June 2025

2024 CAUTI External Validation Toolkit

The 2024 CAUTI External Validation Toolkit is a HAI-specific supplement to be used in conjunction with the 2024 NHSN Patient Safety External Validation Toolkit (2024 PS EVT). It is intended to help guide the external validation process specifically for CAUTI with step-by-step instructions and screenshots from NHSN.

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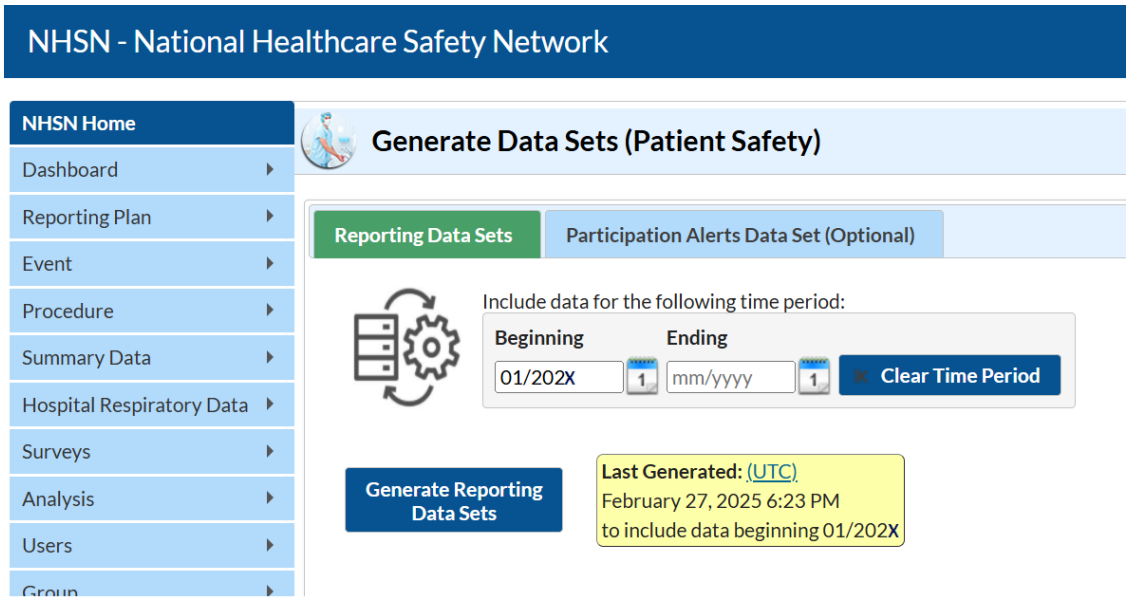
Section 1. Facility Selection

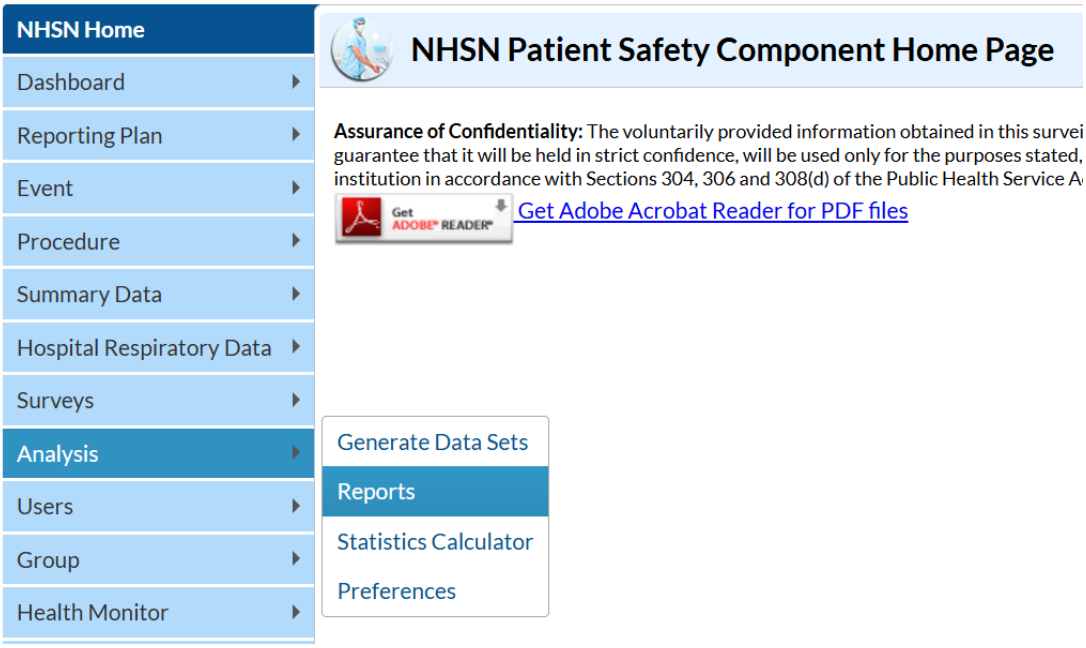
1.1 Steps Applicable to all Facility Selection Methods

Generate Datasets and Modify Report

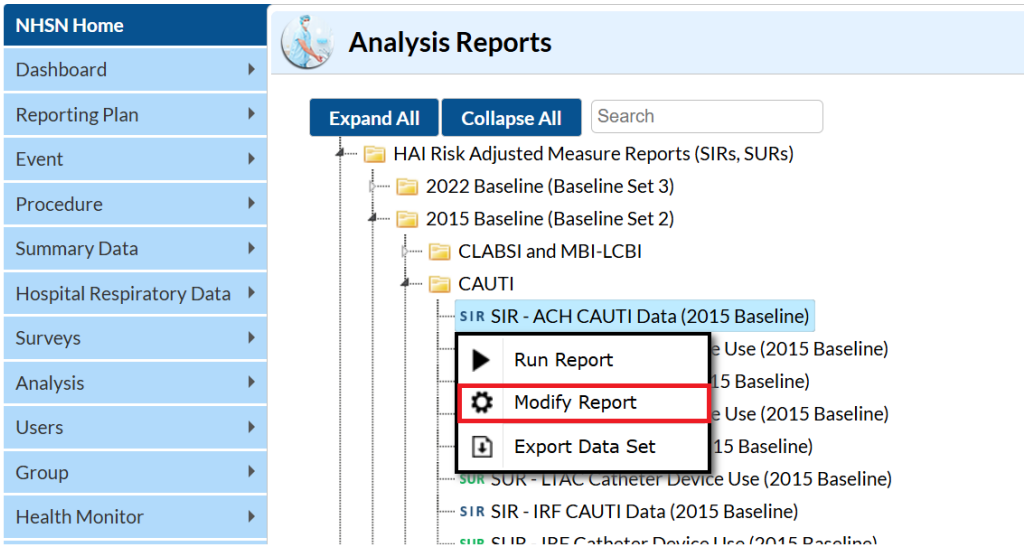
1. Generate new data sets in NHSN to ensure any data updates are included for analysis. On the NHSN Landing Page, navigate to Patient Safety Component → [YOUR State/Jurisdiction Users' Group]. Select the Analysis tab and click Generate Data Sets. For Beginning, enter 01/2024 and for Ending, 12/2024 (or other dates corresponding to the timeframe being validated) for the data set time period. Click the Generate New button. Allow the data set generation process to complete; you can leave NHSN during the generation process.



2. After successful data set generation, navigate to Analysis →Reports to display the tree view list of all analysis reports available within NHSN's analysis tool.

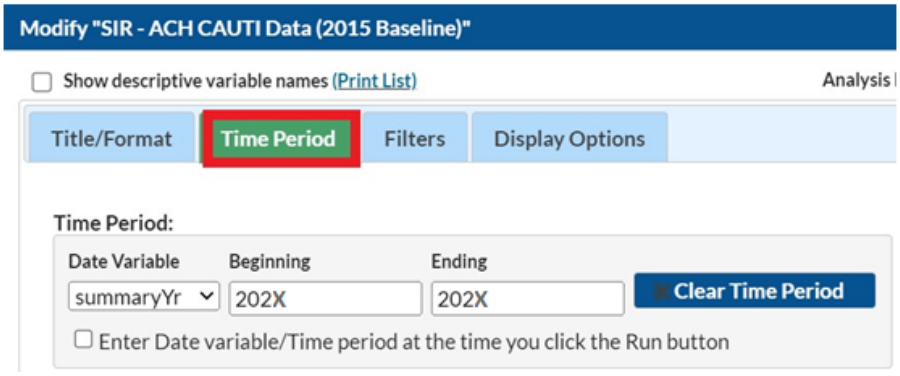


3. Use the tree view structure to select HAI Risk Adjusted Measure Reports (SIRs, SURs), 2015 Baseline (Baseline Set 2), CAUTI, SIR – ACH CAUTI Data. If you are validating Critical Access Hospitals (CAHs), Inpatient Rehab Facilities (IRFs), or Long-term Acute Care Hospitals (LTACHs), select the SIR report that corresponds with that facility type. Click the Modify Report button to proceed to the modification window.

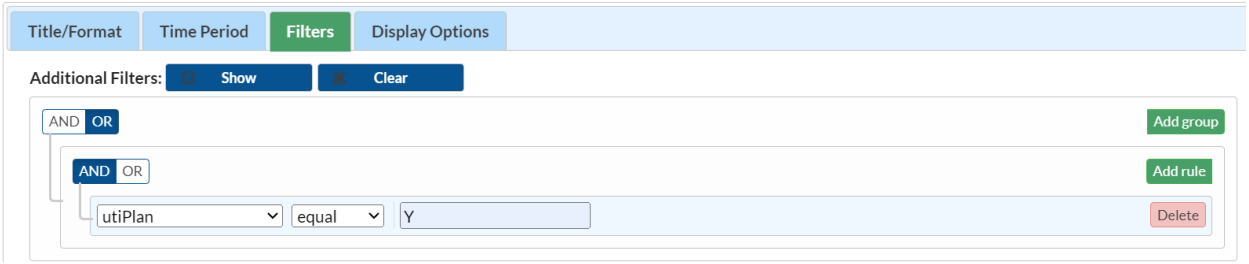


4. In the modification window, there are two key areas to modify, one that controls the time interval of data that are analyzed and displayed and one that controls the level of aggregation of that data.

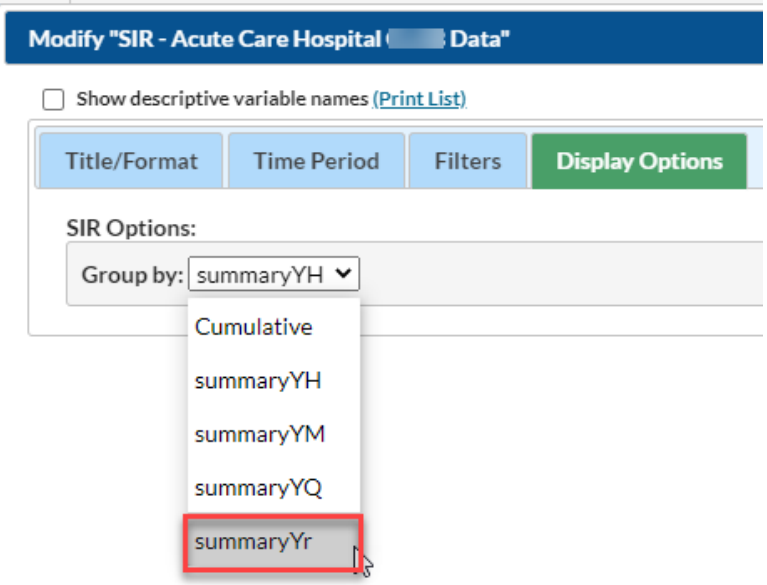
    4a. Under Title/Format tab, select xls format. Then navigate to the Time Period tab to define the time period of data that is included in the report to be exported. Set Date Variable to "summaryYr," Beginning and Ending to 2024, or to the year of data being validated.



4b. Navigate to the "Filters" tab. In the row of drop-down boxes, select "utiPlan," "equal," and enter "Y."

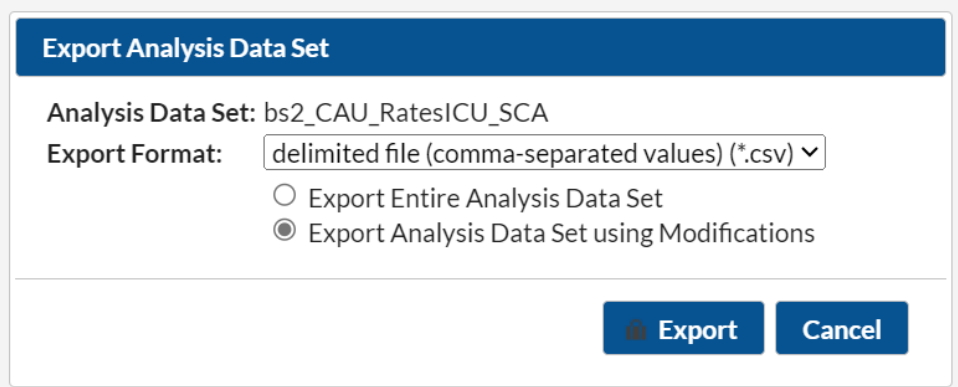


4c. Under the Display Options section, use the Group by option to view the data at a particular level of aggregation. Change the Group by option to "summaryYr."

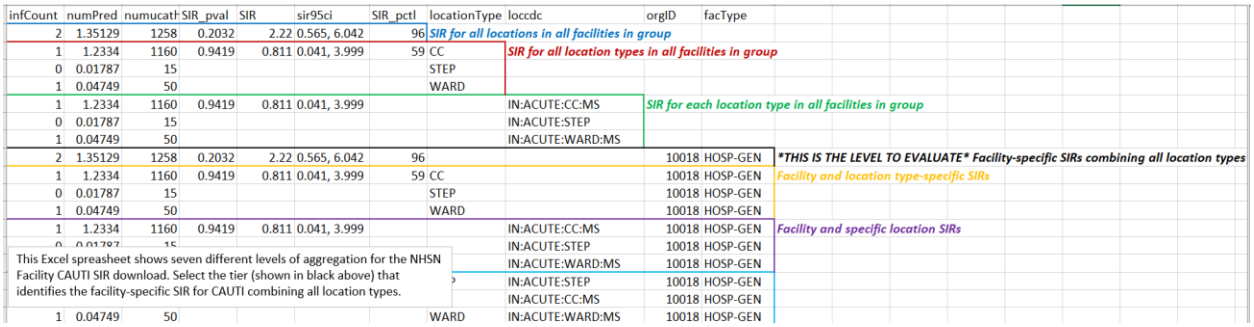


5. After making the above modifications, scroll to the bottom of the modification window. Click the Export button to export the data selected by your modifications. This will open the "Export Analysis Data Set" window.

6. Use the default file format (.csv) and select the bullet "Export Analysis Data Set using Modifications" to export the data. Click the Export button to begin the export process. NHSN will create a .zip file with your SIR data report in it and prompt you to specify a location to save the file on your computer.



7. The exported SIR report will be displayed at several levels of aggregation. Select the orgID level, as illustrated in the screenshot below, to get an unduplicated list of facilities in your jurisdiction.



1.2 Calculate Ranking and Selection

Method 1: Prioritizing Facilities with Highest Likelihood of Event Occurrence

1. Open the exported SIR report in Excel and select the aggregation level that provides a facility-specific SIR at the orgID level (shown in black in the screenshot seen in Section 1.1 step 7). This will allow you to explore the level of exposure risk for CAUTIs and measured performance at each facility. An easy way to find this level of aggregation is to look at the "loccdc" column and scroll until it is blank. The unique orgIDs will then begin to list in ascending order. Once you see the list go through the highest orgID and start over at the smallest orgID, that is where the unduplicated facility list ends. You will also notice that once the list of orgIDs starts over, the column "locationtype" will begin to have data as well. *Tip: the columns "loccdc" and "locationtype" are **blank** for the rows you want.*
2. Copy this information to a new spreadsheet. Arrange the facilities in descending rank order according to SIR, and create three new columns titled "Delta," "Stratum," and "Targeted Selection Number."

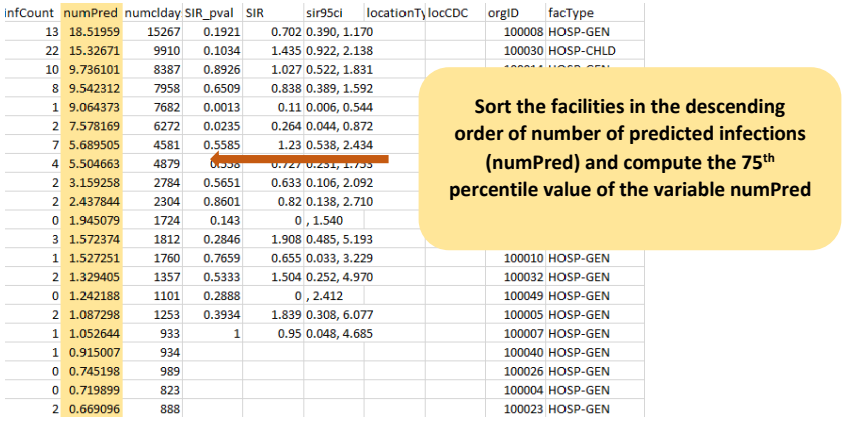
3. Calculate the Delta for each facility/row using the formula (=ABS[row cell under InfCount]-[row cell under numPred]). Delta will be used only where an SIR is not calculated by NHSN.
4. Select the top tertile (33%) of facilities by predicted number (numPred) of CAUTIs in surveillance locations. This top tertile of facilities where CAUTIs in surveillance locations are most expected and may have the greatest potential for surveillance and prevention impact.
5. Within the top tertile, sort by SIR in descending order, and identify the current median SIR for the top tertile. To sort just the top tertile, highlight the entire row for each facility in the top tertile, and click "Data," "Sort"; Sort by "Column" (select SIR), "Sort On" (cell values), and "Order" (largest to smallest).
6. Within the top tertile, assign stratum A to facilities with SIR above the current median SIR, stratum B for remaining facilities with SIR less than or equal to the median and above zero, and stratum C for facilities with SIR = zero (but not missing). Note that some facilities will not have a calculated SIR; do not include these in the strata (see step 9 below).
7. Re-sort within each stratum A, B, and C, by numPred from highest to lowest. To sort just one stratum at a time, highlight the entire row for each facility in the first stratum, and click "Data," "Sort"; Sort by "Column" (select numPred), "Sort On" (cell values), and "Order" (largest to smallest). Repeat this process for the next two strata, one-by-one.
8. Assign sequential Targeted Selection Numbers to facilities, by selecting the highest available numPred from each stratum, alternating through A, B, and C. For example, the facility with the highest numPred from stratum A would be Targeted Selection Number=1, the facility with the highest numPred from stratum B would be Targeted Selection=2, and the facility with the highest numPred from stratum C would be the Targeted Selection Number=3. Return to stratum A and assign the facility with the next highest numPred as Targeted Selection Number=4. Continue alternating strata until no facilities remain or the target number of facilities is reached (typically 18 or 21; refer to the 2024 PS EVT for facility sample size recommendations). If additional facilities are needed, repeat steps 4-8 using the second and then third tertile based on risk level.
9. If additional facilities are needed to reach the targeted number after step 8 is complete, sort the remaining facilities without a calculated SIR by Delta in descending order, starting with the highest, and select facilities from the top of the list until targeted number is reached.
10. After the targeted selection is complete, randomly select additional 5% of remaining facilities from ALL tertiles. The targeted facilities along with the 5% randomly selected make up the total sample.

Method 2: Cumulative Attributable Difference (CAD) Approach

1. Open the exported SIR report in Excel and select the aggregation level that provides a facility-specific SIR at the orgID level (shown in black in the screenshot seen in Section 1.1 step 7). This will allow you to explore the level of exposure risk for CAUTIs and measured performance for each facility. An easy way to find this level of aggregation is to look at the "loccdc" column and scroll until it is blank. The unique orgIDs will then begin to list in ascending order. Once you see the list go through the highest orgID and start over at the smallest orgID, that is where the unduplicated facility list ends. You will also notice that once the list of orgIDs starts over, the

column “locationtype” will begin to have data as well. *Tip: the columns “loccdc” and “locationtype” are **blank** for the rows you want.*

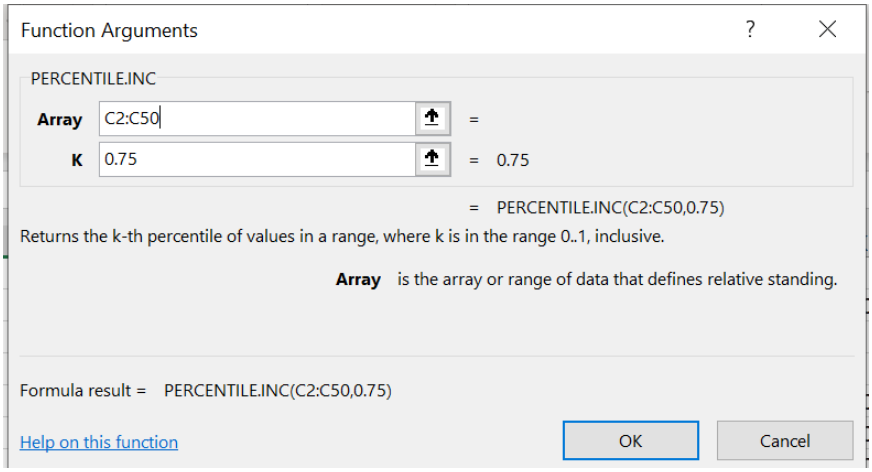
2. If there are 30 or fewer facilities in your jurisdiction, stop here and validate them all. If there are more than 30 facilities, proceed through the following steps to create facility sampling frame.
3. Select the rows from the aggregation level being evaluated and copy this information to a new spreadsheet. Insert a row above your data and copy the header row so you can identify the variables on the new spreadsheet. Next, sort the facilities by numPred (number of predicted events) in descending order (high to low).



infCount	numPred	numclday	SIR_pval	SIR	sir95ci	locationTy	locCDC	orgID	facType
13	18.51959	15267	0.1921	0.702	0.390, 1.170			100008	HOSP-GEN
22	15.32671	9910	0.1034	1.435	0.922, 2.138			100030	HOSP-CHLD
10	9.736101	8387	0.8926	1.027	0.522, 1.831				
8	9.542312	7958	0.6509	0.838	0.389, 1.592				
1	9.064373	7682	0.0013	0.11	0.006, 0.544				
2	7.578169	6272	0.0235	0.264	0.044, 0.872				
7	5.689505	4581	0.5585	1.23	0.538, 2.434				
4	5.504663	4879	0.538	0.727	0.231, 1.753				
2	3.159258	2784	0.5651	0.633	0.106, 2.092				
2	2.437844	2304	0.8601	0.82	0.138, 2.710				
0	1.945079	1724	0.143	0	, 1.540				
3	1.572374	1812	0.2846	1.908	0.485, 5.193				
1	1.527251	1760	0.7659	0.655	0.033, 3.229			100010	HOSP-GEN
2	1.329405	1357	0.5333	1.504	0.252, 4.970			100032	HOSP-GEN
0	1.242188	1101	0.2888	0	, 2.412			100049	HOSP-GEN
2	1.087298	1253	0.3934	1.839	0.308, 6.077			100005	HOSP-GEN
1	1.052644	933	1	0.95	0.048, 4.685			100007	HOSP-GEN
1	0.915007	934						100040	HOSP-GEN
0	0.745198	989						100026	HOSP-GEN
0	0.719899	823						100004	HOSP-GEN
2	0.669096	888						100023	HOSP-GEN

Sort the facilities in the descending order of number of predicted infections (numPred) and compute the 75th percentile value of the variable numPred

4. Identify the 75th percentile of numPred for the validation period (minimum of two quarters of data) using the Percentile.inc function in Excel by clicking on the function button (fx) to the left of the white text box and selecting “Percentile.inc.” A Function Arguments window will open and require an array and K values. For the “array” argument, select the column of your spreadsheet containing numPred values. For the “K” argument, enter the percentile value to be generated (0.75), making sure to use a decimal. Click OK and the cell where the function was entered will now show the 75th percentile value.



5. Use the numPred value corresponding to the 75th percentile as the minimum threshold value for selection of facilities eligible for validation. If this value is greater than 1, use the 75th percentile numPred value, otherwise use numPred=1 as the minimum threshold value.

infCount	numPred	numCIday	SIR_pval	SIR	sir95ci	locationTy	locCDC	orgID	facType
13	18.51959	15267	0.1921	0.702	0.390, 1.170			100008	HOSP-GEN
22	15.32671	9910	0.1034	1.435	0.922, 2.138			100030	HOSP-CHL
10	9.736101	8387	0.8926	1.027	0.522, 1.831			100014	HOSP-GEN
8	9.542312	7958	0.6509	0.838	0.389, 1.592			100046	HOSP-GEN
1	9.064373	7682	0.0013	0.11	0.006, 0.544			100001	HOSP-GEN
2	7.578169	6272	0.0235	0.264	0.044, 0.872			100002	HOSP-GEN
7	5.689505	4581	0.5585	1.23	0.538, 2.434			100022	HOSP-GEN
4	5.504663	4879	0.558	0.727	0.231, 1.753			100027	HOSP-GEN
2	3.159258	2784	0.5651	0.63					
2	2.437844	2304	0.8601	0.					
0	1.945079	1724	0.143						
3	1.572374	1812	0.2846	1.9					
1	1.527251	1760	0.7659	0.6					
2	1.329405	1357	0.5333	1.5					
0	1.242188	1101	0.2888						
2	1.087298	1253	0.3934	1.839	0.308, 6.077			100005	HOSP-GEN

75th percentile value of numPred= 5.5. Select facilities with numPred >5.5. Only facilities in red box (numPred >5.5) are included in the sampling frame for targeted validation.

6. Create a subset of facilities that includes facilities with predicted number of CAUTI events greater than the threshold. In the example above, the 75th percentile value of the numPred variable was 5.5. All facilities with numPred value above 5.5 are selected for inclusion in the validation sampling frame.
7. If the sampling frame derived from the 75th percentile of numPred consists of 30 or fewer facilities, select all facilities in the subset for validation, plus an additional random sample of 5% of facilities where numPred was less than the 75th percentile value. In the example above, the number of facilities with numPred value >5.5 is fewer than 30, so all facilities with numPred value >5.5 are selected for validation plus a 5% random sample are selected from the facilities with numPred value $\leq$5.5.
8. If sampling frame consists of greater than 30 facilities, select 30 facilities based on the criteria described in section B below.

A. **Observed Events**

- The Cumulative Attributable Difference (CAD) approach focuses on the difference between the predicted number of CAUTIs and actual observed CAUTIs (reported). The infCount is an aggregated count of observed CAUTIs for individual surveillance locations.
- Create a column titled CAD next to numPred and compute the CAD values for each line by subtracting numPred from infCount (observed – predicted).

B. **Facility Selection: use this step if the sampling frame consists of greater than 30 facilities**

1) Divide the total facilities in the sampling frame into two strata:
   - Create a new column, “stratum,” and assign each facility to either Stratum 1 or Stratum 2:
     - Stratum 1: Includes all facilities in the sampling frame that had zero infCount value, that is, zero reported pooled aggregate estimate of observed events for the validation time frame.

- Stratum 2: includes all facilities in the sampling frame with non- zero infCount value, that is, non-zero reported pooled aggregate observed events for the validation time frame.

2) Stratum 1 (where facility reported zero events): Filter for Stratum 1 facilities (where infCount=0) and sort by ascending CAD value so Stratum 1 facilities with the lowest CAD value are at the top, shown in the green column below. Select the first 15 facilities from Stratum 1.

infCount	numpred	CAD	numclday	SIR_pval	SIR	sir95ci	SIR_pctl	locationTy	locCDC	orgID	facType
0	15.11302	-15.1130	150								HOSP-GEN
0	12.12433	-12.1243	165								HOSP-GEN
0	11.03699	-11.0370	68								HOSP-GEN
0	10.03699	-10.0370	68								HOSP-GEN
0	9.113023	-9.1130	150								HOSP-GEN
0	8.124325	-8.1243	165								HOSP-GEN
0	8.113023	-8.1130	150								HOSP-GEN
0	8.011302	-8.0113	15								HOSP-GEN
0	5.011302	-5.0113	15								HOSP-GEN
0	4.036994	-4.0370	68								HOSP-GEN
0	3.036994	-3.0370	68								HOSP-GEN
0	3.011302	-3.0113	15								HOSP-GEN
0	2.036994	-2.0370	68								HOSP-GEN
0	1.011302	-1.0113	15								HOSP-GEN

3) Stratum 2 (facilities with non-zero events): Filter for Stratum 2 facilities (where infCount > 0). Sort the facilities by ascending CAD value so the facilities with the lowest CAD value are at the top, shown in the green column below. Select the first 15 facilities from Stratum 2.

infCount	numPred	CAD	numclday	SIR_pval	SIR	sir95ci	locationTy	locCDC	orgID	facType
1	9.064373	-8.06437	7682	0.0013	0.11					GEN
2	7.578169	-5.57817	6272	0.0235	0.264					GEN
13	18.51959	-5.51959	15267	0.1921	0.702					GEN
8	9.542312	-1.54231	7958	0.6509	0.838					GEN
4	5.504663	-1.50466	4879	0.558	0.727					GEN
10	9.736101	0.263899	8387	0.8926	1.027					GEN
7	5.689505	1.310495	4581	0.5585	1.23					GEN
22	15.32671	6.673286	9910	0.1034	1.435	0.922, 2.138			100030	HOSP-CHLD

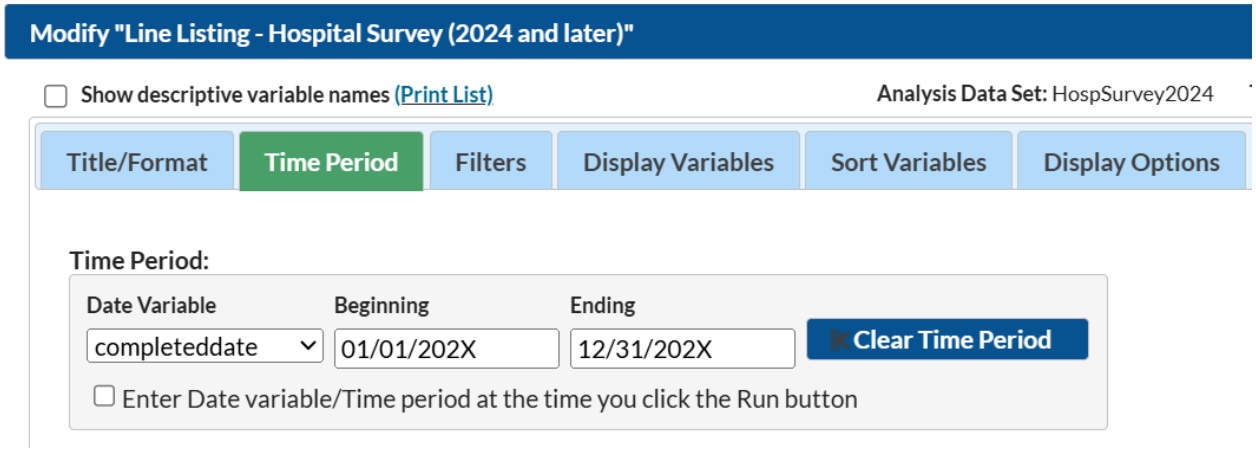
Compute the CAD values for all facilities in the sampling frame. Filter for stratum 2 facilities, where infCount > 0. Sort by ascending CAD value (lowest values on the top). If the sampling frame has greater than 15 facilities, select the top 15 facilities.

4) If there are insufficient facilities in either of the strata, supplement the sample from other strata to reach the required number of facilities for the validation sample.

Note: Remember to randomly select 5% of the remaining facilities with a numPred less than the 75th percentile value.

Method 3: Stratified Random Sampling

1. Open the exported SIR report in Excel and select the aggregation level that provides a facility-specific SIR at the orgID level (shown in black in the screenshot seen in Section 1.1 step 7) so you have an unduplicated list of all facilities reporting data for CAUTI during the validation timeframe. An easy way to find this level of aggregation is to look at the "loccdc" column and scroll until it is blank. The unique orgIDs will then begin to list in ascending order. Once you see the list go through the highest orgID and start over at the smallest orgID, that is where the unduplicated facility list ends. You will also notice that once the list of orgIDs starts over, the column "locationtype" will begin to have data as well *Tip: the columns "loccdc" and "locationtype" are **blank** for the rows you want.*
2. Once you identify where the aggregation at orgID starts, click on the first orgID cell and drag until you reach the highest value (before it starts to repeat). Copy the selected cells and paste into a new Excel worksheet or a new sheet within the same worksheet. This is your final list of all unduplicated facilities reporting CAUTI during the timeframe you specified. You will use this list as your facility sampling frame.
3. Generate list of facilities that completed Annual Survey from NHSN:
    a. On the NHSN landing page, use the Analysis button in the navigation bar and select Reports.
    b. Use the tree view structure to select Supplemental Reports, Facility-Level Data, and Line Listing – Hospital Survey (2024 and later). If validating a type of facility other than Acute Care Hospitals, select the appropriate corresponding report.
    c. Select Modify Report and make the following modifications:
        i. Under the Title/Format tab, select the xls format.
        ii. Under the Time Period tab, select "completeddate" from the dropdown box, and enter 01/01/2024 for Beginning and 12/31/2024 for Ending. Modify dates as needed for the timeframe being validated.



Note: If a facility did not complete the Annual Survey during specified time period, they will not appear in this report.

        iii. Under the Sort Variables tab, double click "surveyYear" in the right-hand box to remove. Find "orgID" in the left-hand box, and double click to move it to the right-hand box.

iv. Click the Export button. In the Export Analysis Data Set window, keep the default file type (.csv) and click Export. This will generate a .zip file with a spreadsheet of all facilities that completed the NHSN Annual Survey in the time period designated above.

4. In the facility sampling frame spreadsheet, create a new column for the variable "bed size."
    a. Ensure that facilities are sorted by orgID, in ascending order, in both the facility sampling frame and the Annual Survey line list. Confirm the orgIDs match up before proceeding.
    b. Copy the numBeds column from the Annual Survey line list and paste into the bed size column in the facility sampling frame spreadsheet. Ensure that the pasted bed size variable is matched to the correct facility.
5. Divide the total facilities in the sampling frame into two strata. Create a new column, "stratum," and assign each facility to either Stratum 1 or Stratum 2:
    a. Stratum 1: Includes all facilities in the sampling frame that have a bed size of <400.
    b. Stratum 2: Includes all facilities in the sampling frame that have a bed size of ≥400.
6. Stratum 1:
    a. If there are 25 or fewer facilities within Stratum 1, select all facilities within Stratum 1 and proceed to Stratum 2.
    b. If there are more than 25 facilities within Stratum 1, assign a random number to each facility. Sort facilities by random number and select the first 25 facilities.
        i. Refer to Table 1 below for three methods for random number assignment.
7. Stratum 2:
    a. If there are 5 or fewer facilities within Stratum 2, select all facilities within Stratum 2 then return to Stratum 1. Select additional facilities from Stratum 1 in descending order, starting with the first facility on the list that was not sampled during step 6, to reach a total of 30 facilities selected.
    b. If there are more than 5 facilities within Stratum 2, assign a random number to each facility. Select the first 5 facilities from the randomized facility list.
        i. Refer to Table 1 below for three methods of random number assignment.
    c. If Stratum 1 has fewer than 25 facilities, return to Stratum 2.
8. Select additional facilities from Stratum 2 in descending order, starting with the first facility on the list not previously sampled, to reach a total of 30 facilities selected.

Table 1. Random number assignment methods	
Option 1: Excel	1. Using the facility list created above, or an HAI line list, insert the command =ROUND(RAND()*1000000,0) into column B and drag to paste this command for each row of the facility list. This will generate a random number for each orgID. 2. Select and copy the values from column B and use the Paste Special (Paste Values) feature to paste the number values into column C. **Note**: any edit made to the Excel sheet will cause the numbers in column B to recalculate. This is normal and can be ignored if you have an iteration copied. 3. Delete column B so the columns shift left and column C becomes column B. 4. Sort by column B, making sure column A is included in the sort (click on "Expand selection" if a dialog box appears). This is your final list that has been assigned and sorted by a random number.
Option 2: Random Number Generator Website + Excel	1. Identify the total number of facilities from the list created above, or the number of records on HAI line list, 2. Go to https://www.random.org/sequences/ 3. Input 1 as the smallest value, and the total number of facilities/records as the largest value, and click "Get Sequence" 4. Copy the sequence created and paste it into column B of your spreadsheet. 5. Sort by column B, making sure column A is included in the sort (click on "Expand selection" if a dialog box appears). This is your final list that has been assigned and sorted by a random number.
Option 3: SAS Codes	1. Enter the appropriate file path where prompted in the code 2. For medical record random number generation, determine if you need/want the program to create an 'EoC' number. If yes, run code as written. If no, delete the lines of code as specified in the program, then run code. 3. The final list, assigned and sorted by a random number, will be exported to the same folder specified in step 1.

Section 2. Download ("freeze") the facility's reported data from NHSN

Prior to selecting the medical records sample, use NHSN Analysis Reports and the modifications described below to "freeze" (take a snapshot of) the data and export the facility's reported CAUTI events. Freeze the data for each facility selected for validation. While in the NHSN application, this would be an opportune time to download each facility's NHSN Annual Survey, which will be needed during the on-site, or virtual, visit. The Annual Survey will be used to review risk adjustment variables (teaching hospital affiliation, bed count, number of patient days, and number of admissions).

To "freeze" data for each facility, select the Analysis tab in the left-hand navigation bar, and then Reports. Select the HAI Detailed Reports (Line Lists, Rate Tables, etc.), Device-Associated (DA) Module, CAUTI, and then "Line Listing – All CAUTI Events," and then click Modify Report.

Suggested Modifications:

- Under the Title/Format tab, select xls as the format. You may also change the title of the report (i.e. <Facility ID> <Freeze Date> NHSN CAUTI Events Line List).
- Under the Time Period tab, go to the Date Variable and select "eventDateYr." For both Beginning and Ending, enter 2024, or the year of data to be validated.
- Under the Filters tab, in the row of drop-down boxes, select "orgID," "equal," and enter the facility's orgID number.
    - Optional: Export single report with all facilities, sort by "orgID," and copy/paste each facility's data into its own spreadsheet. Save each line list in a secure location.
- Optional: Under the Sort Variables tab, select "eventDate."
- Click on the "Export" button. Keep the format as-is (.csv) and select the "Export Analysis Data Set using Modifications" radio button. This will generate the line listing in Excel.
- Save the line listing to a secure location. It will be needed again for the medical record selection process in Section 5.

To find a facility's NHSN Annual Survey, log into NHSN and select Surveys in the Navigation bar, then click Find. In the Survey Type drop down menu, select the survey for the type of facility you are validating (for example, FACSRV-PS – Hospital Survey Data, for validation of Acute Care Hospitals). Then, select the survey year for which you are validating. Finally, click on the Find button, and a list of facilities and their Annual Surveys will be generated.

Note: Use the **Analysis** button on the Navigation bar and select "Reports" to export the data. For more information about how to make modifications to these output options, read "How to Modify a Report" found in the Analysis Quick Reference Guide library at: http://www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html.

Section 3. Notify facilities of the planned validation and request the required laboratory line listings

Suggestions on what information should be included in any outreach to facilities notifying them of their selection can be found in section 2.4 of the 2024 PS EVT. Template letters with suggested format of line listings are located in Appendix 1.

Section 4. Develop the medical record sampling frame for each selected facility

CAUTI in surveillance locations

For CAUTI, the sampling frame is derived from positive laboratory (urine culture) line listings in surveillance locations (SLs). From each selected facility, obtain a complete list of positive urine cultures (PUCs) collected in SLs in 2024 (which includes all PUCs taken during any SL stay, the day of discharge, and the following calendar day) to select the medical record sample before the site visit. Limit PUCs to those with no more than 2 identified pathogens and at least 10^5 CFU/ml organisms. NHSN encourages facilities to develop capacity to generate these lists electronically as recurring need for this task is expected, and the creation of manual line listings presents an excessive burden.

Note: The term "surveillance location," abbreviated SL, is used in the toolkit to indicate that only in plan NHSN-reporting locations will be targeted for the validation efforts for CAUTI.

- Validation of CAUTI in NHSN-reporting surveillance locations excludes NICU locations.
- NICU is considered off plan (not part of CAUTI monthly reporting plan), and therefore not a mandatory reportable surveillance location for CAUTI.

For SL PUCs, the MRN, facility admission date, laboratory specimen number, specimen collection date, identity of organisms (up to two) and colony counts (CFU/ml), specific SL, and patient date of birth are required. Additional patient identifiers such as patient name may be helpful. If needed, ask the IP to translate specific patient location information on the laboratory line listings to mapped NHSN-reporting SLs, and ensure that results for all SLs are included. Only PUCs that have results positive for bacteria with $\geq 10^5$ CFU/ml should be included on the line listings. PUCs with mixed flora; more than two organisms; contain only *Candida spp*., yeast, dimorphic fungi, mold, or parasites; or are positive for bacteria with fewer than 10^5 CFU/ml should be excluded. Information about indwelling urinary catheter status should not be requested; validators will screen for this information while reviewing records. See example of line list template in Appendix 1.2 of the 2024 PS EVT.

Section 5. Medical Record Selection

Use the securely transmitted line listing of PUCs obtained from each selected facility in the following medical record selection process:

1. For each facility, assign a random number to every PUC following steps outlined in Table 1.
2. Sort the list of PUCs by MRN and admission date to generate clusters of PUCs with the same MRN and admission date, also called unique episodes of care (EoC). Create an EoC column where the first EoC = 1. All PUCs in an episode should have the same EoC number.
3. Identify NHSN-reported CAUTIs on the facility-provided PUC line listing and assign strata:
    a. Reference the NHSN CAUTI Events line list created in Section 2 to identify any PUCs reported to NHSN as a CAUTI. Create a new variable, "stratum," and assign any PUCs reported to NHSN as a CAUTI to stratum 1. Additional PUCs in the same EoC as a reported CAUTI should be assigned to stratum 2. Assign all remaining PUCs to stratum 3.
    b. If any reported CAUTIs, identified via the NHSN CAUTI Events line listing, are missing from the facility-provided PUC line listing, the facility list may be incomplete. Work with the facility to address the missing CAUTIs. Update the facility-provided PUC line list with the missing CAUTI events once the issue has been rectified.
4. Select simple random sample of 20 reported CAUTI in NHSN-reporting surveillance locations for review:
    a. Filter to where stratum = 1.
    b. Sort by random number.
    c. Select the first 20 random numbers with a unique EoC number.
    d. If there are less than 20 reported events, review all in stratum 1 and supplement the difference from the remaining PUCs with unique EoCs from stratum 3, as possible.
5. Identify unreported candidate CAUTI events:
        a. Filter to where stratum = 3.
        b. Sort by random number.
        c. Select the first 20 random numbers with unique EoCs.
        d. If there are less than 20 unreported events, review all and supplement the difference from the remaining PUCs with a unique EoC, as possible.
6. If there are any duplicate EoC numbers, keep the record with the smallest random number and substitute out the others with the next PUC on the list.
7. The final sample should contain 20 PUCs with reported CAUTIs, and 20 candidate PUCs without reported CAUTIs from NHSN-reporting surveillance locations. If final sample contains less than 40 records, randomly select additional records to reach 40, as possible.
8. Request the selected medical records in advance of the facility site visit. See Appendix 1.3 for the template letter requesting selected medical records.

Section 6. Site Visit Activities

6.1 Structured Medical Records Review

Validator blinding and consultation at the facility site-visit

Validator blinding as to HAI status is recommended, when feasible. This can be accomplished by mixing and reviewing the selected medical records before determining which have been reported to NHSN with HAIs.

Medical records should be reviewed in a blinded manner using 2024 Medical Records Abstraction Tool (MRAT), which can be found at 2024 PSC Data Validation Resources | NHSN | CDC, Resources by HAI, CAUTI. This tool includes algorithms and logic designed to establish presence or absence of required criteria for case definitions and provide support to avoid common errors.

6.2 Review risk adjustment variables

Have a copy of the facility NHSN Annual Survey available and review surveillance location mapping, location bed size, and teaching hospital status with the IP. A list of CDC locations and descriptions can be found in the NHSN Patient Safety Manual Chapter 15.

Review NHSN definitions for teaching hospital types (under Key Terms, Patient Safety Manual Chapter 16), and ensure that facility teaching hospital status is accurate in the NHSN Annual Survey.

6.3 Review denominator collection methods and documentation

Electronically collected CAUTI denominators

If the facility uses electronic denominator data collection, obtain documentation of their denominator validation process and any periodic spot checks. NHSN specifies that electronic denominator counts should fall within 5% of manual counts for three consecutive months before electronic counts can be used. This may be examined -pre or -post visit.

If documentation of electronic denominator validation is not available, the facility should resume manual counting (and ensure staff training), re-validate electronic counts, and retain evidence of valid electronic counting (within 5% for 3 months). Facilities should conduct periodic spot checks even after formal validation to prevent lost information due to changing medical records systems or other disruptions.

Manual CAUTI denominator counting methods

Denominator data collection surveys found in Sections 6.5 through 6.7 may be administered to the IP contact before or during the site visit; If the facility is manually collecting denominator data, it may be impractical to interview multiple denominator data collectors during the site visit. In this case, collecting contact information during the site visit may be advisable for subsequent administration of surveys by telephone or virtual means (Section 6.6). This allows time with the facility to be used efficiently and accommodates interviews with individuals who may work at other times (for example the night shift).

Knowledge of definitions and counting methods is important even in facilities where denominators are reported electronically in order that spot-checks can be conducted periodically. A form for facilities to document required internal validation of electronic denominator counting is provided in Section 6.5.

Facilities may have already administered denominator counting surveys for internal validation purposes. If this is the case, validators may choose to accept their evidence or conduct this survey among a more limited sample of denominator counters.

CAUTI denominator record documentation

While visiting, request original records of denominator data collection paperwork, which can provide insight into the frequency, reliability, and consistency of this task and how omissions are handled. NHSN provides guidance for missing device-associated denominator data that can be found at https://www.cdc.gov/nhsn/pdfs/gen-support/MissingDenomData-508.pdf.

Consider whether patient days and urinary catheter days data appear as anticipated when manually counted each day: different ink, different but similar numbers. Determine for what percent of day's data are missing and what was done for reporting on those days. This data is best assessed on site, if possible.

6.4 (Optional) Template for Catheter-Associated Urinary Tract Infection (CAUTI) Validation Discrepancies Discussion with Facilities

Please feel free to adapt these templates to meet your jurisdiction's needs to discuss discordant outcomes and request changes

(Instructions: For each CAUTI Event with a discordant outcome between reporters and validators, record the following (first row-enter hospital report; second row-enter recommended changes). Use the Comment area to document reasons for discrepancy, for example: overlooked candidate culture, did not meet alternative primary definition, not a uropathogen, etc. Many states have examined this type of data to identify common errors and direct future education and training. Keep a copy for your records and leave a copy with the facility). F=Facility; V=validator

Pt. ID		Positive urine culture event: first culture date	Select One:			Event date (if UTI)				
			Not candidate CAUTI	SUTI 1a, SUTI 2, ABUTI*	Did not meet UTI criteria (specify below)		POA, HAI or neither	Urethral catheter >2d (y/n)	Location of attribution	CAUTI in Surveillance Location (y/n)
	F									
	V									
Comment:										
	F									
	V									
Comment:										
	F									
	V									
Comment:										
	F									
	V									
Comment:										
****SUTI 1a, SUTI 2, (NHSN): types of symptomatic urinary tract infection. ABUTI (NHSN): asymptomatic bacteremic urinary tract infection. See definitions NHSN PSC Manual Chapter 7.***										

6.5 Documentation of Electronic CAUTI Denominator Validation

OrgID/Name of Hospital: _____ Date of Survey:_____

Instructions: NHSN requires that the monthly electronic denominator count falls within a 5% tolerance interval of the monthly manual denominator count for 3 consecutive months before reporting electronic denominator counts for CAUTI. This validation is not conducted during the external survey. The facility is expected to have a copy of this internal validation comparing manual counts to electronic counts available for the validator to review. *If there is no electronic denominator counting at this facility, skip this survey.*
If electronic device denominator counting is used for reporting at this facility, document the NHSN-required validation results below:

Initial electronic denominator validation (when electronic denominator reporting began):

Location name: Month/year:		Manual count	*Calculated 5% tolerance interval	Electronic count
	Patient days			
	Indwelling urinary catheter days			
Location name: Month/year:				
	Patient days			
	Indwelling urinary catheter days			
Location name: Month/year:				
	Patient days			
	Indwelling urinary catheter days			

If available, please document additional information for any more recent electronic denominator validation:

Location name: Month/year		Manual count	*Calculated 5% tolerance interval	Electronic count
	Patient days			
	Indwelling urinary catheter days			
Location name: Month/year				
	Patient days			
	Indwelling urinary catheter days			
Location name: Month/year:				
	Patient days			
	Indwelling urinary catheter days			

*Equation for calculating 5% tolerance interval is: manual count ± (manual count * 0.05).
Example calculations where manual count = 164 and electronic count = 178:
Eligible 5% tolerance interval = [164±(164*0.05)]=155.8 to 172.2
Electronic count 178 falls outside the tolerance interval.

6.6 Contact Information for Manual CAUTI Denominator Validation

Please feel free to adapt this template to meet your jurisdiction's needs
***Note**: If facility assures annual training updates for denominator counters, and three or more denominator counters show proficiency on the survey, or if facility has already internally surveyed denominator counter proficiency, this can serve as evidence of proficiency.*

OrgID / Name of Hospital _____Date of Survey _____

ID	*Name of data collection professional*	*Surveillance locations covered*	*Work hours/ Preferred time for telephone survey*	*Phone number(s)*	*Supervisor*
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
Add rows as needed					

6.7 CAUTI Denominator Counting Survey (with Key)

*Instructions: Administer in person or by telephone, directly to individuals responsible for denominator counting. This form is divided into 2 sections for facilities where these tasks are performed by different persons. The first section contains questions applicable to collecting **PATIENT DAYS** (questions 1-9). The second section contains questions applicable to collecting **INDWELLING URINARY CATHETER (IUC) DAYS** (questions 10-16).*

Facility OrgID:	Name/ID of individual interviewed:	Position: ☐ IP ☐ Clerical ☐ Nursing ☐ Other (explain)	Interviewer initials:	Date of survey:
CAUTI denominators	NHSN location(s) covered:			

PATIENT DAYS *(for CAUTI denominator counters)*			***Answer Key:***
1. How are patient days usually collected? *(choose one)*			*<u>If using weekly</u>: Once weekly sampling of denominator data to generate estimated central line days, may be used as an alternative to daily collection in non-oncology ICUs and wards. Sampling may not be used in SCA/ONC locations or NICUs. During the month, the number of patients in the location (patient-days) and the **number of patients** with at least one central line of any type (central line days) is collected on a designated day each week (for example, every Tuesday), and at the same time each day.* *The average number of device days per month must be greater than or equal to 75 device days if using weekly denominator collection method.*
	Electronically (*document the software system utilized and skip to Q8*):		
	Manually (daily/weekly)		
	Some units electronic and some units manual		
	Comment:		
2. Is there a specified time when the denominator count is taken?		☐ Yes ☐ No	*The answer should be 'Yes'*
3. When is it done?			*Counts should be done at a specific time daily, preferably at nearly the same time throughout the facility to avoid errors when patients transfer*
4. Describe the method used to count **patient days**:			

	Count the number of <u>patients</u> assigned to a unit bed <u>at the same time IUC counts are conducted</u>	*From NHSN: Denominator data (patient days and IUC days) should be collected at the same time, every day, for each location performing surveillance to ensure that differing collection methods don't inadvertently result in IUC days being > patient days*.
	Other *(specify)*:	
5.	When reporting monthly patient day total, what is done if there are missing **patient day** data? *(choose one)*	*NHSN issued specific guidance on imputing values for missing device-associated denominator data https://www.cdc.gov/nhsn/pdfs/gen-support/MissingDenomData-508.pdf)*
	Report the sum of available daily counts with no adjustment for missing data	
	Estimate or re-create missing data from existing information using our own methods	
	Impute missing values using recent CDC/NHSN guidance	
	Other (specify):	
6.	Which best describes your training for denominator (patient days and catheter days) counting? *(select all that apply)*	
	No specific training was provided	*Formal training by NHSN or NHSN-trained IP is recommended due to technical aspects of definitions (for example, central line, permanent line, temporary line) and methods (for example, when to count lines, how many to count).*
	Peer training (person who previously counted explained their approach to new staff)	
	Formal training by IP	
	Formal training by NHSN (for example, online training)	
	Annual training updates	
	Other (describe):	
7.	Which staff member counts patient days and catheter days when the "regular" data collector(s) is/are not working?	☐ IP ☐ Another trained counter ☐ Nobody ☐ Other (specify)
8.	Does your facility have a mechanism in place for quality control of denominator data? *(Select one):*	
	(Electronic data) Yes, data submitted electronically is periodically checked using manual methods	

	(Manual data) Yes, manually collected data are periodically counted by more than one staff member	
	Yes, other *(explain)*	
	No formal quality control process	
9.	Which staff member(s) is/are responsible for entering validation locations patient days and catheter day data into NHSN?	☐ IP ☐ Counter ☐ Clerical ☐ Other (specify)

Indwelling Urinary Catheter Days *(for IUC counters only)*		
10. How are **IUC days** collected for the units you oversee? (choose one)		
	Electronically (specify *software system utilized*):	
	Manually (daily/weekly)	
	Some units electronic and some units manual	
	Comment:	
11. Identify the method used to count **IUC days**: (*choose one*)		*Count the number of patients on the unit with an indwelling catheter or indwelling three-way (infusion) catheter used for bladder irrigation.* ***Note**: Indwelling urinary catheter: A drainage tube that is inserted into the bladder through the urethra, left in place, and connected to a drainage bag, including urinary catheters that are used for intermittent or continuous irrigation, but excluding suprapubic, condom, or straight in-and-out catheters.*
	Count the number of patients on the unit with a urine collection bag	
	Count the number of patients on the unit with a urinary catheter or condom catheter	
	Count the number of patients on the unit with a urinary catheter, condom catheter, or suprapubic catheter	
	Count the number of patients on the unit with a urinary catheter or indwelling urethral three-way (infusion) catheter used for bladder washes	
	Other (specify):	
12. When reporting monthly IUC day total, what is done if there are missing **catheter day** data? *(choose one)*		*NHSN issued specific guidance on imputing values for missing device-associated denominator data https://www.cdc.gov/nhsn/pdfs/gen-support/MissingDenomData-508.pdf)*
	Report the sum of available daily counts with no adjustment for missing data	
	Estimate or re-create missing data using patient information (for example, medical record), then sum	
	Impute missing values using recent CDC/NHSN guidance for missing denominator data	
13. A patient has a draining ureteral stent and a Foley catheter; each one connected to a collection bag. How many urinary catheter days are counted for this patient on this day?		*One. Ureteral stents are not counted because they are not urethral catheters. A patient can only be counted for 1 urinary catheter each day.*

14. A patient has a three-way IUC used for irrigation after surgery to prevent blood in the bladder from clotting, and to provide for urinary drainage. How many urinary catheter days are counted for this patient on this day?	*One. Catheters to be counted include IUCs used for intermittent or continuous irrigation, as well as those used for drainage.*
15. A patient on the unit has a supra-pubic urinary catheter. How many urinary catheter days are counted for this patient on this day?	*Zero. Supra-pubic catheters are not urinary catheters because they enter the bladder through the abdominal wall.*
16. A patient's IUC is removed at noon and replaced at 5PM. Daily indwelling urinary catheter counts take place at 2PM. How many urinary catheter days are reported for this patient on this day?	*None. There was no IUC at the time of the daily denominator count.* ***Note****: However, If this patient develops a bloodstream infection attributable to a urinary tract infection, this day will count as one of two required catheter days to establish CLABSI criteria, because the catheter need only be in place for part of the two days to meet this criterion.*

6.8 (Optional) 2024 CAUTI Validation Summary

***required **conditionally required**

Facility Validation Overview	
*Facility ID:	
*Facility Type:	☐ Acute care hospital ☐ Long term acute care hospital (LTAC/LTACH) ☐ Oncology hospital ☐ Inpatient rehabilitation facility (IRF)
*Facility sampling method:	☐ CDC Method 1 (Targeted Sampling) ☐ CDC Method 2 (Cumulative attributable difference) ☐ CDC Method 3 (Stratified Random Sampling)
Reason Facility was Sampled:	☐ All facilities were validated ☐ Targeted facility (Methods 1 or 2) ☐ Randomly selected facility

Numerator Validation

***Sampling information for numerator validation at this facility:**

Event	Sampling Frame Elements	Sampling Frame (# episodes or procedures eligible for review for year)	Total # events from facility reported to NHSN for timeframe (before validation)
CAUTI (excluding NICU)	Medical records with positive urine culture(s)	_____	_____

***CAUTI in surveillance locations (excluding NICU) Validation Results:**

Event Determination	Validation: Yes - CAUTI	Validation: No – Not CAUTI
Facility: Yes - Date-matched CAUTI reported	a. _____	b. _____
Facility: No - Date-matched CAUTI NOT reported	c. _____	d. _____

Denominator Validation: Catheter and Patient Days for CAUTI	
**Which method was used by this facility for CAUTI in surveillance locations denominator (patient days and catheter days) counting for this year?	☐ Manual counting: ☐ Daily ☐ Weekly sampling++ ☐ Electronic counting ☐ Both manual and electronic counting
++ Only ICU and ward location types with an average of 75 or more indwelling urinary catheter-days per month are eligible to use this method.	

**Has this facility completed an internal validation of CAUTI in surveillance locations denominator data for this year?	☐ Yes ☐ No

**If yes, provide the following information for all locations and months validated:

Location of validation	Month of validation	Validation method (enter A, B, or C)	Count 1	Count 2

Notes: If Method A is chosen, Count 1 should be "Usual Count" and Count 2 should be "Expert (Referent) Count."
If Method B is chosen, Count 1 should be "Usual Count" and Count 2 should be "Patient-level (Referent) Count."
If Method C is chosen, Count 1 should be "Manual Count" and Count 2 should be "Electronic Count."

Validation of manual denominator data counting requires either:

- Method A – Concurrent dual counting (with more experienced counter as reference) for ≥ three months OR
- Method B – Concurrent patient days data (ADT-Admission/Discharge/Transfer or other reference) and manual counting for ≥ three consecutive months

Validation of electronic denominator data counting requires:

- Method C – Concurrent manual denominator counting (reference) vs. electronic data for ≥ three months

NHSN Inpatient Location Validation: MAPPING	
**Do any inpatient locations require mapping or re-mapping within NHSN?	☐ Yes ☐ No

**If yes, indicate which locations need to be mapped/re-mapped and recommendations:

Location	Current CDC location code designation	Current bed count	Recommended CDC location code designation	Recommended bed count
Add rows as needed.				

**How does this facility obtain inpatient admissions data?	☐ Electronic from billing ☐ Electronic from vendor system ☐ Electronic from ADT ☐ Other (specify): _____
**How does this facility obtain inpatient patient days data?	☐ Electronic from billing ☐ Electronic from vendor system ☐ Electronic from ADT ☐ Other (specify): _____

Risk Adjustment Variable Validation	
**CAUTI Surveillance location (SL) mapping (excluding NICUs)	
Number of SLs correctly mapped in NHSN (excluding NICUs):	
Number of SLs incorrectly mapped (excluding NICUs):	
Number of SLs (excluding NICUs) omitted from mapping:	
Number of SLs mapping errors:	
**Teaching hospital affiliation (CLABSI in surveillance locations)	
Facility teaching hospital affiliation reported on 2024 NHSN annual facility survey:	☐ Non-teaching ☐ Major ☐ Graduate ☐ Undergraduate ☐ N/A (IRF & LTACH)
Is facility teaching hospital affiliation correct?	☐ Yes ☐ No

Comments