

# AU Option Implementation Data Validation

Facilities should use the following guidance when completing the initial set up and implementation for reporting to the NHSN AU Option or undergoing a change in vendor system. The NHSN AU Option Team developed these questions to focus validation efforts on key AU Option protocol definitions and CDA requirements including potential sources of error. Facilities should complete this document to confirm data accuracy and guide discussions with the vendor in the case of data discrepancy. While there is great value in completing the entire document, facilities with low resources/time can start with Section C. If facilities identify issues within Section C, we then recommend completing Sections A & B to identify the source of the issue(s). Please refer to the [NHSN AUR Module Protocol](#) for a review of applicable definitions.

Facilities in the maintenance phase of AU reporting or those with extreme high or low SAAR values should use the separate, more focused [Annual AU Option Data Validation Protocol](#). Facilities interested in validating AR Option data can refer to the [AR Option Data Validation Protocol](#).

Please email questions to the NHSN Helpdesk: [NHSN@cdc.gov](mailto:NHSN@cdc.gov).

## Validation Checklist

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## Section A. Manual Validation of eMAR/BCMA data feeds to vendor software

This section will help you confirm the connection between your eMAR/BCMA data feed within your Electronic Health Record (EHR) and the vendor system you will be using to submit AU Option data to NHSN. If you'll be using your EHR system to submit AU Option data to NHSN, use the questions to ensure the EHR system is accurately capturing these data.

**Methodology:** Depending on available resources, the validator should generate a 1 month or 7 day output (line list of agents administered for each day of the validation period) from the system being used to submit AU Option data to NHSN as manual review reference (hereafter referred to as a line list) for the validation process. Line list of agents administered should be per day, per patient, per patient care location. It should include fields such as patient identifier, antimicrobial agent, route of administration, date of administration, and location of patient for all inpatient locations, emergency departments (EDs), and 24-hour observation locations as applicable.

### 1. Review line list for antimicrobial agents and routes of administration

#### Reviewing the antimicrobials

- a. **Verify:** Use Appendix B of the [AUR Module Protocol](#) to check the agents that appeared in your line list. If you'd like the list of agents from the previous calendar year, please reach out to [NHSN@cdc.gov](mailto:NHSN@cdc.gov).
- b. **Question:** Of those agents that did not appear in the line list, are these rarely used agents at the facility and therefore, it is reasonable that they do not appear within this given period? (Y/N)
- c. **Question:** How many non-formulary agents did you find on the data feed line list?
- d. **Question:** If you found no non-formulary agents in the line list, are you certain the vendor system is capturing non-formulary agents? How did you verify this?

#### Reviewing the routes of administration

*For questions answered as "no", we recommend listing an explanation for your internal reference.*

- e. **Question:** Did the line list include intramuscular (IM) administered ceftriaxone or any other agents administered via the IM route? (Y/N)  
**Note:** Prescribers most commonly use this route in the ED.
- f. **Question:** Did the line list include amikacin, gentamicin, tobramycin, aztreonam, or zanamivir administered through the respiratory tract? (Y/N)  
**Note:** Zanamivir is anti-influenza agent and thus prescribers may only use during influenza season.

## 2. Spot check for unusual routes of administration

**Methodology:** Use the line list to confirm that at least one instance of each of the following occurs.

*For items answered as “no”, we recommend listing an explanation for your internal reference. Consider reviewing a longer period to potentially capture the administration of rarer drugs/routes.*

- a. **Verify:** System is accurately capturing continuous or extended infusions (for example, piperacillin-tazobactam) if used at your facility. (Y/N/NA)
- b. **Verify:** Vancomycin digestive includes rectal administration in rare cases when used at your facility. (Y/N/NA)
- c. **Verify:** System captures the parenteral formulation of vancomycin administered orally for *C. difficile* as digestive rather than IV route. (Y/N)
- d. **Verify:** System accurately captures naso-gastric (for example, ciprofloxacin, levofloxacin, moxifloxacin, or posaconazole) administrations. (Y/N)

## 3. Compare data in eMAR/BCMA to data in vendor software

**Note:** If you'll be using your EHR system to submit AU Option data to NHSN, you can skip this section.

**Methodology:** Pick Option A or Option B. Your vendor may have additional tools available for facilitation of this section. We recommend contacting your vendor prior to starting this section.

**Option A:** For those that can create a hospital based eMAR report: manually validate whether the administered antimicrobials and routes are identical for each location per calendar day during the specified validation time period.

**Option B:** For those that are unable to create a hospital based eMAR report: manually confirm eMAR/BCMA through the EMR of individual patients. We recommend using ten patients per patient care location in three separate patient care locations. Please manually validate whether the administered antimicrobials and routes are identical for each location per calendar day during the specified validation time period.

- a. **Question:** Which locations did you check (minimum of three units, ideally with a lot of transfer to each other)?
- b. **Question:** How many patients did you check per location?
- c. **Question:** Please describe any inconsistencies you identified and how you addressed the issues.

## 4. Review patient-level scenarios

**Note:** If you'll be using your EHR system to submit AU Option data to NHSN, you will not have anything to compare to, but we recommend reviewing patients with the scenarios below to ensure the EHR is accurately capturing these data.

**Methodology:** Compare the line list to the hospital-based eMAR report or use manual eMAR/BCMA confirmation to review the following patient-level scenarios. We recommend reviewing five patients per scenario. Your vendor may have additional tools available for facilitation of this section. We recommend contacting your vendor prior to starting this section.

- a. **Verify:** Some facilities place patients in an inpatient location that have a patient status of “observation” instead of “inpatient”. Other facilities may have a designated outpatient 24-hour observation unit to house these patients during their time at the facility. Review patients in an inpatient location with “observation” status to confirm that the patients’ administrations were correctly attributed to the inpatient location in which they were housed at the time of the administration. (Y/N)  
**Note:** The vendor software should include these patients in the antimicrobial days (numerator) and days present (denominator) for the location in which they are physically located regardless of patient status (for example, inpatient, observation, emergency).
  
- b. **Verify:** Review patients admitted to an inpatient location through the ED and/or 24-hour observation location to confirm the vendor system is attributing antimicrobials administered in the ED and/or 24-hour observation location to the ED and/or 24-hour observation location while the antimicrobials administered in the inpatient location are attributed to the inpatient location. (Y/N)
  
- c. **Verify:** Review patients transferred to and from the Operating Room and/or Interventional Radiology to confirm antimicrobials administered to the patient in the various locations were correctly attributed to the location in which they received the antimicrobial (in other words, confirm an antimicrobial given in the Operating Room is correctly attributed to the Operating Room while an antimicrobial given in the location of the patient prior to the Operating Room is attributed to that location). (Y/N)
  
- d. **Verify:** Review newborns housed in the room with their mothers to confirm whether the vendor system includes antimicrobials given to the newborn in a NHSN Nursery/NICU location or in with the mother’s NHSN Labor & Delivery Ward, Postpartum Ward, and/or Labor/Delivery/Recovery/Postpartum Suite [LDRP] location. (Y/N/NA)  
**Note:** If possible, NHSN recommends capturing babies housed in the room with their mothers in a separate “virtual” Nursery/NICU location within NHSN for the most accurate risk adjustment.

## 5. Confirm appropriate use of N/A versus zero

**Note:** According to the AU Option protocol “Not applicable (N/A)” is used when an antimicrobial can’t be electronically captured from eMAR/BCMA while “0” is used when the facility had no patients administered the drug and/or route(s) during the given month. Facilities should only use “NA” for non-formulary agents when those agents, if administered, cannot be accurately electronically captured by the eMAR/BCMA system. NHSN expects facilities to consistently report “NA” across all locations and FacWideIN and across months.

- a. **Question:** Have you identified any antimicrobial agents and/or routes of administration that would require N/A? (Y/N) If so, please list these. Please describe any inconsistencies you identified and how you addressed the issues.

## Section B. Validation of data aggregations and calculations

### 1. Review locations mapped in NHSN

**Methodology:** With the NHSN Facility Administrator (or representative from Infection Control), review the NHSN Locations used for reporting to NHSN. Facilities should use the same NHSN Locations for ALL NHSN reporting including HAI and AU. Review in the NHSN Location Manager or export the list of locations used within NHSN facility. Within NHSN: Facility > Locations > Export Location List.

- a. **Verify:** All physical inpatient locations, as well as outpatient Emergency Departments (EDs) and 24-hour observation unit(s), are mapped in the NHSN Facility to the appropriate CDC Location Description outlined in the [NHSN Locations Chapter](#). (Y/N)  
With approval from the NHSN Facility Administrator, update any locations that have changed patient mix since the last review (for example, changed from medical ward to medical/surgical ward).
- b. **Verify:** All NHSN locations, especially the “Your Code” and CDC Location Description, match the locations in your vendor software. (Y/N)
- c. **Verify:** With approval from the NHSN Facility Administrator, deactivate all locations no longer housing patients from both the NHSN Location manager and the vendor software. (Y/N)
- d. **Verify:** Of the locations mapped in your NHSN facility, confirm that your vendor system can accurately electronically capture both the numerator (antimicrobial days) and denominator (days present). The vendor system should be EXCLUDING any locations in which the system cannot accurately capture either the antimicrobial days and/or the days present from the location specific and FacWideIN NHSN AU data submission. (for example, if the vendor system cannot accurately capture the antimicrobial administrations in the Operating Room, then the system should exclude the Operating Room from all AU Option submissions) (Y/N)

### 2. Review aggregations

#### Aggregating the routes of administration

**Methodology:** Choose three commonly used drugs, administered via more than one route, to confirm both the individual routes and the total antimicrobial day counts are correct. Review five patients per drug.

**Example:** Per [AU Option protocol](#), a patient administered ciprofloxacin intravenously and orally on the same day would be attributed “one ciprofloxacin Day (Total)”; the stratification by route would be “one ciprofloxacin Day (IV)” and “one ciprofloxacin Day (Digestive)”. In these cases, the sum of the routes of administration should be greater than the total drug-specific antimicrobial day count.

- a. **Verify:** For patients receiving the same antimicrobial by two different routes of administration (for example, patient switched from IV to oral antimicrobial formulation) in a calendar day, confirm that the administrations were counted appropriately: one total antimicrobial day and one antimicrobial day for each of the specified routes. (Y/N)

#### Aggregating antimicrobial days

**Methodology:** Check with your vendor to determine if there is a mechanism in the vendor system to see aggregated data prior to NHSN upload. If this does not exist in the vendor software, upload 1 month of data for three locations into NHSN to complete these steps.

For three patient care locations during the specified time period, manually validate that vendor software is correctly aggregating the numerator for the total antimicrobial days and sub-stratification based on routes of administration. Additionally, validate that the vendor software is correctly aggregating the days present denominator for the locations.

Consider using the tables below, or something similar in the program of your choice, to compare your aggregations. First populate the tables, then answer the questions that follow.

**Note:** NHSN defines days present as the aggregate number of patients housed in a patient care location (or all inpatient units in the facility for FacWideIN counts) at any time throughout a calendar day during a month. Days present is **not** the same as patient days which NHSN defines as the aggregate number of patients housed in a patient care location during the once daily census count. See the [AUR Module Protocol](#) for more details.

Month, Year:

Location:

Drug	Manual Aggregation of Antimicrobial Days					Vendor Software Aggregation of Antimicrobial Days				
	Total	IV	IM	Digest	Resp	Total	IV	IM	Digest	Resp

- b. **Question:** On the days of admission and transfer or discharge, were antimicrobial days (if administered an antimicrobial agent) attributed to that patient care location even though the patient was only there for a partial day? (Y/N)

Month, Year:

Location	Manual Aggregation of Days Present	Vendor Software Aggregation of Days Present

- c. **Question:** On the days of admission and transfer or discharge, were days present attributed to that patient care location even though the patient was only there for a partial day? (Y/N)

### Aggregating FacWideIN antimicrobial days

**Methodology:** Choose three commonly used drugs, administered more than once per day, to confirm appropriate aggregation of FacWideIN antimicrobial days (see table below).

**Example:** The location specific piperacillin/tazobactam antimicrobial days may add up to be higher than the FacWideIN piperacillin/tazobactam antimicrobial days because piperacillin/tazobactam can be administered more than once daily. Therefore, if a patient received piperacillin/tazobactam once in the medical ward in the morning then was transferred and received the remaining doses in the medical ICU, that patient would attribute one total piperacillin/tazobactam antimicrobial day to both the medical ward and the medical ICU but could still only attribute one total piperacillin/tazobactam for the FacWideIN count.

Please list the drug-specific values of antimicrobial days for FacWideIN and the drug-specific values of antimicrobial days for the aggregate of all inpatient locations in the table the answer the questions below.

	Drug Name	Month/Year	Total Antimicrobial Days for FacWideIN	Total Antimicrobial Days for aggregate of all individual inpatient locations
Drug 1				
Drug 2				
Drug 3				

- d. **Question:** Using the data you’ve populated in the table above, are the antimicrobial days for those given drugs fewer in FacWideIN than by adding up each location? (Y/N)

If the counts for FacWideIN are higher than the sum of the locations:

- i. **Question:** Is the vendor system incorrectly including non-inpatient locations (for example, ED or 24-hour observation unit) in the FacWideIN calculations? (Y/N)
- ii. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)
- iii. **Question:** For units the vendor system is not reporting individually due to lack of accurate capture of either antimicrobial days or days present, is the vendor system also correctly excluding them from the FacWideIN calculations? (Y/N)

If the counts for FacWideIN are considerably lower than the sum of the locations:

- iv. **Question:** Is the vendor system’s FacWideIN logic including all inpatient locations (including Operating Rooms, Interventional Radiology if applicable)? (Y/N)

### Aggregating FacWideIN days present

To confirm the appropriate aggregation of FacWideIN days present, please list the value of days present for FacWideIN and the value of days present for the aggregate of all locations in the table below:

Month/Year	Total Days Present for FacWideIN	Total Days Present for aggregate of all individual inpatient locations

**Note:** Due to admissions, discharges and transfers the FacWideIN days present count should always be less than the sum of the location-specific days present count.

- e. **Question:** Using the data you’ve populated in the table above, are days present for FacWideIN less than the aggregate days present for all locations? (Y/N)

If the counts for FacWideIN are higher than the sum of the locations:

- i. **Question:** Is the vendor system incorrectly including non-inpatient locations (for example, ED or 24-hour observation unit) in the FacWideIN calculations? (Y/N)

- ii. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)
  
- iii. **Question:** For units the vendor system is not reporting individually due to lack of accurate capture of either antimicrobial days or days present, is the vendor system also correctly excluding them from the FacWideIN calculations? (Y/N)

If the counts for FacWideIN are considerably lower than the sum of the locations:

- iv. **Question:** Is the vendor system’s FacWideIN logic including all inpatient locations (including Operating Rooms, Interventional Radiology if applicable)? (Y/N)

### 3. Compare AU and HAI denominators

**Note:** The NHSN Team expects some variability due to the different data sources used for the various reporting modules of NHSN.

**Methodology:** Please list the AU days present and HAI patient days reported for the locations in the table below and calculate the percent difference. We recommend checking at least two ICU locations, two ward locations, and one NICU location (if applicable). You can find the HAI patient days on the NHSN Device-associated summary records used for CLABSI/CAUTI reporting.

**Note:** For facilities participating in CMS reporting, all adult, pediatric, and neonatal ICU locations along with adult and pediatric medical, surgical, and medical/surgical ward locations will have reported location-specific HAI patient days. You may need to ask your IP for help in finding these numbers within NHSN.

Based on internal NHSN analyses of days present and patient days, on average the AU days present are 24% higher than the HAI patient days for the same month/location. You can find the detailed breakdown by location type in the Days Present section of the [AU Option FAQs](#).

$$\text{Percent Difference: } \frac{(AU \text{ Days Present} - HAI \text{ Patient Days})}{AU \text{ Days Present}} \times 100$$

#### Location specific days present and patient days

Month/Year	Location Name	Total AU Days Present	Total HAI Patient Days	Percent Difference

- a. **Question:** Are AU days present greater than HAI patient days for each location listed above? (Y/N)
  - i. If the percent difference is considerably higher than the average for that location type, consider discussing the denominator counts with your vendor. Check for double counting (for AU reporting, the vendor system should count a patient only once per location per day).

- ii. If AU Days Present are equal to the HAI patient days, check with your vendor as this should never happen. Make sure the vendor system is including all patients in the location counts regardless of patient status (for example, observation, emergency).
- iii. If AU Days present are lower than the HAI patient days, check with your vendor as this should never happen. Make sure the vendor system is including all patients in the location counts regardless of patient status (for example, observation, emergency).

**FacWideIN days present and patient days**

**Methodology:** Please list the AU days present and admissions and HAI MDRO/CDI total facility patient days and admissions reported for FacWideIN in the table below. You can find the HAI FacWideIN total facility patient days and admissions on the NHSN MDRO/CDI Module summary records used for LabID reporting. You may need to ask your IP for help in finding these numbers.

Based on internal NHSN analyses of days present and patient days, on average the FacWideIN AU days present are 24% higher than the FacWideIN HAI patient days for the same month. Due to the slightly different definitions and data sources used to collect these counts, the NHSN Team expects some small variation in admissions counts.

Month/Year	Total AU Days Present for FacWideIN	Total Facility Patient Days for MDRO/CDI FacWideIN	Percent Difference		Total AU Admissions for FacWideIN	Total Facility Admissions for MDRO/CDI FacWideIN

- b. **Question:** Are FacWideIN AU days present greater than the total facility patient-days on the FacWideIN MDRO/CDI Module record? (Y/N/NA)

If the percent difference is considerably higher than the average for FacWideIN:

- i. **Question:** Is the system including additional locations in the HAI FacWideIN MDRO/CDI summary patient day counts that it is not including in the AU FacWideIN counts? (Y/N)  
**Note:** For AU reporting, the vendor system should only include those locations in the FacWideIN record where the system can accurately electronically capture both the numerator and denominator. Therefore, the vendor system might exclude some locations from AU FacWideIN and include them in HAI MDRO/CDI FacWideIN.

- c. **Question:** Are the AU Option admission counts slightly higher than MDRO/CDI Module admission counts? (Y/N/NA)

**Outpatient days present and encounters**

**Methodology:** Please list the days present and encounters reported for the ED and 24-hour Observation locations in the table below, as applicable. You can find the HAI MDRO/CDI encounters on the NHSN MDRO/CDI Module summary records used for LabID reporting. You may need to ask your IP for help in finding these numbers within NHSN.

Based on internal NHSN analyses of days present and encounters, on average the ED and 24-hour Observation AU days present are 14% higher than the HAI patient days for the same month/location.

Location	Month/Year	Total AU Days Present	Total MDRO/CDI Encounters	Percent Difference
Emergency Department				
Pediatric Emergency Department				
24-hour Observation				

- d. **Question:** Are ED and 24-hour Observation AU days present greater than the HAI encounters for those outpatient locations for same time period? (Y/N/NA)

End Section B: Validation of data aggregations and calculations

## Section C. Spot check data submitted to NHSN

Prior to beginning this section, you should upload at least one month's worth of AU data into NHSN for all patient care locations. After uploading the data, generate a new data set in NHSN following the [instructions for data set generation](#). For questions answered as "no", we recommend listing an explanation for your internal reference.

### 1. Use the AU Option Data Quality Line List within NHSN

**Methodology:** The AU Option Data Quality Line List provides facilities with a quick way to assess four data quality issues.

- a. Zero or missing antimicrobial days
- b. Antimicrobial days reported when patients were not present
- c. Antimicrobial days greater than or equal to Days present
- d. Sum of routes less than Total Antimicrobial days

Run the [Data Quality Line List](#) within the NHSN application to check if these issues are present in your data. Within the document, you'll also find guidance for interpreting your output and next steps for how to address the data quality issue(s).

### 2. Review less common routes of administration

**Methodology:** Generate a line list within NHSN, by clicking "Analysis" then "Reports" then "[Line Listing – All Submitted AU data by Location](#)". Use the line list to answer the following questions.

#### Intramuscular (IM) Route of Administration:

- a. **Verify:** The vendor system is capturing ceftriaxone IM usage in the Emergency Department (ED) (often used for treatment of *N. gonorrhoea* in ED setting). (Y/N/NA if not submitting ED data)
- b. **Verify:** The vendor system is capturing other agents administered via IM route in ED and this appears appropriate based upon the specific antimicrobial agent (for example, the vendor system should not document oral cephalosporin administered IM). (Y/N/NA if not submitting ED data)
- c. **Verify:** Review IM administrations in non-ED locations and confirm appropriateness based upon specific antimicrobial agent (for example, the vendor system should not document oral cephalosporin as administered IM). (Y/N)
- d. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

#### Intravenous Route of Administration:

- e. **Verify:** The vendor system is accurately capturing continuous or extended infusions (for example, piperacillin/tazobactam, cefiderocol, ceftazidime/avibactam, meropenem/vaborbactam) if applicable for your facility. (Y/N/NA)
- f. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

#### Digestive Route of Administration:

- g. **Verify:** The vendor system is capturing the parenteral formulation of vancomycin administered orally for *C. difficile* as digestive rather than IV route if applicable for your facility. (Y/N/NA)
- h. **Verify:** Vancomycin digestive includes oral and rectal administrations of vancomycin. (Y/N)
- i. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

#### Respiratory Route of Administration:

- j. **Verify:** The vendor system is capturing zanamivir administered via respiratory route. (Y/N)
- k. **Verify:** The vendor system is capturing amikacin, gentamicin, or tobramycin respiratory usage in ICUs or units with patients who have cystic fibrosis or atypical mycobacterial infections? (Y/N)
- l. **Verify:** The vendor system is capturing aztreonam, colistin\*, and/or polymyxin B respiratory administrations. In general, we anticipate less usage than aminoglycosides via respiratory route. (Y/N)  
\*Note: While the vendor software will report colistin and colistimethate separately in the CDA file, NHSN will roll up colistin and it will appear with colistimethate in the NHSN AU Option Line Lists.
- m. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

### 3. Evaluate location specific “expected” patterns

**Methodology:** Use the Antimicrobial Use “[Line Listing – All Submitted AU data by Location](#)” to answer the following questions.

- a. **Question:** Review Labor and Delivery usage. Did you find higher usage of beta-lactams such as ampicillin, penicillin G, and cefazolin? (Y/N)
- b. **Question:** Review ED usage (if applicable). Did you find use of antibiotics such as azithromycin, ceftriaxone, and/or doxycycline for STD treatment? (Y/N/NA)
- c. **Question:** Review NICU usage. Did you find higher usage of ampicillin and gentamicin? (Y/N)
- d. **Question:** Overall, did you find critical care usage greater than non-critical care unit usage? (Y/N)
- e. **Question:** Review Operating Room usage (if applicable). Did you find higher usage of cefazolin and vancomycin? (Y/N/NA)

- f. **Question:** Review cancer and/or transplant locations usage.
  - i. Did you find usage of antifungals including azoles, echinocandins, and amphotericin B products? (Y/N)
  - ii. Verify accurate capture of amphotericin B vs amphotericin B lipid complex vs amphotericin B liposomal. (Y/N)
- g. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

#### 4. Evaluate drug specific “expected” patterns

**Methodology:** Use the Antimicrobial Use “[Line Listing – All Submitted AU data by Location](#)” to answer the following questions.

- a. **Verify:** The vendor system is capturing non-formulary and rarely used agents. (Y/N)
- b. **Verify:** Correct usage of N/A or zero in cases of no use of the specific drug. (Y/N)  
**Note:** According to the AU Option protocol “Not applicable (N/A)” is reported when an antimicrobial cannot be electronically captured from eMAR/BCMA while “0” is reported when the facility had no administrations of the drug and/or route during the given month in the specific location. In NHSN, “N/A” is shown as “.” in the line list. Facilities should only report “NA” for non-formulary agents when those agents, if administered, cannot be accurately electronically captured in the eMAR/BCMA system.
- c. **Question:** Does your facility have higher usage of vancomycin and piperacillin-tazobactam and lower usage with oral cephalosporins and nafcillin in the inpatient setting? (Y/N)
- d. **Verify:** Anti-influenza agents (for example, oseltamivir, zanamivir) have usage during flu season with potential peaks in usage in January and February. (Y/N)
- e. **Verify:** The vendor system is correctly capturing single and combination drugs such as amoxicillin and amoxicillin/clavulanate, ampicillin and ampicillin/sulbactam, ceftazidime and ceftazidime/avibactam, and meropenem and meropenem/vaborbactam. For example, the vendor system is not mapping and aggregating ceftazidime/avibactam to ceftazidime (Y/N)
- f. **Verify:** If your facility has submitted AU data for more than one month, confirm general usage patterns for a specific location are similar across months. (Y/N)

**Important note:** This document includes the next two sections, “Review aggregations” and “Comparing AU and HAI denominator data”, in Section B as well (pages 5-10). If you’ve already completed these sections as part of section B above, you can skip these sections in Section C. If you did not complete Section B, please proceed with the following questions.

## 5. Review aggregations

### Aggregating FacWideIN antimicrobial days

**Methodology:** Choose three commonly used drugs, administered more than once per day, to confirm appropriate aggregation of FacWideIN antimicrobial days (see table below). Use the Antimicrobial Use “[Line Listing – All Submitted AU data by Location](#)” to answer the following questions. Remove the location filter and add a filter for the three drugs of interest for the most efficient data review.

**Example:** The location specific piperacillin/tazobactam antimicrobial days may add up to be higher than the FacWideIN piperacillin/tazobactam antimicrobial days because piperacillin/tazobactam can be administered more than once daily. Therefore, if a patient received piperacillin/tazobactam once in the medical ward in the morning then was transferred and received the remaining doses in the medical ICU, that patient would attribute one total piperacillin/tazobactam antimicrobial day to both the medical ward and the medical ICU but could still only attribute one total piperacillin/tazobactam for the FacWideIN count.

Please list the drug-specific values of antimicrobial days for FacWideIN and the drug-specific values of antimicrobial days for the aggregate of all inpatient locations in the table below:

	Drug Name	Month/Year	Total Antimicrobial Days for FacWideIN	Total Antimicrobial Days for aggregate of all individual inpatient locations
Drug 1				
Drug 2				
Drug 3				

- f. **Question:** Using the data you’ve populated in the table above, are the antimicrobial days for those given drugs fewer in FacWideIN than by adding up each location? (Y/N)

If the counts for FacWideIN are higher than the sum of the locations:

- v. **Question:** Is the vendor system incorrectly including non-inpatient locations (for example, ED or 24-hour observation) in the FacWideIN calculations? (Y/N)
- vi. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)
- vii. **Question:** For units the vendor system is not reporting individually due to lack of accurate capture of either antimicrobial days or days present, is the vendor system also correctly excluding them from the FacWideIN calculations? (Y/N)

If the counts for FacWideIN are considerably lower than the sum of the locations:

- viii. **Question:** Is the vendor system’s FacWideIN logic including all inpatient locations (including Operating Rooms, Interventional Radiology if applicable)? (Y/N)

### Aggregating FacWideIN days present

To confirm the appropriate aggregation of FacWideIN days present, please list the value of days present for FacWideIN and the value of days present for the aggregate of all locations in the table below. Use the Antimicrobial Use “[Line Listing – All Submitted AU data by Location](#)” report. Remove the location filter and add a filter for a single drug for the most efficient data review.

Month/Year	Total Days Present for FacWideIN	Total Days Present for aggregate of all individual inpatient locations

**Note:** Due to admissions, discharges and transfers the FacWideIN days present count should always be less than the sum of the location-specific days present count.

- g. **Question:** Using the data you’ve populated in the table above, are days present for FacWideIN fewer than the sum of days present by location? (Y/N)

If the counts for FacWideIN are higher than the sum of the locations:

- v. **Question:** Is the vendor system incorrectly including non-inpatient locations (for example, ED or 24-hour observation) in the FacWideIN calculations? (Y/N)
- vi. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)
- vii. **Question:** For units the vendor system is not reporting individually due to lack of accurate capture of either antimicrobial days or days present, is the vendor system also correctly excluding them from the FacWideIN calculations? (Y/N)

If the counts for FacWideIN are considerably lower than the sum of the locations:

- viii. **Question:** Is the vendor system’s FacWideIN logic including all inpatient locations (including Operating Rooms, Interventional Radiology if applicable)? (Y/N)

## 6. Compare AU and HAI denominators

**Note:** The NHSN Team expects some variability due to the different data sources used for the various reporting modules of NHSN.

**Methodology:** Please list the days present and patient days reported for the locations in the table below and calculate the percent difference. We recommend checking at least two ICU locations, two ward locations, and one NICU location (if applicable). You can find the HAI patient days on the NHSN Device-associated summary records used for CLABSI/CAUTI reporting.

**Note:** For facilities participating in CMS reporting, all adult, pediatric, and neonatal ICU locations along with adult and pediatric medical, surgical, and medical/surgical ward locations will have reported location-specific HAI patient days. You may need to ask your IP for help in finding these numbers within NHSN.

Based on internal NHSN analyses of days present and patient days, on average the AU days present are 24% higher than the HAI patient days for the same month/location. You can find the detailed breakdown by location type in the Days Present section of the [AU Option FAQs](#).

Percent Difference:  $\frac{(AU\ Days\ Present - HAI\ Patient\ Days)}{AU\ Days\ Present} \times 100$

**Location specific days present and patient days**

Month/Year	Location Name	Total AU Days Present	Total HAI Patient Days	Percent Difference

- e. **Question:** Are AU days present greater than HAI patient days for each location listed above? (Y/N)
  - iv. If the percent difference is considerably higher than the average for that location type, consider discussing the denominator counts with your vendor. Check for double counting (for AU reporting, the vendor system should count a patient only once per location per day).
  - v. If AU Days Present are equal to the HAI patient days, check with your vendor as this should never happen. Make sure the vendor system is including all patients in the location counts regardless of patient status (for example, observation, emergency).
  - vi. If AU Days present are lower than the HAI patient days, check with your vendor as this should never happen. Make sure the vendor system is including all patients in the location counts regardless of patient status (for example, observation, emergency).

**FacWideIN days present and patient days**

**Methodology:** Please list the AU days present and admissions and HAI MDRO/CDI total facility patient days and admissions reported for FacWideIN in the table below. You can find the HAI FacWideIN total facility patient days and admissions on the NHSN MDRO/CDI Module summary records used for LabID reporting. You may need to ask your IP for help in finding these numbers.

Based on internal NHSN analyses of days present and patient days, on average the FacWideIN AU days present are 24% higher than the FacWideIN HAI patient days for the same month. Due to the slightly different definitions and data sources used to collect these counts, the NHSN Team expects some small variation in admissions counts.

Month/Year	Total AU Days Present for FacWideIN	Total Facility Patient Days for MDRO/CDI FacWideIN	Percent Difference	Total AU Admissions	Total Facility Admissions for MDRO/CDI FacWideIN

- f. **Question:** Are FacWideIN AU days present greater than the total facility patient-days on the FacWideIN MDRO/CDI Module record? (Y/N/NA)

If the percent difference is considerably higher than the average for FacWideIN:

- ii. **Question:** Is the system including additional locations in the HAI FacWideIN MDRO/CDI summary patient day counts that it is including in the AU FacWideIN counts? (Y/N)

**Note:** For AU reporting, the vendor system should only include those locations in the FacWideIN record where the system can accurately electronically capture both the numerator and denominator. Therefore, the vendor system might exclude some locations from AU FacWideIN and include them in HAI MDRO/CDI FacWideIN.

- g. **Question:** Are the AU Option admission counts slightly higher than MDRO/CDI Module admission counts? (Y/N/NA)

### Outpatient days present and encounters

**Methodology:** Please list the days present and encounters reported for the ED and 24-hour Observation locations in the table below, as applicable. You can find the HAI MDRO/CDI encounters on the NHSN MDRO/CDI Module summary records used for LabID reporting. You may need to ask your IP for help in finding these numbers within NHSN.

Based on internal NHSN analyses of days present and encounters, on average the ED and 24-hour Observation AU days present are 14% higher than the HAI patient days for the same month/location.

Location	Month/Year	Total AU Days Present	Total MDRO/CDI Encounters	Percent Difference
Emergency Department				
Pediatric Emergency Department				
24-hour Observation				

- h. **Question:** Are ED and 24-hour Observation AU days present greater than the HAI encounters for those outpatient locations for same time period? (Y/N/NA)

End of Section C: Spot check data submitted to NHSN

## Appendix: Links to Referenced Documents

Complete web addresses for references hyperlinked in this document in the order of appearance:

AUR Module Protocol: <https://www.cdc.gov/nhsn/pdfs/pscmanual/11pscaurcurrent.pdf>

Annual AU Option Validation Protocol: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/annual-au-data-validation-508.pdf>

AR Option Data Validation Protocol: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/ar-validation-508.pdf>

NHSN Locations Chapter: [https://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions\\_current.pdf](https://www.cdc.gov/nhsn/pdfs/pscmanual/15locationsdescriptions_current.pdf)

AU Option FAQs: <https://www.cdc.gov/nhsn/faqs/faq-au.html>

Generating Data Sets: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/generateddatasets-psc-508.pdf>

AU Data Quality Line List: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/au-dataquality-linelist-508.pdf>

AU Option Line List: <https://www.cdc.gov/nhsn/pdfs/ps-analysis-resources/aur/AU-QRG-LineList.pdf>