### Objectives

- Describe NHSN’s procedure-associated SSI surveillance and reporting methods
- Review NHSN key terms, SSI surveillance definitions, and data requirements
- Discuss data entry and data import options (e.g. CSV file upload)
- Provide hospital “tips” to successful implementation

### National Healthcare Safety Network (NHSN)

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For more information, please refer to the slides.
SSI Surveillance and Reporting via NHSN

For consistency and to enable risk adjustment, follow NHSN protocols for identifying and reporting SSI and procedures.

NHSN Monthly Reporting Plan

- Enables NHSN (and CDPH) to know what data to expect
- Of the 29 procedure categories (AFL 11-32), add each procedure you anticipate performing anytime during the year
- In an update to NHSN coming later this year, hospitals will be able to indicate "zero" for any specific procedures not performed in a given month

NHSN Procedure-specific SSI Surveillance

- Each NHSN operative procedure category consists of a group of ICD-9-CM codes
  Example: Hip prosthesis (HPRO) include 00.70, 00.71, 00.72, 00.73, 00.85, 00.86, 00.87, 81.51, 81.52, 81.53
- SSI surveillance for each NHSN operative procedure category must include ALL the listed ICD-9 codes
- Refer to AFL 11-32 for complete list of operative procedures and associated ICD-9 codes
Interpreting SSI Surveillance

Requires

• Consistent use of standard methods and definitions for identifying SSI cases
• Capture of sufficient risk factor data for each procedure performed
• Application of risk adjustment methods for meaningful comparisons (i.e. over time within your hospital or to national referent data)

Superficial Incisional SSI

Surveillance Definition

- Infection occurs within 30 days after surgical procedure
- Involve only skin and subcutaneous tissue of the incision

Patient has at least 1:
- Purulent drainage from incision
- Organism isolated from incision culture or fluid (obtained aseptically)
- Pain or tenderness
- Localized swelling, redness, or heat
- Diagnosis of superficial SSI by surgeon or attending physician

Deep Incisional SSI

Surveillance Definition

- Infection occurs within 30 days after surgical procedure if no implant or within 1 year if implant
- Involves deep soft tissues of the incision, e.g. fascial & muscle layers

Patient has at least 1:
- Purulent drainage from deep incision but not from the organ/space of the surgical site
- Deep incision spontaneously dehisc or opened by surgeon and found to be culture positive or was not cultured
- Fever >38°C, localized pain, or tenderness
- Abscess or evidence of deep infection found on direct exam, during reoperation, by histopathologic or radiologic exam
- Diagnosis of deep SSI by surgeon or attending physician
Organ Space SSI

**Surveillance Definition**
- Infection occurs within 30 days after surgical procedure if no implant or within 1 year if implant
- Involves any part of body that is opened or manipulated during the surgical procedure; excludes skin, fascia, or muscle layers, and subcutaneous tissue of the incision
- Patient has at least 1:
  - Purulent drainage from drain placed through stab wound into organ/space
  - Organism isolated from incision culture or fluid (obtained aseptically)
  - Abscess or evidence of organ/space infection found on direct exam, during reoperation, by histopathologic or radiologic exam

Classifying Organ/Space SSI

- When SSI occurs in an organ or organ space related to the procedure, specific infection sites are assigned to further identify the location of the infection
- Examples
  - Hip Prosthesis (HPRO) with subsequent osteomyelitis would be reported as SSI-BONE
  - CBGB with mediastinitis would be reported as SSI-MED

Procedure Risk Factor Data Elements

**For all procedures**
- Gender
- Date of birth
- Date of procedure
- NHSN procedure code
- Wound class
- ASA score
- Duration (hours/minutes)
- Yes/No fields
  - Emergency
  - Trauma
  - Endoscope
  - Implant
  - Non-autologous transplant
  - General anesthesia
  - Outpatient
Procedure Risk Factor Data Elements

Additional data for specific procedures

C-section
- Height
- Weight
- Duration of labor
- Est. blood loss

Hip prosthesis
- Total or partial
- Primary or revision

Knee prosthesis
- Primary or revision

Additional data for specific procedures

Duration
- Hours and minutes between skin incision and skin closure
- Not anesthesia time
- If patient goes to OR within 24 hours of the original incision, report combined duration of operation for both procedures

Wound Classification
- Clean I (C)
  Uninfected wound, no inflammation; respiratory, alimentary, genital, or uninfected urinary tracts not entered; primarily closed; closed drainage if needed.
- Clean contaminated II (CC)
  Respiratory, alimentary, genital, or urinary tracts entered under controlled conditions and without unusual contamination; include operations on biliary tract, appendix, vagina, oropharynx.
- Contaminated III (CO)
  Open, fresh, accidental wounds; major breaks in sterile technique or gross spillage from GI tract; includes incisions into acute, nonpurulent inflamed tissue.
- Dirty / Infected IV (D)
  Old traumatic wounds with retained devitalized tissue and those that involve existing clinical infection or perforated viscera.
ASA* Score

Used to proxy patient co-morbidities or underlying disease

1 = Normally healthy patient
2 = Patient with mild systemic disease
3 = Patient with severe systemic disease that is not incapacitating
4 = Patient with an incapacitating systemic disease that is a constant threat to life
5 = Moribund patient not expected to survive for 24 hours with or without operation

*American Society of Anesthesiologists

Endoscope – Yes/No

• Indicate yes if the entire operative procedure was performed using an endoscope/laparoscope

• Exception: For CBGB, if the donor vessel was harvested using a laparoscope, select “Yes”

Implant – Yes/No

• A nonhuman-derived implantable foreign body (e.g., prosthetic heart valve, hip prosthesis) permanently placed during an NHSN operative procedure and not routinely manipulated for diagnostic or therapeutic purposes

• Screws, wires, and mesh that are left in place ARE considered implants
Non-autologous Transplant – Yes/No

- Transplant: Human cells, tissues, organs, or cellular- or tissue-based products that are placed in a human recipient via grafting, infusion, or transfer
  Examples include: heart valves, organs, ligaments, bone, blood vessels, skin, corneas, and bone marrow cells
- Autologous or “autograft” are products that originate from the patient’s own body
- Non-autologous or “allografts” are tissues or other products derived from another human body, either a donor cadaver or a live donor

Select “Yes” ONLY for Non-autologous transplants

Other Yes/No Fields

- Emergency
  “Yes” if non-elective, unscheduled operative procedure
- Trauma
  “Yes” if operative procedure performed because of blunt or penetrating injury to patient
- General anesthesia
  “Yes” for administration of drugs or gasses that enter the general circulation and affect the central nervous system to render the patient pain-free, amnesic, unconscious, and often paralyzed with relaxed muscles

Surgeon Code

- Optional field
- Select the hospital-assigned code of the surgeon who performed the principal operative procedure

Why monitor by surgeon?
Feedback of surgeon-specific data has been demonstrated to lower SSI rates
SSI Risk Adjustment: Standardized Infection Ratio (SIR)

For SSI comparisons, NHSN now applying the SIR
- Risk models developed for each procedure
- Model includes only those factors associated with increased risk of infection for that specific procedure
- Allows risk factors to be weighted based on contribution to SSI risk

Risk Stratification vs. Risk Adjustment

- NHSN legacy: Used a 0-3 Risk Index to stratify risk for all procedures
  Based on ASA, Wound class, Duration >75th percentile
- NHSN new method: Adjusts for individual patient risk using only those variables found to be associated with SSI risk for each procedure type (determined by logistic regression models)
  Example: SSI risk factors for HPRO
  Age, Anesthesia type, ASA score, surgical duration, HPRO type, medical school affiliation, number of beds, trauma status

Standardized Infection Ratio (SIR)

- Driven by need for a summary measure (replacing multiple rate comparisons)
  SIR calculations added to NHSN Oct 2010
- SIR adjusts for differences in levels of infection risk in your patients
- SIR compares # HAIs reported by your hospital with the expected or “predicted” # based on NHSN data
  NHSN data (2006-08) used for national predicted values
- SIR value of 1.0 means your hospital is observing HAIs as national data predict (i.e. not different)
Interpreting SIR for SSI

The value **1.0** indicates the number of SSI observed in your hospital is the **same as predicted** number of SSIs as seen in the national baseline data.

- A value less than 1.0 means there are fewer SSIs observed than predicted.
- A value greater than 1.0 means more SSIs than predicted.

SIR will only be calculated for your hospital if the expected number of SSIs is >1 (because can’t have less than a whole person infected)

\[
\text{SIR} = \frac{\text{Observed HAIs}}{\text{Predicted HAIs}}
\]

Examples:

If your hospital has 4 SSI per 100 Hip prosthesis procedures and national data predict 2.5 SSIs for a similar surgical population, SIR = \(\frac{4}{2.5} = 1.6\).
The intercept represents underlying infection risk when none of the risk factors in the model are present.

Factors in this model that add to SSI risk are:
- Age equal to or younger than 44 years
- ASA score of 3, 4, or 5
- Duration of surgery longer than 100 minutes (incision to close time)
- Procedure done at hospital affiliated with a medical school (from Annual Facility Survey)

The SSI probabilities are added together to get the predicted (expected) number of SSI for this surgical population.

SSI SIR is not different than predicted:
- 3 SSI observed
- 2.8 SSI expected

Probability of SSI is calculated for each procedure.
“Systems” Approaches to Identify SSI

Work with surgical services and surgical unit staff to develop process for alerting to possible SSI
• Evaluate surgical patients during same admission
• Monitor surgical patients for re-admission
• Develop screens to identify and evaluate positive wound cultures
• Perform post-discharge surveillance

“Systems” Approaches for Procedure Data

• Operating room staff and data systems
• Anesthesia
• Medical records
• OB staff and data systems
• Information technology
• Administration
• Hospital epidemiology & infection control

Options for Entering Procedure Data

• Electronically via vendor-enabled Clinical Document Architecture (CDA) standards
• Electronically via hospital-developed Comma Separated Variable (CSV) file format
• Manually
Developing a CSV File to Import Procedure Data

1. Identify where (in what existing systems) the required data fields reside
2. Work with your IT department, OR data system manager, medical records supervisor, and/or others
3. Determine how data elements might be made electronic if not already
4. Learn or seek assistance on how to develop the CSV file (or convert from an excel spreadsheet).

CSV files can be uploaded directly to NHSN

Available on the NHSN website under Patient Safety Component “Related Material”
Give this information to your IT department and/or surgical data manager.

Available on CDPH HAI Program website under “NHSN Guidance Specific to California Hospitals”
<table>
<thead>
<tr>
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<th>Column 2</th>
<th>Column 3</th>
<th>Column 4</th>
<th>Column 5</th>
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<tbody>
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<td>Value 3</td>
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<td>Value 6</td>
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<td>Value 8</td>
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<td>Value 10</td>
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</tbody>
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CSV file ready for import to NHSN
Importing Your CSV Procedure Data File

Log into NHSN and click on Import/Export function.

Importing Procedure Data into NSHN

Select your .csv import file (it will appear in gray box)

Click "Submit"

Records will appear under "Inserts" or "Bad Data" tabs

"Inserts" list contains the Procedure records ready for import.
Importing Procedure Data into NSHN

Click on “Bad Data” tab. Records listed have errors that need to be corrected prior to import.

When there is no “Bad Data” tab, Procedure records from your .csv file are ready to import into NHSN.

Click the “Update” button, then “OK” to complete the import.
Importing Procedure Data into NSHN

Look for message that indicates Success!

Implementation Success Stories in California Hospitals

- IP staff negotiated to get needed data by purchasing new Anesthesia data system (part of existing system “suite” of products)
- Medical records staff took lead in CSV file development, process similar to OSHPD reporting
- Made OR and/or OB technical staff NHSN users to enter data directly (need training and secure data access)
- Developed simple MS Excel spreadsheets for use by OR, MS Access to correlate data points

Implementation Success Stories in California Hospitals continued

- Each hospital’s situation is unique depending on EMR and other existing data systems and interfaces
  - Solutions found using/incorporating many systems: Showcase, Centricity, Midas, Quality Compass, Pisces, Cerner, GE, Meditech, EPIC, SAS (LIST NOT INCLUSIVE; EXAMPLES ONLY)
- Collaborative discussions with administration, OR, surgery, anesthesia, quality, medical records, infection prevention, and IT staff appear to be necessary for successful implementation
Resources

- CDPH HAI Program  www.cdph.ca.gov/HAI
- Under “NHSN Guidance Specific to California Hospitals”
  - SSI training materials, slide sets
  - SSI Data Entry GUIDE
  - SSI Procedure Import WORKBOOK
- AFL’s
- CDC NHSN Program  www.cdc.gov/NHSN
- "HELP" on each NHSN data entry screen
- One-on-one consultations with HAI Liaison Program regional IPs

Questions?

HAI Liaison Program
InfectionControl@cdph.ca.gov

More information can be found on the Healthcare-Associated Infections Program website
www.cdph.ca.gov/HAI