How Good is Your LTCF Data?

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Protocol and Validation Team

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Infection Preventionist
Protocol and Validation Team

National Healthcare Safety Network Annual Training
Long-term Care Facility Component
July 18, 2018
Session Objectives

• Attributes of LTCF HAI surveillance
• HAI Data Validation in LTCF settings
• Types of HAI Data Validation
  • External Data Validation
  • Internal Data Validation (Data Quality Checks)
Long-term Care Facility Component

Healthcare-associated Infections (HAI) Module
  - Urinary Tract Infections (UTI)

Laboratory-Identified (LabID) Event Module
  - Multi-drug Resistant Organisms (MDRO)
    - Clostridium difficile Infection (CDI)

Prevention Process Measures Module
  - Hand Hygiene
  - Gowns/Gloves
Facilities Eligible for Enrolling in NHSN LTCF Component

- Certified skilled nursing facilities (SNF) and nursing homes (NH)
- Intermediate/chronic care facilities for the developmentally disabled
- Assisted living facilities and residential care facilities
  - Currently limited to Prevention Process Measures
Nursing Homes Enrolled in NHSN — August 2013

Total Number of NH: 171
~ 1.1% of all 15600 US NH
Nursing Homes Enrolled in NHSN — June 2016

Total Number of NH: 374
~ 2.4% of 15,600 US NH
Nursing Homes Enrolled in NHSN — December 2017

Total Number of NH: 3223
~ 20% of 15,600 US NH
Current, 3425 NHs enrolled in NHSN

CMS CDI Reporting and Reduction Project
- QIN-QIOs recruited ~15% NHs from respective region
  - As of October 2017, QINs have enrolled 2592 NHs
  - Defined QIN-QIO cohort of 2493 NHs for tracking CDI reporting patterns in the first 9 months
CMS CDI Reporting and Reduction Project
March – November, 2017

- Among the 2,493 NHs evaluated
  - 2,451 (98%) at least one month of complete data
  - Noted month to month variation in the number of complete reporters
- 78% (1,919/2451) reported 9 consecutive months
- 55% (1352/2451) reported zero events
- 45% (1099/2451) reported ≥1 events
  - Median 2/Mean 3.61 (min 1, max 36)
- Total CDI rate=0.66/10,000 resident days
Healthcare Associated Infections (HAI) Surveillance

- Ongoing
- Systematic collection
- Analysis
- Interpretation
- Dissemination

Of HAI data that is essential to planning and implementing prevention measures
Quality HAI Surveillance System Requires

- Simplicity
- Objectivity
- Flexibility
- Data quality
- Acceptability
- Sensitivity
- Positive predictive value
- Representativeness
- Timeliness
- Stability
Data Quality of HAI Surveillance Reflects

- **Consistency of data**
  - completeness, timeliness, confidence on your data

- **Validity**
  - accuracy of data

These surveillance attributes can be achieved by HAI Data Validation
Types of HAI Data Validation

Internal Validation
- Active efforts by a reporting facility to assure completeness and consistency of NHSN data
- Built in as a routine facility process

External Validation
- Survey and audit process by external agency to assure accuracy of NHSN surveillance and reporting
- Requires additional resources
HAI Data Validation

**Internal Validation**
- Consistency
- Data Completeness
- Timeliness

**External Validation**
- Data Accuracy

Improves
Why Should You Validate Data Reported to NHSN

• Accuracy of data reported to NHSN by LTC settings
• Barriers in data collection and reporting
• Remediable errors in reporting
• Staff understanding of the methods and definitions in protocol
• Feedback to CDC:
  • Clarification of protocol and definitions
  • Improvement of the data validation tools, development of optimal and standardized data evaluation methods
External Validation of LTCF Data Reported to NHSN

Example of CDI Data Validation
Planning the LTC CDI Data Validation

• Pre-site visit activities
  • Facility selection
  • Invitation letter to participate in data validation
  • Medical record selection for onsite chart review
  • NHSN data freeze

• Onsite activities
  • Chart review
  • Survey with staff responsible for NHSN reporting

• Post-site visit activities
  • Report summary of findings to facility
  • Discuss errors in report, clarifications from protocol
Pre-site visit Activities
## Facility Selection: Distribution of Nursing Homes by Bed Size

### Bed Size – Number of Nursing Homes (Percent)

<table>
<thead>
<tr>
<th>Bed Size</th>
<th>Nation</th>
<th>50-99 beds</th>
<th>100-199 beds</th>
<th>&gt;199 beds</th>
<th>All Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;50 beds</td>
<td>2,017  (12.9)</td>
<td>5,772 (36.9)</td>
<td>6,899 (44.1)</td>
<td>946 (6.1)</td>
<td>15,634</td>
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<td>5 (2.2)</td>
<td>86 (38.1)</td>
<td>122 (54.0)</td>
<td>13 (5.8)</td>
<td>226</td>
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<tr>
<td>Alaska</td>
<td>12 (66.7)</td>
<td>5 (27.8)</td>
<td>1 (5.6)</td>
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<tr>
<td>Arizona</td>
<td>14 (9.7)</td>
<td>40 (27.6)</td>
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</tr>
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</table>

Creating The State Health Department (SHD) Validation Sampling Frame

For States >50 nursing homes, total the number of facilities with > 100 beds

<table>
<thead>
<tr>
<th>Bed Size – Number of Nursing Homes (Percent)</th>
<th>&lt;50 beds</th>
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## Facility Selection

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</table>

- < 20 facilities statewide: select all to validate
- <50 facilities: randomly select 20 facilities
- 50 - 200 facilities: randomly select 10% of facilities with >100 beds
- 200 - 500: randomly select 5% of facilities with >100 beds
- > 500 facilities: randomly select 2.5% of facilities with >100 beds
**Sample Size Estimation**

<table>
<thead>
<tr>
<th></th>
<th>All Facilities</th>
<th>Facilities &gt; 100 beds</th>
<th>Proportion</th>
<th>Validation sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alaska</td>
<td>18</td>
<td>18</td>
<td></td>
<td>18 facilities</td>
</tr>
<tr>
<td>Delaware</td>
<td>46</td>
<td>20 randomly selected</td>
<td></td>
<td></td>
</tr>
<tr>
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<tr>
<td>Georgia</td>
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<td>222</td>
<td>0.05 *222</td>
<td>11 randomly selected</td>
</tr>
<tr>
<td>Florida</td>
<td>689</td>
<td>521</td>
<td>0.025 *521</td>
<td>13 randomly selected</td>
</tr>
</tbody>
</table>

Use either a random number generator or assign a number to the facilities (1....n) and randomly selected facilities.
Letter I: Invitation to Participate

• Letter addressed to the facility manager
  • Explain the NHSN LTC data evaluation project
  • Solicit the facility’s participation.

• Describes the importance and usefulness of HAI data validation
Letter II: Confirm Site Visit and Preparation

• Letter addressed to the facility manager confirming the date of the site visit
• Description of the site visit
• Process is expected to be least disruptive to facility’s routine activities
• Request the onsite needs:
  • Access to patient charts for review
  • If electronic medical records: login for reviewers to be set up in advance
  • Interview time (Approximately an hour) with the one staff responsible for data entry and submission
• Request for resident line lists of patient that will be used to select residents’ charts for review.
Medical Record Selection for Review

• Selected facility:
  • Request a line listing of all toxin-positive *C. difficile* stool specimens, for the validation timeframe (minimum 2 quarters/year)
  • From FacwideIN residents and ED or office visits when the resident returns the same calendar or the following calendar day
  • Request additional variables used for ResidentID identification and possible matching to NHSN reports
  • Strongly encourage facilities to use an Excel format

Template positive C. difficile assay line listing (*indicates required data):

| *Resident ID | *Date of current admission to the facility | *Laboratory Specimen Number | *Specimen Collection Date | *Result of CDI Toxin Test | *FacwideIN/outpatient (ED/clinic visit) | *Date of Birth | First Name | Last Name |
Selecting Medical Records

• Assign a sequential number [1 to X] to each toxin-positive CDI result
  • Using a random number generator select 60 resident charts randomly for review
  • If multiple records are selected for same residentID
  • Replace the duplicate records with additional random selections
NHSN Data Freeze

• Prior to the site visit, extract the frozen facility data for the validation time frame
• Use the frozen data file to tally the findings from chart review post site visit
On-site Activities
Medical Record Abstraction Tool (MRAT)

NHSN Long-term Care Facilities (LTCFs): 2017 LTCF CDI LabID Event Surveillance Chart Review Form

Instructions: The attached form is a tool to review a long-term care facility resident chart and collect NHSN LTCF CDI LabID Event Surveillance information to determine whether data were correctly reported. Chart reviewers must be familiar with the NHSN LTCF CDI LabID Events Protocol instructions and definitions prior to chart review.

First complete sections A and B. For section C, note all C. difficile positive laboratory assay results identified for this resident, as defined by the NHSN LTCF CDI LabID Event Surveillance Protocol. Arrange the positive results chronologically. Include all specimens obtained while the resident is receiving care from the LTCF, including specimens collected from an emergency department (ED) or outpatient (OP) setting during a resident’s current admission. Use a calendar to help you to determine which events are duplicate events (< 15 days since the last positive specimen).

Section A: Facility and Resident Information

<table>
<thead>
<tr>
<th>Facility name</th>
<th>Resident/Med Record Number</th>
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</thead>
<tbody>
<tr>
<td>NHSN Org ID</td>
<td>Date of birth</td>
</tr>
<tr>
<td>NHSN Resident ID Number</td>
<td>Gender</td>
</tr>
<tr>
<td>Resident Name</td>
<td>Date of First Admission to Facility</td>
</tr>
</tbody>
</table>

Section B: Chart Review Information

<table>
<thead>
<tr>
<th>Reviewer name</th>
<th>Review Start Time</th>
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</thead>
<tbody>
<tr>
<td>Review date</td>
<td>Review End Time</td>
</tr>
<tr>
<td>Time Period Reviewed (Month/Year to Month/Year)</td>
<td>From:</td>
</tr>
<tr>
<td></td>
<td>Total Review Time (in minutes)</td>
</tr>
</tbody>
</table>

Section C: CDI LabID Events

☐ Chart review for this resident completed and no CDI LabID Events were found during the evaluation time period.

<table>
<thead>
<tr>
<th>Current Admission Date</th>
<th>Date of Specimen Collection</th>
<th>Location of Specimen Collection</th>
<th>Number of days since last C. difficile positive laboratory assay result</th>
<th>Yes</th>
<th>No</th>
<th>Should this event be reported to NHSN?</th>
<th>Yes</th>
<th>No</th>
<th>Was this event reported to NHSN by the facility?</th>
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</thead>
<tbody>
<tr>
<td>LTCF ED OP</td>
<td>days</td>
<td></td>
<td>(collected &lt; 15 days since the last positive specimen)*</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
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<tr>
<td>LTCF ED OP</td>
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<td></td>
<td>(collected &lt; 15 days since the last positive specimen)*</td>
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<td>No</td>
<td>Yes No</td>
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<td>Yes No</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
</tr>
<tr>
<td>LTCF ED OP</td>
<td>days</td>
<td></td>
<td>(collected &lt; 15 days since the last positive specimen)*</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
</tr>
<tr>
<td>LTCF ED OP</td>
<td>days</td>
<td></td>
<td>(collected &lt; 15 days since the last positive specimen)*</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
<td>Yes</td>
<td>No</td>
<td>Yes No</td>
</tr>
</tbody>
</table>

*Note: The LabID Event algorithm for determining duplicate events (<15 calendar days between positive specimens) applies across current admissions.

Event is reportable to NHSN if

• No prior C. difficile positive laboratory assay for the resident while receiving care from this LTCF
• More than 14 calendar days since the last C. difficile positive laboratory assay for the patient
Medical Record Abstraction Tool (MRAT)

• When reviewing the data
  • Look for systematic reporting errors or misconceptions that could impact reporting beyond the medical records that are reviewed.

• If systematic errors are made
  • Facility should be asked to re-review and correct all numerators, not just those reviewed by auditors

• Document all identified reasons for reporting errors
  • This will help target areas for improvement.
Staff Surveillance Practices Survey

NHSN Long-term Care Facilities (LTCFs) 2017 CDI LabID Event Surveillance Practices Survey

INTERVIEWER INSTRUCTIONS

Prior to interview:
Identify the primary person who does NHSN CDI LabID Event data collection and reporting at the facility to interview. If other staff perform NHSN activities such as data entry or analysis, it is ideal for them also to be included.

During Interview:
This interview is a tool to evaluate and improve NHSN CDI LabID Event data collection and reporting. If data collection or reporting errors are identified through this evaluation of practices, the interviewer should provide education and information to help correct errors and ensure that staff report data correctly to NHSN. Refer to the “Note to Interviewer” boxes for reference information.

Note to Interviewer –

If there is a correct answer to a question, the correct answer is bolded.

SECTION A: FACILITY INFORMATION AND NHSN
Survey is dual-purposed:

- Assess user knowledge and facility practices
  - Understanding of definitions
  - Event surveillance practices
  - Denominator collection practices
  - Data reporting practices
- Provide education to improve data quality going forward
  - Educate staff on protocol/definitions
  - Process improvement for data collection

Survey is intended to be interactive and educational

Educational feedback: essential component of validation project, valuable to the participating facility
Post Site-visit Activities
## Data Analysis

<table>
<thead>
<tr>
<th>Auditor Determination</th>
<th>Facility</th>
<th>Case</th>
<th>Not a Case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Case reported</strong></td>
<td>True Positive (a)</td>
<td>False Positive (b)</td>
<td>(a+b)</td>
</tr>
<tr>
<td><strong>Case not reported</strong></td>
<td>False Negative (c)</td>
<td>True Negative (d)</td>
<td>(c+d)</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>(a+c)</td>
<td>(b+d)</td>
<td>Total</td>
</tr>
</tbody>
</table>

- **Sensitivity**: Ability of a test to correctly identify those with the disease (true positive rate) = \( \frac{a}{a+c} \)

- **Specificity**: Ability of the test to correctly identify those without the disease (true negative rate) = \( \frac{d}{b+d} \)

- **Positive Predictive Value**: Proportion of individuals who test positively (a+b) AND truly have the disease (a) = \( \frac{a}{a+b} \)

- **Negative Predictive Value**: Proportion of individuals who test negatively (c+d) AND truly do not have the disease (d) = \( \frac{d}{c+d} \)
### Data Analysis – CDI Example

<table>
<thead>
<tr>
<th>Auditor Determination</th>
<th>Facility</th>
<th>Case</th>
<th>Not a Case</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case reported</td>
<td>10 (True Positive)</td>
<td>20 (over-reported)</td>
<td>(30)</td>
</tr>
<tr>
<td>Case not reported</td>
<td>4 (Missed report)</td>
<td>266 (True negative)</td>
<td>(270)</td>
</tr>
<tr>
<td></td>
<td>(14)</td>
<td>(286)</td>
<td>300</td>
</tr>
</tbody>
</table>

- **Sensitivity**: Ability of a test to correctly identify those with the disease (true positive rate) = \( \frac{10}{14} = 71.4\% \)
- **Specificity**: Ability of the test to correctly identify those without the disease (true negative rate) = \( \frac{266}{286} = 93.0\% \)
- **Positive Predictive Value**: Proportion of individuals who test positively (a+b) AND truly have the disease (a) = \( \frac{10}{30} = 33.3\% \)
- **Negative Predictive Value**: Proportion of individuals who test negatively (c+d) AND truly do not have the disease (d) = \( \frac{266}{270} = 98.5\% \)
Reasons for Misclassification

- For each misclassified case, list the reasons for errors in reports
- Compute each proportion error type – identify gaps, need for training

**Reasons for under-reported CDI events**
- Incorrect understanding of protocol definition (n1)
- Laboratory records missed (n2)
- Reason ....

Total Under-reported events

**Reasons for over-reported CDI events**
- Incorrect specimen (n1)
- Duplicate record (n2)
- Reason ....

Total Over-reported events
Post-Site Visit Summary

• Letter addressed to the facility manager thanking for participating
• Summary of data evaluation findings
• Instructions for data corrections (if necessary)
• Excerpts from the protocol to address issues identified (if necessary).
**Timeline for Activities: ~ 24 weeks**

<table>
<thead>
<tr>
<th>Step</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Preparation (estimated duration 4 weeks)** | - Read project implementation materials  
- Determine the number of facilities that will be included in the project and select facilities  
- Customize Template Letters 1 and 2 for your organization and project parameters  
- Determine when the site visits will occur  
- Train project staff on NHSN LTC Surveillance and evaluation tools |
| **Solicit Facility Participation (estimated duration 2 weeks)** | - Send Template Letter 1 to the Managers of the selected facilities  
- Follow-up with Facility Managers to provide a brief description of the project |
| **Schedule Site Visits (estimated duration 4 weeks)** | - Schedule site visits and confirm details of each visit with Facility Managers and request resident lists  
- Use resident lists to determine which residents charts will be selected for review  
- Inform Facility Manager of which resident charts will be reviewed; ask for these resident charts to be available on the day of the site visit |
| **Site Visits (estimated duration 6 - 12 weeks)** | - Prepare for site visit: print sufficient number of all the data collection instruments  
- Conduct site visits  
- Upon completion of each site visit, summarize findings, customize Template Letter 3 and send to the Facility Manager |
| **Facility Follow-up and Data Summary and Dissemination (estimated duration 4 - 8 weeks)** | - Follow-up 4 weeks post-site visit to ensure identified errors were corrected  
- Aggregate and summarize findings for all facilities that participated in the project  
- Share summary findings with CDC  
- Write a report, disseminate findings to key stakeholders |
Internal Data Quality Checks for LTCF
Data are considered complete in NHSN when:

- Monthly reporting plan is submitted
- Event data to NHSN (if events are found) is submitted
  - If no event check “no event” in summary data form
- Summary data to NHSN is submitted
ANALYSIS REPORTS

NHSN Home
- Reporting Plan
- Event
- Summary Data
- Surveys

Analysis
- Generate Data Sets
- Reports

Expand All
- MDRO/CDI Module - LABID Event Reporting
- HAI Module
- Process Measures
- Advanced
- My Custom Reports

Collapse All
Search
NHSN ANALYSIS REPORTS FOR DATA VALIDATION

- Facility survey data line list
- Plan data report
- Event level data report
- Summary level data report
ANALYSIS REPORTS
## ANALYSIS REPORTS

### Line Listing Of Facility Survey Data

**Data source: Annual survey**

| Facility Org ID | Survey Year | National Provider ID | State Provider ID | CMS Certification Number | Facility Ownership | Certification | Affiliation | Average Daily Census | Number of Short-Stay Residents | Number of Long-Stay Residents | Number of New Admissions | Number of Beds | Number of Pediatric Beds | Total Resident Census |
|-----------------|-------------|----------------------|-------------------|--------------------------|-------------------|--------------|-------------|---------------------|-------------------------------|---------------------------|----------------———|--------------|-----------------------|---------------------|
| 41141           | 2014        | 12345                |                   |                         | NP                | DUAL         | IFS         | 88                  | 35                           | 53                        | 20                   | 100          | 0                     | 88                  |

Sorted by orgID

Data contained in this report were last generated on April 10, 2018 at 3:00 PM.
ANALYSIS REPORTS
# ANALYSIS REPORTS

- **Line Listing of Monthly Reporting Plans**
- **Data source**: Monthly Reporting Plan form

## National Healthcare Safety Network

**Line Listing of Monthly Reporting Plans**

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Sorted by orgID planYM

Data contained in this report were last generated on April 10, 2018 at 3:00 PM.
ANALYSIS REPORTS
ANALYSIS REPORTS

- Analyze the number of events submitted by month
  - Review line list for any missing months
    - Reasons for missing month in line list
      - No events for the month
      - Missing or incomplete events

National Healthcare Safety Network
Line Listing for All Events
As of: June 8, 2018 at 1:37 PM
Date Range: LTCEVENTS datepart(createDate) 01/01/2015 to 06/30/2015

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>Resident ID</th>
<th>Date of Birth</th>
<th>Gender</th>
<th>Event ID</th>
<th>Event Date</th>
<th>Event Type</th>
<th>Specific Organism</th>
<th>Specific Event</th>
<th>Location</th>
<th>CDC Location</th>
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<tbody>
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<td>41141</td>
<td>78965</td>
<td>05/02/1935</td>
<td>M</td>
<td>3537</td>
<td>04/14/2015</td>
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<td>MRSA</td>
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<td>12368</td>
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<td>3528</td>
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<td>CA-SUTI</td>
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Sorted by eventType eventDate
Data contained in this report were last generated on April 10, 2018 at 3:00 PM.
ANALYSIS REPORTS
# ANALYSIS REPORTS

## Line listing – All Summary Data

### National Healthcare Safety Network

**Line Listing for All Summary Data**

As of: June 8, 2018 at 2:25 PM  
Date Range: LTC SUMMARY summaryYM 2017M01 to 2017M03

<table>
<thead>
<tr>
<th>Facility Org ID</th>
<th>Summary Year/Month</th>
<th>Type of summary record</th>
<th>Location</th>
<th>Event Type</th>
<th>Number of Resident Days</th>
<th>Urinary Catheter Days</th>
<th>Number of Resident Admissions</th>
<th>No Events</th>
<th>Number of Urine Cultures Ordered</th>
<th>Admissions on C. diff Treatment</th>
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Sorted by orgID summaryYM  
Data contained in this report were last generated on April 10, 2018 at 3:00 PM.
Check Alert Page

NHSN Long Term Care Facility Component Home Page

Action Items

COMPLETE THESE ITEMS

Survey Required

2017

ALERTS

3

Missing Events

3

Incomplete Summary Data
Summary

- Credible data is vital to HAI prevention

- In the era of “publicly looking good” ongoing validation is the key to improvement in prevention practices