Epidemiology and Surveillance

Basics of Infection Prevention

2-Day Course

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Objectives

- Discuss basic principles of epidemiology and how they apply to surveillance
- Review basic surveillance practices: data collection, recording, analysis, interpretation, and communication of surveillance findings
- Describe surveillance process and outcome measures for infection prevention

Epidemiology

- Study of factors affecting health of populations

Clinical care: focus on the individual
– vs –
Epidemiology: focus on the group

- In healthcare, answers questions such as:
  - What factors contribute to increased HAI rates?
  - What populations are at higher risk for developing HAIs?
    - What percentage of the time?
- Allows assessment of trends over time

Applying Epidemiology in Healthcare

- Surveillance
- Assessment of intervention, new product
- Outbreak identification

Infection Prevention and Hospital Epidemiology

- Goal is prevention of healthcare-associated infections (HAIs)
- Professional societies include
  - Association for Professionals in Infection Control and Epidemiology (APIC)
  - Society for Healthcare Epidemiology of America (SHEA)
  - Infectious Diseases Society of America (IDSA)
- Epidemiologic research and surveillance underlies HAI prevention
  - Data for action

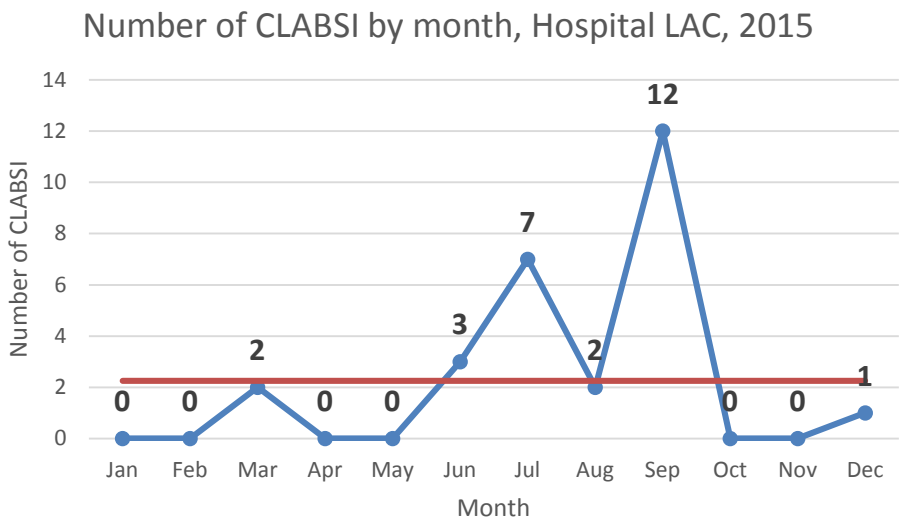
Surveillance

- The ongoing, **systematic** collection, **recording**, analysis, **interpretation** and **dissemination** of data
- Reflects rate of disease onset and/or current health/disease status of a community or population (e.g. healthcare patients)
- Aims to identify risk factors for disease
- Used for public health **action** to reduce morbidity and mortality, and to improve health.

Terminology

Mean

- Measure of central tendency used to describe a data set
- The average value of a set of numbers
- Most affected by outliers
- To calculate:
  - Add the values in the data set
  - Divide by total number of variables

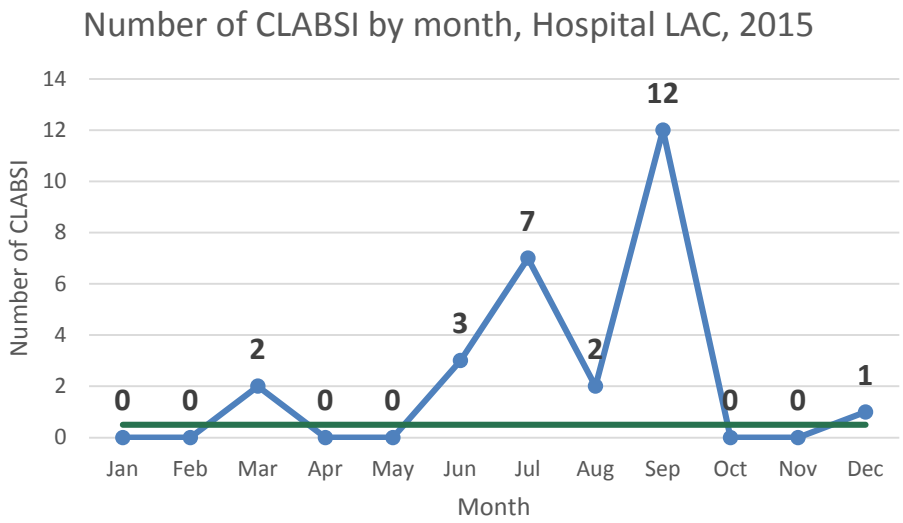


Calculation

$$\frac{(0+0+2+0+0+3+7+2+12+0+0+1)}{12} = \text{Mean} = 2.25$$

Median

- Another measure of central tendency used to describe a data set
- The midpoint of a distribution of values
- To calculate:
  - Order the values in the data set (low to high, or vice versa)
  - Identify middle value



Calculation

0,0,2,0,0,3,7,2,12,0,0,1

Order: 0,0,0,0,0,0,1,2,2,3,7,12

Median= 0.5

Types of numerical measurements

- Incidence
- Prevalence
- SIR
- Incidence density rate

Prevalence

- Proportion of persons in a population who have a particular disease or attribute at a specified point in time
  - Includes both new and pre-existing cases

$$\frac{\text{All new and pre-existing cases during a given time period}}{\text{Population during the same time period}}$$

- Can be point or period
- Healthcare epidemiology example:

$$\text{MRSA admission prevalence rate} = \frac{\text{2 patients colonized with MRSA}}{\text{10 patients admitted on Mar 31, 2012}} = 0.2$$

Incidence

- Proportion of an initially disease-free population that develops disease during a specified period of time

$$\frac{\text{New cases during time period}}{\text{Population during time period}}$$

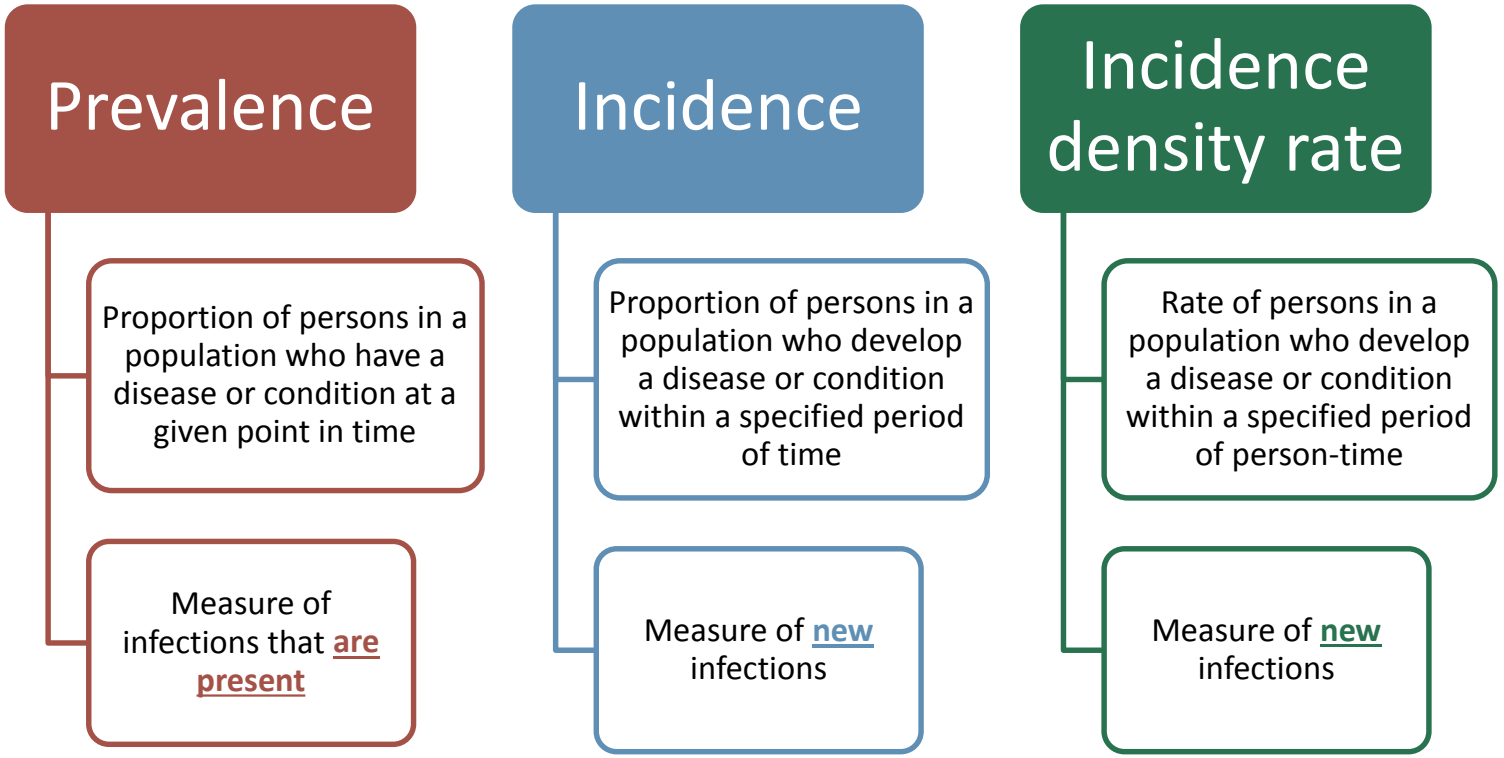
- Also referred to as attack rate or risk
- Healthcare epidemiology example:

$$\text{Colon SSI rate} = \frac{\text{8 SSI in 2015}}{\text{240 colon surgeries in 2015}} * 100 = 3.33$$

Incidence density rate

- Measure of incidence that incorporates time directly into the denominator
  - Central line-days, patient-days, person-time
- Healthcare epidemiology example:

$$\text{CLABSI rate} = \frac{\text{5 CLABSI in 2015}}{\text{11,400 line-days in 2015}} * 10{,}000 = \text{4.38 CLABSI per 10,000 central-line days}$$

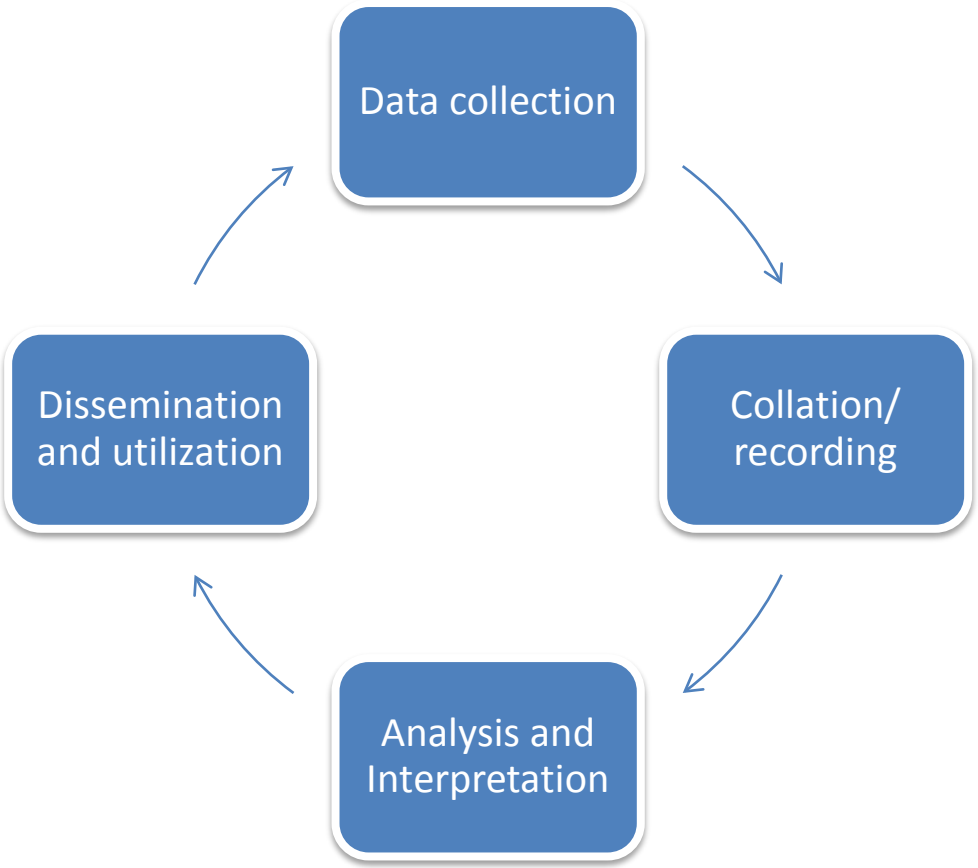

Prevalence
Proportion of persons in a population who have a disease or condition at a given point in time
Measure of infections that are present
Incidence
Proportion of persons in a population who develop a disease or condition within a specified period of time
Measure of new infections
Incidence density rate
Rate of persons in a population who develop a disease or condition within a specified period of person-time
Measure of new infections

Confidence interval, p-value

- **Confidence interval**: range of values to describe uncertainty around a point estimate
  - Measure of variability in data
- **p-value**: measure of statistical significance which tells us the probability of an event occurring due to chance alone
  - Range: 0-1.0
  - Common cut-offs: 0.05, 0.01
  - E.g. An investigator found that men with hypertension were twice more likely to develop complications due to a smallpox vaccination than those with normal blood pressure (p=0.09). There is a 9% chance of finding such an association due to random error in the sample (chance).

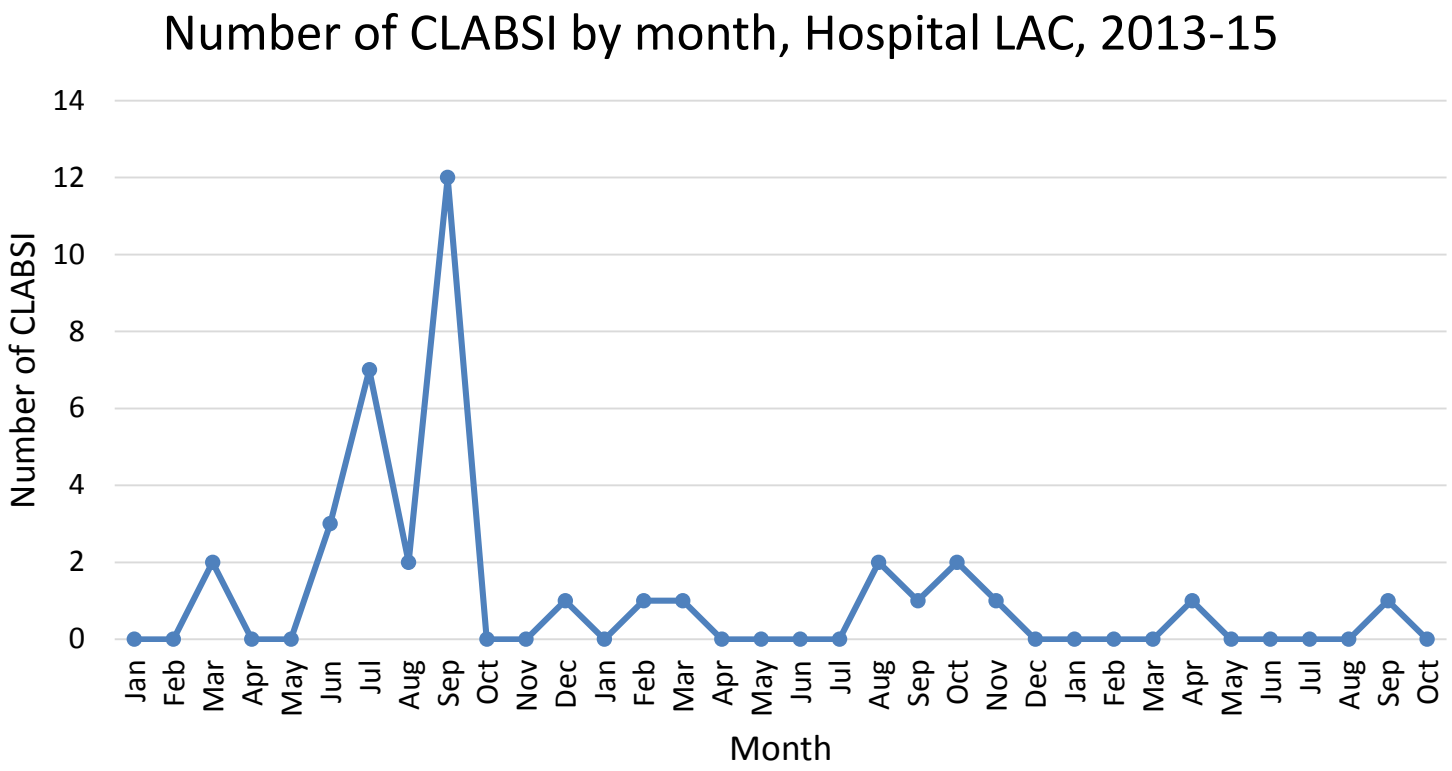
Surveillance

- A surveillance system is an **information** loop or cycle
- Starts and ends with communication and action



Endpoint of HAI Surveillance?

Data that demonstrates progress in **HAI prevention!**



Surveillance Terms

- **Case definition (also called surveillance definition)**
  - the clinical and laboratory characteristics that a patient must have to be counted as a case for surveillance purposes: Time, place, & person (e.g., age, sex, other characteristics etc.)
- **Universal case reporting**
  - a surveillance system in which all cases of a disease are supposed to be reported
- **Laboratory-based reporting**
  - a surveillance method in which the reports of cases come from clinical laboratory data (forgoing case review/symptomatology)

Quality HAI Surveillance

Key tenets:

- A written plan should serve as the foundation
  - What HAIs am I tracking? Why?
  - How will data be used?
  - If only to meet mandates, how **can** data be used?
  - Where are opportunities to prevent HAI in **MY** facility?
- The intensity of surveillance needs to be maintained over time
- Stay consistent over time; apply same surveillance definitions

Scenario

As a new, yet prepared, infection preventionist, you are conducting your daily rounds. As you stop by the ICU, a nurse approaches you and voices her concern that there has been a noticeable increase in the number of CLABSIs in that unit. You reply that you will look into the issue.

Where do you start?

Resource

AJIC major articles

Recommended practices for surveillance: Association for Professionals in Infection Control and Epidemiology (APIC), Inc.

Terrie B. Lee, RN, MS, MPH, CIC, Ona G. Montgomery, RN, MSHA, CIC, James Marx, RN, MS, CIC, Russell N. Olmsted, MPH, CIC, and William E. Scheckler, MD

Surveillance in public health is defined as "the ongoing, systematic collection, analysis, interpretation, and dissemination of data regarding a health-related event for use in public health action to reduce morbidity and mortality and to improve health."[1] Infection control professionals apply this definition to both reduce and prevent health care–associated infections (HAIs) and enhance patient safety. Surveillance, as part of infection prevention and control programs in health care facilities, contributes to meeting the pro-

the frequency of adverse events such as infection or injury. Although the goal of contemporary infection prevention and control programs is to eliminate HAIs, epidemiologic surveillance is still required for accurate quantification of events and demonstration of perfor-

Am J Infect Control 2007;35:427-40.

veillance design or implementation, sound epidemiologic principles must form the foundation of effective systems and be understood by key participants in the

Recommended Practices for Surveillance

I. Assess the population
II. Select the outcome or process for surveillance
III. Use surveillance definitions
IV. Collect surveillance data
V. Calculate and analyze infection rates
VI. Apply risk stratification methodology
VII. Report and use surveillance information

AJIC Am J Infect Control 1998; 26:277-88

AJIC Am J Infect Control 2007; 35:427-40

Recommended Practices for Surveillance

I. Assess the population

Patient Population at Risk for Infection

Do you know:

- What infections occur most commonly?
- What infections are likely to occur?
- Where are greatest opportunities to prevent infections?
- What are the most frequently performed surgeries or procedures?
- What types of patients increase liability and/or costs for the facility?

Scenario: Assess population

- Who is at risk for CLABSI (type of patients)?
- Where are CLABSIs occurring in the facility (units)?

Recommended Practices for Surveillance

II. Select the outcome or process for surveillance

Outcome vs. Process Measures

- Outcome - the result of care or performance
  - Infection
  - Length of stay
  - Patient satisfaction
- Process - series of steps that result in an outcome; adherence to polices and recommended practices
  - Immunization
  - Central line insertion practices
  - Hand hygiene

Outcome Measures

Examples:

- Incidence
  - CAUTI per 1000 urinary catheter days (or patient days-?)
  - CLABSI per 1000 central line days
  - VAP per 1000 ventilator days
  - MRSA and VRE BSI per 10,000 patient days
  - CDI per 10,000 patient days
  - Hospital Onset (HO) CDI per 10,000 patient days
- Prevalence
  - Community Onset (CO) CDI per 10,000 patient days

Process Measures

Examples:

- CLABSI prevention: % adherence to CLIP bundle (all or none)
- CDI prevention: thoroughness of environmental cleaning
- CAUTI prevention: % urinary catheters with appropriate indication

Scenario: select measures

- Outcome
  - Number of CLABSI
  - Incidence density rate of CLABSI by unit
  - Standardized infection ratio by unit, facility-wide
- Process
  - Central line insertion practices (CLIP) adherence

Recommended Practices for Surveillance

III. Use surveillance definitions

Surveillance Definitions

- Always refer to written definitions to ensure accuracy of applying case definitions
  - Use standardized, published, validated definitions where available
  - Where not available, prepare written definitions to ensure intra-facility standardization
- For accurate and valid comparisons, use the same definitions
  - If definitions change, the comparability of rates over time will be compromised

NHSN Infection Surveillance Definitions

CDI-*Clostridium difficile* Infection

Clostridium difficile infection must meet at least ***one*** of the following criteria:

CDC/NHSN Surveillance Definitions for Specific Types of Infections

ied stool specimen (conforms to the shape

ss anatomic (includes endoscopic exams)

the specimen collection date of the
d stool.
ic organisms are identified and criteria are

met for GE or GIT.

- Report each new GI-CDI according to the Repeat Infection Timeframe (RIT) rule for HAIs (see NHSN HAI definitions in Chapter 2 for further details and guidance).
- CDI laboratory-identified event (LabID Event) categorizations (e.g., recurrent CDI assay, incident CDI assay, healthcare facility-onset, community-onset, community-onset healthcare facility-associated) do **not** apply to HAIs; including *C. difficile* associated gastrointestinal infections (GI-CDI).
- Cohen SH, Gerding DN, Johnson S, Kelly CP, Loo VG, McDonald LC, et al. Clinical practice guidelines for Clostridium difficile infection in adults: 2010 update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). *Infection Control and Hospital Epidemiology* 2010; 31:431-455

Look for updates to definitions at www.cdc.gov/nhsn

Alternative Surveillance Definitions

Surveillance definitions also exist for settings that may not yet be covered by NHSN definitions:

- Home care
- Clinics
- Dental offices

Can check other sources (e.g. APIC, HICPAC)

Recommended Practices for Surveillance

IV. Collect surveillance data

Collecting Surveillance Data

- Data collectors should include IP staff **and others** with responsibility or interest
- Limit collection to only what is needed
- Be involved in efforts that advance the electronic health record

Prospective Surveillance

- Initiated when patient is still under the care
- Advantages:
  - ability to capture information in real time
  - can interview caregivers
  - can gather findings not recorded in patient record
  - easier to demonstrate temporality (before & after observations) and therefore make causal inferences
- Disadvantages:
  - can't see full picture, as patient is not discharged

Retrospective Surveillance

- Closed record review after patient has been discharged
- Advantages:
  - allows for comprehensive review of sequential events
  - efficient
- Disadvantages:
  - does not allow for prompt intervention
  - important/relevant information my be missing
- Avoid sole reliance administrative data, i.e. abstracted billing
  - may be useful for identifying possible HAIs
  - not reliable or valid for HAI surveillance on its own

Numerator Data Collection

- Numerator = the "event" being measured
- Examples:
  - HAIs identified through **active surveillance**: CLABSI, CAUTI, SSI, VAP
  - HAIs identified by **laboratory finding alone**: CDI, MRSA BSI, VRE BSI
  - Care **practices, processes, observations**:

    CLIP, hand hygiene compliance

Denominator Data

- Denominator = Population at risk, or total of all possible events
  - Procedures, patient encounters, or total inpatient time

Additional Data

- Data collection may involve collection of risk factor data necessary for risk adjustment

HAI	Factors in Risk Adjustment
CDI	Test Type; Community admission prevalence; Facility bed size; Facility major teaching status
CLABSI	Number of patients with central lines; ICU vs ward
MRSA BSI	Community admission prevalence; Facility bed size; Facility major teaching status
SSI	Age, ASA score; Wound classification (contaminated or dirty); Procedure duration; General anesthesia; Emergency procedure; Gender; BMI; Diabetes Trauma association; Endoscope; Type of surgery (primary, revision); Blood loss; Approach; Spine Level; Facility bed size Facility major teaching status

Scenario: data collection

- Numerator:
  - Number of CLABSI events in January 2015
- Denominator:
  - Number of central line-days in January 2015
- Additional data:
  - Location of CLABSI (critical care, NICU, PICU, other?)

Recommended Practices for Surveillance

V. Calculate and analyze infection rates
VI. Apply risk stratification methodology

Calculate appropriate measures

- Prevalence
- Ratio
- Incidence density rate
- Crude rates
- Adjusted rates
  - Incorporate risk adjustment

Why risk adjust?

- Enables HAI predictors to be taken into account in summary measures
- Helps address concerns related to the complexity of patients receiving care in an institution
- Can adjust for testing type (e.g. CDI)

Procedure-associated Risk

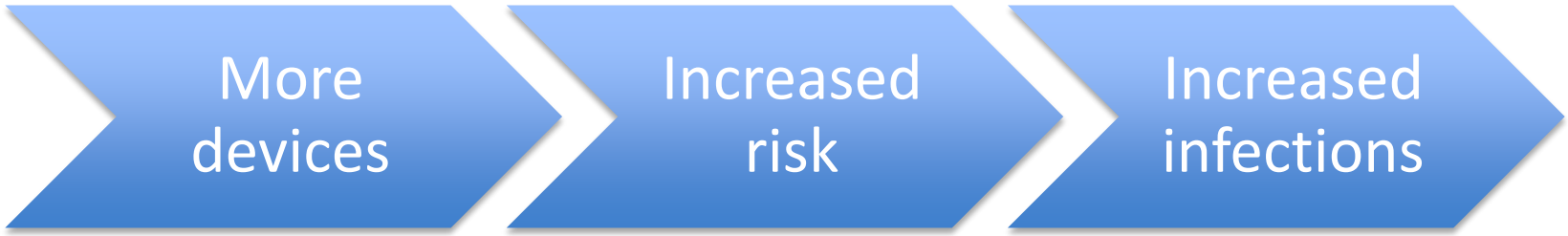
- Infection risk varies by type of procedure

Table 22. SSI rates* by operative procedure and risk index category, PA module, 2006 through 2007

SSI rate-inpatient procedures						
Procedure code	**Operative procedure description**	**Duration cut point (min)**	**Risk index category**	**No. of procedures**	**No. of SSI**	**Pooled mean**
AAA	Abdominal aortic aneurysm repair	225	0,1	881	16	1.82
AAA	Abdominal aortic aneurysm repair	225	2,3	288	15	5.21
APPY	Appendix surgery	81	0,1	2691	40	1.49
APPY	Appendix surgery	81	2,3	372	13	3.49
AVSD	Arteriovenostomy for renal dialysis	111	0,1,2,3	606	6	0.99
BILI	Bile duct, liver or pancreatic surgery	330	0,1	422	37	8.77
BILI	Bile duct, liver or pancreatic surgery	330	2,3	202	33	16.34
BRST	Breast surgery	202	0	997	8	0.80
BRST	Breast surgery	202	1	914	25	2.74
CARD	Cardiac surgery	300	0,1	10,382	121	1.17
CARD	Cardiac surgery	300	2,3	3396	58	1.71
CBGB	Coronary bypass w/chest and donor incision	300	0	1003	3	0.30
CBGB	Coronary bypass w/chest and donor incision	300	1	47,296	1399	2.96
CBGB	Coronary bypass w/chest and donor incision	300	2,3	15,706	767	4.88
CBGC	Coronary bypass graft with chest incision	285	0,1	3495	57	1.63
CBGC	Coronary bypass graft with chest incision	285	2,3	1147	33	2.88
CEA	Carotid endarterectomy	133	0,1,2,3	2615	11	0.42
CHOL	Gallbladder surgery	121	0,1,2,3	3337	23	0.69
COLO	Colon surgery	188	0	9539	299	4.19

Device-associated Risk

- Infection risk increases with use of invasive devices
  - Higher risk with longer duration



Patient-, unit-, facility-level risk

- Infection risk varies by patient-specific risk factors (e.g. age, sex, diabetes status)
- Infection rates vary by patient care unit (e.g. bed size, medical school association)

Calculating SIRs

$$\text{SIR} = \frac{\text{Observed number of HAIs}}{\text{Predicted number of HAIs}}$$

SIR is a risk-adjusted composite measure

Scenario SIR:

Hospital has 4 CLABSI over the course of 23,500 patient-days, and national data predicted 2.5:

$$\text{SIR} = \frac{4}{2.5} = 1.6$$

Applying risk adjustment methods

The SIRs for CLABSIs and CAUTIs are adjusted for:

- Type of patient care location, hospital affiliation with a medical school, location bed size

The SIRs for hospital-onset *C. difficile* and MRSA bloodstream infections are adjusted for:

- Facility bed size, hospital affiliation with a medical school, number of community-onset" cases, and CDI test type

The SIRs for SSIs are adjusted for:

- Duration of surgery, surgical wound class, use of endoscopes, re-operation status, patient age, patient assessment at time of anesthesiology

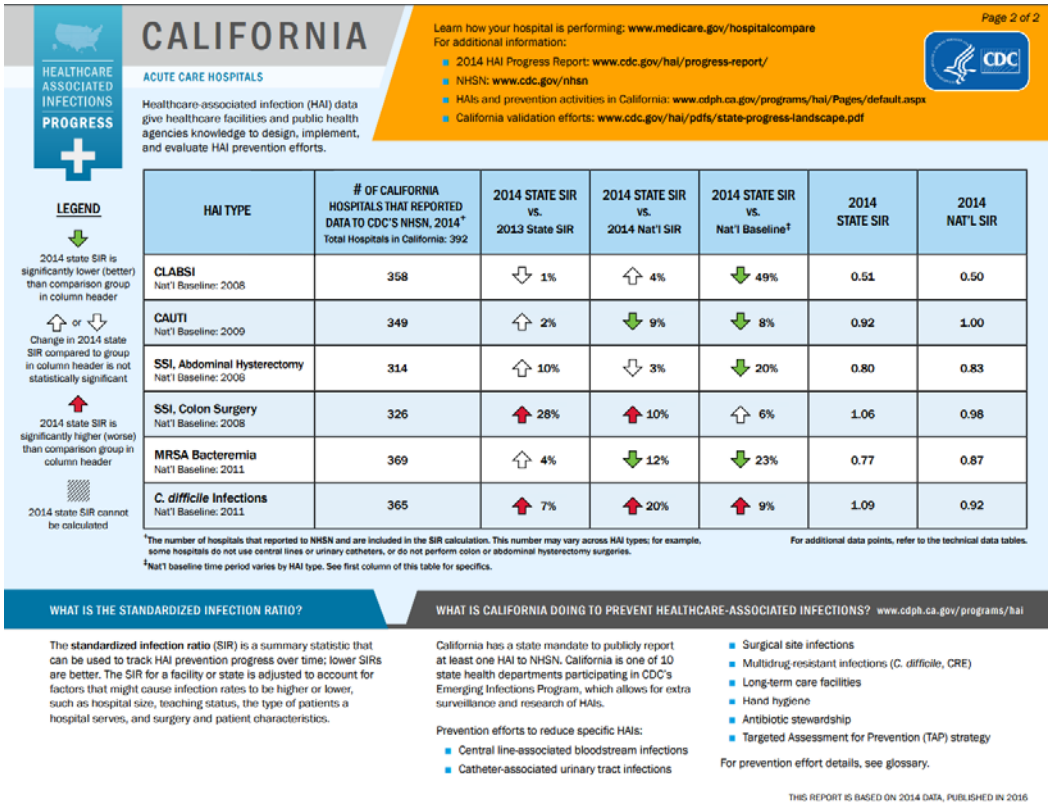
Scenario: risk adjustment

Central line–associated BSI rate*				
Type of acute care hospital location	No. of locations†	No. of CLABSIs	Central line days	Pooled mean
Critical care				
Burn	71 (69)	219	74,949	2.9
Medical: major teaching	251 (250)	812	669,976	1.2
Medical: all other	452 (432)	660	611,514	1.1
Medical cardiac	387 (381)	565	557,944	1.0
Medical/surgical: major teaching	358 (354)	908	800,019	1.1
Medical/surgical: all other, ≤15 beds	1,647 (1,510)	1,032	1,260,781	0.8
Medical/surgical: all other, >15 beds	807 (804)	1,752	2,132,226	0.8
Neurologic	59 (58)	91	80,894	1.1
Neurosurgical	181 (178)	300	317,745	0.9
Pediatric cardiothoracic	43	185	146,328	1.3
Pediatric medical	31 (26)	19	23,719	0.8
Pediatric medical/surgical	315 (288)	479	389,069	1.2
Pediatric surgical	6 (5)	1	3,105	0.3
Prenatal	8 (1)	0	710	0.0

Will adjust for (stratify by) location when reporting rate, calculating SIR

NHSN published data can help you interpret your HAI data

- http://www.cdc.gov/nhsn/datastat/index.html
- Annual reports published in American Journal of Infection Control



HEALTHCARE ASSOCIATED INFECTIONS PROGRESS

CALIFORNIA

ACUTE CARE HOSPITALS

Healthcare-associated infection (HAI) data give healthcare facilities and public health agencies knowledge to design, implement, and evaluate HAI prevention efforts.

Learn how your hospital is performing: www.medicare.gov/hospitalcompare
For additional information:
- 2014 HAI Progress Report: www.cdc.gov/hai/progress-report/
- NHSN: www.cdc.gov/nhsn
- HAIs and prevention activities in California: www.cdph.ca.gov/programs/hai/Pages/default.aspx
- California validation efforts: www.cdc.gov/hai/pdfs/state-progress-landscape.pdf

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CDC

LEGEND

- 2014 state SIR is significantly lower (better) than comparison group in column header
- ⇧ or ⇩ Change in 2014 state SIR compared to group in column header is not statistically significant
- 2014 state SIR is significantly higher (worse) than comparison group in column header
- 2014 state SIR cannot be calculated

HAI TYPE	# OF CALIFORNIA HOSPITALS THAT REPORTED DATA TO CDC'S NHSN, 2014* Total Hospitals in California: 392	2014 STATE SIR vs. 2013 State SIR	2014 STATE SIR vs. 2014 Nat'l SIR	2014 STATE SIR vs. Nat'l Baseline†	2014 STATE SIR	2014 NAT'L SIR
CLABSI Nat'l Baseline: 2008	358	⇩ 1%	⇧ 4%	⇩ 49%	0.51	0.50
CAUTI Nat'l Baseline: 2009	349	⇧ 2%	⇩ 9%	⇩ 8%	0.92	1.00
SSI, Abdominal Hysterectomy Nat'l Baseline: 2008	314	⇧ 10%	⇩ 3%	⇩ 20%	0.80	0.83
SSI, Colon Surgery Nat'l Baseline: 2008	326	⇧ 28%	⇧ 10%	⇧ 6%	1.06	0.98
MRSA Bacteremia Nat'l Baseline: 2011	369	⇧ 4%	⇩ 12%	⇩ 23%	0.77	0.87
***C. difficile* Infections** Nat'l Baseline: 2011	365	⇧ 7%	⇧ 20%	⇧ 9%	1.09	0.92

*The number of hospitals that reported to NHSN and are included in the SIR calculation. This number may vary across HAI types; for example, some hospitals do not use central lines or urinary catheters, or do not perform colon or abdominal hysterectomy surgeries.

†Nat'l baseline time period varies by HAI type. See first column of this table for specifics.

For additional data points, refer to the technical data tables.

WHAT IS THE STANDARDIZED INFECTION RATIO?

The **standardized infection ratio** (SIR) is a summary statistic that can be used to track HAI prevention progress over time; lower SIRs are better. The SIR for a facility or state is adjusted to account for factors that might cause infection rates to be higher or lower, such as hospital size, teaching status, the type of patients a hospital serves, and surgery and patient characteristics.

WHAT IS CALIFORNIA DOING TO PREVENT HEALTHCARE-ASSOCIATED INFECTIONS? www.cdph.ca.gov/programs/hai

California has a state mandate to publicly report at least one HAI to NHSN. California is one of 10 state health departments participating in CDC's Emerging Infections Program, which allows for extra surveillance and research of HAIs.

Prevention efforts to reduce specific HAIs:
- Central line-associated bloodstream infections
- Catheter-associated urinary tract infections
- Surgical site infections
- Multidrug-resistant infections (*C. difficile*, CRE)
- Long-term care facilities
- Hand hygiene
- Antibiotic stewardship
- Targeted Assessment for Prevention (TAP) strategy

For prevention effort details, see glossary.

THIS REPORT IS BASED ON 2014 DATA, PUBLISHED IN 2016

Recommended Practices for Surveillance

VII. Report and use surveillance information

Reporting and Using Surveillance Data

" *The demonstrable power of surveillance is in sharing findings with those who need to know and who can act on the findings to improve patient safety.*"

AJIC Am J Infect Control 2007; 35:427-40

- Plan for distribution of findings
- Report to health care providers most able to impact patient care
- Report in a manner to stimulate process improvement
- Use visual displays of data
  - Charts, graphs, tables, or other graphics data

Tables and Line Lists

National Healthcare Safety Network

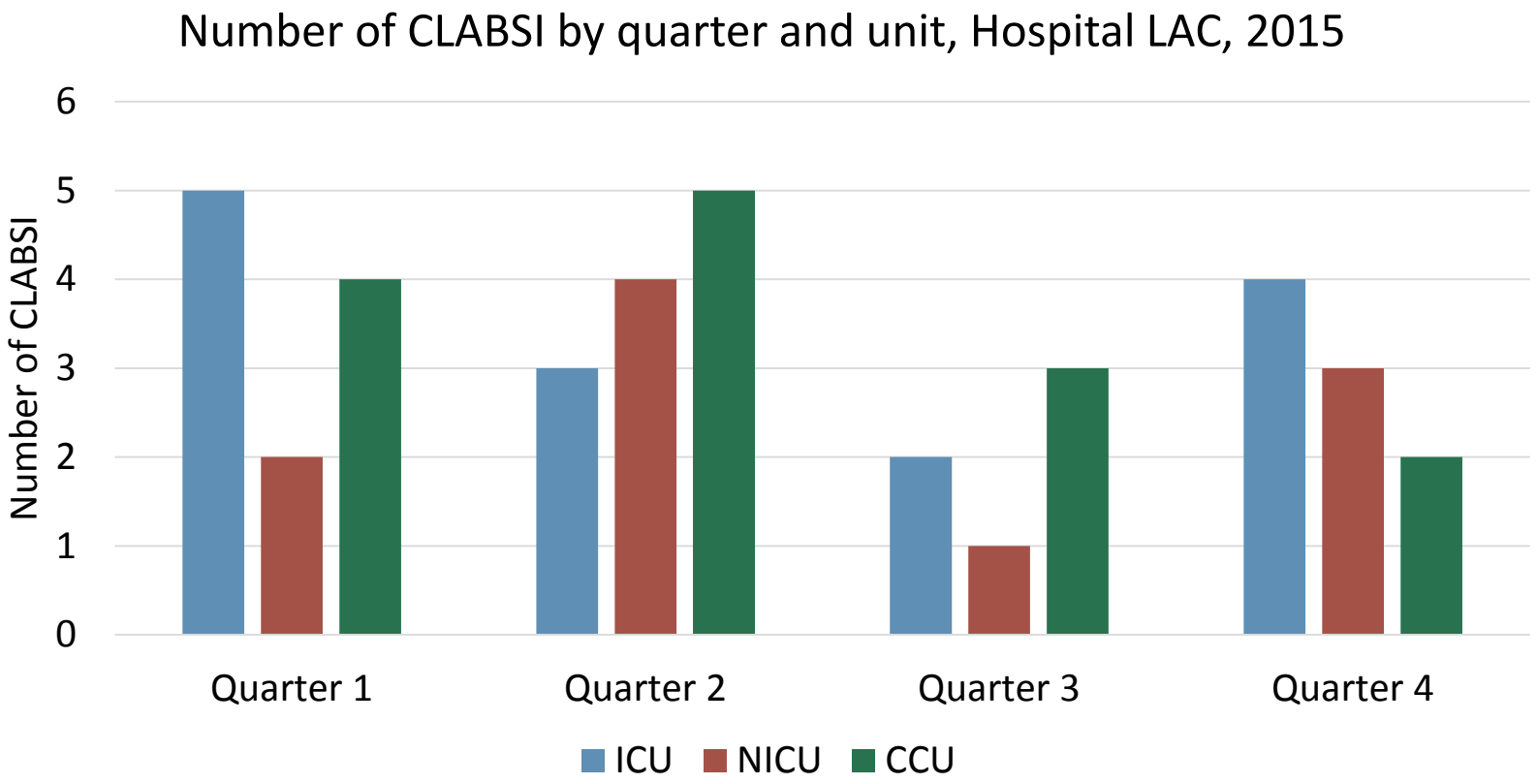
Line Listing for All Central Line-Associated BSI Events

As of: November 3, 2009 at 9:04 AM

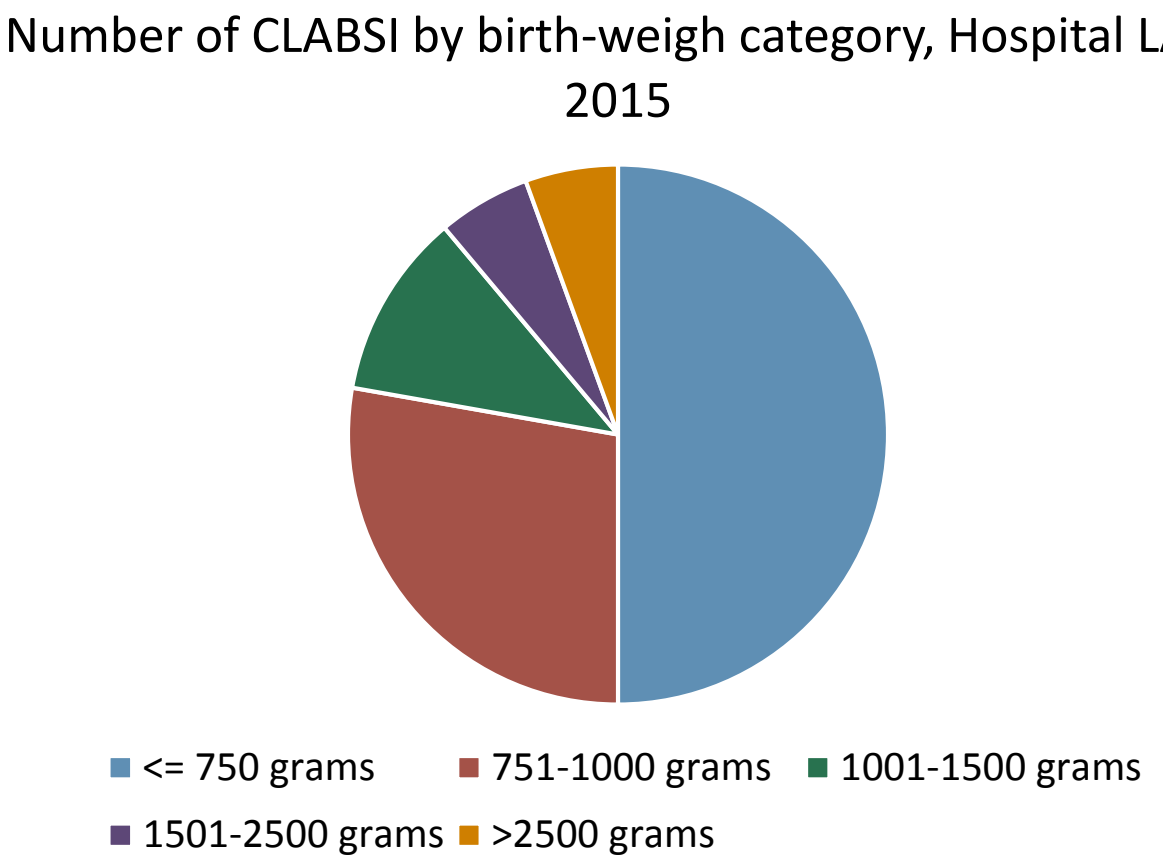
Date Range: All CLAB_EVENTS

orgID	patID	dob	gender	admitDate	eventID	eventDate	eventType	spcEvent	location
10018	7425	09/22/1961	M	06/06/2005	1676	06/11/2005	BSI	LCBI	BMT
10018	MD-4937	09/19/1922	F	05/30/2005	1678	06/21/2005	BSI	LCBI	BMT
10018	85613	04/18/1951	M	07/08/2005	1685	07/13/2005	BSI	LCBI	S-ICU
10018	10222	01/04/1978	F	08/01/2005	1927	08/08/2005	BSI	LCBI	MICU
10018	01-88-145	10/07/1939	M	03/17/2006	3321	03/21/2006	BSI	LCBI	S-ICU
10018	122-501	02/29/1952	M	02/21/2006	4265	02/23/2006	BSI	LCBI	S-ICU
10018	34-22-100	03/22/1940	M	03/12/2006	4789	03/20/2006	BSI	LCBI	MICU
10018	86-990-01	12/12/1926	M	03/10/2006	4798	03/14/2006	BSI	LCBI	S-ICU
10018	26-22-678	03/28/2006	M	03/28/2006	4800	03/31/2006	BSI	LCBI	NICU
10018	32-54-731	02/21/1959	M	03/06/2006	4820	03/09/2006	BSI	LCBI	S-ICU
10018	13-19	04/18/1934	F	03/07/2006	4821	03/16/2006	BSI	LCBI	MICU
10018	44-18-004	08/16/1944	F	02/11/2006	4824	02/21/2006	BSI	LCBI	MICU

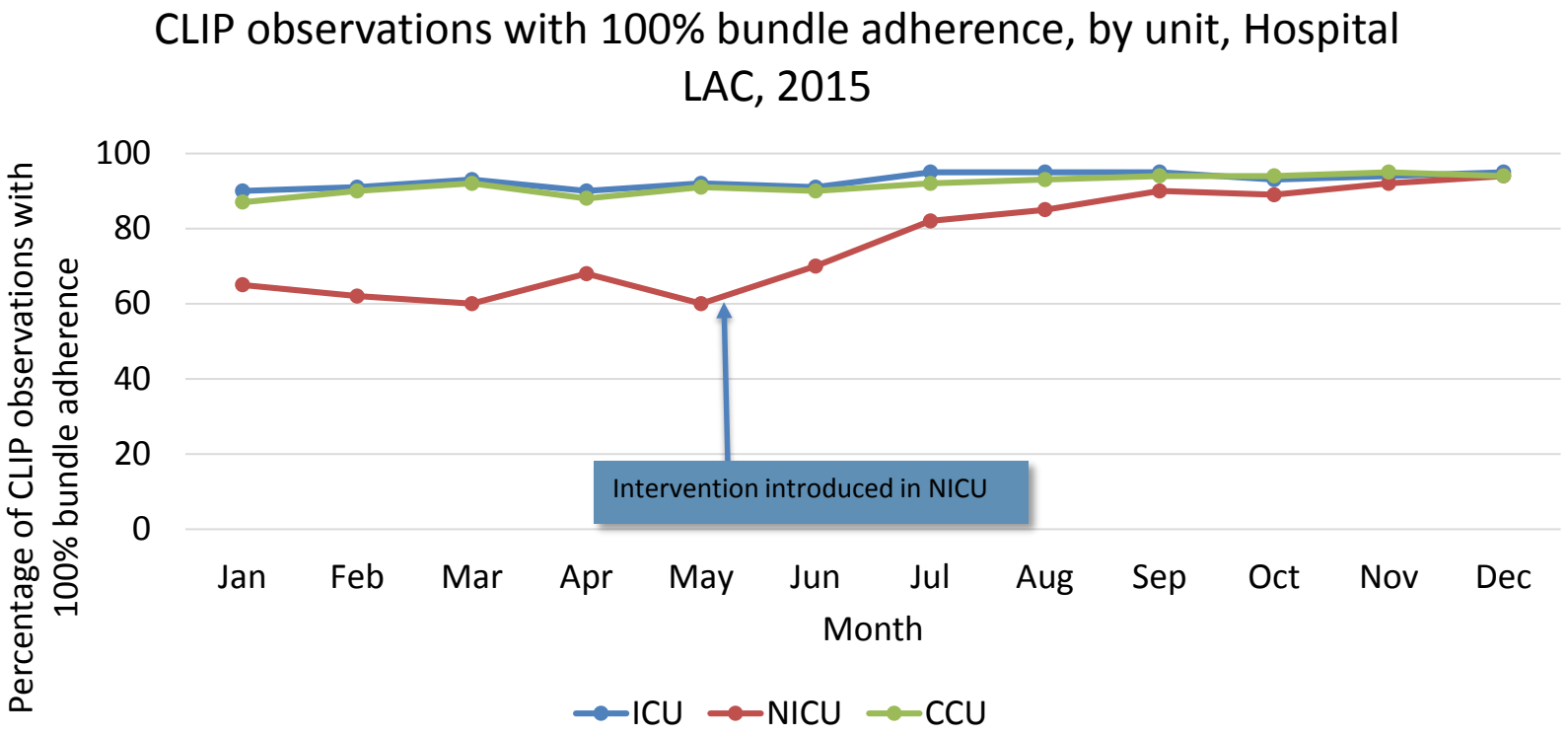
Bar Charts


Number of CLABSI by quarter and unit, Hospital LAC, 2015
Number of CLABSI
6
5
4
3
2
1
0
Quarter 1
Quarter 2
Quarter 3
Quarter 4
ICU
NICU
CCU

Pie Charts


Number of CLABSI by birth-weigh category, Hospital LAC, 2015
<= 750 grams
751-1000 grams
1001-1500 grams
1501-2500 grams
>2500 grams

Line Graphs or Histograms



Present data to demonstrate “surveillance for prevention”

Cost calculator

Cost of HAI Calculator

:::: Determine Hospital Size Category ::::

REGION	TEACHING[5]	HOSPITAL BEDS	
		↑ SMALL	↑ MEDIUM
Northeast[1]	Non-teaching	1-124	125-199
	Teaching	1-249	250-424
Midwest[2]	Non-teaching	1-74	75-174
	Teaching	1-249	250-374
South[3]	Non-teaching	1-99	100-199
	Teaching	1-249	250-449
West[4]	Non-teaching	1-99	100-174
	Teaching	1-199	200-324

:::: View Expected and Actual Results - Annual ::::

	EXPECTED NUMBER OF INFECTIONS	EXPECTED INFECTION RATE	EXPECTED EXCESS COST Per HAI	EXPECTED EXCESS LOS Per HAI
SSI	13	0.22%	$29,276	8.1
VAP	23	5.51%	$27,393	14.9
CLABSI	1	0.10%	$32,199	16.6
MRSA	253	1.58%	$6,248	4.5
C. Difficile	219	1.37%	$10,577	6.7
UTI	535	6.68%	$5,904	4.1
Total	1044			

	EXPECTED TOTAL COSTS	ACTUAL TOTAL COSTS	EXPECTED TOTAL LOS	ACTUAL TOTAL LOS
SSI	$380,593	$0	106	0
VAP	$630,029	$0	344	0
CLABSI	$32,199	$0	17	0
MRSA	$1,580,645	$0	1150	0
C. Difficile	$2,316,408	$0	1471	0
UTI	$3,158,478	$0	2207	0
Total	$8,098,354	$0	5295	0

TAP Reports

- **T**argeted **A**ssessment for **P**revention
- Can run TAP report for a single facility or group
- Customizable by HAI type, time period of interest, SIR
- Uses cumulative attributable difference (CAD) metric
  - Number of infections that a facility would have needed to prevent to achieve an HAI reduction goal during a specified time period
  - Prioritization metric to identify units with highest burden of excess infections

NHSN - National Healthcare Safety Network

- NHSN Home
- Alerts
- Dashboard
- Reporting Plan
- Patient
- Event
- Procedure
- Summary Data

NHSN Patient Safety Component Home Page

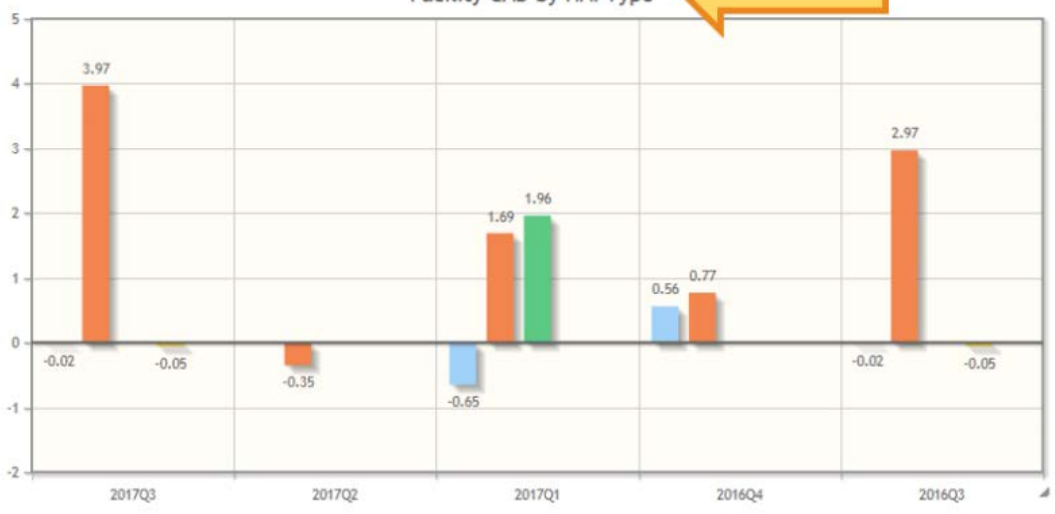
TAP Strategy Dashboard

Update Data as of: May 15 2017 4:08PM

Data For Action:

The TAP Report Dashboard

Facility CAD by HAI Type



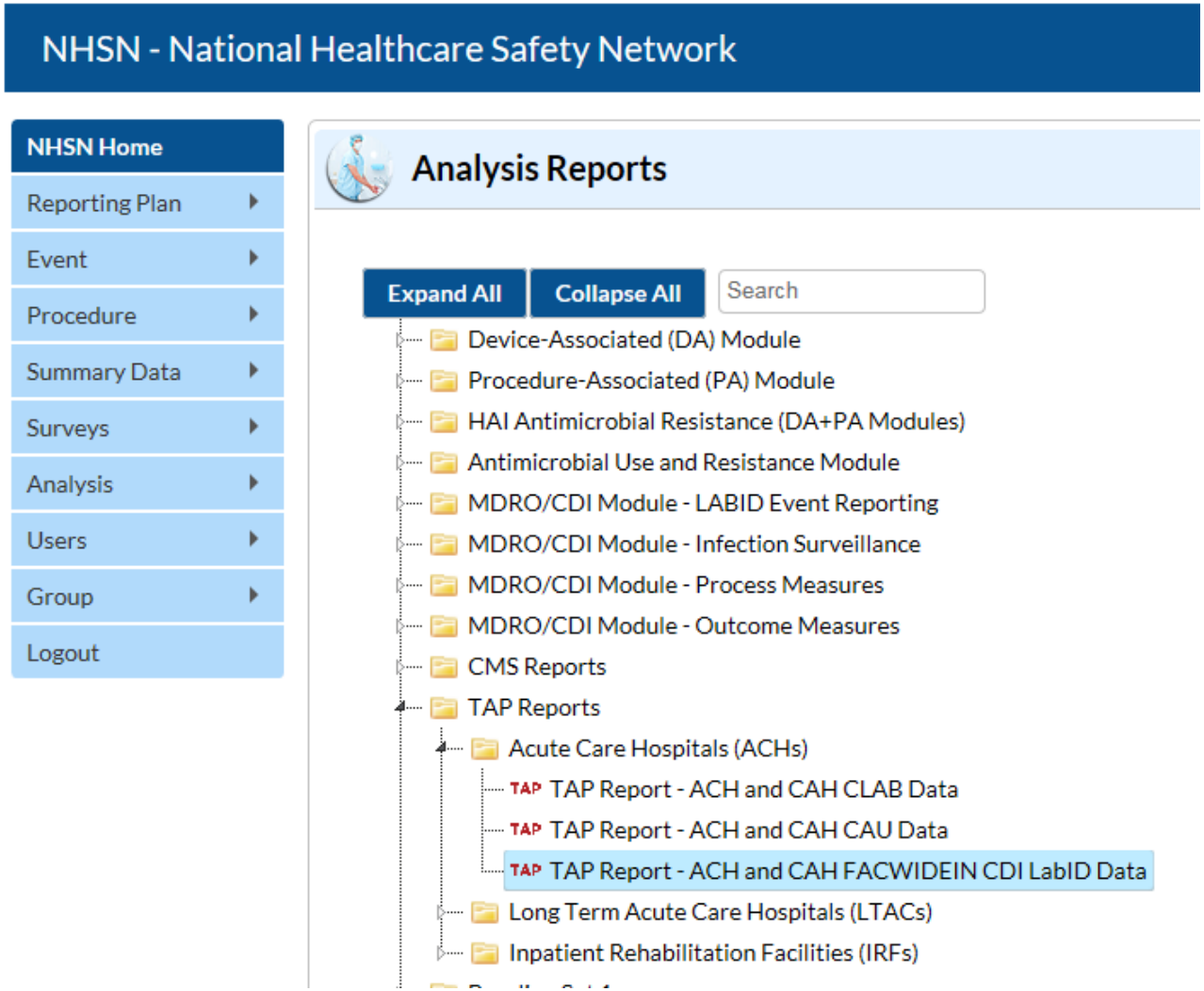
- CAUTI Data for Acute Care Hospitals
- CLABSI Data for Acute Care Hospitals
- FACWIDEIN CDI Data for Acute Care Hospitals
- CAUTI Data for Inpatient Rehabilitation Facilities
- FACWIDEIN CDI Data for Inpatient Rehabilitation Facilities

Show All HAI Types

View Last 5 Quarters.

Print Graph

Creating your TAP report



Interpreting a TAP report

Facility Org ID	Facility Name	Facility CAD	Location Rank	Location	CDC Location	Events	Urinary Catherter Days	DUR %	CAD	SIR	Sir Test	No. Pathogens (EC, YS, PA, KS, PM, ES
1000	DHQP Memorial	5.73	1	SICU	IN:ACUTE:CC:S	5	502	81	3.38	2.31	SIG	5 (0, 3, 1, 1, 0, 0)
			2	NEURO	IN:ACUTE:CC:N	3	257	77	1.58	1.58		3 (0, 0, 1, 0, 2, 0)
			3	BURN	IN:ACUTE:CC:B	2	162	61	1.10	1.67		2 (1, 0, 0, 0, 0, 0)
			4	REHAB	IN:ACUTE:WARD:REHAB	1	76	11	0.18	0.91		1 (0, 0, 0, 0, 1, 0)
			5	2N	IN:ACUTE:WARD:M	1	239	20	-0.20	0.63		1 (0, 0, 0, 0, 0, 0)
			6	6S	IN:ACUTE:WARD:M	1	261	20	-0.31	0.57		1 (0, 0, 0, 0, 0, 0)

If location-level CADs are the same in a given facility, their ranks are tie
(EC, YS, PA, KS, PM, ES) = No. of E. coli, yeast (both candida and non-candida species), *P. aeruginosa*, *K. pneumoniae/K. oxytoca*, *Proteus Mirabilis*, *Enterococcus* species
SIR is set to '.' when expected number of events is < 1.0
LOCATION CAD = (OBSERVED_LOCATION - EXPECTED_LOCATION*0.75)

Rounding the CAD up to a whole number when explaining the data to leadership ensures that they understand how many infections they would have needed to prevent to reach the SIRgoal.

The SIR will display as missing when the predicted number of events is less than 1.0.

If nothing is listed under SIRtest, the SIR is not significantly higher than the SIRgoal. 'SIG' will be displayed if the SIR is significantly higher than the SIRgoal.

Reference

Ebbing Lautenbach, Keith F. Woeltje, and Preeti N. Malani., Practical Healthcare Epidemiology, 3rd Edition

https://apic.org/Resources/Cost-calculators

https://www.cdc.gov/hai/pdfs/prevent/TAP-Guide-for-Individual-Facility-User.pdf

Questions?