# Findings from 2013 SSI Validation Project: Improving SSI Surveillance

Presented to
California Hospitals
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# Today's Presentation

1. Describe the attributes of quality HAI surveillance
2. Review 2013 SSI validation findings from 42 California hospitals
3. Identify best practices for SSI case-finding
4. Review NHSN SSI protocols, targeting highlighted issues
5. Demonstrate SSI data validation process for internal use by hospitals
6. Review enhanced SSI case finding method for additional procedures

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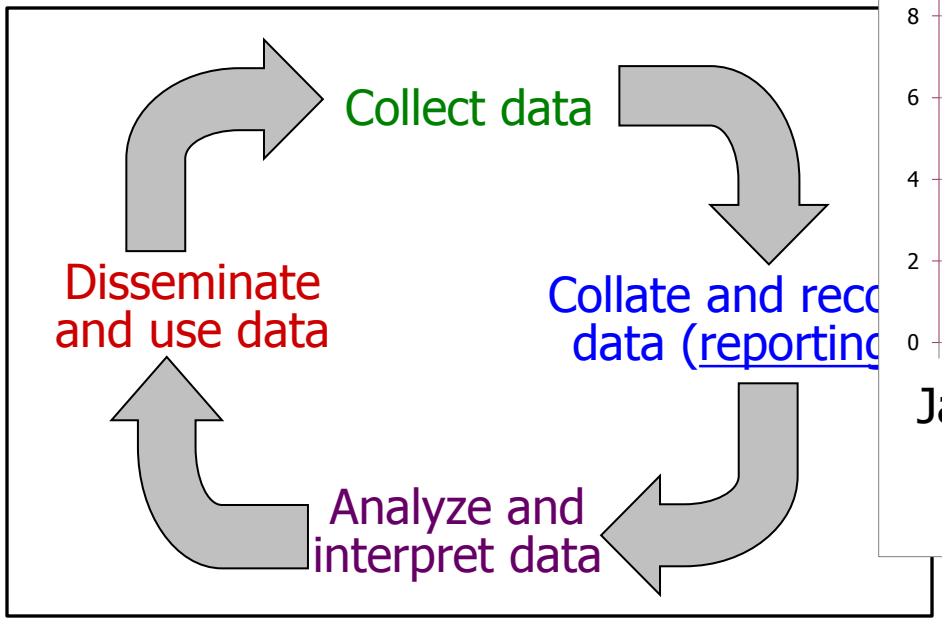
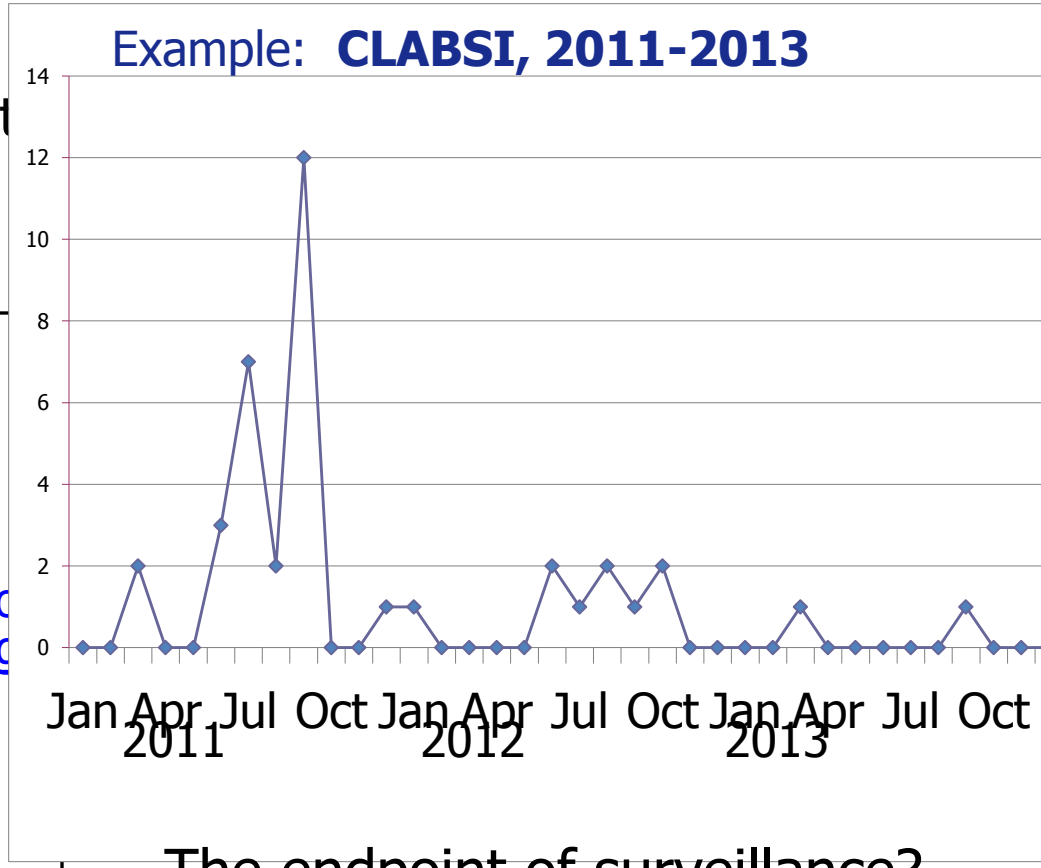
# What is HAI Surveillance?

A **System** that starts and ends wit
communication and action; an
**Information Cycle**




The endpoint of surveillance?
Data showing **HAI Prevention**

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# Quality HAI Surveillance

*Requires*

CONSISTENCY

COORDINATION

CONFIDENCE

COMPASSION

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# 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<br>- all returns-to-OR<br>- All post-op hospital re-admissions (30d or 90d)<br>– **(NEW)** ICD9 post-op diagnosis and procedure "flag" codes | Realize that culture-based surveillance alone misses 50-60% of SSI<br>Consider review of post-op imaging, such as CT/MRI (Required in WA state) |
| **MRSA/VRE BSI** | Review all final *S.aureus* and Enterococcal blood cultures | Assess if ER-positives were admitted |
| **CDI** | Review all *C.difficile* toxin positives tests (PCR or assay) | Assess if ER-positives were admitted |

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# COORDINATION

- IP 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. ICD9 billing codes, imaging studies, new antimicrobial starts)
- Ongoing collection of patient surgical risk factors (i.e. denominator data) requires data system solutions

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# CONFIDENCE

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

*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.

Also included in this chapter are the criteria for Ventilator-Associated Events (VAEs). It should
the first definition within the VAE
r the other definitions within the algorithm
t be infection-related.

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ent on admission (POA) or a healthcare-

## 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

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

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# Common Steps for HAI Data Validation

1) Select hospitals
2) Develop sampling framework
3) Select patient population for review
4) Abstract data from medical records
5) Use findings to improve surveillance

CDC, 2009

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# Objectives of CDPH SSI Validation, 2013

HAI Program Liaison IPs performed onsite data validation to

- Gain a better understanding of how well SSI surveillance is being performed
- Provide immediate one-on-one education and coaching to volunteer hospitals
- Develop targeted education for all CA hospitals based on common errors, identified gaps, misinterpretations

What this validation process was NOT:

- A research study
- Formal evaluation of SSI reporting implementation

Important to remember that findings may not be generalizable

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# CDPH HAI Program Data Validation Tenets

| | |
|---|---|
| • External | *Performed by CDPH HAI Program staff* |
| • Independent | *Reviews done by CDPH reviewers working alone* |
| • Voluntary | *HAI Program non-regulatory* |
| • Applied a "real practice" model | *Used census sample (records not randomly selected); comprehensive review of 1 or 2 quarter time period* |
| • Reproducible | *Process can be duplicated by hospital* |

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# SSI Validation Process

- Onsite 2-day review at each hospital by 1 or 2 HAI Program Liaison IPs
- Requested list of Colon (COLO) and abdominal hysterectomy (HYST) procedures performed over 1 or 2 quarter period of 2013
  - Requested search for post-op billing codes, including diagnosis and procedure codes
  - All "flagged" patient records reviewed during onsite visit
  - Required Liaison IP to have access to all medical records
  - Reviewed additional SSI reported to NHSN not identified by "flag" code
- Standardized collection tool to enter data and produce hospital-specific findings for presentation prior to exit

# Procedure Codes Required by NHSN for **Defining** and **Reporting COLO and HYST**

| ICD-9 Procedure Codes That Define an NHSN Colon Procedure | | | | | |
|---|---|---|---|---|---|
| 17.31 | 17.32 | 17.33 | 17.34 | 17.35 | 17.36 |
| 17.39 | 45.03 | 45.26 | 17.39 | 45.03 | 45.26 |
| 45.41 | 45.49 | 45.52 | 45.71 | 45.72 | 45.73 |
| 45.74 | 45.75 | 45.76 | 45.79 | 45.81 | 45.82 |
| 45.83 | 45.92 | 45.93 | 45.94 | 45.95 | 46.03 |
| 46.04 | 46.10 | 46.11 | 46.13 | 46.14 | 46.43 |
| 46.52 | 46.75 | 46.76 | 49.94 | | |

| ICD-9 Procedure Codes That Define an NHSN Abdominal Hysterectomy | | | | | |
|---|---|---|---|---|---|
| 68.31 | 68.39 | 68.41 | 68.49 | 68.61 | **68.69*** |

***Note:** Code corrected Sept 1, 2014. Previous version of slides may have incorrect codes*

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# Post-Operative ICD-9 **Procedure Codes** for "Flagging" Possible COLO SSI

| ICD9 Procedure Codes That MIGHT Indicate a Colon SSI | |
|---|---|
| 54.0 | Incision and drainage (I&D) of abdominal wall |
| 54.11 | Exploratory laparotomy |
| 54.19 | Drainage of intraperitoneal abscess or hematoma |
| 86.04 | Skin and subcutaneous I&D NEC |
| 86.22 | Excision debridement of wound, infection, burn |
| 86.28 | Non-excision debridement of wound, infection, burn |

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# Post-Operative ICD-9 **Diagnosis Codes** for "Flagging" Possible COLO SSI

| ICD9 Diagnosis Codes That MIGHT Indicate a Colon SSI | |
|---|---|
| 567.21, 567.22 | Intra-abdominal abscess, intra- or retroperitoneal abscess |
| 567.29 | Other suppurative peritonitis |
| 567.38 | Pelvic abscess |
| 569.5 | Intestinal abscess |
| 569.61 | Infection of colostomy or enterotomy |
| 569.81 | Fistula of intestine |
| 682.2 | Abdominal wall abscess, cellulitis of trunk |
| 879.9 | Open wound of unspecified site, complicated |
| 998.31, 998.32 | Disruption of internal or external surgical wound |
| 998.51 | Postoperative infection, seroma |
| 998.59 | Postoperative infection, abscess |
| 998.6 | Non-healing surgical wound, persistent post op fistula |

# Post-Operative ICD-9 **Diagnosis Codes** for "Flagging" Possible HYST SSI

| ICD9 Diagnosis Codes That MIGHT Indicate a HYST SSI | |
|---|---|
| 567.21, 567.22 | Peritonitis, intra-abdominal abscess, intraperitoneal or retroperitoneal abscess |
| 567.29 | Other suppurative peritonitis |
| 682.2 | Abdominal wall abscess, cellulitis of trunk |
| 998.31, 998.32 | Disruption of internal or external surgical wound |
| 998.51 | Postoperative infection, seroma |
| 998.59 | Postoperative infection, abscess |

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# Completing Validation Process

- Results of validation findings reviewed and left with the hospital prior to exit
  - Provided immediate onsite education to improve HAI surveillance and reporting
  - Hospitals expected to correct data in NHSN based on validation findings
  - Hospitals expected to incorporate ICD9-based surveillance to improve SSI case-finding moving forward
- No hospital identifiers recorded on any validation forms or materials
  - Date and reviewer's initials removed from all forms immediately following data entry
  - Identifiable hospital results not maintained by CDPH

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# Summary to Date

- All CA hospitals invited to participate in SSI validation in January 2013
- 47 hospitals volunteered and participated
- Onsite validation performed from March–July 2013
- Preliminary analysis presented to the volunteer hospital participants on Tuesday, July 1, 2014
- Outreach and education for using SSI validation findings to improve surveillance presented to all CA hospitals via webinars July 16 & 18, 2014

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# 2013 SSI Validation Findings

# Comparison of Hospital Characteristics

| | California | | Validation Sample | |
|---|---|---|---|---|
| **Acute care hospitals** | **429** | | **47** | |
| Counties with hospitals | 57 | | 18 | |
| Northern hospitals | 197 | (45%) | 13 | (28%) |
| Southern hospitals | 232 | (55%) | 34 | (72%) |
| LA County hospitals | 101 | (23%) | 17 | (36%) |
| Rural hospitals | 63 | (15%) | 2 | (4%) |
| Critical Access hospitals | 28 | (6%) | 1 | (2%) |
| Pediatric hospitals | 12 | (3%) | 1 | (2%) |
| Teaching hospitals | 83 | (19%) | 17 | (36%) |
| Bed size, mean | 210 | | 341 | |

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# Quick Review of NHSN SSI Reporting Rules

- SSI met NHSN definition for Superficial incisional, Deep incisional, or Organ/space SSI
- Inpatient surgical procedures only
- SSI within 30 days of procedure
- Based on 2012 definition, both the SSI and procedure excluded if not primarily closed in OR

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# Presentation of SSI Validation Findings

- **Sensitivity**
  - Proportion of SSI reported by hospital among all patients with an SSI
  - High sensitivity indicates SSI are being identified and reported
- **Specificity**
  - Proportion of SSI not reported by hospital among patients without SSI
  - High specificity indicates accuracy in "ruling out" SSI
- **Positive Predicted Value**
  - Proportion of SSI detected by hospital that actually are SSI
  - High PPV indicates accuracy in applying surveillance definitions

| | | HAI Liaison Program IP Review | |
|---|---|---|---|
| | | HAI | Not an HAI |
| Hospital Surveillance Report | HAI | True positives | False positives |
| | Not an HAI | False negatives | True negatives |

**Positive Predictive Value**

$$\frac{\text{True positives}}{\text{True positives + False positives}} \times 100$$

**Sensitivity**

$$\frac{\text{True positives}}{\text{True positives + False negatives}} \times 100$$

**Specificity**

$$\frac{\text{True negatives}}{\text{True negatives + False positives}} \times 100$$

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# SSI Validation Findings by Surgical Type

| | Colon | Abdominal Hysterectomy |
|---|---|---|
| Number of Procedures Reviewed by Validators | 561 | 133 |
| SSI Reported by Hospital | 120 | 52 |
| SSI Not Reported by Hospital, Met NHSN Criteria<br>- Should have been reported (**MISSED** case) | **119** | **24** |
| SSI Reported by Hospital, Did Not Meet NHSN Criteria<br>- Should *not* have been reported (**ERROR)** | 1 | 2 |
| SSI Not Reported by Hospital **AND** No Evidence of SSI on Validation Review | 321 | 55 |
| | | |
| **Sensitivity** | **50.2%** | **68.4%** |
| **Specificity** | 99.7% | 96.5% |
| **PPV** | 99.2% | 96.3% |

**NOTE:** *Sensitivity for complex SSI (deep incisional and organ/space) was 46.5% for colon procedures and 67.3% for abdominal hysterectomy.*

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# Evaluation of ICD-Flag Codes for Finding SSI

| | Colon | Abdominal Hysterectomy |
|---|---|---|
| Records "Flagged" for SSI Review by ICD9 Diagnosis or Procedure Code | 522 | 113 |
| - SSI Identified by "Flag" Code | 201 | 56 |
| - No SSI Identified Despite "Flag" | 321 | 57 |
| Additional Confirmed SSI NOT Flagged | 38 | 20 |
| | | |
| **Sensitivity of Flag Codes for Identifying All SSI Types** | 84.1% | 73.7% |
| **Sensitivity of Flag Codes for Identifying Deep Incisional & Organ Space SSI** | 87.9% | 78.3% |
| **PPV of SSI if Record is "Flagged"** | **38.5%** | **49.6%** |

**1 COLO SSI case found for every 2-3 records reviewed**

**1 HYST SSI case found for every 2 records reviewed**

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# SSI Validation Findings: **Colon**

- Colon SSI missed by hospital surveillance were:
  1. More likely to have occurred during the surgical admission, opposed to post-discharge or readmission ($p<0.01$)
  2. Less likely to have positive culture of fluid or tissue from incision or organ space ($p=0.02$)
- Documentation of SSI by surgeon or attending physician was similar in Colon SSI cases reported by hospitals and in cases missed ($p=0.57$)

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# SSI Validation Findings: **Colon** *(continued)*

- Use of ICD9 post-operative "flag" codes identified additional unreported Colon SSIs in 31 of 42 (74%) hospitals
  - 7 of these hospitals had previously reported 0 Colon SSIs
- Only 11 of 42 (**26%**) hospitals demonstrated complete identification* and reporting of Colon SSI

*Defined as 100% sensitivity or case-finding

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# SSI Validation Findings: **Abdominal HYST**

- HYST SSI cases missed by hospitals met similar CDC/NHSN criteria as cases that had been reported
- Comparing cases found by ICD9 flag codes to cases found/reported by hospital (prior to validation visit):
  1. ICD9 flag codes identified fewer cases in outpatient setting (57% vs. 81%, although p-value was NS)
  2. ICD9 flag codes identified more cases on readmission (79% vs. 67%, p-value = NS)

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# SSI Validation Findings: **Abdominal HYST**

*(continued)*

- Use of ICD-9 post-operative "flag" codes identified additional unreported HYST SSIs in 12 of 34 (35%) hospitals
  - 6 of these hospitals had previously reported 0 HYST SSIs
- 22 of 34 (65%) hospitals demonstrated complete identification and reporting of HYST SSI

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# ICD9 "Flag" Codes Validated for Use to Identify SSI for Other Surgical Procedures

# HPRO & KPRO Post Operative ICD9 "Flag" Codes

| Procedure | Post Operative Diagnostic Codes that might indicate an SSI | | | | SSI identified by traditional methods. #(sensitivity) | SSI identified by flagged codes #(sensitivity) |
|---|---|---|---|---|---|---|
| Hip Arthroplasty | 996.66 | 998.5 | 998.51 | 998.59 | 3 (21%) | 14 (100%) |
| Knee Arthroplasty | 996.66 | 998.5 | 998.51 | 998.59 | 4 (57%) | 7 (100%) |

Calderwood MS, Ma A, Khan YM, et al. Use of Medicare diagnosis and procedure codes to improve detection of surgical site infections following hip arthroplasty, knee arthroplasty, and vascular surgery. ***Infect Control Hosp Epidemiol*** **2012**; 33(1): 40-49

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# CABG Post Operative ICD9 "Flag" Codes

| Post Operative Diagnostic Codes that might indicate CABG SSI | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 34.0 | 34.01 | 34.02 | 34.10 | 86.01 | 86.04 | 86.09 | 86.22 | 86.28 | 91.71 |
| 91.72 | 91.73 | 519.1 | 519.2 | 682.2 | 682.3 | **682.8*** | 686.8 | 686.9 | 730.0 |
| 730.08 | 730.09 | 730.20 | 730.28 | 730.29 | 730.30 | 730.38 | 730.39 | 730.80 | 730.88 |
| 730.89 | 730.90 | 730.98 | 730.99 | 785.52 | 790.7 | 875.0 | 879.8 | 879.9 | 891.0 |
| 891.1 | **996.6*** | **996.61*** | **996.62*** | 966.71 | 998.31 | 998.32 | 998.51 | 998.83 | 998.9 |

| CABG SSI identified by traditional methods # (sensitivity) | CABG SSI identified by flag codes # (sensitivity) |
|---|---|
| 24/50 (48%) | 48/50 (96%) |

Huang SS, Placzek H, Livinigston J, et al. Use of Medicare claims to rank hospital by surgical site infection risk following coronary artery bypass graft surgery. ***Infect Control Hosp Epidemiol*** **2011**; 32(8): 775-783

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***Note:** Codes corrected Sept 1, 2014. Previous version of slides may have incorrect codes*

# Improving SSI Surveillance

# Recommended SSI Surveillance Methods

## NHSN

- Direct examination of wounds
  - Are any IPs really doing this?
- Review of medical records
  - Ok, but which ones?
- Surgeon surveys by mail or telephone
- Patient surveys by mail or telephone

## CMS Validation

- Using ICD9 procedure and diagnosis code-sets for COLO and HYST

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# Superficial Incisional SSI

NHSN Surveillance Definition, 2014

- ❑ Infection occurs within 30 days after surgical procedure

**AND**

- ❑ Involves only skin and subcutaneous tissue of the incision

**AND**

Patient has at least **1:**

- ❑Purulent drainage from the superficial incision
- ❑Organism isolated from incision culture or fluid (obtained aseptically)
- ❑Diagnosis of superficial SSI by surgeon or attending physician or other designee
- ❑Pain, tenderness, localized swelling, redness, or heat **AND** ❑ Incision opened by surgeon; culture positive or not cultured

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*NHSN Patient Safety Manual: Ch 17*

# Superficial SSI – additional reporting instructions

- Do not report stitch abscess as an SSI
  - "Minimal inflammation and discharge confined to points of suture penetration"
- Do not report a localized stab wound infection as an SSI
- Cellulitis by itself is not an SSI

# Deep Incisional SSI

NHSN Surveillance Definition, 2014

- ❑ Infection occurs within 30 after surgical procedure (**UNLESS** its one of the 13 procedures followed for **90 days)**

**AND**

- ❑ Involves deep soft tissues of the incision, e.g. fascial & muscle layers

**AND**

Patient has at least **1:**

- ❑ Purulent drainage from deep incision
- ❑ Abscess or evidence of infection involving deep incision detected on direct exam, during invasive procedure, or by histopathologic or imaging test
- ❑ Deep incision spontaneously dehisces
  **-OR-** opened by surgeon, attending physician or designee

**AND**

Patient has at least **1:***

- ❑ fever>38°C
- ❑ localized pain, or
- ❑ tenderness

*Unless culture-negative

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*NHSN Patient Safety Manual: Ch 17*

# NHSN Surgical Procedures Followed for **90-Day** SSI Surveillance Period

| 90-day Surveillance | |
|---|---|
| **Code** | **Operative Procedure** |
| BRST | Breast surgery |
| CARD | Cardiac surgery |
| CBGB | Coronary artery bypass graft with both chest and donor site incisions |
| CBGC | Coronary artery bypass graft with chest incision only |
| CRAN | Craniotomy |
| FUSN | Spinal fusion |
| FX | Open reduction of fracture |
| HER | Herniorrhaphy |
| HPRO | Hip prosthesis |
| KPRO | Knee prosthesis |
| PACE | Pacemaker surgery |
| PVBY | Peripheral vascular bypass surgery |
| RFUSN | Refusion of spine |
| VSHN | Ventricular shunt |

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*NHSN Patient Safety Manual: Ch 17 Table 12*

# Organ/Space SSI

NHSN Surveillance Definition, 2014

- Infection occurs within 30 after surgical procedure (**UNLESS** its one of the 13 procedures followed for **90 days)**

**AND**

- Involves any part of body opened or manipulated during the surgical procedure

**AND**

Patient has at least **1:**

- Purulent drainage from drain placed into organ/space
- Organism isolated from an aseptically-obtained culture of fluid or tissue in the organ/space
- Abscess or evidence of infection involving the organ/space that is detected on direct exam, during invasive procedure, or by histopathologic or imaging test

**AND**

- Meets surveillance definition for a **specific NHSN infection site**

*NHSN Patient Safety Manual: Chapter 17, Table 13*

= Most common with COLO or HYST

*Table 13. Specific Sites of an Organ/Space SSI*

| Code | Site | Code | Site |
|---|---|---|---|
| BONE | Osteomyelitis | LUNG | Other infections of the respiratory tract |
| BRST | Breast abscess or mastitis | MED | Mediastinitis |
| CARD | Myocarditis or pericarditis | MEN | Meningitis or ventriculitis |
| DISC | Disc space | ORAL | Oral cavity (mouth, tongue, or gums) |
| EAR | Ear, mastoid | OREP | Other infections of the male or female reproductive tract |
| EMET | Endometritis | OUTI | Other infections of the urinary tract |
| ENDO | Endocarditis | PJI | Periprosthetic Joint Infection |
| EYE | Eye, other than conjunctivitis | SA | Spinal abscess without meningitis |
| GIT | GI tract | SINU | Sinusitis |
| HEP | Hepatitis | UR | Upper respiratory tract |
| IAB | Intraabdominal, not specified | VASC | Arterial or venous infection |
| IC | Intracranial, brain abscess or dura | VCUF | Vaginal cuff |
| JNT | Joint or bursa | | |

*NHSN Patient Safety Manual: Chapter 17*

# Gastrointestinal Tract (GIT) Infection

NHSN Surveillance Definition, 2014

Patient meets **1** of 2 criteria:

- ❑ 1. Abscess or other evidence of infection seen during invasive procedure or histopathologic exam
- ❑ 2. **2** signs/symptoms of organ/tissue involved
  - ❑ fever(>38C)
  - ❑ nausea*
  - ❑ vomiting*
  - ❑ abdominal pain*
  - ❑ tenderness*
  - ❑ diarrhea*

**with no other recognized cause*

**AND**

At least **1** of the following:

- ❑ Organisms cultured from drainage or tissue obtained during an invasive procedure /endoscopy or from a drain
- ❑ Organisms seen on Gram's/KOH stain or giant cells seen on micro exam of drainage or tissue obtained during invasive procedure or from drain
- ❑ Organisms cultured from the blood
- ❑ **Evidence of pathologic findings on imaging test**
- ❑ Evidence of pathologic findings on endoscopic exam *(e.g., Candida esophagitis, proctitis, toxic megacolon)*

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# Intra-abdominal (IAB) Infection

NHSN Surveillance Definition, 2014

Patient meets **1** of 3 criteria:

- ❑ 1. Organisms cultured from abscess and/or purulent material from intraabdominal space obtained during an invasive procedure
- ❑ 2. Abscess or other evidence of IAB seen during an invasive procedure or histopathologic exam.
- ❑ 3. **2** signs/symptoms **AND**
  - ❑fever(>38C)
  - ❑nausea*
  - ❑vomiting*
  - ❑abdominal pain*
  - ❑jaundice

**with no other recognized cause*

At least **1** of the following:

- ❑ Organisms cultured from drainage from an aseptically-placed drain
- ❑ Organisms seen on Gram's stain of drainage or tissue obtained during invasive procedure or from an aseptically-placed drain
- ❑ Organisms cultured from blood and imaging test evidence of infection (e.g, abnormal findings on ultrasound, CT scan, MRI, or radiolabel scans, or on abdominal x-ray

# Vaginal Cuff (VCUF) Infection

NHSN Surveillance Definition, 2014

**Post-hysterectomy** patient meets **1** of 3 criteria:

- ❑ 1. Purulent drainage from the vaginal cuff
- ❑ 2. Abscess at the vaginal cuff
- ❑ 3. Pathogens cultured from fluid or tissue obtained from the vaginal cuff

# Other Infection of Reproductive Tract (OREP)

NHSN Surveillance Definition, 2014

Patient meets **1** of 3 criteria:

- ❑ 1. Organisms cultured from tissue or fluid from affected site.
- ❑ 2. Abscess or other evidence of infection of affected site seen during an invasive procedure or histopathologic examination.
- ❑ 3. **2** signs/symptoms
  - ❑ fever(>38C)
  - ❑ nausea*
  - ❑ vomiting*
  - ❑ pain*
  - ❑ tenderness*
  - ❑ dysuria*

**AND** At least **1** of the following:
- ❑ Organisms cultured from blood
- ❑ Physician diagnosis

**with no other recognized cause*

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# Other Urinary Tract Infections (OUTI)

Includes kidney, ureter, bladder, urethra, or tissue surrounding the retroperitoneal or perinephric space

NHSN Surveillance Definition, 2014

Patient meets **1** of 3 criteria:

- ❑ 1. Organisms isolated from culture of fluid (other than urine) or tissue from affected site.
- ❑ 2. Abscess or other evidence of infection seen on direct exam, during an invasive procedure, or during a histopathologic exam.
- ❑ 3. **2** signs or symptoms:
  - ❑ fever(>38° C)
  - ❑ localized pain*
  - ❑ localized tenderness at involved site*

**AND**

At least **1** of the following:

- ❑ purulent drainage from affected site
- ❑ microorganisms cultured from blood that are compatible with suspected site of infection.
- ❑ image test evidence of infection (e.g., abnormal ultrasound, CT scan, MRI, or radiolabel scan [gallium, technetium])

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# Wound Class

- Per CA reporting requirements, ALL mandated procedures, **regardless of wound class**, must by reported to NHSN
  - Includes clean (C), clean contaminated (CC), contaminated (CO), and dirty (D) procedures
  - CDC risk-adjustment requires reporting all procedures; SIR accounts for higher infection risk for CO and D procedures
- Wound class must be assessed at the time of the operation by a person present during the surgical procedure
  - End-of-case assessment done by surgeon, circulating nurse, etc.
  - Wound class assigned prior to surgery will lead to both inaccurate reporting and inaccurate risk adjustment!

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*NHSN Patient Care Safety Manual Ch16*

# Wound Class

**Clean**

Operation where no inflammation encountered

Respiratory, alimentary, genital, urinary tracts ***not*** entered

Operation following non-penetrating (blunt) trauma

Primarily closed with no open drainage

**Clean - Contaminated**

Operation entering respiratory, alimentary, genital, or urinary tracts

No evidence of infection, no major break in technique, no unusual contamination encountered

Operation involving biliary tract, appendix, vagina, and oropharynx

**Contaminated**

Operation following open, fresh, accidental wounds

Operation with major breaks in sterile technique (e.g., open cardiac massage) or gross spillage from GI tract

Includes operation where acute, non-purulent inflammation encountered

**Dirty**

Operation involving old traumatic wounds with retained devitalized tissue, **or** existing clinical infection **or** perforated viscera

Definition suggests the organisms causing post-op infection were present before the operation

*NHSN Patient Care Safety Manual Ch16*

# Using SSI Surveillance Data

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

- Plan for distribution of SSI and other HAI data
- Use NHSN analysis features to review, interpret, and understand your data
- Report to the health care providers in your hospital most able to impact patient care
  - Report in a manner to stimulate process improvement
  - Use visual displays of data - charts, graphs, tables

CDPH California Department of PublicHealth

*"Recommended Practices for Surveillance"*
*AJIC Am J Infect Control* 2007; 35:427-40

# SSI Validation in Summary

1. Traditional methods of SSI case finding are likely inadequate and fail to identify all infections
   - Resulting in inaccurate calculations and understanding of true SSI incidence
   - Potential failure to identify highest-risk procedures and alert surgeons of need for action
2. Hospitals are strongly encouraged to incorporate the use of post-op diagnostic/procedure ICD9 "flag" codes into routine surveillance methods
   - May improve efficiency of SSI case finding by as much as 50% for colon and abdominal hysterectomy
   - Will be incorporated into CDPH HAI Program 2014 and 2015 validation (all CA hospitals are expected to participate)
   - Already used by CMS for validation

CDPH California Department of PublicHealth

# References

Calderwood MS, Ma A, Khan YM, et al. Use of Medicare diagnosis and procedure codes to improve detection of surgical site infections following hip arthroplasty, knee arthroplasty, and vascular surgery. *Infect Control Hosp Epidemiol* 2012; 33(1): 40-49

Huang SS, Placzek H, Livinigston J, et al. Use of Medicare claims to rank hospital by surgical site infection risk following coronary artery bypass graft surgery. *Infect Control Hosp Epidemiol* 2011; 32(8): 775-783

Yokoe DS, Khan Y, Olsen MA, et al. Enhanced surgical site infection surveillance following hysterectomy, vascular, and colorectal surgery. *Infect Control Hosp Epidemiol* 2012; 33(8): 768-773

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# Questions?

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