

CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL CENTER FOR EMERGING AND ZOO NOTIC
INFECTIOUS DISEASES
DIVISION OF HEALTHCARE QUALITY PROMOTION

NHSN's Guide to the Standardized Antimicrobial Administration Ratio (SAAR)

**A Guide to the SAAR Models Under the
2017 and 2018 Baselines (Abbreviated)**



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Summary

This document provides details for the NHSN Antimicrobial Use (AU) Option 2017 baseline adult and pediatric Standardized Antimicrobial Administration Ratios (SAARs) and the 2018 baseline neonatal SAARs. For NHSN facilities that have submitted applicable data, the 2017 baseline SAARs are available for adult and pediatric AU data for 2017-2026, and the 2018 baseline SAARs are available for neonatal AU data for 2018-2026. Additional 2017 and 2018 baseline SAAR model details can be found [here](#):

O’Leary EN, Edwards JR, Srinivasan A, et al. National Healthcare Safety Network Standardized Antimicrobial Administration Ratios (SAARs): A Progress Report and Risk Modeling Update Using 2017 Data. *Clinical Infectious Diseases* 2020; 71(10): e702–e709.

O’Leary EN, Edwards JR, Srinivasan A, et al. National Healthcare Safety Network 2018 Baseline Neonatal Standardized Antimicrobial Administration Ratios. *Hospital Pediatrics* 2022; 12(2): 190–198.

2017 and 2018 Baseline SAAR Categories

2017 Baseline Adult SAAR Categories

2017 Baseline SAAR Title	Locations	SAAR Type in NHSN
SAARs for all antibacterial agents	All Adult SAAR Locations	Adult_All-Antibacterial_2017
SAARs for broad-spectrum antibacterial agents predominantly used for hospital-onset infections	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_BSHO_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_BSHO_Ward_2017
	Adult Step-down Units	Adult_BSHO_Step_2017
	Adult General Hematology-Oncology Wards	Adult_BSHO_ONC_2017
SAARs for broad-spectrum antibacterial agents predominantly used for community-acquired infections	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_BSCA_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_BSCA_Ward_2017
	Adult Step-down Units	Adult_BSCA_Step_2017
	Adult General Hematology-Oncology Wards	Adult_BSCA_ONC_2017
SAARs for antibacterial agents predominantly used for resistant gram-positive infections (e.g., methicillin-resistant <i>Staphylococcus aureus</i> [MRSA])	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_GramPos_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_GramPos_Ward_2017
	Adult Step-down Units	Adult_GramPos_Step_2017
	Adult General Hematology-Oncology Wards	Adult_GramPos_ONC_2017
SAARs for narrow-spectrum beta-lactam agents	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_NSBL_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_NSBL_Ward_2017
	Adult Step-down Units	Adult_NSBL_Step_2017
	Adult General Hematology-Oncology Wards	Adult_NSBL_ONC_2017
SAARs for antibacterial agents posing the highest risk for <i>Clostridioides difficile</i> infection (CDI)	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_CDI_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_CDI_Ward_2017
	Adult Step-down Units	Adult_CDI_Step_2017

	Adult General Hematology-Oncology Wards	Adult_CDI_ONC_2017
SAARs for antifungal agents predominantly used for invasive candidiasis	Adult Medical, Medical-Surgical, Surgical ICUs	Adult_Antifungal_ICU_2017
	Adult Medical, Medical-Surgical, Surgical Wards	Adult_Antifungal_Ward_2017
	Adult Step-down Units	Adult_Antifungal_Step_2017
	Adult General Hematology-Oncology Wards	Adult_Antifungal_ONC_2017

2017 Baseline Pediatric SAAR Categories

2017 Baseline SAAR Title	Locations	SAAR Type in NHSN
SAARs for all antibacterial agents	All Pediatric SAAR Locations	Ped_All-Antibacterial_2017
SAARs for broad-spectrum antibacterial agents predominantly used for hospital-onset infections	Pediatric Medical and Medical-Surgical ICUs	Ped_BSHO_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_BSHO_Ward_2017
SAARs for broad-spectrum antibacterial agents predominantly used for community-acquired infections	Pediatric Medical and Medical-Surgical ICUs	Ped_BSCA_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_BSCA_Ward_2017
SAARs for antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)	Pediatric Medical and Medical-Surgical ICUs	Ped_GramPos_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_GramPos_Ward_2017
SAARs for narrow-spectrum beta-lactam agents	Pediatric Medical and Medical-Surgical ICUs	Ped_NSBL_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_NSBL_Ward_2017
SAARs for azithromycin	Pediatric Medical and Medical-Surgical ICUs	Ped_Azith_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_Azith_Ward_2017
SAARs for antibacterial agents posing the highest risk for CDI	Pediatric Medical and Medical-Surgical ICUs	Ped_CDI_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_CDI_Ward_2017
SAARs for antifungal agents predominantly used for invasive candidiasis	Pediatric Medical and Medical-Surgical ICUs	Ped_Antifungal_ICU_2017
	Pediatric Medical, Medical-Surgical, Surgical Wards	Ped_Antifungal_Ward_2017

2018 Baseline Neonatal SAAR Categories

2018 Baseline SAAR Title	Locations	SAAR Type in NHSN
SAARs for all antibacterial agents	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_All-Antibacterial_2018
SAARs for vancomycin predominantly used for treatment of late-onset sepsis	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_Vancomycin_2018
SAARs for broad-spectrum antibacterial agents predominantly used for hospital-onset infections	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_BSHO_2018
SAARs for third generation cephalosporins	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_3G-Cephalosporins_2018
SAARs for ampicillin predominantly used for treatment of early-onset sepsis	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_Ampicillin_2018
SAARs for aminoglycosides predominantly used for treatment of early-onset and late-onset sepsis	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_Aminoglycosides_2018
SAARs for fluconazole predominantly used for candidiasis	Special Care Nursery (Level II), Neonatal Critical Care (Level II/III), Neonatal Critical Care (Level III), Neonatal Critical Care (Level IV)	Neo_Fluconazole_2018

Location Types Included in the 2017 and 2018 Baseline SAAR Models

The table below lists the location types eligible for generating SAARs using the 2017 and 2018 baseline models, organized by population (adult, pediatric, and neonatal).

CDC Location Type	CDC Location Code	NSHN Healthcare Service Location (HL7) Code
Adult Patient Care Locations		
Medical Critical Care	IN:ACUTE:CC:M	1027-2
Surgical Critical Care	IN:ACUTE:CC:S	1030-6
Medical-Surgical Critical Care	IN:ACUTE:CC:MS	1029-8
Medical Ward	IN:ACUTE:WARD:M	1060-3
Surgical Ward	IN:ACUTE:WARD:S	1072-8
Medical-Surgical Ward	IN:ACUTE:WARD:MS	1061-1
ONC General Hematology-Oncology Ward	IN:ACUTE:WARD:ONC_HONC	1232-8
Adult Step-down Unit	IN:ACUTE:STEP	1099-1
Pediatric Patient Care Locations		
Pediatric Medical Critical Care	IN:ACUTE:CC:M:PED	1044-7
Pediatric Medical-Surgical Critical Care	IN:ACUTE:CC:MS_PED	1045-4
Pediatric Medical Ward	IN:ACUTE:WARD:M_PED	1076-9
Pediatric Surgical Ward	IN:ACUTE:WARD:S_PED	1086-8
Pediatric Medical-Surgical Ward	IN:ACUTE:WARD:MS_PED	1081-9
Neonatal Patient Care Locations		
Neonatal Special Care Nursery (Level II)	IN:ACUTE:STEP:NURS	1041-3
Neonatal Critical Care (Level II/III)	IN:ACUTE:CC_STEP: NURS	1039-7
Neonatal Critical Care (Level III)	IN:ACUTE:CC:NURS	1040-5
Neonatal Critical Care (Level IV)	IN:ACUTE:CC:NURS_IV	1269-0

Antimicrobial Groupings for 2017 and 2018 Baseline SAAR Calculations

Below are the SAAR antimicrobial agent categories for adult, pediatric, and neonatal populations and antimicrobials included in each category for the 2017 and 2018 baselines.

Adult SAAR Antimicrobial Agent Categories

Adult all antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME
- CEFEPIME/ ENMETAZOBACTAM
- CEFIDEROCOL
- CEFTOBIPROLE MEDOCARIL
- COLISTIN
- DELAFLOXACIN
- ERAVACYCLINE
- IMIPENEM/CILATATIN/RELEBACTAM
- LEFAMULIN
- MEROPENEM/VABORBACTAM
- OMADACYCLINE
- PIPERACILLIN
- PIVMECILLINAM
- PLAZOMICIN
- SULBACTAM/DURLOBACTAM
- TICARCILLIN/CLAVULANATE

Adult broad-spectrum antibacterial agents predominantly used for hospital-onset infections

- AMIKACIN (IV only)
- AZTREONAM (IV only)
- CEFEPIME
- CEFTAZIDIME
- DORIPENEM
- GENTAMICIN (IV only)
- IMIPENEM/CILASTATIN
- MEROPENEM
- PIPERACILLIN/TAZOBACTAM
- TOBRAMYCIN (IV only)

Adult broad-spectrum antibacterial agents predominantly used for community-acquired infections

- CEFACLOR
- CEFDINIR
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFPROZIL
- CEFTRIAXONE

- CEFUROXIME
- CIPROFLOXACIN
- ERTAPENEM
- GEMIFLOXACIN
- LEVOFLOXACIN
- MOXIFLOXACIN

Adult antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)

- CEFTAROLINE
- DALBAVANCIN
- DAPTOMYCIN
- LINEZOLID
- ORITAVANCIN
- QUINUPRISTIN/DALFOPRISTIN
- TEDIZOLID
- TELAVANCIN
- VANCOMYCIN (IV only)

Adult narrow-spectrum beta-lactam agents

- AMOXICILLIN
- AMOXICILLIN/CLAVULANATE
- AMPICILLIN
- AMPICILLIN/SULBACTAM
- CEFADROXIL
- CEFAZOLIN
- CEFOTETAN
- CEFOXITIN
- CEPHALEXIN
- DICLOXACILLIN
- NAFCILLIN
- OXACILLIN
- PENICILLIN G
- PENICILLIN V

Adult antibacterial agents posing the highest risk for CDI

This category contains antimicrobials that are part of other SAAR categories.

- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFTAZIDIME
- CEFTRIAXONE
- CIPROFLOXACIN
- CLINDAMYCIN
- GEMIFLOXACIN
- LEVOFLOXACIN
- MOXIFLOXACIN

Adult antifungal agents predominantly used for invasive candidiasis

- ANIDULAFUNGIN
- CASPOFUNGIN
- FLUCONAZOLE
- MICAFUNGIN

Pediatric SAAR Antimicrobial Agent Categories

Pediatric all antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME
- CEFEPIME/ENMETAZOBACTAM
- CEFIDEROCOL
- CEFTOBIPROLE MEDOCARIL
- COLISTIN
- DELAFLOXACIN
- ERAVACYCLINE
- IMIPENEM/CILATATIN/RELEBACTAM
- LEFAMULIN
- MEROPENEM/VABORBACTAM
- OMADACYCLINE
- PIPERACILLIN
- PIVMECILLINAM
- PLAZOMICIN
- SULBACTAM/DURLOBACTAM
- TICARCILLIN/CLAVULANATE

Pediatric broad-spectrum antibacterial agents predominantly used for hospital-onset infections

- AMIKACIN (IV only)
- AZTREONAM (IV only)
- CEFEPIME
- CEFTAZIDIME
- CIPROFLOXACIN
- DORIPENEM
- ERTAPENEM
- GEMIFLOXACIN
- IMIPENEM/CILASTATIN
- LEVOFLOXACIN
- MEROPENEM
- MOXIFLOXACIN
- PIPERACILLIN/TAZOBACTAM
- TOBRAMYCIN (IV only)

Pediatric broad-spectrum antibacterial agents predominantly used for community-acquired infections

- AMOXICILLIN/CLAVULANATE
- AMPICILLIN/SULBACTAM
- CEFACLOX
- CEFDINIR
- CEFIXIME

- CEFOTAXIME
- CEFPODOXIME
- CEFPROZIL
- CEFTRIAXONE
- CEFUROXIME

Pediatric antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)

- CEFTAROLINE
- CLINDAMYCIN
- DALBAVANCIN
- DAPTOMYCIN
- LINEZOLID
- ORITAVANCIN
- QUINUPRISTIN/DALFOPRISTIN
- TEDIZOLID
- TELAVANCIN
- VANCOMYCIN (IV only)

Pediatric narrow-spectrum beta-lactam agents

- AMOXICILLIN
- AMPICILLIN
- CEFADROXIL
- CEFAZOLIN
- CEFOTETAN
- CEFOXITIN
- CEPHALEXIN
- DICLOXACILLIN
- NAFCILLIN
- OXACILLIN
- PENICILLIN G
- PENICILLIN V

Pediatric azithromycin

- AZITHROMYCIN

Pediatric antibacterial agents posing the highest risk for CDI

This category contains antimicrobials that are part of other SAAR categories.

- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFTAZIDIME
- CEFTRIAXONE
- CIPROFLOXACIN
- CLINDAMYCIN
- GEMIFLOXACIN
- LEVOFLOXACIN
- MOXIFLOXACIN

Pediatric antifungal agents predominantly used for invasive candidiasis

- ANIDULAFUNGIN
- CASPOFUNGIN
- FLUCONAZOLE
- MICAFUNGIN

Neonatal SAAR Antimicrobial Agent Categories

Neonatal All antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME
- CEFEPIME/ENMETAZOBACTAM
- CEFIDEROCOL
- CEFTOBIPROLE MEDOCARIL
- CHLORAMPHENICOL
- COLISTIN
- DALBAVACIN
- DELAFLOXICIN
- DORIPENEM
- DOXYCYCLINE
- ERAVACYCLINE
- ERYTHROMYCIN/SULFISOXAZOLE
- GEMIFLOXACIN
- IMIPENEM/CILASTATIN/RELEBACTAM
- MEROPENEM/VABORBACTAM
- MINOCYCLINE
- OMADACYCLINE
- ORITIVANCIN
- PIPERACILLIN
- PIVMECILLINAM
- PLAZOMICIN
- SULBACTAM/DURLOBACTAM
- TETRACYCLINE
- TIGECYCLINE

Neonatal vancomycin predominantly used for treatment of late-onset sepsis

- VANCOMYCIN (IV only)

Neonatal broad-spectrum antibacterial agents predominantly used for hospital-onset infections

- CEFEPIME (IV only)
- ERTAPENEM (IV only)
- IMIPENEM/CILASTATIN (IV only)
- MEROPENEM (IV only)
- PIPERACILLIN/TAZOBACTAM (IV only)

Neonatal third generation cephalosporins

- CEFOTAXIME (IV only)
- CEFTAZIDIME (IV only)
- CEFTRIAZONE (IV only)

Neonatal ampicillin predominantly used for treatment of early-onset sepsis

- AMPICILLIN (IV only)

Neonatal aminoglycosides predominantly used for treatment of early-onset and late-onset sepsis

- AMIKACIN (IV only)
- GENTAMICIN (IV only)
- TOBRAMYCIN (IV only)

Neonatal fluconazole predominantly used for candidiasis

- FLUCONAZOLE (IV and oral only)

2017 and 2018 Baseline SAAR Model Details

Below are the 2017 baseline adult and pediatric and 2018 neonatal SAAR risk models by SAAR antimicrobial agent category.

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

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.3357	0.05	-2.43	-2.24	2260.98	<0.001
Location type						
Medical ICU	1.0084	0.04	0.92	1.09	531.59	<0.001
Medical-surgical ICU, surgical ICU	0.8825	0.03	0.83	0.94	982.03	<0.001
General hematology-oncology ward	0.3795	0.06	0.27	0.49	43.13	<0.001
Step-down unit	0.2197	0.03	0.16	0.28	49.33	<0.001
Medical ward	0.0781	0.03	0.02	0.13	8.25	0.004
Medical-surgical ward, surgical ward	REF	.	.	.	.	.
Facility type						
Veterans Affairs (VA)	-0.1821	0.03	-0.24	-0.12	37.96	<0.001
Critical access	-0.2465	0.09	-0.42	-0.07	7.92	0.005
Military	-0.6278	0.06	-0.75	-0.50	99.86	<0.001
Women's	-1.1920	0.33	-1.83	-0.55	13.25	<0.001
General acute, oncology, surgical, women's and children's	REF	.	.	.	.	.
Number of ICU beds, facility-wide						
≥8	0.1734	0.05	0.08	0.27	13.07	<0.001
<8	REF	.	.	.	.	.
Average length of hospital stay (in days)						
≥3.6	0.1091	0.03	0.06	0.16	18.02	<0.001
<3.6	REF	.	.	.	.	.
Teaching Status						
Undergraduate only	0.1394	0.03	0.08	0.20	22.09	<0.001
None, graduate, major	REF	.	.	.	.	.

¹ SE=standard error

² CLs=confidence limits

Adult: Broad spectrum antibacterial agents predominantly used for community-acquired infections

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-3.9491	0.18	-4.31	-3.59	472.89	<0.001
Location type						
Medical ICU, medical ward, general hematology-oncology ward	0.3598	0.03	0.31	0.41	197.15	<0.001
Medical-surgical ICU, medical-surgical ward	0.2938	0.03	0.24	0.34	136.88	<0.001
Step-down unit	0.2083	0.03	0.15	0.27	46.93	<0.001
Surgical ICU, surgical ward	REF	.	.	.	.	.
Facility type						
Critical access, general acute care, oncology	1.5380	0.18	1.19	1.89	73.19	<0.001
Surgical, Veterans Affairs	1.2805	0.18	0.92	1.64	49.42	<0.001
Military	1.0781	0.19	0.71	1.44	33.36	<0.001
Women's, women's and children's	REF	.	.	.	.	.
Average length of hospital stay (in days)						
<4.5	0.1714	0.02	0.13	0.21	63.64	<0.001
4.5 - 5.1	0.1128	0.02	0.07	0.16	23.95	<0.001
≥5.2	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
<135	0.2505	0.03	0.20	0.30	99.39	<0.001
135 - 330	0.1545	0.02	0.12	0.19	65.90	<0.001
≥331	REF	.	.	.	.	.
ICU beds (as a percentage of total beds)						
<7.6%	0.1198	0.02	0.07	0.17	23.20	<0.001
≥7.6%	REF	.	.	.	.	.

Adult: Antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-4.0018	0.20	-4.39	-3.61	402.38	<0.001
Location type						
Medical ICU, medical-surgical ICU, surgical ICU	0.8382	0.03	0.77	0.90	667.29	<0.001
Medical ward, medical-surgical ward, hematology-oncology ward, Step-down unit	0.1443	0.03	0.09	0.20	24.78	<0.001
Surgical ward	REF	.	.	.	.	.
Facility type						
Critical access, general acute, oncology, surgical, VA	1.1291	0.19	0.75	1.51	33.69	<0.001
Military	0.7007	0.20	0.30	1.10	12.02	<0.001
Women's, women's and children's	REF	.	.	.	.	.
Number of hospital beds, facility-wide						

≥66	0.1619	0.04	0.09	0.23	19.98	<0.001
<66	REF	.	.	.	.	.
Average length of hospital stay (in days)						
≥3.3	0.1913	0.03	0.14	0.24	51.19	<0.001
<3.3	REF	.	.	.	.	.

Adult: Narrow-spectrum beta-lactam agents

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ ²	χ ² P-Value
Intercept	-3.2228	0.07	-3.36	-3.09	2101.80	<0.001
Location type						
Surgical ICU, surgical ward	1.1285	0.07	1.00	1.26	276.13	<0.001
Medical-surgical ICU, medical-surgical ward	0.5004	0.06	0.37	0.63	60.55	<0.001
Step-down unit	0.2857	0.07	0.15	0.42	17.51	<0.001
Medical ICU, medical ward	0.2145	0.07	0.09	0.34	10.85	0.001
General hematology-oncology ward	REF	.	.	.	.	.
Average length of hospital stay (in days)						
<3.5	0.2612	0.03	0.20	0.32	75.22	<0.001
≥5.8	0.1726	0.03	0.11	0.24	26.40	<0.001
3.5 - 5.7	REF	.	.	.	.	.
ICU beds (as a percentage of total beds)						
≥8.6%	0.1633	0.03	0.11	0.22	30.48	<0.001
<8.6%	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
≥222	0.1112	0.02	0.07	0.16	23.37	<0.001
<222	REF	.	.	.	.	.

Adult: Antifungal agents predominantly used for invasive candidiasis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ ²	χ ² P-Value
Intercept	-6.7391	0.36	-7.44	-6.04	352.37	<0.001
Location type						
Surgical ICU, general hematology-oncology ward	1.2644	0.06	1.15	1.38	440.72	<0.001
Medical ICU, medical-surgical ICU	0.8993	0.04	0.83	0.97	609.34	<0.001
Step-down unit	0.1635	0.04	0.08	0.25	14.45	<0.001
Medical ward, medical-surgical ward, surgical ward	REF	.	.	.	.	.
Number of ICU beds, facility-wide						
≥78	0.7605	0.07	0.62	0.90	113.16	<0.001
15 - 77	0.4798	0.07	0.35	0.61	53.60	<0.001
8 - 14	0.3311	0.07	0.19	0.47	21.62	<0.001
<8	REF	.	.	.	.	.
Number of hospital beds, facility-wide						

176 - 306	0.1611	0.04	0.09	0.23	20.69	<0.001
<176 or ≥307	REF	.	.	.	.	.
Facility type						
Oncology	3.5368	0.59	2.38	4.70	35.74	<0.001
Critical access, general acute care, surgical	1.9238	0.35	1.23	2.62	29.42	<0.001
Military, Veterans Affairs	1.5391	0.36	0.84	2.24	18.53	<0.001
Women's, women's and children's	REF	.	.	.	.	.
Average length of hospital stay (in days)						
≥5.2	0.3836	0.06	0.28	0.49	48.45	<0.001
4.5 - 5.1	0.2550	0.05	0.15	0.36	21.86	<0.001
3.0 - 4.4	0.1685	0.05	0.07	0.27	10.56	0.001
<3.0	REF	.	.	.	.	.

Adult: Complementary group of antibacterial agents

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ ²	χ ² P-Value
Intercept	-2.5547	0.05	-2.66	-2.45	2343.21	<0.001
Location type						
Medical ICU	0.4980	0.04	0.42	0.57	163.19	<0.001
Medical-surgical ICU	0.3324	0.03	0.27	0.39	120.09	<0.001
Surgical ICU, medical ward, medical-surgical ward	0.2152	0.03	0.17	0.26	73.30	<0.001
General hematology-oncology ward, Step-down unit	0.1477	0.03	0.09	0.21	25.14	<0.001
Surgical Ward	REF	.	.	.	.	.
Average length of hospital stay (in days)						
<3	0.1850	0.03	0.14	0.23	54.60	<0.001
≥3	REF	.	.	.	.	.
Facility type						
Critical access, general acute, oncology, surgical, women's, women's and children's	0.3758	0.05	0.28	0.47	59.71	<0.001
Veterans Affairs	0.2708	0.05	0.17	0.37	26.75	<0.001
Military	REF	.	.	.	.	.

Adult: Antibacterial agents posing the highest risk for CDI

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ ²	χ ² P-Value
Intercept	-2.6749	0.06	-2.78	-2.57	2323.70	<0.001
Location type						
Medical ICU, medical-surgical ICU, general hematology-oncology ward	0.4922	0.03	0.44	0.55	309.10	<0.001
Medical ward	0.3392	0.03	0.28	0.40	141.54	<0.001
Surgical ICU, medical-surgical ward, Step-down unit	0.2687	0.03	0.22	0.32	107.26	<0.001
Surgical ward	REF	.	.	.	.	.

Facility type						
Critical access, general acute, oncology, surgical	0.5005	0.05	0.41	0.59	109.63	<0.001
Veterans Affairs	0.2427	0.05	0.14	0.34	21.85	<0.001
Military, women's, women's and children's	REF	.	.	.	.	.
Teaching status						
None, undergraduate, graduate	0.0810	0.02	0.05	0.12	21.04	<0.001
Major	REF	.	.	.	.	.
Average length of hospital stay (in days)						
<5.2	0.0773	0.02	0.04	0.12	15.87	<0.001
≥5.2	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
<442	0.1469	0.02	0.10	0.19	46.73	<0.001
≥442	REF	.	.	.	.	.
Number of ICU beds, facility-wide						
<15	0.0628	0.02	0.02	0.10	9.60	0.002
≥15	REF	.	.	.	.	.

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

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-3.0042	0.16	-3.32	-2.69	354.40	<0.001
ICU beds (as a percentage of total beds)						
≥16.6%	0.2954	0.12	0.06	0.53	5.99	0.014
<16.6%	REF	.	.	.	.	.
Location/Facility type combination						
Medical-surgical ICU in children's, general acute, military, women's and children's hospitals; Medical ward in children's hospitals	0.7558	0.18	0.40	1.11	17.30	<0.001
Medical-surgical ward in children's, general acute, military, women's and children's hospitals	0.4056	0.16	0.08	0.73	6.11	0.013
Medical ICU in general acute care hospitals; Medical ward in general acute, military, women's and children's hospitals; Surgical ward in children's, general acute care hospitals	REF	.	.	.	.	.

Pediatric: Broad spectrum antibacterial agents predominantly used for community-acquired infections

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.8862	0.12	-3.12	-2.65	596.67	<0.001
Number of hospital beds, facility-wide						
<450	0.4758	0.08	0.32	0.63	34.87	<0.001
≥450	REF	.	.	.	.	.

Facility Type						
General acute care, women's and children's	0.5476	0.09	0.37	0.73	36.23	<0.001
Children's, military	REF	.	.	.	.	.
Location type						
Medical-surgical ICU, medical ICU	0.2629	0.08	0.12	0.41	12.28	<0.001
Medical-surgical ward, medical ward, surgical ward	REF	.	.	.	.	.

Pediatric: Narrow-spectrum beta-lactam agents

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.4703	0.04	-2.56	-2.39	3261.86	<0.001
Location/Facility type combination						
Medical-surgical ICU in children's hospitals; Surgical ward in children's, general acute care hospitals	0.6571	0.13	0.40	0.91	24.98	<0.001
Medical and medical-surgical wards in children's, general acute, military, women's and children's hospitals; Medical-surgical ICU in general acute, military, women's and children's; Medical ICU in general acute care hospitals	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
<204 or ≥450	0.3161	0.06	0.19	0.44	25.19	<0.001
204 - 449	REF	.	.	.	.	.

Pediatric: Antibacterial agents predominantly used for resistant gram-positive infections (e.g., MRSA)

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.5518	0.05	-2.65	-2.45	2436.92	<0.001
ICU location	0.4608	0.10	0.27	0.65	23.35	<0.001

Pediatric: Azithromycin

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-6.2324	0.39	-6.99	-5.47	258.24	<0.001
Location type						
Medical-surgical ICU, medical ICU	2.3497	0.39	1.59	3.11	36.79	<0.001
Medical-surgical ward, medical ward	1.9694	0.38	1.22	2.71	26.82	<0.001
Surgical ward	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
<204	0.3832	0.19	0.02	0.75	4.28	0.039
204 - 276	1.3460	0.19	0.98	1.71	51.91	<0.001
277 - 449	0.8030	0.15	0.51	1.09	29.23	<0.001
≥450	REF	.	.	.	.	.

Pediatric: Antifungal agents predominantly used for invasive candidiasis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-5.5790	0.14	-5.85	-5.31	1608.54	<0.001
ICU beds (as a percentage of total beds)						
≥16.6%	0.9569	0.17	0.62	1.29	31.25	<0.001
<16.6%	REF	.	.	.	.	.
Location type						
Medical-surgical ICU, medical ICU	1.1361	0.17	0.80	1.48	42.61	<0.001
Medical-surgical ward, medical ward, surgical ward	REF	.	.	.	.	.

Pediatric: Complementary group of antibacterial agents

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-3.3383	0.09	-3.51	-3.17	1467.30	<0.001
ICU beds (as a percentage of total beds)						
≥16.6%	0.6375	0.09	0.47	0.81	54.01	<0.001
<16.6%	REF	.	.	.	.	.
Average length of hospital stay (in days)						
≥4.5	0.2378	0.09	0.07	0.41	7.49	0.006
<4.5	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
≥450	0.2367	0.10	0.05	0.43	5.99	0.014
<450	REF	.	.	.	.	.

Pediatric: Antibacterial agents posing the highest risk for CDI

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.2753	0.12	-2.51	-2.04	371.36	<0.001
Location type						
Medical-surgical ICU, medical ICU	0.2711	0.08	0.11	0.43	11.33	<0.001
Medical-surgical ward, medical ward, surgical ward	REF	.	.	.	.	.
Number of hospital beds, facility-wide						
<386	0.3145	0.08	0.16	0.47	15.72	<0.001
≥386	REF	.	.	.	.	.
Average length of stay (in days)						
4.1 - 4.7	0.2139	0.08	0.05	0.38	6.65	0.01
<4.1 or ≥4.8	REF	.	.	.	.	.
Facility type						
General acute care, women's and children's	0.3656	0.10	0.17	0.56	13.36	<0.001
Children's, military	REF	.	.	.	.	.

Neonatal: Vancomycin predominantly used for treatment of late-onset sepsis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-7.4328	0.26	-7.93	-6.93	847.31	<.0001
Percentage of annual neonatal admissions that are very low birthweight (≤ 1500 g)						
$\geq 4.0\%$	1.6873	0.23	1.23	2.15	51.95	<.0001
1.3 - 3.9%	1.0009	0.30	0.41	1.59	11.15	0.0008
<1.3%	REF	.	.	.	.	.
Unit type (level of neonatal care) and facility capabilities (Level IV capabilities)						
Level II/III, III, or IV NICU in facility that accepts neonates as transfers for various specified complex procedures ³	2.1816	0.20	1.79	2.57	120.75	<.0001
Level II/III, III, or IV NICU in facility that does NOT accept neonates as transfers for various specified complex procedures ³	1.3515	0.18	1.00	1.71	55.40	<.0001
Level II neonatal step-down unit	REF	.	.	.	.	.

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

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-9.7455	0.56	-10.85	-8.64	301.22	<.0001
Percentage of annual neonatal admissions that are very low birthweight (≤ 1500 g)						
$\geq 5.7\%$	3.6274	0.54	2.57	4.68	45.32	<.0001
1.3 - 5.6%	2.6932	0.56	1.59	3.80	22.79	<.0001
<1.3%	REF	.	.	.	.	.
Unit type (level of care) and facility capabilities (Level IV capabilities)						
Level III or IV NICU in facility that accepts neonates as transfers for various specified complex procedures ³	2.6601	0.32	2.04	3.28	70.12	<.0001
Level II/III NICU; Level III or IV NICU in facility that does NOT accept neonates as transfers for various specified complex procedures ³	1.3772	0.27	0.85	1.91	26.06	<.0001
Level II neonatal step-down unit	REF	.	.	.	.	.

Neonatal: 3rd generation cephalosporins

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-5.8596	0.23	-6.30	-5.41	666.10	<.0001

³ Procedures include: Omphalocele repair; ventriculoperitoneal shunt; tracheoesophageal fistula/esophageal atresia repair; bowel resection/reanastomosis; meningomyelocele repair; cardiac catheterization

Facility demographics (facility type, medical school affiliation, bed size)						
All children's, women's, and women's children's facilities; General acute care and military facilities with medical school affiliation and ≥ 469 beds	1.8304	0.28	1.28	2.38	43.10	<.0001
General acute care and military facilities with medical school affiliation and <469 beds	0.7076	0.26	0.20	1.21	7.60	0.0058
General acute care and military facilities with NO medical school affiliation	REF	.	.	.	.	.

Neonatal: Ampicillin predominantly used for treatment of early-onset sepsis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.5079	0.05	-2.61	-2.41	2546.04	<.0001
Number of annual outborn admissions						
0 outborn admissions	0.3869	0.09	0.21	0.57	18.03	<.0001
1 or more outborn admissions	REF	.	.	.	.	.
Percentage of annual neonatal admissions that are very low birthweight (≤ 1500 g)						
<11.3%	0.3748	0.07	0.25	0.50	32.14	<.0001
$\geq 11.3\%$	REF	.	.	.	.	.

Neonatal: Aminoglycosides predominantly used for treatment of early-onset and late-onset sepsis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-2.7661	0.05	-2.87	-2.66	2568.30	<.0001
Number of annual outborn admissions						
0 outborn admissions	0.4138	0.10	0.22	0.61	17.06	<.0001
1 or more outborn admissions	REF	.	.	.	.	.
Percentage of annual neonatal admissions that are very low birthweight (≤ 1500 g)						
<11.3%	0.3601	0.07	0.22	0.50	24.57	<.0001
$\geq 11.3\%$	REF	.	.	.	.	.

Neonatal: Fluconazole predominantly used for candidiasis

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-7.0101	0.24	-7.48	-6.54	864.20	<.0001
Percentage of annual neonatal admissions with birthweight ≤ 750 g						
$\geq 1.3\%$	2.5920	0.26	2.08	3.10	98.85	<.0001
0.2 - 1.2%	1.1725	0.30	0.58	1.76	15.20	<.0001
<0.2%	REF	.	.	.	.	.

Neonatal: All antibacterial agents

Parameter	Estimate	SE ¹	Wald 95% CLs ²		Wald χ^2	χ^2 P-Value
Intercept	-1.7363	0.06	-1.86	-1.61	775.02	<.0001
Level of neonatal care and overall neonatal reporting to AU Option						
Level III or IV unit in a facility with Level II and/or II/III unit(s) reporting ⁴	0.4858	0.12	0.24	0.73	15.54	<.0001
Level II or II/III unit OR Level III/IV unit in a facility without Level II or II/III unit(s) reporting ⁴	REF	.	.	.	.	.
Number of annual outborn admissions						
0 outborn admissions	0.3153	0.08	0.17	0.46	17.70	<.0001
1 or more outborn admissions	REF	.	.	.	.	.
Percentage of annual neonatal admissions that are normal birthweight (>2500g)						
≥54.1%	0.2429	0.06	0.13	0.35	18.75	<.0001
<54.1%	REF	.	.	.	.	.
Total number of annual neonatal admissions						
≥268 annual admissions	0.1786	0.06	0.07	0.29	9.93	0.0016
<268 annual admissions	REF	.	.	.	.	.

⁴ Neonatal units present within a facility AND for which data is being reported to the AU Option