Predicted Value**
 - Proportion identified as HAI that meets the surveillance definition

| | | | |
|------------------------------|------------|-------------------------------|-----------------|
| | | HAI Liaison Program IP Review | |
| | | HAI | Not an HAI |
| Hospital Surveillance Report | HAI | True positives | False positives |
| | Not an HAI | False negatives | True negatives |

Positive Predictive Value

$$\frac{\text{True positives}}{\text{True positives} + \text{False positives}} \times 100$$



Sensitivity

$$\frac{\text{True positives}}{\text{True positives} + \text{False negatives}} \times 100$$

Specificity

$$\frac{\text{True negatives}}{\text{True negatives} + \text{False positives}} \times 100$$



CLABSI Validation – Form B BSI Events Table

Instructions:

1. Fill in first specimen date for each BSI event in table below. Numbers should correspond to laboratory line list (see Form A).
2. Produce CLABSI line list for the 1,2, or 3-month review period using NHSN Analysis. Also print NHSN Event record for each reported CLABSI.
3. For each numbered BSI event, answer Q1 by referring to your NHSN line list. For cases reported to NHSN, record NHSN Event #. If CLABSI found on your NHSN list but were not on lab line list, add to the bottom of the table.
4. For each BSI event, review patient's medical record to verify your decision to report or not report as CLABSI to NHSN. Carefully follow NHSN protocols and surveillance definitions; refer to them often.
 - o For each CLABSI **Reported** to NHSN, complete a Form C, CLABSI Validation Review. Record info on table in 1 of 2 columns as shown.
 - o For each BSI event **NOT** reported to NHSN, indicate reason why in the appropriate column. Use Form D as worksheet if needed. If BSI event should have been reported as a CLABSI but was not, record as missed. Indicate a reason the case may have been missed.
5. Complete Form E, CLABSI Validation Findings.

When review complete, make all needed corrections to your data in NHSN!

BSI Events Table.

| Lab list # | First positive blood culture of each BSI Event Specimen date | Admission date | Q1. Was Event reported to NHSN as a CLABSI? | | If YES to Q1 Perform medical record review, complete Form 5 , then fill in 1 of columns below | | If NO to Q1 Perform medical review. Use BSI review work sheet if helpful. Stop as soon as you can complete one of the columns below. | | | | | | |
|------------|---|----------------|---|--------------------------|---|---|---|--|---|--|---|--------------------------|--------------------------|
| | | | YES √ NHSN Event# | NO √ | Not a CLABSI Reported in error Why? | *Data fields correctly reported to NHSN? √ If NO, List | NO central line or no line in previous 48 hours | Present on admission and not discharged in previous 48 hours | Contaminant i.e. Common skin commensals Single +bld cx ≥2 +bld cx but no S/S | Secondary BSI Primary site of infection | MISSED CLABSI Should have been reported | | |
| 1 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 2 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 3 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 4 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 5 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 6 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 7 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 8 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 9 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| 10 | ___/___/11 | ___/___/11 | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

Column totals: _____

Data Validation for CLABSI

Hospital: _____

Surveillance time period: _____

From BSI Events Table, Form 4

| | | Validation Review | |
|--|--|--------------------|-----------------------------------|
| | | CLABSI | Not CLABSI |
| # positive blood culture events reviewed = _____ | | A | B <i>Reported in Error</i> |
| Identified and Reported by Hospital | CLABSI _____ <i>Form B, total Q1 = Yes</i> | C <i>Missed</i> | D |
| | Not CLABSI _____ <i>Form B total Q1 = No</i> | | |

Sensitivity = $\frac{A}{A + C} \times 100 =$ _____

Specificity = $\frac{D}{D + B} \times 100 =$ _____

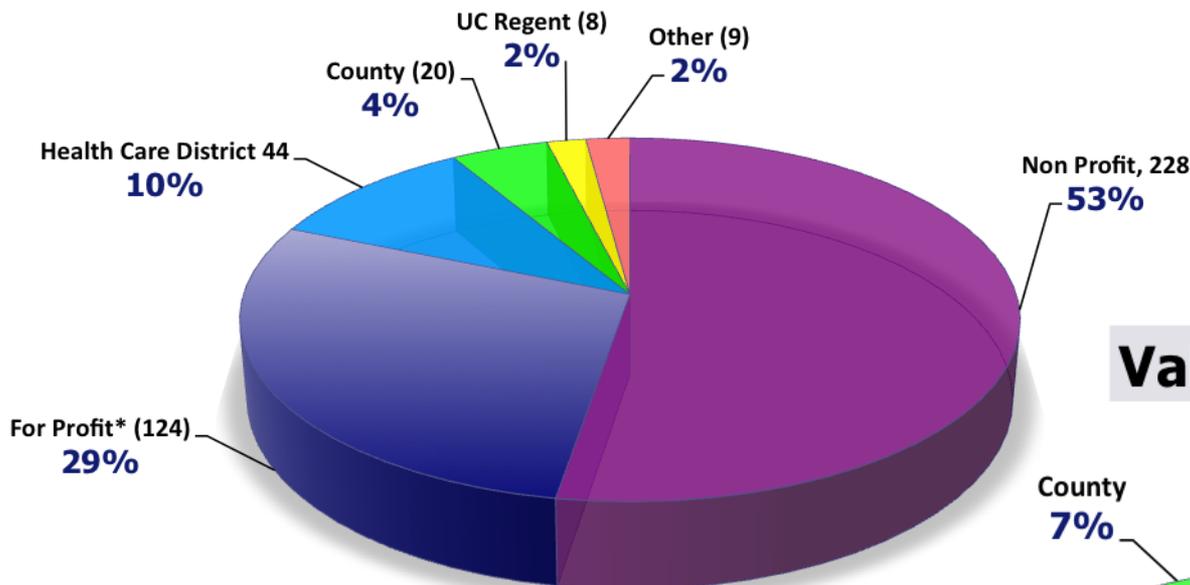
Positive Predictive Value = $\frac{A}{A + B} \times 100 =$ _____

Validation Volunteer Hospitals Compared to All Hospitals

| | California | Validation Sample |
|-----------------------------|------------|-------------------|
| Acute care hospitals | 433 | 100 |
| Counties with hospitals | 57 | 33 |
| Northern hospitals | 197 (45%) | 47 (47%) |
| Southern hospitals | 236 (55%) | 53 (53%) |
| LA County hospitals | 101 (23%) | 25 (25%) |
| Rural hospitals | 63 (15%) | 15 (15%) |
| Critical Access hospitals | 28 (6%) | 6 (6%) |
| Pediatric hospitals | 12 (3%) | 1 (1%) |
| Teaching hospitals | 83 (19%) | 28 (28%) |
| Bed size, mean | 210 | 255 |

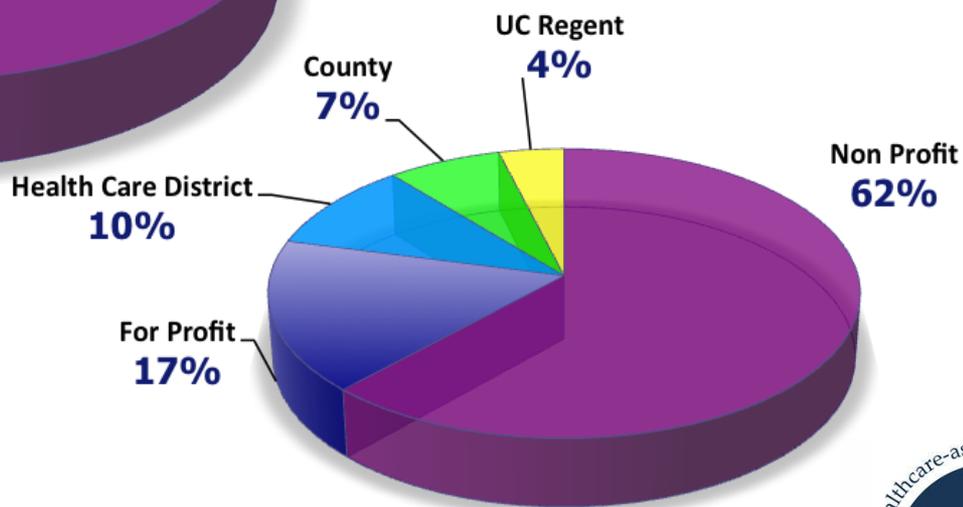
Hospital License Type

All CA Hospitals, N=433



*Includes for-profit, limited

Validation Hospitals, N=100



Quick Review of NHSN CLABSI Surveillance Definition

Criteria are:

- ✓ One or more positive blood cultures (depending on organism)
- ✓ Presence of central line currently or within previous 48 hours
- ✓ Clinical review to determine:
 - Primary bloodstream infection, not due to infection at another site
 - Not present on admission
 - Not due to contamination during blood draw

CLABSI Validation Findings

| | | |
|---|-------|--------------|
| Positive blood culture “events” reviewed: | 4,099 | 97 hospitals |
| CLABSI reported: | 135 | 52 hospitals |
| Reported in error: | 23 | 19 hospitals |
| CLABSI not identified, not reported: | 68 | 42 hospitals |

Agreement could not be reached for only 8 unreported CLABSI

| Sensitivity | Specificity | Positive Predictive Value |
|-------------|-------------|---------------------------|
| 62.0% | 99.4% | 82.3% |

55 hospitals identified and reported ALL CLABSI; none were missed

Most Common Reasons CLABSI Reported in Error or Missed

1. Incomplete review of all positive blood cultures
 - Data source used for routine surveillance excluded lab results
 - “Lack of time;” making assumptions to rule in or out
2. Not following or not understanding surveillance definitions, especially
 - Especially whether positive blood culture represents a primary infection (CLABSI) or is secondary to another infection

Lessons Learned for Improving CLABSI Surveillance

1. Review every positive blood culture from inpatients
2. Using available data systems, determine presence of central line during hospitalization
3. Know and apply surveillance definitions consistently
 - Identify primary site of infection to determine whether CLABSI or secondary BSI
4. Perform internal validation (min. once/year)

Quick Review of NHSN CDI/MDRO LabID Surveillance Protocol

✓ Identify positive lab results

| | | |
|-----------------|--|--|
| CDI | Report all inpatient <i>C.difficile</i> toxin positive tests (PCR, assay, culture) | If lab result from ED or outpatient, report only if patient was admitted to hospital the same calendar day |
| MRSA BSI | Report all inpatient <i>S.aureus</i> -positive blood cultures resistant to oxacillin, methicillin, or cefoxitin and/or other MRSA+ blood tests | |
| VRE BSI | Report all inpatient <i>Enterococcus</i> -positive blood cultures resistant to vancomycin and/or other VRE+ blood test | |

For inpatient LabID surveillance, ignore positive lab tests done in outpatient settings if patient not admitted

✓ Do not report another of the same positive lab if from same patient on the same hospital unit until >14 days after previous

Validation Findings for MDRO (LabID)

| | CDI | MRSA BSI | VRE BSI |
|--|---|--|---|
| Description of labs reviewed | ED & inpatient <i>C difficile</i> toxin-positive tests, 3 mo. | ED & inpatient MRSA positive bloods, 3 mo. | ED & inpatient VRE positive bloods, 3 mo. |
| Labs reviewed by validators | 3000 | 1300 | 239 |
| Reported by hospitals | 2172 | 442 | 112 |
| Reported in error * (should <i>not</i> have been reported) | 55* | 15* | 4* |
| Not identified by hospital (should have been reported) | 221 | 150 | 41 |
| | | | |
| Sensitivity | 90% | 74% | 73% |
| Specificity | 92% | 98% | 96% |
| PPV | 97% | 97% | 96% |

*Actual number is slightly lower; validators' error in protocol interpretation for facility-wide surveillance

Most Common Reasons CDI or MRSA/VRE BSI Reported in Error or Missed

1. Incomplete identification of all positive lab findings
 - Data source used for routine surveillance missing lab results
 - Lab result not followed up or just missed
2. Not following or not understanding surveillance rules, especially
 - Related to patient admission dates
 - Duplicate test results
 - “Over-thinking” lab-based criteria

Lessons Learned for Improving CDI & MRSA/VRE BSI Surveillance

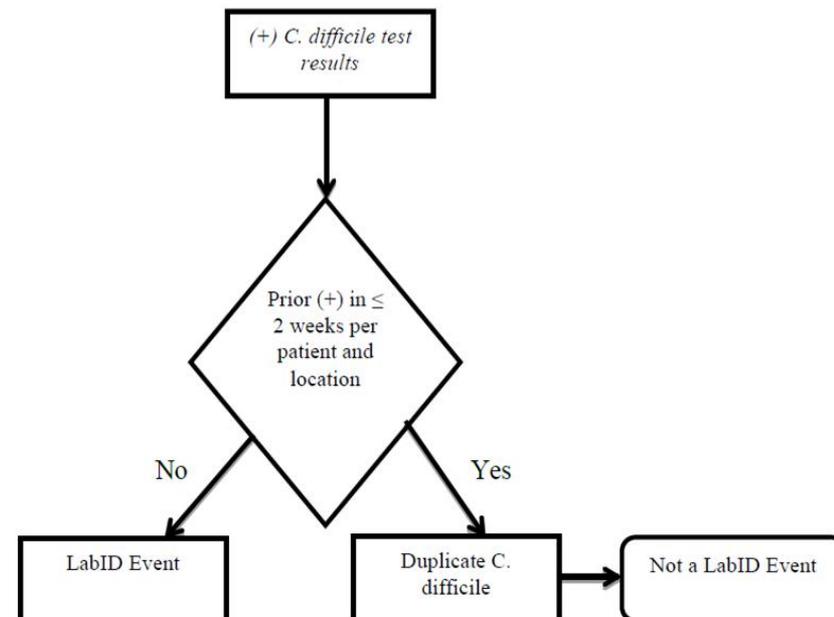
1. Let the LabID algorithm work

- Clinical review not required
- Report every case



MDRO and CDI Ma

Figure 2. *C. difficile* test Results Algorithm for Laboratory-Identified (LabID) Even



2. Perform internal validation to ensure receipt of all lab data

- Compare data sources
- Ensure final results reported, with clear MDRO status

Using Validation Findings to Improve Surveillance and Prevention

Outreach to all hospitals

- Review findings, highlight surveillance gaps
- Practice surveillance using case scenarios
- Teach use of forms for internal data validation using

“Road shows” - 17 cities, May-July 2012

301 attendees from 182 hospitals

Distance-learning - Sept-Oct 2012

564 attendees, 99 additional hospitals



ORIGINAL ARTICLE

Statewide Validation of Hospital-Reported Central Line–Associated Bloodstream Infections: Oregon, 2009

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(See the commentary by Arnold and Thompson, on pages 446–448.)

BACKGROUND. Mandatory reporting of healthcare-associated infections is common, but underreporting by hospitals limits meaningful interpretation.

OBJECTIVE. To validate mandatory intensive care unit (ICU) central line–associated bloodstream infection (CLABSI) reporting by Oregon hospitals.

DESIGN. Blinded comparison of ICU CLABSI determination by hospitals and health department–based external reviewers with group adjudication.

SETTING. Forty-four Oregon hospitals required by state law to report ICU CLABSIs.

PARTICIPANTS. Seventy-six patients with ICU CLABSIs and a systematic sample of 741 other patients with ICU-related bacteremia episodes.

METHODS. External reviewers examined medical records and determined CLABSI status. All cases with CLABSI determinations discordant from hospital reporting were adjudicated through formal discussion with hospital staff, a process novel to validation of CLABSI reporting.

RESULTS. Hospital representatives and external reviewers agreed on CLABSI status in 782 (96%) of 817 bacteremia episodes ($\kappa = 0.77$ [95% confidence interval (CI), 0.70–0.84]). Among the 27 episodes identified as CLABSIs by external reviewers but not reported by hospitals, the final status was CLABSI in 16 (59%). The measured sensitivities of hospital ICU CLABSI reporting were 72% (95% CI, 62%–81%) with adjudicated CLABSI determination as the reference standard and 60% (95% CI, 51%–69%) with external review alone as the reference standard ($P = .07$). Validation increased the statewide ICU CLABSI rate from 1.21 (95% CI, 0.95–1.51) to 1.54 (95% CI, 1.25–1.88) CLABSIs/1,000 central line–days; ICU CLABSI rates increased by more than 1.00 CLABSI/1,000 central line–days in 6 (14%) hospitals.

CONCLUSIONS. Validating hospital CLABSI reporting improves accuracy of hospital-based CLABSI surveillance. Discussing discordant findings improves the quality of validation.

HAI Data Validation by State HDs

- 15 states have performed 1 or more validation studies
- Processes vary widely
 - Mandatory vs. voluntary
 - All hospitals vs. sample vs. targeted (determined by those with high &/or low reported incidence)
 - Annually vs. periodically (or “one-time”)
 - Eligible time frames from 1-3 months to 2 years
 - Reviewers blinded vs. not blinded to reported CLABSI
 - Charts selected by probability sample (stratified or random) vs. convenience sample
- Results not comparable

CLABSI Data Validation by State

| | Year | Scope | % of All Hosp in State | No. Hosp validated | Records per Hosp (mean) | Sens | Spec | PPV |
|-----------|-------------|------------------|------------------------|--------------------|-----------------------------------|-----------|-----------|-----------|
| | | | | | | | | |
| CA | 2011 | Hosp-wide | 23% | 100 | 41+Bld Cx ~10 in-depth | 62 | 99 | 82 |
| CO | 2010 | ICU | 45% | 31 | 6 | 66 | 100 | 100 |
| CT | 2008 | ICU | 100% | 30 | 7 | 48 | 99 | 85 |
| MD | 2009 | ICU | 100% | 46 | 5 | 92 | 94 | 90 |
| NY | 2007 | ICU | 80% | 147 | 5 | 74 | 90 | -- |
| | 2008 | ICU | 71% | 130 | 5 | 69 | 98 | -- |
| | 2009 | ICU | 88% | 157 | 5 | 73 | 99 | -- |
| OR | 2009 | ICU | 100% | 44 | 6 | 72 | 99 | 92 |
| PA | 2009 | ICU | 5% | 12 | 13 | 90 | 91 | 73 |
| SC | 2010 | ICU | 43% | 29 | 17 | 96 | 95 | 88 |
| TN | 2008 | ICU | 9% | 14 | 16 | 78 | 98 | 92 |
| VA | 2010 | ICU | 51% | 37 | 13 | 97 | 100 | 100 |

HAI Data Validation in Washington State

- Based on quality management system ISO9001; endorsed by ASQ
- Establishes sample size and acceptance thresholds (in accordance with ISO2859)
- Performed annually using a tiered method
 1. Hospital performs internal self-assessment of 22 patient records; submits results to State HAI Program
 2. State HAI Program performs verification visits
 - Systematic sample of 40 records
 - 20 reviewed; if hospital “fails” (>1 error) additional 20 reviewed
 - Remediation plans developed for hospitals that fail (≥ 5 errors in 40 records) – all hospitals must achieve min. 85% sensitivity

Validation results cannot be released per state law

SSI Data Validation

- SSI surveillance requires identification of cases via multiple clinical indicators; cannot rely on laboratory data
- Validation of SSI data requires different “flags” to identify potential infections not identified by hospital surveillance
 - Excessive lengths of stay by procedure type
 - ICD9 codes that may indicate infectious process

Example

| | | |
|------|---|--|
| KPRO | 730(.08) 996.66-.67 998.31-32 998.5 (.51 and .59) 998.83 | Osteomyelitis, bone abscess Infection due to internal prosthetic device Disruption of surgical wound Postoperative infection (seroma and abscess) Non-healing surgical wound |
|------|---|--|

ORIGINAL ARTICLE

Use of Administrative Data in Efficient Auditing of Hospital-Acquired Surgical Site Infections, New York State 2009–2010

Valerie B. Haley, MS;¹ Carole Van Antwerpen, RN, BSN, CIC;¹ Boldtsetseg Tserenpuntsag, DrPH;¹
Kathleen A. Gase, MPH, CIC;¹ Peggy Hazamy, RN, BSN, CIC;¹ Diana Doughty, RN, MBA, CIC, CPHQ;¹
Marie Tsivitis, MPH, CIC;¹ Rachel L. Stricof, MPH, CIC^{1,2}

OBJECTIVE. To efficiently validate the accuracy of surgical site infection (SSI) data reported to the National Healthcare Safety Network (NHSN) by New York State (NYS) hospitals.

DESIGN. Validation study.

SETTING. 176 NYS hospitals.

METHODS. NYS Department of Health staff validated the data reported to NHSN by review of a stratified sample of medical records from each hospital. The four strata were (1) SSIs reported to NHSN; (2) records with an indication of infection from diagnosis codes in administrative data but not reported to NHSN as SSIs; (3) records with discordant procedure codes in NHSN and state data sets; (4) records not in the other three strata.

RESULTS. A total of 7,059 surgical charts (6% of the procedures reported by hospitals) were reviewed. In stratum 1, 7% of reported SSIs did not meet the criteria for inclusion in NHSN and were subsequently removed. In stratum 2, 24% of records indicated missed SSIs not reported to NHSN, whereas in strata 3 and 4, only 1% of records indicated missed SSIs; these SSIs were subsequently added to NHSN. Also, in stratum 3, 75% of records were not coded for the correct NHSN procedure. Errors were highest for colon data; the NYS colon SSI rate increased by 7.5% as a result of hospital audits.

CONCLUSIONS. Audits are vital for ensuring the accuracy of hospital-acquired infection (HAI) data so that hospital HAI rates can be fairly compared. Use of administrative data increased the efficiency of identifying problems in hospitals' SSI surveillance that caused SSIs to be unreported and caused errors in denominator data.

ORIGINAL ARTICLE

Use of Medicare Diagnosis and Procedure Codes to Improve Detection of Surgical Site Infections following Hip Arthroplasty, Knee Arthroplasty, and Vascular Surgery

Michael S. Calderwood, MD;¹ Allen Ma, PhD;² Yosef M. Khan, MBBS, MPH;³ Margaret A. Olsen, PhD, MPH;⁴ Dale W. Bratzler, DO, MPH;^{2,5} Deborah S. Yokoe, MD, MPH;⁶ David C. Hooper, MD;⁷ Kurt Stevenson, MD, MPH;³ Victoria J. Fraser, MD;⁴ Richard Platt, MD, MSc;¹ Susan S. Huang, MD, MPH;⁸
for the CDC Prevention Epicenters Program

OBJECTIVE. To evaluate the use of routinely collected electronic health data in Medicare claims to identify surgical site infections (SSIs) following hip arthroplasty, knee arthroplasty, and vascular surgery.

DESIGN. Retrospective

SETTING. Four

METHODS. We used Medicare diagnosis and procedure codes for patients older than 65 years to identify SSIs. SSIs were identified by either National Healthcare Security and Research Act (NHSRA) or either method.

RESULTS. Claims-based methods identified 14 cases of hip arthroplasty, 7 cases of knee arthroplasty, and 29 cases of vascular surgery, respectively, with 14, 7, and 29 confirmed cases, respectively, which led to confirmation of 14, 7, and 29 SSIs, respectively, following hip arthroplasty, knee arthroplasty, and vascular surgery.

TABLE 4. Sensitivity and Surgical Site Infection (SSI) Confirmation Using a Restricted List of Codes

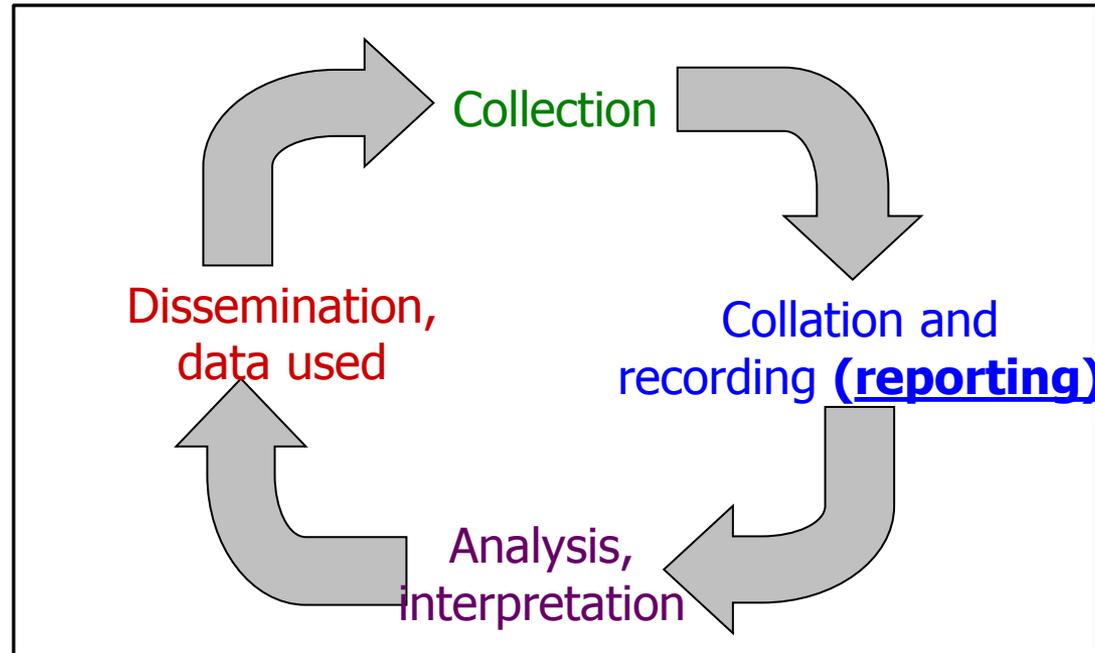
| | Sensitivity (%) | No. of confirmed SSIs/no. of procedures flagged at index hospital |
|---|-----------------|---|
| Hip arthroplasty | | |
| ICD-9 codes 996.66, 998.5, 998.51, 998.59 | 14/14 (100) | 14/26 (1 : 2) |
| Knee arthroplasty | | |
| ICD-9 codes 996.66, 998.5, 998.51, 998.59 | 7/7 (100) | 7/27 (1 : 4) |
| Vascular surgery | | |
| ICD-9 codes 996.62, 998.5, 998.51, 998.59 | 29/29 (100) | 29/44 (2 : 3) |

NOTE. ICD-9, International Classification of Diseases, Ninth Revision.

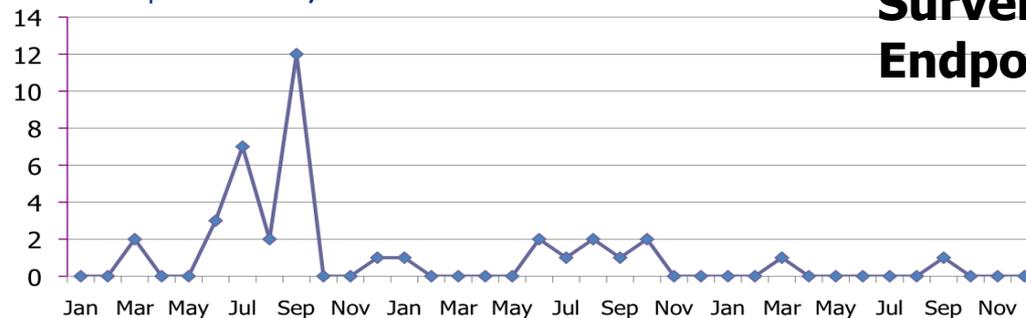
CONCLUSION. Claims-based SSI surveillance markedly increased the number of SSIs detected following hip arthroplasty, knee arthroplasty, and vascular surgery. It deserves consideration as a more effective approach to target chart reviews for identifying SSIs.

Surveillance and Public Reporting

Surveillance Process



Example: **CLABSI, 2009-2011**



Surveillance Endpoint

Building Confidence in Public Reporting

1. Acknowledge wide variability among hospitals performing HAI surveillance; can't be tolerated in era of public reporting
2. Continue toward complete electronic surveillance using clinical data points to approximate HAI; remove subjectivity
3. In the meantime, require external data validation
 - Make a condition of public reporting (include needed resources)
 - Establish formal responsibility and authority
 - Ensure protections from FOIA/PRA, subpoena, civil action
4. Develop validation processes that result in real quality improvement (not estimation of the problem)
5. Develop standard approach for performing validation of NHSN data



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THANK YOU!

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