



## Using NHSN Data and Analysis Features for Prevention:

### Risk Adjustment Models for SSI

The Standardized infection ratio (SIR) improves SSI surveillance risk adjustment by incorporating the contribution of surgery-specific risk factors combined with individual patient risk factors. Development of procedure-specific logistic regression models allows NHSN analysis to calculate the probability of SSI for each of your surgical patients. In contrast, previous adjustment for SSI surveillance used the same three standard risk factors (duration of procedure, wound class, and ASA score) for each procedure type, creating risk strata for each procedure type. Using NHSN's Analysis features, the IP is empowered to explore each patient's risk for surgical site infection and how the surgical patient population plays into the facilities' overall SSI SIR. New analytical tools can be used to further reduce and prevent infections as the significance of individual risks are understood and focused infection prevention strategies can be implemented.

#### *Exploring SSI Risk using NHSN Analysis*

- 1) Generate a data set prior to running reports in Analysis to be sure all data are up to date
- 2) Run a line list of your SSI Procedures (in this example, we will use 2011 data): Click Analysis → Output Options → Advanced

Department of Health and Human Services  
Centers for Disease Control and Prevention

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Logged into California General Hospital (ID 15633) as TRACYLANIER.  
Facility California General Hospital (ID 15633) is following the PS component.

### Patient Safety Component

Analysis Output Options

Expand All Collapse All

- Device-Associated Module
- Procedure-Associated Module
- MDRO/CDI Module - Infection Surveillance
- MDRO/CDI Module - LABID Event Reporting
- MDRO/CDI Module - Process Measures
- MDRO/CDI Module - Outcome Measures
- Vaccination Module
- Antimicrobial Use Module
- Advanced
- My Custom Output
- Published Output

**Click in order:**

1. Analysis
2. Output Options
3. Advanced

3) Run a line list of your SSI Procedures (continued): Click Advanced → Procedure-level Data → CDC Defined Output → Line Listing-All Procedures → Modify

The screenshot shows a software interface with a blue navigation sidebar on the left containing the following items: Surveys, Users, Facility, Group, and Log Out. The main content area displays a folder tree structure:

- MDRO/CDI Module - Process Measures
- MDRO/CDI Module - Outcome Measures
- Vaccination Module
- Antimicrobial Use Module
- Advanced
  - [Create New custom Option](#)
  - Patient-level Data
  - Event-level Data
  - Procedure-level Data
    - CDC Defined Output
      - Line Listing - All Procedures (Run, Modify)
      - Frequency Table - All Procedures (Run, Modify)
      - Bar Chart - All Procedures (Run, Modify)
      - Pie Chart - All Procedures (Run, Modify)
      - Rate Table - SSI Data by Procedure and Risk Index (Run, Modify)
      - Run Chart - SSI Data by Procedure and Risk Index (Run, Modify)
      - Rate Table - Specific Event SSI Rates by Procedure (Run, Modify)
      - Run Chart - Specific Event SSI Data by Procedure (Run, Modify)
      - Rate Table - SSI Data by Surgeon, Procedure, and...more (Run, Modify)
      - Run Chart - SSI Data by Surgeon, Procedure, and ...more (Run, Modify)
  - Custom Output

To the right of the folder tree, an orange callout box contains the following text:

**Click in order (continued):**

4. Advanced
5. Procedure-level data
6. CDC Defined Output
7. Line Listing – All Procedures
8. Modify

4) When you click Modify, the Line Listing screen will appear

**Line Listing**

Analysis Data Set: Procedures

**Modify Attributes of the Output:**

Last Modified On: **05/24/2012**

Output Type: **Line Listing**

Output Name:

Output Title:

**Select output format:**

Output Format: **HTML**

Use Variable Labels

**Select a time period or Leave Blank for Cumulative Time Period:**

Date Variable:  Beginning:  Ending:

Enter Date variable/Time period at the time you click the Run button

**Specify Other Selection Criteria:**

[Show Criteria](#) [Column +](#) [Row +](#) [Clear Criteria](#)



**Other Options:** [Print Variable Refer](#)

Modify Variables To Display By Clicking: [Modify List](#)

Specify Sort Variables By Clicking: [Modify List](#)

Select Page by variable:

1. Name your report if you wish to save it for the future (you may want run the same report or a similar report again). Not necessary for a quick look.
2. For Output Format, keep in HTML -OR- If you wish to export to Excel, change to CSV using the drop down
3. Always check the box, "Use Variable Labels"
4. Select a Date Variable – We are choosing July - September 2011
5. If you want to filter your data to include a subset of your data (ie. surgery type), indicate your selection in the "Specify Other Selection Criteria" table
6. Other Options: click on the blue "modify list" for Modify Variables to Display

**Specify Other Selections**

[Show Criteria](#) [Column](#)


**Other Options:**

**Modify Variables To Display By Clicking:** [Modify List](#)

**Specify Sort Variables By Clicking:** [Modify List](#)

**Select Page by variable:**

**Select Variables to include in Line Listing:**

Available Variables		Selected Variables
id2		orgID
implant		patID
imported		dob
incomplete		gender
kpro		procID
kproDesc		procDate
medAff		procCode
medicareID		modelRiskAll
modelRiskComplex30d	>>	modelRiskComplex
modifyDate	All >>	
modifyUserID	<<	
multiProc	All <<	
numBeds		Up
outpatient		Down
patGName		
patMName		
patRaceAAB		
patRaceAMIN		
patRaceASIAN		
patRaceNH_PI		
patRaceWHITE		
patSurname		
procCodeDesc		
procDateYH		
procDateYM		
procDateYQ		
procDateYr		

Save    Reset    Close

Add "modelRiskAll" and "modelRiskComplex" by clicking twice on these items in the Available Variable list. The selections will populate in the Selected Variables Column.

Save the selections by clicking "Save" at the bottom of the grey box.

**Other Options:** [Print Variable Reference](#)

**Modify Variables To Display By Clicking:** [Modify List](#)

**Specify Sort Variables By Clicking:** [Modify List](#)

**Select Page by variable:**

Choose "procCode" in the Select Page by Variable Option to create a report sorted by your procedure types.

Press "Run" to create a report!

**National Healthcare Safety Network  
Line Listing for All Procedures LRM**

As of: May 29, 2012 at 4:10 PM  
Date Range: PROCEDURES procDateYM 2011M07 to 2011M09

Procedure Code=CBGB

Org ID	Patient ID	Date of Birth	Gender	Procedure ID	Procedure Date	Procedure Code	Risk using All SSI Model	Risk using Complex AR Model
15633	001	05/05/2005	M	5197870	08/15/2011	CBGB	0.0080	0.0021

Sorted by procCode  
Data contained in this report were last generated on May 24, 2012 at 4:52 PM.

**National Healthcare Safety Network  
Line Listing for All Procedures LRM**

As of: May 29, 2012 at 4:10 PM  
Date Range: PROCEDURES procDateYM 2011M07 to 2011M09

Procedure Code=COLO

Org ID	Patient ID	Date of Birth	Gender	Procedure ID	Procedure Date	Procedure Code	Risk using All SSI Model	Risk using Complex AR Model
15633	155427	11/26/1944	M	6605722	08/07/2011	COLO	0.0512	0.0235
15633	170808	10/09/1947	M	6605726	08/05/2011	COLO	0.0500	0.0227
15633	192757	03/06/1940	M	6605728	08/13/2011	COLO	0.0476	0.0218
15633	193855	05/19/1953	M	6605731	07/02/2011	COLO	0.0518	0.0234
15633	289954	07/03/1925	M	6605745	08/03/2011	COLO	0.0488	0.0202

Our report is categorized by procedure type.

**Risk using all SSI Model** calculates SSI risk\* for each surgical patient for all SSI types (Superficial, Deep incisional, and Organ/space)

**Risk using Complex AR Model** calculates SSI risk\* for only Deep incisional and Organ/space SSI identified in patients during the same surgical Admission or on Readmission to a hospital

\* Based on national referent data (NHSN, 2006-2008).

For more information on methods of SSI risk adjustment in NHSN, please refer to Risk Model paper on the NHSN website that was published in ICHE late last year:

[http://www.cdc.gov/nhsn/PDFs/pscManual/SSI\\_ModelPaper.pdf](http://www.cdc.gov/nhsn/PDFs/pscManual/SSI_ModelPaper.pdf)

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ORIGINAL ARTICLE

**Improving Risk-Adjusted Measures of Surgical Site Infection for the National Healthcare Safety Network**

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(See the commentary by Moehring et al, on pages 987-989.)

**BACKGROUND.** The National Healthcare Safety Network (NHSN) has provided simple risk adjustment of surgical site infection (SSI) rates to participating hospitals to facilitate quality improvement activities; improved risk models were developed and evaluated.

**METHODS.** Data reported to the NHSN for all operative procedures performed from January 1, 2006, through December 31, 2008, were analyzed. Only SSIs related to the primary incision site were included. A common set of patient- and hospital-specific variables were evaluated as potential SSI risk factors by univariate analysis. Some ifc variables were available for inclusion. Stepwise logistic regression was used to develop the specific risk models by procedure category. Bootstrap resampling was used to validate the models, and the c-index was used to compare the predictive power of new procedure-specific risk models with that of the models with the NHSN risk index as the only variable (NHSN risk index model).

**RESULTS.** From January 1, 2006, through December 31, 2008, 847 hospitals in 43 states reported a total of 849,659 procedures and 16,147 primary incisional SSIs (risk, 1.90%) among 39 operative procedure categories. Overall, the median c-index of the new procedure-specific risk was greater (0.67 [range, 0.59-0.85]) than the median c-index of the NHSN risk index models (0.60 [range, 0.51-0.77]); for