AU Option Implementation Data Validation

The following guidance can be used by facilities undergoing the initial set up and implementation for reporting to the NHSN AU Option as well as by those who underwent a change in vendor system. These questions were developed by the NHSN AU Option Team to focus validation efforts on key AU Option protocol definitions and CDA requirements including potential sources of error. This document is meant to be completed by the facility 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 and go back to Sections A & B if issues are identified. 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 available upon request from the NHSN Helpdesk (NHSN@cdc.gov).

Please email questions to the NHSN Helpdesk: NHSN@cdc.gov.

Validation Checklist

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

Methodology: Validator should generate 7 day or 1 month output (line list of agents administered for each day of the validation time period) 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.

1. Completeness of line list for antimicrobial agents (n=89) and route of administration

a. Check the boxes for agents that appeared in your line list:

□ Amantadine	□ Cefprozil	□ Erythromycin/ Sulfisoxazole	□ Peramivir
□ Amikacin	□ Ceftaroline	□ Fidaxomicin	□ Piperacillin
□ Amoxicillin	□ Ceftazidime	□ Fluconazole	□ Piperacillin/ Tazobactam
□ Amoxicillin/ Clavulanate	□ Ceftazidime/ Avibactam	□ Fosfomycin	□ Polymyxin B
□ Amphotericin B	□ Ceftibuten	□ Gemifloxacin	□ Posaconazole
□ Amphotericin B liposomal	□ Ceftizoxime	□ Gentamicin	□ Quinupristin/ Dalfopristin
□ Ampicillin	□ Ceftolozane/ Tazobactam	□ Imipenem/ Cilastatin	□ Rifampin
□ Ampicillin/ Sulbactam	□ Ceftriaxone	□ Isavuconazonium	□ Rimantadine
□ Anidulafungin	□ Cefuroxime	□ Itraconazole	□ Sulfamethoxazole/ Trimethoprim
□ Azithromycin	□ Cephalexin	□ Levofloxacin	□ Sulfisoxazole
□ Aztreonam	□ Chloramphenicol	□ Linezolid	□ Tedizolid
□ Caspofungin	□ Ciprofloxacin	□ Meropenem	□ Telavancin
□ Cefaclor	□ Clarithromycin	□ Metronidazole	□ Telithromycin
□ Cefadroxil	□ Clindamycin	□ Micafungin	□ Tetracycline
□ Cefazolin	□ Colistimethate	□ Minocycline	□ Ticarcillin/ Clavulanate
□ Cefdinir	□ Dalbavancin	□ Moxifloxacin	□ Tigecycline
□ Cefditoren	□ Daptomycin	□ Nafcillin	□ Tinidazole
□ Cefepime	□ Delafloxacin	□ Nitrofurantoin	□ Tobramycin
□ Cefixime	□ Dicloxacillin	□ Oritavancin	□ Vancomycin
□ Cefotaxime	□ Doripenem	□ Oseltamivir	□ Voriconazole
□ Cefotetan	□ Doxycycline	□ Oxacillin	□ Zanamivir
□ Cefoxitin	□ Ertapenem	□ Penicillin G	
□ Cefpodoxime	□ Erythromycin	□ Penicillin V	

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

b. Question: Of those agents that did <u>not</u> appear in the line list, do these agents represent rarely used agents at the facility and therefore, it is reasonable that they do not appear within this given time 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 non-formulary agents are being captured? How did you verify this?

Completeness of routes per agent
<u>For questions answered as "no", please provide explanation.</u>

e. Question: Did the line list include intramuscular (IM) administered ceftriaxone or any other agents administered via the IM route? (Y/N) Note: This is most commonly used in the emergency department.

f. Question Did the line list include aztreonam, tobramycin, amikacin, gentamicin or zanamivir administered through the respiratory tract? (Y/N) Note: Zanamivir is anti-influenza agent and thus may only be used in influenza season.

2. Spot check data feed for unusual routes of administration

Methodology: Use the line list to confirm that at least one instance of each of the following occurs.
<u>For items answered as "no", please provide explanation and consider reviewing a longer time period to potentially capture the administration of rarer drugs/route administrations.</u>

a. Verify: Continuous or extended infusions (e.g., piperacillin-tazobactam) are being accurately captured 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)

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

c. Verify: The parenteral formulation of vancomycin that is administered orally for *C. difficile* is captured as digestive rather than IV route of administration. (Y/N)

d. Verify: Naso-gastric (e.g., levofloxacin, ciprofloxacin, moxifloxacin, or posaconazole) administrations are being accurately captured. (Y/N)

3. Compare line list to hospital-based eMAR report or manual eMAR/BCMA confirmation

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 antimicrobials administered and routes of administration 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 antimicrobials administered and routes of administration are identical for each location per calendar day during the specified validation time period.

a. Question: Which locations were checked (minimum of three units, ideally with a lot of transfer to each other)?

b. Question: How many patients were checked per location?

c. Question: Please describe any inconsistencies you identified and how you addressed the issues.

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

4. Review data in specific patient-level scenarios

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: Review patients in observation status that were housed in an inpatient location 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 patient should be included in the antimicrobial days (numerator) and days present (denominator) for the location in which they are physically located regardless of patient status (e.g., inpatient, observation, emergency).

b. Verify: Review patients admitted to an inpatient location through the Emergency Department (ED) to confirm the antimicrobials administered in the ED are attributed to the ED while the antimicrobials administered on the day of admission 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 (i.e., 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)

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

d. Verify: Review newborns housed in the room with their mothers to confirm whether antimicrobials given to the newborn are included 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]. (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. Appropriate use N/A or zero in antimicrobial days numerator

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) of administration during the given month.

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.

End Section A: Validation of eMAR/BCMA data feeds to vendor software

Section B. Validation of aggregation/calculation of data in vendor system

1. Review facility's NHSN locations currently mapped in NHSN

Methodology: With the NHSN Facility Administrator (or representative from Infection Control), review the currently mapped NHSN Locations being used for reporting to NHSN. The same NHSN Locations should be used 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 Department(s) and 24-hour observation unit(s) are mapped in the NHSN Facility to the appropriate CDC Location Description. (Y/N)
With approval from the NHSN Facility Administrator, update any locations that have changed patient mix since the last review (i.e., 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:** All locations no longer housing patients are inactivated 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). Any locations in which either the antimicrobial days and/or the days present cannot be accurately captured should be EXCLUDED from the location-specific and FacWideIN NHSN AU data submission. (i.e., if antimicrobial administrations in the Operating Room cannot be accurately captured in the vendor system, the Operating Room should be excluded from all AU Option submissions) (Y/N)

2. Test accuracy in calculating the numerator and denominator and aggregating one month's worth of data to the location level for three separate patient care locations

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 the *numerator* is being attributed correctly for the total antimicrobial days and sub-stratification based on routes of administration. Additionally, validate that the days present *denominator* is being correctly aggregated for the locations.

Section B. Validation of aggregation/calculation of data in vendor system

Note: Days present are defined as the aggregate number of patients housed in a patient care location (or facility for FacWideIN counts) at any time throughout a calendar day during a month. Days present is **not** the same as patient days where a patient is counted in the location they are in during the *once daily* census count. See the AUR Module Protocol for more details.

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

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

3. General questions regarding the calculations

a. Verify: For patients receiving the same antimicrobial by two different routes of administration (i.e., 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 of administration. (Y/N)

Note: Per AU Option protocol, a patient to whom ciprofloxacin was administered intravenously and orally on the same day would be attributed "one ciprofloxacin Day (Total)"; the stratification by route of administration 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.

Methodology: Choose three commonly used drugs, which are administered more than once per day, to confirm appropriate aggregation of FacWideIN antimicrobial days (see table on page 9).

For 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 administrated 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 1 total piperacillin-tazobactam antimicrobial day to both the medical ward and the medical ICU but could still only attribute 1 total piperacillin-tazobactam for the FacWideIN count.

Section B. Validation of aggregation/calculation of data in vendor system

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				

b. 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: Are non-inpatient locations (e.g., ED or 24hr observation) being incorrectly included in the FacWideIN calculations? (Y/N)

ii. Question: Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)

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

iii. Question: Are all inpatient locations (including Operating Rooms, Interventional Radiology if applicable) being included in the vendor's FacWideIN logic? (Y/N)

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.

c. Question: Using the data you've populated in the table above, are *days present* for FacWideIN fewer than adding up days present by location? (Y/N)

Section B. Validation of aggregation/calculation of data in vendor system

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

i. **Question:** Are non-inpatient locations (e.g., ED or 24hr observation) being incorrectly included in the FacWideIN calculations? (Y/N)

ii. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)

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

iii. **Question**: Are all inpatient locations (including Operating Rooms, Interventional Radiology if applicable) being included in the vendor's FacWideIN logic? (Y/N)

4. Comparing AU denominator data to HAI denominator data

Note: Some variability is expected due to the different data sources used for the various reporting modules of NHSN.

Prior to answering the question below, please list the days present and patient days reported for the locations in the table below and calculate the percent difference. The HAI patient days can be found on the NHSN Device-associated summary records used for CLABSI/CAUTI reporting. We recommend checking at least two ICU locations, two ward locations, and one NICU location (if applicable).

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 for adult and pediatric ICUs and wards are 29% higher than the HAI patient days for the same location. On average the AU days present for NICU locations are 14% higher than the HAI patient days for the same location.

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

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

Section B. Validation of aggregation/calculation of data in vendor system

a. Question: If your facility has calculated/reported HAI *patient days* per patient care location for the NHSN Device-Associated Module (e.g., CLABSI, CAUTI), are AU *days present* greater than HAI *patient days* for a specific location for same time period? (Y/N/NA)

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, a patient can only be counted once in a location per day).

ii. If AU Days Present are **equal** to the HAI patient days, check with your vendor as this should never happen.

iii. If AU Days present are **lower** than the HAI patient days, check with your vendor to make sure all patients are being included in the location counts regardless of patient status (e.g., observation, emergency).

Prior to answering the question below, please list the days present and patient days reported for FacWideIN in the table below. The HAI FacWideIN patient days can be found on the NHSN MDRO summary records used for LabID reporting.

Note: For facilities participating in CMS reporting, FacWideIN patient days are required to be reported within the monthly MDRO summary record. You may need to ask your IP for help in finding these numbers.

Month/Year	Total AU Days Present for FacWideIN	Total HAI Patient Days for FacWideIN

b. Question: If your facility has calculated/reported HAI *patient-days* for FacWideIN for the NHSN MDRO Module, are FacWideIN AU *days present* greater than HAI *patient-days* for FacWideIN for same time period? (Y/N/NA)

If the counts for FacWideIN HAI patient days are **higher** than AU days present:

i. Question: Are additional locations being included in the HAI patient day counts? (Y/N)
Note: For AU reporting, FacWideIN should only include those locations where both the numerator and denominator can be accurately electronically captured. Therefore, some locations might be excluded from AU FacWideIN and included in HAI FacWideIN.

Section B. Validation of aggregation/calculation of data in vendor system

Prior to answering the question below, please list the days present and encounters reported for the Emergency Department and 24-hour Observation locations in the table below. The HAI MDRO patient days can be found on the NHSN MDRO summary records used for LabID reporting.

Note: Facilities with EDs and/or 24-hour observation locations participating in CMS reporting are required to report location-specific MDRO encounters in the monthly MDRO summary record. MDRO encounters is the same definition as AU days present. Therefore these numbers should be equal or almost equal depending on the data sources that were used to obtain the counts. You may need to ask your IP for help in finding these numbers within NHSN.

Location	Month/Year	Total AU Days Present	Total HAI MDRO Encounters
Emergency Department			
24-hour Observation			

c. **Question:** If your facility has calculated/reported HAI MDRO *encounters* for your Emergency Department (ED) and/or 24-hour observation locations for the NHSN MDRO Module, are ED and 24-hour Observation AU *days present* roughly equal to the HAI encounters for those outpatient locations for same time period? (Y/N/NA)

End Section B: Validation of calculation/aggregation of data in vendor system

Section C. Post-CDA submission validation to be performed using the NHSN application

1. Spot checks of less common administrations

Methodology: After generating a new data set in NHSN, under Reports use the Antimicrobial Use 'Line Listing – All Submitted AU data by Location' to answer the following questions. For questions answered as "no", please provide explanation.

Intramuscular (IM) Route of Administration:

a. Verify: Ceftriaxone IM usage is being captured in the Emergency Department (ED) as it is often used for treatment of *N. gonorrhea* in ED setting. (Y/N/NA if not submitting ED data)

b. Verify: Other agents are being administered via IM route in ED and if this appears appropriate based upon the specific antimicrobial agent (i.e., oral cephalosporin should not be documented as 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 (i.e., oral cephalosporin should not be documented 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: Continuous or extended infusions (e.g., piperacillin-tazobactam) are being accurately captured 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 parenteral formulation of vancomycin that is administered orally for *C. difficile* is being captured as digestive rather than IV route of administration if applicable for your facility. (Y/N/NA)

Section C. Post-CDA submission validation to be performed using the NHSN application

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: Zanamivir is being captured via respiratory route. (Y/N)

k. Question: Is amikacin, gentamicin, or tobramycin respiratory usage being captured in ICUs or units with patients who have cystic fibrosis or atypical mycobacterial infections? (Y/N)

l. Verify: Aztreonam, colistin, and/or polymyxcin B respiratory administrations are being captured. In general, we anticipate less usage than aminoglycosides via respiratory route. (Y/N)

m. Question: Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

2. Evaluate location-specific "expected" patterns for general trends

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, and cefazolin? (Y/N)

b. Question: Review ED usage (if applicable). Did you find usage of antibiotics such as ceftriaxone, doxycycline, cefixime, and/or azithromycin 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)

Section C. Post-CDA submission validation to be performed using the NHSN application

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 liposomal products. (Y/N)

g. **Question:** Review any locations reporting zero antimicrobial days for **all** drugs. Were zero antimicrobials administered in that location for that month (a true zero) or were antimicrobials administered during that month but not accurately electronically captured? (Y/N/NA)

h. **Question:** Did you identify any potential inconsistencies or errors? If so, how did you address these issues?

3. 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:** Non-formulary and rarely used agents are being captured. (Y/N)

b. **Verify:** Correct usage of N/A or zero. (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 "zero" is reported when the facility had no administrations of the drug and/or route of administration during the given month in the specific location. In NHSN, "N/A" is shown as "." in the line list.

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)

Section C. Post-CDA submission validation to be performed using the NHSN application

d. Verify: Osetamivir and zanamivir usage during flu season with potential peaks in usage in January and February. (Y/N)

e. 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)

4. Evaluate aggregate numbers for antimicrobial days versus stratification by route of administration for a specific agent
Note: Per AU Option protocol, antimicrobial days (total) attributes one antimicrobial day for any of the specified routes of administration (i.e., days of same agent across routes should not be cumulative in cases where the drug is administered more than once daily).

Methodology: Use the Antimicrobial Use 'Line listing – All Submitted AU data for FacWideIN' to answer the following questions. While the FacWideIN line list is recommended to be able to review all drugs for a given month, the questions can also be answered using the location-specific line list.

Evaluate fluoroquinolones, vancomycin, aminoglycosides and any other agents with more than one route of administration captured (i.e., IV and digestive). Please list the value of total antimicrobial days and the summed value of antimicrobial days for each route of administration in the table below.

Month/Year	Location/FacWideIN	Drug	Total Antimicrobial Days	Total Antimicrobial Days for Aggregate of All Routes of Administration

a. Question: Are the drug-specific antimicrobial days (total) lower than adding up IM, IV, Digestive, and Respiratory? (Y/N)

Section C. Post-CDA submission validation to be performed using the NHSN application

b. Question: Confirm that non-AU Option routes of administration are being appropriately excluded from the drug specific total antimicrobial days (e.g., topical, eye drops). (Y/N)
Note: If the total antimicrobial days for a given drug is higher than the sum of the routes, then the total may be including non-AU Option routes.

5. Evaluate FacWideIN calculations

- Questions 5 & 6 were also included in Section B. If you've already answered these questions while completing Section B, you may skip these questions in Section C. If you did not complete Section B, please proceed with the following questions.

Methodology: Use the Antimicrobial Use 'Line listing – All Submitted AU data for FacWideIN' to answer the following questions. Modify the report to remove the location = FacWideIN filter so that all individual locations and FacWideIN will show up on the line list. Choose three commonly used drugs, which are administered more than once per day, to review. Add a filter to review the three specific drugs you've chosen to limit the data in the output.

For 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 administrated 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 1 total piperacillin-tazobactam antimicrobial day to both the medical ward and the medical ICU but could still only attribute 1 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 sum 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				

a. 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)

Section C. Post-CDA submission validation to be performed using the NHSN application

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

i. **Question:** Are non-inpatient locations (e.g., ED or 24hr observation) being incorrectly included in the FacWideIN calculations? (Y/N)

ii. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)

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

iii. **Question:** Are all inpatient locations (including Operating Rooms, Interventional Radiology if applicable) being included in the vendor's FacWideIN logic? (Y/N)

Methodology: Use the Antimicrobial Use 'Line listing – All Submitted AU data for FacWideIN' to answer the following question. Modify the report to remove the location = FacWideIN filter so that all individual locations and FacWideIN will show up on the line list. Since only the denominators are needed for this question, add a filter to select one specific drug to limit the data in the output.

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

b. **Question:** Are *days present* for FacWideIN fewer than adding up days present by location? (Y/N)
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.

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

i. **Question:** Are non-inpatient locations (e.g., ED or 24hr observation) being incorrectly included in the FacWideIN calculations? (Y/N)

ii. **Question:** Are you missing a reportable inpatient location when doing the location-specific sums? (Y/N)

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

iii. **Question**: Are all inpatient locations (including Operating Rooms, Interventional Radiology if applicable) being included in the vendor's FacWideIN logic? (Y/N)

Section C. Post-CDA submission validation to be performed using the NHSN application

6. Evaluate the AU Option denominators

- Questions 5 & 6 were also included in Section B. If you've already answered these questions while completing Section B, you may skip these questions in Section C. If you did not complete Section B, please proceed to the questions below.

Methodology: The denominator patient days is used for NHSN HAI Modules either through manual or electronic capture.

Note: For AU Option Days Present, the patient is counted in the location if they are physically there for any period during the calendar day. For HAI Patient Days, the patient is counted in the location if they are physically for the once daily census count. Therefore, AU Days Present should be higher than HAI Patient Days for a given location.

Prior to answering the question below, please list the days present and patient days reported for the locations in the table below and calculate the percent difference. The HAI patient days can be found on the NHSN Device-Associated summary records used for CLABSI/CAUTI reporting. We recommend checking at least two ICU locations, two ward locations, and one NICU location (if applicable).

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 for adult and pediatric ICUs and wards are 29% higher than the HAI patient days for the same location. On average the AU days present for NICU locations are 14% higher than the HAI patient days for the same location.

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

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

a. **Question:** If your facility has calculated/reported HAI *patient days* per patient care location for the NHSN Device-Associated Module (e.g., CLABSI, CAUTI), are AU *days present* greater than HAI *patient days* for a specific location for same time period? (Y/N/NA)

Section C. Post-CDA submission validation to be performed using the NHSN application

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, a patient can only be counted once in a location per day).

ii. If AU Days Present are **equal** to the HAI patient days, check with your vendor as this should never happen.

iii. If AU Days present are **lower** than the HAI patient days, check with your vendor to make sure all patients are being included in the location counts regardless of patient status (e.g., observation, emergency).

Prior to answering the question below, please list the days present, patient days, and admissions reported for FacWideIN in the table below. The HAI FacWideIN patient days and admissions can be found on the NHSN MDRO summary records used for LabID reporting.

Note: For facilities participating in CMS reporting, FacWideIN patient days are required to be reported within the monthly MDRO summary record. You may need to ask your IP for help in finding these numbers within NHSN.

Month/Year	Total AU Days Present for FacWideIN	Total HAI Patient Days for FacWideIN MDRO		Total AU Admissions for FacWideIN	Total HAI Admissions for FacWideIN MDRO

b. **Question:** If your facility has calculated/reported HAI *patient-days* for FacWideIN for the NHSN MDRO Module, are FacWideIN AU *days present* greater than HAI *patient-days* for FacWideIN for same time period? (Y/N/NA)

If the counts for FacWideIN HAI patient days are **higher** than AU days present:

i. **Question:** Are additional locations being included in the HAI patient day counts? (Y/N)
Note: For AU reporting, FacWideIN should only include those locations where both the numerator and denominator can be accurately electronically captured so some locations might be excluded from AU FacWideIN and included in HAI FacWideIN.

c. **Question:** If your facility has reported monthly MDRO summary records, are the admissions numbers reported within the AU Option and the MDRO Module roughly the same? (Y/N/NA)
Note: The same definition of admissions is used in both Modules.

Section C. Post-CDA submission validation to be performed using the NHSN application

Prior to answer the question below, please list the days present and encounters reported for the Emergency Department and 24-hour Observation locations in the table below. The HAI MDRO patient days can be found on the NHSN MDRO summary records used for LabID reporting.

Note: Facilities with EDs and/or 24-hour observation locations participating in CMS reporting are required to report location-specific MDRO encounters in the monthly MDRO summary record. MDRO encounters is the same definition as AU days present. Therefore these numbers should be equal or almost equal depending on the data sources that were used to obtain the counts. You may need to ask your IP for help in finding these numbers within NHSN.

Location	Month/Year	Total AU Days Present	Total HAI MDRO Encounters
Emergency Department			
24-hour Observation			

d. Question: If your facility has calculated/reported HAI MDRO *encounters* for your Emergency Department (ED) and/or 24-hour observation locations for the NHSN MDRO Module, are ED and 24-hour observation AU *days present* roughly equal to the HAI encounters for those outpatient locations for same time period? (Y/N/NA)

End Section C: Post-CDA Submission Validation