# VUH and Associated Clinics Antimicrobial Susceptibility Summary: Adult Patients 2025

Clinical Microbiology
Department of Pathology, Microbiology and Immunology

**Preface**

This booklet contains up-to-date information to assist in decisions concerning antimicrobial therapy.

Tables summarize susceptibility data obtained for organisms isolated in the VUMC Clinical Microbiology Laboratory between January 1, 2025 – December 31, 2025

**Guidelines for Interpretation of Minimum Inhibitory Concentrations (MICs)**

MICs are interpreted as susceptible, intermediate, resistant, non-susceptible or susceptible dose dependent according to Clinical and Laboratory Standards Institute (CLSI) guidelines. When deciding whether the interpretation is meaningful, one should consider the antimicrobial pharmacokinetics, taking into account dosage and route of administration, the infecting organism and site of infection, and previous clinical experience.

For additional information, please call the microbiology laboratory or the Antimicrobial Stewardship team.

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**Frequently called numbers:**
Antibiotic Approval Pager: 615-317-GERM (4376)
On Call VU ID Fellow Pager: 615-831-8872
Microbiology Lab: 615-322-3406

Microbiology Fellows (pager: 615- 835-9742)
VASP Website:
https://www.vumc.org/antimicrobial-stewardship-program

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## Table 1. Adults – Most Common Gram-negative Bacteria, Urine Isolates, % Susceptible

*Data represent first isolate per patient*

| Organism | N | Ampicillin | Ampicillin/Sulbactam | Cefazolin* | Cefepime | Ceftazidime | Ceftriaxone | Ciprofloxacin | Ertapenem | Gentamicin | Levofloxacin | Meropenem | Nitrofurantoin | Piperacillin/Tazobactam | Trimethoprim/Sulfamethoxazole |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Citrobacter braakii* | 57 | R | 72 | R | 100 | 70 | 70 | 86 | 98 | 98 | 88 | 98 | 98 | 68 | 97 |
| *Citrobacter freundii* | 148 | R | R | R | 97 | 77 | R | 83 | 98 | 93 | 85 | 99 | 92 | 76 | 85 |
| *Citrobacter koseri* | 156 | R | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 100 | 90 | 98 | 100 |
| *Enterobacter cloacae* | 314 | R | R | R | 91 | 71 | R | 85 | 91 | 96 | 86 | 98 | 41 | 70 | 85 |
| *Escherichia coli* | 9025 | 56 | 80 | 87 | 92 | 90 | 90 | 73 | 100 | 91 | 75 | 100 | 97 | 95 | 77 |
| *Klebsiella aerogenes* | 242 | R | R | R | 98 | 82 | R | 93 | 98 | 100 | 94 | 100 | 12 | 82 | 96 |
| *Klebsiella oxytoca* | 250 | R | 86 | 39 | 96 | 95 | 89 | 94 | 99 | 97 | 96 | 99 | 89 | 88 | 92 |
| *Klebsiella pneumoniae* | 2166 | R | 83 | 84 | 90 | 87 | 87 | 81 | 99 | 93 | 82 | 100 | 16 | 86 | 83 |
| *Morganella morganii* | 92 | R | 34 | R | ND | ND | 84 | 80 | 99 | 89 | 79 | 100 | R | 98 | 84 |
| *Proteus mirabilis* | 679 | 85 | 97 | 93 | 96 | 97 | 94 | 87 | 100 | 92 | 87 | 99 | R | 100 | 81 |
| *Providencia rettgeri* | 45 | R | 78 | R | 98 | 96 | 93 | 91 | 98 | 100 | 73 | 93 | R | 96 | 82 |
| *Pseudomonas aeruginosa* | 582 | R | R | R | 90 | 91 | R | 85 | R | R | 78 | 93 | R | 83 | R |
| *Serratia marcescens* | 116 | R | R | R | 97 | 98 | R | 85 | 98 | 100 | 87 | 99 | R | ND | 97 |

*Cefazolin serves as the sensitivity marker for all oral cephalosporins in urine isolates. Oral cephalosporins include: cefaclor, cefdinir, cefpodoxime, cefprozil, cefuroxime, cephalexin, and loracarbef for treatment of uncomplicated urinary tract infections.

ⓘ Empiric guidance for the treatment of urinary tract infections, including pyelonephritis, can be found on the VASP website at https://www.vumc.org/vasp/52609. Antibiotics should be narrowed once susceptibilities are known.

Table 2. Adults – Gram-negative bacteria, Urine isolates, % Susceptible by Patient Location

| Organism | Location | N | Ampicillin | Ampicillin/Sulbactam | Cefazolin* | Cefepime | Ceftazidime | Ceftriaxone | Ciprofloxacin | Ertapenem | Gentamicin | Levofloxacin | Meropenem | Nitrofurantoin | Piperacillin/Tazobactam | Trimethoprim/Sulfamethoxazole |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Citrobacter braakii* | ICU | 2** | R | R | R | 100 | ND | ND | 100 | 100 | 100 | 100 | 100 | 100 | ND | 100 |
| | IN | 8** | R | R | R | 100 | 75 | 75 | 63 | 100 | 100 | 75 | 100 | 100 | 63 | 100 |
| | OP | 45 | R | R | R | 100 | 71 | 71 | 89 | 98 | 98 | 89 | 98 | 98 | 71 | 96 |
| *Citrobacter freundii* | ICU | 8** | R | R | R | 100 | 75 | 63 | 88 | 100 | 100 | 88 | 100 | 100 | 75 | 100 |
| | IN | 24** | R | R | R | 92 | 63 | 63 | 88 | 96 | 92 | 92 | 96 | 88 | 63 | 92 |
| | OP | 102 | R | R | R | 98 | 80 | 73 | 83 | 98 | 94 | 83 | 100 | 91 | 78 | 83 |
| *Citrobacter koseri* | ICU | 1** | R | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| | IN | 14** | R | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 79 | 93 | 100 |
| | OP | 125 | R | 99 | 99 | 100 | 100 | 100 | 99 | 100 | 99 | 100 | 100 | 91 | 100 | 100 |
| *Enterobacter cloacae* | ICU | 19** | R | R | R | 79 | 47 | 37 | 79 | 68 | 95 | 79 | 95 | 37 | 47 | 84 |
| | IN | 70 | R | R | R | 87 | 65 | 57 | 81 | 90 | 93 | 86 | 97 | 42 | 58 | 78 |
| | OP | 205 | R | R | R | 94 | 77 | 70 | 87 | 94 | 96 | 87 | 99 | 40 | 76 | 89 |
| *Escherichia coli* | ICU | 159 | 47 | 72 | 79 | 85 | 83 | 82 | 63 | 100 | 92 | 64 | 99 | 95 | 86 | 67 |
| | IN | 680 | 45 | 75 | 77 | 85 | 83 | 80 | 61 | 100 | 88 | 63 | 100 | 96 | 91 | 67 |
| | OP | 7384 | 57 | 81 | 88 | 93 | 91 | 90 | 73 | 100 | 91 | 75 | 100 | 97 | 96 | 78 |
| *Klebsiella aerogenes* | ICU | 9** | R | R | R | 100 | 44 | 44 | 89 | 100 | 100 | 89 | 100 | ND | 44 | 100 |
| | IN | 26** | R | R | R | 96 | 69 | 69 | 96 | 100 | 100 | 96 | 100 | 8 | 65 | 96 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OP | 183 | R | R | R | 97 | 86 | 86 | 92 | 98 | 100 | 94 | 100 | 14 | 86 | 97 |
| *Klebsiella oxytoca* | ICU | 10** | R | 70 | 30 | 90 | 90 | 70 | 90 | 100 | 90 | 100 | 100 | 100 | 70 | 90 |
| | IN | 43 | R | 81 | 26 | 93 | 95 | 79 | 95 | 100 | 98 | 95 | 100 | 95 | 81 | 93 |
| | OP | 185 | R | 85 | 41 | 96 | 95 | 91 | 94 | 99 | 97 | 95 | 98 | 87 | 89 | 92 |
| *Klebsiella pneumoniae* | ICU | 95 | R | 68 | 57 | 73 | 62 | 60 | 57 | 98 | 80 | 58 | 98 | 16 | 74 | 62 |
| | IN | 341 | R | 70 | 69 | 78 | 72 | 73 | 68 | 98 | 85 | 70 | 99 | 17 | 74 | 71 |
| | OP | 1579 | R | 86 | 88 | 93 | 90 | 90 | 85 | 100 | 95 | 85 | 100 | 15 | 89 | 86 |
| *Morganella morganii* | ICU | 3** | R | 67 | R | ND | ND | 67 | 67 | 100 | 100 | 67 | 100 | R | 100 | 67 |
| | IN | 25** | R | 36 | R | ND | ND | 84 | 60 | 100 | 76 | 64 | 100 | R | 96 | 72 |
| | OP | 59 | R | 34 | R | ND | ND | 83 | 88 | 98 | 93 | 85 | 100 | R | 98 | 88 |
| *Proteus mirabilis* | ICU | 23** | 91 | 96 | 96 | 96 | 100 | 96 | 87 | 100 | 100 | 87 | 100 | R | 100 | 87 |
| | IN | 109 | 73 | 95 | 81 | 86 | 94 | 83 | 71 | 100 | 88 | 71 | 100 | R | 99 | 67 |
| | OP | 480 | 89 | 97 | 95 | 98 | 98 | 96 | 90 | 100 | 93 | 91 | 99 | R | 100 | 85 |
| *Pseudomonas aeruginosa* | ICU | 56 | R | R | R | 84 | 82 | R | 78 | R | R | 69 | 87 | R | 76 | R |
| | IN | 169 | R | R | R | 92 | 88 | R | 84 | R | R | 79 | 93 | R | 80 | R |
| | OP | 343 | R | R | R | 91 | 93 | R | 83 | R | R | 75 | 93 | R | 83 | R |
| *Serratia marcescens* | ICU | 8** | R | R | R | 88 | 100 | 88 | 100 | 100 | 100 | 100 | 100 | R | ND | 100 |
| | IN | 27** | R | R | R | 100 | 93 | 96 | 78 | 96 | 100 | 85 | 96 | R | ND | 96 |
| | OP | 69 | R | R | R | 97 | 100 | 88 | 83 | 99 | 100 | 84 | 100 | R | ND | 99 |

*Data represent first isolate per patient.*

ICU, intensive care unit; IN, inpatient; OP, outpatient (includes emergency department); R, intrinsic resistance; ND, not tested.

*Cefazolin serves as the sensitivity marker for all oral cephalosporins in urine isolates. Oral cephalosporins include: cefaclor, cefdinir, cefpodoxime, cefprozil, cefuroxime, cephalexin, and loracarbef for treatment of uncomplicated urinary tract infections.

**Calculated with <30 isolates, interpret data with caution.

## Table 3. Adults – Most Common Gram-negative Bacteria, Non-Urine Isolates, % Susceptible

*Data represent first isolate per patient.*

| Organism | N | Ampicillin | Ampicillin/Sulbactam | Cefazolin | Cefepime | Ceftazidime | Ceftriaxone | Cefuroxime axetil | Ciprofloxacin | Ertapenem | Gentamicin | Levofloxacin | Meropenem | Piperacillin/Tazobactam | Trimethoprim/Sulfamethoxazole |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Citrobacter koseri* | 48 | R | 98 | 94 | 98 | 98 | 96 | 79 | 96 | 98 | 100 | 96 | 100 | 94 | 98 |
| *Citrobacter freundii* | 45 | R | R | R | 96 | R | R | R | 82 | 93 | 91 | 84 | 93 | 80 | 78 |
| *Enterobacter cloacae* | 391 | R | R | R | 94 | R | R | R | 92 | 93 | 99 | 93 | 99 | 83 | 90 |
| *Escherichia coli* | 806 | 45 | 74 | 76 | 83 | 80 | 79 | 72 | 61 | 99 | 86 | 63 | 100 | 90 | 67 |
| *Klebsiella aerogenes* | 109 | R | R | R | 96 | R | R | R | 95 | 97 | 100 | 94 | 100 | 71 | 100 |
| *Klebsiella oxytoca* | 166 | R | 84 | 50 | 93 | 92 | 87 | 83 | 91 | 100 | 93 | 93 | 100 | 85 | 90 |
| *Klebsiella pneumoniae* | 616 | R | 78 | 78 | 86 | 80 | 81 | 73 | 75 | 99 | 91 | 75 | 99 | 78 | 78 |
| *Morganella morganii* | 85 | R | 32 | R | ND | ND | 85 | R | 85 | 100 | 93 | 84 | 100 | 100 | 88 |
| *Proteus mirabilis* | 269 | 84 | 97 | 90 | 96 | 97 | 92 | 91 | 83 | 99 | 94 | 83 | 98 | 99 | 82 |
| *Pseudomonas aeruginosa* | 977 | R | R | R | 92 | 92 | R | R | 86 | R | R | 82 | 94 | 84 | R |
| *Serratia marcescens* | 239 | R | R | R | 98 | R | R | R | 89 | 98 | 98 | 90 | 98 | ND | 98 |

R, intrinsic resistance; ND, not tested.

## Table 4. Adults – Gram-negative Bacteria, Non-Urine Isolates, by Patient Location

*Data represent first isolate per patient.*

| Organism | Location | N | Ampicillin | Ampicillin/Sulbactam | Cefazolin | Cefepime | Ceftazidime | Ceftriaxone | Cefuroxime axetil | Ciprofloxacin | Ertapenem | Gentamicin | Levofloxacin | Meropenem | Piperacillin/Tazobactam | Trimethoprim/Sulfamethoxazole |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Enterobacter cloacae* | ICU | 77 | R | R | R | 87 | R | R | R | 96 | 88 | 99 | 96 | 99 | 66 | 93 |
| | IN | 202 | R | R | R | 93 | R | R | R | 89 | 93 | 97 | 90 | 98 | 80 | 85 |
| | OP | 91 | R | R | R | 98 | R | 85 | R | 95 | 97 | 100 | 95 | 100 | 97 | 95 |
| *Escherichia coli* | ICU | 188 | 41 | 68 | 67 | 75 | 73 | 71 | 60 | 52 | 100 | 87 | 54 | 100 | 85 | 63 |
| | IN | 353 | 42 | 70 | 74 | 82 | 78 | 78 | 70 | 59 | 99 | 84 | 62 | 99 | 88 | 64 |
| | OP | 200 | 49 | 79 | 79 | 87 | 83 | 83 | 78 | 65 | 100 | 86 | 68 | 100 | 95 | 68 |
| *Klebsiella aerogenes* | ICU | 23** | R | R | R | 100 | R | R | R | 100 | 91 | 100 | 96 | 100 | 61 | 100 |
| | IN | 41 | R | R | R | 95 | R | R | R | 88 | 100 | 100 | 88 | 100 | 61 | 100 |
| | OP | 33 | R | R | R | 97 | R | R | R | 97 | 97 | 100 | 97 | 100 | 82 | 100 |
| *Klebsiella oxytoca* | ICU | 33 | R | 76 | 36 | 91 | 91 | 76 | 76 | 94 | 100 | 94 | 97 | 100 | 76 | 94 |
| | IN | 63 | R | 81 | 38 | 89 | 84 | 84 | 79 | 84 | 100 | 86 | 87 | 100 | 79 | 84 |
| | OP | 60 | R | 85 | 57 | 97 | 97 | 88 | 83 | 95 | 100 | 98 | 97 | 100 | 88 | 93 |
| *Klebsiella pneumoniae* | ICU | 188 | R | 73 | 74 | 81 | 75 | 77 | 69 | 69 | 97 | 90 | 70 | 98 | 71 | 75 |
| | IN | 280 | R | 77 | 76 | 85 | 79 | 79 | 71 | 74 | 99 | 90 | 74 | 99 | 80 | 77 |
| | OP | 118 | R | 81 | 83 | 89 | 84 | 83 | 76 | 81 | 99 | 90 | 81 | 99 | 82 | 80 |
| *Morganella morganii* | ICU | 15** | R | 40 | R | ND | ND | R | R | 93 | 100 | 93 | 93 | 100 | 100 | 87 |
| | IN | 30 | R | 23 | R | ND | ND | R | R | 77 | 100 | 97 | 77 | 100 | 100 | 97 |
| | OP | 31 | R | 36 | R | ND | ND | R | R | 87 | 100 | 90 | 84 | 100 | 100 | 81 |
| *Proteus mirabilis* | ICU | 39 | 82 | 95 | 95 | 100 | 97 | 95 | 95 | 80 | 100 | 90 | 77 | 97 | 97 | 69 |
| | IN | 96 | 77 | 97 | 81 | 94 | 97 | 85 | 85 | 76 | 100 | 93 | 77 | 98 | 100 | 80 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | OP | 119 | 90 | 98 | 94 | 96 | 98 | 95 | 94 | 87 | 98 | 94 | 87 | 98 | 99 | 87 |
| *Pseudomonas aeruginosa* | ICU | 193 | R | R | R | 86 | 84 | R | R | 83 | R | R | 78 | 90 | 70 | R |
| | IN | 383 | R | R | R | 90 | 88 | R | R | 85 | R | R | 81 | 92 | 80 | R |
| | OP | 370 | R | R | R | 95 | 96 | R | R | 85 | R | R | 81 | 97 | 90 | R |
| *Serratia marcescens* | ICU | 44 | R | R | R | 98 | R | R | R | 91 | 98 | 100 | 93 | 98 | ND | 100 |
| | IN | 108 | R | R | R | 95 | R | R | R | 84 | 96 | 95 | 86 | 96 | ND | 95 |
| | OP | 66 | R | R | R | 100 | R | R | R | 89 | 100 | 100 | 89 | 100 | ND | 100 |

ICU, intensive care unit; IN, inpatient; OP, outpatient (includes emergency department) R, intrinsic resistance; ND, not tested.

**Calculated with <30 isolates, interpret data with caution

## Table 5. Adults – *Staphylococcus aureus*, % Susceptible

*Data represent first isolate per patient.*

| Organism | | N | Clindamycin | Daptomycin | Doxycycline | Linezolid | Oxacillin | Trimethoprim/sulfamethoxazole | Vancomycin |
|---|---|---|---|---|---|---|---|---|---|
| *Staphylococcus aureus* | All | 3423 | 88 | 100 | 95 | 100 | 65 | 89 | 100 |
| MSSA | ICU | 222 | 95 | 100 | 99 | 100 | 100 | 95 | 100 |
| | IN | 563 | 95 | 100 | 99 | 100 | 100 | 96 | 100 |
| | OP | 1303 | 95 | 100 | 98 | 100 | 100 | 95 | 100 |
| MRSA | ICU | 168 | 74 | 100 | 81 | 100 | 0 | 77 | 100 |
| | IN | 424 | 70 | 100 | 87 | 100 | 0 | 75 | 100 |
| | OP | 568 | 75 | 100 | 88 | 100 | 0 | 81 | 100 |

ICU, intensive care unit; IN, inpatient; OP, outpatient (includes emergency department)
R, intrinsic resistance; ND, not tested.

ⓘ Isolation of *S. aureus* in the urine should be followed by a blood culture to confirm the patient is not bacteremic.
*S. aureus* bacteremia or suspected invasive infection should be treated in conjunction with ID consultation.

## Table 6. Adults – *Staphylococcus* spp., % Susceptible

*Data represent first isolate per patient. Only normally sterile site isolates included.*

| Organism | N | Clindamycin | Daptomycin | Doxycycline | Linezolid | Levofloxacin | Oxacillin | Trimethoprim/sulfamethoxazole | Vancomycin |
|---|---|---|---|---|---|---|---|---|---|
| *Staphylococcus capitis* | 75 | 77 | 100 | 97 | 100 | 84 | 85 | 95 | 100 |
| *Staphylococcus epidermidis* | 862 | 62 | 100 | 82 | 100 | 69 | 37 | 51 | 100 |
| *Staphylococcus haemolyticus* | 173 | 65 | 100 | 83 | 100 | 66 | 35 | 75 | 100 |
| *Staphylococcus hominis* | 104 | 80 | 100 | 94 | 99 | 79 | 56 | 63 | 100 |
| *Staphylococcus lugdunensis* | 265 | 90 | 100 | 99 | 100 | 97 | 77 | 99 | 100 |
| *Staphylococcus pseudintermedius* | 32 | 72 | 100 | 91 | 100 | 78 | 78 | 69 | 100 |

## Table 7. Adults – *Enterococcus* spp., % Susceptible

*Data represent first isolate per patient.*

| | N | Ampicillin | Daptomycin | Doxycycline | Linezolid | Levofloxacin | Vancomycin |
|---|---|---|---|---|---|---|---|
| *Enterococcus faecalis* | 2652 | 100 | 71 | 28 | 99 | 91 | 98 |
| *Enterococcus faecium* | 401 | 19 | ND | 25 | 97 | 15 | 48 |

ND, not tested

ⓘ Drug of choice for *E. faecalis* include ampicillin in the absence of severe penicillin allergy.
VRE infections often require treatment with protected antibiotics such as daptomycin, which require ID approval for use.

## Table 8. Adults – Urine Nitrofurantoin %Susceptibility for Staphylococcus species and Enterococcus species

| | N | Nitrofurantoin |
|---|---|---|
| *Enterococcus faecalis* | 2301 | 100 |
| *Enterococcus faecium* | 264 | 46 |
| MSSA | 163 | 99 |
| MRSA | 88 | 99 |
| *Staphylococcus epidermidis* | 423 | 99 |
| *Staphylococcus haemolyticus* | 143 | 99 |
| *Staphylococcus hominis* | 41 | 98 |
| *Staphylococcus lugdunensis* | 93 | 100 |

Nitrofurantoin susceptibilities are aggregated from all culture types. Nitrofurantoin should ONLY be used to treat uncomplicated UTI.

ⓘ Isolation of MSSA or MRSA in the urine should be followed by a blood culture to confirm the patient is not bacteremic. *S. aureus* bacteremia or suspected invasive infection should be treated in conjunction with ID consultation.

## Table 9. – *Streptococcus pneumoniae,* % Susceptible

*Data represent first isolate per patient.*

| | N | Penicillin | | | Ceftriaxone | | Levofloxacin | Linezolid | Vancomycin | Tetracycline | Erythromycin* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Meningitis | Non-meningitis | Oral | Meningitis | Non-meningitis | | | | | |
| *Streptococcus pneumoniae* | 71 | 54 | 90 | 54 | 79 | 95 | 100 | 100 | 100 | 72 | 49 |

*Erythromycin susceptible isolates are also susceptible to azithromycin.

## Table 10. Adults – *Streptococcus* spp., % Susceptible

*Data represent first isolate per patient.*

| Organism | N | Ampicillin | Clindamycin | Ceftriaxone | Linezolid | Levofloxacin | Penicillin | Vancomycin | Erythromycin |
|---|---|---|---|---|---|---|---|---|---|
| *Streptococcus agalactiae* | 162 | 100 | 40 | 100 | 100 | 98 | 100 | 100 | 24 |
| *Streptococcus anginosus* | 142 | 100 | 68 | 95 | 100 | 99 | 94 | 100 | 48 |
| *Streptococcus constellatus* | 93 | 100 | 61 | 97 | 100 | 99 | 99 | 100 | 63 |
| *Streptococcus intermedius* | 53 | 100 | 65 | 98 | 100 | 100 | 94 | 100 | 53 |
| *Streptococcus mitis* | 77 | 100 | 75 | 78 | 100 | 81 | 48 | 100 | ND |