



## **Internal NHSN Data Validation for Improved Surveillance and Prevention**

**NHSN Training  
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Katie Arnold MD**

Acknowledgments: Surveillance Branch, DHQP

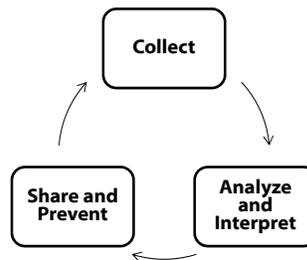
Division of Healthcare Quality Promotion

### **Objectives**

- ❑ **Describe**
  - Attributes of high quality HAI surveillance
  - How internal validation can help you achieve it
  - Why it matters
- ❑ **Consider**
  - Elements of internal data validation
- ❑ **Recommend**
  - Ways facilities can validate their own CLABSI and SSI data

## **HAI Surveillance is**

Ongoing, systematic collection, analysis, interpretation, and communication of data essential to planning and implementing prevention



## **Quality surveillance for Healthcare-Associated Infections (HAI) Requires:**

- **CONSISTENCY -> COMPLETENESS**

## Consistency - > Completeness

- ❑ **In the era before public reporting and payment schemes, surveillance had to be consistent and relatively complete**
  
- ❑ **New paradigm: Complete surveillance is the standard for all facilities**
  - Otherwise, harder-working facilities could suffer
  - The public and external validators will judge by this standard

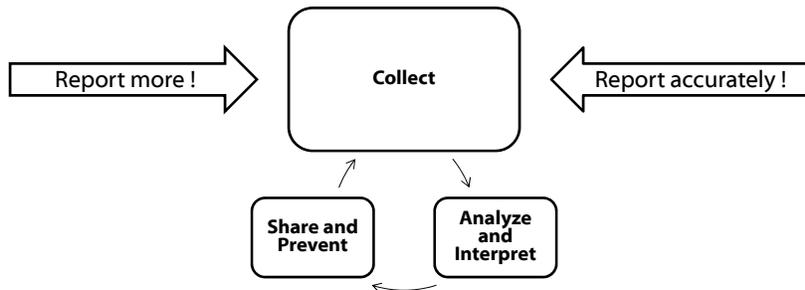
## How Can You Achieve Completeness ?

- ❑ **Review\*\* of a minimum clinical data set for all candidates**

	Recommended Step 1	Step 2
CLABSI	Review every positive blood culture**	Review for presence of a central line
SSI	Identify and review all post-op** patients and hospital re-admissions: 2012 → 30d or 1y 2013 → 30d or 90d	<ul style="list-style-type: none"> <li>• Daily hospital rounds important to identify infections not resulting in cultures</li> <li>• Review wound cultures but realize that culture-based surveillance alone misses 50-60% of SSI</li> </ul>
CAUTI	Review every positive urine culture**	Review for presence of a urinary catheter
labID event FacWideIN	Review all final test results for specific events** (e.g. MRSA blood cultures, C. difficile tests)	Assess if ER positives were admitted

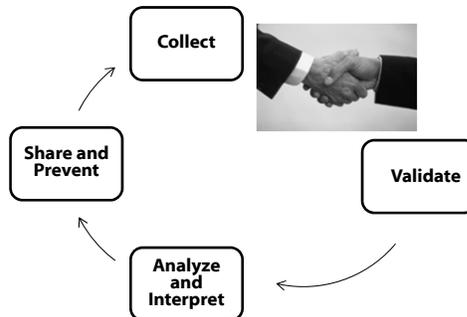
- \*\*Review events up to the point where HAI is ruled out, (at minimum) for CLABSI and CAUTI surveillance locations, surgical procedures under surveillance, labID events under surveillance

**Increasing Pressure on Collection:**  
**More required reporting**  
**Data must be accurate**  
**Money is on the line**  
**IP cannot go it alone**



### **HAI Validation Provides**

- ❑ Insights into systematic weaknesses (and how to correct them)
- ❑ Assurance that surveillance data are of high quality:  
Complete, accurate, and timely
- ❑ Validation engages a team



### **Quality Surveillance for Healthcare-Associated Infections (HAI) Requires:**

- ❑ **CONSISTENCY -> COMPLETENESS**
- ❑ **COORDINATION**

### **Coordination of Support for IPs**

- ❑ **IP and Quality cannot do complete surveillance/ validation alone**
- ❑ **HAI surveillance /validation needs to be a shared responsibility across hospital units, services and disciplines**
- ❑ **IP needs protected time for prevention activities;**
  - Delegation of certain tasks, e.g. denominator collection, data entry
  - Widespread and ongoing collection of patient denominator data may require data system/ IT solutions
  - As facilities achieve more connection of relevant clinical data (e.g. new antimicrobial starts), surveillance may further improve

### Who Can Support IP?

	Recommended Step 1	Partner	Step 2	Partner
CLABSI	Review every positive blood culture**	<ul style="list-style-type: none"> <li>• Micro lab LIS</li> </ul>	Review for presence of a central line	<ul style="list-style-type: none"> <li>• Location-specific denominator counters, CL investigators</li> <li>• IT to tweak electronic down loads</li> </ul>
SSI	Identify and review all post-op** patients and hospital re-admissions 2012 → 30d or 1y 2013 → 30d or 90d	<ul style="list-style-type: none"> <li>• Bed control /ADT system</li> <li>• Medical records</li> <li>• Surgery staff</li> </ul>	<ul style="list-style-type: none"> <li>• Daily hospital rounds important to identify infections not resulting in cultures</li> <li>• Review wound cultures but realize that culture-based surveillance alone misses 50-60% of SSI</li> </ul>	<ul style="list-style-type: none"> <li>• Micro lab LIS</li> <li>• Surgical ward staff</li> <li>• OR: Return to surgery</li> </ul> Consider: <ul style="list-style-type: none"> <li>• Pharmacy</li> <li>• MR: extended LOS</li> <li>• MR: ICD-9 d/c coding</li> </ul>
All	IP has final call, using NHSN definitions	<ul style="list-style-type: none"> <li>• Clerical help (data entry/tracking)</li> </ul>		

Internal validation engages partners in supporting surveillance data quality

- \*\*at least for surveillance locations, surgical procedures under surveillance, labID events under surveillance

### Quality Surveillance for Healthcare-Associated Infections (HAI) Requires:

- CONSISTENCY -> COMPLETENESS**
- COORDINATION**
- CONFIDENCE**

Courtesy of Lynn Janssen, CA DPH

### **Confidence in Your Data**

- ❑ **Facilities will be held accountable for using NHSN methods and definitions**
- ❑ **Team must know the NHSN surveillance definitions**
- ❑ **Apply definitions with confidence the same way every time**
- ❑ **Seek assistance for ambiguity**

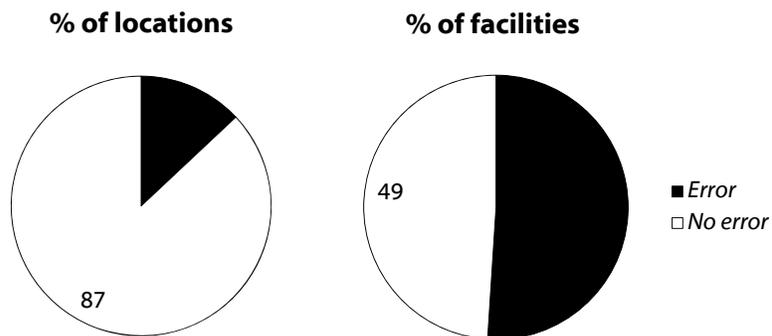
### **Validation Can Help Each of These**

- ❑ **COMPLETENESS:**
  - by double checking sources and investigating ALL candidate events until ruled out
- ❑ **COORDINATION:**
  - Focusing facility systems on developing tools to support surveillance and validation
    - E.g. line list of positive blood cultures from LIS
    - E.g. systems for alerts upon return trips to OR, surgical readmissions
- ❑ **CONFIDENCE:**
  - in your data through team training
  - In a level playing field for all facilities

### Why Validate?

- ❑ **These are YOUR data**
  - Good data help you derive meaningful, actionable information for your facility
- ❑ **Ability to hold up under external scrutiny (e.g. CMS)**
  - Incomplete or inaccurate surveillance may affect payment and/or reputation
- ❑ **You may be surprised at what you find**

### Mapping Errors Found by NHSN Validation, CA



CA DPH 2012

## Denominator Errors Found by NHSN Validation

- ❑ **Central line counting problems**
  - Central line-counters who don't know or follow correct definitions and methods
  - Electronic upload of line data that mis-counts
- ❑ **Incomplete surgical procedures based on source limitations**
  - Add-on procedures omitted from OR schedule
  - Omitted ICD-9 procedure code during electronic upload
- ❑ **Excess NHSN procedures due to inclusion of wounds not primarily closed**
  - A common problem that may resolve with new 2013 definitions

## Numerator Errors Found by NHSN Validation

- ❑ **Omissions and Misconceptions**
  - Blood cultures were sometimes "just missed"
  - MRSA BSI was not POA just because MRSA colonization was found on active surveillance testing
  - Candida BSI was not secondary to PNEU unless patient met PNEU3 definition
  - Use of current weight vs. birth weight in NICUs
  - Primary vs. secondary BSI issues commonly a challenge

### **Suggestions for Internal Data Validation**

- **~Annually**
  - Draft surveillance / validation plans
  - Recruit partners and update staff training
  - Review annual survey for facility descriptors, mapping
- **~Monthly**
  - Report CLABSI denominators, SSI Procedure Import
  - Run analysis checks for missing, inconsistent or duplicate data
  - Communicate with partners
- **~Daily:**
  - Spot check processes
    - denominator tracking (e.g.: central line days)
    - Surgical procedure documentation
  - Active case-identification
    - Walk-the-walk: micro lab, surgical wards, ICUs

### **Recommended Annual Check: Pull up Annual Survey and the NHSN Manual**

- **Error-prone facility-level information in NHSN**
  - Medical school affiliation
  - Number of beds (ICU, specialty care areas, wards)
  - Location mapping
    - With CMS addition of labID event, facility mapping needed house-wide
    - CA suggested working with bed control or CNO to map correctly
- **Are reporters up to date on protocol standards?**
  - Gather your group (facility, or APIC Chapter)
    - Review NHSN newsletter updates
    - Organize a webinar or training update
    - Work through case-studies from AJIC

### **Annual Check: For Manual CLABSI Denominators**

- **Protocol: manual count, same time each day**
  - **Are you confident that staff are counting correctly?**
    - What is definition of a central line? Which lines do they count?
    - Quiz them, or conduct a spot check with each location
    - What happens when they go on vacation?
  - **Missing or implausible data?**
    - # patient days > # beds
    - # central line days > # patient days
  - **Using logs, calculate % of days per year that**
    - Patient days not collected
    - Central line days not collected
  - **Involve and review results with staff**
    - A source of pride !

### **Annual Check: Electronic CLABSI Denominators**

- **Electronic denominators commonly inflated**
  - Protocol: one central-line day per patient
  - Electronic count for patient with 3 lines may be 3 line-days
- **Before you begin: validate e-denominators with concurrent manual counts x 3 months**
  - Counts should match within 5%
  - Work with IT to correct electronic counting problems, or hand count
- **Current users: spot check at least one unit per month**
  - **Determine % of days per year that**
    - Patient days not collected
    - Central line days not collected
    - # patient days > # beds
    - # central line days > # patient days

### **Annual Check: SSI Denominators (Procedures)**

- **Whether manual or imported, are denominators complete?**
- **Missing denominators will make you look bad**
  - Consider quality of chosen denominator data sources: OR log, OR schedule, ICD-9 for repeat procedures or high risk ICD-9 CM diagnoses at d/c, EMR filter
  - Consider checking a second source to look for missing procedure data
- **How do you identify and remove procedures not primarily closed, or multiple NHSN procedures?**
  - Chart review, op report review
  - Your edits needed to correct for these
- **Proposed revisions to SSI surveillance may reduce this burden**

### **Annual Check: SSI Denominators (Procedures)**

- **Especially for facilities with lots of surgery: use electronic denominator import**
  - SSI "Procedure import via .csv": Step-by-step instructions, available in NHSN Help
  - Work closely with OR and IT staff make this work
  - Validate results to assure coding has not omitted ICD-9 categories

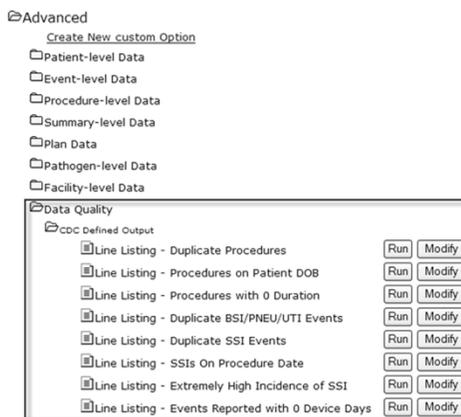
## Check SSI Denominator Data Quality in Analysis

- ❑ Consider which variables you want to validate
  - Variables you care about:
    - E.g.: Surgeons, emergency, ASA, wound class, procedure duration
  - (Revised) variables used for NHSN risk adjustment
    - Listed by procedure in Appendix A of the National HAI Standardized Infection Ratio (SIR) Report, January-December 2010  
[http://www.cdc.gov/hai/pdfs/SIR/national-SIR-Report\\_03\\_29\\_2012.pdf](http://www.cdc.gov/hai/pdfs/SIR/national-SIR-Report_03_29_2012.pdf)
  - Variables shared with CMS



## NHSN Monthly Analysis: “Canned” but Modifiable Data Quality Output Options :

- ❑ Analysis
  - (Generate datasets)
  - Output options
  - Advanced
  - Data Quality
    - CDC-defined output



### Example: Denominator Quality Validation Check procedure duration and ASA Score for all CBGB and CBGC procedures

- ❑ Do monthly, after procedure upload
- ❑ Analysis
  - (Generate datasets)
  - Output options
  - Advanced
  - Procedure-level Data
  - CDC-defined output
  - Line-listing – All Procedures
  - Modify button

Advanced

Create New custom Option

Patient-level Data

Event-level Data

Procedure-level Data

CDC Defined Output

- Line Listing - All Procedures Run Modify
- Frequency Table - All Procedures Run Modify
- Bar Chart - All Procedures Run Modify
- Pie Chart - All Procedures Run Modify
- Rate Table - SSI Data by Procedure and Risk Index Run Modify
- Run Chart - SSI Data by Procedure and Risk Index Run Modify
- Rate Table - Specific Event SSI Rates by Procedure Run Modify
- Run Chart - Specific Event SSI Data by Procedure Run Modify
- Rate Table - SSI Data by Surgeon, Procedure, and...more Run Modify
- Run Chart - SSI Data by Surgeon, Procedure, and ...more Run Modify

### Checking CBGB Data: Procedure Duration

National Healthcare Safety Network  
Line Listing for All Procedures  
As of: September 22, 2010 at 2:58 PM  
Date Range: ALL PROCEDURES

Org ID	Patient ID	Date of Birth	Gender	Procedure ID	Procedure Date	Procedure Code	Duration of Procedure - hr	Duration of Procedure - min
10018	829204	10/20/1925	F	21790	07/27/2009	CBGB	1	6
10018	250754	08/23/1941	M	21664	07/31/2009	CBGB	1	42
10018	789995	08/05/1925	F	21750	08/13/2009	CBGB	1	47
10018	814096	02/12/1931	M	21766	07/23/2009	CBGB	1	51
10018	838249	03/20/1930	M	21873	07/02/2009	CBGB	1	55
10018	838231						2	0
10018	527318						2	7
10018	836570						2	12
10018	739259						2	15
10018	744782						2	15

Notice that all CBGB procedure durations are <3hours; suggests that incorrect duration was imported for these procedures.

## Checking CBGB/CBGC Data: ASA Score

National Healthcare Safety Network  
Frequency Table for All Procedures  
As of: September 22, 2010 at 3:15 PM  
Date Range: All PROCEDURES

Frequency Col Pct	Table of asa by proccode			Total
	proccode			
	asa	CBGB	CBGC	
	2	1 1.75	0 0.00	1
	3	1 1.75	0 0.00	1
	4	26	1	27
	5	29 50.88	0 0.00	29
	Total	57	1	58

ASA Score of 5 =  
Moribund patient who is  
not expected to survive  
for 24 hours with or  
without the operation.

*It is unlikely that 50% of the  
patients undergoing CBGB  
would be classified as a 5.*

## Troubleshooting

- ❑ **Consider sources of data & possible sources of problem**
- ❑ **Perform data checks monthly**
  - Especially after any changes in source database(s) and/or NHSN protocol
- ❑ **Discuss issues with OR staff, IT staff, and/or data manager**
  - Has IT glitch changed data capture?
  - Has code omitted procedures?
  - Have default values been used in the absence of available or electronically captured variables?

## Numerators: CLABSI

- ❑ **More problems with under-reporting than over-reporting CLABSIs**
- ❑ **Some facilities “just miss” positive blood cultures**
- ❑ **One way to be sure you haven’t missed any CLABSIs is to track and double check all positive blood cultures in surveillance locations**
- ❑ **During surveillance, stop when you can rule-out HAI**
  - Screening questions: Is this a known infection? Was the patient in a surveillance location (or recently discharged)? Was there a central line (or recently pulled)?
  - Documentation may help you during external validation
- ❑ **Validation of case-ascertainment should include periodically reviewing list of candidate cases**
  - Micro lab should be able to produce list of positive blood cultures for surveillance areas
  - If candidate cases were “missed,” investigate why and how to fix it

## New this Fall: Analysis Quick Reference Guides

- ❑ **Line list**
- ❑ **Pie chart**
- ❑ **Frequency Table or SIR Table (DA vs. SSI)**
- ❑ **Run chart (control chart) showing change over time**
- ❑ **How to filter data by time period or other criteria**
- ❑ **Rate table or SIR report by the fiscal year**
- ❑ **How to export NHSN data**
- ❑ **How to run analyses with custom (self-defined) fields, and save output template for future use**
- ❑ **How to run multiple reports at once**

## **E.g. Run Charts: Longitudinal Data Checks**

- **Review longitudinal trends and assess aberrations**
  - Numerators by location and overall
  - Denominators by location and overall
  - Rates by location and overall
  - Benchmarked rates (SIR) by location and overall

## **Now What?**

- **Use YOUR Valid Data**
  - Consider weaknesses identified by validation, how to improve
  - Consider the increasingly valid results to direct prevention efforts
    - What's good and improving
    - What's bad or falling behind
  - Discuss your validated results with hospital epidemiologist and/or infection control committee chair, and strategize for next steps
  - Show your validated results to partners
  - Show your validated results to C-suite
    - How many cases has your facility prevented?
    - How much money have you saved?
    - Can you explain methods to The Joint Commission?
    - Can you stand up to a CMS audit?

**Thank you !**

**Questions?**