LACDPH Antibiotic Stewardship Program

Basics about the National Healthcare Safety Network (NHSN) Standardized Antimicrobial Administration Ratio (SAAR)

What is the standardized antimicrobial administration ratio (SAAR)?

The SAAR is a risk adjusted measure of antibiotic use that provides a national benchmark for a facility's reported antibiotic use (AU) in a defined time-period (i.e., month, quarter or year).

How are SAARs calculated?

NHSN calculates the SAAR by dividing the number of observed antimicrobial days of therapy (DOT) (reported by facilities to NHSN) by the number of predicted antimicrobial DOTs (calculated by NHSN).

SAAR = Observed antimicrobial DOTs/Predicted antimicrobial DOTs, where:

- **A SAAR value < 1 indicates observed AU was less than predicted AU**
- **A SAAR value = 1 indicates observed AU was equivalent to predicted AU**
- **A SAAR value >1 indicates observed AU was greater than predicted AU**

What are predicted antimicrobial DOTs?

Predicted antimicrobial DOTs are calculated by NHSN using models that consider specific hospital features and length of stay data reported by facilities to NHSN. The current models used by NHSN are based on hospital data collected in 2023. The models are updated every few years.

What are the SAAR antimicrobial categories?

The SAAR antimicrobial categories are groupings of antibiotics (or antifungals) that share common clinical uses. There are 7 adult SAAR antimicrobial categories, 8 pediatric SAAR antimicrobial categories and 7 neonatal SAAR antimicrobial categories:

Adult SAAR Antimicrobial Categories

All Antibiotics (Excludes below)	BSHO	BSCA	NSBL	GramPos	High CDI Risk	Antifungal
Amikacin Liposome Aztreonam/Avi Cefepime/Enmeta Gepotidacin Sulopenem/Prob	Amikacin (IV) Aztreonam (IV) Cefepime Ceftazidime Gentamicin (IV) Imipenem Meropenem Piperacillin/Tazo Tobramycin (IV)	Cefaclor Cefdinir Cefixime Cefotaxime Cefpodoxime Cefprozil Ceftriaxone Cefuroxime Ciprofloxacin Delafloxacin Ertapenem Levofloxacin Moxifloxacin Pivmecillinam	Amoxicillin Amoxicillin/Clav Ampicillin Ampicillin/Sulb Cefadroxil Cefazolin Cefotetan Cefoxitin Cephalexin Dicloxacillin Nafcillin Oxacillin Penicillin G Penicillin V	Ceftaroline Ceftobiprole Medocaril Dalbavancin Daptomycin Linezolid Oritavancin Tedizolid Telavancin Vancomycin (IV)	Cefaclor Cefdinir Cefepime Cefixime Cefotaxime Cefotetan Cefoxitin Cefpodoxime Cefprozil Ceftazidime Ceftazidime/Avi Ceftriaxone Cefuroxime Ciprofloxacin Clindamycin Delafloxacin Ertapenem Imipenem Imipenem/Rele Levofloxacin Meropenem Meropenem/Vab Moxifloxacin	Anidulafungin Caspofungin Fluconazole Micafungin Rezafungin

BSHO: Broad spectrum antibacterial agents predominantly used for hospital-onset infections; **BSCA**: Broad spectrum antibacterial agents predominantly used for community-acquired infections; **NSBL**: Narrow spectrum beta-lactam agents; **GramPos**: Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA); **CDI**: Antibacterial agents posing the highest risk for *C.difficile* infection; **Antifungal**: Antifungal agents predominantly used for invasive candidiasis

Pediatric SAAR Antimicrobial Categories

All Antibiotics (Excludes below)	BSHO	BSCA	NSBL	GramPos	High CDI Risk	Antifungal	Azithromycin
Amikacin Liposome Aztreonam/Avi Cefepime/Enmeta Gepotidacin Sulopenem/Prob	Amikacin (IV) Aztreonam (IV) Cefepime Ceftazidime Ciprofloxacin Delafloxacin Ertapenem Imipenem Levofloxacin Meropenem Moxifloxacin Piperacillin/Tazo Tobramycin (IV)	Amoxicillin/Clav Ampicillin/Sulb Cefaclor Cefdinir Cefixime Cefotaxime Cefpodoxime Cefprozil Ceftriaxone Cefuroxime Pivmecillinam	Amoxicillin Ampicillin Cefadroxil Cefazolin Cefotetan Cefoxitin Cephalexin Dicloxacillin Nafcillin Oxacillin Penicillin G Penicillin	Ceftaroline Ceftobiprole Medocaril Clindamycin Dalbavancin Daptomycin Linezolid Oritavancin Tedizolid Telavancin Vancomycin (IV)	Cefaclor Cefdinir Cefepime Cefixime Cefotaxime Cefotetan Cefoxitin Cefpodoxime Cefprozil Ceftazidime Ceftazidime/Avi Ceftriaxone Cefuroxime Ciprofloxacin Clindamycin Delafloxacin Ertapenem Imipenem Imipenem/Rele Levofloxacin Meropenem Meropenem/Vab Moxifloxacin	Anidulafungin Caspofungin Fluconazole Micafungin Rezafungin	Azithromycin

BSHO: Broad spectrum antibacterial agents predominantly used for hospital-onset infections; **BSCA**: Broad spectrum antibacterial agents predominantly used for community-acquired infections; **NSBL**: Narrow spectrum beta-lactam agents; **GramPos**: Antibacterial agents predominantly used for resistant Gram-positive infections (e.g., MRSA); **CDI**: Antibacterial agents posing the highest risk for *C.difficile* infection; **Antifungal**: Antifungal agents predominantly used for invasive candidiasis

Neonatal SAAR Antimicrobial Categories

All Antibiotics (Excludes below)	BSHO	Third Generation Cephalosporins	Ampicillin for early-onset sepsis	Vancomycin for late-onset sepsis	Aminoglycosides for early-onset and late-onset sepsis	Fluconazole predominantly used for candidiasis
Amikacin liposomal Aztreonam-Avi Cefepime/Enmeta Gepotidacin Sulopenem/Prob	Cefepime Ertapenem Imipenem Meropenem Piperacillin/Tazo	Cefotaxime Ceftazidime Ceftriaxone	Ampicillin IV	Vancomycin IV	Amikacin IV Gentamicin IV Tobramycin IV	Fluconazole

BSHO: Broad spectrum antibacterial agents predominantly used for hospital-onset infections

What are the SAAR locations?

SAAR locations are hospital wards and units where antimicrobials are commonly used. There are 26 adult SAAR inpatient locations, 9 pediatric SAAR inpatient locations and 4 neonatal SAAR inpatient locations. Note that NHSN may combine related locations and calculate a SAAR for the location grouping (example: the General Ward SAAR combines AU from medical ward, medical-surgical ward and surgical ward locations). SAAR inpatient locations include:

- **Adult**: burn critical care, burn ward, labor and delivery ward, labor-delivery-post-partum suite, medical cardiac critical care, medical critical care, medical ward, medical-surgical critical care, medical-surgical ward, mixed acuity unit, neurological critical care, neurological ward, neurosurgical critical care, neurosurgical ward, oncology general hematology-oncology ward, oncology hematopoietic stem cell transplant ward, orthopedic trauma ward, orthopedic ward, postpartum ward, pulmonary ward, solid organ transplant special care area, step-down unit, surgical cardiothoracic critical care, surgical critical care, surgical ward, trauma critical care

- **Pediatric**: medical critical care, medical ward, medical-surgical critical care, medical-surgical ward, oncology general hematology-oncology ward, oncology hematopoietic stem cell transplant ward, step down unit, surgical cardiothoracic critical care, surgical ward

- **Neonate:** special care nursery (level II), critical care (level II/III), critical care (level III), critical care (level IV)

What are SAAR Types?

A SAAR type is an antimicrobial category – hospital location combination reported for a time-period (month, quarter or year). SAARs are calculated for each antimicrobial category in each hospital location or location grouping. Currently there are 109 adult SAAR types, 36 pediatric SAAR types and 7 neonatal SAAR types.

When are SAARs not calculated by NHSN?

SAARs are not calculated in the following circumstances:

- If there are no patient days or antibiotic use reported for a hospital location during the time-period.
- If the predicted DOTs are 1.0 or lower, the risk of statistical error is greater. This would typically occur in small hospitals and can be addressed by aggregating data over a longer time-period.

What does the SAAR tell you about your facility?

The SAAR provides a national benchmark for the QUANTITY of antibiotic use within a facility. SAAR values can be tracked over time to assess progress toward meeting specific antibiotic stewardship goals or identify other areas of high AU previously not known.

What does the SAAR NOT tell you about your facility's antibiotic use?

The SAAR does not provide information about the APPROPRIATENESS of antibiotic use within a facility. Antibiotic use indications, case-mix index, infectious disease burden, or seasonality are not reported by facilities to NHSN. These data require very large sample sizes to create the predictive AU models.

Why are SAARs valuable?

Tracking AU with an external benchmark provides additional opportunities to identify areas of improvement that can inform antibiotic stewardship actions.

How can SAARs be used by the antimicrobial stewardship programs?

***Actions*:** Identify hospital locations with high (or low) SAARs to direct AS efforts through prospective audit and feedback, preauthorization, medication use evaluation, treatment guideline adherence, etc.
***Tracking*:** Track SAARs over time to identify increases in AU or assess outcomes from interventions. NHSN provides statistical analysis between time points.
***Reporting and physician feedback*:** Include SAARs in routine antibiotic stewardship benchmark reports presented to hospital committees. Provide feedback to physicians who prescribe antibiotics in specific facility locations.
***Education*:** Use SAARs to target prescriber education.

Resources:

- CDC Antimicrobial Use (AU) and Antimicrobial Resistance (AR) Comprehensive Resources
- Leveraging National Health Safety Network (NHSN) AU Data to Inform, Implement and Assess Antibiotic Stewardship Activities
- Strategies to assess antibiotic use to drive improvements
- DASON Clinical Stewardship scenarios
- NHSN AU and AR module
- NHSN AU and AR training videos
- NHSN AU Case Examples
- NHSN Guide to the SAAR
- NHSN FAQs: Antimicrobial use option