# BACTERIAL SUSCEPTIBILITY REPORT: 2016

**(January 2016 – December 2016)**

**VA Palo Alto Health Care System**
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*This report includes bacterial susceptibility information for the following:*

| Division/Units | Comments |
|---|---|
| Palo Alto:<br>Emergency Department<br>Acute Care (2A, 2C, 3C)<br>Critical Care (2F, 3F)<br>Spinal Cord (7SCI) | Units and buildings with similar patient populations and bacterial susceptibility patterns were combined in this report to increase the number of isolates, thus improving the interpretation of the data and our ability to detect trends. Spinal Cord (7SCI) was not combined with other units due to its unique population. |
| Nursing Home (4C)<br>Menlo Park and Livermore CLC | Buildings 331, 360, and 90 |

*Summary:*

| Methodology/Findings | Comments |
|---|---|
| • All susceptibility data were obtained from Praedico, and reports were generated using first isolate methodology as recommended by Clinical Laboratory Standards Institute (CLSI). | • New breakpoints for cephalosporins vs. enteric gram-negative bacilli issued by the Clinical Laboratory Standards Institute were implemented July 2013 (lowered MIC value associated with resistance). Therefore, ESBL is no longer reported since reduced susceptibilities are identified using these breakpoints.<br>• Amoxicillin/clavulanate, cefazolin (for urine only), and daptomycin susceptibilities were added, and quinupristin/dalfopristin susceptibilies were removed for the 2016 antibiogram. |
| • Susceptibility of *Pseudomonas aeruginosa* to cefepime, piperacillin/tazobactam, and ceftazidime were relatively similar: cefepime 79-95%, piperacillin/ tazobactam 85-96%, and ceftazidime 82-95%.<br>• For the medical/surgical acute care units, 2A/2C/3C and 2F/3F, % susceptibility of *Pseudomonas aeruginosa* isolates was the following: cefepime 79% and 85%, respectively; piperacillin/tazobactam 85% and 88%, respectively; ceftazidime 84% and 82%, respectively. | • *Pseudomonas aeruginosa* susceptibility rates to cefepime, piperacillin/tazobactam, and ceftazidime have remained relatively stable compared to 2015 overall, but have slightly decreased for 2F/3F (cefepime 95% to 85%, piperacillin/tazobactam 90% to 88% and ceftazidime 90% to 82%). Susceptibility rates to cefepime also decreased for 2A/2C/3C: 89% to 79% and 7SCI: 90% to 79%.<br>• *Pseudomonas aeruginosa* susceptibility to meropenem has remained relatively stable from 2015 to 2016 (overall unchanged at 91%; slightly improved for 2F/3F: 85% to 91%). |
| • For *Escherichia coli*, resistance to ciprofloxacin (and levofloxacin) and trimethoprim-sulfamethoxazole remains high at 26% and 25%, respectively; resistance rates varied from unit to unit (20-45% and 24-41%, respectively). | • From 2015 to 2016, *E.coli* resistance to ciprofloxacin (and levofloxacin) and trimethoprim-sulfamethoxazole has remained relatively stable overall: 24% to 26% and 24% to 25%, respectively. |
| • 94% of *Enterococcus* isolates were *Enterococcus faecalis*. Susceptibility of *E.faecalis* isolates to ampicillin and vancomycin were 99-100% and 90-100%, respectively. The overall vancomycin-resistant *Enterococcus* (VRE) rate is estimated to be 5%. | • The overall estimated VRE rate has slightly decreased from 2014 to 2016: 10% to 7% to 5%. |
| • The overall rate of methicillin-resistant *Staphylococcus aureus* (MRSA) is estimated to be 39% (range: 40-67% on unit specific antibiograms).<br>• Susceptibility of MRSA isolates to trimethoprim-sulfamethoxazole and tetracycline remains high (94-100% and 86-100%, respectively). MRSA susceptibility to clindamycin is limited (27-69%). | • Overall, MRSA rates have slightly increased from 2015 to 2016: 35% to 39%. |

# ALL UNITS (Inpatient & Outpatient) ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 489 | - | - | 99 | - | - | 73 | 92 | - | 100 | - | - | 99 | - | 19 | - | 99 |
| Enterococcus faecium | 31 | - | - | 19 | - | - | 100* | 29* | - | 100* | - | 100* | 9* | - | 26* | - | 32 |
| Staphylococcus aureus (MRSA) | 224 | - | - | - | - | - | - | - | 57 | 100 | 13 | 100 | - | 100 | 94 | 97 | 100 |
| Staphylococcus aureus (MSSA) | 346 | 30 | 100 | - | - | - | - | - | 82 | 100* | 69 | - | - | - | - | 99 | 100 |
| Staphylococcus, coag negative | 378 | 18 | 55 | - | - | - | - | - | 57 | - | 38 | 100 | - | 99 | 87 | 68 | 100 |
| Staphylococcus lugdunensis | 31 | 48 | 94 | - | - | - | - | - | 77 | - | 69 | 100 | - | 100 | 100 | 100 | 100 |
| Streptococcus agalactiae (group B) | 21* | 100* | - | - | 100* | 95* | - | - | 57* | - | 48* | - | - | - | - | - | 100* |
| Streptococcus pneumoniae (c) | 19* | 100*(c) | - | - | 100*(c) | 95* | - | - | 95* | - | 68* | 100* | - | - | 74* | 89* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Acinetobacter baumaunii | 11* | - | - | 91* | 60* | - | - | - | - | 36* | 40* | - | 80* | 91* | 91* | - | 73* | 73* | - | - | 73* |
| Citrobacter freundii | 36 | - | - | - | 89 | - | - | # | # | # | 100 | 100 | 100 | 94 | 94 | 100 | 97 | 92 | 89 | 100* | 83 |
| Citrobacter koseri | 50 | - | 98 | - | 100 | 100*^ | 90 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 98 | 96 | 100 | 84 | 100 |
| Enterobacter aerogenes | 41 | - | - | - | 78 | - | - | # | # | # | 100 | 100 | 100 | 100 | 100 | 100 | 93 | 90 | 90 | 36* | 93 |
| Enterobacter cloacae | 117 | - | - | - | 86 | - | - | # | # | # | 96 | 92 | 97 | 96 | 96 | 100 | 93 | 95 | 85 | 59 | 89 |
| Escherichia coli | 770 | 52 | 79 | 61 | 95 | 80^ | 88 | 89 | 91 | 93 | 93 | 100 | 100 | 89 | 90 | 100 | 74 | 74 | 93 | 97 | 75 |
| Klebsiella oxytoca | 78 | - | - | 68 | 95 | 62^ | 96 | 97 | 96 | 97 | 97 | 99 | 100 | 99 | 99 | 100 | 96 | 96 | 96 | 92 | 90 |
| Klebsiella pneumoniae | 329 | - | 92 | 82 | 94 | 89^ | 95 | 93 | 93 | 94 | 94 | 99 | 100 | 97 | 91 | 99 | 93 | 94 | 94 | 46 | 86 |
| Morganella morganii | 48 | - | - | - | 98 | - | 37 | - | 83 | 88 | 96 | 100 | 98 | 87 | 89 | 96 | 67 | 71 | 93 | - | 63 |
| Proteus mirabilis | 197 | 73 | 91 | 86 | 99 | 70^ | 92 | 93 | 94 | 96 | 95 | 99 | 99 | 87 | 88 | 99 | 69 | 70 | 96 | - | 66 |
| Providencia rettgeri | 20* | - | - | - | 100* | - | 95* | 100* | 100* | 100* | 100* | 90* | 100* | 85* | 85* | 100* | 95* | 95* | 100* | - | 95* |
| Providencia stuartii | 21* | - | - | - | 100* | - | 95* | 100* | 100* | 100* | 100* | 95* | 100* | - | - | 100* | 38* | 38* | 100* | - | 76* |
| Pseudomonas aeruginosa | 275 | - | - | - | 94 | - | - | - | - | 93 | 93 | - | 91 | 88 | 97 | 96 | 83 | 77 | 80* | - | - |
| Serratia marcescens | 50 | - | - | - | 98 | 100^ | - | - | # | # | 100 | 96 | 100 | 100 | 92 | 100 | 94 | 96 | 100 | - | 100 |
| Stenotrophomonas maltophilia | 17* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 76* | - | - | 88* |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were only tested against 18 and 4 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

(R) Restricted. Use of these agents requires Infectious Diseases approval.

^ Actual cefazolin urine susceptibilities are likely better than what is listed in this column (due to MIC interpretation differences).

# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.

# EMERGENCY ROOM ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 116 | - | - | 99 | - | - | 78 | 100 | - | 100* | - | - | 97 | - | 21 | - | 100 |
| Enterococcus faecium | 7* | - | - | 0* | - | - | 100* | 0* | - | 100* | - | 100* | 17* | - | 33* | - | 29* |
| Staphylococcus aureus (MRSA) | 64 | - | - | - | - | - | - | - | 69 | 100* | 11 | 100 | - | 100 | 90 | 94 | 100 |
| Staphylococcus aureus (MSSA) | 96 | 32 | 100 | - | - | - | - | - | 82 | 100* | 71 | - | - | - | - | 99 | 100 |
| Staphylococcus, coag negative | 84 | 18 | 58 | - | - | - | - | - | 69 | - | 50 | 100 | - | 99 | 88 | 75 | 100 |
| Staphylococcus lugdunensis | 11* | 36* | 91* | - | - | - | - | - | 78* | - | 78* | 100* | - | 100* | 100* | 91* | 100* |
| Streptococcus agalactiae (group B) | 8* | 100* | - | - | 100* | 88* | - | - | 75* | - | 63* | - | - | - | - | - | 100* |
| Streptococcus pneumoniae (c) | 10* | 100*(c) | - | - | 100*(c) | 95* | - | - | 100* | - | 70* | 100* | - | - | 80* | 90* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Acinetobacter baumaunii | 2* | - | - | 50* | 100* | - | - | - | - | 50* | - | - | 100* | 100* | 100* | - | 100* | 100* | - | - | 100* |
| Citrobacter freundii | 13* | - | - | - | 92* | - | - | # | # | # | 100* | 100* | 100* | 100* | 92* | 100* | 100* | 100* | 92* | 100* | 69* |
| Citrobacter koseri | 10* | - | 98* | - | 100* | 100*^ | 90* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 71* | 100* |
| Enterobacter aerogenes | 9* | - | - | - | 78* | - | - | # | # | # | 100* | 100* | 100* | 100* | 100* | 100* | 93* | 90* | 90* | 36* | 93* |
| Enterobacter cloacae | 26* | - | - | - | 86* | - | - | # | # | # | 96* | 92* | 97* | 96* | 96* | 100* | 93* | 95* | 85* | 59* | 89* |
| Escherichia coli | 210 | 49 | 76 | 57 | 95 | 82^ | 89 | 89 | 90 | 92 | 92 | 100 | 100 | 89 | 88 | 100 | 75 | 75 | 93 | 98 | 76 |
| Klebsiella oxytoca | 17* | - | - | 76* | 100* | 75*^ | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* |
| Klebsiella pneumoniae | 60 | - | 93 | 86 | 97 | 91^ | 98 | 95 | 95 | 95 | 95 | 98 | 98 | 97 | 95 | 98 | 95 | 95 | 95 | 49 | 86 |
| Morganella morganii | 17* | - | - | - | 100* | - | 31* | - | 88* | 94* | 100* | 100* | 100* | 76* | 88* | 100* | 82* | 94* | 94* | - | 65* |
| Proteus mirabilis | 44 | 73 | 93 | 89 | 100 | 77^ | 93 | 95 | 98 | 100 | 100 | 100 | 100 | 82 | 82 | 100 | 66 | 70 | 100 | - | 70 |
| Providencia rettgeri | 6* | - | - | - | 100* | - | 83* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | - | 100* |
| Providencia stuartii | 5* | - | - | - | 100* | - | 100* | 100* | 100* | 100* | 100* | 100* | 100* | - | - | 100* | 20* | 20* | 100* | - | 60* |
| Pseudomonas aeruginosa | 56 | - | - | - | 96 | - | - | - | - | 95 | 95 | - | 89 | 86 | 100 | 96 | 84 | 78 | - | - | - |
| Serratia marcescens | 8* | - | - | - | 100* | - | - | - | # | # | 100* | 88* | 100* | 100* | 88* | 100* | 100* | 100* | 100* | - | 100* |
| Stenotrophomonas maltophilia | 4* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 50* | - | - | 100* |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) There were 10 Streptococcus pneumoniae isolates from the ER in 2016. For all units (inpatient and outpatient) combined, the % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were only tested against 5 and 1 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

(R) Restricted. Use of these agents requires Infectious Diseases approval.

^ Actual cefazolin urine susceptibilities are likely better than what is listed in this column (due to MIC interpretation differences).

# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.

# ACUTE MED/SURG (2A/2C/3C) ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 32 | - | - | 100 | - | - | 78 | 100 | - | 100* | - | - | 100* | - | 16 | - | 94 |
| Enterococcus faecium | 5* | - | - | 0* | - | - | - | - | - | - | - | 100* | 0* | - | 20* | - | 20* |
| Staphylococcus aureus (MRSA) | 19* | - | - | - | - | - | - | - | 50* | 100* | 17* | 100* | - | 100* | 89* | 95* | 100* |
| Staphylococcus aureus (MSSA) | 20* | 20* | 100* | - | - | - | - | - | 94* | - | 65* | - | - | - | - | 100* | 100* |
| Staphylococcus, coag negative | 17* | - | 18* | - | - | - | - | - | 27* | - | - | 100* | - | 94* | 100* | 41* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Escherichia coli | 43 | 44 | 79 | 53 | 95 | 67^ | 88 | 77 | 79 | 79 | 79 | 100 | 100 | 88 | 88 | 100 | 60 | 60 | 77 | 93* | 63 |
| Klebsiella pneumoniae | 18* | - | 94* | 78* | 89* | 100*^ | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 58 | 72* |
| Proteus mirabilis | 16* | 69* | 86* | 81* | 100* | 69*^ | 94* | 88* | 88* | 88* | 88* | 100* | 100* | 87* | 88* | 100* | 75* | 75* | 88* | - | 56* |
| Pseudomonas aeruginosa | 19* | - | - | - | 89* | - | - | - | - | 84* | 79* | - | 95* | 89* | 100* | 94* | 79* | 84* | - | - | - |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) There were 2 Streptococcus pneumoniae isolates from 2A/2C/3C in 2016. For all units (inpatient and outpatient) combined, the % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were only tested against 4 and 0 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

(R) Restricted. Use of these agents requires Infectious Diseases approval.

^ Actual cefazolin urine susceptibilities are likely better than what is listed in this column (due to MIC interpretation differences).

# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.

# ICU/IICU (2F/3F) ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 21* | - | - | 100* | - | - | 100* | 75* | - | 100* | - | 100* | 100* | - | 29* | - | 90* |
| Enterococcus faecium | 4* | - | - | 25* | - | - | 100* | 100* | - | - | - | 100* | 50* | - | 50* | - | 25* |
| Staphylococcus aureus (MRSA) | 32 | - | - | - | - | - | - | - | 52 | 100* | 23 | 100 | - | 100 | 97 | 97 | 100 |
| Staphylococcus aureus (MSSA) | 23* | 35* | 100* | - | - | - | - | - | 86* | - | 86* | - | - | - | - | 100* | 100* |
| Staphylococcus, coag negative | 17* | 6* | 25* | - | - | - | - | - | 45* | - | 36* | 100* | - | 88* | 88* | 88* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Enterobacter cloacae | 13* | - | - | - | 69* | - | - | # | # | # | 92* | 85* | 100* | 100* | 100* | 100* | 92* | 92* | 69* | 67* | 92* |
| Escherichia coli | 20* | 45* | 70* | 55* | 85* | 75*^ | 85* | 95* | 95* | 95* | 95* | 100* | 100* | 90* | 90* | 100* | 80* | 80* | 95* | 80* | 70* |
| Klebsiella pneumoniae | 16* | - | 94* | 69* | 88* | 71*^ | 88* | 94* | 94* | 94* | 93* | 94* | 100* | 100* | 94* | 94* | 88* | 81* | 94* | 20* | 75* |
| Proteus mirabilis | 12* | 75* | 75* | 83* | 100* | 100*^ | 100* | 83* | 83* | 83* | 83* | 92* | 100* | 83* | 83* | 100* | 58* | 58* | 83* | - | 58* |
| Pseudomonas aeruginosa | 33 | - | - | - | 88 | - | - | - | - | 82 | 85 | - | 88 | 88 | 97 | 94 | 85 | 85 | - | - | - |
| Serratia marcescens | 9* | - | - | - | 100* | 0*^ | - | - | # | # | 100* | 100* | 100* | 100* | 89* | 100* | 100* | 100* | 100* | - | 100* |
| Stenotrophomonas maltophilia | 5* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 100* | - | - | 80* |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) There was 1 Streptococcus pneumoniae isolate from 2F/3F in 2016. For all units (inpatient and outpatient) combined, the % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were only tested against 3 and 0 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

(R) Restricted. Use of these agents requires Infectious Diseases approval.

^ Actual cefazolin urine susceptibilities are likely better than what is listed in this column (due to MIC interpretation differences).

# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.

# SPINAL CORD INJURY UNIT (7SCI) ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 32 | - | - | 100 | - | - | - | 50* | - | - | - | 100* | 100 | - | 13 | - | 94 |
| Staphylococcus aureus (MRSA) | 20* | - | - | - | - | - | - | - | 44* | 100* | 33* | 94* | - | 100* | 100* | 100* | 100* |
| Staphylococcus aureus (MSSA) | 10* | 50* | 100* | - | - | - | - | - | 100* | - | 100* | - | - | - | - | 90* | 100* |
| Staphylococcus, coag negative | 9* | 33* | 33* | - | - | - | - | - | 100* | - | 67* | 100* | - | 100* | 67* | 56* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Escherichia coli | 51 | 35 | 80 | 53 | 98 | 85^ | 80 | 94 | 94 | 94 | 96 | 100 | 100 | 90 | 90 | 100 | 55 | 55 | 94 | 94* | 59 |
| Klebsiella pneumoniae | 45 | - | 93 | 79 | 93 | 83^ | 89 | 89 | 87 | 89 | 89 | 100 | 100 | 98 | 91 | 100 | 89 | 91 | 89 | 36 | 84 |
| Proteus mirabilis | 22* | 68* | 91* | 86* | 100* | 56*^ | 86* | 91* | 91* | 100* | 100* | 95* | 95* | 91* | 91* | 95* | 45* | 45* | 100* | - | 41* |
| Pseudomonas aeruginosa | 47 | - | - | - | 85 | - | - | - | - | 87 | 79 | - | 79 | 77 | 91 | 93 | 66 | 59 | - | - | - |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) There were no Streptococcus pneumoniae isolates from 7SCI in 2016. For all units (inpatient and outpatient) combined, the % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were tested against 1 and 0 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

(R) Restricted. Use of these agents requires Infectious Diseases approval.

^ Actual cefazolin urine susceptibilities are likely better than what is listed in this column (due to MIC interpretation differences).

# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.

# LONG TERM CARE (4C/331/360/90) ANTIBIOGRAM: January 2016 – December 2016

| GRAM-POSITIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins / Cephalosporins | | | | Fluoroquinolones / Aminoglycosides (synergy) | | | Miscellaneous | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Penicillin | Oxacillin | Ampicillin | Ceftriaxone | Levofloxacin (R) | Gentamicin (a) | Streptomycin (a)(R) | Clindamycin | Daptomycin (R) | Erythromycin | Linezolid (d)(R) | Nitrofurantoin *for urine only* | Rifampin (b) *not for monotherapy* | Tetracycline | Trimethoprim/ sulfamethoxazole | Vancomycin |
| Enterococcus faecalis | 11* | - | - | 100* | - | - | - | - | - | - | - | - | 100* | - | 20* | - | 100* |
| Enterococcus faecium | 2* | - | - | 0* | - | - | 100* | - | - | 100* | - | 100* | 0* | - | 0* | - | 0* |
| Staphylococcus aureus (MRSA) | 15* | - | - | - | - | - | - | - | 27* | 100* | 9* | 100* | - | 100* | 86* | 100* | 100* |
| Staphylococcus aureus (MSSA) | 10* | 60* | 100* | - | - | - | - | - | 83* | - | 67* | - | - | - | - | 100* | 100* |

| GRAM-NEGATIVE ORGANISM (% Susceptibility) | # isolates tested | Beta lactams: Penicillins | | | | Cephalosporins | | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones / Miscellaneous | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Ampicillin | Amoxicillin/ Clavulanate | Ampicillin/ sulbactam (R) | Piperacillin/ tazobactam | Cefazolin *for urine only* | Cefoxitin | Cefpodoxime | Ceftriaxone | Ceftazidime (R) | Cefepime (CR) | Ertapenem | Meropenem (R) | Gentamicin | Tobramycin | Amikacin (CR) | Ciprofloxacin | Levofloxacin (R) | Aztreonam (R) | Nitrofurantoin *for urine only* | Trimethoprim/ sulfamethoxazole |
| Escherichia coli | 37 | 54 | 81 | 65 | 89 | 78^ | 92 | 86 | 86 | 86 | 89 | 100 | 100 | 86 | 92 | 100 | 65 | 65 | 89 | 97 | 73 |
| Klebsiella pneumoniae | 28* | - | 93* | 86* | 93* | 90*^ | 93* | 96* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 100* | 40* | 100* |
| Proteus mirabilis | 35 | 80 | 91 | 83 | 97 | 80^ | 94 | 100 | 100 | 100 | 100 | 100 | 100 | 86 | 89 | 100 | 54 | 54 | 100 | - | 60 |
| Pseudomonas aeruginosa | 20* | - | - | - | 85* | - | - | - | - | 90* | 95* | - | 90* | 75* | 95* | 95* | 65* | 65* | - | - | - |

**FOOTNOTES * Fewer than 30 isolates were tested. Due to the small number of isolates tested, results may be statistically unreliable (i.e. interpret with caution).**

(a) Test for Enterococcal high-level resistance to gentamicin (MIC 500 mcg/mL) and streptomycin (MIC 2000 mcg/mL). S: synergy with beta-lactams likely, R: synergy with beta-lactams is unlikely.

(b) Rifampin should NOT be used as monotherapy for the treatment of Staphylococcal infections

(c) There was one S pneumoniae isolate from 4C/331/360/90 in 2016. For all units (inpatient and outpatient) combined, the % susceptibility for penicillin and ceftriaxone for Streptococcus pneumoniae- non-meningitis: penicillin 95% (18/19), ceftriaxone 100% (19/19); meningitis: penicillin 63% (12/19), ceftriaxone 95% (18/19).

(d) Linezolid and daptomycin were only tested against 2 and 1 vancomycin-resistant Enterococcus isolates, respectively.

(CR) Criteria restricted. Cefepime for neutropenic fever, amikacin for gram-negative organisms resistant to gentamicin/tobramycin, streptomycin for gentamicin-resistant Enterococcal endocarditis. Use for other indications requires Infectious Diseases approval.

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# Enterobacter, Citrobacter, and Serratia may develop resistance during prolonged therapy (approx 5 days) with 3rd generation cephalosporins as a result of derepression of AmpC beta-lactamase. Therefore, isolates that are initially susceptible may become resistant after initiation of therapy. Repeat testing may be warranted. For blood culture/sterile sites, ID consult is recommended.