



March 19, 2018



External NHSN Data Validation in NC

Heather Dubendris, HAI Epidemiologist

Katie Steider, HAI Epidemiologist

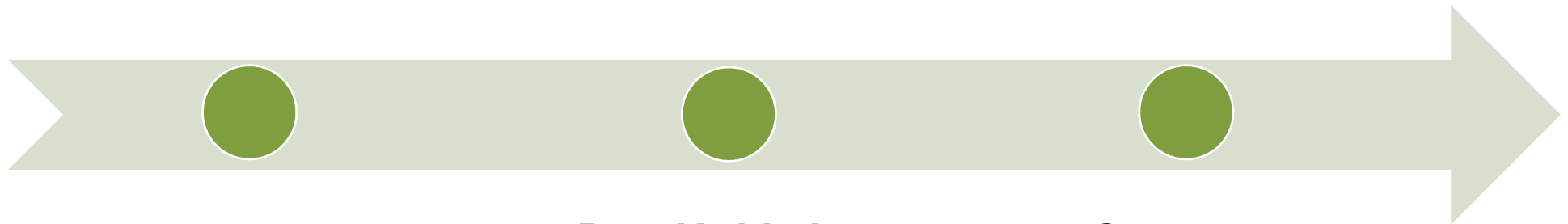


Overview

- NC data validation process
- Facility selection methodology
- Validation challenges and takeaways



NC Data Validation Process



Preparation

1. Select HAI(s)
2. Review/create MRAT
3. Create results database
4. Create tools
5. Validator training
6. Pilot validation tools
7. Facility selection/notification
8. Record selection

Data Validation Visits

1. Record review
2. Numerator/denominator survey
3. (2018) Annual Survey
4. (2018) TAP Assessment

Summary

1. Data entry
2. Data analysis
3. Follow-up call with facility
4. Final report



Facility Selection

- 92 Acute Care Hospitals in NC, too many for one epi to visit/validate
- CDC recommendation (2017 External Validation Guidance and Toolkit):

ACHs in jurisdiction	Number of facilities to target	Include 5% random sample?
20 or fewer	All facilities	No
21 – 149	18	Yes
150 or more	21	Yes



Slide courtesy of Savannah Carrico, MPH

Current CDC Facility Selection Method

1. Sort facilities by descending Number of Predicted Events
2. Assign to tertiles (Tertile 1 = top 33.3% of facilities, etc.)
3. Calculate the median SIR within each tertile
4. Assign facilities in each tertile into groups based on SIR:
 - a. $SIR > \text{median}$: Group A
 - b. $SIR < \text{median}$: Group B
 - c. $SIR = 0$ and Number of Predicted Events > 1 : Group C
5. Select the facility with the highest Number of Predicted Events sequentially from Group A, B, and C in Tertile 1; continue to subsequent tertiles if necessary
6. Select 5% random sample from remaining facilities in all tertiles



Hospital	Observed Events	Predicted Events	SIR	Tertile	Stratum	Selected
1	56	50.54	1.108	1	A	1
2	23	25.3	0.909	1	A	4
3	24	15.8	1.519	1	A	6
4	64	70.87	0.903	1	B	5
5	145	166.7	0.870	1	B	2
6	0	5.74	0.000	1	C	3
7	5	5	1.000	2		
8	10	4.9	2.041	2		
9	0	4.5	0.000	2		
10	2	3.8	0.526	2		
11	5	3.3	1.515	2		
12	0	1.56	0.000	2		
13	5	1.2	4.167	3		
14	0	0.9		3		
15	0	0.89		3		
16	2	0.4		3		
17	1	0.3		3		
18	0	0.2		3		

← Median SIR = 0.906

Not Included because
Predicted Events < 1

*Fictitious data

Slide courtesy of Savannah Carrico

Current CDC Facility Selection Method

Pros

- Focuses on high-burden facilities
- Acknowledges potential for over- and under-reporting within the top third of facilities by stratifying by SIR

Considerations

- Excludes facilities with < 1 Predicted Event
- Smaller facilities less likely to be selected
- Relies on accurate risk-adjustment

NC Facility Selection Method - 2015

Hospitals were selected for validation based on potential over-reporting and/or high burden of the given HAI or potential under-reporting.

Facilities were selected using the following algorithm:

- If the number of observed HAIs was > 0 :
 - The percent difference $[(\text{observed} - \text{predicted HAIs}) / \text{observed HAIs}]$ was $> 50\%$.
 - The percent difference was $< -150\%$.
- If the number of observed HAIs was 0:
 - The absolute difference (predicted-observed HAIs) was > 2
 - (CLABSI) and central line utilization ratio (central line days/patient days) was $> 50\%$



NC Facility Selection Method - 2016

1. Stratify facilities into 2 groups
 - a. Facilities belonging to organizations with ≥ 5 facilities:
Stratum 1
 - b. Remaining facilities: Stratum 2
2. Randomly select number of targeted facilities with allocation proportional to the size of the strata.



NC Facility Selection Method - 2018

1. Sort facilities by descending Number of Predicted Events
2. Assign to tertiles (Tertile 1 = top 33.3% of facilities, etc.)
3. Sort by descending SIR
4. Select every n^{th} facility in each tertile until 1/3 of target facilities selected; repeat for remaining tertiles

$$n = \frac{\frac{\# \text{ target facilities}}{3}}{\# \text{ facilities in tertile}}$$

Facilities	Observed Events	Predicted Events	SIR	Tertile	
5	24	15.8	1.519	1	← Selected
3	56	50.54	1.108	1	
4	23	25.3	0.909	1	
2	64	70.87	0.903	1	
1	145	166.7	0.870	1	
6	0	5.74	0.000	1	← Selected
8	10	4.9	2.041	2	← Selected
11	5	3.3	1.515	2	
7	5	5	1.000	2	
10	2	3.8	0.526	2	
9	0	4.5	0.000	2	
12	0	1.56	0.000	2	← Selected
13	5	1.2	4.167	3	← Selected
14	0	0.9		3	
15	0	0.89		3	
16	2	0.4		3	
17	1	0.3		3	
18	0	0.2		3	← Selected

Other Tertiles included

*Fictitious data

Slide courtesy of Savannah Carrico

NC Facility Selection Method - 2018

Pros

- Captures facilities with < 1 predicted events
- More likely to include low-burden (small) facilities
- All facilities have an equal chance of selection

Considerations

- Relies on accurate risk-adjustment

Cumulative Attributable Difference (CAD) Facility Selection Method

- $CAD = \text{Observed \# HAIs} - (\text{Predicted \# HAIs} * \text{SIR Goal})$
- Calculated even if the number of predicted events is < 1 (unlike SIR)
- Represents the number of infections needed to prevent to reach SIR goal
- The CAD identifies potential under- and over-reporters that would benefit the most from data validation
- CAD should not be used to compare facilities

Cumulative Attributable Difference (CAD) Facility Selection Method

1. Run TAP Report in NHSN (limited to CLABSI, CAUTI, CDI)
2. Sort by descending Number of Observed Events
3. Assign facilities to strata
 - a. Number of Observed Events = 0: Stratum 1
 - b. Number of Observed Events > 0: Stratum 2
4. Calculate absolute value of CAD for facilities
5. Sort each stratum by descending absolute value of CAD
6. Select 50% of target facilities from Stratum 1 and remainder from Stratum 2



SIR Goal for CLABSI = 0.7

Observed Events	Predicted Events	SIR	CAD	AbsoluteCAD	Stratum	Tertile
0	5.74	0	-4.018	4.018	1	1
0	4.5	0	-3.15	3.15	1	2
0	1.56	0	-1.092	1.092	1	2
0	0.9		-0.63	0.63	1	3
0	0.89		-0.623	0.623	1	3
0	0.2		-0.14	0.14	1	3
24	15.8	1.519	12.94	12.94	2	1
56	50.54	1.108	20.622	20.622	2	1
23	25.3	0.909	5.29	5.29	2	1
64	70.87	0.903	14.391	14.391	2	1
145	166.7	0.87	28.31	28.31	2	1
10	4.9	2.041	6.57	6.57	2	2
5	3.3	1.515	2.69	2.69	2	2
5	5	1	1.5	1.5	2	2
2	3.8	0.526	-0.66	0.66	2	2
5	1.2	4.167	4.16	4.16	2	3
2	0.4		1.72	1.72	2	3
1	0.3		0.79	0.79	2	3

*Fictitious data

Slide courtesy of Savannah Carrico

CAD Facility Selection Method

Pros

- Captures facilities with < 1 predicted event
- Includes equal sample of facilities with 0 observed HAI events and > 0 observed HAI events
- Identifies potential over-/under-reporters
- Potential to identify facilities with excellent prevention (extremely negative CAD)

Considerations

- Relies on accurate risk-adjustment

External Data Validation in NC

Calendar Year	Validation Time Period	HAI	Facility Selection Methodology	Number of reviewers
2015	2014	CLABSI	NC Facility Selection Method - 2015	1
2015	2014	CDI	NC Facility Selection Method - 2015	1
2017	2016H1	CAUTI	NC Facility Selection Method - 2016	2
2017	2017H1	MRSA	NC Facility Selection Method - 2015	1
2018	2017H2 2018H1 (anticipated)	CDI	CAD	1
2018	2017H2 2018H1 (anticipated)	CLABSI	CAD	2

Challenges

- Modifications to MRAT when toolkit not available
- Facility participation
 - Staff turnover, participation in CMS validation
- Obtaining records from facilities
 - Obtaining necessary data
 - Secure data transfer



Contact

Heather Dubendris, MSPH
heather.dubendris@dhhs.nc.gov

Katie Steider, MPH, CPH
katie.steider@dhhs.nc.gov

