2019 Annual NHSN Training

Analyzing LabID Event Data in NHSN

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Disclaimer: The examples and screen shots used in this presentation represent fictitious data.
Goals For Today

- Introduce the analytic reports available for LabID event data
  - MRSA bacteremia, *C. difficile*, other organisms
- Discuss benchmarks: rates and SIRs
- Describe the risk adjustment used in the LabID SIRs for acute care hospitals
- Define *which* LabID events contribute to the SIR numerators
- Discuss techniques for ensuring accuracy and quality of data

Acronyms
*CDI = *C. difficile* LabID Event
*CO = community-onset
*HO = healthcare facility-onset
*CO-HCFA = community-onset, healthcare facility-associated
LabID Analysis Reports in NHSN
Analysis Tree

Analysis Reports

- Device-Associated (DA) Module
- Procedure-Associated (PA) Module
- HAI Antimicrobial Resistance (DA+PA Modules)
- Antimicrobial Use and Resistance Module
- MDRO/CDI Module - LABID Event Reporting
  - MDRO/CDI Module - Infection Surveillance
  - MDRO/CDI Module - Process Measures
  - MDRO/CDI Module - Outcome Measures
- CMS Reports
- TAP Reports
- Baseline Set 1

- MDRO/CDI Module - LABID Event Reporting
  - All LabID Events
  - All MRSA LabID Events
  - All MSSA LabID Events
  - All C. difficile LabID Events
  - All VRE LabID Events
  - All CephR-Klebsiella LabID Events
  - All CRE LabID Events
  - All CRE-Klebsiella LabID Events
  - All CRE-Ecoli LabID Events
  - All CRE-Enterobacter LabID Events
  - All Acinetobacter LabID Events
### The Other MDROs

<table>
<thead>
<tr>
<th>Organism</th>
<th># Facilities Reporting to NHSN</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>C. difficile</em></td>
<td>5,351</td>
</tr>
<tr>
<td>MRSA</td>
<td>5,232</td>
</tr>
<tr>
<td>CRE</td>
<td>725</td>
</tr>
<tr>
<td>VRE</td>
<td>666</td>
</tr>
<tr>
<td>Multidrug-resistant <em>Acinetobacter</em></td>
<td>151</td>
</tr>
<tr>
<td>Extended-spectrum cephalosporin-resistant (CephR) <em>Klebsiella</em></td>
<td>136</td>
</tr>
<tr>
<td>MSSA</td>
<td>72</td>
</tr>
</tbody>
</table>

2017 NHSN data
Line Lists & Frequency Tables

- Great starting place for analysis
  - Line List: event-level details
  - Frequency Table: counts of events
- Will contain all LabID events reported for the organism
- Review NHSN’s categorizations for each event
  - Onset: CO, HO, or CO-HCFA
  - cdiAssay: Incident, Recurrent, or blank
- Determine which events are counted in the SIR
- Easy to customize
NHSN provides healthcare-onset and community-onset rates

Rates are available for locations listed separately on the monthly reporting plans (i.e., in which location-specific denominator records are entered)

- Most common: FacWideIN, EDs, 24 hour observation units, and IRF units
- Other units

Useful for data quality review

- Rate tables display the # of events, patient days, and admissions
- Rates can be generated by month, quarter, half-year, or year
Healthcare-onset Incidence Rate

- Used to describe the amount of HO events identified in inpatient locations in the facility
  - Formula (CDI): \( \frac{\text{# incident HO CDI events}}{\text{# patient days}} \times 10,000 \)
  - Numerator of the incidence rate = numerator of the SIR (CDIF_facIncHOCount)

October: \( \frac{1 \text{ incident HO CDI event}}{1,200 \text{ patient days}} \times 10,000 = 8.333 \)

Interpretation: *Our facility saw 8.3 incident HO CDI events per 10,000 patient days*
Community-onset Prevalence Rate

- Inpatient CO prevalence rate+: \( \frac{\text{# inpatient CO LabID events}}{\text{# admissions}} \times 100 \)
- Outpatient CO prevalence rate: \( \frac{\text{# outpatient CO LabID events}}{\text{# encounters}} \times 100 \)

**Interpretation:**
- In October, our facility identified 0.124 inpatient CO CDI events per 100 admissions
- Or, stated another way: \( \frac{1.24}{1000} \) inpatient CO CDI events per 1,000 admissions

Choice of multiplier

### CDI Prevalence - Community-Onset Admission Prevalence Rate

<table>
<thead>
<tr>
<th>summaryYM</th>
<th>location</th>
<th>CDIF_admPrevCOCount</th>
<th>numAdms</th>
<th>CDI_COprevRate</th>
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</thead>
<tbody>
<tr>
<td>2018M10</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>804</td>
<td>0.124</td>
</tr>
<tr>
<td>2018M11</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>1107</td>
<td>0.090</td>
</tr>
<tr>
<td>2018M12</td>
<td>FACWIDEIN</td>
<td>0</td>
<td>908</td>
<td>0.000</td>
</tr>
</tbody>
</table>

* Used in risk adjustment of the SIR
More about LabID Rates

- National LabID rates are not available for any organism

Why?

- MRSA bacteremia & CDI: national benchmarks are available in the form of a standardized infection ratio (SIR)
  - SIR offers a better comparison to national data and takes into account significant predictors of infection

- CRE, MDR-Acinetobacter, VRE, CephR-Klebsiella, MSSA:
  - Reporting based on state/local mandate, or voluntary reporting
  - CDC continues to evaluate the amount of these data entered into NHSN
  - National benchmarks may be available in the future, if/when sufficient national data exist
Standardized Infection Ratio
LabID Event SIRs: A Quick Review

- “How does MRSA bacteremia (or CDI) in my facility compare to the nation?”

\[
SIR = \frac{\text{# observed HO LabID Events}}{\text{# predicted HO LabID Events}}
\]

- **# observed events**: HO events entered into NHSN that meet the SIR criteria
- **# predicted events**: based on the national 2015 baseline data
  - Calculated and risk adjusted specifically for your facility

**Interpretation:**
- If SIR > 1.0: more events observed than predicted
- If SIR < 1.0: fewer events observed than predicted
- Statistical significance: p-value and 95% confidence interval
Example MRSA SIR Report: 2018 Q3 and 2018 Q4

2018 Q3
- Months: 3
- SIR numerator (MRSA_bldIncCount): 1
- SIR denominator (numPred): 1.314
- Total patient days for the quarter: 17,089
- SIR: 1 / 1.314 = 0.761

Interpretation (SIR < 1):
- In 2018 Q3, we observed fewer MRSA blood events than what was predicted by the national baseline
2018 Q3

- P-value and 95% confidence interval
  - P-value is > 0.05
  - The 95% confidence interval (CI) includes 1
    - (0.038 – 3.754)

**Interpretation:**
- SIR is not statistically significant
- # observed events is not significantly different than the number predicted
- # observed events is not significantly different than national baseline
Example MRSA SIR Report: 2018 Q3 and 2018 Q4

2018 Q4
- Facility reported 3 months of data and 2,627 patient days
- Facility observed 3 healthcare-onset MRSA blood events
- Why are the columns for SIR, p-value, and 95% CI blank?
Knowledge Check!

TRUE or FALSE?

The SIR and statistics are not calculated because the number of patient days for this quarter is below the pre-determined threshold.
Answer: FALSE

Rationale

- NHSN does not calculate SIRs and accompanying statistics when the number of predicted events is less than 1
  - Statistically imprecise SIRs, which typically have extreme values
- This rule is implemented regardless of the number of patient days

<table>
<thead>
<tr>
<th>location</th>
<th>summaryYQ</th>
<th>months</th>
<th>MRSA_bldIncCount</th>
<th>numPred</th>
<th>numpatdays</th>
<th>SIR</th>
<th>SIR_pval</th>
<th>sir95ci</th>
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<tr>
<td>FACWIDEIN</td>
<td>2018Q3</td>
<td>3</td>
<td>1</td>
<td>1.314</td>
<td>17089</td>
<td>0.761</td>
<td>0.8907</td>
<td>0.038 3.754</td>
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<tr>
<td>FACWIDEIN</td>
<td>2018Q4</td>
<td>3</td>
<td>3</td>
<td>0.156</td>
<td>2627</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
Example MRSA SIR Report: 2018 Q3 and 2018 Q4

- 2018 Q3 – our facility had 1.314 predicted events
- 2018 Q4 – our facility had 0.156 predicted events
- Drastic change between quarters could indicate a data quality issue
  - How would we investigate this?
  - Know what values are used in the calculation of # predicted events
SIR Denominator: # Predicted Events

Emphasis on MRSA Bacteremia
How is the Predicted # of MRSA Events Calculated?

- Negative binomial regression models were created using 2015 national data
  - MRSA: 6 different factors & total patient days
- Review data table beneath the SIR report
  - Inaccurate risk adjustment factors will lead to inaccurate # of predicted events
  - Review this table whenever you run your SIR reports

<table>
<thead>
<tr>
<th>summaryYQ</th>
<th>MRSA_admPrevBldRate</th>
<th>MRSA_EDObsPrevRate</th>
<th>LOS</th>
<th>medType</th>
<th>facType</th>
<th>numICUBeds</th>
<th>numpatdays</th>
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</thead>
<tbody>
<tr>
<td>2017Q1</td>
<td>0.265</td>
<td>0.000</td>
<td>10.3</td>
<td>M</td>
<td>HOSP-GEN</td>
<td>10</td>
<td>2120</td>
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<tr>
<td>2017Q2</td>
<td>0.062</td>
<td>0.071</td>
<td>10.3</td>
<td>M</td>
<td>HOSP-GEN</td>
<td>10</td>
<td>1500</td>
</tr>
<tr>
<td>2017Q3</td>
<td>12.5</td>
<td>0.000</td>
<td>10.3</td>
<td>M</td>
<td>HOSP-GEN</td>
<td>10</td>
<td>1089</td>
</tr>
</tbody>
</table>

### Closer Look: MRSA Risk Factors for 2018 Q4

<table>
<thead>
<tr>
<th>summaryYQ</th>
<th>MRSA_admPrevBldRate</th>
<th>MRSA_EDObsPrevRate</th>
<th>LOS</th>
<th>medType</th>
<th>facType</th>
<th>numICUBeds</th>
<th>numpatdays</th>
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</thead>
<tbody>
<tr>
<td>2018Q4</td>
<td>0</td>
<td>0.022</td>
<td>90</td>
<td>M</td>
<td>HOSP-GEN</td>
<td>100</td>
<td>2627</td>
</tr>
</tbody>
</table>

- Inpatient MRSA blood community-onset prevalence rate

\[
\frac{\text{# unique CO blood events}}{\text{total # admissions (quarter)}} \times 100
\]

- “Is this rate correct for my facility, for this quarter?”
  - Confirm CO events & admission counts were entered correctly
FacWideIN Denominator Form

Location Code: FACWIDEIN - Facility-wide Inpatient (FacWIDEIn)
Month: January
Year: 2019

General

Line 1: Setting: Inpatient
Total Facility Patient Days: 3500
Total Facility Admissions: 905

Line 2: If your facility has a CMS-certified rehab unit (IRF) or CMS-certified IPF, please subtract these counts from the total. If you do not have these units, enter the same values you entered on Line 1.
Counts = [Total Facility - (IRF + IPF)]

Inpatient Days: 3200
Admissions: 805

Line 3: If your facility has a CMS-certified IRF, CMS-certified IPF, NICU, or Well Baby Unit, please subtract those counts from the total. If you do not have these units, enter the same values you entered on Line 1.
Counts = [Total Facility - (IRF + IPF + NICU + Well Baby Unit)]

Patient Days: 2500
Admissions: 705

MRSA prevalence rate denominator
Inpatient Community-Onset (CO) Prevalence Rate

- Prevalence rate includes data from all inpatient locations
- CO: LabID specimen collected on Day 1, 2, or 3 of patient admission
  - Facility admission date: “Day 1”
  - 14 day de-duplication*
- Calculated for the entire quarter
  - Quarterly prevalence rate is used to predict quarterly # of MRSA events
- View this rate in MRSA Rate Tables
  - $\frac{MRSA\_admPrevBldCount}{numAdms} \times 100$
Outpatient MRSA CO Prevalence Rate

- Calculated for the entire quarter, and combines EDs & 24hr Obs
- Available in NHSN Rate Tables: \( \frac{MRSA\_EDOBSprevCount}{numEncounters} \times 100 \)
- If no ED or 24 hr Observation Unit in your facility, you will still receive risk adjustment based on other variables in the model
LabID Event SIRs are a Quarterly Measure

- LabID event SIRs should only be reviewed at the end of a quarter, once all 3 months of data are entered for that quarter

Why?

- MRSA and CDI SIRs are risk adjusted based on quarterly community-onset prevalence rates
- CDI SIRs are risk adjusted based on CDI test type, which is collected once per quarter
- LabID event SIRs are not accurate until the quarterly risk adjustment calculations can be performed
Collected on annual facility survey and during NHSN enrollment:

- Average length of stay
- Medical school affiliation
- Facility type
- # of ICU beds

Patient days are collected on the FacWideIN denominator form and summed for the quarter.
### FacWideIN Denominator Form

**Location Code**: FACWIDEIN - Facility-wide Inpatient (FacWIDEIn)

**Month**: January

**Year**: 2019

#### General

<table>
<thead>
<tr>
<th>Line 1: Setting: Inpatient</th>
<th>Total Facility Patient Days</th>
<th>Total Facility Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Days</td>
<td>3200</td>
<td></td>
</tr>
<tr>
<td>Admissions</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Line 2: If your facility has a CMS-certified IRF or CMS-certified psych unit (IPF), please subtract these counts if you do not have these units, and enter the values you entered on Line 1. |

| Counts= [Total Facility - (IRF + IPF)] |

| Line 3: If your facility has a CMS-certified NICU, CMS-certified IPF, NICU, or Well Baby Unit, please subtract those counts if you do not have these units, and enter the values you entered on Line 1. |

| Counts= [Total Facility - (NICU + IPF + Well Baby Unit)] |

| Patient Days | 2500 |
| Admissions   | 705  |
Which of the following is true?

- A) SIRs are available for all organisms in the MDRO Module
- B) I can review my facility’s MRSA SIRs for each month of a quarter
- C) If a facility adds their Medical ICU to their LabID monthly reporting plan, a LabID Event SIR will become available for that ICU
- D) The MRSA SIR is risk adjusted using the inpatient and outpatient CO prevalence rate
Answer: D

Rationale

- SIRs are available for all organisms in the MDRO Module
  - **FALSE:** SIRs are only available for MRSA and CDI
- I can review my facility’s MRSA SIRs for each month of a quarter
  - **FALSE:** SIRs are only calculated on a quarterly-level due to requirements for risk adjustment
- If a facility adds their Medical ICU to their LabID monthly reporting plan, a LabID Event SIR will become available for that ICU
  - **FALSE:** SIRs are only available for FacWideIN and CMS-certified IRF units. Adding select ICUs to the monthly reporting plans would allow the facility to see rates for those ICUs.
CDI Test Type and Risk Adjustment

- The CDI SIR is risk adjusted, each quarter, based on your facility’s CDI test type category

<table>
<thead>
<tr>
<th>CDI Test Type Category</th>
<th>Parameter Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAAT category</td>
<td>0.1307</td>
</tr>
<tr>
<td>EIA category</td>
<td>-0.1579</td>
</tr>
<tr>
<td>Other category</td>
<td>Referent</td>
</tr>
</tbody>
</table>

- NAAT category: NAAT, or any testing algorithm in which “NAAT” is the final step
- EIA category: EIA, or any algorithm in which “EIA” is the final step
- Other category: cell cytotoxicity assay, toxigenic culture, or free-text entry
CDI Test Type and Risk Adjustment

- ‘Parameter estimate’ describes the contribution of CDI test type to the # of predicted events
  - Referent = no contribution to predicted events
  - Positive number = more predicted events than referent category
  - Negative number = fewer predicted events than referent category

- Question from NHSN facility:
  - “My facility is thinking about changing our CDI test method from NAAT (Q1) to a two-step algorithm of NAAT + EIA (for Q2). How will this change impact our number of predicted events?”

<table>
<thead>
<tr>
<th>CDI Test Type Category</th>
<th>Parameter Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAAT category</td>
<td>0.1307</td>
</tr>
<tr>
<td>EIA category</td>
<td>-0.1579</td>
</tr>
<tr>
<td>Other category</td>
<td>Referent</td>
</tr>
</tbody>
</table>

Facility is moving from ‘NAAT’ to ‘NAAT + EIA’
   - CDI test type category will change from the NAAT category to the EIA category
   - EIA contributes to a lower # of predicted events, compared to the NAAT category

However:
   - The # predicted CDI events is calculated using 8 different variables
   - For any given qtr, # of predicted events will change from the prior qtr based on changes to these variables (e.g., patient days, inpatient CO prevalence rate)
   - A change in CDI test type may lead to a change in the inpatient CO prevalence rate

Final Answer: The change in # of predicted events cannot be determined by assuming that CDI test type is the ONLY variable that changes between 2 quarters. However, assuming all other variables in the model do not change, this facility may see a decrease in the # predicted events.
SIR Numerator
# Observed LabID Events
Important LabID Analysis Variables

- CDI Test Type
- onset
- cdiAssay
CDI Test Type

- Entered on FacWideIN monthly denominator form: Mar, Jun, Sept, Dec

For this quarter, what is the primary testing method for *C. difficile* used most often by your facility’s laboratory or the outside laboratory where your facility’s testing is performed?  
*Note: PCR testing should be indicated by selecting NAAT.*

- Drop-down menu provides testing methods: consult with lab if needed!

<table>
<thead>
<tr>
<th>Methods</th>
<th>vs.</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>NAAT</td>
<td></td>
<td>NAAT</td>
</tr>
<tr>
<td>EIA</td>
<td></td>
<td>EIA</td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td>Other</td>
</tr>
</tbody>
</table>

- EIA - Enzyme immunoassay (EIA) for toxin
- Cyto - Cell cytotoxicity neutralization assay
- NAAT - Nucleic acid amplification test (NAAT)
- NAATEIA - NAAT plus EIA, if NAAT positive (2-step algorithm)
- GDH - Glutamate dehydrogenase (GDH) antigen plus EIA for toxin
- GDHNAAT - GDH plus NAAT
- GDHEIA - GDH plus EIA for toxin, followed by NAAT for discrepant results
- ToxiCul - Toxigenic culture
- OTH - Other (specify)
Onset

- Uses the location, facility admission date (if applicable), & specimen collection date. *Assigned within NHSN application*

- Community-onset (CO)
  - Outpatient event and **NOT** previous discharge in 4 weeks* OR
  - Inpatient event ≤ Day 3 of admission+

- Community-onset healthcare facility-associated (CO-HCFA) **CDI only**
  - Outpatient or inpatient event and **WITH** previous discharge in 4 weeks*

- Healthcare facility-onset (HO): Inpatient event on Day 4+

*Has patient been discharged from your facility in the past 4 weeks?  
+Where Day 1 is the date of inpatient admission
Onset, continued

- **CO** and **CO-HCFA** events are not included in SIR numerator
- **CO-HCFA** events are not counted in CO admission prevalence rate

---

**Line Listing - MRSA BLDSPC**

<table>
<thead>
<tr>
<th>Pat id</th>
<th>Event id</th>
<th>Location</th>
<th>Outpatient</th>
<th>PatDischarge4wk</th>
<th>Onset</th>
<th>Admit Date</th>
<th>Specimen Date</th>
<th>FWMRSA_adm</th>
<th>FWMRSA_bldIncCount</th>
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</thead>
<tbody>
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<td>303</td>
<td>66877</td>
<td>ICU</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>11/18/2018</td>
<td>11/22/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>303</td>
<td>66883</td>
<td>ICU</td>
<td>N</td>
<td>Y</td>
<td>CO</td>
<td>12/01/2018</td>
<td>12/01/2018</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>332</td>
<td>43019</td>
<td>3NS</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>10/01/2018</td>
<td>10/09/2018</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

**PatDischarge4wk:** Has patient been discharged from your facility in the past 4 weeks?
cdiAssay

- Uses current and prior specimen collection dates
- Assigned within NHSN application
  - **Incident** if a positive specimen was collected > 56 days after most recent event or no previous event for patient
  - **Recurrent** if a positive specimen was collected 2–8 weeks (15–56 days) earlier
  - **Blank / “ ”** if a positive specimen was collected < 2 weeks (1–14 days) earlier
    - “ ” cdiAssay represents a duplicate event in a new location
cdiAssay, continued

- Both Blank and Recurrent events are not counted in SIR numerator

<table>
<thead>
<tr>
<th>PatId</th>
<th>EventId</th>
<th>SpcOrgType</th>
<th>Location</th>
<th>PatDischarge4wk</th>
<th>Onset</th>
<th>AdmitDate</th>
<th>SpecimenDate</th>
<th>cdlAssay</th>
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<th>FWCDIF_fac IncHOCount</th>
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<tbody>
<tr>
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<td>63078</td>
<td>CDIF</td>
<td>3NS</td>
<td>N</td>
<td>CO</td>
<td>10/01/2018</td>
<td>10/01/2018</td>
<td>Incident</td>
<td></td>
<td></td>
</tr>
<tr>
<td>142</td>
<td>63079</td>
<td>CDIF</td>
<td>OBS</td>
<td>N</td>
<td>CO</td>
<td></td>
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<td>Recurrent</td>
<td></td>
<td></td>
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<tr>
<td>189</td>
<td>76261</td>
<td>CDIF</td>
<td>ED</td>
<td>Y</td>
<td>CO-HCF</td>
<td>12/01/2018</td>
<td>12/01/2018</td>
<td>Incident</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Common Question from NHSN Users

Q: “I entered 5 MRSA events for Q1, but only 4 events were included in the SIR numerator. Why is the SIR excluding some of my events?”

- Reminder: All LabID events that meet NHSN protocol must be reported
  - Events that are not counted in the SIR numerator contribute to risk adjustment and algorithms for determining “duplicate” events
  - However, not all LabID events will be counted in the SIR numerator
Which LabID Events are Counted in FacWideIN SIR Numerator?

- **C. difficile (CDI):**
  - Inpatient units only, excluding Rehab & Psych units with unique CCN
  - **HO** (specimens collected on Day 4 or later after admission)
  - **Incident** (> 56 days after the most recent positive CDI LabID event for this patient)

- **MRSA Bacteremia:**
  - Blood specimens from inpatient units, excluding Rehab & Psych units with unique CCN
  - **HO** (specimens collected on Day 4 or later after admission)
  - No positive MRSA bacteremia in the previous 14 days in any location

* Read more about LabID SIR numerator: [https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf](https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/mrsacdi_tips.pdf)
FAQ from the NHSN Helpdesk

Q: Our patient was positive for MRSA on Day 1, and a second positive specimen was collected on Day 6 in a different unit. This second specimen was labeled as “HO” in NHSN! How do I change this?

A: You cannot change the onset categorization applied by NHSN.
Knowledge Check

A patient was positive for MRSA on Day 1, and a second positive specimen was collected on Day 6 in a different unit. The second specimen was categorized as HO.

True or False: The 2\textsuperscript{nd} specimen is counted in the MRSA SIR numerator
Knowledge Check: Answer

**True or False**: The 2\textsuperscript{nd} specimen is counted in the MRSA SIR numerator.

**Answer**: False

The 2\textsuperscript{nd} specimen is **NOT** counted in the MRSA SIR numerator.

- Correctly labeled HO
- Positive MRSA bacteremia in the previous 14 days in any location
- Not all HO events are counted in the SIR numerator
Review FacWideIN SIR Numerator

- Run a LabID Event line list for the organism of interest
- Review indicator variable
  - FWCDIF_facIncHOCount (CDI) or FWMRSA_bldIncCount (MRSA blood)
    - 1 = counted in SIR numerator
    - 0 = not counted in SIR numerator

<table>
<thead>
<tr>
<th>Pat id</th>
<th>Event id</th>
<th>Location</th>
<th>Outpatient</th>
<th>PatDischarge4wk</th>
<th>Onset</th>
<th>Admit Date</th>
<th>Specimen Date</th>
<th>FWMRSA_admPrevBldCount</th>
<th>FWMRSA_bldIncCount</th>
</tr>
</thead>
<tbody>
<tr>
<td>303</td>
<td>66877</td>
<td>ICU</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>10/18/2018</td>
<td>10/22/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>303</td>
<td>66883</td>
<td>ICU</td>
<td>N</td>
<td>Y</td>
<td>CO</td>
<td>11/01/2018</td>
<td>11/01/2018</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>332</td>
<td>43019</td>
<td>MED</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>10/01/2018</td>
<td>10/09/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>227</td>
<td>46274</td>
<td>2S</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>12/01/2018</td>
<td>12/09/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>227</td>
<td>46325</td>
<td>3S</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>12/01/2018</td>
<td>12/20/2018</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
When reviewing MRSA events, ask yourself these questions:

- Did the event occur in an inpatient unit (non-IRF/IPF)?
- Is the event labeled “HO” (Day 4 or later after admission)?
- Was there a prior MRSA positive event in the previous 14 days in any location?

<table>
<thead>
<tr>
<th>Pat id</th>
<th>Event id</th>
<th>Location</th>
<th>Outpatient</th>
<th>PatDischarge4wk</th>
<th>Onset</th>
<th>Admit Date</th>
<th>Specimen Date</th>
<th>FWMRSA_adm</th>
<th>FWMRSA_bldIncCount</th>
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</thead>
<tbody>
<tr>
<td>303</td>
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<td>Y</td>
<td>CO</td>
<td>11/01/2018</td>
<td>11/01/2018</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>332</td>
<td>43019</td>
<td>MED</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>10/01/2018</td>
<td>10/09/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>227</td>
<td>46274</td>
<td>2S</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>12/01/2018</td>
<td>12/09/2018</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>227</td>
<td>46325</td>
<td>3S</td>
<td>N</td>
<td>N</td>
<td>HO</td>
<td>12/01/2018</td>
<td>12/20/2018</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Assume 66877 is first event for Patid 303

FYI:
- Event 66883 is excluded because it is CO
- Event 46325 is excluded because it occurred on Day 12, after prior positive event
### LabID Event Line List SIR Numerator Indicator Variables

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>MRSA SIR numerator Indicator</th>
<th>CDI SIR numerator Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Hospital</td>
<td>FWMRSA_bldIncCount</td>
<td>FWCDIF_facIncHOCCount</td>
</tr>
<tr>
<td>CMS-certified Inpatient Rehabilitation (IRF) unit located within a hospital</td>
<td>MRSA_IRFbldIncCount</td>
<td>CDIF_IRFIncCount</td>
</tr>
<tr>
<td>Critical Access Hospital</td>
<td>FWMRSA_bldIncCount</td>
<td>FWCDIF_facIncHOCCount</td>
</tr>
<tr>
<td>Long-term Acute Care Hospital</td>
<td>FWMRSA_bldIncCount</td>
<td>FWCDIF_facIncHOCCount</td>
</tr>
<tr>
<td>Free-standing Inpatient Rehab Facility</td>
<td>FWMRSA_bldIncCount</td>
<td>FWCDIF_facIncHOCCount</td>
</tr>
</tbody>
</table>

- 1 = counted in SIR numerator
- 0 = not counted in SIR numerator
FacWideIN and IRF SIR Differences
Hospitals With a CMS-Certified Rehab (IRF) Unit

- Hospitals with an IRF unit may have two separate SIRs submitted to CMS
  - 1. FacWideIN SIR for the acute care hospital
  - 2. IRF Unit SIR
- **As of 2018 Q4, MRSA is no longer part of the CMS IRFQR program**

Review both reports

CMS reports

- Acute Care Hospitals (Hospital IQR)
- Critical Access Hospitals (Hospital IQR)
- Inpatient Rehabilitation Facilities (IRFQR)
- Long Term Acute Care Hospitals (LTCHQR)

MRSA SIR still available here

non-CMS reports

- MDRO/CDI Module - LABID Event Reporting
  - All LabID Events
  - All MRSA LabID Events
  - All MSSA LabID Events
  - All C. difficile LabID Events
  - All VRE LabID Events
Which LabID Events are Counted in the SIR numerator for IRF Units?

- **C. difficile (CDI):**
  - Specimens collected in CMS-certified Rehab unit
  - Specimens collected on Day 4 or later after being transferred to Rehab unit
  - No positive test in the previous 14 days in any Rehab unit within the facility

- **MRSA Bacteremia:**
  - Blood specimens from CMS-certified Rehab unit
  - Specimens collected on Day 4 or later after being transferred to Rehab unit
  - No positive test in the previous 14 days in any Rehab unit within the facility

- Run a LabID line list and review IRF unit indicator variables: **MRSA_IRFbldIncCount** or **CDIF_IRFIncCount**
Knowledge Check

True or False: The algorithm for the SIR numerator is different for FacWideIN and IRF units.
Knowledge Check: Answer

True or False: The algorithm for the SIR numerator is different for FacWideIN and IRF units.

Answer: True

- Previous slides
  - Which LabID Events are Counted in FacWideIN SIR Numerator?
  - Which LabID Events are Counted in the SIR for IRF Units?

Data Quality

CDI Test Type, FacWideIN denominator form, complete 3 months reporting
Important Note

- Regenerate datasets
CDI Test Type = Other

- Majority of hospitals should not select “Other”
- Use the pre-populated drop-down options when possible
- **Note:** PCR testing should be indicated by selecting NAAT
- Possible SIR impact
CDI Test Type = Other SIR Impact

For this quarter, what is the primary testing method for *C. difficile* used most often by your facility’s laboratory or the testing is performed?

*Note: PCR testing should be indicated by selecting NAAT.*

<table>
<thead>
<tr>
<th>Parameter Estimate</th>
<th>CDI Test Type Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.1307</td>
<td>NAAT category</td>
</tr>
<tr>
<td>-0.1579</td>
<td>EIA category</td>
</tr>
<tr>
<td>Referent</td>
<td>Other category</td>
</tr>
</tbody>
</table>

**Will cause facility’s SIR to be inflated**

SIR = 1.299

For this quarter, what is the primary testing method for *C. difficile* used most often by your facility’s laboratory or the testing is performed?

*Note: PCR testing should be indicated by selecting NAAT.*

NAAT - Nucleic acid amplification test (NAAT)(e.g., PCR)

**Facility’s SIR will receive proper risk adjustment category, and calculate appropriately.**

SIR = 1.140
CDI Test Type Review

- Denominator forms (3rd month of the quarter: Mar, Jun, Sept, and Dec)
  - Soft alert
- Analysis > Reports > Advanced > Data Quality > CDI Test Method History

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Source</th>
<th>cdiTestMeth</th>
<th>cdiTestMethOth</th>
<th>down grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>3</td>
<td>MDRO/CDI FacWideIN Summary</td>
<td>NAAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>6</td>
<td>MDRO/CDI FacWideIN Summary</td>
<td>NAAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>9</td>
<td>MDRO/CDI FacWideIN Summary</td>
<td>GDHNAAT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2018</td>
<td>12</td>
<td>MDRO/CDI FacWideIN Summary</td>
<td>EIA</td>
<td></td>
<td>Y</td>
</tr>
</tbody>
</table>
### FacWideIN Denominator Form

#### General

<table>
<thead>
<tr>
<th>Line 1: Setting: Inpatient</th>
<th>Total Facility Patient Days</th>
<th>Total Facility Admissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 2: Your facility has a CMS-certified rehab unit (IRF) or CMS-certified psych unit (IPF), please subtract these counts from &quot;Total Facility Patient Days&quot; and &quot;Total Facility Admissions&quot; (Line 1). If you do not have these units, enter the same values you entered on Line 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counts = [Total Facility - (IRF + IPF)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Days</td>
<td>Admissions</td>
<td></td>
</tr>
<tr>
<td>Line 3: Your facility has a CMS-certified IRF, CMS-certified IPF, NICU, or Well Baby Unit, please subtract those counts from &quot;Total Facility Patient Days&quot; and &quot;Total Facility Admissions&quot; (Line 1). If you do not have these units, enter the same values you entered on Line 1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Counts = [Total Facility - (IRF + IPF + NICU + Well Baby Unit)]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient Days</td>
<td>Admissions</td>
<td></td>
</tr>
</tbody>
</table>

- **Line 1**: Counts from **all** inpatient locations in the facility
- **Line 2**: Counts from all inpatient locations in the facility **except** CMS-certified Rehab and Psych units
- **Line 3**: Counts from all inpatient locations in the facility **except** CMS-certified Rehab and Psych units, NICUs, and well-baby units
Incorrect Data Entry

- **Line 2** and **Line 3** refer to the total number of patient days & admissions based on all patients housed in inpatient locations (FacWideIN) in your facility, regardless of the patient’s MDRO or *C. difficile* infection status.
FacWideIN Data Quality Check

- Suspicious data entry: patient days or admissions on Line 2 and/or Line 3 < 25% of Line 1

<table>
<thead>
<tr>
<th>FacWideIN denominator</th>
<th>Variable name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line 1</td>
<td>numTotPayDays</td>
</tr>
<tr>
<td>Line 1</td>
<td>numTotAdm</td>
</tr>
<tr>
<td>Line 2</td>
<td>numpatdays</td>
</tr>
<tr>
<td>Line 2</td>
<td>numAdms</td>
</tr>
<tr>
<td>Line 3</td>
<td>numCdifPatDays</td>
</tr>
<tr>
<td>Line 3</td>
<td>numCdifAdm</td>
</tr>
</tbody>
</table>
Ensure Reporting for the Quarter is Complete

- Monthly reporting plan
- Review summary data
- Incomplete quarter review
3 months of reporting – MRPs

- Ensure FacWideIN, ED, & 24-hr observation units are included on monthly reporting plans for all 3 months
- Analysis folder: Advanced > Plan Data > Line Listing
  - Possible filters: mrsa_labID, mrsa_LabIDBld, cdif_labID

<table>
<thead>
<tr>
<th>planYM</th>
<th>PSNoPlan</th>
<th>location</th>
<th>mrsa_labID</th>
<th>mrsa_labIDBld</th>
<th>cdif_labID</th>
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</thead>
<tbody>
<tr>
<td>2018M10</td>
<td>N</td>
<td>ED</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2018M10</td>
<td>N</td>
<td>FACWIDEIN</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2018M11</td>
<td>N</td>
<td>ED</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2018M11</td>
<td>N</td>
<td>FACWIDEIN</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2018M12</td>
<td>N</td>
<td>ED</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>2018M12</td>
<td>N</td>
<td>FACWIDEIN</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
</tr>
</tbody>
</table>

Note: Row shows unique location-month pair
3 months of reporting – Summary forms

- Ensure FacWideIN, ED, & 24-hr observation units completed denominator forms for all 3 months
- Analysis folder: Advanced > Summary-level Data > Line Listing
  - Filter on SummaryType = MDRO
  - Review denominator values

<table>
<thead>
<tr>
<th>summary YM</th>
<th>summary type</th>
<th>location</th>
<th>event type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018M10</td>
<td>MDRO</td>
<td>ED</td>
<td>CDIF</td>
</tr>
<tr>
<td>2018M10</td>
<td>MDRO</td>
<td>FACWIDEIN</td>
<td>CDIF</td>
</tr>
<tr>
<td>2018M10</td>
<td>MDRO</td>
<td>ED</td>
<td>MRSA</td>
</tr>
<tr>
<td>2018M10</td>
<td>MDRO</td>
<td>FACWIDEIN</td>
<td>MRSA</td>
</tr>
<tr>
<td>2018M11</td>
<td>MDRO</td>
<td>ED</td>
<td>CDIF</td>
</tr>
<tr>
<td>2018M11</td>
<td>MDRO</td>
<td>FACWIDEIN</td>
<td>CDIF</td>
</tr>
<tr>
<td>2018M11</td>
<td>MDRO</td>
<td>ED</td>
<td>MRSA</td>
</tr>
<tr>
<td>2018M11</td>
<td>MDRO</td>
<td>FACWIDEIN</td>
<td>MRSA</td>
</tr>
</tbody>
</table>
Incomplete Months

- SIR report will first display the SIR table
- Scroll down to view supplemental table

<table>
<thead>
<tr>
<th>location</th>
<th>summaryYM</th>
<th>CDIF_labidCount</th>
<th>numPatDays</th>
<th>numAdms</th>
<th>cdiTestType</th>
<th>numbed</th>
<th>medAff</th>
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<tbody>
<tr>
<td>FACWIDEIN</td>
<td>2019M01</td>
<td>0</td>
<td>1450</td>
<td>976</td>
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<tr>
<td>FACWIDEIN</td>
<td>2019M02</td>
<td>1</td>
<td>1345</td>
<td>987</td>
<td></td>
<td>50</td>
<td>N</td>
</tr>
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</table>
Reviewing LabID Data Before Quarter is Complete

- Several ways to review monthly LabID data:
  - 1. SIR Reports: monthly counts of the SIR numerator and patient days
  - 2. Rate Tables: monthly HO and CO rates
  - 3. Frequency Table: # of events reported on each unit
  - 4. Summary Data Line List: patient days, admissions, CDI test type

- Refer to Appendix of this presentation for more details

<table>
<thead>
<tr>
<th>location</th>
<th>summaryYM</th>
<th>CDIF_labidCount</th>
<th>numPred</th>
<th>numpatdays</th>
<th>SIR</th>
<th>SIR_pval</th>
<th>sir95ci</th>
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<tr>
<td>FACWIDEIN</td>
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<td>.</td>
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<tr>
<td>FACWIDEIN</td>
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<td>.</td>
<td>1345</td>
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<td>.</td>
<td>.</td>
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<tr>
<td>FACWIDEIN</td>
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<td>.</td>
<td>1402</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
Conclusions

- LabID Rate tables are available on a monthly basis for all organisms in the MDRO Module.
- LabID SIRs are available on a quarterly basis for MRSA & CDI, and are risk adjusted using several factors.
- Not all events are included in the SIR numerator (MRSA/CDI Troubleshooting).
- Data quality.
- Appendix (more topics!)
Thank you!

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.
2019 NHSN Training
LabID Data Analysis in NHSN

APPENDIX:
- Reviewing data from incomplete quarters
- Additional information on CDI LabID SIRs in acute care hospitals
  - LabID SIRs in other healthcare settings
Reviewing LabID Data Before Quarter is Complete
Reviewing Data Before Quarter is Complete

- We encourage review of your HAI data before the quarter is complete
  - Data quality checks, internal validation, preparation for CMS deadlines, and measure impact of prevention activities
- What happens if you try to run the CDI SIR report in the middle of the quarter?

“Dear NHSN,

I entered January 2019 LabID data, but it is not appearing in my CDI SIR report. I confirmed that my January data entry is complete and accurate. NHSN must be broken!”
CDI SIR Report Before Quarter is Complete

### Answer

*NHSN is working as designed. CDI test type has not been selected for this quarter yet, and therefore an SIR cannot be calculated. CDI test type is selected at the end of quarter 1, on the March denominator record.*

### Several ways to review monthly LabID data:

1. Review supplemental SIR tables in the report (for incomplete quarters)
2. Run monthly SIR report to view numerator and patient days
3. Run monthly rate tables
4. Review monthly numerator data (e.g., frequency tables)
5. Review summary data line list
Option 1: Review Supplemental SIR Report Tables

- Keep the “Group by” option set to Summary
- **HINT!** Ensure that your time period includes at least one complete quarter
  - Ex: We want to view January 2018 data
  - Set beginning time period to **2017 Q4**

- When running CDI SIR report on an incomplete quarter, “Incomplete Months” table will appear at the bottom of the report
  - January is considered “Incomplete” until all of Q1 data are entered
Option 2: Adjust “Group by” to SummaryYM on the SIR Report

- Will allow you to review the SIR numerator and total patient days for each month
- # predicted and SIR will not be calculated

- Depending on your facility type, months from completed quarters will be shown
Option 3: Run Monthly Rate Tables

- Rate Tables will show you monthly data from *any* month
- Can view the # of events (SIR numerator), total patient days, and total admissions for each month
  - SIR numerators:
    - MRSA – MRSA_bldIncCount
    - CDI – CDIF_facIncHOCCount
Option 3: Run Monthly Rate Tables, continued

- Review CO rate tables
- $\text{MRSA\_admPrevBLDCount} = \text{MRSA blood admission prevalence rate}$

<table>
<thead>
<tr>
<th>summaryYM</th>
<th>location</th>
<th>MRSA_admPrevBLDCount</th>
<th>numAdms</th>
<th>MRSA_PrevRate</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018M07</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>1345</td>
<td>0.074</td>
</tr>
<tr>
<td>2018M08</td>
<td>FACWIDEIN</td>
<td>2</td>
<td>1233</td>
<td>0.162</td>
</tr>
<tr>
<td>2018M09</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>1442</td>
<td>0.069</td>
</tr>
<tr>
<td>2018M10</td>
<td>FACWIDEIN</td>
<td>0</td>
<td>1301</td>
<td>0.000</td>
</tr>
</tbody>
</table>

- Review HO rate tables
- $\text{MRSA\_BSIIncDensRate} = \text{MRSA blood incidence density rate}$

<table>
<thead>
<tr>
<th>summaryYM</th>
<th>location</th>
<th>MRSA_bldIncCount</th>
<th>numPatDays</th>
<th>MRSA_BSIIncDensRate</th>
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<td>FACWIDEIN</td>
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<td>0.000</td>
</tr>
<tr>
<td>2018M08</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>3333</td>
<td>0.030</td>
</tr>
<tr>
<td>2018M09</td>
<td>FACWIDEIN</td>
<td>1</td>
<td>4290</td>
<td>0.023</td>
</tr>
<tr>
<td>2018M10</td>
<td>FACWIDEIN</td>
<td>0</td>
<td>6343</td>
<td>0.000</td>
</tr>
</tbody>
</table>

MRSA SIR numerator indicator
Options 4 and 5: Monthly Numerator Data and Summary Line List

- Review monthly numerator data (e.g., frequency table)
- Review monthly summary data line list
The Details: CDI LabID SIR Reports
LabID Event SIR Reports

- Different SIR reports in NHSN based on your facility type
- Different risk factors and calculations for the number of predicted events (SIR denominator) for each facility type
LabID Event SIR Tables from NHSN

Depending on your facility type and data, you may see the following tables in your MRSA/CDI SIR reports from NHSN:

- Table 1: Actual SIR calculation for your facility (or Group)
- Table 2: Risk adjustment factors used to calculate # predicted events
- Table 3: Outlier Prevalence Rate (if applicable)
- Table 4: Incomplete Months (if applicable)
Number of Predicted Events: CDI in Acute Care Hospitals

- Negative binomial regression model incorporates 7 different factors & total patient days

### 7 Variables Used to Calculate Acute Care Hospital's # Predicted CDI Events

1. Inpatient community-onset prevalence rate
2. CDI test type
3. Medical school affiliation *(from annual survey)*
4. Number of ICU beds *(from annual survey)*
5. Total number of inpatient beds *(from annual survey)*
6. Facility type *(indicated during enrollment)*
7. Reporting CDI from an ED or 24 hr observation unit

Number of Predicted Events: CDI in Acute Care Hospitals

Table 2:

<table>
<thead>
<tr>
<th>summaryYQ</th>
<th>CDI_C0prevRate</th>
<th>cdiTestType</th>
<th>numICUBeds</th>
<th>facType</th>
<th>numBeds</th>
<th>CDIF_EDOBSIndicator</th>
<th>medType</th>
<th>numpatdays</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017Q1</td>
<td>0.000</td>
<td>NAAT</td>
<td>15</td>
<td>HOSP-GEN</td>
<td>50</td>
<td>0</td>
<td></td>
<td>1570</td>
</tr>
</tbody>
</table>

- Displays all values for your hospital that were used to calculate the # of predicted events
- Inaccurate data entry may lead to inaccurate # of predicted events
- Review this table whenever you run your SIR reports
Inpatient Community-Onset (CO) Prevalence Rate

- # Inpatient CO CDI events / # Admissions * 100
- Prevalence rate includes data from inpatient locations only
- CO = LabID event collected on Day 1, 2, or 3 of patient admission
  - Facility admit date: first date patient is transferred to inpatient unit
- CO-HCFAs are excluded
- Based on your facility’s prevalence rate for the ENTIRE QUARTER
  - Quarterly prevalence rate is used to predict # of CDI events per quarter

NHSN Variables: cdif_admPrevCOCount /numAdms * 100
Outlier Prevalence Rate Exclusion: CDI SIR

- Outlier prevalence rate exclusion rule
- If facility’s inpatient CO prevalence rate is above pre-determined threshold, the # of predicted CDI events and SIR cannot be accurately calculated for that quarter
- Outlier threshold = **2.6 CO CDI events per 100 admissions**
- In this situation, data are still considered “complete” and submitted to CMS for Quality Reporting, given that all reporting requirements are met

More information:
Example: Outlier Prevalence Rate

- You will notice that **all** SIR data are missing for a quarter
- Scroll down in the SIR report – look for supplemental table

### Table 3:

<table>
<thead>
<tr>
<th>Location</th>
<th>Summary Yr/Qtr</th>
<th>CDIF_facInChOCCount</th>
<th>numPred</th>
<th>numpatdays</th>
<th>SIR</th>
<th>SIR_pval</th>
<th>sir95ci</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACWIDEIN</td>
<td>2017Q1</td>
<td>3</td>
<td>1</td>
<td>1.069</td>
<td>1570</td>
<td>0.935</td>
<td>1.0000</td>
</tr>
<tr>
<td>FACWIDEIN</td>
<td>2017Q2</td>
<td>3</td>
<td>3</td>
<td>0.241</td>
<td>702</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>FACWIDEIN</td>
<td>2017Q3</td>
<td>3</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
<td>.</td>
</tr>
</tbody>
</table>
CDI Specimens Collected in ED and Observation Units

- Used to determine which events are counted in the SIR numerator
- For example:
  - Patient has a positive CDI event in ED.
  - Patient is transferred to an inpatient unit. 10 days after admission, patient has a second positive CDI event.

✓ First CDI event in the ED will not be counted in the SIR
✓ Second CDI event occurred 10 days after admission
  - Event will be labeled as “HO” on the CDI Line List
  - Event will **NOT** be counted in the SIR (i.e., second event within 56 days)
Surveillance in ED/Observation Unit Impacts Risk Adjustment (# predicted)

- Indicator variable included in risk adjustment
- "For this quarter, is the facility reporting CDI LabID data from an ED or 24 hour observation location?" (Yes/No)
  - Baseline analysis found facilities with these locations had more HO CDI events compared to facilities without
- For data quality: If you have an ED/24 hr observation location, make sure it is mapped and included in LabID surveillance efforts
- If facility does not have an ED/24 hr observation location, will still receive risk adjustment from the other variables in the model

Other Healthcare Settings

- Acute Care Hospitals (Hospital IQR)
- Critical Access Hospitals (Hospital IQR)
- Inpatient Rehabilitation Facilities (IRFQR)
- Long Term Acute Care Hospitals (LTCHQR)
- PPS-Exempt Cancer Hospitals (PCHQR)
**CDI Event Line List SIR Indicator Variables**

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>CDI SIR Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Hospital</td>
<td>FWCDIF_facIncHOCount</td>
</tr>
<tr>
<td>CMS-certified Inpatient Rehabilitation (IRF) unit located within a hospital</td>
<td>CDIF_IRFIncCount</td>
</tr>
<tr>
<td>Critical Access Hospital</td>
<td>FWCDIF_facIncHOCount</td>
</tr>
<tr>
<td>Long-term Acute Care Hospital</td>
<td>FWCDIF_facIncHOCount</td>
</tr>
<tr>
<td>Free-standing Inpatient Rehab Facility</td>
<td>FWCDIF_facIncHOCount</td>
</tr>
</tbody>
</table>

- Use these variables to determine which events on the line lists are counted in the SIR numerator
  - 1 = counted in SIR numerator
  - 0 = not counted in SIR numerator
### MRSA Event Line List SIR Indicator Variables

<table>
<thead>
<tr>
<th>Facility Type</th>
<th>MRSA SIR Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Hospital</td>
<td>FWMRSA_bldIncCount</td>
</tr>
<tr>
<td>CMS-certified Inpatient Rehabilitation (IRF) unit located within a hospital</td>
<td>MRSA_IRFbldIncCount</td>
</tr>
<tr>
<td>Critical Access Hospital</td>
<td>FWMRSA_bldIncCount</td>
</tr>
<tr>
<td>Long-term Acute Care Hospital</td>
<td>FWMRSA_bldIncCount</td>
</tr>
<tr>
<td>Free-standing Inpatient Rehab Facility</td>
<td>FWMRSA_bldIncCount</td>
</tr>
</tbody>
</table>

- Use these variables to determine which events on the line lists are counted in the SIR numerator
  - 1 = counted in SIR numerator
  - 0 = not counted in SIR numerator
Critical Access Hospital (CAH): CDI SIR

- Available for facilities enrolled in NHSN as “HOSP-CAH”
- SIR numerator: incident, healthcare-facility onset events
- Risk adjustment used for # predicted events:
  - Inpatient Community-Onset Prevalence Rate
    - # Inpatient CO CDI events / # Admissions * 100
    - 2 categories for risk adjustment:
      - Prevalence Rate = 0
      - Prevalence Rate > 0
    - Based on your facility’s prevalence rate for the ENTIRE QUARTER
      - All 3 months of data entry for the quarter must be complete

REMINDER: Accurate CDI SIRs can only be calculated for an entire quarter, or longer.
CAH: MRSA Bacteremia SIR

- Available for facilities enrolled in NHSN as “HOSP-CAH”
- # of predicted events uses “intercept-only model”
  - None of the investigated variables were statistically significantly associated with MRSA bacteremia in CAHs
  - # predicted events will be calculated using the overall (unadjusted) national MRSA bacteremia experience in CAHs
  - Monthly SIRs are available for CAHs

Table 2. Critical Access Hospitals (CAHs)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Parameter Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intercept*</td>
<td>-10.7795</td>
</tr>
</tbody>
</table>

Formula for manual calculation:

\[ \# \text{ predicted} = [\exp (-10.7795)] \times \text{patient days} \]
LTAC: CDI SIR

Risk adjustment for # predicted events:

- 1. Inpatient Community-Onset Prevalence Rate (for the entire quarter)
- 2. CDI test type
- 3. Percent of admissions on a ventilator (annual survey)
- 4. Percent of beds located in single occupancy rooms (annual survey)

REMEMBER: Accurate CDI SIRs can only be calculated for an entire quarter, or longer.
IRF: CDI SIR

- Risk adjustment used in calculation of # predicted events:
  - CDI test type
  - Type of IRF (unit within a hospital vs. free-standing IRF)
    - Additional adjustment for free-standing IRFs with reported community-onset (CO) events
  - Percent of admissions with orthopedic conditions (*annual survey*)
  - Percent of admissions with traumatic and non-traumatic spinal cord dysfunction (*annual survey*)
  - Percent of admissions with stroke (*annual survey*)

REMINDER: Accurate CDI SIRs can only be calculated for an entire quarter, or longer.