



## Using NHSN Analysis Features for Prevention: SSI

Using the NHSN Analysis features allows you to easily view and work with your SSI surveillance data. You can verify that all procedures and events have been entered each month, and can analyze SSI findings using the standardized infection ratio (SIR). In this document, we will demonstrate how to run reports to calculate SIR by procedure, by procedure and surgeon, and how to compare SIRs using the Statistics Calculator. We will also demonstrate how to enter surgeon codes manually or upload a list of surgeon codes by creating a .CSV file.

### Using the SIR Output Option to Review SSI Data by Procedure Type

Always begin by generating a data set prior to using the Analysis features to be sure all data are current.

1. In the NHSN Portal click Analysis → Output Options → Procedure-Associated Module → SSI → CDC Defined Output → SIR – All SSI Data By Procedure → Modify.

The screenshot shows the NHSN portal interface. A yellow callout box on the right contains the following text: "Click in order:" followed by a list of steps: Analysis, Output Options, Procedure-Associated Module, SSI, CDC Defined Output, SIR – All SSI Data By Procedure, and Modify. Red arrows point from each step in the list to the corresponding menu item in the screenshot. The "Analysis" menu is highlighted with a red box. The "SIR – All SSI Data By Procedure" item has "Run" and "Modify" buttons next to it.

2. After clicking “Modify”, the “Analysis SIR” screen appears. Make changes depending on what you want in your report.
  - Give your Output a name if you wish.
  - Select output format. HTML looks nice in your report. A CSV file is the best if you’re going to export to an Excel spreadsheet.
  - Use Variable Labels. Column headers are easier to read.
  - Choose your date range. When checking completeness of monthly data, “SummaryYM” is best. Be sure “Group by” (towards the bottom left of the page) also has “summary YM” selected.
  - Click “Run” to see the data right now. We will discuss the export option later.

The screenshot shows the 'Analysis SIR' configuration page. A yellow callout box on the right contains the following instructions:

- Name your report if you wish to save it for future reports. Not necessary for a quick look.
- Leave HTML for now. If you wish to export to Excel later, you may change the Output to a CSV file
- Always check Use Variable Labels
- Select a Date Variable – We are choosing the year by month “SummaryYM”
- Use 01/2013 and 12/2013 for your beginning and ending dates.

Red arrows point from these callouts to the corresponding fields in the interface: 'Export Analysis Data Set' button, 'Output Type: SIR', 'Output Name: Hospital Procedures', 'Output Title: 2013 Procedures', 'Output Format: HTML', 'Use Variable Labels' checkbox, 'Date Variable: summaryYM', 'Beginning: 01/2013', 'Ending: 12/2013', and 'Clear Time Period' button.

Be sure “SummaryYM” is visible in the “Group By” drop down box at the bottom of the screen – then click “Run.”

This screenshot shows the bottom section of the 'Analysis SIR' page. The 'Group by:' dropdown menu is set to 'summaryYM'. Below it are buttons for 'Run', 'Save As', 'Reset', 'Back', and 'Export Output Data Set'. A yellow callout box from the previous page points to the 'Run' button.

You should see a screen with several tables as demonstrated in the example on the following page.

- The first table shows every month procedures were reported in 2013 and the total number of reported procedures each month.

**National Healthcare Safety Network  
2013 Procedures - By OrgID**

As of: May 27, 2015 at 1:47 PM  
Date Range: SIR\_ALL SSI PROC summaryYM 2013M01 to 2013M12

Facility Org ID

All Procedures  
Performed in 2013, reported by month

*Note: These are fictional procedures in our test hospital for demonstration purposes only; not every month is represented.*

*When observing your own data, a missing month may be an error if any surgeries in the required 29 reportable procedure categories were performed.*

Facility Org ID	Summary Year/Month	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	2013M01	115	11	1.221	9.009	0.0000	4.737, 15.659
15633	2013M02	125	5	4.026	1.242	0.5953	0.455, 2.753
15633	2013M03	82	11	1.853	5.935	0.0000	3.121, 10.316
15633	2013M04	108	10	1.615	6.192	0.0000	3.145, 11.037
15633	2013M05	76	6	1.999	3.002	0.0210	1.217, 6.243
15633	2013M06	68	5	3.420	1.462	0.3916	0.536, 3.240
15633	2013M07	73	7	1.541	4.543	0.0013	1.987, 8.987
15633	2013M08	107	8	2.099	3.811	0.0018	1.770, 7.237
15633	2013M09	73	8	1.568	5.101	0.0003	2.369, 9.686

- The next table provides a summary of your data (white columns) and your data compared to NHSN data (yellow columns). Listed are each procedure category you reported by month (listed alphabetically), the number of procedures reported each month, and the SSI you reported each month (by procedure type).

Procedures listed alphabetically; reported by month

Shown also (yellow) is the number of SSI expected each month based on NHSN risk models, the SIR each month, SIR p-value, and 95% confidence interval. Most hospitals will need to review SSI data by quarter, half-year, or year to calculate SIRs. We are going to look more closely at this section later in the lesson.

Facility Org ID	Procedure Code	Summary Year/Month	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	AAA	2013M03	2	1	0.050	.	.	.
15633	AAA	2013M08	1	1	0.025	.	.	.
15633	APPY	2013M01	10	2	0.160	.	.	.
15633	APPY	2013M04	11	1	0.238	.	.	.
15633	APPY	2013M07	12	1	0.233	.	.	.
15633	APPY	2013M09	10	1	0.198	.	.	.
15633	BILI	2013M02	10	1	0.481	.	.	.
15633	BILI	2013M03	10	1	0.481	.	.	.
15633	BILI	2013M07	13					
15633	BILI	2013M12	8					

*Remember, SIR is never calculated if the number of expected SSI expected is less than 1 (you cannot have <1 person infected). Your hospital may not have enough procedures to calculate an SIR for every procedure.*

5. The third table illustrates information about your inpatient procedures, including the procedure number, infection count and SIR. Both in-plan and out of plan outpatient surgeries are excluded from this table.

Facility Org ID	Procedure Code	Outpatient?	Summary Year/Month	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	AAA	N	2013M03	2	1	0.050	-	-	-
15633	AAA	N	2013M08	1	1	0.025	-	-	-
15633	APPY	N	2013M01	9	2	0.137	-	-	-
15633	APPY	N	2013M04	11	1	0.238	-	-	-
15633	APPY	N	2013M07	12	1	0.233	-	-	-
15633	APPY	N	2013M09	10	1	0.198	-	-	-
15633	BILI	N	2013M02	10	1	0.481	-	-	-
15633	BILI	N	2013M03	10	1	0.481	-	-	-

6. The last table lists “Procedures not included SIR”. These procedures have been excluded from your SIR calculations. The data may be incomplete, or one of the data fields is identified as being an outlier, such as an extremely long surgical duration. Take a look at each case individually to determine where the possible errors are.

### Incomplete and Custom Procedures not Included in SIR

As of: May 27, 2015 at 4:40 PM

Date Range: SIR\_ALL SSIPROC summaryYM 2013M01 to 2013M12

Facility Org ID=15633 CMS Certification Number=999999

Summary Year/Month	Facility Org ID	Procedure Code	Outpatient?	Procedure Count	All SSI Model Infection Count
2013M04	15633	APPY	N	1	1

Includes only procedures and associated SSIs that are reported with primary closure technique.

Source of aggregate data: 2006-2008 NHSN SSI Data

Data contained in this report were last generated on May 27, 2015 at 4:33 PM.

**Refer to NHSN October 2010 Special Edition E-Newsletter, pages 11 -14, for a list of SIR outlier criteria:**

[http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN\\_NL\\_OCT\\_2010SE\\_final.pdf](http://www.cdc.gov/nhsn/PDFs/Newsletters/NHSN_NL_OCT_2010SE_final.pdf)

7. Next, we are going to run a report to analyze SSI data for just one procedure. REPEAT step one (as below).

**Click in order:**

- Analysis
- Output Options
- Procedure-Associated Module SSI
- CDC Defined Output
- SIR – All SSI Data By Procedure
- Modify

8. When the Analysis SIR screen appears, name your report, leave in HTML, use variable labels, enter the date variable “summaryYr,” and beginning and ending date “2013.”

**Analysis SIR**

Analysis Data Set: SIR\_AISSIProc    Export Analysis Data Set

**Modify Attributes of the Output:**

Last Modified On: 05/27/2015

Output Type: SIR

Output Name:  ①

Output Title:  ①

**Select output format:**

Output Format:  ②

Use Variable Labels ③

**Select a time period or Leave Blank for Cumulative Time Period:** [HELP](#)

Date Variable:  ④    Beginning:     Ending:  x    Clear Time Period

9. In the Selection Criteria table, click on the drop down box of the first cell. Select “procCode” (procedure code). When procCode appears in the table, click on a cell directly below. When the gray box appears, leave the operator for the variable procCode as = (equals). From the values drop down, select a procedure that you want to analyze. In this example, we selected “COLO”(colon procedures).

- Output Options
- Statistics Calculator
- Surveys
- Users
- Facility
- Group
- Log Out

**Modify Attributes of the Output:**

Last Modified On: **05/27/2015**

Output Type: **SIR**

Output Name:

Output Title:

**Select output format:**

Output Format:

Use Variable Labels

- ageAIProc
- anesthesia
- approach
- asa
- bidLoss
- BMI\_val
- CCN
- countyName
- diabetes
- emergency
- fctype
- gender
- hpro
- hrLabor
- intRepHemi
- intRepRes
- intRepTot
- kpro
- medAff
- medtype
- numBeds
- orgID
- outpatient
- patID
- procCode
- procCodeDesc
- procDurationHr
- procDurationMin

**Link for Cumulative Time Period:** [HELP](#)

Ending:

Period at the time you click the Run button

**Criteria:** [HELP](#)

Variable	Operator	Value(s)
<input type="text" value="procCode"/>	<input "="" type="text" value="="/>	<input type="text" value=""/>
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>

1. Click on the drop down box of the 1st cell in the table.
2. Select "proc Code"
3. Click on the box below procCode (opens a grey box).

4. Select "="
5. Select the procedure you want from the drop down box. We are choosing COLO
6. Be sure to click "save" at the bottom of the box

**Specify an operator and value(s) for selection criteria:**

Variable	Operator	Value(s)
procCode	=	COLO - Colon surgery

**Specify Other Selection Criteria:** [HELP](#)

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

Variable	Operator	Value(s)
procCode	=	COLO
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>
<input type="text" value=""/>	<input type="text" value=""/>	<input type="text" value=""/>

7. Group by SummaryYr
8. Click "Run"

Other Options:

[Print Variable Reference List](#)

In the lower portion of the screen, be sure to Group by "SummaryYr." Now click "Run" to see your report.

10. The report will include 3 data tables: All procedures by year, by procedure code, and by in/outpatient.

**National Healthcare Safety Network**

**2013 Colon Procedures - By OrgID**

As of: May 27, 2015 at 4:47 PM  
 Date Range: SIR\_ALL \$SIPROC summaryYr 2013 to 2013  
 If ((procCode = "COLO" ))

Facility Org ID=15633 CMS Certification Number=999999

Facility Org ID	Summary Yr	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	2013	31	3	1.738	1.726	0.3518	0.439, 4.698

If infCount in this table is less than you reported, aggregate data are not available to calculate numExp.  
 Excludes Superficial Incisional Secondary (SIS) and Deep Incisional Secondary (DIS) SSIs.  
 Includes only procedures and associated SSIs that are reported with primary closure technique.  
 Lower bound of 95% Confidence Interval only calculated if infCount > 0. SIR values only calculated if numExp >= 1.  
 Source of aggregate data: 2006-2008 NHSN SSI Data  
 Data contained in this report were last generated on May 27, 2015 at 4:33 PM.

Again you will see 3 ways of displaying your data.

1. All procedures for the year
2. All COLO for the year (same as above because we limited the report to only COLO)
3. Procedures by inpatient

**National Healthcare Safety Network**

**2013 Colon Procedures - By OrgID/ProcCode**

As of: May 27, 2015 at 4:47 PM  
 Date Range: SIR\_ALL \$SIPROC summaryYr 2013 to 2013  
 If ((procCode = "COLO" ))

Facility Org ID=15633 CMS Certification Number=999999

Facility Org ID	Procedure Code	Summary Yr	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	COLO	2013	31	3	1.738	1.726	0.3518	0.439, 4.698

If infCount in this table is less than you reported, aggregate data are not available to calculate numExp.  
 Excludes Superficial Incisional Secondary (SIS) and Deep Incisional Secondary (DIS) SSIs.  
 Includes only procedures and associated SSIs that are reported with primary closure technique.  
 Lower bound of 95% Confidence Interval only calculated if infCount > 0. SIR values only calculated if numExp >= 1.  
 Source of aggregate data: 2006-2008 NHSN SSI Data  
 Data contained in this report were last generated on May 27, 2015 at 4:33 PM.

**National Healthcare Safety Network**

**2013 Colon Procedures - By OrgID/ProcCode/Outpatient**

As of: May 27, 2015 at 4:47 PM  
 Date Range: SIR\_ALL \$SIPROC summaryYr 2013 to 2013  
 If ((procCode = "COLO" ))

Facility Org ID=15633 CMS Certification Number=999999

Facility Org ID	Procedure Code	Outpatient?	Summary Yr	Months	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	COLO	N	2013	3	31	3	1.738	1.726	0.3518	0.439, 4.698

If infCount in this table is less than you reported, aggregate data are not available to calculate numExp.  
 Excludes Superficial Incisional Secondary (SIS) and Deep Incisional Secondary (DIS) SSIs.  
 Includes only procedures and associated SSIs that are reported with primary closure technique.  
 Lower bound of 95% Confidence Interval only calculated if infCount > 0. SIR values only calculated if numExp >= 1.  
 Source of aggregate data: 2006-2008 NHSN SSI Data  
 Data contained in this report were last generated on May 27, 2015 at 4:33 PM.

11. For this example, we will focus with primary on the middle table to analyze our COLO data. In our example, there were 31 COLO performed and 3 SSI reported. The number of SSI following colon procedures in our hospital is above the NHSN expected number of 1.738. Our colon SIR is 1.73, which is above 1.0, meaning over 70% more SSI were observed in our data than expected. However, the confidence interval overlaps 1.0 (0.439 - 4.698), so our SIR is not significantly different than expected.

Facility Org ID	Procedure Code	Summary Yr	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	COLO	2013	31	3	1.738	1.726	0.3518	0.439, 4.698

**IMPORTANT! WHEN REVIEWING AN SSI SIR FOR STATISTICAL SIGNIFICANCE, LOOK FIRST AT THE CONFIDENCE INTERVAL (CI).** If CI overlaps 1.0, the SIR is not significantly different than expected. CIs are exact; p-values are estimates.

In our previous example, we may be content that our SSIs are above the number expected. However, we understand we cannot say the difference is significant. So what else might we learn from these COLO data? Can we look for trends in 2013, such as who performed the COLO procedures in our hospital and which procedures resulted in SSI? To perform this level of analysis, surgeon codes must be entered into NHSN. This can be done either manually or by CSV upload.

### Entering Surgeon Codes Needed to Produce Surgeon-Specific SIRs

The following is a demonstration of how to enter your Surgeon Codes into NHSN. Note, this is **not** required under California reporting mandates. It should be noted that feedback of surgeon-specific SSI data has been demonstrated to decrease infections; it is a CDC/HICPAC Category 1B recommendation.

1. On the left blue navigation bar click: Facility→ Surgeons. On Surgeons page, enter each surgeon’s information. The surgeon code is whatever number your hospital identifies with each surgeon. Check with Medical Records, OR or Medical Staff, or Perioperative Services for surgeon codes already in use.

**Click:**

1. Facility
2. Surgeons
3. On “Surgeons” page, enter  
Your Surgeon Code  
Last Name *optional*  
First Name *optional*  
Middle Name *optional*  
Status – Active
4. Add

2. After you click add, the surgeon record will appear at the bottom of the screen.

**Surgeon Table**

Delete	Status	Surgeon Code	Last Name	First Name	Middle Name
<input type="checkbox"/>	Active	<a href="#">100</a>	Hart	Gotta	Have

If your entry is incorrect, you may check the box and click “delete,” or click on the Surgeon Code link to edit

Manual entry could be a long process if you have more than a few surgeons. A faster way is to create a file with all your surgeon codes that can be uploaded at one time.

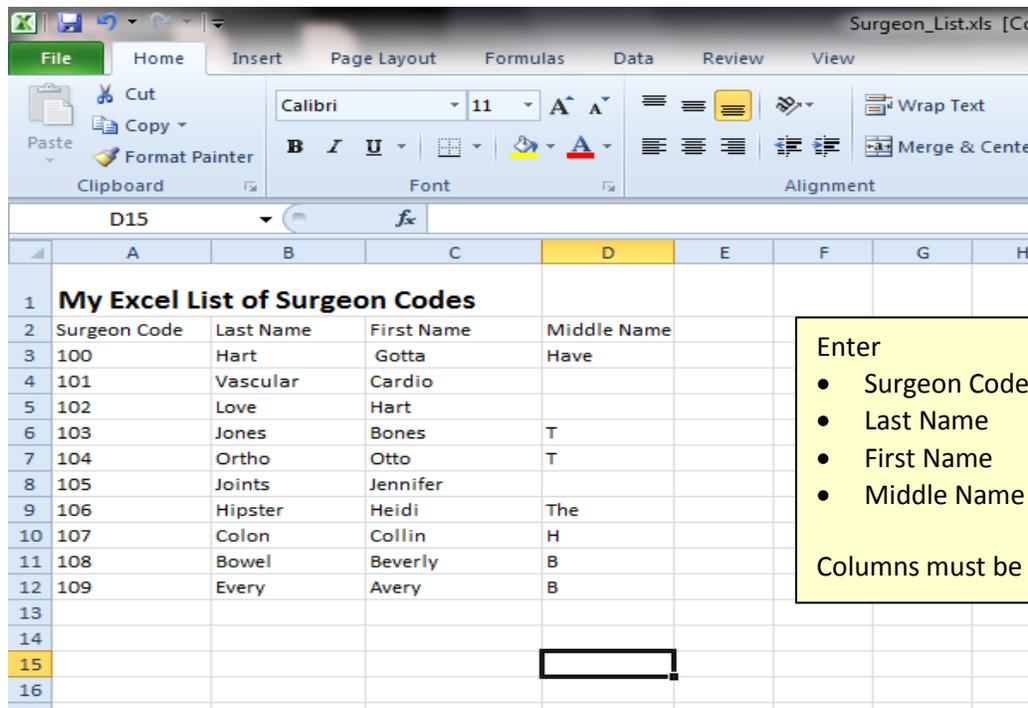
3. On the Surgeons screen, click the "Import Surgeon Codes" button for further instructions.

4. The Import Surgeon Data screen will appear. Use the HELP! Button for further instructions.

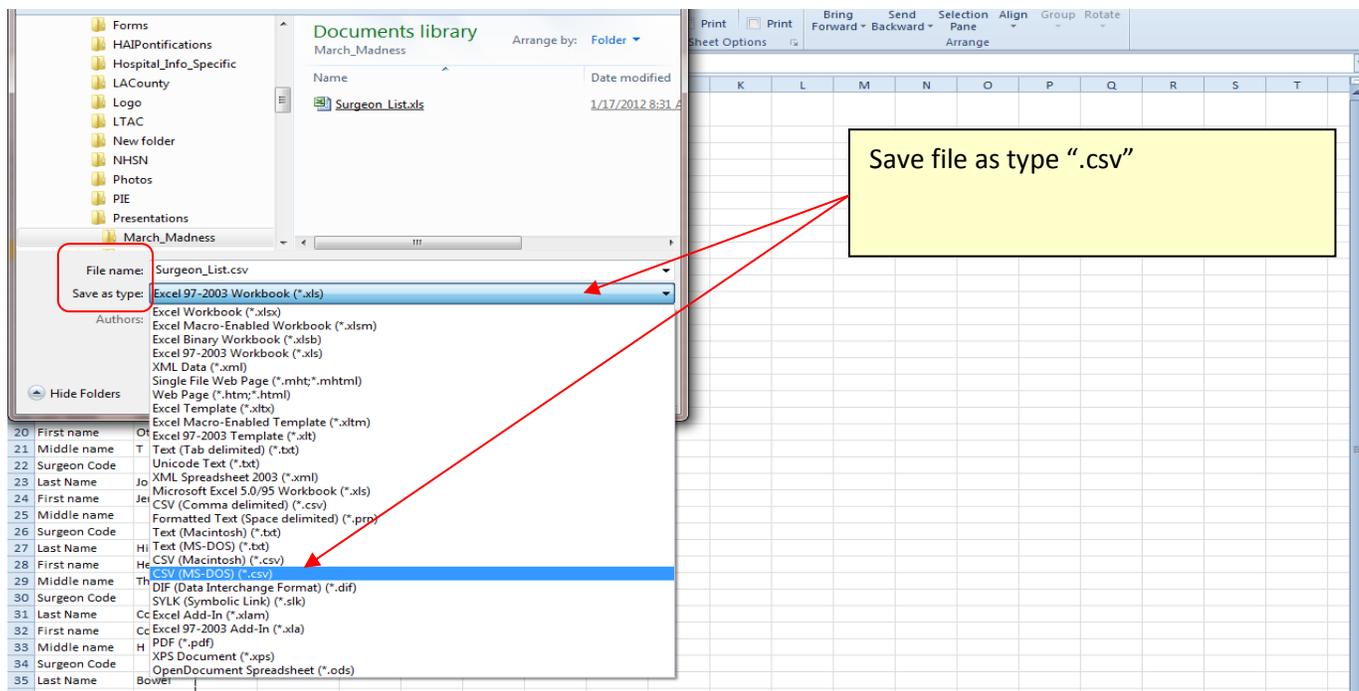
The following instruction box will pop up, demonstrating how to create a file to import surgeon data. (We will demonstrate...)

Field	Required/Optional	Values	Format
Surgeon Code	Required		Character - Length 20
Last name	Optional		Character - Length 30
First name	Optional		Character - Length 20
Middle name	Optional		Character - Length 15

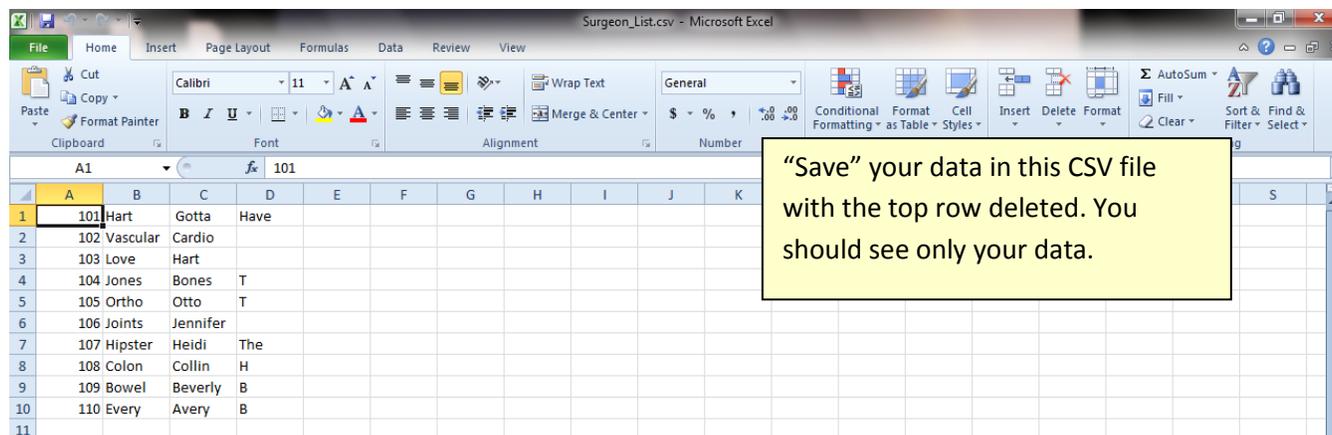
- Leave NHSN and open Microsoft Excel. Create a worksheet with the columns and rows exactly as shown in the example below.



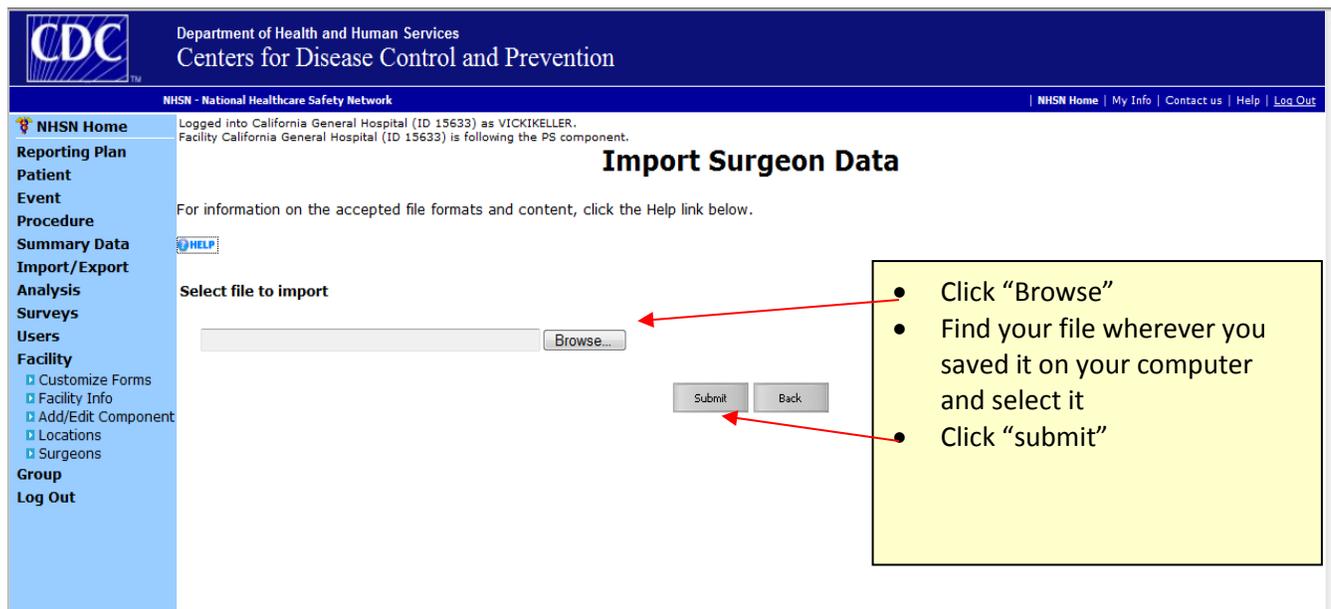
- “Save as” with a File name of your choice (e.g. Surgeon\_List) and Type CSV (“\*.csv”) as in the illustration below.



7. In the CSV file, delete the top row with all the labels or column headings. Only your data remain. Save again.



8. Return to your NHSN Page for Surgeon Import as in step 1 of this section. The following screen will appear. Click on Browse to find the CSV file you saved for import



- The Surgeons screen will appear with message “Data successfully imported,” and at the bottom, a Surgeon Table listing your newly imported surgeon codes.

The screenshot shows the NHSN Surgeons import interface. At the top, a message states "Data successfully imported." Below this, there are instructions for adding, finding, editing, and deleting records. A form for adding a new surgeon is visible, with fields for Surgeon Code, Last Name, First Name, Middle Name, and Status. Below the form is a "Surgeon Table" listing 10 imported surgeons. A yellow callout box with red arrows pointing to the first row of the table contains the text: "If you have any errors – simply select the box next to the entry you wish to remove and click “delete” or click on a Surgeon Code link to edit".

**Surgeon Table**

Delete	Status	Surgeon Code	Last Name	First Name	Middle Name
<input type="checkbox"/>	Active	<a href="#">101</a>	Hart	Gotta	Have
<input type="checkbox"/>	Active	<a href="#">102</a>	Vascular	Cardio	
<input type="checkbox"/>	Active	<a href="#">103</a>	Love	Hart	
<input type="checkbox"/>	Active	<a href="#">104</a>	Jones	Bones	T
<input type="checkbox"/>	Active	<a href="#">105</a>	Ortho	Otto	T
<input type="checkbox"/>	Active	<a href="#">106</a>	Joints	Jennifer	
<input type="checkbox"/>	Active	<a href="#">107</a>	Hipster	Heidi	The
<input type="checkbox"/>	Active	<a href="#">108</a>	Colon	Collin	H
<input type="checkbox"/>	Active	<a href="#">109</a>	Bowel	Beverly	B
<input type="checkbox"/>	Active	<a href="#">110</a>	Every	Avery	B

### Using the SIR Output Option to Review SSI Data by Surgeon Code

When you have entered your surgeon codes in NHSN, you may then begin to include in each Procedure record which surgeon performed the procedure. Analysis of SSI data can now include surgeon-specific results. Using the same SSI data in our example on page 5-6, we are going to run the SIR analysis broken down by surgeon.

1. From the NHSN blue navigation bar, click Analysis → Output Options → Procedure-Associated Module → SSI → CDC Defined Output → SIR – SSI Data by Surgeon → Modify.
2. Modify by naming your report as you wish. Use Format HTML. Use variable labels. Select date as SummaryYr, 2013.
3. Select criteria for variable ProcCode and select COLO (or the procedure you want) as you did earlier.
4. Remember to select Group by SummaryYr. Click “Run”

In our example, a data table is produced that shows 3 surgeons and each of his/her number of procedures and SSI during 2013.

Facility Org ID	Surgeon Code	Summary Yr	Procedure Count	All SSI Model Infection Count	All SSI Model Number Expected	All SSI Model SIR	All SSI Model SIR p-value	All SSI Model 95% Confidence Interval
15633	108	2013	113	1	5.522	0.181	0.0261	0.005, 1.009
15633	109	2013	158	16	7.719	2.073	0.0061	1.184, 3.366
15633	110	2013	117	0	5.643	0.000	0.0035	, 0.654

Note: NHSN does not show a lower bound of the CI when there are zero infections

**Surgeon 108**  
 113 procedures  
 1 infection reported  
 5.5 infections expected  
 SIR 0.18 certainly below 1.0  
 ○ CI overlaps 1.0 (barely!) so cannot say difference is less than expected  
 ○ Note p-value <0.05 but an estimate. For SIRs refer to CI

**Surgeon 109**  
 158 procedures  
 16 infections reported  
 7.7 infections expected  
 SIR 2.07  
 ○ CI does not overlap 1.0; difference is significant  
 ○ Can say SIR is 200% higher than expected

**Surgeon 110**  
 117 procedures  
 0 infections  
 5.6 infections expected  
 SIR 0  
 ○ CI does not overlap 1.0; difference is significant  
 ○ Can say SIR is significantly lower than expected

This demonstrates how each surgeon’s SIR can be evaluated separately. In this example, when the total numbers of procedures and SSI are broken down by surgeon code, its easy to see where most of the infections occurred.

Now complete the surveillance loop! Feedback these data to each surgeon by showing how he/she compares to the group. This can be done by comparing a single surgeon’s SIR to the overall SIR for a specific procedure. Statistical significance of the differences can be calculated using the NHSN Analysis feature, Statistics Calculator (comparing SIRs – select the two-tailed comparison option). When presenting the data, its important to describe the SIR risk adjustment, and include a reminder that SIR adjusts for patient risk, so differences are not likely due to “sicker” surgical patients.

There are many other ways you can use your SSI data for prevention. For surgical groups or surgeons with SIRs >1.0:

- Assess adherence to SCIP measures. (You may also wish to review SCIP adherence for every SSI).
- Work with staff to perform observational studies in the OR to measure adherence to recommended surgical practices (e.g. CDC/HICPAC, AORN, ACS).
- Ensure there is a culture of safety in your OR where staff can speak up when breeches are suspected.

Make your SSI data work for you!