

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
2023 Baseline (Interim)**



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Summary

The Standardized Antimicrobial Administration Ratio (SAAR) is the primary summary metric used by the National Healthcare Safety Network (NHSN) to track antimicrobial use in hospitals. This quick interim guide provides key details on the 2023 baseline SAAR models. A comprehensive SAAR Guide—including methods used in model development and recommendations for use—will be updated and released in early 2026.

This Guide contains:

- Location types included in the 2023 baseline SAAR models
- Antimicrobial agents included in each 2023 baseline SAAR category
- Risk adjustment models under the 2023 national baseline

Location Types Included in the 2023 Baseline SAAR Models

The table below lists, by alphabetical order, the location types eligible for generating SAARs using the 2023 baseline models, organized by population (adult, pediatric, and neonatal). Location types that are newly eligible (i.e., not included in previous baseline) are noted in the final column.

| CDC Location Type | CDC Location Code | New SAAR eligible location type? |
|--|--------------------------|----------------------------------|
| Adult Patient Care Locations | | |
| Burn Critical Care | IN:ACUTE:CC:B | Yes |
| Burn Ward | IN:ACUTE:WARD:B | Yes |
| Labor and Delivery Ward | IN:ACUTE:WARD:LD | Yes |
| Labor, Delivery, Recovery, Postpartum Suite | IN:ACUTE:WARD:LD_PP | Yes |
| Medical Cardiac Critical Care | IN:ACUTE:CC:C | Yes |
| Medical Critical Care | IN:ACUTE:CC:M | |
| Medical Ward | IN:ACUTE:WARD:M | |
| Medical-Surgical Critical Care | IN:ACUTE:CC:MS | |
| Medical-Surgical Ward | IN:ACUTE:WARD:MS | |
| Mixed Acuity Unit | IN:ACUTE:MIXED:ALL_ADULT | Yes |
| Neurologic Critical Care | IN:ACUTE:CC:N | Yes |
| Neurology Ward | IN:ACUTE:WARD:N | Yes |
| Neurosurgical Critical Care | IN:ACUTE:CC:NS | Yes |
| Neurosurgical Ward | IN:ACUTE:WARD:NS | Yes |
| Oncology General Hematology-Oncology Ward | IN:ACUTE:WARD:ONC_HONC | |
| Oncology Hematopoietic Stem Cell Transplant Ward | IN:ACUTE:WARD:ONC_HSCT | Yes |
| Orthopedic Trauma Ward | IN:ACUTE:WARD:T_ORT | Yes |
| Orthopedic Ward | IN:ACUTE:WARD:ORT | Yes |
| Postpartum Ward | IN:ACUTE:WARD:PP | Yes |
| Pulmonary Ward | IN:ACUTE:WARD:PULM | Yes |
| Solid Organ Transplant Special Care Area | IN:ACUTE:SCA:SOTP | Yes |
| Step-down Unit | IN:ACUTE:STEP | |
| Surgical Cardiothoracic Critical Care | IN:ACUTE:CC:CT | Yes |
| Surgical Critical Care | IN:ACUTE:CC:S | |

| | | |
|--|----------------------------|-----|
| Surgical Ward | IN:ACUTE:WARD:S | |
| Trauma Critical Care | IN:ACUTE:CC:T | Yes |
| Pediatric Patient Care Locations | | |
| Pediatric Medical Critical Care | IN:ACUTE:CC:M_PED | |
| Pediatric Medical Ward | IN:ACUTE:WARD:M_PED | |
| Pediatric Medical-Surgical Critical Care | IN:ACUTE:CC:MS_PED | |
| Pediatric Medical-Surgical Ward | IN:ACUTE:WARD:MS_PED | |
| Pediatric Oncology General Hematology-Oncology Ward | IN:ACUTE:WARD:ONC_HONC_PED | Yes |
| Pediatric Oncology Hematopoietic Stem Cell Transplant Ward | IN:ACUTE:WARD:ONC_HSCT_PED | Yes |
| Pediatric Step-down Unit | IN:ACUTE:STEP:PED | Yes |
| Pediatric Surgical Cardiothoracic Critical Care | IN:ACUTE:CC:CT_PED | Yes |
| Pediatric Surgical Ward | IN:ACUTE:WARD:S_PED | |
| Neonatal Patient Care Locations | | |
| Neonatal Special Care Nursery (Level II) | IN:ACUTE:STEP:NURS | |
| Neonatal Critical Care (Level II/III) | IN:ACUTE:CC_STEP:NURS | |
| Neonatal Critical Care (Level III) | IN:ACUTE:CC:NURS | |
| Neonatal Critical Care (Level IV) | IN:ACUTE:CC:NURS_IV | |

Antimicrobial Groupings for 2023 Baseline SAAR Calculations

Below are the SAAR antimicrobial agent categories for adult, pediatric, and neonatal populations and antimicrobials included in each category for the 2023 baseline.

Adult SAAR Antimicrobial Agent Categories

Adult All antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME
- CEFEPIME/ENMETAZOACTAM

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

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

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

- CEACLOR
- CEFDINIR
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFPROZIL
- CEFTRIAZONE
- CEFUROXIME
- CIPROFLOXACIN
- DELAFLOXACIN
- ERTAPENEM
- LEVOFLOXACIN
- MOXIFLOXACIN
- PIVMECILLINAM

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

- CEFTAROLINE
- CEFTOBIPROLE MEDOCARIL
- DALBAVANCIN
- DAPTOMYCIN

- LINEZOLID
- ORITAVANCIN
- 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.

- CEFACLOR
- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFOTETAN
- CEFOXITIN
- CEFPODOXIME
- CEFPROZIL
- CEFTAZIDIME
- CEFTAZIDIME/AVIBACTAM
- CEFTRIAZONE
- CEFUROXIME
- CIPROFLOXACIN
- CLINDAMYCIN
- DELAFLOXACIN
- ERTAPENEM
- IMIPENEM/CILASTATIN
- IMIPENEM/CILASTATIN/RELEBACTAM
- LEVOFLOXACIN
- MEROPENEM
- MEROPENEM/VABORBACTAM
- MOXIFLOXACIN

Adult Antifungal agents predominantly used for invasive candidiasis

- ANIDULAFUNGIN
- CASPOFUNGIN
- FLUCONAZOLE
- MICAFUNGIN
- REZAFUNGIN

Pediatric SAAR Antimicrobial Agent Categories

Pediatric All antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME
- CEFEPIME/ENMETAZOACTAM

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

- AMIKACIN (IV only)
- AZTREONAM (IV only)
- CEFEPIME
- CEFTAZIDIME
- CIPROFLOXACIN
- DELAFLOXACIN
- ERTAPENEM
- IMIPENEM/CILASTATIN
- LEVOFLOXACIN
- MEROPENEM
- MOXIFLOXACIN
- PIPERACILLIN/TAZOACTAM
- TOBRAMYCIN (IV only)

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

- AMOXICILLIN/CLAVULANATE
- AMPICILLIN/SULBACTAM
- CEFACLOR
- CEFDINIR
- CEFIXIME
- CEFOTAXIME
- CEFPODOXIME
- CEFPROZIL
- CEFTRIAZONE
- CEFUROXIME
- PIVMECILLINAM

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

- CEFTAROLINE
- CEFTOBIPROLE MEDOCARIL
- CLINDAMYCIN
- DALBAVANCIN

- DAPTOMYCIN
- LINEZOLID
- ORITAVANCIN
- 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.

- CEFACLOR
- CEFDINIR
- CEFEPIME
- CEFIXIME
- CEFOTAXIME
- CEFOTETAN
- CEFOXITIN
- CEFPODOXIME
- CEFPROZIL
- CEFTAZIDIME
- CEFTAZIDIME/AVIBACTAM
- CEFTRIAZONE
- CEFUROXIME
- CIPROFLOXACIN
- CLINDAMYCIN
- DELAFLOXACIN
- ERTAPENEM
- IMIPENEM/CILASTATIN
- IMIPENEM/CILASTATIN/RELEBACTAM
- LEVOFLOXACIN
- MEROPENEM
- MEROPENEM/VABORBACTAM
- MOXIFLOXACIN

Pediatric Antifungal agents predominantly used for invasive candidiasis

- ANIDULAFUNGIN
- CASPOFUNGIN
- FLUCONAZOLE
- MICA FUNGIN
- REZAFUNGIN

Neonatal SAAR Antimicrobial Agent Categories

Neonatal All antibacterial agents

All antibacterial agents in the AUR protocol except:

- AMIKACIN LIPOSOME

Neonatal Vancomycin

- VANCOMYCIN (IV only)

Neonatal Broad spectrum gram-negative coverage

- 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

- AMPICILLIN (IV and IM only)

Neonatal Aminoglycosides

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

Neonatal Fluconazole

- FLUCONAZOLE (IV and oral only)

2023 Baseline SAAR Model Details

Below are the 2023 baseline adult, pediatric, and 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 | -4.9392 | 0.048 | -5.034 | -4.845 | 10451.80 | <.0001 |
| Location Type | | | | | | |
| Medical ICU | 3.0644 | 0.024 | 3.017 | 3.112 | 15893.80 | <.0001 |
| Oncology Hematopoietic Stem Cell Transplant Ward | 2.9621 | 0.059 | 2.847 | 3.077 | 2544.47 | <.0001 |
| Medical-Surgical ICU, Surgical ICU | 2.9448 | 0.017 | 2.911 | 2.979 | 28984.80 | <.0001 |
| Burn ICU, Medical Cardiac ICU, Trauma ICU | 2.7411 | 0.032 | 2.678 | 2.804 | 7210.87 | <.0001 |
| Surgical Cardiothoracic ICU, Neurologic ICU, Neurosurgical ICU | 2.5611 | 0.026 | 2.510 | 2.613 | 9474.91 | <.0001 |
| Solid Organ Transplant Special Care Area | 2.5036 | 0.073 | 2.361 | 2.646 | 1179.62 | <.0001 |
| Burn Ward, General Hematology-Oncology Ward, Pulmonary Ward | 2.4750 | 0.028 | 2.420 | 2.530 | 7711.94 | <.0001 |
| Mixed Acuity Unit, Step-Down Unit | 2.2976 | 0.017 | 2.264 | 2.331 | 17896.70 | <.0001 |
| Medical-Surgical Ward, Surgical Ward | 2.1882 | 0.015 | 2.160 | 2.217 | 22303.50 | <.0001 |
| Medical Ward | 2.1105 | 0.017 | 2.078 | 2.143 | 15988.70 | <.0001 |
| Orthopedic Ward, Orthopedic Trauma Ward | 1.7345 | 0.028 | 1.680 | 1.789 | 3850.68 | <.0001 |
| Neurosurgical Ward | 1.5232 | 0.057 | 1.412 | 1.635 | 717.85 | <.0001 |
| Neurology Ward | 1.3758 | 0.044 | 1.290 | 1.462 | 990.20 | <.0001 |
| Labor and Delivery Ward, Labor and Delivery/Postpartum Ward, Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Critical Access, General Acute Care, Oncology, Surgical, Veterans Affairs | 0.4214 | 0.043 | 0.338 | 0.505 | 97.65 | <.0001 |
| Children's, Military, Orthopedic, Psychiatric, Women's, Women's and Children's | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| ≥5 | 0.2593 | 0.020 | 0.219 | 0.299 | 161.90 | <.0001 |
| <5 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥2.8 | 0.0909 | 0.022 | 0.047 | 0.135 | 16.63 | <.0001 |
| 1.0 - 2.7 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Undergraduate, Major | 0.0446 | 0.014 | 0.018 | 0.071 | 10.94 | 0.0009 |
| Graduate | 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 | -6.0608 | 0.074 | -6.205 | -5.916 | 6769.17 | <.0001 |
| Location Type | | | | | | |
| Oncology Hematopoietic Stem Cell Transplant Ward | 3.8199 | 0.057 | 3.708 | 3.932 | 4468.77 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Pulmonary Ward, General Hematology-Oncology Ward | 2.9825 | 0.014 | 2.955 | 3.010 | 45304.80 | <.0001 |
| Medical ICU, Medical-Surgical ICU | 2.9631 | 0.016 | 2.931 | 2.995 | 32481.50 | <.0001 |
| Mixed Acuity Unit, Step-Down Unit, Solid Organ Transplant Special Care Area | 2.8558 | 0.017 | 2.823 | 2.889 | 28655.60 | <.0001 |
| Surgical Ward | 2.7151 | 0.021 | 2.675 | 2.756 | 17369.70 | <.0001 |
| Medical Cardiac ICU, Neurologic ICU, Neurosurgical ICU, Surgical ICU | 2.6716 | 0.024 | 2.625 | 2.718 | 12833.40 | <.0001 |
| Burn ICU, Surgical Cardiothoracic ICU, Trauma ICU | 2.5765 | 0.028 | 2.522 | 2.631 | 8534.99 | <.0001 |
| Burn Ward, Neurology Ward, Neurosurgical Ward, Orthopedic Ward, Orthopedic Trauma Ward | 2.4581 | 0.023 | 2.413 | 2.503 | 11531.20 | <.0001 |
| Labor and Delivery Ward, Labor and Delivery/Postpartum Ward, Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Critical Access, Oncology | 1.0365 | 0.080 | 0.881 | 1.192 | 169.86 | <.0001 |
| General Acute Care, Surgical, Veterans Affairs | 0.9325 | 0.074 | 0.788 | 1.077 | 159.54 | <.0001 |
| Military, Psychiatric | 0.4831 | 0.089 | 0.308 | 0.658 | 29.35 | <.0001 |
| Children's, Orthopedic, Women's, Women's and Children's | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| 5 - 11 | 0.2936 | 0.018 | 0.258 | 0.329 | 267.84 | <.0001 |
| 12 - 33 | 0.1695 | 0.014 | 0.143 | 0.196 | 158.67 | <.0001 |
| <5 | 0.1342 | 0.026 | 0.083 | 0.186 | 25.96 | <.0001 |
| 34 - 82 | 0.1200 | 0.012 | 0.097 | 0.143 | 101.99 | <.0001 |
| ≥83 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Undergraduate | 0.0947 | 0.012 | 0.072 | 0.117 | 67.78 | <.0001 |
| Graduate | 0.0404 | 0.014 | 0.013 | 0.067 | 8.59 | 0.0034 |
| Major | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| 1.0 - 5.1 | 0.0807 | 0.010 | 0.061 | 0.100 | 66.24 | <.0001 |
| ≥5.2 | 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 | -6.6969 | 0.094 | -6.882 | -6.512 | 5045.09 | <.0001 |
| Location Type | | | | | | |
| Medical ICU | 4.0969 | 0.030 | 4.038 | 4.156 | 18256.60 | <.0001 |
| Burn Ward | 3.9966 | 0.117 | 3.768 | 4.225 | 1172.82 | <.0001 |
| Burn ICU, Surgical Cardiothoracic ICU, Medical-Surgical ICU, Surgical ICU | 3.9779 | 0.025 | 3.929 | 4.027 | 25682.60 | <.0001 |
| Medical Cardiac ICU, Neurologic ICU, Neurosurgical ICU, Trauma ICU | 3.7961 | 0.033 | 3.733 | 3.860 | 13666.80 | <.0001 |
| Oncology Hematopoietic Stem Cell Transplant Ward, Orthopedic Ward, Pulmonary Ward | 3.5030 | 0.031 | 3.442 | 3.564 | 12515.10 | <.0001 |
| Mixed Acuity Unit, Step-Down Unit, Solid Organ Transplant Special Care Area | 3.3782 | 0.025 | 3.329 | 3.427 | 18108.20 | <.0001 |
| General Hematology-Oncology Ward, Medical Ward, Medical-Surgical Ward, Orthopedic Trauma Ward | 3.3604 | 0.023 | 3.315 | 3.406 | 20871.20 | <.0001 |
| Neurosurgical Ward, Surgical Ward | 3.2942 | 0.027 | 3.241 | 3.348 | 14470.20 | <.0001 |
| Neurology Ward | 2.8222 | 0.047 | 2.731 | 2.914 | 3638.74 | <.0001 |
| Labor and Delivery Ward | 0.5374 | 0.032 | 0.475 | 0.600 | 279.93 | <.0001 |
| Labor and Delivery/Postpartum Ward | 0.3214 | 0.032 | 0.259 | 0.384 | 100.55 | <.0001 |
| Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| General Acute Care, Psychiatric, Surgical, Veterans Affairs | 0.6592 | 0.090 | 0.482 | 0.836 | 53.31 | <.0001 |
| Critical Access, Military, Oncology, Orthopedic | 0.5269 | 0.093 | 0.344 | 0.710 | 31.93 | <.0001 |
| Children's, Women's, Women's and Children's | REF | . | . | . | . | . |
| ICU beds (as a percentage of total beds), facility-wide | | | | | | |
| ≥23.1% | 0.0362 | 0.014 | 0.008 | 0.064 | 6.50 | 0.0108 |
| 18.9% - 23.0% | 0.0690 | 0.014 | 0.042 | 0.096 | 25.13 | <.0001 |
| 12.6% -18.8% | 0.0217 | 0.010 | 0.002 | 0.042 | 4.43 | 0.0353 |
| <12.6% | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥6.4 | 0.2262 | 0.025 | 0.178 | 0.274 | 84.55 | <.0001 |
| 4.6 - 6.3 | 0.1521 | 0.023 | 0.108 | 0.196 | 45.42 | <.0001 |
| 2.8 - 4.5 | 0.1147 | 0.022 | 0.071 | 0.159 | 26.15 | <.0001 |
| 1.0 - 2.7 | REF | . | . | . | . | . |

Adult: Narrow-spectrum beta-lactam agents

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -3.5688 | 0.063 | -3.692 | -3.446 | 3236.97 | <.0001 |
| Location Type | | | | | | |
| Orthopedic Ward | 2.1686 | 0.066 | 2.039 | 2.298 | 1071.37 | <.0001 |
| Labor and Delivery Ward, Orthopedic Trauma Ward | 1.7985 | 0.064 | 1.673 | 1.924 | 784.80 | <.0001 |
| Surgical Cardiothoracic ICU | 1.7575 | 0.068 | 1.624 | 1.891 | 666.21 | <.0001 |
| Surgical Ward | 1.4760 | 0.063 | 1.353 | 1.600 | 548.36 | <.0001 |
| Neurologic ICU, Neurosurgical ICU, Surgical ICU, Trauma ICU | 1.3853 | 0.065 | 1.259 | 1.512 | 461.83 | <.0001 |
| Burn Ward, Labor and Delivery/Postpartum Ward, Neurosurgical Ward | 1.2910 | 0.064 | 1.166 | 1.416 | 411.71 | <.0001 |
| Medical-Surgical Ward | 1.0456 | 0.061 | 0.925 | 1.166 | 290.20 | <.0001 |
| Burn ICU | 0.8968 | 0.106 | 0.690 | 1.104 | 71.94 | <.0001 |
| Mixed Acuity Unit | 0.8883 | 0.065 | 0.762 | 1.015 | 188.62 | <.0001 |
| Neurology Ward | 0.8607 | 0.074 | 0.715 | 1.006 | 133.98 | <.0001 |
| Medical Cardiac ICU, Medical-Surgical ICU | 0.8540 | 0.062 | 0.733 | 0.976 | 189.76 | <.0001 |
| Medical Ward | 0.7462 | 0.062 | 0.625 | 0.867 | 146.63 | <.0001 |
| Step-down Unit, Solid Organ Transplant Special Care Area | 0.7447 | 0.062 | 0.623 | 0.867 | 143.37 | <.0001 |
| Medical ICU | 0.6869 | 0.064 | 0.561 | 0.813 | 114.11 | <.0001 |
| General Hematology-Oncology Ward, Pulmonary Ward | 0.5400 | 0.066 | 0.410 | 0.670 | 66.69 | <.0001 |
| Postpartum Ward | 0.4732 | 0.064 | 0.348 | 0.598 | 54.90 | <.0001 |
| Oncology Hematopoietic Stem Cell Transplant Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Orthopedic | 0.7465 | 0.152 | 0.449 | 1.044 | 24.18 | <.0001 |
| Surgical | 0.3203 | 0.073 | 0.178 | 0.463 | 19.46 | <.0001 |
| Critical Access, Children's, General Acute Care, Military, Oncology, Psychiatric, Veterans Affairs, Women's, Women's and Children's | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| <5 | 0.1364 | 0.025 | 0.088 | 0.185 | 30.44 | <.0001 |
| ≥34 | 0.1011 | 0.016 | 0.069 | 0.133 | 38.66 | <.0001 |
| 12 - 33 | 0.0740 | 0.017 | 0.041 | 0.107 | 19.57 | <.0001 |
| 5 - 11 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| Major, Graduate | 0.1155 | 0.011 | 0.093 | 0.138 | 103.39 | <.0001 |
| None, Undergraduate | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| 1.0 - 2.7 | 0.1908 | 0.024 | 0.145 | 0.237 | 66.14 | <.0001 |
| ≥2.8 | 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 | -4.9392 | 0.048 | -5.034 | -4.845 | 10451.80 | <.0001 |
| Location Type | | | | | | |
| Oncology Hematopoietic Stem Cell Transplant Ward | 5.5764 | 0.085 | 5.411 | 5.742 | 4352.81 | <.0001 |
| Solid Organ Transplant Special Care Area | 4.5505 | 0.103 | 4.349 | 4.752 | 1960.34 | <.0001 |
| Surgical ICU | 4.2655 | 0.054 | 4.160 | 4.371 | 6229.30 | <.0001 |
| General Hematology-Oncology Ward | 4.1436 | 0.050 | 4.045 | 4.242 | 6789.38 | <.0001 |
| Burn ICU, Surgical Cardiothoracic ICU, Medical ICU, Medical-Surgical ICU, Trauma ICU | 3.7862 | 0.036 | 3.717 | 3.856 | 11365.00 | <.0001 |
| Medical Cardiac ICU | 3.2540 | 0.063 | 3.131 | 3.377 | 2696.50 | <.0001 |
| Burn Ward, Pulmonary Ward | 3.1965 | 0.086 | 3.027 | 3.366 | 1370.84 | <.0001 |
| Mixed Acuity Unit, Step-down Unit | 3.1005 | 0.037 | 3.029 | 3.172 | 7218.78 | <.0001 |
| Surgical Ward | 3.0055 | 0.040 | 2.927 | 3.084 | 5642.69 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Orthopedic Trauma Ward | 2.8942 | 0.034 | 2.828 | 2.961 | 7213.77 | <.0001 |
| Neurologic ICU, Neurosurgical ICU | 2.8075 | 0.059 | 2.692 | 2.923 | 2251.36 | <.0001 |
| Neurology Ward, Neurosurgical Ward, Orthopedic Ward | 2.2456 | 0.043 | 2.161 | 2.330 | 2701.58 | <.0001 |
| Labor and Delivery Ward, Labor and Delivery/Postpartum Ward | 0.7319 | 0.040 | 0.653 | 0.811 | 329.58 | <.0001 |
| Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Critical Access, General Acute Care, Military, Oncology | 0.4027 | 0.035 | 0.335 | 0.471 | 133.94 | <.0001 |
| Children's, Orthopedic, Psychiatric, Surgical, Veterans Affairs, Women's, Women's and Children's | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| ≥83 | 0.5489 | 0.034 | 0.483 | 0.615 | 266.75 | <.0001 |
| 24 - 82 | 0.3451 | 0.031 | 0.284 | 0.406 | 121.73 | <.0001 |
| 16 - 23 | 0.2604 | 0.035 | 0.192 | 0.329 | 54.79 | <.0001 |
| 5 - 15 | 0.1551 | 0.032 | 0.092 | 0.218 | 23.17 | <.0001 |
| <5 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥5.5 | 0.3050 | 0.025 | 0.256 | 0.354 | 150.98 | <.0001 |
| 3.4 - 5.4 | 0.1339 | 0.022 | 0.091 | 0.177 | 37.75 | <.0001 |
| 1.0 - 3.3 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| Major | 0.0491 | 0.014 | 0.021 | 0.077 | 11.74 | 0.0006 |
| None, Undergraduate, Graduate | REF | . | . | . | . | . |

Adult: Complementary group of antibacterial agents

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|--|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -3.7253 | 0.039 | -3.801 | -3.649 | 9272.04 | <.0001 |
| Location Type | | | | | | |
| Solid Organ Transplant Special Care Area | 2.2359 | 0.067 | 2.105 | 2.367 | 1120.00 | <.0001 |
| Oncology Hematopoietic Stem Cell Transplant Ward, Pulmonary Ward | 1.9727 | 0.043 | 1.889 | 2.057 | 2106.71 | <.0001 |
| Medical ICU | 1.8327 | 0.026 | 1.782 | 1.883 | 5057.13 | <.0001 |
| Medical-Surgical, Surgical ICU | 1.6918 | 0.021 | 1.651 | 1.733 | 6558.66 | <.0001 |
| General Hematology-Oncology Ward, Medical Ward, Medical-Surgical Ward | 1.4848 | 0.019 | 1.448 | 1.522 | 6224.04 | <.0001 |
| Mixed Acuity Unit, Step-down Unit | 1.4737 | 0.021 | 1.433 | 1.514 | 5059.29 | <.0001 |
| Burn ICU, Medical Cardiac ICU, Trauma ICU | 1.3739 | 0.032 | 1.311 | 1.437 | 1841.93 | <.0001 |
| Burn Ward, Surgical Ward | 1.3306 | 0.023 | 1.285 | 1.376 | 3288.58 | <.0001 |
| Surgical Cardiothoracic ICU | 1.2584 | 0.033 | 1.195 | 1.322 | 1502.62 | <.0001 |
| Neurologic ICU, Neurosurgical ICU | 0.9799 | 0.037 | 0.908 | 1.052 | 714.67 | <.0001 |
| Orthopedic Ward, Orthopedic Trauma Ward | 0.9571 | 0.029 | 0.901 | 1.013 | 1128.09 | <.0001 |
| Neurology Ward, Neurosurgical Ward | 0.7786 | 0.035 | 0.711 | 0.847 | 505.26 | <.0001 |
| Labor and Delivery Ward | 0.5399 | 0.026 | 0.489 | 0.591 | 427.22 | <.0001 |
| Labor and Delivery/Postpartum Ward | 0.1975 | 0.026 | 0.148 | 0.247 | 60.09 | <.0001 |
| Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Critical Access, General Acute Care, Oncology, Veterans Affairs | 0.2547 | 0.032 | 0.192 | 0.318 | 62.31 | <.0001 |
| Children's, Military, Orthopedic, Psychiatric, Surgical, Women's, Women's and Children's | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| <6 | -0.0729 | 0.019 | -0.110 | -0.036 | 15.17 | <.0001 |
| ≥16 | -0.0699 | 0.011 | -0.092 | -0.048 | 39.83 | <.0001 |
| 6 - 15 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥6.4 | 0.0668 | 0.012 | 0.043 | 0.090 | 30.92 | <.0001 |
| 1.0 - 4.5 | 0.0333 | 0.009 | 0.016 | 0.051 | 14.30 | 0.0002 |
| 4.6 - 6.3 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Undergraduate, Major | 0.0421 | 0.012 | 0.019 | 0.066 | 12.37 | 0.0004 |
| Graduate | 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 | -5.1629 | 0.127 | -5.411 | -4.915 | 1661.48 | <.0001 |
| Location Type | | | | | | |

| | | | | | | |
|--|--------|-------|--------|-------|----------|--------|
| Oncology Hematopoietic Stem Cell Transplant Ward | 3.2808 | 0.050 | 3.183 | 3.379 | 4328.91 | <.0001 |
| Medical ICU | 2.8152 | 0.021 | 2.775 | 2.856 | 18594.40 | <.0001 |
| Medical-Surgical ICU | 2.6919 | 0.015 | 2.662 | 2.722 | 30778.10 | <.0001 |
| General Hematology-Oncology Ward, Pulmonary Ward | 2.5878 | 0.025 | 2.540 | 2.636 | 11136.90 | <.0001 |
| Burn ICU, Medical Cardiac ICU, Surgical ICU, Trauma ICU | 2.5272 | 0.021 | 2.485 | 2.569 | 13974.90 | <.0001 |
| Neurologic ICU, Neurosurgical ICU, Surgical Cardiothoracic ICU | 2.3948 | 0.023 | 2.351 | 2.439 | 11272.90 | <.0001 |
| Burn Ward, Medical Ward, Medical-Surgical Ward | 2.3361 | 0.012 | 2.313 | 2.360 | 37863.30 | <.0001 |
| Solid Organ Transplant Special Care Area, Step-down Unit, Mixed Acuity Unit | 2.3342 | 0.015 | 2.306 | 2.363 | 25957.50 | <.0001 |
| Surgical Ward | 2.1290 | 0.018 | 2.094 | 2.164 | 14284.80 | <.0001 |
| Neurology Ward, Neurosurgical Ward, Orthopedic Ward, Orthopedic Trauma Ward | 1.8687 | 0.020 | 1.829 | 1.908 | 8633.06 | <.0001 |
| Labor and Delivery Ward, Labor and Delivery/Postpartum Ward, Postpartum Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Critical Access, General Acute Care, Oncology, Surgical, Veterans Affairs | 1.1551 | 0.126 | 0.909 | 1.401 | 84.56 | <.0001 |
| Children's, Military, Psychiatric, Women's, Women's and Children's | 0.7460 | 0.131 | 0.490 | 1.002 | 32.59 | <.0001 |
| Orthopedic | REF | . | . | . | . | . |
| Number of beds, facility-wide | | | | | | |
| <44 | 0.0088 | 0.019 | -0.028 | 0.045 | 0.22 | 0.6357 |
| 44 - 73 | 0.1293 | 0.020 | 0.091 | 0.168 | 43.33 | <.0001 |
| 74 - 325 | 0.0746 | 0.008 | 0.058 | 0.091 | 79.44 | <.0001 |
| ≥326 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Undergraduate | 0.0960 | 0.010 | 0.077 | 0.115 | 102.57 | <.0001 |
| Graduate, Major | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥2.8 | 0.0757 | 0.019 | 0.038 | 0.113 | 15.82 | <.0001 |
| 1.0 - 2.7 | 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 | -1.3584 | 0.081 | -1.518 | -1.199 | 278.89 | <.0001 |
| Location Type | | | | | | |
| Step-down Unit | -1.4433 | 0.115 | -1.669 | -1.218 | 157.76 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | -1.3442 | 0.071 | -1.484 | -1.205 | 356.72 | <.0001 |
| Medical ICU, Medical-Surgical ICU | -0.7061 | 0.078 | -0.859 | -0.553 | 82.12 | <.0001 |

| | | | | | | |
|--|---------|-------|--------|--------|-------|--------|
| Surgical Cardiothoracic ICU | -0.4758 | 0.112 | -0.696 | -0.256 | 17.92 | <.0001 |
| General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward | REF | . | . | . | . | . |
| Number of beds, facility-wide | | | | | | |
| ≥592 | 0.3110 | 0.064 | 0.185 | 0.437 | 23.55 | <.0001 |
| 199 - 591 | 0.1479 | 0.058 | 0.034 | 0.262 | 6.46 | 0.0110 |
| <199 | 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 | -3.2972 | 0.065 | -3.424 | -3.170 | 2595.95 | <.0001 |
| Location Type | | | | | | |
| Medical ICU, Medical-Surgical ICU | 1.1726 | 0.068 | 1.039 | 1.307 | 294.66 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | 0.8299 | 0.065 | 0.702 | 0.958 | 161.35 | <.0001 |
| General Hematology-Oncology Ward | 0.5658 | 0.078 | 0.414 | 0.718 | 53.34 | <.0001 |
| Step-down Unit | 0.3452 | 0.089 | 0.172 | 0.519 | 15.17 | <.0001 |
| Hematopoietic Stem Cell Transplant Ward | 0.0890 | 0.135 | -0.175 | 0.353 | 0.44 | 0.5091 |
| Surgical Cardiothoracic ICU | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| <54 | 0.1698 | 0.042 | 0.088 | 0.252 | 16.37 | <.0001 |
| 54 - 69 | 0.3648 | 0.060 | 0.247 | 0.482 | 37.06 | <.0001 |
| 70 - 167 | 0.1926 | 0.034 | 0.127 | 0.259 | 32.57 | <.0001 |
| ≥168 | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| General Acute Care | 0.1832 | 0.029 | 0.127 | 0.240 | 40.50 | <.0001 |
| Children's, Military, Women's and Children's | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None | 0.3129 | 0.081 | 0.154 | 0.472 | 14.93 | 0.0001 |
| Undergraduate, Graduate, Major | REF | . | . | . | . | . |

Pediatric: Narrow-spectrum beta-lactam agents

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | Wald χ^2 | χ^2 P-Value | |
|--------------------------------------|----------|-----------------|---------------------------|---------------|------------------|--------|
| Intercept | -3.0255 | 0.073 | -3.169 | -2.882 | 1706.46 | <.0001 |
| Location Type | | | | | | |
| Surgical Cardiothoracic ICU | 1.2786 | 0.082 | 1.118 | 1.439 | 242.61 | <.0001 |
| Surgical Ward | 0.8010 | 0.103 | 0.600 | 1.002 | 60.84 | <.0001 |
| Step-down Unit | 0.5609 | 0.084 | 0.396 | 0.726 | 44.58 | <.0001 |
| Medical ICU, Medical-Surgical ICU | 0.5461 | 0.059 | 0.431 | 0.661 | 86.30 | <.0001 |
| Medical Ward, Medical-Surgical Ward, | 0.5200 | 0.055 | 0.413 | 0.627 | 90.76 | <.0001 |

| | | | | | | |
|---|--------|-------|-------|-------|------|--------|
| Hematopoietic Stem Cell Transplant Ward | | | | | | |
| General Hematology-Oncology Ward | REF | . | . | . | . | . |
| ICU beds (as a percentage of total beds), facility-wide | | | | | | |
| ≥12.8% | 0.1197 | 0.046 | 0.030 | 0.210 | 6.81 | 0.009 |
| <12.8% | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Major | 0.0999 | 0.042 | 0.017 | 0.183 | 5.59 | 0.0181 |
| Undergraduate, Graduate | 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 | -3.3660 | 0.092 | -3.546 -3.186 | 1338.51 | <.0001 |
| Location Type | | | | | |
| Medical ICU, Medical-Surgical ICU, Surgical Cardiothoracic ICU | 0.9304 | 0.082 | 0.769 1.092 | 127.78 | <.0001 |
| General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward | 0.6033 | 0.094 | 0.420 0.787 | 41.68 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | 0.2058 | 0.080 | 0.049 0.363 | 6.63 | 0.01 |
| Step-down Unit | REF | . | . | . | . |
| Number of beds, facility-wide | | | | | |
| ≥780 | 0.2272 | 0.044 | 0.140 0.314 | 26.28 | <.0001 |
| <780 | REF | . | . | . | . |
| ICU beds (as a percentage of total beds), facility-wide | | | | | |
| ≥12.8% | 0.2131 | 0.052 | 0.112 0.314 | 17.12 | <.0001 |
| <12.8% | REF | . | . | . | . |

Pediatric: Azithromycin

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|---------------|------------------|
| Intercept | -5.9067 | 0.185 | -6.269 -5.545 | 1021.14 | <.0001 |
| Location Type | | | | | |
| Medical ICU, Medical-Surgical ICU | 1.9580 | 0.184 | 1.598 2.318 | 113.86 | <.0001 |
| Medical Ward, General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward | 1.5633 | 0.182 | 1.206 1.921 | 73.51 | <.0001 |
| Step-down Unit | 1.3805 | 0.215 | 0.960 1.802 | 41.30 | <.0001 |
| Medical-Surgical Ward | 1.2032 | 0.182 | 0.847 1.560 | 43.73 | <.0001 |
| Surgical Cardiothoracic ICU | 1.0997 | 0.214 | 0.681 1.518 | 26.51 | <.0001 |
| Surgical Ward | REF | . | . | . | . |
| Facility Type | | | | | |
| General Acute Care | 0.1350 | 0.060 | 0.017 0.253 | 4.99 | 0.0255 |
| Children's, Military, Women's and Children's | REF | . | . | . | . |

| | | | | | | |
|---|--------|-------|-------|-------|-------|--------|
| Number of ICU beds, facility-wide | | | | | | |
| <70 | 0.3820 | 0.072 | 0.242 | 0.522 | 28.57 | <.0001 |
| ≥70 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥4.7 | 0.2036 | 0.067 | 0.071 | 0.336 | 9.11 | 0.0025 |
| 1.0 - 4.6 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None | 0.5432 | 0.164 | 0.221 | 0.865 | 10.94 | 0.0009 |
| Undergraduate, Graduate, Major | 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 | -6.2214 | 0.265 | -6.742 | -5.701 | 549.61 | <.0001 |
| Location Type | | | | | | |
| Hematopoietic Stem Cell Transplant Ward | 3.2033 | 0.353 | 2.512 | 3.894 | 82.54 | <.0001 |
| General Hematology-Oncology Ward | 2.5129 | 0.208 | 2.106 | 2.920 | 146.61 | <.0001 |
| Surgical Cardiothoracic ICU | 1.4689 | 0.230 | 1.018 | 1.920 | 40.81 | <.0001 |
| Medical ICU, Medical-Surgical ICU | 1.0818 | 0.182 | 0.725 | 1.439 | 35.20 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | 0.0656 | 0.176 | -0.278 | 0.410 | 0.14 | 0.7086 |
| Step-down Unit | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| ≥86 | 0.9426 | 0.113 | 0.722 | 1.163 | 70.27 | <.0001 |
| 55 - 85 | 0.5013 | 0.124 | 0.258 | 0.745 | 16.28 | <.0001 |
| <55 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥4.9 | 0.2670 | 0.092 | 0.086 | 0.448 | 8.35 | 0.0039 |
| 1.0 - 4.8 | REF | . | . | . | . | . |
| Medical school affiliation type | | | | | | |
| None, Graduate, Major | 0.6563 | 0.200 | 0.265 | 1.048 | 10.78 | 0.001 |
| Undergraduate | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Children's, Military, Women's and Children's | 0.2389 | 0.076 | 0.090 | 0.388 | 9.86 | 0.0017 |
| General Acute Care | REF | . | . | . | . | . |

Pediatric: Complementary group of antibacterial agents

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -3.1831 | 0.045 | -3.271 | -3.095 | 5062.85 | <.0001 |
| Location Type | | | | | | |
| Step-down Unit | 0.2464 | 0.090 | 0.071 | 0.422 | 7.54 | 0.006 |
| Medical ICU, Medical-Surgical ICU, Surgical | 0.2450 | 0.043 | 0.161 | 0.329 | 32.47 | <.0001 |

| | | | | | | |
|--|--------|-------|-------|-------|--------|--------|
| Cardiothoracic ICU | | | | | | |
| General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward | 0.7701 | 0.066 | 0.641 | 0.899 | 136.41 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| Children's, Military, Women's and Children's | 0.2253 | 0.040 | 0.147 | 0.303 | 32.02 | <.0001 |
| General Acute Care | REF | . | . | . | . | . |
| Number of ICU beds, facility-wide | | | | | | |
| ≥168 | 0.6063 | 0.062 | 0.486 | 0.727 | 96.93 | <.0001 |
| 85 - 167 | 0.4884 | 0.054 | 0.383 | 0.594 | 82.31 | <.0001 |
| 55 - 84 | 0.2444 | 0.063 | 0.120 | 0.369 | 14.90 | 0.0001 |
| <55 | REF | . | . | . | . | . |
| Average length of stay, facility-wide (in days) | | | | | | |
| ≥6.1 | 0.1996 | 0.043 | 0.115 | 0.284 | 21.46 | <.0001 |
| 1.0 - 3.5 | 0.1925 | 0.072 | 0.052 | 0.333 | 7.17 | 0.0074 |
| 3.6 - 6.0 | 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 | -2.3597 | 0.097 | -2.550 | -2.170 | 592.07 | <.0001 |
| Location Type | | | | | | |
| General Hematology-Oncology Ward, Hematopoietic Stem Cell Transplant Ward | 1.1440 | 0.080 | 0.988 | 1.300 | 206.03 | <.0001 |
| Medical ICU, Medical-Surgical ICU | 0.8306 | 0.071 | 0.691 | 0.971 | 135.39 | <.0001 |
| Surgical Cardiothoracic ICU | 0.6263 | 0.091 | 0.449 | 0.804 | 47.73 | <.0001 |
| Medical Ward, Medical-Surgical Ward, Surgical Ward | 0.2701 | 0.068 | 0.137 | 0.404 | 15.72 | <.0001 |
| Step-down Unit | REF | . | . | . | . | . |
| Number of beds, facility-wide | | | | | | |
| ≥780 | 0.1005 | 0.038 | 0.026 | 0.175 | 6.94 | 0.0084 |
| <780 | REF | . | . | . | . | . |
| ICU beds (as a percentage of total beds), facility-wide | | | | | | |
| ≥8.8% | 0.1658 | 0.072 | 0.025 | 0.306 | 5.34 | 0.0209 |
| <8.8% | REF | . | . | . | . | . |

Neonatal: Vancomycin

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|--|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -8.4724 | 0.303 | -9.066 | -7.879 | 782.50 | <.0001 |
| Location Type and whether facility provides Level III or higher care | | | | | | |
| Level III and Level IV NICUs | 2.7417 | 0.229 | 2.293 | 3.190 | 143.55 | <.0001 |

| | | | | | | |
|--|--------|-------|-------|-------|--------|--------|
| Level II/III NICUs | 2.3672 | 0.231 | 1.914 | 2.820 | 104.83 | <.0001 |
| Level II special care nurseries in a facility that does NOT provide Level III or higher care | 1.2695 | 0.254 | 0.771 | 1.768 | 24.93 | <.0001 |
| Level II special care nurseries in a facility that DOES provide Level III or higher care | REF | . | . | . | . | . |
| Percentage of annual neonatal admissions in very lowest birthweight category A ($\leq 750g$) | | | | | | |
| ≥3.3% | 1.3345 | 0.116 | 1.108 | 1.562 | 132.79 | <.0001 |
| 0.8% - 3.2% | 0.6717 | 0.100 | 0.477 | 0.867 | 45.50 | <.0001 |
| <0.8% | REF | . | . | . | . | . |
| Total number of annual neonatal admissions | | | | | | |
| ≥106 | 0.9295 | 0.191 | 0.555 | 1.304 | 23.70 | <.0001 |
| <106 | REF | . | . | . | . | . |

Neonatal: Broad spectrum gram-negative coverage

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|---------------|------------------|
| Intercept | -10.1102 | 0.376 | -10.846 -9.374 | 724.65 | <.0001 |
| Percentage of annual neonatal admissions in very lowest birthweight category A ($\leq 750g$) | | | | | |
| ≥3.3% | 1.9043 | 0.176 | 1.560 2.249 | 117.44 | <.0001 |
| 1.8% - 3.2% | 1.5423 | 0.169 | 1.210 1.874 | 82.86 | <.0001 |
| 0.1% - 1.7% | 1.1657 | 0.149 | 0.873 1.458 | 60.93 | <.0001 |
| 0.0% | REF | . | . | . | . |
| Location Type, whether facility provides Level III or higher care, and whether facility accepts neonates as transfers for various specific complex procedures ³ | | | | | |
| Level III NICUs in facilities accepting neonates as transfers; and Level IV NICUs | 3.7028 | 0.309 | 3.097 4.308 | 143.59 | <.0001 |
| Level II special care nurseries in a facility that does NOT provide Level III or higher care; and Level II/III NICUs; and Level III NICUs in facilities NOT accepting neonates as transfers | 3.0984 | 0.304 | 2.502 3.695 | 103.67 | <.0001 |
| Level II special care nurseries in a facility that DOES provide Level III or higher care | REF | . | . | . | . |
| Total number of annual neonatal admissions | | | | | |
| ≥243 | 1.2109 | 0.242 | 0.738 1.684 | 25.14 | <.0001 |
| 106 - 242 | 0.7644 | 0.238 | 0.298 1.231 | 10.31 | 0.0013 |
| <106 | REF | . | . | . | . |
| Number of beds, facility-wide | | | | | |
| ≥433 | 0.3801 | 0.120 | 0.146 0.614 | 10.12 | 0.0015 |
| <433 | REF | . | . | . | . |

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

Neonatal: 3rd generation cephalosporins

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|--|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -6.5786 | 0.167 | -6.906 | -6.251 | 1552.55 | <.0001 |
| Location Type | | | | | | |
| Level III NICUs; Level IV NICUs | 0.5220 | 0.139 | 0.249 | 0.795 | 14.03 | 0.0002 |
| Level II special care nurseries; Level II/III NICUs | REF | . | . | . | . | . |
| Number of annual outborn neonatal admissions | | | | | | |
| ≥61 | 0.8421 | 0.190 | 0.469 | 1.215 | 19.61 | <.0001 |
| 2 - 60 | 0.3952 | 0.162 | 0.077 | 0.714 | 5.92 | 0.015 |
| <2 | REF | . | . | . | . | . |
| Percentage of annual neonatal admissions in very lowest birthweight category A (≤750g) | | | | | | |
| ≥0.8% | 0.5058 | 0.146 | 0.219 | 0.792 | 11.97 | 0.0005 |
| <0.8% | REF | . | . | . | . | . |
| Percentage of annual neonatal admissions in low birthweight category D (1501-2500g) | | | | | | |
| <26.3% | 0.5779 | 0.134 | 0.315 | 0.841 | 18.50 | <.0001 |
| ≥26.3% | REF | . | . | . | . | . |
| Number of beds, facility-wide | | | | | | |
| ≥253 | 0.4126 | 0.139 | 0.141 | 0.684 | 8.85 | 0.0029 |
| <253 | REF | . | . | . | . | . |

Neonatal: Ampicillin

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -3.6107 | 0.124 | -3.854 | -3.368 | 848.84 | <.0001 |
| Percentage of annual neonatal admissions in normal birthweight category E (>2500g) | | | | | | |
| ≥63.3% | 0.4747 | 0.059 | 0.360 | 0.589 | 65.71 | <.0001 |
| 51.9% - 63.2% | 0.2608 | 0.055 | 0.153 | 0.369 | 22.28 | <.0001 |
| <51.9% | REF | . | . | . | . | . |
| Number of annual outborn neonatal admissions | | | | | | |
| <7 | 0.2250 | 0.046 | 0.136 | 0.314 | 24.32 | <.0001 |
| ≥7 | REF | . | . | . | . | . |
| Location Type, whether facility provides Level III or higher care, and whether facility accepts neonates as transfers for various complex procedures ³ | | | | | | |
| Level II special care nurseries in a facility that does NOT provide Level III or higher care; and Level III NICUs in facilities NOT accepting neonates as transfers | 0.9719 | 0.122 | 0.733 | 1.211 | 63.56 | <.0001 |
| Level II/III NICUs; and Level III NICUs in facilities accepting neonates as transfers; and Level IV NICUs | 0.8574 | 0.119 | 0.623 | 1.091 | 51.58 | <.0001 |

| | | | | | | |
|--|-----|---|---|---|---|---|
| Level II special care nurseries in a facility that DOES provide Level III or higher care | REF | . | . | . | . | . |
|--|-----|---|---|---|---|---|

Neonatal: Aminoglycosides

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -4.3109 | 0.150 | -4.605 | -4.017 | 823.86 | <.0001 |
| Percentage of annual neonatal admissions in very low birthweight category A, B, C ($\leq 1500g$) | | | | | | |
| <4.8% | 0.4322 | 0.080 | 0.276 | 0.588 | 29.53 | <.0001 |
| 4.8% - 13.8% | 0.2357 | 0.062 | 0.114 | 0.358 | 14.31 | 0.0002 |
| $\geq 13.9\%$ | REF | . | . | . | . | . |
| Number of annual outborn neonatal admissions | | | | | | |
| <7 | 0.1808 | 0.056 | 0.072 | 0.290 | 10.53 | 0.0012 |
| ≥ 7 | REF | . | . | . | . | . |
| Location Type and whether facility provides Level III or higher care | | | | | | |
| Level II special care nurseries in a facility that does NOT provide Level III or higher care; and Level II/III NICUs; and Level III NICUs; and Level IV NICUs | 0.8897 | 0.144 | 0.608 | 1.172 | 38.19 | <.0001 |
| Level II special care nurseries in a facility that DOES provide Level III or higher care | REF | . | . | . | . | . |
| Facility Type | | | | | | |
| General Acute Care, Surgical | 0.3675 | 0.090 | 0.190 | 0.545 | 16.52 | <.0001 |
| Children's, Military, Women's, and Women's and Children's | REF | . | . | . | . | . |
| Number of beds, facility-wide | | | | | | |
| <378 | 0.1444 | 0.055 | 0.037 | 0.252 | 6.87 | 0.0088 |
| ≥ 378 | REF | . | . | . | . | . |

Neonatal: Fluconazole

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|--|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -9.7103 | 0.387 | -10.469 | -8.952 | 629.89 | <.0001 |
| Percentage of annual neonatal admissions in very lowest birthweight category A ($\leq 750g$) | | | | | | |
| $\geq 3.3\%$ | 1.5483 | 0.172 | 1.211 | 1.886 | 81.01 | <.0001 |
| 0.8% - 3.2% | 1.1243 | 0.150 | 0.830 | 1.419 | 56.10 | <.0001 |
| <0.8% | REF | . | . | . | . | . |
| Location Type | | | | | | |
| Level III NICUs; Level IV NICUs | 1.6565 | 0.190 | 1.284 | 2.029 | 76.06 | <.0001 |
| Level II/III NICUs | 1.4021 | 0.178 | 1.054 | 1.750 | 62.39 | <.0001 |
| Level II special care nurseries | REF | . | . | . | . | . |
| Total number of annual neonatal admissions | | | | | | |

| | | | | | | |
|-----------|--------|-------|-------|-------|-------|--------|
| ≥244 | 2.4571 | 0.373 | 1.726 | 3.189 | 43.34 | <.0001 |
| 106 - 243 | 2.0487 | 0.382 | 1.300 | 2.797 | 28.76 | <.0001 |
| <106 | REF | . | . | . | . | . |

Neonatal: All antibacterial agents

| Parameter | Estimate | SE ¹ | Wald 95% CLs ² | | Wald χ^2 | χ^2 P-Value |
|---|----------|-----------------|---------------------------|--------|---------------|------------------|
| Intercept | -2.6122 | 0.111 | -2.830 | -2.395 | 554.41 | <.0001 |
| Location Type and whether facility provides Level III or higher care | | | | | | |
| Level IV NICUs | 1.0968 | 0.118 | 0.865 | 1.329 | 85.94 | <.0001 |
| Level II special care nurseries in a facility that does NOT provide Level III or higher care; Level III NICUs | 0.9411 | 0.110 | 0.725 | 1.157 | 73.12 | <.0001 |
| Level II/III NICUs | 0.8214 | 0.111 | 0.604 | 1.039 | 54.74 | <.0001 |
| Level II special care nurseries in a facility that DOES provide Level III or higher care | REF | . | . | . | . | . |
| Percentage of annual neonatal admissions in low birthweight category D (1501-2500g) | | | | | | |
| <31.8% | 0.2364 | 0.038 | 0.161 | 0.312 | 37.95 | <.0001 |
| ≥31.8% | REF | . | . | . | . | . |
| Number of annual outborn neonatal admissions | | | | | | |
| <7 | 0.1692 | 0.044 | 0.084 | 0.255 | 15.01 | 0.0001 |
| ≥78 | 0.1250 | 0.057 | 0.014 | 0.236 | 4.88 | 0.0271 |
| 7 - 77 | REF | . | . | . | . | . |