

**UCLA**

Health System

**Antimicrobial  
Susceptibility  
Summary  
2026**

**Clinical Microbiology  
Department of Pathology & Laboratory Medicine**

# **Antimicrobial Susceptibility Summary**

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**UCLA Health System**

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The information contained in this booklet can also  
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at the top of the homepage

# Preface

This booklet contains up-to-date information to assist the clinician in making decisions concerning antimicrobial therapy and testing.

These tables summarize susceptibility data obtained for organisms isolated in the UCLA Clinical Microbiology Laboratory in 2025.

In order to provide the most meaningful information, the laboratory is selective in reporting antimicrobial susceptibility results.

Reporting guidelines are based on:

1. Identity of the organism
2. Body site of culture
3. Overall antibiogram of the organism
4. Therapeutically relevant antimicrobials
5. Formulary status of the antimicrobial

Non-formulary drugs are not routinely reported and controlled formulary agents are reported only in the appropriate setting: e.g. amikacin and tobramycin if resistant to gentamicin. Results of all relevant drugs tested, including those not reported, are available upon request.

We thank:

Daniel Uslan, MD, Chief Infection Prevention  
Tara Vijayan, MD, Medical Director, Adult ASP  
Ishminder Kaur, MD, Medical Director, Pediatric ASP  
Kavitha Prabaker, MD, Hospital Epidemiologist SMH  
Meganne Kanatani, PharmD, BCIDP, ID Pharmacist  
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Lynn Chan, Pharm D, BCIDP ID Pharmacist  
Allison Tsan, CLS, Sr. Specialist, Brentwood Annex  
Stephanie Horiuchi, CLS, Sr. Specialist, Brentwood Annex

# Guidelines for Interpretation of Minimal Inhibitory Concentrations (MICs)

MICs are interpreted as susceptible, susceptible dose dependent, intermediate, resistant, or non-susceptible according to Clinical and Laboratory Standards Institute (CLSI) M100, 36<sup>th</sup> edition 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 antimicrobials without interpretive criteria consultation with Infectious Diseases strongly advised.

For additional information, please call the antimicrobial testing laboratory, or email the Antimicrobial Stewardship group.

Clinical Microbiology  
UCLA Health System  
Department of Pathology and Laboratory Medicine

## Frequently called numbers\*:

Antimicrobial Stewardship: [antimicrobialstewardship@mednet.ucla.edu](mailto:antimicrobialstewardship@mednet.ucla.edu)  
Antimicrobial Testing Laboratory: 310-794-2760  
Drug Information Center: 310-267-8522  
Infection Prevention: Page 94040  
Infectious Diseases Adult: 310-825-7225  
Infectious Diseases Pediatric: 310-825-5235  
RRMC and RNPH ID Pharmacist - Adult: 310-267-1423, page 71423  
RRMC ID Pharmacist - Adult and Pediatric: 310-267-8510, page 92528  
SMH ID Pharmacist - Adult: 310-267- 7567, page 91059  
Microbiology Fellow on-call: page 90103

\* If calling within UCLA system, dial the last 5 digits of the phone number.

## **Resources at UCLA through the Antimicrobial Stewardship Program (ASP)**

The Antimicrobial Stewardship Program (ASP) has made resources available for the sole purpose of improving clinical outcomes of patients with infections. Questions and guidance on interpretation of culture reports (contaminant/pathogen), drug dosing, etc. are welcome. The ASP can be contacted numerous ways, depending on the urgency and clinical needs:

ASP Helpdesk/Consultation Email:

[antimicrobialstewardship@mednet.ucla.edu](mailto:antimicrobialstewardship@mednet.ucla.edu)

Website: <https://asp.mednet.ucla.edu/pages/>

We encourage you to reach out to the program with questions. The program is staffed by:

- Christine Pham, PharmD, BCIDP, ID Pharmacist
- Ethan Smith, PharmD, BCIDP, ID Pharmacist
- Lynn Chan, PharmD, BCIDP, ID Pharmacist
- Meganne Kanatani, PharmD, BCIDP, ID Pharmacist
- Daniel Uslan, MD, Chief Infection Prevention
- Tara Vijayan, MD, Medical Director, Adult ASP
- Ishminder Kaur, MD, Medical Director, Pediatric ASP
- Kavitha Prabaker, MD, Hospital Epidemiologist SMH
- Omai Garner, PhD, Section Chief Clinical Microbiology
- Sukantha Chandrasekaran, PhD, D(ABMM), Associate Director, Clinical Microbiology

# Table of Contents

| Table.....                                                                                                  | Page     |
|-------------------------------------------------------------------------------------------------------------|----------|
| <b>Glossary and Acronyms .....</b>                                                                          | <b>8</b> |
| <b>Adults</b>                                                                                               |          |
| 1 Adults (>21 y.o.) Most Common Gram-negative Bacteria –<br>Non-Urine Isolates, % Susceptible .....         | 9        |
| 2 Adults (>21 y.o.) Gram-negative Bacteria –<br>Non-Urine Isolates, % Susceptible .....                     | 10       |
| 3 Adults (>21 y.o.) Gram-negative Bacteria –<br>Urine Isolates, % Susceptible .....                         | 11       |
| 4 Adults (>21 y.o.) Gram-positive Cocci, % Susceptible .....                                                | 12       |
| <b>Adults/Peds</b>                                                                                          |          |
| 5 Miscellaneous Gram-negative Bacteria .....                                                                | 15       |
| 6 Multiple Drug Resistant Enterobacterales – All sources, % Susceptible .....                               | 16       |
| 7 Multiple Drug Resistant Gram-negative Bacteria, Other –<br>All sources, % Susceptible .....               | 17       |
| <b>Peds</b>                                                                                                 |          |
| 8 Pediatrics (≤ 21 y.o.) Gram-negative Bacteria –<br>Non-Urine Isolates, % Susceptible .....                | 18       |
| 9 Pediatrics (≤ 21 y.o.) Gram-negative Bacteria –<br>Urine Isolates, % Susceptible .....                    | 19       |
| 10 Pediatrics (≤ 21 y.o.) Gram-positive Cocci, % Susceptible .....                                          | 20       |
| <b>Yeasts</b>                                                                                               |          |
| 11 Yeasts, %S, %I, %SDD, %R .....                                                                           | 23       |
| 12 Candida Resistance .....                                                                                 | 24       |
| <b>Resistance</b>                                                                                           |          |
| 13 Carbapenem-resistant Organisms (CRE and CRPA) .....                                                      | 25       |
| 14 Treatment Suggestions for Organisms for which<br>Susceptibility Testing is Not Routinely Performed ..... | 27       |

# Table of Contents

|                   |             |
|-------------------|-------------|
| <b>Table.....</b> | <b>Page</b> |
|-------------------|-------------|

## Misc.

|    |                                                                   |    |
|----|-------------------------------------------------------------------|----|
| 15 | Blood: One Isolate per Patient.....                               | 29 |
| 16 | CSF: One Isolate per Patient.....                                 | 31 |
| 17 | Mycobacteria, One Isolate per Patient per Source .....            | 32 |
| 18 | Mycobacteria Antimicrobial Susceptibility Testing .....           | 33 |
| 19 | California Mycobacterium tuberculosis % Resistant.....            | 34 |
| 20 | Rapid Grower – Mycobacteria % Susceptible .....                   | 35 |
| 21 | CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible..... | 36 |

## Lab Info

|    |                                                                                                                                         |    |
|----|-----------------------------------------------------------------------------------------------------------------------------------------|----|
| 22 | Indications for Performing Routine Antimicrobial<br>Susceptibility Tests – Aerobic Bacteria.....                                        | 42 |
| 23 | Antimicrobial Agents Routinely Reported – Aerobic Bacteria .....                                                                        | 44 |
| 24 | CLSI M62 – Expected Antimicrobial Susceptibility<br>Patterns of the Most Commonly Isolated Nocardia<br>Data Derived from CLSI M62 ..... | 49 |
| 25 | Susceptible MIC (µg/ml) Breakpoints for Aerobic<br>Gram-negative Bacilli .....                                                          | 50 |
| 26 | Susceptible MIC (µg/ml) Breakpoints for Aerobic<br>Gram-positive Cocci .....                                                            | 51 |

## Antimicrobial Stewardship Program

|    |                                 |    |
|----|---------------------------------|----|
| 27 | Antimicrobial Stewardship ..... | 52 |
|----|---------------------------------|----|

## Glossary and Acronyms

|            |                                                                           |
|------------|---------------------------------------------------------------------------|
| —          | Not routinely tested and/or not applicable                                |
| %R         | Percent resistant                                                         |
| %S         | Percent susceptible                                                       |
| Cipro R    | Ciprofloxacin resistant                                                   |
| CP CRE     | Carbapenemase producing carbapenem resistant Enterobacterales             |
| CP CRPA    | Carbapenemase producing carbapenem resistant Pseudomonas aeruginosa       |
| CRE        | Carbapenem Resistant Enterobacterales                                     |
| CRPA       | Carbapenem-Resistant Pseudomonas aeruginosa                               |
| I          | Intermediate                                                              |
| ICU        | Intensive care unit                                                       |
| IP         | Inpatient ( <b>excludes</b> intensive care unit and Emergency Department) |
| MDR        | Multidrug resistant                                                       |
| Mero R     | Meropenem resistant                                                       |
| MIC        | Minimal inhibitory concentration µg/mL                                    |
| MRSA       | Methicillin resistant Staphylococcus aureus                               |
| MSSA       | Methicillin susceptible Staphylococcus aureus                             |
| Non-CP CRE | Non-Carbapenemase producing carbapenem resistant Enterobacterales         |
| OP         | Outpatient ( <b>includes</b> Emergency Department collections)            |
| Pip-Tazo R | Piperacillin tazobactam resistant                                         |
| R          | Resistant, can be resistant due to intrinsic resistance                   |
| S          | Susceptible                                                               |
| SDD        | Susceptible dose dependent                                                |
| spp.       | Species                                                                   |
| UTIs       | Urinary tract infections                                                  |
| V          | Variable                                                                  |
| VRE        | Vancomycin-resistant Enterococcus                                         |

**Table 1. Adults (> 21 y.o.) Most Common Gram-negative Bacteria – Non-Urine Isolates, % Susceptible**

| Organism                                         | Location | No. Isolates    | Penicillin |                             |                        |                                        | Cephalosporins |                       |                |                | Carbapenems |                |           | Aminoglycosides |                |            | Fluoro-quinolone |              | Other                           |
|--------------------------------------------------|----------|-----------------|------------|-----------------------------|------------------------|----------------------------------------|----------------|-----------------------|----------------|----------------|-------------|----------------|-----------|-----------------|----------------|------------|------------------|--------------|---------------------------------|
|                                                  |          |                 | Ampicillin | Amoxicillin-Clavulanic acid | Ampicillin - sulbactam | Piperacillin - tazobactam <sup>1</sup> | Cefazolin      | Cefepime <sup>1</sup> | Ceftazidime    | Ceftriaxone    | Ertapenem   | Imipenem       | Meropenem | Amikacin        | Gentamicin     | Tobramycin | Ciprofloxacin    | Levofloxacin | Trimethoprim - sulfamethoxazole |
| <i>Enterobacter cloacae</i> complex <sup>2</sup> | OP       | 91              | R          | R                           | R                      | 92                                     | R              | 99                    | — <sup>3</sup> | — <sup>3</sup> | 99          | 100            | 100       | 100             | 100            | 100        | 97               | 98           | 96                              |
|                                                  | IP       | 102             | R          | R                           | R                      | 69                                     | R              | 99                    | — <sup>3</sup> | — <sup>3</sup> | 90          | 99             | 100       | 99              | 95             | 95         | 91               | 91           | 85                              |
|                                                  | ICU      | 65              | R          | R                           | R                      | 77                                     | R              | 95                    | — <sup>3</sup> | — <sup>3</sup> | 94          | 94             | 97        | 100             | 97             | 95         | 98               | 97           | 88                              |
| <i>Escherichia coli</i>                          | OP       | 452             | —          | 69                          | —                      | 94                                     | 56             | 88                    | 82             | 77             | 100         | 100            | 100       | 97              | 85             | 83         | 65               | 68           | 62                              |
|                                                  | IP       | 506             | —          | 66                          | —                      | 95                                     | 47             | 78                    | 71             | 66             | 99          | 100            | 99        | 95              | 81             | 79         | 58               | 61           | 59                              |
|                                                  | ICU      | 130             | —          | 58                          | —                      | 89                                     | 43             | 72                    | 62             | 59             | 98          | 100            | 100       | 98              | 75             | 75         | 52               | 58           | 55                              |
| <i>Klebsiella pneumoniae</i>                     | OP       | 198             | R          | 87                          | —                      | 95                                     | 74             | 88                    | 83             | 80             | 98          | 98             | 98        | 98              | 92             | 90         | 77               | 89           | 74                              |
|                                                  | IP       | 243             | R          | 81                          | —                      | 90                                     | 75             | 81                    | 76             | 76             | 97          | 98             | 98        | 98              | 89             | 85         | 74               | 82           | 71                              |
|                                                  | ICU      | 132             | R          | 67                          | —                      | 81                                     | 55             | 73                    | 68             | 67             | 94          | 94             | 94        | 92              | 83             | 72         | 68               | 78           | 68                              |
| <i>Proteus mirabilis</i>                         | OP       | 169             | —          | 93                          | —                      | 99                                     | 22             | 96                    | 99             | 89             | 100         | — <sup>4</sup> | 100       | 88              | 85             | 83         | 78               | 78           | 74                              |
|                                                  | IP       | 162             | —          | 83                          | —                      | 98                                     | 15             | 96                    | 98             | 78             | 100         | — <sup>4</sup> | 100       | 89              | 87             | 83         | 63               | 64           | 69                              |
|                                                  | ICU      | 29 <sup>5</sup> | —          | 76                          | —                      | 93                                     | 10             | 90                    | 93             | 62             | 97          | — <sup>4</sup> | 97        | 89              | 82             | 76         | 55               | 55           | 59                              |
| <i>Pseudomonas aeruginosa</i>                    | OP       | 533             | R          | R                           | R                      | 89                                     | R              | 92                    | 92             | R              | R           | 89             | 92        | — <sup>6</sup>  | — <sup>6</sup> | 92         | 81               | 78           | R                               |
|                                                  | IP       | 446             | R          | R                           | R                      | 81                                     | R              | 90                    | 85             | R              | R           | 82             | 85        | — <sup>6</sup>  | — <sup>6</sup> | 93         | 80               | 73           | R                               |
|                                                  | ICU      | 142             | R          | R                           | R                      | 63                                     | R              | 77                    | 73             | R              | R           | 68             | 68        | — <sup>6</sup>  | — <sup>6</sup> | 90         | 74               | 66           | R                               |

<sup>1</sup> %S includes %SDD

<sup>2</sup> *Enterobacter cloacae* complex includes *E. cloacae*, *E. asburiae*, and *E. hormaechei*.

<sup>3</sup> 3<sup>rd</sup> generation cephalosporins should not be used for serious infections.

<sup>4</sup> *Proteus* spp. may have elevated imipenem MIC by mechanisms other than production of carbapenemases.

<sup>5</sup> Calculated from fewer than the standard recommendation of 30 isolates.

<sup>6</sup> As of 2023, *Pseudomonas aeruginosa* breakpoints were revised, and tobramycin is now the only recommended aminoglycoside for systemic therapy. Amikacin is effective against *P. aeruginosa* only in urinary tract infections. Gentamicin is no longer recommended for *P. aeruginosa* infection at any site.

**Table 2. Adults (> 21 y.o.) Gram-negative Bacteria – Non-Urine Isolates, % Susceptible**

| Organism                                            | No. Isolates | Penicillin                  |                         | Cephalosporins |                       |                |                | Carbapenems |                |           | Aminoglycosides |                |            | Fluoro-quinolone |                 | Other                         |
|-----------------------------------------------------|--------------|-----------------------------|-------------------------|----------------|-----------------------|----------------|----------------|-------------|----------------|-----------|-----------------|----------------|------------|------------------|-----------------|-------------------------------|
|                                                     |              | Amoxicillin-Clavulanic acid | Piperacillin-tazobactam | Cefazolin      | Cefepime <sup>1</sup> | Ceftazidime    | Ceftriaxone    | Ertapenem   | Imipenem       | Meropenem | Amikacin        | Gentamicin     | Tobramycin | Ciprofloxacin    | Levofloxacin    | Trimethoprim sulfamethoxazole |
| <i>Citrobacter freundii</i> complex <sup>2</sup>    | 103          | R                           | 80                      | R              | 96                    | — <sup>3</sup> | — <sup>3</sup> | 97          | 99             | 99        | 99              | 94             | 93         | 89               | 90              | 89                            |
| <i>Klebsiella (Enterobacter) aerogenes</i>          | 100          | R                           | 85                      | R              | 98                    | — <sup>3</sup> | — <sup>3</sup> | 96          | 95             | 98        | 99              | 99             | 99         | 93               | 96              | 98                            |
| <i>Enterobacter cloacae</i> complex <sup>4</sup>    | 267          | R                           | 81                      | R              | 98                    | — <sup>3</sup> | — <sup>3</sup> | 95          | 98             | 99        | 99              | 97             | 97         | 95               | 96              | 90                            |
| <i>Escherichia coli</i>                             | 1072         | 68                          | 94                      | 52             | 82                    | 76             | 71             | 99          | 99             | 99        | 96              | 82             | 81         | 61               | 64              | 60                            |
| <i>Klebsiella oxytoca</i>                           | 206          | 93                          | 96                      | 12             | 97                    | 95             | 91             | 99          | 99             | 99        | 98              | 94             | 93         | 91               | 97              | 89                            |
| <i>Klebsiella pneumoniae</i>                        | 578          | 82                          | 91                      | 69             | 84                    | 79             | 78             | 97          | 98             | 98        | 98              | 90             | 86         | 77               | 86              | 73                            |
| <i>Morganella morganii</i>                          | 83           | R                           | 100                     | R              | 100                   | 89             | 87             | 99          | — <sup>5</sup> | 99        | 95              | 87             | 95         | 71               | 70              | 74                            |
| <i>Proteus mirabilis</i>                            | 357          | 88                          | 98                      | 17             | 95                    | 97             | 82             | 99          | — <sup>5</sup> | 100       | 90              | 87             | 84         | 69               | 70              | 71                            |
| <i>Serratia marcescens</i>                          | 226          | R                           | 97                      | R              | 100                   | 98             | 88             | 99          | 95             | 100       | 95              | 97             | 88         | 89               | 94              | 99                            |
| <i>Acinetobacter baumannii</i> complex <sup>6</sup> | 80           | R                           | 43                      | R              | 55                    | 49             | —              | —           | 56             | 55        | 74              | 63             | 71         | 56               | 60              | 68                            |
| <i>Pseudomonas aeruginosa</i>                       | 1110         | R                           | 84                      | R              | 90                    | 88             | R              | R           | 85             | 88        | — <sup>7</sup>  | — <sup>7</sup> | 91         | 79               | 75              | R                             |
| <i>Stenotrophomonas maltophilia</i> <sup>8</sup>    | 111          | R                           | —                       | R              | —                     | —              | R              | R           | R              | R         | R               | R              | R          | —                | 54 <sub>9</sub> | 97 <sup>9</sup>               |
| <i>Achromobacter</i> spp.                           | 78           | —                           | 88                      | R              | 12                    | 62             | —              | —           | 92             | 91        | 9               | 8              | 9          | 6                | 55              | 95                            |

<sup>1</sup> %S includes %SDD

<sup>2</sup> *Citrobacter freundii* complex includes *C. freundii*, *C. youngae*, *C. braakii*, and *C. werkmanii*.

<sup>3</sup> 3<sup>rd</sup> generation cephalosporins should not be used for serious infections.

<sup>4</sup> *Enterobacter cloacae* complex includes *E. cloacae*, *E. asburiae*, and *E. hormaechei*.

<sup>5</sup> *Proteus* spp. and *Morganella* spp. may have elevated imipenem MIC by mechanisms other than production of carbapenemases.

<sup>6</sup> *Acinetobacter baumannii* complex includes *A. baumannii*, *A. calcoaceticus*, *A. pittii*, and *A. nosocomialis*.

<sup>7</sup> As of 2023, *Pseudomonas aeruginosa* breakpoints were revised, and tobramycin is now the only recommended aminoglycoside for systemic therapy. Amikacin is effective against *P. aeruginosa* only in urinary tract infections. Gentamicin is no longer recommended for *P. aeruginosa* infection at any site.

<sup>8</sup> *Stenotrophomonas maltophilia* minocycline %S = 85%

<sup>9</sup> Levofloxacin and Trimethoprim sulfamethoxazole should not be used alone for antimicrobial therapy.

**Table 3. Adults (> 21 y.o.) Gram-negative Bacteria – Urine Isolates, % Susceptible**

| Organism                            | Location | No. Isolates | Penicillin |                               | Cephalosporin                   |                       |                |                | Carbapenem |          |           | Amino-glycoside |                 | Fluoro-quinolone |              | Other          |                                |                                       |
|-------------------------------------|----------|--------------|------------|-------------------------------|---------------------------------|-----------------------|----------------|----------------|------------|----------|-----------|-----------------|-----------------|------------------|--------------|----------------|--------------------------------|---------------------------------------|
|                                     |          |              | Ampicillin | Amoxicillin – Clavulanic acid | Oral Cephalosporin <sup>1</sup> | Cefepime <sup>2</sup> | Ceftazidime    | Ceftriaxone    | Ertapenem  | Imipenem | Meropenem | Tobramycin      | Amikacin        | Ciprofloxacin    | Levofloxacin | Nitrofurantoin | Trimethoprim/ sulfamethoxazole | Piperacillin/ Tazobactam <sup>2</sup> |
| <i>Enterobacter cloacae</i> complex | OP       | 236          | R          | R                             | R                               | 98                    | — <sup>3</sup> | — <sup>3</sup> | 93         | —        | 99        | 97              | —               | 93               | 92           | 51             | 90                             | —                                     |
|                                     | IP       | 52           | R          | R                             | R                               | 99                    | — <sup>3</sup> | — <sup>3</sup> | 87         | —        | 99        | 97              | —               | 88               | 88           | 45             | 85                             | —                                     |
| <i>Escherichia coli</i>             | OP       | 9692         | 56         | 87                            | 86                              | —                     | —              | 89             | 99         | —        | 99        | 89              | —               | 69               | 71           | 97             | 74                             | —                                     |
|                                     | IP       | 1094         | 39         | 80                            | 71                              | —                     | —              | 74             | 99         | —        | 99        | 77              | —               | 54               | 55           | 96             | 64                             | —                                     |
| <i>Klebsiella pneumoniae</i>        | OP       | 1657         | R          | R                             | 87                              | —                     | —              | 89             | 99         | —        | 99        | 92              | —               | 84               | 84           | 32             | 86                             | —                                     |
|                                     | IP       | 291          | R          | R                             | 77                              | —                     | —              | 78             | 99         | —        | 99        | 83              | —               | 75               | 75           | 32             | 78                             | —                                     |
| <i>Proteus mirabilis</i>            | OP       | 944          | 82         | 97                            | 94                              | —                     | —              | 96             | 99         | —        | 99        | 94              | —               | 88               | 88           | R              | 82                             | —                                     |
|                                     | IP       | 189          | 72         | 93                            | 78                              | —                     | —              | 82             | 99         | —        | 99        | 76              | —               | 70               | 69           | R              | 72                             | —                                     |
| <i>Pseudomonas aeruginosa</i>       | OP       | 490          | R          | R                             | R                               | 98                    | 95             | R              | R          | 89       | 93        | 98              | 99 <sup>4</sup> | 89               | 84           | R              | R                              | 94                                    |
|                                     | IP       | 143          | R          | R                             | R                               | 89                    | 85             | R              | R          | 86       | 88        | 95              | 98 <sup>4</sup> | 85               | 77           | R              | R                              | 83                                    |

<sup>1</sup> Oral cephalosporins include cefpodoxime and cephalexin for treatment of uncomplicated urinary tract infections.

<sup>2</sup> %S includes %SDD

<sup>3</sup> 3<sup>rd</sup> generation cephalosporin should not be used for serious infections.

<sup>4</sup> As of 2023, *Pseudomonas aeruginosa* breakpoints were revised, and tobramycin is now the only recommended aminoglycoside for systemic therapy. Amikacin is effective against *P. aeruginosa* only in urinary tract infections. Gentamicin is no longer recommended for *P. aeruginosa* infection at any site.

**Table 4. Adults (> 21 y.o.) Gram-positive Cocci, % Susceptible**

| Organism                                            | Location | No. Isolates | Penicillins            |                | Other         |             |            |                           |              |           |                       |                                  |            |             |
|-----------------------------------------------------|----------|--------------|------------------------|----------------|---------------|-------------|------------|---------------------------|--------------|-----------|-----------------------|----------------------------------|------------|-------------|
|                                                     |          |              | Oxacillin <sup>1</sup> | Penicillin     | Ciprofloxacin | Clindamycin | Daptomycin | Tetracycline <sup>2</sup> | Erythromycin | Linezolid | Rifampin <sup>3</sup> | Trimethoprim<br>sulfamethoxazole | Vancomycin | Ceftaroline |
| <i>Staphylococcus aureus</i>                        | OP       | 1886         | 76                     | 24             | 78            | 72          | 99         | 85                        | 55           | 99        | 99                    | 95                               | 99         | 99          |
|                                                     | IP       | 830          | 64                     | 20             | 70            | 67          | 99         | 81                        | 48           | 99        | 99                    | 95                               | 99         | 99          |
|                                                     | ICU      | 236          | 65                     | 24             | 70            | 72          | 99         | 81                        | 54           | 99        | 98                    | 91                               | 99         | 99          |
| Oxacillin-resistant<br><i>S. aureus</i><br>(MRSA)   | OP       | 460          | R <sup>1</sup>         | R <sup>1</sup> | 35            | 69          | 99         | 61                        | 19           | 99        | 99                    | 88                               | 99         | 99          |
|                                                     | IP       | 614          | R <sup>1</sup>         | R <sup>1</sup> | 31            | 64          | 99         | 64                        | 19           | 99        | 99                    | 89                               | 99         | 99          |
|                                                     | ICU      | 86           | R <sup>1</sup>         | R <sup>1</sup> | 28            | 64          | 99         | 68                        | 23           | 99        | 95                    | 81                               | 99         | 99          |
| Oxacillin-susceptible<br><i>S. aureus</i><br>(MSSA) | OP       | 1410         | 99                     | 34             | 93            | 74          | 99         | 97                        | 68           | 99        | 99                    | 96                               | 99         | 99          |
|                                                     | IP       | 343          | 99                     | 31             | 91            | 72          | 99         | 99                        | 66           | 99        | 99                    | 95                               | 99         | 99          |
|                                                     | ICU      | 127          | 99                     | 32             | 90            | 73          | 99         | 99                        | 70           | 99        | 99                    | 94                               | 99         | 99          |

<sup>1</sup> *Staphylococcus* resistant to oxacillin are resistant to all other beta lactams except ceftaroline.

<sup>2</sup> Isolates that test susceptible to tetracycline are considered susceptible to doxycycline. Isolates that test intermediate or resistant to tetracycline may not be resistant to doxycycline. Isolate should be tested with doxycycline if results are needed for treatment.

<sup>3</sup> Rifampin should not be used as monotherapy.

**Table 4. Adults (> 21 y.o.) Gram-positive Cocci, % Susceptible (cont.)**

| Organism                                                | Location | No. Isolates | Penicillins |           |            | Other                              |               |             |            |             |                           |              |           |                       |                               |            |             |
|---------------------------------------------------------|----------|--------------|-------------|-----------|------------|------------------------------------|---------------|-------------|------------|-------------|---------------------------|--------------|-----------|-----------------------|-------------------------------|------------|-------------|
|                                                         |          |              | Ampicillin  | Oxacillin | Penicillin | High Level Gentamicin <sup>1</sup> | Ciprofloxacin | Clindamycin | Daptomycin | Doxycycline | Tetracycline <sup>2</sup> | Erythromycin | Linezolid | Rifampin <sup>3</sup> | Trimethoprim sulfamethoxazole | Vancomycin | Ceftaroline |
| <i>Staphylococcus epidermidis</i>                       | All      | 612          | —           | 46        | 10         | —                                  | 65            | 64          | 99         | —           | 78                        | 38           | 99        | 98                    | 63                            | 99         | —           |
| <i>Staphylococcus haemolyticus</i>                      | All      | 86           | —           | 38        | 28         | —                                  | 52            | 48          | 99         | —           | 64                        | 29           | 99        | 84                    | 62                            | 99         | —           |
| <i>Staphylococcus lugdunensis</i> <sup>4</sup>          | All      | 419          | —           | 87        | 37         | —                                  | 99            | 85          | 99         | —           | 91                        | 79           | 99        | 99                    | 99                            | 99         | —           |
| <i>Staphylococcus pseudintermedius/ intermedius</i>     | All      | 83           | —           | 71        | 8          | —                                  | 67            | 65          | 99         | —           | 52                        | 52           | 99        | 99                    | 58                            | 99         | —           |
| Coagulase negative <i>Staphylococcus</i> <sup>5,6</sup> | All      | 139          | —           | 66        | 32         | —                                  | 80            | 80          | 99         | —           | 84                        | 53           | 99        | 99                    | 91                            | 99         | —           |
| <i>Enterococcus</i> spp. <sup>7 8</sup>                 | All      | 48           | 88          | —         | —          | — <sup>9</sup>                     | 71            | R           | 79         | 63          | —                         | 63           | 99        | 46                    | R                             | 58         | R           |
| <b>Enterococcus faecalis</b> <sup>7</sup>               | All      | 683          | 99          | —         | —          | 82 <sup>10</sup>                   | 55            | R           | 90         | 35          | —                         | R            | 99        | 21                    | R                             | 96         | R           |
| <b>Enterococcus faecium</b> <sup>7</sup>                | All      | 223          | 15          | —         | —          | 91 <sup>10</sup>                   | 8             | R           | 87         | 39          | —                         | R            | 99        | 7                     | R                             | 40         | R           |

<sup>1</sup> High level gentamicin 500µg/mL.

<sup>2</sup> Isolates that test susceptible to tetracycline are considered susceptible to doxycycline. Isolates that test intermediate or resistant to tetracycline may not be resistant to doxycycline. Isolate should be tested with doxycycline if results are needed for treatment.

<sup>3</sup> Rifampin should not be used as monotherapy.

<sup>4</sup> *S. lugdunensis* is best treated with a Beta-lactam agent.

<sup>5</sup> *S. saprophyticus* urinary tract infections respond to antibiotic concentrations achieved in urine with agents commonly used to treat acute uncomplicated UTIs.

<sup>6</sup> Excluding *S. epidermidis*, *S. lugdunensis* and *S. pseudintermedius*.

<sup>7</sup> Serious Enterococcal infections need combination therapy of ampicillin plus ceftriaxone or an aminoglycoside.

<sup>8</sup> Enterococcus spp. excludes *E. faecalis* and *E. faecium*.

<sup>9</sup> Insufficient data to calculate % susceptible.

<sup>10</sup> % susceptible calculated with isolates tested from sterile body sites. *E. faecalis* n=99 and *E. faecium* n=91.

**Table 4. Adults (> 21 y.o.) Gram-positive Cocci, % Susceptible (cont.)**

| Organism                                               | No. Isolates    | Penicillins |                 | Cephalosporins |             |    | Other       |              |              |                                 |              |            |
|--------------------------------------------------------|-----------------|-------------|-----------------|----------------|-------------|----|-------------|--------------|--------------|---------------------------------|--------------|------------|
|                                                        |                 | Amoxicillin | Penicillin      | Cefotaxime     | Ceftriaxone |    | Doxycycline | Erythromycin | Levofloxacin | Trimethoprim – sulfamethoxazole | Tetracycline | Vancomycin |
| <i>Streptococcus pneumoniae</i>                        | 51              | 86          | —               | —              | —           | 80 | 73          | 60           | 100          | 75                              | —            | 100        |
| Meningitis <sup>1</sup>                                |                 | —           | 59              | 75             | 73          | —  | —           | —            | —            | —                               | —            | —          |
| Non-meningitis <sup>2</sup>                            |                 | —           | 90              | 88             | 88          | —  | —           | —            | —            | —                               | —            | —          |
| Viridans group <i>Streptococcus</i> spp. <sup>3</sup>  | 102             | —           | 55 <sup>4</sup> | 98             | 98          | —  | —           | —            | —            | —                               | —            | 100        |
| <i>Streptococcus anginosus</i> group                   | 74              | —           | 99              | 100            | 100         | —  | —           | —            | —            | —                               | —            | 100        |
| <i>Streptococcus agalactiae</i> (Group B streptococci) | 119             | —           | 100             | —              | —           | 41 | —           | —            | —            | —                               | —            | 100        |
| <i>Streptococcus pyogenes</i> (Group A streptococci)   | 21 <sup>5</sup> | —           | 100             | —              | —           | 85 | —           | 81           | —            | 86 <sup>6</sup>                 | 71           | 100        |

<sup>1</sup> % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients with meningitis.

<sup>2</sup> % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients without meningitis.

<sup>3</sup> Excluding *Streptococcus anginosus* group.

<sup>4</sup> 42.5% Intermediate (MIC 0.25-2 µg/ml).

<sup>5</sup> Calculated from fewer than the standard recommendation of 30 isolates.

<sup>6</sup> Limited to skin and skin structure infections; not indicated for isolates from other sources (e.g. pharyngeal)

**Table 5. Miscellaneous Gram-negative Bacteria**

| Organism                      | No. Isolates                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | % beta-lactamase positive <sup>1</sup> |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|
| <i>Haemophilus influenzae</i> | 143 (pts. >21 y.o)<br>19 (pts. ≤21 y.o.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 25<br>21                               |
| <i>Moraxella catarrhalis</i>  | 56 (pts. >21 y.o)<br>10 (pts. ≤21 y.o.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 96<br>100                              |
| <i>Neisseria gonorrhoeae</i>  | <p>The current therapy recommendation is ceftriaxone. Culture and susceptibility testing should be performed in cases of treatment failure. See <a href="https://www.cdc.gov/gonorrhea/about/index.html">https://www.cdc.gov/gonorrhea/about/index.html</a></p> <p>PER STD 2021 treatment guidelines, the recommended treatment for gonorrhea is ceftriaxone 500 mg IM x 1 for patients &lt;150 kg, 1g for patients ≥ 150 kg.</p> <p>Doxycycline 100mg twice daily for 7 days is recommended if there is suspicion or confirmed Chlamydia co-infection</p>                                                                                                                                             |                                        |
| <i>Neisseria meningitidis</i> | <p>The current therapy recommendation is ceftriaxone for treating meningococcal infections. Penicillin may be considered after susceptibilities return and MIC is ≤0.12 µg/mL (Antimicrob Agents Chemother 56:2268, 2012). CDPH no longer recommends ciprofloxacin for post-exposure prophylaxis due to resistance. Ref: <a href="https://www.cdph.ca.gov/Programs/OPA/Pages/CAHAN/ca-discontinuation-of-ciprofloxacin-for-invasive-meningococcal-disease-pep.aspx">https://www.cdph.ca.gov/Programs/OPA/Pages/CAHAN/ca-discontinuation-of-ciprofloxacin-for-invasive-meningococcal-disease-pep.aspx</a>.</p> <p><b>Sanford guide 2025</b><br/>Recommended: Ceftriaxone<br/>Alternative: Meropenem</p> |                                        |

<sup>1</sup> Resistant to ampicillin, amoxicillin, and penicillin.

**Table 6. Multiple Drug Resistant Enterobacterales – All sources % Susceptible**

|                                             | Amikacin                  |               | Aztreonam                 |               | Ceftazidime-Avibactam <sup>1</sup> |               | Ceftolozane-Tazobactam <sup>1</sup> |               | Tigecycline <sup>2</sup>  |               | Meropenem-Vaborbactam <sup>1</sup> |               | Eravacycline <sup>1, 2, 3</sup> |               | Omadacycline <sup>2, 4</sup> |               |
|---------------------------------------------|---------------------------|---------------|---------------------------|---------------|------------------------------------|---------------|-------------------------------------|---------------|---------------------------|---------------|------------------------------------|---------------|---------------------------------|---------------|------------------------------|---------------|
| Organism                                    | Number of isolates tested | % Susceptible | Number of isolates tested | % Susceptible | Number of isolates tested          | % Susceptible | Number of isolates tested           | % Susceptible | Number of isolates tested | % Susceptible | Number of isolates tested          | % Susceptible | Number of isolates tested       | % Susceptible | Number of isolates tested    | % Susceptible |
| Carbapenem Resistant Enterobacterales (CRE) | 349                       | 83            | 67                        | 6             | 349                                | 94            | 349                                 | 77            | 70                        | 87            | 66                                 | 77            | 66                              | 79            | 66                           | 80            |

<sup>1</sup>Restricted formulary. ID consult required.

<sup>2</sup> Interpretations are based on FDA breakpoints. There are no current CLSI breakpoints available for these drugs. Please refer to the FDA website at: <https://www.fda.gov/drugs/development-resources/antibacterial-susceptibility-test-interpretive-criteria>.

<sup>3</sup> FDA guidelines indicated that clinical efficacy was shown for *Citrobacter freundii*, *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella oxytoca* & *Klebsiella pneumoniae*.

<sup>4</sup> FDA breakpoint for Omadacycline applies to *Klebsiella pneumoniae* only and indicated for Community Acquired Bacterial Pneumonia (CABP) and Acute Bacterial Skin/Skin Structure Infections (ABSSI).

**Table 7. Multiple Drug Resistant Gram-negative Bacteria, Other – All sources % Susceptible**

| Organism                                                                     | Number of Isolates | Amikacin        | Gentamicin | Ciprofloxacin | Piperacillin-Tazobactam | Cefepime | Ceftazidime | Ceftazidime-Avibactam <sup>1</sup> | Ceftolozane-Tazobactam <sup>1</sup> | Minocycline <sup>1</sup> | Trimethoprim-sulfamethoxazole |
|------------------------------------------------------------------------------|--------------------|-----------------|------------|---------------|-------------------------|----------|-------------|------------------------------------|-------------------------------------|--------------------------|-------------------------------|
| <i>Pseudomonas aeruginosa</i> ,<br>Imipenem <u>or</u> Meropenem resistant    | 292                | 91 <sup>2</sup> | —          | 50            | 49                      | 63       | 59          | 90                                 | 91                                  | R                        | R                             |
| <i>Pseudomonas aeruginosa</i> ,<br>Imipenem <u>and</u> Meropenem resistant   | 171                | 89 <sup>2</sup> | —          | 38            | 29                      | 47       | 41          | 87                                 | 89                                  | R                        | R                             |
| <i>Acinetobacter baumannii</i> complex <sup>3</sup> ,<br>Meropenem resistant | 42                 | 43 <sup>2</sup> | 21         | 10            | 2                       | 2        | 5           | —                                  | —                                   | 50                       | 36                            |

<sup>1</sup> Restricted formulary. ID consult required.

<sup>2</sup> Amikacin for *Pseudomonas aeruginosa* is for Urine isolates only.

<sup>3</sup> *Acinetobacter baumannii* complex includes *A. baumannii*, *A. calcoaceticus*, *A. pittii* and *A. nosocomialis*.

**Table 8. Pediatrics ( $\leq 21$  y.o.) Gram-negative Bacteria – Non-Urine Isolates, % Susceptible**

| Organism                                         | No. Isolates    | Penicillins             |                             |                                   |                         | Cephalosporins |          |                 |                          | Carbapenems |          |           | Aminoglycosides |                |            | Fluoroquinolone            | Other                           |
|--------------------------------------------------|-----------------|-------------------------|-----------------------------|-----------------------------------|-------------------------|----------------|----------|-----------------|--------------------------|-------------|----------|-----------|-----------------|----------------|------------|----------------------------|---------------------------------|
|                                                  |                 | Ampicillin <sup>1</sup> | Amoxicillin-Clavulanic acid | Ampicillin-sulbactam <sup>1</sup> | Piperacillin-tazobactam | Cefazolin      | Cefepime | Ceftazidime     | Ceftriaxone <sup>2</sup> | Ertapenem   | Imipenem | Meropenem | Amikacin        | Gentamicin     | Tobramycin | Ciprofloxacin <sup>3</sup> | Trimethoprim – sulfamethoxazole |
| <i>Enterobacter cloacae</i> complex <sup>4</sup> | 29 <sup>5</sup> | R                       | R                           | R                                 | 90                      | R              | 97       | — <sup>6</sup>  | — <sup>5</sup>           | 99          | 97       | 99        | 99              | 97             | 97         | 93                         | 96                              |
| <i>Escherichia coli</i>                          | 68              | —                       | 76                          | —                                 | 94                      | 78             | 90       | 88              | 81                       | 99          | 99       | 99        | 97              | 88             | 87         | 72                         | 66                              |
| <i>Klebsiella pneumoniae</i>                     | 42              | R                       | 76                          | —                                 | 90                      | 74             | 90       | 86              | 81                       | 95          | 99       | 99        | 99              | 81             | 81         | 79                         | 81                              |
| <i>Serratia marcescens</i>                       | 35              | R                       | R                           | R                                 | 99                      | R              | 99       | 99 <sup>6</sup> | 94 <sup>6</sup>          | 99          | 97       | 99        | 97              | 99             | 91         | 91                         | 97                              |
| <i>Pseudomonas aeruginosa</i>                    | 94              | R                       | R                           | R                                 | 93                      | R              | 95       | 94              | R                        | R           | 86       | 90        | — <sup>7</sup>  | — <sup>7</sup> | 96         | 89                         | R                               |

<sup>1</sup> Ampicillin and Ampicillin-sulbactam testing were discontinued on July 26, 2016.

<sup>2</sup> Ceftriaxone and cefotaxime have comparable activity against *Enterobacteriaceae*.

<sup>3</sup> Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and should only be used when no safe and effective alternatives exist.

<sup>4</sup> *Enterobacter cloacae* complex includes *E. cloacae*, *E. asburiae*, and *E. hormaechei*.

<sup>5</sup> Calculated from fewer than the standard recommendation of 30 isolates.

<sup>6</sup> 3<sup>rd</sup> generation cephalosporins should not be used for serious infections.

<sup>7</sup> As of 2023, *Pseudomonas aeruginosa* breakpoints were revised, and tobramycin is now the only recommended aminoglycoside for systemic therapy. Amikacin is effective against *P. aeruginosa* only in urinary tract infections. Gentamicin is no longer recommended for *P. aeruginosa* infection at any site.

**Table 9. Pediatrics ( $\leq 21$  y.o.) Gram-negative Bacteria – Urine Isolates, % Susceptible**

| Organism                                         | No. Isolates    | Penicillins |                               | Cephalosporins                   |          |             |            | Carbapenems |                |           | Amino-glycosides |                |                 | Fluoroquinolone            | Other                           |                |
|--------------------------------------------------|-----------------|-------------|-------------------------------|----------------------------------|----------|-------------|------------|-------------|----------------|-----------|------------------|----------------|-----------------|----------------------------|---------------------------------|----------------|
|                                                  |                 | Ampicillin  | Amoxicillin - Clavulanic acid | Oral Cephalosporins <sup>1</sup> | Cefepime | Ceftazidime | Ceftioxone | Ertapenem   | Imipenem       | Meropenem | Amikacin         | Gentamicin     | Tobramycin      | Ciprofloxacin <sup>2</sup> | Trimethoprim - sulfamethoxazole | Nitrofurantoin |
| <i>Enterobacter cloacae</i> complex <sup>3</sup> | 24 <sup>4</sup> | R           | R                             | R                                | 99       | —           | —          | 91          | —              | 99        | —                | —              | 96              | 92                         | 83                              | 21             |
| <i>Escherichia coli</i>                          | 904             | 56          | 88                            | 91                               | —        | —           | 93         | 99          | —              | 99        | —                | —              | 92              | 77                         | 78                              | 98             |
| <i>Klebsiella pneumoniae</i>                     | 95              | R           | 91                            | 87                               | —        | —           | 88         | 99          | —              | 99        | —                | —              | 88              | 82                         | 76                              | 25             |
| <i>Proteus mirabilis</i>                         | 123             | 90          | 96                            | 99                               | —        | —           | 99         | 99          | — <sup>5</sup> | 99        | —                | —              | 98              | 97                         | 87                              | R              |
| <i>Pseudomonas aeruginosa</i>                    | 14 <sup>4</sup> | R           | R                             | R                                | 99       | 99          | R          | R           | —              | 99        | 99 <sup>6</sup>  | — <sup>6</sup> | 99 <sup>6</sup> | 93                         | R                               | R              |

<sup>1</sup> Oral Cephalosporins include Cefpodoxime and Cephalexin for treatment of uncomplicated urinary tract infections.

<sup>2</sup> Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and should only be used when no safe and effective alternatives exist.

<sup>3</sup> *Enterobacter cloacae* complex includes *E. cloacae*, *E. asburiae*, and *E. hormaechei*.

<sup>4</sup> Calculated from fewer than the standard recommendation of 30 isolates.

<sup>5</sup> *Proteus* spp. may have elevated imipenem MIC by mechanisms other than production of carbapenemases.

<sup>6</sup> As of 2023, *Pseudomonas aeruginosa* breakpoints were revised, and tobramycin is now the only recommended aminoglycoside for systemic therapy. Amikacin is effective against *P. aeruginosa* only in urinary tract infections. Gentamicin is no longer recommended for *P. aeruginosa* infection at any site.

**Table 10. Pediatrics ( $\leq 21$  y.o.) Gram-positive Cocci, % Susceptible**

| Organism                                                 | Location | No. Isolates    | Penicillins |                |                | Cephalosporins |                | Others                     |             |            |             |                           |              |           |                       |                               |            |             |
|----------------------------------------------------------|----------|-----------------|-------------|----------------|----------------|----------------|----------------|----------------------------|-------------|------------|-------------|---------------------------|--------------|-----------|-----------------------|-------------------------------|------------|-------------|
|                                                          |          |                 | Ampicillin  | Oxacillin      | Penicillin     | Ceftriaxone    | Cefotaxime     | Ciprofloxacin <sup>1</sup> | Clindamycin | Daptomycin | Doxycycline | Tetracycline <sup>2</sup> | Erythromycin | Linezolid | Rifampin <sup>3</sup> | Trimethoprim-sulfamethoxazole | Vancomycin | Ceftaroline |
| <i>Staphylococcus aureus</i> (All)                       | OP       | 538             | —           | 88             | 25             | —              | —              | 91                         | 81          | 99         | —           | 89                        | 68           | 99        | 99                    | 96                            | 99         | 99          |
|                                                          | IP       | 113             | —           | 87             | 25             | —              | —              | 92                         | 75          | 99         | —           | 95                        | 66           | 99        | 99                    | 97                            | 99         | 99          |
| Oxacillin-resistant <i>S. aureus</i> (MRSA) <sup>3</sup> | OP       | 63              | —           | R <sup>4</sup> | R <sup>4</sup> | R <sup>4</sup> | R <sup>4</sup> | 56                         | 81          | 99         | —           | 68                        | 32           | 99        | 99                    | 89                            | 99         | 99          |
|                                                          | IP       | 15 <sup>5</sup> | —           | R <sup>4</sup> | R <sup>4</sup> | R <sup>4</sup> | R <sup>4</sup> | 53                         | 80          | 99         | —           | 86                        | 33           | 99        | 99                    | 80                            | 99         | 99          |
| Oxacillin-susceptible <i>S. aureus</i> (MSSA)            | OP       | 477             | —           | 99             | 28             | —              | —              | 96                         | 80          | 99         | —           | 92                        | 72           | 99        | 99                    | 97                            | 99         | 99          |
|                                                          | IP       | 99              | —           | 99             | 28             | —              | —              | 97                         | 75          | 99         | —           | 96                        | 72           | 99        | 99                    | 99                            | 99         | 99          |

<sup>1</sup> Ciprofloxacin is associated with arthropathy and histological changes in weight bearing joints of juvenile animals and should only be used when no safe and effective alternatives exist.

<sup>2</sup> Isolates that test susceptible to tetracycline are considered susceptible to doxycycline. Isolates that test intermediate or resistant to tetracycline may not be resistant to doxycycline. Isolate should be tested with doxycycline if results are needed for treatment.

<sup>3</sup> Rifampin should not be used as monotherapy.

<sup>4</sup> *Staphylococcus* resistant to oxacillin are resistant to cefazolin, cephalixin, ceftriaxone and all other beta-lactams except ceftaroline.

<sup>5</sup> Calculated from fewer than the standard recommendation of 30 isolates.

**Table 10. Pediatrics ( $\leq 21$  y.o.) Gram-positive Cocci, % Susceptible (cont.)**

| Organism                                              | Location | No. Isolates    | Penicillins |           |            | Cephalosporins |            | Others                             |                            |             |            |             |                           |              |           |                       |                               |            |             |
|-------------------------------------------------------|----------|-----------------|-------------|-----------|------------|----------------|------------|------------------------------------|----------------------------|-------------|------------|-------------|---------------------------|--------------|-----------|-----------------------|-------------------------------|------------|-------------|
|                                                       |          |                 | Ampicillin  | Oxacillin | Penicillin | Ceftriaxone    | Cefotaxime | High Level Gentamicin <sup>1</sup> | Ciprofloxacin <sup>2</sup> | Clindamycin | Daptomycin | Doxycycline | Tetracycline <sup>3</sup> | Erythromycin | Linezolid | Rifampin <sup>4</sup> | Trimethoprim-sulfamethoxazole | Vancomycin | Ceftaroline |
| Coagulase negative <i>Staphylococcus</i> <sup>5</sup> | ALL      | 37              | —           | 67        | 32         | —              | —          | —                                  | 97                         | 73          | 99         | —           | 77                        | 46           | 99        | 99                    | 86                            | 99         | —           |
|                                                       | OP       | 18 <sup>6</sup> | —           | 78        | 50         | —              | —          | —                                  | 99                         | 78          | 99         | —           | 93                        | 67           | 99        | 99                    | 99                            | 99         | —           |
|                                                       | IP       | 19 <sup>6</sup> | —           | 56        | 16         | —              | —          | —                                  | 95                         | 68          | 99         | —           | 55                        | 26           | 99        | 99                    | 74                            | 99         | —           |
| <i>Staphylococcus epidermidis</i>                     | All      | 70              | —           | 40        | 13         | —              | —          | —                                  | 73                         | 61          | 99         | —           | 85                        | 34           | 99        | 99                    | 70                            | 99         | —           |
| <i>Staphylococcus lugdunensis</i>                     | All      | 49              | —           | 98        | 32         | —              | —          | —                                  | 98                         | 86          | 99         | —           | 94                        | 88           | 99        | 99                    | 99                            | 99         | —           |
| <i>Enterococcus faecalis</i>                          | All      | 43              | 99          | —         | —          | R              | R          | 74                                 | 70                         | R           | 93         | 30          | —                         | R            | 99        | 16                    | R                             | 99         | —           |
| <i>Enterococcus faecium</i>                           | All      | 5 <sup>6</sup>  | 20          | —         | —          | R              | R          | 99                                 | 20                         | R           | 99         | 60          | —                         | R            | 99        | 20                    | R                             | 60         | —           |

<sup>1</sup> High level Gentamicin 500 µg/ml.

<sup>2</sup> Ciprofloxacin is associated with arthropathy and histological changes in weight bearing joints of juvenile animals and should only be used when no safe and effective alternatives exist.

<sup>3</sup> Isolates that test susceptible to tetracycline are considered susceptible to doxycycline. Isolates that test intermediate or resistant to tetracycline may not be resistant to doxycycline. Isolate should be tested with doxycycline if results are needed for treatment.

<sup>4</sup> Rifampin should not be used as monotherapy.

<sup>5</sup> *Staphylococcus* other than *S. aureus* (SOSA), excludes *S. epidermidis* and *S. lugdunensis*.

<sup>6</sup> Calculated from fewer than the standard recommendation of 30 isolates.

**Table 10. Pediatrics ( $\leq 21$  y.o.) Gram-positive Cocci, % Susceptible (cont.)**

| Organism                            | No. Isolates    | Penicillins |            | Cephalosporins |             | Other       |             |              |                                 |            |
|-------------------------------------|-----------------|-------------|------------|----------------|-------------|-------------|-------------|--------------|---------------------------------|------------|
|                                     |                 | Amoxicillin | Penicillin | Cefotaxime     | Ceftriaxone | Clindamycin | Doxycycline | Erythromycin | Trimethoprim – sulfamethoxazole | Vancomycin |
| <i>Viridans group Streptococcus</i> | 25 <sup>1</sup> | —           | 44         | 88             | 88          | —           | —           | —            | —                               | 99         |
| <i>Streptococcus anginosus</i>      | 5 <sup>1</sup>  | —           | 99         | 99             | 99          | —           | —           | —            | —                               | 99         |
| <i>Streptococcus pneumoniae</i>     | 5 <sup>1</sup>  | 99          | —          | —              | —           | 99          | 80          | 80           | 80                              | 99         |
| Meningitis <sup>2</sup>             |                 | —           | 40         | 99             | 99          | —           | —           | —            | —                               | —          |
| Non-meningitis <sup>3</sup>         |                 | —           | 99         | 99             | 99          | —           | —           | —            | —                               | —          |

<sup>1</sup> Calculated from fewer than the standard recommendation of 30 isolates.

<sup>2</sup> % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients with meningitis.

<sup>3</sup> % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients without meningitis.

**Table 11. Yeasts, %S, %I, %SDD, %R, 2024-2025**

- Most yeast infections can be treated empirically. Antifungal testing of yeasts may be warranted for the following:
  - Oropharyngeal or vaginal infections due to *Candida* spp. in patients who appear to be failing therapy.
  - Management of invasive *Candida* spp. infections when utility of an azole agent is uncertain (e.g., *Candida* spp. other than *C. albicans*), per IDSA guidelines for candidiasis: CID 2016:62, E1-E50. Clinical Practice Guidelines for the Management of Candidiasis.
- Isolation of *Candida* in respiratory specimens of immunocompetent patients should be interpreted as airway colonization.

| Organism                      | N               | Percent Susceptible, Susceptible Dose Dependent, Intermediate, Resistant at Breakpoints <sup>1, 2, 3</sup> |      |      |                           |                |                |                          |      |       |                         |      |        |                            |      |       |
|-------------------------------|-----------------|------------------------------------------------------------------------------------------------------------|------|------|---------------------------|----------------|----------------|--------------------------|------|-------|-------------------------|------|--------|----------------------------|------|-------|
|                               |                 | Fluconazole <sup>4</sup>                                                                                   |      |      | Voriconazole <sup>4</sup> |                |                | Caspofungin <sup>4</sup> |      |       | Micafungin <sup>4</sup> |      |        | Anidulafungin <sup>4</sup> |      |       |
|                               |                 | S                                                                                                          | SDD  | R    | S                         | I              | R              | S                        | I    | R     | S                       | I    | R      | S                          | I    | R     |
| <i>Candida albicans</i>       | 344             | ≤ 2                                                                                                        | 4    | ≥ 8  | ≤ 0.12                    | 0.25-0.5       | ≥ 1            | ≤ 0.25                   | 0.5  | ≥ 1   | ≤ 0.25                  | 0.5  | ≥ 1    | ≤ 0.25                     | 0.5  | ≥ 1   |
|                               |                 | 96                                                                                                         | 0    | 4    | 83                        | 16             | 1              | 99                       | 0    | 0     | 99                      | 0    | 0      | 99                         | 0    | 0     |
| <i>Candida glabrata</i>       | 207             | —                                                                                                          | ≤ 32 | ≥ 64 | — <sup>5</sup>            | — <sup>5</sup> | — <sup>5</sup> | ≤ 0.12                   | 0.25 | ≥ 0.5 | ≤ 0.06                  | 0.12 | ≥ 0.25 | ≤ 0.12                     | 0.25 | ≥ 0.5 |
|                               |                 | —                                                                                                          | 87   | 13   | — <sup>5</sup>            | — <sup>5</sup> | — <sup>5</sup> | 96                       | 4    | 0     | 99                      | 1    | 0      | 99                         | 1    | 0     |
| <i>Candida parapsilosis</i>   | 86              | ≤ 2                                                                                                        | 4    | ≥ 8  | ≤ 0.12                    | 0.25-0.5       | ≥ 1            | ≤ 2                      | 4    | ≥ 8   | ≤ 2                     | 4    | ≥ 8    | ≤ 2                        | 4    | ≥ 8   |
|                               |                 | 95                                                                                                         | 0    | 5    | 94                        | 3              | 2              | 99                       | 0    | 0     | 99                      | 0    | 0      | 99                         | 1    | 0     |
| <i>Candida tropicalis</i>     | 57              | ≤ 2                                                                                                        | 4    | ≥ 8  | ≤ 0.12                    | 0.25-0.5       | ≥ 1            | ≤ 0.25                   | 0.5  | ≥ 1   | ≤ 0.25                  | 0.5  | ≥ 1    | ≤ 0.25                     | 0.5  | ≥ 1   |
|                               |                 | 96                                                                                                         | 0    | 4    | 93                        | 2              | 5              | 99                       | 0    | 0     | 99                      | 0    | 0      | 99                         | 0    | 0     |
| <i>Candida krusei</i>         | 34              | —                                                                                                          | —    | —    | ≤ 0.5                     | 1              | ≥ 2            | ≤ 0.25                   | 0.5  | ≥ 1   | ≤ 0.25                  | 0.5  | ≥ 1    | ≤ 0.25                     | 0.5  | ≥ 1   |
|                               |                 | R                                                                                                          | R    | R    | 97                        | 3              | 0              | 91                       | 9    | 0     | 99                      | 0    | 0      | 99                         | 0    | 0     |
| <i>Candida guilliermondii</i> | 10 <sup>6</sup> | —                                                                                                          | —    | —    | —                         | —              | —              | ≤ 2                      | 4    | ≥ 8   | ≤ 2                     | 4    | ≥ 8    | ≤ 2                        | 4    | ≥ 8   |
|                               |                 | —                                                                                                          | —    | —    | —                         | —              | —              | 99                       | 0    | 0     | 99                      | 0    | 0      | 99                         | 0    | 0     |

<sup>1</sup> CLSI. Reference Method for Broth Dilution Antifungal Susceptibility Testing of Yeast. 4<sup>th</sup> ed. CLSI Standard M27. Wayne, PA.: Clinical and Laboratory Standards Institute; 2017

<sup>2</sup> CLSI. Performance Standards for Antifungal Susceptibility Testing of Yeasts. 2<sup>nd</sup> ed. CLSI Standard M27. Wayne, PA.: Clinical and Laboratory Standards Institute; 2017

<sup>3</sup> Breakpoint MIC in mg/ml

<sup>4</sup> Not all isolates were tested against all four antifungal agents.

<sup>5</sup> For *C. glabrata* and voriconazole, current data are insufficient to demonstrate correlation between *in vitro* susceptibility testing and clinical outcome.

<sup>6</sup> Calculated from fewer than the standard recommendation of 30 isolates.

## Table 12. Candida Resistance

When specific antimicrobial resistance (R) is detected, an Infectious Disease (ID) consult is strongly suggested.

| Organism                | If Resistant to:                                                            | Therapeutic Options                                                                   | Comments                                                                                                        |
|-------------------------|-----------------------------------------------------------------------------|---------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------|
| <i>Candida krusei</i>   | micafungin                                                                  | voriconazole <sup>1</sup><br>amphotericin <sup>2</sup>                                | Typically susceptible to micafungin. Breakthrough infections have been reported. <sup>3</sup>                   |
|                         | voriconazole                                                                | micafungin <sup>4</sup><br>amphotericin <sup>2, 5</sup>                               | Intrinsically resistant to fluconazole <sup>6, 7</sup><br>Typically susceptible to voriconazole <sup>6, 7</sup> |
| <i>Candida glabrata</i> | micafungin                                                                  | fluconazole <sup>8</sup><br>voriconazole <sup>1</sup><br>amphotericin <sup>2, 5</sup> | echinocandin resistance may be emerging. <sup>6</sup>                                                           |
|                         | fluconazole                                                                 | voriconazole <sup>1</sup><br>micafungin <sup>4</sup><br>amphotericin <sup>2, 5</sup>  | Typically resistant to fluconazole. <sup>6, 7</sup>                                                             |
| <i>Candida albicans</i> | micafungin                                                                  | fluconazole <sup>8</sup><br>amphotericin <sup>2, 5</sup>                              | Typically susceptible to micafungin. <sup>6, 7</sup>                                                            |
|                         | fluconazole                                                                 | micafungin <sup>4</sup><br>amphotericin <sup>2, 5</sup>                               | Typically susceptible to fluconazole but resistance can develop during therapy. <sup>6, 7</sup>                 |
| <i>Candida auris</i>    | Often resistant to azoles, amphotericin and some are echinocandin resistant | Infectious Disease consult is strongly suggested                                      | <i>Candida auris</i> is an emerging multi-drug resistant organism, able to cause wide range of infections.      |

These are therapeutic options in adults. For therapeutic options in pediatric patients, please contact the Antimicrobial Stewardship.

<sup>1</sup> Voriconazole has poor penetration in urine.

<sup>2</sup> Liposomal amphotericin has poor penetration in urine.

<sup>3</sup> Tavernier, E., et al. Development of echinocandin resistance in *Candida krusei* isolates following exposure to micafungin and caspofungin in a BM transplant unit. Bone Marrow Transplant 50, 158–160 (2015)

<sup>4</sup> micafungin may not reach therapeutic concentration in the CSF, vitreous fluid or urine.

<sup>5</sup> Among patients without baseline renal dysfunction and suspected azole- and echinocandin-resistant *Candida* infections, liposomal amphotericin B is recommended. Infectious Disease consult is highly recommended.

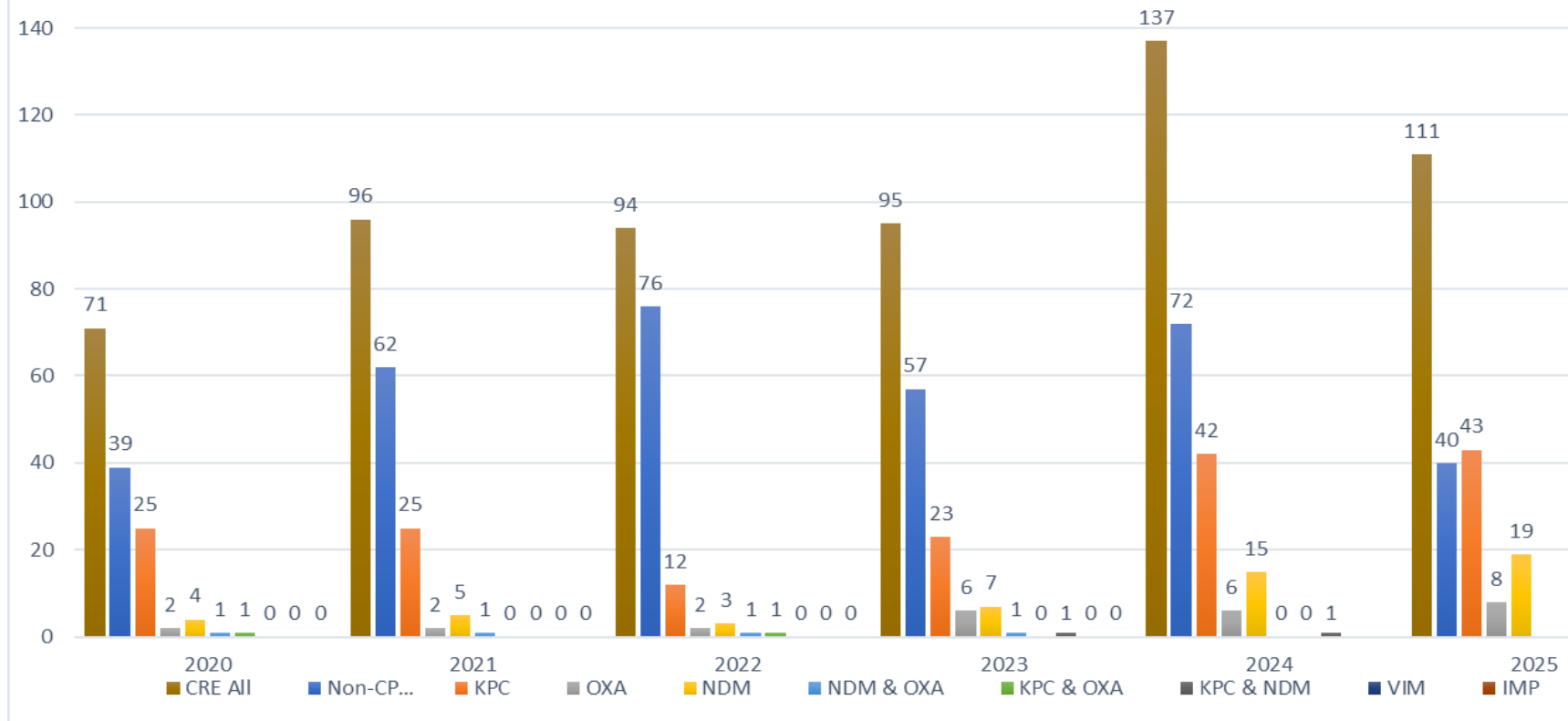
<sup>6</sup> Pappas, P. G., et al. (2016). Clinical Practice Guideline for the Management of Candidiasis: 2016 Update by the Infectious Diseases Society of America. Clinical infectious diseases: an official publication of the Infectious Diseases Society of America, 62(4), e1–e50.

<sup>7</sup> Treatment Guidelines from the Med. Letter-Antifungal Drugs. 2012;10(120);61-68

<sup>8</sup> For initial treatment with fluconazole, careful consideration should be given, especially in critically ill patients or those with prior azole exposure or prophylaxis. Infectious Disease consult is highly recommended.

**Table 13. Carbapenem-resistant Enterobacterales (CRE), 2020-2025**

| Year              | CRE All | CPE | Non-CP CRE | KPC | OXA | NDM | KPC & NDM | NDM & OXA | KPC & OXA | VIM | IMP |
|-------------------|---------|-----|------------|-----|-----|-----|-----------|-----------|-----------|-----|-----|
| 2020              | 71      | 32  | 39         | 25  | 2   | 4   | 0         | 0         | 1         | 0   | 0   |
| 2021              | 96      | 34  | 62         | 25  | 2   | 5   | 0         | 1         | 1         | 0   | 0   |
| 2022              | 94      | 18  | 76         | 12  | 2   | 3   | 0         | 1         | 0         | 0   | 0   |
| 2023              | 95      | 38  | 57         | 23  | 6   | 7   | 0         | 1         | 1         | 0   | 0   |
| 2024 <sup>1</sup> | 137     | 65  | 72         | 42  | 6   | 15  | 1         | 1         | 0         | 0   | 0   |
| 2025 <sup>1</sup> | 111     | 71  | 40         | 43  | 8   | 19  | 1         | 0         | 0         | 0   | 0   |



<sup>1</sup> Includes CPE Surveillance Cultures results

**Table 13. Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA), 2023-2025 (Cont.)**

| Year | Non-CP CRPA | CP CRPA | KPC | OXA | NDM | VIM | IMP |
|------|-------------|---------|-----|-----|-----|-----|-----|
| 2023 | 114         | 7       | 0   | 2   | 5   | 0   | 0   |
| 2024 | 137         | 3       | 0   | 0   | 2   | 1   | 0   |
| 2025 | 175         | 2       | 1   | 0   | 0   | 1   | 0   |

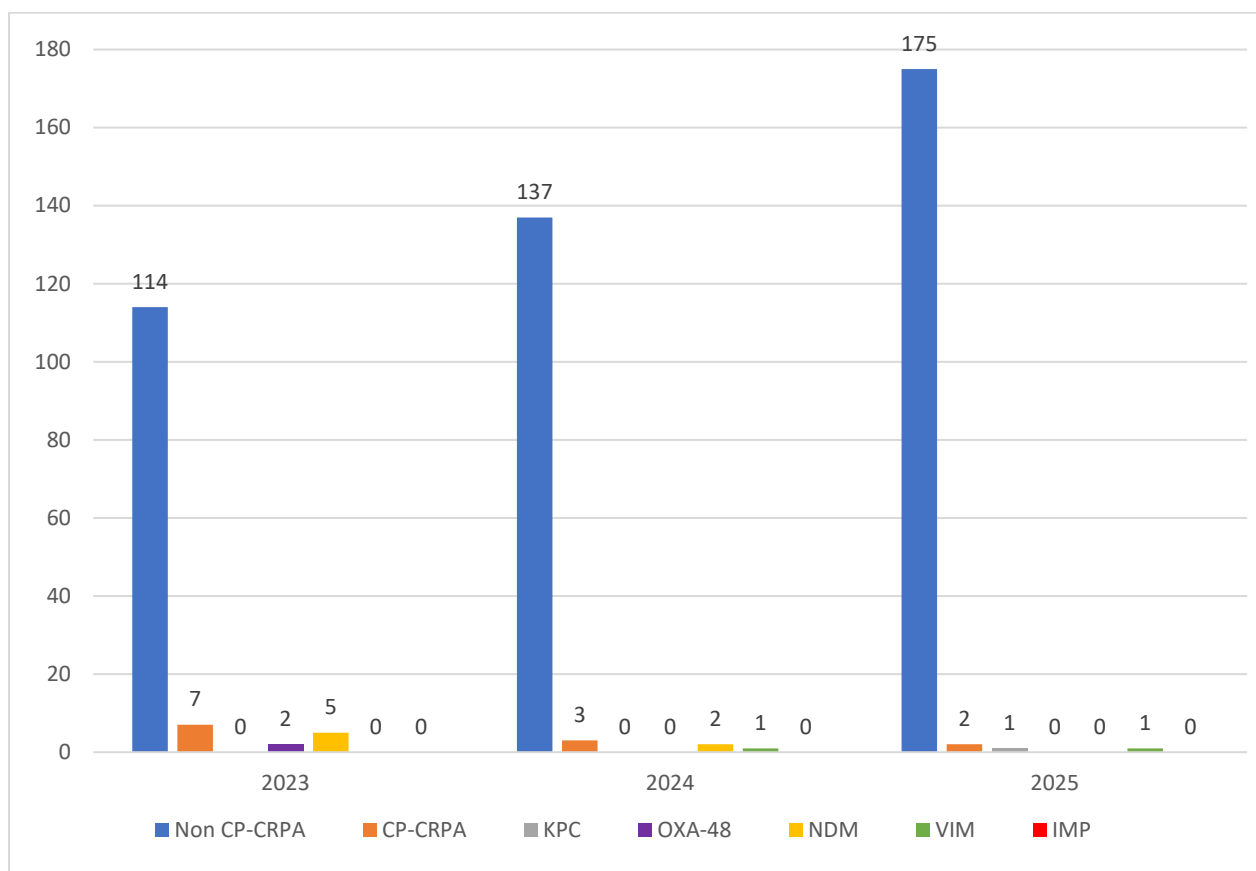


**Table 14. Treatment Suggestions for Organisms for which Susceptibility Testing is not Routinely Performed**

| Organism                                  | Recommended                                                                                                                                                                                                                                                        | Alternate treatment                                                                    | Comments / Also Effective                                                                                                                     |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Aerococcus urinae</i>                  | Amoxicillin                                                                                                                                                                                                                                                        | Levofloxacin or Ciprofloxacin                                                          | Fluoroquinolones resistant strains (27%-33%) have been reported. <sup>1</sup>                                                                 |
| <i>Bordetella pertussis</i> <sup>2</sup>  | Azithromycin or Clarithromycin                                                                                                                                                                                                                                     | Trimethoprim-sulfamethoxazole                                                          |                                                                                                                                               |
| <i>Burkholderia cepacia</i> complex       | Routine susceptibility testing is not recommended, as MIC values do not correlate with clinical outcomes. If susceptibility information is needed for patient management, please contact the microbiology laboratory and consider infectious disease consultation. |                                                                                        |                                                                                                                                               |
| <i>Campylobacter jejuni</i> <sup>2</sup>  | Azithromycin                                                                                                                                                                                                                                                       | Consult with ID                                                                        | Trimethoprim-sulfamethoxazole, Penicillin & Cephalosporins <b><u>NOT Active</u></b>                                                           |
| <i>Campylobacter fetus</i> <sup>2</sup>   | Gentamicin                                                                                                                                                                                                                                                         | Imipenem or Ceftriaxone                                                                | Ampicillin                                                                                                                                    |
| <i>Legionella</i> spp. <sup>2</sup>       | Levofloxacin or Azithromycin                                                                                                                                                                                                                                       | Moxifloxacin or doxycycline                                                            |                                                                                                                                               |
| <i>Mycoplasma pneumoniae</i> <sup>2</sup> | Adult Patients:<br>Doxycycline<br><br>Pediatric Patients:<br>Azithromycin                                                                                                                                                                                          | Adult Patients:<br>Azithromycin, Minocycline<br><br>Pediatric Patients:<br>Doxycycline | Clindamycin & B-lactams <b><u>NOT Effective</u></b> . Increasing macrolide resistance.                                                        |
| <i>Mycoplasma hominis</i>                 | Consult with ID                                                                                                                                                                                                                                                    | Consult with ID                                                                        | <b><u>Resistant</u></b> to Erythromycin and azithromycin. Fluoroquinolone and Tetracycline resistant strains have been reported. <sup>3</sup> |

<sup>1</sup> Berteau, T., Roy, F. É., Bestman-Smith, J., Lapierre, S. G., Longtin, J., Dufresne, S. F., ... & Leduc, J. M. (2018, November). 2001. Susceptibility of *Aerococcus urinae* to Fluoroquinolones: Broth Microdilution and Gradient Diffusion. In *Open Forum Infectious Diseases* (Vol. 5, No. suppl\_1, pp. S582-S583). US: Oxford University Press.

<sup>2</sup> The Sanford Guide to Antimicrobial Therapy. (2020). Sperryville, VA: Antimicrobial Therapy, Inc.

<sup>3</sup> Waites, K. B., Katz, B., & Schelonka, R. L. (2005). *Mycoplasmas* and *Ureaplasma* as neonatal pathogens. *Clinical microbiology reviews*, 18(4), 757–789.

**Table 14. Treatment Suggestions for Organisms for which Susceptibility Testing is not Routinely Performed (cont.)**

| Organism                                                                             | Recommended                            | Alternate treatment               | Comments / Also Effective                                                                   |
|--------------------------------------------------------------------------------------|----------------------------------------|-----------------------------------|---------------------------------------------------------------------------------------------|
| <b><i>Stenotrophomonas maltophilia</i></b> <sup>4 5</sup>                            | Consult with ID                        | Consult with ID                   | Fluoroquinolone<br>For moderate to severe infections, ID consultation should be considered. |
| <b><i>Streptococcus agalactiae</i><br/>(Group B Streptococcus)</b>                   | Penicillin, Ampicillin, or Amoxicillin | Cefazolin or Vancomycin           |                                                                                             |
| <b><i>Cutibacterium</i><br/>(<i>Propionibacterium</i>) <i>acnes</i></b> <sup>2</sup> | Penicillin, Ceftriaxone                | Vancomycin, Daptomycin, Linezolid | Resistant to Metronidazole                                                                  |
| <b><i>Ureaplasma</i></b>                                                             | Azithromycin, Doxycycline              |                                   | Resistant to Clindamycin. Tetracycline resistant strains have been reported. <sup>3</sup>   |

<sup>4</sup> Susceptibility performed on *Stenotrophomonas maltophilia* isolates from sterile body sites and Cystic Fibrosis cases.

<sup>5</sup> Tamma P, Heil EL, Justo JA, Mathers AJ, Satlin MJ, Bonomo RA. IDSA Antimicrobial-Resistant Treatment Guidance: Gram-Negative Bacterial Infections. IDSA 2024. Version 4.0

**Table 15. Blood: One Isolate per Patient (All), 2025**

| Blood Culture Organisms (ALL)         | n   | % of Total Blood Isolates |
|---------------------------------------|-----|---------------------------|
| Gram-negative, Enterobacterales       | 726 | 27.0%                     |
| Gram-negative, non-Enterobacterales   | 110 | 4.1%                      |
| Gram-positive, Staphylococcus species | 912 | 34.0%                     |
| Gram-positive, Other                  | 618 | 23.0%                     |
| Anaerobe                              | 132 | 4.9%                      |
| Fungi                                 | 143 | 5.3%                      |
| Mycobacteria                          | 7   | 0.3%                      |

\*Excludes

Coagulase-negative *Staphylococcus* (n= 892)

Viridans group *Streptococcus* (n=128)

*Corynebacterium* spp. (n= 52)

*Bacillus* spp. (n=34)

*Micrococcus* spp. (n= 31)

*Cutibacterium (Propionibacterium) acnes* (n=15)

*Aerococcus viridans* (n=6)

| Most Common Organism*                            | n   | % of Total Blood Isolates |
|--------------------------------------------------|-----|---------------------------|
| <i>Escherichia coli</i> , 31% ceftriaxone R      | 464 | 26.2%                     |
| <i>Staphylococcus aureus</i> , 38% MRSA          | 282 | 15.9%                     |
| <i>Enterococcus</i> species, 27% VRE             | 260 | 14.7%                     |
| <i>Klebsiella pneumoniae</i> , 27% ceftriaxone R | 169 | 9.5%                      |
| <i>Pseudomonas aeruginosa</i>                    | 89  | 5.0%                      |
| <i>Proteus mirabilis</i>                         | 66  | 3.7%                      |
| <i>Candida glabrata</i>                          | 54  | 3.0%                      |
| <i>Bacteroides</i> species                       | 47  | 2.7%                      |
| <i>Enterobacter cloacae</i> complex              | 41  | 2.3%                      |
| Other Enterobacteriaceae spp.                    | 33  | 1.9%                      |
| <i>Candida albicans</i>                          | 28  | 1.6%                      |
| <i>Streptococcus anginosus</i> group             | 24  | 1.4%                      |
| <i>Streptococcus pneumoniae</i>                  | 23  | 1.3%                      |
| <i>Klebsiella oxytoca</i>                        | 22  | 1.2%                      |
| <i>Serratia marcescens</i>                       | 22  | 1.2%                      |
| <i>Streptococcus agalactiae</i>                  | 20  | 1.1%                      |
| <i>Acinetobacter</i> species                     | 19  | 1.1%                      |
| <i>Candida parapsilosis</i>                      | 18  | 1.0%                      |
| <i>Stenotrophomonas maltophilia</i>              | 16  | 0.9%                      |
| <i>Citrobacter freundii</i> complex              | 15  | 0.8%                      |
| <i>Candida auris</i>                             | 14  | 0.8%                      |
| <i>Streptococcus pyogenes</i>                    | 13  | 0.7%                      |
| <i>Morganella morganii</i>                       | 13  | 0.7%                      |
| <i>Candida tropicalis</i>                        | 11  | 0.6%                      |
| <i>Klebsiella aerogenes</i>                      | 8   | 0.5%                      |

**Table 15. Blood: One Isolate per Patient (ALL), 2025 (cont.)**

| Gram-positive Bacterial Isolates*                                                                                                       | n           | % of Gram-positive Isolates        | Fungal Isolates                                     | n          | % of Fungal Isolates                     |
|-----------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------|-----------------------------------------------------|------------|------------------------------------------|
| <i>Staphylococcus aureus</i> , 38% MRSA                                                                                                 | 282         | 33.3%                              | <i>Candida albicans</i>                             | 28         | 20%                                      |
| <i>Enterococcus spp.</i> , 27% VRE                                                                                                      | 260         | 30.7%                              | <i>Candida glabrata</i>                             | 28         | 20%                                      |
| Viridans group <i>Streptococcus</i>                                                                                                     | 128         | 15.1%                              | <i>Candida auris</i>                                | 21         | 15%                                      |
| Other Gram-Positive                                                                                                                     | 59          | 7.0%                               | <i>Candida parapsilosis</i>                         | 14         | 10%                                      |
| <i>Streptococcus anginosus</i> group                                                                                                    | 24          | 2.8%                               | <i>Candida tropicalis</i>                           | 11         | 8%                                       |
| <i>Streptococcus pneumoniae</i>                                                                                                         | 23          | 2.7%                               | <i>Candida krusei</i>                               | 6          | 4%                                       |
| <i>Streptococcus agalactiae</i>                                                                                                         | 20          | 2.4%                               | <i>Cryptococcus neoformans</i>                      | 5          | 4%                                       |
| <i>Beta Streptococcus</i>                                                                                                               | 17          | 2.0%                               | <i>Candida lusitanae</i>                            | 3          | 2%                                       |
| <i>Rothia species</i>                                                                                                                   | 16          | 1.9%                               | <i>Other Fungi</i>                                  | 26         | 18%                                      |
| <i>Streptococcus pyogenes</i>                                                                                                           | 13          | 1.5%                               | <b>Total</b>                                        | <b>142</b> |                                          |
| <i>Arcanobacterium haemolyticum</i>                                                                                                     | 2           | 0.2%                               |                                                     |            |                                          |
| <i>Listeria monocytogenes</i>                                                                                                           | 2           | 0.2%                               |                                                     |            |                                          |
| <b>Total</b>                                                                                                                            | <b>846</b>  |                                    |                                                     |            |                                          |
| *Excludes other coagulase – negative <i>Staphylococcus</i> , <i>Corynebacterium</i> spp., <i>Bacillus</i> spp., <i>Micrococcus</i> spp. |             |                                    | <b>Anaerobic Bacterial Isolates*</b>                | <b>n</b>   | <b>% of Anaerobic Bacterial Isolates</b> |
| <b>Gram-negative Bacterial Isolates</b>                                                                                                 | <b>n</b>    | <b>% of Gram-negative Isolates</b> | <i>Bacteroides species</i>                          | 32         | 24%                                      |
| <i>Escherichia coli</i> , 31% ceftriaxone R                                                                                             | 464         | 45%                                | <i>Lactobacillus species</i>                        | 15         | 11%                                      |
| <i>Klebsiella pneumoniae</i> , 27% ceftriaxone R                                                                                        | 169         | 16%                                | <i>Clostridium species</i>                          | 9          | 7%                                       |
| <i>Pseudomonas aeruginosa</i>                                                                                                           | 89          | 9%                                 | <i>Gemella species</i>                              | 8          | 6%                                       |
| <i>Proteus mirabilis</i>                                                                                                                | 66          | 6%                                 | <i>Fusobacterium species</i>                        | 6          | 5%                                       |
| Other gram-negatives                                                                                                                    | 58          | 6%                                 | <i>Staphylococcus saccharolyticus</i>               | 5          | 4%                                       |
| <i>Enterobacter cloacae</i> complex                                                                                                     | 41          | 4%                                 | <i>Actinomyces species</i>                          | 5          | 4%                                       |
| Other <i>Enterobacteriaceae</i> spp.                                                                                                    | 29          | 3%                                 | <i>Bifidobacterium species</i>                      | 4          | 3%                                       |
| <i>Klebsiella oxytoca</i>                                                                                                               | 22          | 2%                                 | <i>Other anaerobe</i>                               | 49         | 37%                                      |
| <i>Serratia marcescens</i>                                                                                                              | 22          | 2%                                 | *Excludes <i>Cutibacterium acnes</i>                |            |                                          |
| <i>Acinetobacter species</i>                                                                                                            | 19          | 2%                                 | <b>Total</b>                                        | <b>133</b> |                                          |
| <i>Stenotrophomonas maltophilia</i>                                                                                                     | 16          | 2%                                 | <b>Mycobacterial Isolates</b>                       | <b>n</b>   | <b>% of Mycobacterial Isolates</b>       |
| <i>Citrobacter freundii</i> complex                                                                                                     | 15          | 1%                                 | <i>Mycobacterium abscessus</i> ssp <i>abscessus</i> | 1          | 33%                                      |
| <i>Morganella morganii</i>                                                                                                              | 13          | 1%                                 | <i>Mycobacterium avium</i>                          | 1          | 33%                                      |
| <i>Klebsiella aerogenes</i>                                                                                                             | 8           | 1%                                 | <i>Mycobacterium mucogenicum</i>                    | 1          | 33%                                      |
| <b>Total</b>                                                                                                                            | <b>1031</b> |                                    | <b>Total</b>                                        | <b>3</b>   |                                          |

**Table 16. CSF: One Isolate per Patient (ALL), 2025**

| CSF Isolates (n = 49)                     | Number of Isolates | CSF Isolates (cont.)                            | Number of Isolates |
|-------------------------------------------|--------------------|-------------------------------------------------|--------------------|
| <b>Gram-positive bacteria (28)</b>        |                    | <b>Anaerobe (12)</b>                            |                    |
| <i>Staphylococcus other than S.aureus</i> | 12                 | <i>Cutibacterium (Propionibacterium) acnes</i>  | 11                 |
| <i>Streptococcus pneumoniae</i>           | 1                  | <i>Cutibacterium (Propionibacterium) avidum</i> | 1                  |
| <i>Coryneform bacteria</i>                | 1                  |                                                 |                    |
| <i>Enterococcus faecalis</i>              | 1                  | <b>Fungi (10)</b>                               |                    |
| <i>Streptococcus agalactiae</i>           | 1                  | <i>Cryptococcus neoformans</i>                  | 6                  |
| <i>Enterococcus faecium</i>               | 1                  | <i>Coccidioides immitis/posadasii</i>           | 3                  |
| <i>Viridans group Streptococcus</i>       | 1                  | <i>Scedosporium apiospermum</i>                 | 1                  |
| <i>Listeria monocytogenes</i>             | 1                  |                                                 |                    |
| <i>Staphylococcus aureus</i>              | 1                  | <b>Mycobacteria (1)</b>                         |                    |
|                                           | 1                  | <i>Mycobacterium tuberculosis complex</i>       | 1                  |
| <b>Gram-negative bacteria (6)</b>         |                    |                                                 |                    |
| <i>Pseudomonas aeruginosa</i>             | 3                  |                                                 |                    |
| <i>Enterobacter cloacae complex</i>       | 2                  |                                                 |                    |
| <i>Serratia marcescens</i>                | 1                  |                                                 |                    |

The following antimicrobial agents are not the drug of choice and may not be effective for treating infections caused by bacteria isolated from CSF:

- Agents administered by oral route only
- First- and second-generation cephalosporins and cephamycins
- Doripenem, ertapenem, and imipenem
- Clindamycin
- Lefamulin
- Macrolides
- Tetracyclines

**Table 17. Mycobacteria, One Isolate per Patient per Source, 2025**

| Organisms                                                | No. of Isolates | # Patients By Source <sup>1</sup> |                                    |          |
|----------------------------------------------------------|-----------------|-----------------------------------|------------------------------------|----------|
|                                                          |                 | Respiratory                       | Abscess/<br>wound/<br>tissue/other | Blood    |
| <i>Mycobacterium avium complex</i>                       | 363             | 350                               | 12                                 | 1        |
| <i>Mycobacterium gordonae</i>                            | 36              | 33                                | 3                                  |          |
| <i>Mycobacteroides (Mycobacterium) chelonae</i>          | 30              | 25                                | 5                                  |          |
| <i>Mycobacterium abscessus</i>                           | 29              | 25                                | 3                                  | 1        |
| <i>Mycolicibacterium (Mycobacterium) fortuitum group</i> | 17              | 15                                | 2                                  |          |
| <i>Mycobacterium tuberculosis complex</i>                | 13              | 10                                | 3                                  |          |
| <i>Mycolicibacterium (Mycobacterium) mucogenicum</i>     | 11              | 10                                |                                    | 1        |
| <i>Mycobacteroides (Mycobacterium) immunogenum</i>       | 6               | 3                                 | 3                                  |          |
| <i>Mycobacterium kansasii</i>                            | 4               | 3                                 | 1                                  |          |
| <i>Mycobacterium lentiflavum</i>                         | 4               | 4                                 |                                    |          |
| <i>Mycobacterium xenopi</i>                              | 4               | 4                                 |                                    |          |
| <i>Mycobacterium simiae</i>                              | 2               | 2                                 |                                    |          |
| <i>Mycobacterium scrofulaceum</i>                        | 2               | 2                                 |                                    |          |
| <i>Mycobacterium szulgai</i>                             | 1               |                                   | 1                                  |          |
| <i>Mycolicibacterium (Mycobacterium) smegmatis</i>       | 1               | 1                                 |                                    |          |
| <i>Mycobacterium gilvum</i>                              | 1               | 1                                 |                                    |          |
| <i>Mycobacterium arupense</i>                            | 1               | 1                                 |                                    |          |
| <i>Mycobacterium mageritense</i>                         | 1               | 1                                 |                                    |          |
| <i>Mycobacterium bovis</i>                               | 1               |                                   | 1                                  |          |
| <b>Total Mycobacteria</b>                                | <b>527</b>      | <b>490</b>                        | <b>34</b>                          | <b>3</b> |

<sup>1</sup> Some patients have isolates in more than one source.

## Table 18. Mycobacteria Antimicrobial Susceptibility Testing

### 1. *Mycobacterium tuberculosis* complex:

Performed on first isolate per patient; performed on additional isolates recovered after 3 months, testing performed at reference lab.

| Primary agents  | Secondary agents      |
|-----------------|-----------------------|
| Rifampin        | Amikacin              |
| Isoniazid (INH) | Capreomycin           |
| Pyrazinamide    | Ciprofloxacin         |
| Ethambutol      | Ethionamide           |
|                 | p-aminosalicylic acid |
|                 | Streptomycin          |

### 2. *Mycobacterium avium* complex:

Performed on first isolate per patient; performed on additional isolates recovered after 3 months, testing performed at reference lab.

Correlation between in vitro susceptibility and clinical response has been demonstrated only for clarithromycin. Clarithromycin results predict azithromycin results. Susceptibility testing for clarithromycin should be performed on isolates from patients only when failing prior macrolide therapy or prophylaxis.

### 3. Rapidly growing *Mycobacterium* spp. (e.g. *M. abscessus*, *M. chelonae*, and *M. fortuitum* group):

Performed on one isolate per patient, testing performed in-house. Additional agents on request.

| Agents routinely reported     | Agents conditionally reported                  |
|-------------------------------|------------------------------------------------|
| amikacin                      | imipenem                                       |
| cefoxitin                     | linezolid                                      |
| ciprofloxacin                 | meropenem                                      |
| clarithromycin (inducible)    | moxifloxacin                                   |
| doxycycline                   | tigecycline                                    |
| trimethoprim-sulfamethoxazole | tobramycin ( <i>M. chelonae</i> isolates only) |

*M. abscessus* Clarithromycin and Amikacin drug resistance prediction and subspecies identification by Whole Genome Sequencing is performed by physician request only.

### 4. Other Nontuberculous Mycobacteria (NTM):

*M. kansasii* – Performed on one isolate per patient, at reference lab.  
Other NTM by physician request.

**Table 19. California Mycobacterium tuberculosis % Resistant, 2015-2025**

Data derived from California Department of Public Health Annual report "California TB Snapshot"<sup>1</sup>

| Antimicrobial Agent                                  | 2015  | 2016  | 2017              | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|------------------------------------------------------|-------|-------|-------------------|------|------|------|------|------|------|------|------|
| Isoniazid                                            | 10.9% | 10.9% | 7.6% <sup>2</sup> | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   |
| Rifampin                                             | 1.4%  | 1.8%  | 0.4% <sup>1</sup> | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   |
| Ethambutol                                           | 0.7%  | ND    | ND                | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   |
| Pyrazinamide                                         | 5.1%  | 5.4%  | 4.5% <sup>1</sup> | ND   | ND   | ND   | ND   | ND   | ND   | ND   | ND   |
| Multi-drug Resistant Tuberculosis rates <sup>3</sup> | 1.3%  | 1.8%  | 1.8%              | 1.2% | 1.0% | 1.0% | 0.6% | 0.9% | 1.1% | 1.0% | 1.3% |
| MTB Case rate per 100,000 population                 | 5.5   | 5.2   | 5.2               | 5.3  | 5.3  | 4.3  | 4.4  | 4.7  | 5.4  | 5.4  | 5.4  |
| Number of new cases                                  | 2131  | 2059  | 2058              | 2092 | 2115 | 1706 | 1750 | 1843 | 2113 | 2100 | 2150 |

<sup>1</sup> <https://www.cdph.ca.gov/Programs/CID/DCDC/Pages/TB-Disease-Data.aspx>

<sup>2</sup> Excludes multi-drug resistant cases.

<sup>3</sup> Multi-drug resistant = Resistant to isoniazid and rifampin.

**Table 20. Rapid Grower – Mycobacteria % Susceptible 2023-2025**

| Organism                                                     | No. Isolates | Amikacin <sup>1</sup> | Ciprofloxacin | Clarithromycin | Trimethoprim-sulfamethoxazole |
|--------------------------------------------------------------|--------------|-----------------------|---------------|----------------|-------------------------------|
| <i>Mycobacterium abscessus</i> complex <sup>2, 3, 4, 5</sup> | 88           | 90                    | R             | 51             | R                             |
| <i>Mycobacterium fortuitum</i> <sup>6</sup>                  | 42           | 100                   | 95            | 30             | 98                            |
| <i>Mycobacterium chelonae</i>                                | 75           | 88                    | —             | 99             | —                             |

<sup>1</sup> Amikacin susceptible breakpoint: Susceptible ≤ 16 µg/mL CLSI M24S 2nd Edition 2023

<sup>2</sup> *M. abscessus* complex is differentiated into 3 subspecies: *M. abscessus* subsp. *abscessus*, *M. abscessus* subsp. *massiliense* and *M. abscessus* subsp. *bolletii*.

<sup>3</sup> Some isolates of *M. abscessus* subsp. *abscessus* and *M. abscessus* subsp. *bolletii* may contain a functional *erm*(41) gene that confers inducible macrolide resistance. Resistance is detected in MIC at day 15, which is routinely tested for.

<sup>4</sup> *M. abscessus* Clarithromycin and Amikacin drug resistance prediction and subspecies identification by Whole Genome Sequencing is available by physician request.

<sup>5</sup> Subspecies identification by Whole Genome Sequencing (2020 – 2025) n = 37 *M. abscessus* subsp. *abscessus* = 65% (24), *M. abscessus* subsp. *massiliense* = 35% (13), *M. abscessus* subsp. *bolletii* = 0%.

<sup>6</sup> All isolates of the *M. fortuitum* group, *M. mucogenicum* group and *M. smegmatis* group are presumed susceptible to imipenem based on clinical response data. CLSI M24S 2<sup>nd</sup> Edition 2023

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible**

Data derived from CLSI M100S 36<sup>th</sup> edition<sup>1</sup>

| Organism                                                       | Penicillin |    | Amoxicillin-Clavulanate |    | Piperacillin-Tazobactam |    | Ceftriaxone |    | Meropenem |     | Ertapenem |    | Clindamycin |    | Metronidazole |     | Moxifloxacin |    |
|----------------------------------------------------------------|------------|----|-------------------------|----|-------------------------|----|-------------|----|-----------|-----|-----------|----|-------------|----|---------------|-----|--------------|----|
|                                                                | N          | %S | N                       | %S | N                       | %S | N           | %S | N         | %S  | N         | %S | N           | %S | N             | %S  | N            | %S |
| <i>Bacteroides fragilis</i>                                    | 3809       | 0  | 877                     | 75 | 5497                    | 97 | 856         | 44 | 1716      | 92  | 3801      | 95 | 5496        | 66 | 5503          | 98  | 2910         | 63 |
| <i>Bacteroides ovatus</i>                                      | —          | —  | 14                      | 64 | 466                     | 94 | —           | —  | 142       | 99  | —         | —  | 467         | 32 | 467           | 100 | 250          | 29 |
| <i>Bacteroides pyogenes</i>                                    | 228        | 70 | 34                      | 94 | 196                     | 99 | 31          | 84 | 40        | 100 | —         | —  | 244         | 81 | 244           | 100 | 113          | 97 |
| <i>Bacteroides thetaiotaomicron</i>                            | 889        | 0  | 166                     | 67 | 1258                    | 75 | 162         | 1  | 380       | 96  | 891       | 94 | 1256        | 16 | 1259          | 100 | 677          | 53 |
| <i>Bacteroides uniformis</i>                                   | —          | —  | 64                      | 72 | 430                     | 99 | 64          | 14 | 124       | 99  | —         | —  | 430         | 43 | 430           | 100 | 229          | 38 |
| <i>Parabacteroides distasonis</i>                              | 333        | 0  | 51                      | 49 | 426                     | 72 | 53          | 32 | 95        | 98  | —         | —  | 426         | 25 | 426           | 100 | 246          | 52 |
| <i>Phocaeicola dorei/vulgatus</i>                              | 568        | 0  | 112                     | 58 | 765                     | 89 | 105         | 30 | 201       | 98  | 568       | 97 | 763         | 49 | 765           | 100 | —            | —  |
| <i>Bacteroides</i> spp. and related genera, other <sup>2</sup> | 1989       | 2  | 107                     | 69 | 2194                    | 86 | 104         | 20 | 210       | 95  | 1990      | 94 | 2122        | 34 | 2194          | 100 | 1412         | 49 |
| <i>Veillonella</i> spp. <sup>3</sup>                           | 933        | 28 | 141                     | 96 | 839                     | 76 | 157         | 98 | 137       | 99  | 713       | 95 | 995         | 91 | 994           | 96  | 602          | 64 |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 2017 to December 2024.

<sup>2</sup> Includes *Bacteroides* spp., *B.caccae*, *B.cellulosilytius/interstitialis*, *B.faecis*, *B.fragilis* Group, *B.intestinalis*, *B.ovatus/xylanisolvans*, *B.salyersiae/nordii*, *B.stercoris/eggerthii*, *B.thetaiotaomicron/faecis*, *Parabacteroides* spp., *P.goldsteinii*, *P.merdae*, *Phocaeicola* spp., *P.massiliensis*, *Bacteroides/Phocaeiocla* spp., and *Bacteroides/Parabacteroides/Phocaeicola* spp.

<sup>3</sup> Includes *Veillonella* spp., *V. atypica*, *V. dispar*, and *V. parvula*

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible (cont.)**

Data derived from CLSI M100S 36<sup>th</sup> edition <sup>1</sup>

| Prevotella spp.                        | Penicillin |    | Piperacillin-Tazobactam |     | Meropenem |     | Ertapenem |     | Clindamycin |    | Metronidazole |     | Moxifloxacin |                |
|----------------------------------------|------------|----|-------------------------|-----|-----------|-----|-----------|-----|-------------|----|---------------|-----|--------------|----------------|
| Organism                               | N          | %S | N                       | %S  | N         | %S  | N         | %S  | N           | %S | N             | %S  | N            | %S             |
| <i>P. bergensis</i>                    | 92         | 25 | 126                     | 99  | 42        | 98  | —         | —   | 126         | 28 | 126           | 100 | —            | —              |
| <i>P. bivia</i>                        | 850        | 11 | 1145                    | 100 | 337       | 100 | 813       | 100 | 1148        | 45 | 1148          | 97  | 610          | 9 <sup>2</sup> |
| <i>P. buccae</i>                       | 374        | 44 | 539                     | 100 | 199       | 100 | —         | —   | 544         | 49 | 544           | 100 | —            | —              |
| <i>P. buccalis</i>                     | 103        | 39 | 127                     | 100 | 50        | 100 | —         | —   | 128         | 43 | 128           | 100 | —            | —              |
| <i>P. denticola</i>                    | 275        | 26 | 371                     | 100 | 121       | 100 | —         | —   | 375         | 51 | 375           | 100 | —            | —              |
| <i>P. disiens</i>                      | 178        | 16 | 225                     | 100 | 56        | 100 | —         | —   | 224         | 30 | 225           | 100 | —            | —              |
| <i>P. intermedia</i>                   | 88         | 34 | 137                     | 100 | 72        | 100 | —         | —   | 139         | 71 | 139           | 100 | —            | —              |
| <i>P. melaninogenica</i>               | 432        | 9  | 480                     | 100 | 61        | 100 | —         | —   | 480         | 65 | 479           | 100 | —            | —              |
| <i>P. nigrescens</i>                   | 144        | 32 | 200                     | 100 | 91        | 100 | —         | —   | 201         | 55 | 201           | 100 | —            | —              |
| <i>P. oralis</i>                       | 104        | 70 | 113                     | 100 | —         | —   | —         | —   | 114         | 61 | 114           | 100 | —            | —              |
| <i>P. oris</i>                         | 151        | 13 | 205                     | 99  | 65        | 100 | —         | —   | 205         | 43 | 205           | 100 | —            | —              |
| <i>P. timonensis</i>                   | 163        | 30 | 188                     | 100 | 58        | 100 | —         | —   | 191         | 34 | 191           | 100 | —            | —              |
| Prevotella spp.,<br>Other <sup>3</sup> | 790        | 30 | 885                     | 100 | 137       | 100 | 753       | 100 | 903         | 47 | 903           | 99  | 566          | 68             |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 2017 to December 2024.

<sup>2</sup> Forty-five percent of *P. bivia* isolates tested intermediate to moxifloxacin (MIC=4µg/ml). Isolates were from a single site.

<sup>3</sup> Includes *Hollesella* spp., *Prevotella* spp., *P. baroniae*, *P. colorans*, *P. heparinolytica*, *P. histicola*, *P. jejuni*, *P. loesheii*, *P. melaninogenica* group, *P. nanciensis*, *P. salivae*, *P. veroralis*, and *Segatella* spp.

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible (cont.)**

Data derived from CLSI M100S 36<sup>th</sup> edition<sup>1</sup>

| Organism                                                | Penicillin |    | Amoxicillin-Clavulanate |     | Piperacillin-Tazobactam |     | Ceftriaxone |     | Meropenem |     | Clindamycin |    | Metronidazole |     |
|---------------------------------------------------------|------------|----|-------------------------|-----|-------------------------|-----|-------------|-----|-----------|-----|-------------|----|---------------|-----|
|                                                         | N          | %S | N                       | %S  | N                       | %S  | N           | %S  | N         | %S  | N           | %S | N             | %S  |
| <i>Alistipes</i> spp. <sup>2</sup>                      | 89         | 27 | —                       | —   | 89                      | 91  | —           | —   | —         | —   | 89          | 73 | 89            | 100 |
| <i>Bilophila wadsworthia</i>                            | 77         | 16 | —                       | —   | 78                      | 63  | —           | —   | —         | —   | 79          | 92 | 78            | 100 |
| <i>Campylobacter ureolyticus</i>                        | 290        | 82 | 61                      | 98  | 288                     | 95  | 60          | 98  | 62        | 100 | 292         | 80 | 290           | 100 |
| Anaerobic <i>Campylobacter</i> spp., other <sup>3</sup> | 188        | 53 | —                       | —   | 186                     | 65  | —           | —   | —         | —   | 189         | 84 | 188           | 100 |
| <i>Desulfovibrio desulfuricans</i>                      | 116        | 10 | —                       | —   | 113                     | 41  | —           | —   | —         | —   | 116         | 94 | 116           | 100 |
| <i>Dialister micraerophilus</i>                         | 174        | 92 | —                       | —   | 170                     | 100 | —           | —   | 57        | 100 | 175         | 57 | 169           | 46  |
| <i>Dialister pneumosintes</i>                           | 259        | 86 | —                       | —   | 258                     | 89  | —           | —   | —         | —   | 260         | 97 | 257           | 97  |
| <i>Fusobacterium necrophorum</i>                        | 682        | 93 | 394                     | 100 | 677                     | 98  | 392         | 99  | 389       | 100 | 684         | 99 | 684           | 100 |
| <i>Fusobacterium nucleatum</i> <sup>4</sup>             | 590        | 89 | 90                      | 100 | 581                     | 97  | 91          | 100 | 89        | 100 | 590         | 98 | 590           | 100 |
| <i>Fusobacterium</i> spp. <sup>5</sup>                  | 540        | 81 | —                       | —   | 520                     | 92  | 39          | 95  | 30        | 97  | 540         | 91 | 541           | 100 |
| <i>Porphyromonas</i> spp. <sup>6</sup>                  | 193        | 58 | 31                      | 100 | 188                     | 100 | —           | —   | —         | —   | 195         | 68 | 198           | 98  |
| <i>Tissierella praecuta</i>                             | 87         | 99 | —                       | —   | 88                      | 99  | —           | —   | —         | —   | 88          | 35 | 88            | 100 |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2024.

<sup>2</sup> Includes: *Alistipes* spp., *A. finegoldii*, and *A. onderdonkii*

<sup>3</sup> Includes: anaerobic *Campylobacter* spp., *C. concisus*, *C. curvus*, *C. gracilis*, *C. hominis*, *C. rectus*, and *C. showae*

<sup>4</sup> *F. nucleatum* isolates tested 99% susceptible to ertapenem. Isolates tested from a single site (n=500)

<sup>5</sup> Includes: *Fusobacterium* spp., *F. animalis*, *F. gonidiaformans*, *F. mortiferum*, *F. naviforme*//*nucleatum*, *F. periodonticum*, *F. russii*, *F. varium*, and *F. varium/ulcerans*

<sup>6</sup> Includes: *Porphyromonas* spp., *P. asaccharolytica*, *P. gingivalis*, *P. levii*, *P. levii/somerae*, *P. macacae*, and *P. somerae*

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible (cont.)**

Data derived from CLSI M100S 36<sup>th</sup> edition<sup>1</sup>

| Organism                                                                   | Penicillin |     | Amoxicillin-Clavulanate |     | Piperacillin-Tazobactam |     | Ceftriaxone |     | Meropenem |     | Ertapenem |     | Clindamycin |    | Metronidazole |     | Moxifloxacin |    |
|----------------------------------------------------------------------------|------------|-----|-------------------------|-----|-------------------------|-----|-------------|-----|-----------|-----|-----------|-----|-------------|----|---------------|-----|--------------|----|
|                                                                            | N          | %S  | N                       | %S  | N                       | %S  | N           | %S  | N         | %S  | N         | %S  | N           | %S | N             | %S  | N            | %S |
| <i>Clostridioides</i> ( <i>Clostridium</i> ) <i>difficile</i> <sup>2</sup> | 3438       | 8   | —                       | —   | 3438                    | 98  | —           | —   | 3285      | 98  | —         | —   | 3437        | 21 | 3442          | 99  | —            | —  |
| <i>Clostridium cadaveris</i>                                               | 98         | 98  | —                       | —   | 98                      | 98  | —           | —   | —         | —   | —         | —   | 98          | 91 | 98            | 100 | —            | —  |
| <i>Clostridium innocuum</i>                                                | 364        | 64  | —                       | —   | 365                     | 100 | 30          | 90  | 134       | 96  | —         | —   | 365         | 72 | 365           | 99  | —            | —  |
| <i>Clostridium paraputrificum</i>                                          | 160        | 53  | —                       | —   | 158                     | 93  | —           | —   | 39        | 97  | —         | —   | 160         | 8  | 160           | 99  | —            | —  |
| <i>Clostridium perfringens</i>                                             | 2236       | 96  | 318                     | 100 | 2196                    | 100 | 334         | 99  | 780       | 100 | 1428      | 100 | 2234        | 82 | 2236          | 100 | 1023         | 98 |
| <i>Clostridium ramosum</i> ( <i>Thomasclavelia ramosa</i> )                | 638        | 92  | 84                      | 100 | 638                     | 100 | 85          | 100 | 163       | 99  | —         | —   | 637         | 14 | 638           | 99  | —            | —  |
| <i>Clostridium septicum</i>                                                | 319        | 98  | —                       | —   | 320                     | 100 | —           | —   | —         | —   | —         | —   | 319         | 99 | 319           | 99  | —            | —  |
| <i>Clostridium tertium</i>                                                 | 484        | 22  | 44                      | 100 | 482                     | 99  | 44          | 57  | 108       | 99  | —         | —   | 484         | 8  | 484           | 99  | —            | —  |
| <i>Enterocloster clostridioformis</i>                                      | 151        | 31  | —                       | —   | 150                     | 82  | —           | —   | 37        | 97  | —         | —   | 150         | 68 | 151           | 100 | —            | —  |
| <i>Hungatella hathewayi</i>                                                | 111        | 0   | —                       | —   | 111                     | 92  | —           | —   | 41        | 100 | —         | —   | 111         | 94 | 111           | 99  | —            | —  |
| <i>Paenibacillus sordellii</i>                                             | 122        | 100 | —                       | —   | 121                     | 100 | —           | —   | —         | —   | —         | —   | 122         | 93 | 122           | 100 | —            | —  |
| <i>Clostridium</i> spp. and related genera, other <sup>3</sup>             | 1066       | 66  | 30                      | 90  | 1064                    | 95  | 34          | 91  | 248       | 96  | 821       | 99  | 1065        | 50 | 1065          | 99  | 618          | 63 |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2024.

<sup>2</sup> Vancomycin MIC for 3033 *C.difficile* demonstrated 98% wild-type (MIC ≤ 2μg/ml). The majority of isolate (76%) were from intestinal sources.

<sup>3</sup> Includes: *Clostridium/Clostridioides* spp., *Clostridium argentinense/shirmacherense*, *C.butyricum*, *C.combesii/sporogenes/botulinum*, *C.dsporicum*, *C.sartagoforme*, *C.saudiense*, *C.sporogenes/botulinum*, *C.sporogenes*, *C.subterminale*, *C.symbiosum*, *Clostridium/Eubacterium* spp., *Clostridium/Lacrimisporas* pp., *Enterocloster* spp., *E.aldenensis*, *E.boltea/clostridioformis*, *E.citroniae*, *Lacrimisporas* pp., *L.celerecrescens/indolis/sphenoides*, *L.sphenoides*, *Metaclostridioides* spp., *Paenibacillus* spp., *Paraclostridium* spp., and *P.bifermentans*

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible (cont.)**

Data derived from CLSI M100S 36<sup>th</sup> edition<sup>1</sup>

| Organism                                                                    | Penicillin |     | Amoxicillin-Clavulanate |     | Piperacillin-Tazobactam |     | Ceftriaxone |     | Ertapenem |     | Clindamycin |    | Metronidazole |     | Moxifloxacin |    |
|-----------------------------------------------------------------------------|------------|-----|-------------------------|-----|-------------------------|-----|-------------|-----|-----------|-----|-------------|----|---------------|-----|--------------|----|
|                                                                             | N          | %S  | N                       | %S  | N                       | %S  | N           | %S  | N         | %S  | N           | %S | N             | %S  | N            | %S |
| <i>Cutibacterium</i> ( <i>Propionibacterium</i> ) <i>acnes</i> <sup>2</sup> | 8025       | 100 | 1650                    | 100 | 6282                    | 100 | 2156        | 100 | 4774      | 100 | 6503        | 90 | 4964          | 2   | 6477         | 98 |
| <i>Cutibacterium avidum</i>                                                 | 808        | 100 | 113                     | 100 | 638                     | 100 | 149         | 100 | 536       | 100 | 655         | 60 | 545           | 0   | 698          | 94 |
| <i>Eggerthella lenta</i>                                                    | 943        | 2   | 96                      | 100 | 763                     | 65  | 104         | 15  | 671       | 100 | 943         | 90 | 945           | 99  | 574          | 49 |
| <i>Lancefieldella</i> spp. <sup>3</sup>                                     | 240        | 100 | —                       | —   | 180                     | 100 | —           | —   | —         | —   | 239         | 76 | 238           | 98  | —            | —  |
| <i>Propionimicrobium lymphophilum</i>                                       | 91         | 100 | —                       | —   | 74                      | 100 | —           | —   | —         | —   | 79          | 41 | —             | —   | —            | —  |
| <i>Propionibacterium</i> spp. and related genera, other <sup>4</sup>        | 414        | 100 | 78                      | 100 | 314                     | 100 | 91          | 100 | —         | —   | 328         | 81 | 254           | 2   | —            | —  |
| <i>Slackia exigua</i>                                                       | 274        | 99  | 95                      | 100 | 229                     | 100 | 93          | 100 | —         | —   | 276         | 99 | 276           | 100 | —            | —  |
| <i>Solobacterium moorei</i>                                                 | 154        | 97  | —                       | —   | 116                     | 98  | —           | —   | —         | —   | 154         | 88 | 154           | 99  | —            | —  |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2024.

<sup>2</sup> Vancomycin MIC for 1903 *C.acnes* isolates demonstrated 100% wild-type (MIC ≤ 2µg/ml).

<sup>3</sup> Includes: *Lancefieldella* spp., *L.parvula*, and *L.rimae*

<sup>4</sup> Includes: *Arachnia propionica*, *Cutibacterium* spp., *C.acnes/namnetense*, *Cutibacterium granulosum*, *C.modestum*, *C.namnetense*, *Cutibacterium/Propionibacterium* spp., and *Propionibacterium* spp.

**Table 21. CLSI Anaerobic Bacteria Cumulative Antibigram, % Susceptible (cont.)**

Data derived from CLSI M100S 36<sup>th</sup> edition<sup>1</sup>

| Organism                                          | Penicillin |     | Amoxicillin-Clavulanate |     | Piperacillin-Tazobactam |     | Ceftriaxone |     | Meropenem |     | Ertapenem |     | Clindamycin |    | Metronidazole |     | Moxifloxacin |    |
|---------------------------------------------------|------------|-----|-------------------------|-----|-------------------------|-----|-------------|-----|-----------|-----|-----------|-----|-------------|----|---------------|-----|--------------|----|
|                                                   | N          | %S  | N                       | %S  | N                       | %S  | N           | %S  | N         | %S  | N         | %S  | N           | %S | N             | %S  | N            | %S |
| Anaerococcus vaginalis                            | 302        | 99  | 38                      | 100 | 241                     | 100 | 40          | 100 | 57        | 100 | —         | —   | 302         | 82 | 302           | 99  | —            | —  |
| Anaerococcus spp. <sup>2</sup>                    | 612        | 88  | 90                      | 96  | 471                     | 99  | 96          | 87  | 93        | 100 | —         | —   | 612         | 64 | 612           | 100 | —            | —  |
| Finnegoldia magna                                 | 3118       | 99  | 429                     | 100 | 2483                    | 100 | 453         | 100 | 734       | 100 | 1763      | 100 | 3118        | 58 | 3118          | 100 | 1562         | 50 |
| Helcococcus spp. <sup>3</sup>                     | 102        | 100 | 35                      | 100 | 85                      | 100 | 37          | 100 | 35        | 100 |           |     | 102         | 66 | 71            | 10  | —            | —  |
| Parvimonas micra                                  | 1687       | 99  | 245                     | 100 | 1313                    | 100 | 272         | 100 | 379       | 100 | 937       | 100 | 1685        | 90 | 1687          | 100 | 855          | 92 |
| Peptoniphilus spp. <sup>4</sup>                   | 1221       | 98  | 35                      | 100 | 961                     | 100 | 43          | 100 | 124       | 100 | 840       | 100 | 1218        | 64 | 1220          | 100 | 752          | 82 |
| Peptoniphilus hareii/ indolicus                   | 554        | 98  | —                       | —   | 421                     | 100 | 69          | 100 | 161       | 100 | —         | —   | 555         | 70 | 555           | 100 | —            | —  |
| Peptostreptococcus anaerobius                     | 549        | 76  | 73                      | 75  | 472                     | 98  | 74          | 99  | 225       | 100 | —         | —   | 548         | 90 | 549           | 100 | —            | —  |
| Peptostreptococcus spp., other <sup>5</sup>       | 74         | 97  | —                       | —   | 57                      | 100 | —           | —   | —         | —   | —         | —   | 74          | 78 | 74            | 100 | —            | —  |
| Anaerobic gram-positive cocci, other <sup>6</sup> | 191        | 96  | —                       | —   | 157                     | 99  | —           | —   | —         | —   | —         | —   | 191         | 77 | 189           | 97  | —            | —  |

<sup>1</sup> Isolates submitted from 3 reference laboratories from January 1<sup>st</sup>, 2017 to December 31<sup>st</sup>, 2024.

<sup>2</sup> Includes: *Anaerococcus* spp., *A. hydrogenalis*, *A. hydrogenalis/senegalensis*, *A. lactooyticus*, *A. murdochii*, *A. nageyae*, *A. octavius*, *A. prevotii*, and *A. tetradius*

<sup>3</sup> Includes: *Helcococcus* spp., *H. kunzii*, and *H. sueciensis*

<sup>4</sup> Includes: *Peptoniphilus* spp., *P. asaccharolyticus*, *P. coxii*, *P. duerdenii*, *P. gorbachii*, *P. lacrimalis*, and *P. timonensis*

<sup>5</sup> Includes: *Peptostreptococcus* spp., *P. anaerobius/stomatis*, *P. canis* and *P. stomatis*

<sup>6</sup> Includes: *Ezakiella* spp., *Fastidiosipila* spp., *Finnegoldia* spp., *Meidiannikoviiococcus* spp., *Murdochella* spp., *Parvimonas* spp., *Peptoanaerobacter* spp., *Peptococcus* spp., and *Ruminococcus* spp.



## Table 22. Indications for Performing Routine Antimicrobial Susceptibility Tests – Aerobic Bacteria

Susceptibility tests will be performed as follows:

---

### 1. Blood—all isolates except\*:

*Aerococcus* spp.<sup>1</sup> (excludes *Aerococcus urinae*)  
*Bacillus* spp.<sup>1</sup>  
*Corynebacterium* spp.<sup>1</sup> (excludes *Corynebacterium jeikeium* and *Corynebacterium striatum*)  
Coagulase-negative *Staphylococcus*<sup>1, 2</sup>  
*Cutibacterium* (*Propionibacterium*) *acnes*<sup>1</sup>  
*Micrococcus* spp.<sup>1</sup>  
Viridans group *Streptococcus*<sup>1</sup> (excludes *Streptococcus anginosus* group)

### 2. Urine

>10<sup>5</sup> CFU/ml (1 or 2 species)

>50,000 CFU/ml (pure culture):

Gram-negative bacilli; *Staphylococcus aureus*

**Urine from Urology – Susceptibility performed based on the following criteria upon request**

Workup for up to 5 organisms;

Any quantity of pathogens

- Gram-negative bacilli
- *Staphylococcus aureus*

Potential pathogens – Colony count of ≥50K for ≤2 organisms

- Coagulase Negative *Staphylococcus*
- Viridans *Streptococcus*
- *Corynebacterium* species
- Yeast
- *Staphylococcus saprophyticus*
- *Aerococcus* species
- Beta hemolytic *Streptococcus*

*Enterococcus* species

- ≤2 organism any quantity
- Colony count of <50K Predominant in mix culture
- Colony count of ≥50K Non-predominant in mixed culture

### 3. Respiratory (sputum, nasopharynx, bronchial washing and tracheal aspirate):

Moderate /many growth ≤2 potential pathogens

Cystic fibrosis patients: any quantity of gram-negative bacilli, *S. aureus*, *S. pneumoniae*

### 4. Stool

*Salmonella* spp. (≤ 3 mo. only or susceptibilities performed on all isolates of *S. typhi* and *S. paratyphi*)  
*Shigella* spp.  
*Yersinia* spp.  
*Vibrio* spp.

\* Neonates (≤3 months), susceptibilities performed on all isolates

<sup>1</sup> Susceptibilities performed if isolated from multiple cultures

<sup>2</sup> Susceptibilities performed on all isolates of *S. lugdunensis*

## **Table 23.      Indications for Performing Routine Antimicrobial Susceptibility Tests – Aerobic Bacteria (cont.)**

- 5. Wounds, abscesses and other contaminated body sites, ≤2 potential pathogens.**
- 6. If isolate is from sterile body site, susceptibility testing will be performed on subsequent isolates from similar site(s) every 3 days. Exception: *S. aureus* and *P. aeruginosa* tested each day of collection from blood.**
- 7. If isolate is from non-sterile body site, susceptibility testing will be performed on subsequent isolates from similar site(s) every 5 days.**

### **Additional notes:**

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- Susceptibility tests will not be performed on more than two potential pathogens per culture unless specifically requested following discussion with clinician.**
- Blood and CSF isolates are held for 1 year.**
- Other potentially significant isolates are held in lab for 7 days. Contact lab at (310) 794-2758 within 48 hours if susceptibilities are desired.**

**Table 23. Antimicrobial Agents Routinely Reported – Aerobic Bacteria**

| Primary antimicrobials                                                                                                                                                                                               | Conditions for supplemental antimicrobial reporting                                                                                             | Supplemental antimicrobial(s) <sup>1</sup>                                                                                                                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>E. coli</i>, <i>Klebsiella</i> spp., <i>P. mirabilis</i> – Excludes urine isolates</b>                                                                                                                         |                                                                                                                                                 |                                                                                                                                                                   |
| amoxicillin/clavulanate<br>cefazolin<br>ceftriaxone<br><br>ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)<br>gentamicin<br>piperacillin-tazobactam<br>trimethoprim-sulfamethoxazole                             | Resistant to ceftriaxone<br><br>Resistant to ertapenem (>3 mo.),<br><br><br>Resistant to gentamicin<br><br>Resistant to piperacillin-tazobactam | ertapenem (>3 mo.), imipenem & meropenem (≤18 y.o.)<br>imipenem, meropenem<br><br><br>amikacin, tobramycin<br>ertapenem (>3 mo.), imipenem & meropenem (≤18 y.o.) |
| <b><i>E. coli</i>, <i>Klebsiella</i> spp., <i>P. mirabilis</i> – Urine isolates</b>                                                                                                                                  |                                                                                                                                                 |                                                                                                                                                                   |
| ampicillin<br>amoxicillin/clavulanate<br>oral cephalosporins <sup>2</sup><br>ceftriaxone<br><br>ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)<br>tobramycin<br>nitrofurantoin<br>trimethoprim-sulfamethoxazole | Resistant to ceftriaxone<br><br>Resistant to ertapenem (>3 mo.)                                                                                 | ertapenem (>3 mo.), & meropenem (≤18 y.o.)<br>meropenem                                                                                                           |

<sup>1</sup> The following additional antimicrobial agents are reported on carbapenem resistant Enterobacterales (resistant to meropenem and/or imipenem): azteonom, azithromycin, minocycline, moxifloxacin, tigecycline, ceftazidime-avibactam and ceftolozane-tazobactam.

**Table 23. Antimicrobial Agents Routinely Reported – Aerobic Bacteria (cont.)**

| Primary antimicrobials                                                                                                                                                                                   | Conditions for supplemental antimicrobial reporting                                                                                                                                   | Supplemental antimicrobial(s) <sup>3</sup>                                                                                                                    |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Other Enterobacterales organisms<sup>4</sup> – Excludes urine isolates</b>                                                                                                                            |                                                                                                                                                                                       |                                                                                                                                                               |
| amoxicillin/clavulanate<br>cefepime<br><br>ceftriaxone<br>ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)<br>gentamicin<br>piperacillin-tazobactam <sup>5</sup><br><br>trimethoprim-sulfamethoxazole | Resistant to cefepime<br><br>Resistant to ertapenem (>3 mo.)<br>Not reported for HECK-Y organisms <sup>5</sup><br><br>Resistant to gentamicin<br>Resistant to piperacillin-tazobactam | ertapenem (>3 mo.), imipenem & meropenem (≤18 y.o.)<br>imipenem, meropenem<br><br>amikacin, tobramycin<br>ertapenem (>3 mo.), imipenem & meropenem (≤18 y.o.) |
| <b>Other Enterobacterales organisms<sup>3</sup> – Urine isolates</b>                                                                                                                                     |                                                                                                                                                                                       |                                                                                                                                                               |
| ampicillin<br>amoxicillin/clavulanate<br>cefepime<br><br>ceftriaxone<br>ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)<br>tobramycin<br>nitrofurantoin<br>trimethoprim-sulfamethoxazole             | Resistant to cefepime<br>Resistant to ertapenem (>3 mo.)<br>Not reported for HECK-Y organisms <sup>5</sup>                                                                            | ertapenem (>3 mo.) & meropenem (≤18 y.o.)<br>meropenem                                                                                                        |

<sup>2</sup> Cefazolin results should only be used to predict potential effectiveness of oral cephalosporins for uncomplicated UTIs.

<sup>3</sup> The following additional antimicrobial agents are reported on carbapenem resistant Enterobacterales (resistant to meropenem and/or imipenem): azteonom, azithromycin, minocycline, moxifloxacin, tigecycline, ceftazidime-avibactam and ceftolozane-tazobactam.

<sup>4</sup> Enterobacterales other than *E. coli*, *Klebsiella* spp., *P. mirabilis*, *Salmonella* spp., *Shigella* spp.

<sup>5</sup> Ceftriaxone not reported for *Citrobacter freundii* complex, *Enterobacter cloacae* complex, *Klebsiella aerogenes*, *Hafnia alvei*, *Yersinia enterocolitica*.

**Table 23. Antimicrobial Agents Routinely Reported – Aerobic Bacteria (cont.)**

| Primary antimicrobials                                                                                                            | Conditions for supplemental antimicrobial reporting                                                                                                       | Supplemental antimicrobial(s) <sup>1</sup>                                                                                      |
|-----------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Salmonella</i> spp.,<sup>1</sup> <i>Shigella</i> spp.<sup>2</sup></b>                                                       |                                                                                                                                                           |                                                                                                                                 |
| ampicillin<br>ciprofloxacin (>11 y.o.)<br>trimethoprim-sulfamethoxazole                                                           | <i>Shigella</i> spp.<br>Non-fecal sources/resistant to all primary antimicrobials                                                                         | azithromycin<br>ceftriaxone                                                                                                     |
| <b><i>Pseudomonas aeruginosa</i></b>                                                                                              |                                                                                                                                                           |                                                                                                                                 |
| cefepime<br><br>ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)<br>Tobramycin<br>piperacillin-tazobactam<br>ceftazidime       | Resistant to cefepime<br>Resistant to imipenem or meropenem<br>ceftolozane – tazobactam MIC ≥4 µg/mL<br><br>Urine<br>Resistant to piperacillin-tazobactam | imipenem, meropenem, ceftolozane - tazobactam<br>ceftolozane - tazobactam<br>cefiderocol<br><br>amikacin<br>imipenem, meropenem |
| <b><i>Acinetobacter</i> spp.</b>                                                                                                  |                                                                                                                                                           |                                                                                                                                 |
| cefepime<br>ceftazidime<br><br>ciprofloxacin (>11 y.o.)<br>gentamicin<br>piperacillin-tazobactam<br>trimethoprim-sulfamethoxazole | Resistant to ceftazidime<br>Resistant to meropenem or imipenem<br><br>Resistant to gentamicin                                                             | imipenem, meropenem<br>minocycline<br><br>amikacin, tobramycin                                                                  |
| <b><i>Stenotrophomonas maltophilia</i>- Sterile body site isolates</b>                                                            |                                                                                                                                                           |                                                                                                                                 |
| levofloxacin (>11 y.o.)<br>minocycline<br>trimethoprim-sulfamethoxazole                                                           |                                                                                                                                                           |                                                                                                                                 |

<sup>1</sup> If stool isolates, perform on patients ≤3 mo., or if isolate is *Salmonella typhi* or *Salmonella paratyphi* A.

<sup>2</sup> Susceptibility performed on stool isolates

**Table 23. Antimicrobial Agents Routinely Reported – Aerobic Bacteria (cont.)**

| Primary antimicrobials                                       | Conditions for supplemental antimicrobial reporting | Supplemental antimicrobial(s) |
|--------------------------------------------------------------|-----------------------------------------------------|-------------------------------|
| <b>Nonfermenting Gram Negative Rods not otherwise listed</b> |                                                     |                               |
| cefepime                                                     |                                                     |                               |
| ceftazidime                                                  | Resistant to ceftazidime                            | imipenem, meropenem           |
| ciprofloxacin (>11 y.o.)<br>levofloxacin (>11 y.o.)          |                                                     |                               |
| gentamicin                                                   | If gentamicin >1 µg/ml                              | amikacin, tobramycin          |
| piperacillin-tazobactam                                      |                                                     |                               |
| trimethoprim-sulfamethoxazole                                |                                                     |                               |
| <b><i>Haemophilus influenzae</i></b>                         |                                                     |                               |
| Beta-lactamase test                                          | Sterile body site isolates:                         | Reported upon request:        |
|                                                              | If beta-lactamase positive                          | ceftriaxone                   |
|                                                              | If beta-lactamase negative                          | ampicillin, ceftriaxone       |
|                                                              | CSF only                                            | Meropenem                     |

**Table 23. Antimicrobial Agents Routinely Reported – Aerobic Bacteria (cont.)**

| Primary antimicrobials                                                                                                                                                                        | Conditions for supplemental antimicrobial reporting                                                   | Supplemental antimicrobial(s)                                                                                                                                                                  |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><i>Staphylococcus</i> spp.</b>                                                                                                                                                             |                                                                                                       |                                                                                                                                                                                                |
| clindamycin <sup>1</sup>                                                                                                                                                                      |                                                                                                       |                                                                                                                                                                                                |
| oxacillin                                                                                                                                                                                     | Exclude Blood and CSF<br>Resistant to oxacillin (MRSA)                                                | tetracycline/doxycycline, trimethoprim-sulfamethoxazole<br>All beta-lactams considered resistant except ceftaroline                                                                            |
| penicillin                                                                                                                                                                                    |                                                                                                       |                                                                                                                                                                                                |
| vancomycin                                                                                                                                                                                    | <i>S. aureus</i> on blood (vancomycin $\geq 2\mu\text{g/ml}$ )<br>Urine isolates                      | daptomycin, linezolid<br>ciprofloxacin <sup>2</sup> , nitrofurantoin, trimethoprim-sulfamethoxazole                                                                                            |
| <b><i>Enterococcus</i> spp.</b>                                                                                                                                                               |                                                                                                       |                                                                                                                                                                                                |
| ampicillin                                                                                                                                                                                    |                                                                                                       |                                                                                                                                                                                                |
| vancomycin                                                                                                                                                                                    | Resistant to vancomycin (VRE) from sterile body sites<br>Sterile body site isolates<br>Urine isolates | daptomycin, doxycycline, linezolid, quinupristin-dalfopristin (excluding <i>E. faecalis</i> ), rifampin<br>gentamicin (high level)<br>ciprofloxacin <sup>2</sup> , doxycycline, nitrofurantoin |
| <b><i>Streptococcus pneumoniae</i></b>                                                                                                                                                        |                                                                                                       |                                                                                                                                                                                                |
| amoxicillin, cefotaxime, ceftriaxone, erythromycin <sup>3</sup> , levofloxacin <sup>2</sup> , penicillin, tetracycline <sup>3</sup> , trimethoprim-sulfamethoxazole <sup>3</sup> , vancomycin |                                                                                                       |                                                                                                                                                                                                |
| <b>Viridans group <i>Streptococcus</i></b>                                                                                                                                                    |                                                                                                       |                                                                                                                                                                                                |
| cefotaxime, ceftriaxone, penicillin, vancomycin                                                                                                                                               |                                                                                                       |                                                                                                                                                                                                |
| <b>Beta-hemolytic <i>Streptococcus</i></b>                                                                                                                                                    |                                                                                                       |                                                                                                                                                                                                |
| Clindamycin <sup>1</sup> , penicillin, vancomycin                                                                                                                                             |                                                                                                       |                                                                                                                                                                                                |
| <b><i>Listeria monocytogenes</i></b>                                                                                                                                                          |                                                                                                       |                                                                                                                                                                                                |
| penicillin, trimethoprim-sulfamethoxazole (penicillin results predicts ampicillin results)                                                                                                    |                                                                                                       |                                                                                                                                                                                                |

<sup>1</sup> Excluding urine and CSF isolates

<sup>2</sup> Patients >11 y.o.

<sup>3</sup> Excluding CSF isolates

**Table 24: CLSI M62 – Expected Antimicrobial Susceptibility Patterns of the Most Commonly Isolated Nocardia Data Derived from CLSI M24S 2<sup>nd</sup> Ed.<sup>4</sup>**

| Organism                                     | Amoxicillin/<br>clavulanic acid | Ceftriaxone | Imipenem | Ciprofloxacin | Minocycline    | Linezolid | Trimethoprim –<br>sulfamethoxazole | Amikacin | Tobramycin | Clarithromycin |
|----------------------------------------------|---------------------------------|-------------|----------|---------------|----------------|-----------|------------------------------------|----------|------------|----------------|
| <i>N. abscessus</i>                          | S                               | S           | V        | R             | V              | S         | S                                  | S        | V          | R              |
| <i>N. brasiliensis</i>                       | S                               | V           | R        | R             | V <sup>1</sup> | S         | S                                  | S        | S          | R              |
| <i>N. cyriacigeorgica</i>                    | R                               | S           | V        | R             | V              | S         | S                                  | S        | S          | R              |
| <i>N. farcinica</i>                          | S                               | R           | V        | V             | V              | S         | S                                  | S        | R          | R              |
| <i>N. nova complex</i> <sup>2</sup>          | R                               | V           | S        | R             | V              | S         | S                                  | S        | R          | S              |
| <i>N. otitiscaviarum</i>                     | R                               | R           | R        | V             | V              | S         | S                                  | S        | S          | V              |
| <i>N. pseudobrasiliensis</i>                 | R                               | R           | R        | S             | R              | S         | V                                  | S        | S          | S              |
| <i>N. transvalensis complex</i> <sup>3</sup> | V                               | S           | V        | S             | V              | S         | S                                  | R        | R          | R              |

<sup>1</sup> Most isoaltes of *N. brasiliensis* appear to be susceptible or intermediate to minocycline.

<sup>2</sup> *N. nova complex* includes *N. africana*, *N. elegans*, *N. kruczakiae*, *N. nova*, and *N. veterana*

<sup>3</sup> *N. transvalensis complex* include *N. blacklockiae*, *N. transvalnesis*, and *N. wallacei*

<sup>4</sup> Adapted from CLSI M24S 2nd edition, February 2023

**Table 25. Susceptible MIC (µg/mL) Breakpoints for Aerobic Gram-negative Bacilli <sup>1</sup>**

|                                           | Penicillins |                         |                         | Cephalosporins |          |            |             |             | Carbapenems |          |           | Amino-glycosides |            |            | Fluoro-quinolones          |                           | Other                 |                                 |                |             |             |                        |                       |                       |  |
|-------------------------------------------|-------------|-------------------------|-------------------------|----------------|----------|------------|-------------|-------------|-------------|----------|-----------|------------------|------------|------------|----------------------------|---------------------------|-----------------------|---------------------------------|----------------|-------------|-------------|------------------------|-----------------------|-----------------------|--|
|                                           | Ampicillin  | Amoxicillin-clavulanate | Piperacillin-tazobactam | Cefazolin      | Cefepime | Cefotaxime | Ceftazidime | Ceftriaxone | Ertapenem   | Imipenem | Meropenem | Amikacin         | Gentamicin | Tobramycin | Ciprofloxacin <sup>2</sup> | Levofloxacin <sup>3</sup> | Colistin <sup>4</sup> | Trimethoprim – sulfamethoxazole | Nitrofurantoin | Minocycline | Tigecycline | Ceftolozane-tazobactam | Ceftazidime-avibactam | Meropenem-vaborbactam |  |
| <i>Enterobacterales</i>                   | ≤8          | ≤8                      | ≤8                      | ≤2             | ≤2       | ≤1         | ≤4          | ≤1          | ≤0.5        | ≤1       | ≤1        | ≤4               | ≤2         | ≤2         | ≤0.25                      | ≤0.5                      | ≤2                    | ≤2/38                           | ≤32            | ≤4          | ≤2          | ≤2/4                   | ≤8/4                  | ≤4/8                  |  |
| NONFERMENTERS                             |             |                         |                         |                |          |            |             |             |             |          |           |                  |            |            |                            |                           |                       |                                 |                |             |             |                        |                       |                       |  |
| <i>Acinetobacter species</i> <sup>5</sup> | R           | ≤8                      | ≤16                     | R              | ≤8       | ≤8         | ≤8          | ≤8          | R           | ≤2       | ≤2        | ≤8               | ≤2         | ≤2         | ≤1                         | ≤2                        | ≤2                    | ≤2/38                           | —              | ≤1          | —           | —                      | —                     | —                     |  |
| <i>Pseudomonas aeruginosa</i>             | R           | R                       | ≤16                     | R              | ≤8       | R          | ≤8          | R           | R           | ≤2       | ≤2        | ≤16 <sup>6</sup> | —          | ≤1         | ≤0.5                       | ≤1                        | ≤2                    | R                               | —              | —           | R           | ≤4/4                   | ≤8/4                  | —                     |  |
| <i>Stenotrophomonas maltophilia</i>       | R           | R                       | R                       | R              | —        | R          | —           | R           | R           | R        | R         | R                | R          | R          | —                          | ≤2                        | —                     | ≤2/38                           | —              | ≤1          | —           | —                      | —                     | —                     |  |
| Other non-fermenters                      | —           | —                       | ≤16                     | —              | ≤8       | ≤8         | ≤8          | ≤8          | —           | ≤4       | ≤4        | ≤16              | ≤4         | ≤4         | ≤1                         | ≤2                        | —                     | ≤2/38                           | —              | ≤4          | —           | —                      | —                     | —                     |  |

<sup>1</sup> Data derived from CLSI M100 36th edition.

<sup>2</sup> *Salmonella* spp. breakpoint for ciprofloxacin ≤ 0.06 µg/ml

<sup>3</sup> *Salmonella* spp. breakpoint for levofloxacin ≤ 0.12 µg/ml

<sup>4</sup> There are no susceptible category for colistin. The MIC is based on the new CLSI Intermediate breakpoint at for Colistin at ≤ 2 µg/mL

<sup>5</sup> *Acinetobacter* spp. breakpoint for Ampicillin-sulbactam ≤ 8 µg/ml

<sup>6</sup> Amikacin breakpoints for *Pseudomonas aeruginosa* for Urine sources only.

**Table 26. Susceptible MIC (µg/mL) Breakpoints for Aerobic Gram-positive Cocci <sup>1</sup>**

| Organism                                                                       | Penicillins |           |                    | Cephalo-<br>sporin | Aminogly-<br>cosides |                       | Fluoro-<br>quinolone | Other       |            |             |              |           |                |                               |          |                                    |            |
|--------------------------------------------------------------------------------|-------------|-----------|--------------------|--------------------|----------------------|-----------------------|----------------------|-------------|------------|-------------|--------------|-----------|----------------|-------------------------------|----------|------------------------------------|------------|
|                                                                                | Ampicillin  | Oxacillin | Penicillin         | Ceftaroline        | Gentamicin           | Gentamicin<br>synergy | Ciprofloxacin        | Clindamycin | Daptomycin | Doxycycline | Erythromycin | Linezolid | Nitrofurantoin | Quinupristin-<br>dalbapristin | Rifampin | Trimethoprim –<br>sulfamethoxazole | Vancomycin |
| <i>Staphylococcus aureus</i> <sup>2</sup><br><i>Staphylococcus lugdunensis</i> | –           | ≤2        | ≤0.12              | ≤1                 | ≤4                   | –                     | ≤1                   | ≤0.5        | ≤1         | ≤4          | ≤0.5         | ≤4        | ≤32            | ≤1                            | ≤1       | ≤2/38                              | ≤2         |
| Staphylococci other than<br><i>Staphylococcus aureus</i><br>(SOSA)             | –           | ≤0.5      | ≤0.12 <sup>3</sup> | –                  | ≤4                   | –                     | ≤1                   | ≤0.5        | ≤1         | ≤4          | ≤0.5         | ≤4        | ≤32            | ≤1                            | ≤1       | ≤2/38                              | ≤4         |
| <i>Enterococcus</i> spp.<br><i>Enterococcus faecalis</i>                       | ≤8          | –         | ≤8                 | R                  | R                    | ≤500                  | ≤1                   | R           | ≤2         | ≤4          | R            | ≤2        | ≤32            | ≤1                            | ≤1       | R                                  | ≤4         |
| <i>Enterococcus faecium</i>                                                    | ≤8          | –         | ≤8                 | R                  | R                    | ≤500                  | ≤1                   | R           | ≤4         | ≤4          | R            | ≤2        | ≤32            | ≤1                            | ≤1       | R                                  | ≤4         |

| Organism                            | Penicillins |            | Cephalosporins |             | Tetracyclines |              | Other        |              |            |
|-------------------------------------|-------------|------------|----------------|-------------|---------------|--------------|--------------|--------------|------------|
|                                     | Amoxicillin | Penicillin | Cefotaxime     | Ceftriaxone | Doxycycline   | Tetracycline | Erythromycin | Levofloxacin | Vancomycin |
| <i>Streptococcus pneumoniae</i>     | –           | –          | –              | –           | ≤0.25         | ≤1           | –            | ≤2           | ≤1         |
| Meningitis                          | –           | ≤0.06      | ≤0.5           | ≤0.5        | –             | –            | –            | –            | –          |
| Non-meningitis                      | ≤2          | ≤2         | ≤1             | ≤1          | –             | –            | ≤0.25        | –            | –          |
| Viridans group <i>Streptococcus</i> | –           | ≤0.12      | ≤1             | ≤1          | –             | –            | –            | –            | ≤1         |

<sup>1</sup> Data derived from CLSI M100 36<sup>th</sup> edition.

<sup>2</sup> *S. aureus* only, including MRSA

<sup>3</sup> beta-lactamase negative

## Table 27. Antimicrobial Stewardship

- 1) Treatment of asymptomatic bacteriuria
  - a. A urine culture must ALWAYS be interpreted in the context of the urinalysis and patient symptoms.
  - b. If a patient has no signs of infection on urinalysis and no symptoms of infection, but a positive urine culture, the patient by definition has **asymptomatic bacteriuria**.
  - c. Patients with chronic indwelling catheters, urinary stoma, and neobladders will almost universally have positive urine cultures.
  - d. The only patient populations for which it is recommended to screen for and treat asymptomatic bacteriuria are **pregnant women** and **patients scheduled for a genitourinary surgical procedure**. Screening during the first 2 months of renal transplant is acceptable.
  - e. Avoid routine urine analysis and/or urine cultures for the sole purpose of screening for UTI in asymptomatic patients.
- 2) Treatment of VRE Isolated from stool cultures
  - a. *Enterococcus* are normal bowel flora and do not cause enteric infections, regardless of vancomycin susceptibility.
  - b. Antibiotic treatment of VRE in stool cultures is discouraged, and may lead to increased transmission by causing diarrhea and emergence of antimicrobial resistance among VRE.
- 3) Treatment of *Candida* isolated from bronchoscopic samples in non-neutropenic patients
  - a. Isolation of *Candida*, even in high concentrations, from respiratory samples of immunocompetent patients, including bronchoscopy, should be interpreted as airway colonization.
  - b. Antifungal therapy should not be initiated unless *Candida* is also isolated from sterile specimens or by histologic evidence in tissue from at-risk patients.
- 4) Use of “double coverage” for gram-negative bacteria
  - a. “Double coverage” of suspected gram-negative infections serves the purpose of providing broad spectrum initial empiric coverage until susceptibility data are known.
  - b. No evidence exists to support the superiority of combination therapy over monotherapy for gram-negative infections once susceptibilities are known.
  - c. Once culture identification and susceptibilities have been reported, de-escalation to a single agent is strongly recommended.
- 5) Use of two agents with anaerobic activity to treat infections with potential anaerobic bacteria involvement
  - a. Double anaerobic coverage is not necessary and puts the patient at risk for additional drug toxicities. No data or guidelines support double anaerobic coverage in clinical practice.
  - b. Example: use of piperacillin/tazobactam + metronidazole.
  - c. Two clinical exceptions are:
    - i. Addition of metronidazole to another agent with anaerobic activity to treat *Clostridioides difficile* infection.
    - ii. Clindamycin added to another agent with anaerobic activity when treating necrotizing fasciitis.

For additional information, refer to the Antimicrobial Stewardship website, <https://asp.mednet.ucla.edu/pages/>