

Welcome to *California*



2015 SSI Validation Results

Webinar
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Vicki Keller and Adam D'Amico
Healthcare Associated Infections Program
Center for Healthcare Quality
California Department of Public Health

Objectives

1. Review the results of 2015 SSI Validation in California hospitals
2. Discuss the advantages of using infection “flag” codes
3. Identify areas for surveillance and reporting improvement

Validation of California Hospital HAI Data

Three-year validation plan, approved/endorsed by the CDPH HAI Advisory Committee

- Year 1 – 2013: Ensure hospitals are performing core surveillance practices
- Year 2 – 2014: Help hospitals assess and improve case-finding
- **Year 3 – 2015: Help hospitals evaluate and improve **SSI** surveillance, including **case-finding** and some **denominator data elements****

2015 SSI Validation

- Modeled after previous validations
- Self-directed using a Validation Workbook
- Required review of four common procedure types, and four specific denominator data elements:

Surgical Procedure	Denominator data element(s) to review
Colon Surgery	Surgical duration, wound class
Abdominal hysterectomy	BMI
Cesarean section	BMI, diabetes
Hip prosthesis	Surgical duration, diabetes

Denominator Data Contribute to Standardized Infection Ratios (SIR) Calculations

Patient #	Patient ID	Procedure ID	Date of Birth	Procedure Date	Duration of Procedure - hr	Duration of Procedure - min	Wound Class	Risk using Complex AR Model
1	TEST1319	14725591	7/23/1943	1/1/2014	2	10	CC	0.0214
2	TEST1320	14725592	8/3/1924	1/7/2014	2	20	CC	0.0191
3	TEST1339	14725611	2/4/1944	1/11/2014	2	40	CO	0.0390
4	TEST1322	14725594	8/23/1945	1/17/2014	4	30	D	0.0408
5	TEST1323	14725595	9/1/1955	1/23/2014	6	40	D	0.0698
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.
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100	TEST2918	14743673	3/19/1968	12/21/2014	1	40	CC	0.027
TOTAL (PREDICTED)								2.7094

SSI risk probability is calculated for each surgical patient based on denominator data entered

All patient risk probabilities are added up to calculate the predicted # of SSI

IF hospital observed 3 SSI out of these 100 COLO procedures:

$$\text{SIR} = \frac{\text{Hospital Observed SSI}}{\text{Predicted SSI}}$$

$$\text{SIR} = \frac{3}{2.71}$$

$$\text{SIR} = 1.10$$

2015 SSI Validation Timeline

Date	Event
September 30	Opening webinar/Validation begins
October 26	Online form available to submit validation results
December 4	Deadline to submit results and attest to participation
December–January	Hospitals expected to correct SSI data for all of 2015 based on validation findings
Spring 2016	CDPH review of validation results and follow up as necessary
Fall 2016	Annual Hospital HAI Report published by CDPH

Summary of Validation Method

1. Identify all patients who had inpatient procedures, COLO, CSEC, HPRO, HYST, in the first two quarters of 2015 (Jan 1-June 30) using ICD procedure codes
2. Find the subset of patients who, in the post-operative period, had one or more ICD diagnosis “flag” Codes, indicating a possible SSI
3. Review medical record to determine if flagged patient had an SSI. Also review record to verify reported values of certain denominator data elements
4. Compare to NHSN records and report findings

Participation

- 332 Hospitals expected to participate (i.e. performing the surgical procedures included in this validation)
- Participation rate: **94%** (312 hospitals)
- Participants included
 - 214 (70%) larger volume hospitals
 - 92 (30%) smaller volume hospitals
- 189 (62%) participating hospitals reported routinely using flag codes for SSI surveillance, i.e. prior to this validation

2014 Validation: Colon SSI Case-Finding

- Validation identified 100 missed COLO SSI
- 234 Larger Volume Hospitals

$$\frac{204 \text{ Colon SSI Reported}}{295 \text{ Total Colon SSI}} = \mathbf{69\%}$$

Sensitivity

- 111 Smaller Volume Hospitals

$$\frac{39 \text{ Colon SSI Reported}}{48 \text{ Total Colon SSI}} = \mathbf{81\%}$$

Sensitivity

2015 Case-Finding: Colon Procedures

- 287 hospitals performed validation for COLO procedures

	10 th percentile	25 th percentile	Median	75 th percentile	90 th percentile
Number of COLO procedures performed during 2 quarter validation period	6	16	33	78	113
Percent of COLO procedures reviewed for 2015 validation	0%	4%	10%	19%	33%

2015 Case-Finding: Colon Procedures

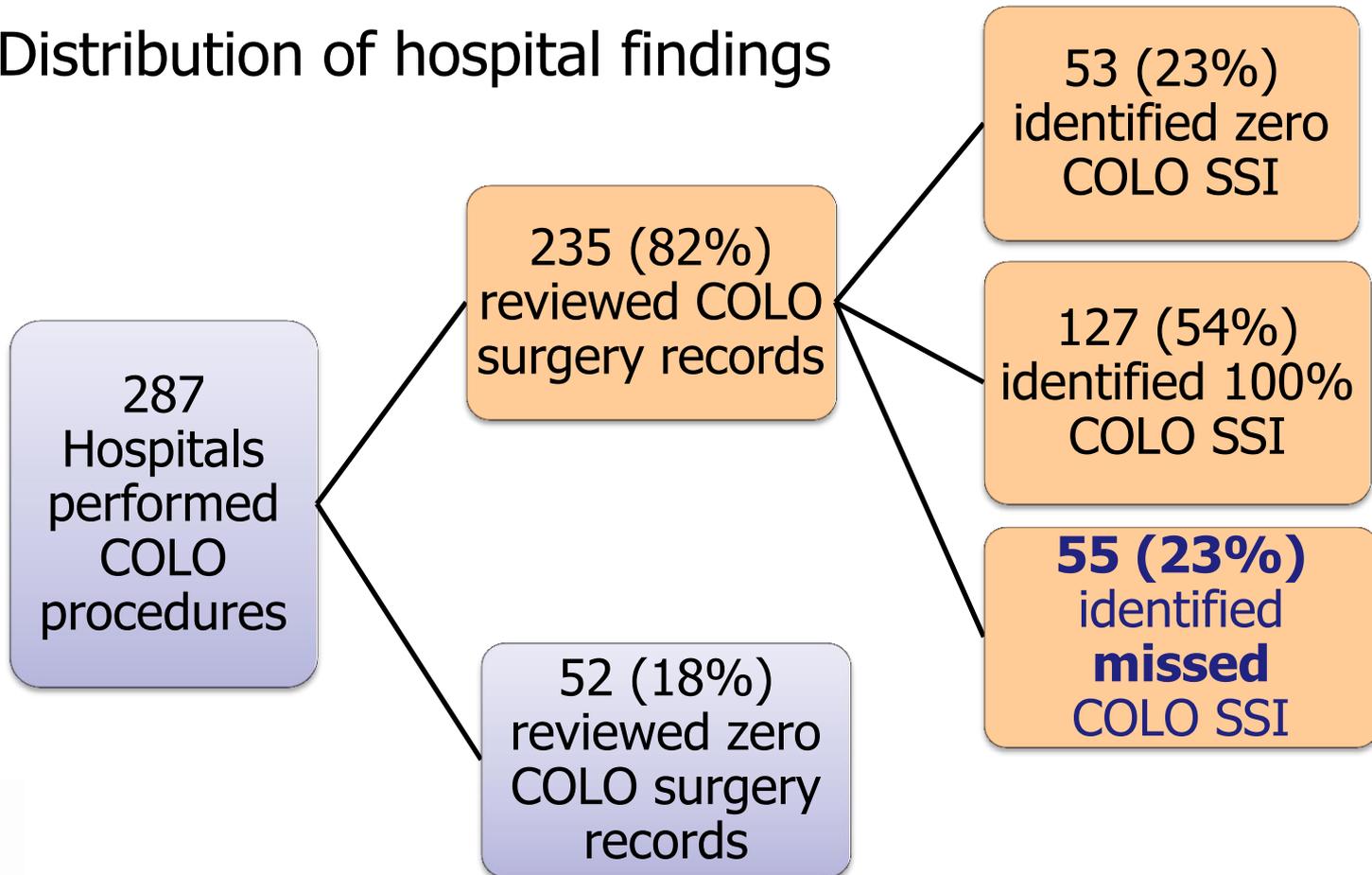
- Validation identified 91 **missed** COLO SSI

$$\frac{440 \text{ SSI Previously Reported}}{531 \text{ Total SSI}} = \mathbf{83\%}$$

Sensitivity

2015 Case-Finding: Colon Procedures

- Distribution of hospital findings



2015 Case-Finding: Abdominal Hysterectomy

- 276 hospitals performed validation for HYST procedures

	10 th percentile	25 th percentile	Median	75 th percentile	90 th percentile
Number of HYST procedures performed during 2 quarter validation period	4	9	33	72	129
Percent of HYST procedures reviewed for 2015 validation	0%	0%	1%	5%	16%

2015 Case-Finding: Abdominal Hysterectomy

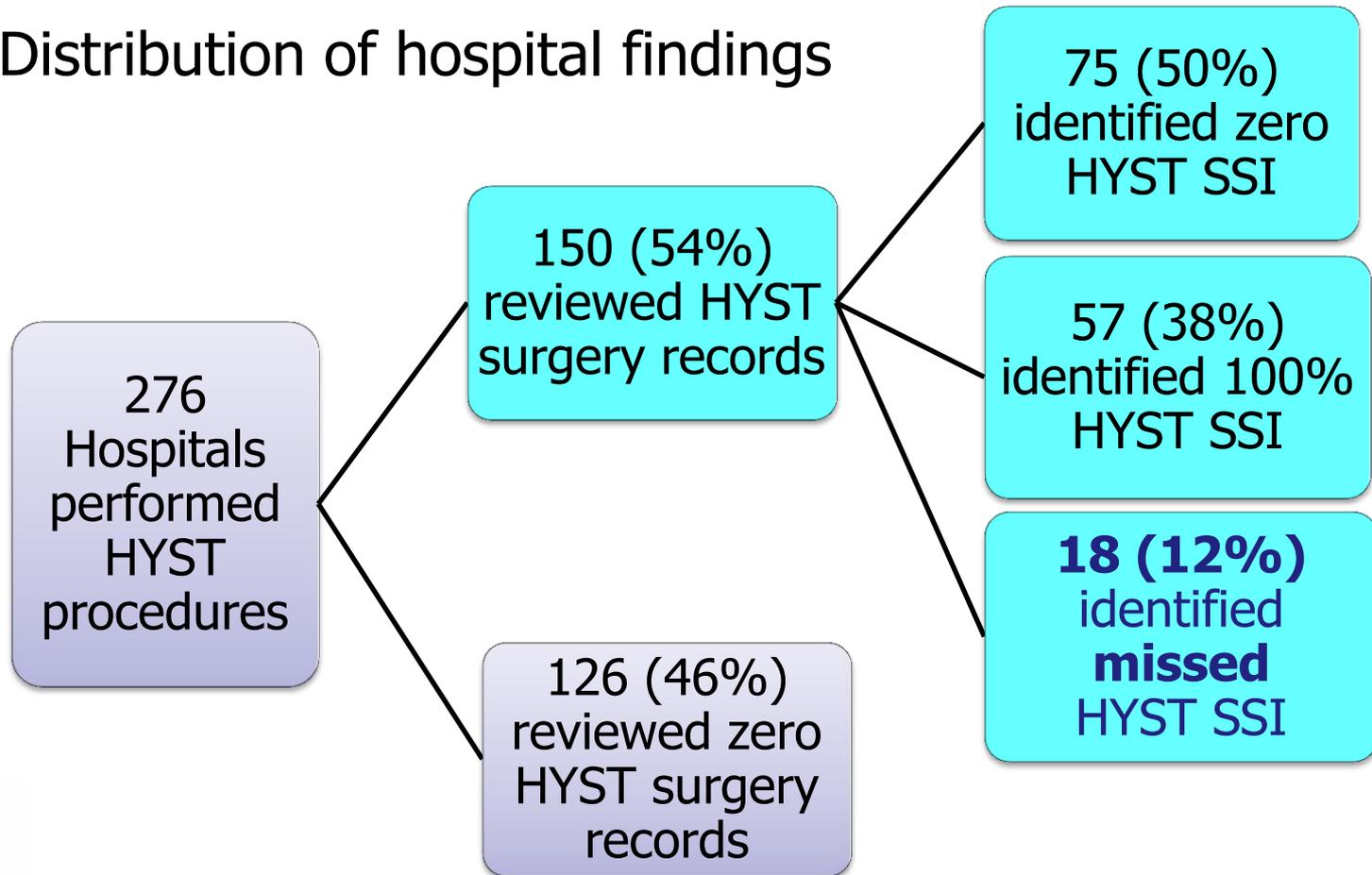
- Validation identified 22 **missed** HYST SSI

116 SSI Previously Reported
138 Total SSI

= **84%**
Sensitivity

2015 Case-Finding: Abdominal Hysterectomy

- Distribution of hospital findings



2015 Case-Finding: Cesarean Section

- 233 hospitals performed validation for CSEC procedures

	10 th percentile	25 th percentile	Median	75 th percentile	90 th percentile
Number of CSEC procedures performed during 2 quarter validation period	45	99	239	402	571
Percent of CSEC procedures reviewed for 2015 validation	0%	0%	1%	2%	4%

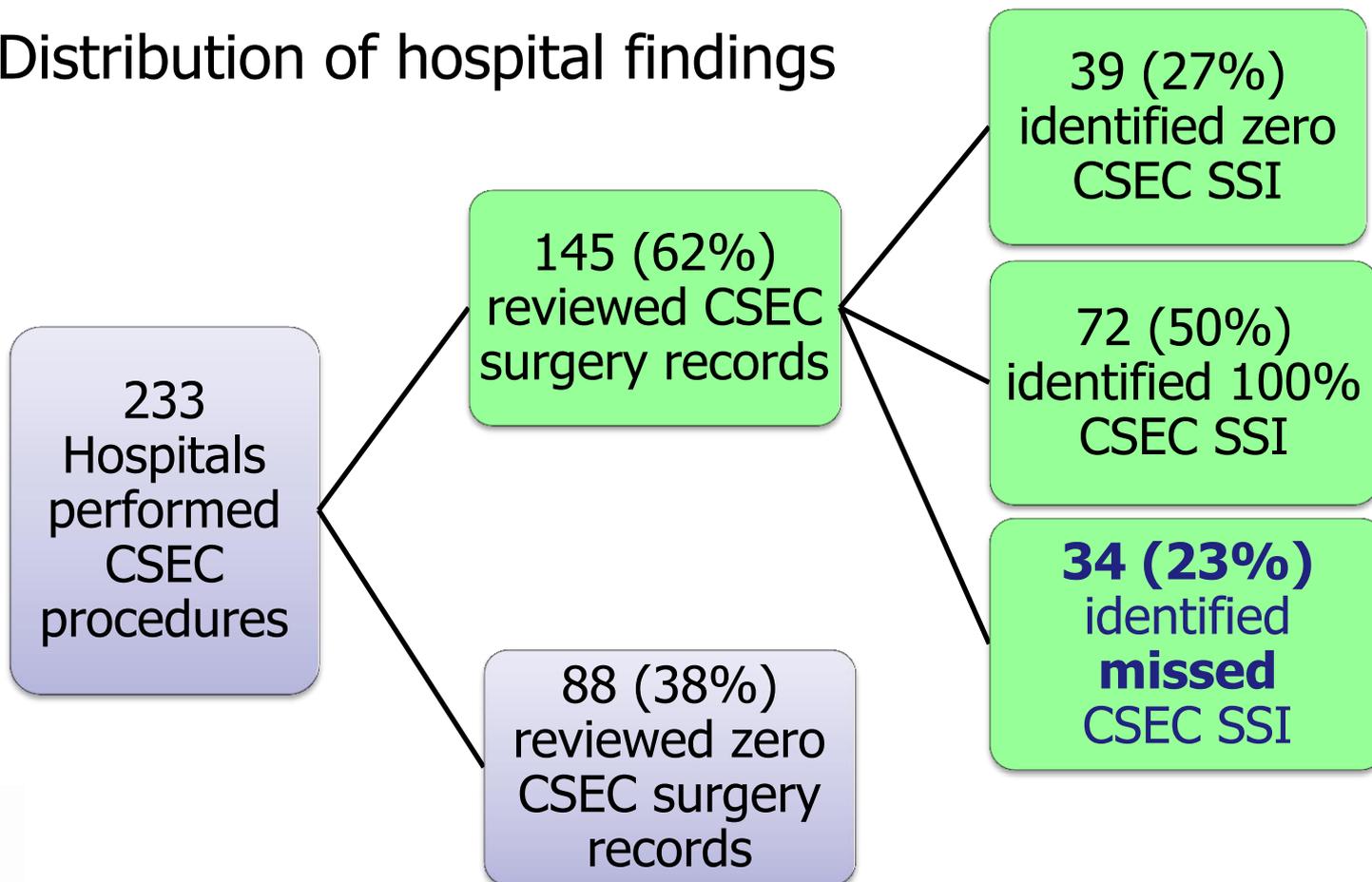
2015 Case-Finding: Cesarean Section

- Validation identified 48 **missed** CSEC SSI

$$\frac{215 \text{ SSI Previously Reported}}{263 \text{ Total SSI}} = 82\% \text{ Sensitivity}$$

2015 Case-Finding: Cesarean Section

- Distribution of hospital findings



2015 Case-Finding: Hip Prosthesis

- 282 hospitals performed validation for HPRO procedures

	10 th percentile	25 th percentile	Median	75 th percentile	90 th percentile
Number of HPRO procedures performed during 2 quarter validation period	7	19	53	115	166
Percent of HPRO procedures reviewed for 2015 validation	0%	0%	1%	4%	9%

2015 Case-Finding: Hip Prosthesis

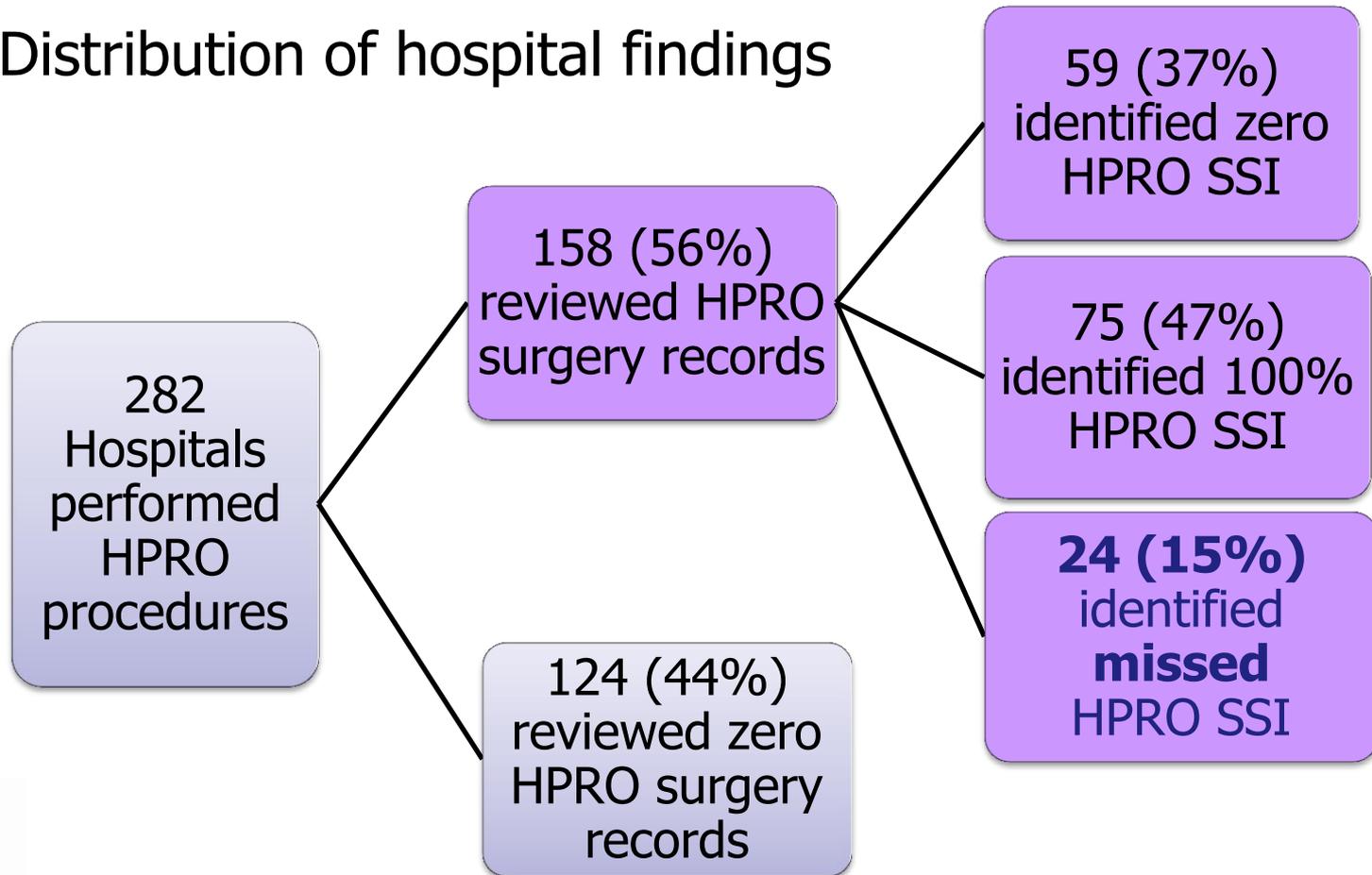
- Validation identified 29 **missed** HPRO SSI

$$\frac{149 \text{ SSI Previously Reported}}{178 \text{ Total SSI}} = \mathbf{84\%}$$

Sensitivity

2015 Case-Finding: Hip Prosthesis

- Distribution of hospital findings



2015 SSI Case-Finding Sensitivity

- Mean sensitivity did not vary by procedure type

Procedure	Sensitivity
Colon Surgery	83%
Abdominal Hysterectomy	84%
Cesarean Section	82%
Hip Prosthesis	84%

2015 SSI Case-Finding Sensitivity

- SSI validation identified 190 **missed** infections

$$\frac{920 \text{ SSI Previously Reported}}{1110 \text{ Total SSI}} = 83\% \text{ Sensitivity}$$

2015 SSI Case-Finding Sensitivity

$$\frac{920 \text{ SSI Previously Reported}}{1110 \text{ Total SSI}} = 83\% \text{ Sensitivity}$$

Did you use flag codes routinely, prior to validation?

Never used flag codes (n=117)

$$\frac{292 \text{ SSI Reported}}{386 \text{ Total SSI}}$$

= 76%
Sensitivity

Used flag codes routinely (n=189)

$$\frac{628 \text{ SSI Reported}}{724 \text{ Total SSI}}$$

= 87%
Sensitivity

2015 SSI Case-Finding Sensitivity: Key Findings

- Use of flag codes results in more **efficient** SSI surveillance
- Among ICD flagged procedure records, 37% of reviews identified an SSI
 - One SSI found for every 2-3 records reviewed
- More efficient than reviewing all records
- Captured SSI missed by microbiology surveillance alone

2013 SSI Validation Pilot

- 47 participating hospitals
- Reviewed accuracy of denominator data reported with COLO and HYST procedures
- Revealed errors in denominator data reported to NHSN
 - Wound classification (COLO) – 68% accurate
 - Duration of procedure (COLO & HYST) – 85% accurate

2015 Denominator Data Accuracy: COLO

- 234 hospitals reviewed COLO procedures for denominator data accuracy
- Duration of COLO procedure – 94% accurate
 - 35 (15%) hospitals had less than 80% accuracy
- COLO Wound Class – 89% accurate
 - 50 (21%) hospitals had less than 80% accuracy

2015 Denominator Data Accuracy: HYST

- 165 hospitals reviewed HYST procedures for denominator data accuracy
- HYST Body Mass Index (BMI) – 92% accurate
 - 35 (21%) hospitals had less than 80% accuracy

2015 Denominator Data Accuracy: CSEC

- 144 hospitals reviewed CSEC procedures for denominator data accuracy
- CSEC BMI - 77% accurate
 - 41 (28%) hospitals had less than 80% accuracy
- CSEC Diabetes – 96% accurate
 - 17 (12%) hospitals had less than 80% accuracy

2015 Denominator Data Accuracy: HPRO

176 Hospitals reviewed HPRO procedures for denominator data accuracy

- HPRO Duration – 95% accurate
 - 17 (10%) hospitals had less than 80% accuracy
- HPRO Diabetes – 95% accurate
 - 16 (9%) hospitals had less than 80% accuracy

2015 Denominator Data Accuracy

- 867 errors identified

$$\frac{11,104 \text{ Data Elements Accurate}}{11,971 \text{ Data Elements Reviewed}} = 93\%$$

2015 Denominator Data Accuracy

- Hospitals reviewed and submitted denominator data accuracy for additional procedures (optional)
- Overall accuracy varied by denominator data element

Data Element	Accuracy
Duration	95%
Wound Class	92%
BMI	87%
Diabetes	96%

2015 SSI Validation Results Summary

- 94% Participation
- 83% SSI Case-Finding Sensitivity
 - 91 hospitals missed at least one SSI
- 93% Denominator Data Element Accuracy
 - 89% COLO wound class accuracy
 - 77% CSEC BMI accuracy

Results of Post-Validation Process Survey

- 212 hospitals completed an optional post-validation process survey
- 94% stated they benefited or somewhat benefited from the validation process
- Average (median) time commitment for 2015 SSI validation:
 - 3 hours active collaboration with billing/finance department
 - 1-5 business days to receive flagged records list
 - 21% needed >10 days
 - 8-16 hours reviewing charts and summarizing results

Results of Post-Validation Process Survey

- Difficulties/concerns
 - Took more time than expected
 - Flag codes did not identify all SSI, i.e. post-discharge
- Opportunities/benefits:
 - Reassuring for those who found no errors
 - Identified systematic errors in medical record documentation or data transfer processes
 - Resulted in processes to more easily generate SSI flag code reports

92% of hospitals that didn't use flag codes for SSI surveillance prior to validation plan to begin using them

Results of Post-Validation Process Survey

- *"I found (2015 SSI validation) to be a great exercise... detection of SSI is hard."*
- *"The validation process allowed us to demonstrate the need for the previously requested flag report, which is now in place."*
- *"Because of the validation process, we found that our case finding was sufficient and accurate but we also found that our denominators were not all captured; (Validation presented an) opportunity for staff education and to validate our internal data systems post-upgrade."*

Improving Surveillance

Quality HAI Surveillance

Requires

CONSISTENCY

COORDINATION

CONFIDENCE

COMPASSION

CONSISTENCY

- Complete case-finding requires a comprehensive evaluation of a minimum clinical data set

	Always Step 1	Step 2
CLABSI	Review every positive blood culture	Review for presence of central line
SSI	Identify and review <ul style="list-style-type: none"> - ICD post-op diagnosis "flag" codes - Returns-to-OR - Post-op hospital re-admissions (30d or 90d) 	Realize that culture-based surveillance alone <u>misses</u> 50-60% of SSI Consider reviewing post-op imaging (CT or MRI) and discharge summaries
MRSA/VRE BSI	Review all final <i>S.aureus</i> and Enterococcal blood cultures	Include and report all positives from ER and 24-hour observation locations (<i>new in 2015</i>)
CDI	Review all <i>C.difficile</i> toxin positives tests (PCR or assay)	Include and report all positives from ER and 24-hour observation locations (<i>new in 2015</i>)

COORDINATION

- Infection prevention and Quality department staff can't do it alone
- HAI surveillance needs to be a shared responsibility across hospital units, services, and disciplines
- The more connection of relevant data points, the better the surveillance (e.g. ICD10 post-op diagnosis codes, imaging studies)
- Ongoing collection of patient surgical risk factors (i.e. denominator data) requires data system solutions

CONFIDENCE

- ✓ Know the HAI surveillance definitions (refer to them often!)
- ✓ Apply definitions with confidence the same way every time
- ✓ Seek assistance for ambiguity*

Difference Between Clinical and Surveillance Definitions

- **Clinical criteria used by physicians for patient care and management may differ from surveillance criteria**
 - Clinical
 - Patient centered
 - Used for therapeutic decisions
 - Surveillance
 - Population based
 - Applied exactly the same way each time



Surveillance Definitions

CDC/NHSN Surveillance Definitions for Specific Types of Infections

INTRODUCTION

This chapter contains the CDC/NHSN surveillance definitions and criteria for all specific types of infections. Comments and reporting instructions that follow the site-specific criteria provide further explanation and are integral to the correct application of the criteria. This chapter also provides further required criteria for the specific infection types that constitute organ/space surgical site infections (SSI) (e.g., mediastinitis [MED] that may follow a coronary artery bypass graft, intra-abdominal abscess [IAB] after colon surgery).

Additionally, it is necessary to refer to the criteria in this chapter when determining whether a positive blood culture represents a primary bloodstream infection (BSI) or is secondary to a different type of HAI (see [Appendix 1 Secondary Bloodstream Infection \(BSI\) Guide](#)). A BSI that is identified as secondary to another site of HAI must meet one of the criteria of HAI detailed in this chapter. Secondary BSIs are not reported as separate events in NHSN, nor can they be associated with the use of a central line.

ted Events (VAEs). It should
initiation within the VAE
definitions within the algorithm
n-related.

CARE-ASSOCIATED

ssion (POA) or a healthcare-



*Contact NHSN@cdc.gov or HAIProgram@cdph.ca.gov

COMPASSION

- Patients want to feel safe
- Patient advocates want to be assured that providers are doing everything possible to prevent infections
- Identifying **every** HAI is necessary to
 1. understand what your patients are experiencing
 2. target prevention efforts
 3. measure HAI prevention progress

Recommended SSI Surveillance Methods

Review medical records

- CDPH recommends using ICD diagnosis codes to flag records for SSI review

Direct examination of wounds

- Coordinate with surgical care colleagues

Surgeon surveys

Patient surveys

Improving SSI Case-finding

Problem: SSI surveillance strategy that relies primarily on positive cultures, patients returning to surgery, and/or surgical patients being re-admitted to identify cases

Recommendations:

- Use post-operative ICD-10 codes to “flag” cases to review for possible SSI
- Consider reviewing imaging results and discharge summaries

CDPH has sets of codes for each of the 29 reportable procedure categories online (shown at end of this slide set)

Improving SSI Surveillance - 1

Problem: Misunderstanding SSI surveillance requirements as related to 'dirty' cases

Recommendations:

- ALL of the 29 procedures required in California are required to be reported regardless of wound class
 - Entering the correct wound class of contaminated or dirty will result in a more accurate calculation of the "predicted" number of SSI used to calculate your SIR
- All SSI must to be reported regardless of wound class

Improving SSI Surveillance - 2

Problem: Inaccuracies in wound class

Recommendations:

- Educate OR staff
- Make recording wound class a part of routine activities at the end of the procedure, i.e., at the time of sponge count
- Do not record prior to surgery

Improving SSI Surveillance - 3

Problem: Inaccuracies in BMI

Recommendations:

- Work with IT department to get data directly from the electronic medical record
- Educate the operating room and obstetrics departments on accurately recording patient height and weight (or BMI)

Improving SSI Surveillance - 4

Problem: Misunderstanding SSI surveillance definitions

Recommendations:

- Keep NHSN surveillance definitions handy. Refer to them often. Do not rely on memory!
- Use a “check sheet” to document SSI criteria

ICD Post-Op Codes to Flag Records for Review

You can visit the HAI Program [Data Validation webpage](#) to find flag codes for all 29 procedures, as well as other helpful resources



<http://www.cdph.ca.gov/programs/hai/Pages/UsingNHSNDataValidationforImprovedHAISurveillanceandReporting.aspx>

ICD Post-Op Codes to Flag Records for Review

CDC Proc Code	ICD-9 Code	ICD-10 Code
AAA	996.6	T81.4XXA
	996.62	T82.7XXA
	998.51	T85.79XA
	998.59	
APPY	567.21	K63.0
	567.22	K63.2
	567.29	K65.0
	567.38	K65.1
	569.5	K68.19
	569.81	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
998.6		
BILI	567.21	K65.0
	567.22	K65.1
	567.29	K68.19
	568.38	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
	998.6	

CDC Proc Code	ICD-9 Code	ICD-10 Code
CARD	513.1	J85.3
	682.2	L03.319
	730.08	M86.18
	996.61	M86.28
	996.62	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T82.6XXA
	998.59	T82.7XXA
	998.59	
CBGB & CBGC	513.1	J85.3
	682.2	L03.319
	730.08	M86.18
	996.61	M86.28
	996.62	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T82.6XXA
	998.59	T82.7XXA
	998.59	
CHOL	567.21	K65.0
	567.22	K65.1
	567.29	K68.19
	567.38	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
	998.6	

CDC Proc Code	ICD-9 Code	ICD-10 Code
COLO	567.21	K63.0
	567.22	K63.2
	567.29	K65.0
	567.38	K65.1
	569.5	K68.19
	569.61	K94.02
	569.81	K94.12
	682.2	L03.319
	998.31	T81.31XA
	998.32	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
	998.6	
CSEC	567.21	K65.0
	567.22	K65.1
	567.29	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.59	
FUSN	996.6	T81.4XXA
	996.69	T85.79XA
	998.51	
	998.59	

CDC Proc Code	ICD-9 Code	ICD-10 Code
FX	996.6	T81.4XXA
	996.66	T84.50XA
	996.67	T84.60XA
	996.69	T84.7XXA
	998.51	T85.79XA
	998.59	
GAST	567.21	K65.0
	567.22	K65.1
	567.29	K68.19
	567.38	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
	998.6	
HPRO	996.6	T81.4XXA
	996.66	T84.50XA
	996.67	T84.60XA
	996.69	T84.7XXA
	998.51	T85.79XA
	998.59	
HTP	998.51	T81.4XXA
	998.59	

ICD Post-Op Codes to Flag Records for Review

CDC Proc Code	ICD-9 Code	ICD-10 Code
HYST	567.21	K65.0
	567.22	K65.1
	567.29	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	
	998.59	
	KPRO	996.6
996.66		T84.50XA
996.67		T84.60XA
996.69		T84.7XXA
998.51		T85.79XA
998.59		
KTP		998.51
	998.59	
LAM	998.51	T81.4XXA
	998.59	
LTP	998.51	T81.4XXA
	998.59	
NEPH	998.51	T81.4XXA
	998.59	

CDC Proc Code	ICD-9 Code	ICD-10 Code
OVRY	567.21	K65.0
	567.22	K65.1
	567.29	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	
	998.59	
	PACE	682.2
996.61		T81.31XA
998.31		T81.32XA
998.32		T81.4XXA
998.51		T82.6XXA
998.59		T82.7XXA
REC		567.21
	567.22	K63.2
	567.29	K65.0
	567.38	K65.1
	569.5	K68.19
	569.61	K94.02
	569.81	K94.12
	569.81	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
998.6		

CDC Proc Code	ICD-9 Code	ICD-10 Code
RFUSN	996.6	T81.4XXA
	996.69	T85.79XA
	998.51	
	998.59	
SB	567.21	K63.0
	567.22	K63.2
	567.29	K65.0
	567.38	K65.1
	569.5	K68.19
	569.61	K94.02
	569.81	K94.12
	682.2	L03.319
	998.31	T81.31XA
	998.32	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
998.6		
SPLE	567.21	K65.0
	567.22	K65.1
	567.29	K68.19
	567.38	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
998.59		
998.6		
THOR	998.51	T81.4XXA
	998.59	

CDC Proc Code	ICD-9 Code	ICD-10 Code
VHYS	567.21	K65.0
	567.22	K65.1
	567.29	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.59	
XLAP	567.21	K65.0
	567.22	K65.1
	567.29	K68.19
	567.38	L03.319
	682.2	T81.31XA
	998.31	T81.32XA
	998.32	T81.4XXA
	998.51	T81.83XA
	998.59	
998.6		

Summary

- SSI self-validation can improve case finding and help identify systematic denominator data errors
- Use of post-operative flag codes should be incorporated into routine SSI surveillance in all California hospitals
 - Provides efficiency in identifying which medical records to review for possible SSI
- Accurate denominator data are important for risk adjustment and calculating your SSI SIRs

Questions?

For more information, please contact
HAIProgram@cdph.ca.gov

