

UCLA Health System

**Antimicrobial
Susceptibility
Summary
2011**

Clinical Microbiology
Department of Pathology & Laboratory Medicine

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The information contained in this booklet can also
be found at:

<http://www.mednet.ucla.edu/>

through the
“Lab and Formulary Manual” link under Medical
References

Preface

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

Antimicrobials (IV, PO):

Formulary Status and Cost Reference (Table 1)

Aerobic Bacteria Susceptible MIC Breakpoints (Tables 5A-B)

Percent Susceptible Data (Tables 6–15)

These tables summarize susceptibility data obtained for organisms isolated in the UCLA Clinical Microbiology Laboratory in 2010.

Antimicrobial Testing and Reporting Policies

(Tables 2–3)

In order to provide the most meaningful information, the laboratory is selective in reporting antimicrobial susceptibility results (Table 3).

Reporting guidelines are based on:

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

Non-formulary drugs are not routinely reported and controlled formulary agents (Table 1) are reported only in the appropriate setting: e.g. amikacin and tobramycin if resistant to gentamicin. Results of all drugs tested, including those not reported, are available upon request.

We thank:

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David Pegues, MD, Division of Infectious Disease

Alma Salonga, Administrative Specialist, Brentwood Annex

Guidelines for Interpretation of MICs

MICs are interpreted as susceptible, intermediate, resistant, or non-susceptible according to CLSI (Clinical and Laboratory Standards Institute) 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. A common rule of thumb is that antimicrobial concentrations at the site of infection should be at least 2–4 times the MIC.

For additional information, please call the antimicrobial testing laboratory.

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Frequently called numbers:

| | |
|---|-------|
| Antimicrobial Testing Laboratory | 42760 |
| Infectious Diseases (Adult)..... | 57225 |
| Infectious Diseases (Pediatric) | 55235 |
| Drug Information Center | 78522 |
| Infection Control (WWH)..... | 40187 |
| Infection Control (SMH) | 94454 |
| Infectious Diseases Pharmacist (page 92528) ... | 78510 |

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Table 1. Antimicrobials (IV, PO), Formulary Status and Cost Reference

| Drug | Usual Dose | Usual Interval | (\$)*Per Day |
|--|-------------------------|----------------|--------------|
| Penicillins | | | |
| Ampicillin | 1 gm/ 2 gm | q6h | 31.10/38.30 |
| Ampicillin-sulbactam | 3 gm | q6h | 32.85 |
| Oxacillin | 1 gm | q6h | 53.85 |
| Penicillin G | 2x10 ⁶ Units | q4h | 37.90 |
| Piperacillin-tazobactam | 3.375 gm | q6h | 77.50 |
| Ampicillin (PO) | 500 mg | q6h | 0.40 |
| Amoxicillin (PO) | 250 mg/ 500 mg | q8h | 0.25/0.30 |
| Amoxicillin-clavulanic acid (PO) | 250 mg/ 500 mg | q8h | 11.50/2.30 |
| Dicloxacillin (PO) | 250 mg/ 500 mg | q6h | 1.15/1.40 |
| Cephalosporins | | | |
| Cefazolin | 1 gm | q8h | 17.05 |
| Cefepime ^{1,2} | 1 gm | q12h | 24.15 |
| Cefotaxime ^{1, 3} | 1 gm | q8h | 18.40 |
| Cefoxitin ^{1, 4} | 1 gm | q6h | 33.80 |
| Ceftriaxone | 1 gm/ 2 gm | q24h | 14.00/20.70 |
| Cefuroxime | 1.5 gm | q8h | 23.25 |
| Cephalexin (PO) | 500 mg | q6h | 0.85 |
| Cefpodoxime (PO) | 100 mg/ 200 mg | q12h | 4.45/9.40 |
| Other β-lactams/monobactam | | | |
| Aztreonam ^{1, 5} | 1 gm | q8h | 88.85 |
| Ertapenem | 1 gm | q24h | 65.30 |
| Meropenem ^{1, 6} | 1 gm | q8h | 93.95 |

* Includes drug acquisition cost plus estimated preparation and administrative costs; charges rounded up to the nearest \$0.05

¹ Use of "controlled" antimicrobials is RESTRICTED to UCLA Health System-approved criteria.

² Restricted: suspected or documented *Pseudomonas aeruginosa* infection and in the management of gram-negative meningitis.

³ For neonatal use only

⁴ Restricted: surgical prophylaxis; refer to Pre-incisional Antimicrobial Recommendations.

⁵ Restricted: aerobic gram-negative infections (β -lactam allergic patients)

⁶ Restricted: organisms resistant to all other formulary agents or febrile neutropenic patients on Hematology-Oncology services.

Table 1. Antimicrobials (IV, PO), Formulary Status and Cost Reference (cont.)

| Drug | Usual Dose | Usual Interval | (\$)*Per Day |
|--|----------------------------|----------------|--------------|
| Aminoglycosides | | | |
| Amikacin ^{1, 7} | 500 mg (7.5 mg/kg/dose) | q12h | 16.30 |
| Gentamicin | 140 mg (1–2 mg/kg/dose) | q12h | 11.75 |
| Tobramycin ^{1, 8} | 140 mg (1–2 mg/kg/dose) | q12h | 13.55 |
| Others | | | |
| Azithromycin | 500 mg | q24h | 9.40 |
| Ciprofloxacin | 400 mg | q12h | 13.80 |
| Clindamycin | 600 mg | q8h | 51.05 |
| Colistimethate | 150 mg | q8h | 95.35 |
| Daptomycin ^{1, 9} | 500 mg | q24h | 247.95 |
| Doxycycline | 100 mg | q12h | 24.15 |
| Levofloxacin ^{1, 11} | 500 mg/ 750 mg | q24h | 17.70/16.90 |
| Linezolid ^{1, 12} | 600 mg | q12h | 201.50 |
| Metronidazole | 500 mg | q8h | 18.20 |
| Quin-Dalfopristin ^{1, 12} (7.5 mg/kg/dose) | 500 mg | q8h | 508.10 |
| Rifampin ^{1, 13} | 600 mg | q24h | 110.60 |
| Tigecycline ^{1, 9} | 50 mg | q12h | 135.40 |
| Trimethoprim- Sulfamethoxazole | 320 mg TMP | q12h | 21.45 |
| Vancomycin | 1 gm | q12h | 17.60 |
| Azithromycin (PO) | 500 mg | q24h | 19.05 |
| Ciprofloxacin (PO) | 500 mg | q12h | 0.30 |
| Clarithromycin (PO) | 500 mg | q12h | 2.40 |
| Doxycycline (PO) | 100 mg | q12h | 0.15 |
| Erythromycin (PO) | 500 mg | q6h | 7.00 |
| Levofloxacin (PO) ^{1, 11} | 500 mg/750 mg | q24h | 2.35/1.60 |
| Linezolid (PO) ^{1, 12} | 600 mg | q12h | 146.65 |
| Metronidazole (PO) | 500 mg | q8h | 1.90 |
| Nitrofurantoin (PO) (macrocrystal formulation) | 50 mg/100 mg | q12h | 0.70/1.25 |
| Rifampin (PO) | 600 mg | q24h | 2.20 |
| Tetracycline (PO) | 500 mg | q6h | 0.15 |
| Trimeth-Sulfa (PO) | 160 mg/800 mg | q12h | 0.30 |
| Vancomycin (PO) | 125 mg | q6h | 101.50 |

Table 1. Antimicrobials (IV, PO), Formulary Status and Cost Reference (cont.)

| Drug | Usual Dose | Usual Interval | (\$)*Per Day |
|---|----------------------|----------------|--------------------|
| Antifungal Agents | | | |
| Amphotericin B | 50 mg (avg) | q24h | 14.55 |
| Amphotericin B^{1, 9} | 350 mg | q24h | 244.15 |
| Lipid Complex (ABLC) | | | |
| Caspofungin^{1, 9} | 50 mg | q24h | 95.45 |
| Fluconazole | 200 mg/400 mg | q24h | 10.95/10.25 |
| Voriconazole^{1,10} | 300 mg | q12h | 467.55 |
| Fluconazole (PO) | 200 mg/400 mg | q24h | 0.20/0.40 |
| Flucytosine (PO) | 2000 mg | q6h | 663.85 |
| Voriconazole (PO)^{1,10} | 200 mg | q12h | 77.65 |

⁷ Restricted: organisms with suspected/documentated resistance to gentamicin and tobramycin.

⁸ Restricted: infections caused by organisms with suspected/documentated resistance to gentamicin.

⁹ Restricted to use by Adult or Pediatric Infectious Diseases Service approval.

¹⁰ Restricted: treatment of suspected/documentated invasive aspergillosis. For treatment of infections caused by *S. apiospermum*, *Fusarium* species (including *F. solani*) and non-albicans *Candida* species in patients intolerant of, or refractory to other therapy.

¹¹ Restricted: all services, lower respiratory tract infections where RESISTANT organisms are suspected (e.g. penicillin- and cephalosporin-resistant *S. pneumoniae*).

¹² Restricted: suspected or documented VRE infection, documented allergy to vancomycin (not Redman's Syndrome). For Quinupristin-Dalfopristin, no activity against *E. faecalis*.

¹³ Injection: For use in patients unable to tolerate the oral formulation.

Table 2. Indications for Performing Routine Antimicrobial Susceptibility Tests – Aerobic Bacteria

Susceptibility tests will be performed as follows:

1. **Blood—all isolates except:**
Bacillus spp.¹
Corynebacterium spp.¹
Coagulase-negative *Staphylococcus*^{1,2}
2. **Urine**
>10⁵ CFU/ml of (1 or 2 species):
>50,000 CFU/ml of (pure culture)³:
Gram-negative bacilli; *Staphylococcus aureus*
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.
Shigella spp.
Yersinia spp.
Vibrio spp.

¹ Susceptibilities performed if isolated from multiple cultures

² Susceptibilities performed on *S. lugdunensis*

³ Susceptibilities not routinely performed on *Enterococcus* spp. from outpatients

**Table 2. Indications for Performing Routine
(cont.) Antimicrobial Susceptibility Tests –
Aerobic Bacteria**

5. Wounds, abscesses and other contaminated body sites, ≤ 2 potential pathogens.
6. Sterile body sites—any organism except:
*Bacillus spp.*⁴
7. Susceptibility testing will be performed on subsequent isolates from similar site every 5 days to determine if resistance has developed.

Additional notes:

- 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 within 48 hours if susceptibilities are desired (x42758).

⁴ Susceptibilities performed if isolated from multiple cultures

Table 3. Antimicrobial Agents Routinely Reported – Aerobic Bacteria

| Primary antimicrobials | Conditions for supplemental antimicrobial reporting | Supplemental antimicrobial(s) |
|--|---|--|
| <i>E. coli</i>, <i>Klebsiella</i> spp., <i>P. mirabilis</i> – Excludes urine isolates | | |
| ampicillin cefazolin | Resistant to ampicillin Resistant to cefazolin Resistant to ceftriaxone | ampicillin-sulbactam ceftriaxone ertapenem (>18 y.o.) or meropenem (≤18 y.o.), ciprofloxacin (>11 y.o.) meropenem |
| gentamicin piperacillin-tazobactam trimethoprim-sulfamethoxazole | Resistant to ertapenem (>18 y.o.) Resistant to gentamicin | amikacin, tobramycin |
| <i>E. coli</i>, <i>Klebsiella</i> spp., <i>P. mirabilis</i> – Urine isolates | | |
| ampicillin cefazolin | Resistant to cefazolin Resistant to ceftriaxone | ceftriaxone ertapenem (>18 y.o.) or meropenem (≤18 y.o.) meropenem |
| ciprofloxacin(>11 y.o.) gentamicin nitrofurantoin trimethoprim-sulfamethoxazole | Resistant to ertapenem (>18 y.o.) Resistant to gentamicin | amikacin |
| SPICE organisms¹ – Excludes urine isolates | | |
| ampicillin ampicillin-sulbactam cefazolin cefepime (≤18 y.o.) ertapenem (>18 y.o.) gentamicin piperacillin-tazobactam trimethoprim-sulfamethoxazole | Resistant to cefepime Resistant to ertapenem Resistant to gentamicin | meropenem, ciprofloxacin (>11 y.o.) cefepime, meropenem, ciprofloxacin amikacin, tobramycin |
| SPICE organisms¹ – Urine isolates | | |
| ampicillin cefazolin ciprofloxacin (>11 y.o.) ertapenem (>18 y.o.) meropenem (≤18 y.o.) gentamicin nitrofurantoin trimethoprim-sulfamethoxazole | Resistant to ertapenem | meropenem |

¹Enterobacteriaceae other than *E. coli*, *Klebsiella* spp., *P. mirabilis*, *Salmonella* spp., *Shigella* spp.

Table 3. Antimicrobial Agents Routinely Reported – Aerobic Bacteria
(cont.)

| Primary antimicrobials | Conditions for supplemental antimicrobial reporting | Supplemental antimicrobial(s) |
|--|---|-----------------------------------|
| <i>Salmonella</i> spp., <i>Shigella</i> spp. | | |
| ampicillin ciprofloxacin (>11 y.o.) trimethoprim-sulfamethoxazole | Non-fecal sources | ceftriaxone |
| <i>Acinetobacter</i> spp. | | |
| ampicillin-sulbactam ceftazidime cefepime ciprofloxacin (>11 y.o.) gentamicin | Resistant to ceftazidime | meropenem |
| piperacillin-tazobactam trimethoprim-sulfamethoxazole | Resistant to gentamicin | amikacin, tobramycin |
| <i>Pseudomonas aeruginosa</i> | | |
| cefepime | Resistant to cefepime and piperacillin-tazobactam | meropenem |
| ciprofloxacin (>11 y.o.) gentamicin piperacillin-tazobactam | If gentamicin > 1ug/ml Resistant to cefepime and piperacillin-tazobactam | amikacin, tobramycin meropenem |
| <i>Stenotrophomonas maltophilia</i>- Sterile site isolates | | |
| <i>Burkholderia cepacia</i> | | |
| ceftazidime levofloxacin (>11 y.o.) minocycline ticarcillin-clavulanate trimethoprim-sulfamethoxazole meropenem | | |

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Table 3. Antimicrobial Agents Routinely Reported – Aerobic Bacteria
(cont.)

| Primary antimicrobials | Conditions for supplemental antimicrobial reporting | Supplemental antimicrobial(s) |
|---|---|-----------------------------------|
| Nonfermenters not otherwise listed | | |
| ceftazidime | Resistant to ceftazidime and piperacillin-tazobactam | meropenem |
| cefepime ciprofloxacin (>11 y.o) gentamicin piperacillin-tazobactam | If gentamicin >1ug/ml Resistant to ceftazidime and piperacillin-tazobactam | amikacin, tobramycin meropenem |
| trimethoprim-sulfamethoxazole | | |
| <i>Haemophilus influenzae</i> | | |
| Beta-lactamase test | Positive: sterile site isolates | ampicillin, ceftriaxone |

∞

Table 3. Antimicrobial Agents Routinely Reported – Aerobic Bacteria (cont.)

| Primary antimicrobials | Conditions for supplemental antimicrobial reporting | Supplemental antimicrobial(s) |
|--|--|---|
| <i>Staphylococcus</i> spp. clindamycin erythromycin oxacillin penicillin vancomycin | clindamycin excluded from urine and sterile site isolates erythromycin excluded from urine and sterile site isolates Resistant to oxacillin (MRSA) <i>S. aureus</i> from sterile body sites Urine isolates | doxycycline, rifampin, trimethoprim-sulfamethoxazole; report all beta-lactams as resistant gentamicin ciprofloxacin, ¹ nitrofurantoin, trimethoprim-sulfamethoxazole |
| <i>Enterococcus</i> spp. ampicillin vancomycin | Sterile body site isolates VRE from sterile body sites Urine isolates | gentamicin & streptomycin synergy screens daptomycin, doxycycline, linezolid, quinupristin-dalfopristin (excluding <i>E. faecalis</i>), rifampin ciprofloxacin, ¹ doxycycline, nitrofurantoin |
| <i>Streptococcus pneumoniae</i> amoxicillin, cefotaxime, ceftriaxone, erythromycin, levofloxacin, ¹ penicillin, tetracycline, trimethoprim-sulfamethoxazole, vancomycin | | |
| Viridans group <i>Streptococcus</i> cefotaxime, ceftriaxone, penicillin, vancomycin | | |
| beta-hemolytic streptococci clindamycin, erythromycin, penicillin, vancomycin | | |
| <i>Listeria monocytogenes</i> ampicillin, trimethoprim-sulfamethoxazole | | |

¹ Patients > 11 y.o.

Table 4. Special Antimicrobial Tests

Use Lab Request Form 2 for tests on fluids, cultures

Phones: x78100 option #1 Client Services, Specimen Information, and Reports
x42760 Antimicrobial Laboratory

| Test Name | Specimen | Instruction/Notes | Description/Results |
|---|--|---|--|
| Antimicrobial Level *Time of specimen collection in relation to dosage is a critical factor | Blood: 0.4 ml red top tube (0.2 ml serum) Other body fluids: 1 ml Minimum amt: Contact Toxicology Laboratory: x78141 | Immediately place specimen on ice; write date and time drawn on both specimen label and request form. See Toxicology section of Clinical Laboratories Reference Manual for gentamicin, tobramycin, amikacin, and vancomycin levels. (Toxicology: x78141) | Quantitative measure of antimicrobial concentration (µg/ml) in serum or body fluid. Results available within 24 h; for serum, 7 days for fluids |
| MIC/MBC Minimal Inhibitory Concentration (MIC) Minimal Bactericidal Concentration (MBC) | Patient's bacterial isolate | Specify antimicrobials to be tested. | Determination of the inhibitory and bactericidal activity of specific antimicrobials against a bacterial isolate. Results available in 48–96 h. |
| Synergy | Patient's bacterial isolate | Specify antimicrobials to be tested. | Determination of the susceptibility (µg/ml) of bacterial isolate to a combination of 2 antimicrobials. Both MIC and MBC of each antimicrobial alone and in combination are determined. Results available in 3–7 days. |

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*The following guidelines are suggested for blood specimens: Peak and Trough levels should be drawn at steady state, i.e. around 4th dose of regimen, unless otherwise indicated
Aminoglycosides (Gentamicin, Tobramycin, Amikacin)

| | |
|-----------------------------------|---|
| Trough specimen and Peak specimen | Obtain 30 min prior to administration of the next dose. |
| or | |
| Extended interval | 1. Obtain 60 min after IM injection. 2. Obtain 30 min after completion of 30 min IV infusion or 60 min IV infusion |
| | Obtain 6-14 h after start of a 60 min infusion; level may be drawn after the 1 st dose |

| |
|-----------------------------|
| Vancomycin |
| Obtain Trough specimen only |

Table 5A. Susceptible MIC (µg/ml) Breakpoints for Aerobic Gram-negative Bacilli

| Organism | Penicillins | | | | Cephalosporins | | | | | Carbapenems | | Aminoglycosides | | | Fluoroquinolones | | Other | | |
|---------------------------------------|-------------|----------------------|-------------------------|-------------------------|----------------|----------|------------|-------------|-------------|-------------|-----------|-----------------|------------|------------|------------------|--------------|-------------------------------|----------------|-------------|
| | Ampicillin | Ampicillin-sulbactam | Piperacillin-tazobactam | Ticarcillin-clavulanate | Cefazolin | Cefepime | Cefotaxime | Ceftazidime | Ceftriaxone | Ertapenem | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Levofloxacin | Trimethoprim-sulfamethoxazole | Nitrofurantoin | Minocycline |
| ENTEROBACTERIACEAE¹ | ≤8 | ≤8 | ≤16 | - | ≤8 | ≤8 | ≤8 | ≤8 | ≤8 | ≤25 | ≤1 | ≤16 | ≤4 | ≤4 | ≤1 | ≤2 | ≤2/40 | ≤32 | - |
| NONFERMENTERS | | | | | | | | | | | | | | | | | | | |
| <i>Acinetobacter baumannii</i> | - | ≤8 | ≤16 | - | - | ≤8 | ≤8 | ≤8 | - | ≤4 | ≤16 | ≤4 | ≤4 | ≤1 | ≤2 | ≤2/40 | - | - | - |
| <i>Burkholderia cepacia</i> | - | - | - | ≤16 | - | - | ≤8 | - | - | ≤4 | - | - | - | - | ≤2 | ≤2/40 | - | ≤4 | - |
| <i>Pseudomonas aeruginosa</i> | - | - | ≤16 | - | - | ≤8 | - | ≤8 | - | ≤4 | ≤16 | ≤4 | ≤4 | ≤1 | ≤2 | - | - | - | - |
| <i>Stenotrophomonas maltophilia</i> | - | - | - | ≤16 | - | - | ≤8 | - | - | ≤4 | - | - | - | - | ≤2 | ≤2/40 | - | ≤4 | - |
| <i>Other nonfermenters</i> | - | - | ≤16 | - | - | ≤8 | ≤8 | ≤8 | ≤8 | - | ≤4 | ≤16 | ≤4 | ≤4 | ≤1 | ≤2 | ≤2/40 | - | - |

¹ Enterobacteriaceae: *Citrobacter freundii*, *Enterobacter* spp., *Escherichia coli*, *Klebsiella* spp., *Morganella morganii*, *Proteus mirabilis*, *Salmonella* spp., *Serratia* spp., *Shigella* spp.

Table 5B. Susceptible MIC (µg/ml) Breakpoints for Gram-positive Cocci

| Organism | Penicillins | | | Aminoglycosides | | | Fluoroquinolone | Other | | | | | | | | | |
|--|-------------|-----------|------------|-----------------|--------------------|----------------------|-----------------|-------------|------------|-------------|--------------|-----------|----------------|---------------------------|----------|-------------------------------|------------|
| | Ampicillin | Oxacillin | Penicillin | Gentamicin | Gentamicin synergy | Streptomycin synergy | Ciprofloxacin | Clindamycin | Daptomycin | Doxycycline | Erythromycin | Linezolid | Nitrofurantoin | Quinupristin-dalfopristin | Rifampin | Trimethoprim-sulfamethoxazole | Vancomycin |
| <i>Staphylococcus aureus</i> | - | ≤2 | ≤12* | ≤4 | - | - | ≤1 | ≤5 | ≤1 | ≤4 | ≤5 | ≤4 | ≤32 | ≤1 | ≤1 | ≤2/40 | ≤2 |
| <i>Staphylococcus lugdunensis</i> | - | ≤25 | ≤12* | ≤4 | - | - | ≤1 | ≤5 | ≤1 | ≤4 | ≤5 | ≤4 | ≤32 | ≤1 | ≤1 | ≤2/40 | ≤4 |
| Coagulase-negative <i>Staphylococcus</i> | - | ≤25 | ≤12* | ≤4 | - | - | ≤1 | ≤5 | ≤1 | ≤4 | ≤5 | ≤4 | ≤32 | ≤1 | ≤1 | ≤2/40 | ≤4 |
| <i>Enterococcus</i> spp. | ≤8 | - | ≤8 | - | ≤500 | ≤1000 | ≤1 | - | ≤4 | ≤4 | - | ≤2 | ≤32 | ≤1 | ≤1 | - | ≤4 |

* beta-lactamase negative

| Organism | Penicillins | | Cephalosporins | | Other | | | |
|-------------------------------------|-------------|------------|----------------|-------------|--------------|--------------|--------------|------------|
| | Amoxicillin | Penicillin | Cefotaxime | Ceftriaxone | Erythromycin | Levofloxacin | Tetracycline | Vancomycin |
| <i>Streptococcus pneumoniae</i> | - | - | - | - | - | ≤2 | ≤2 | - |
| Meningitis | - | ≤0.6 | ≤5 | ≤5 | - | - | - | - |
| Non-meningitis | ≤2 | ≤2 | ≤1 | ≤1 | ≤25 | - | - | - |
| Viridans group <i>Streptococcus</i> | - | ≤12 | ≤1 | ≤1 | ≤25 | - | - | ≤1 |

Table 6. Gram-negative – Excludes Urine Isolates, Percent Susceptible

| Organism | No. Isolates | Penicillins | | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoroquin- olone | Other |
|---|--------------|----------------|----------------------|-------------------------|----------------|-------------|----------------|-----------------|-----------------|----------------|----------------|----------------------|---------------------------------|
| | | Ampicillin | Ampicillin-sulbactam | Piperacillin-tazobactam | Cefazolin | Ceftazidime | Ceftriaxone | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Trimethoprim – sulfamethoxazole |
| | | | | | | | | | | | | | |
| <i>Citrobacter freundii</i> | 40 | R ¹ | R ¹ | 70 | R ¹ | 65 | 65 | 100 | 98 | 90 | 93 | 83 | 83 |
| <i>Enterobacter aerogenes</i> | 73 | R ¹ | R ¹ | 77 | R ¹ | 75 | 77 | 100 | 100 | 100 | 100 | 100 | 99 |
| <i>Enterobacter cloacae</i> | 168 | R ¹ | R ¹ | 79 | R ¹ | 75 | 76 | 99 | 100 | 95 | 95 | 99 | 90 |
| <i>Escherichia coli</i> | 448 | 38 | 45 | 88 | 74 | 82 | 82 | 100 | 99 | 83 | 81 | 64 | 58 |
| <i>Klebsiella oxytoca</i> | 89 | R ¹ | 59 | 94 | 73 | 91 | 91 | 100 | 99 | 96 | 93 | 98 | 90 |
| <i>Klebsiella pneumoniae</i> | 267 | R ¹ | 71 | 88 | 84 | 86 | 86 | 99 | 96 | 91 | 87 | 86 | 83 |
| <i>Morganella morganii</i> ² | 24 | R ¹ | R ¹ | 96 | R ¹ | 87 | 100 | 100 | 100 | 83 | 96 | 83 | 71 |
| <i>Proteus mirabilis</i> | 80 | 80 | 92 | 100 | 93 | 96 | 96 | 99 | 100 | 89 | 92 | 78 | 76 |
| <i>Serratia marcescens</i> | 133 | R ¹ | R ¹ | 97 | R ¹ | 96 | 96 | 99 | 100 | 96 | 91 | 95 | 99 |
| <i>Acinetobacter baumannii</i> | 79 | R ¹ | 54 | 43 | R ¹ | 46 | 24 | 62 | 60 | 53 | 54 | 54 | 56 |
| <i>Pseudomonas aeruginosa</i> | 530 | R ¹ | R ¹ | 77 | R ¹ | 81 | R ¹ | 88 | 96 | 88 | 90 | 75 | R ¹ |
| <i>Stenotrophomonas maltophilia</i> | 71 | R ¹ | R ¹ | R ¹ | R ¹ | 31 | R ¹ | R ¹ | R ¹ | R ¹ | R ¹ | — | 99 |

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Calculated from fewer than the standard recommendation of 30 isolates.

Table 7. Five Most Common Gram-negative Bacteria – Excludes Urine Isolates, Percent Susceptible

| Organism | Source | No. Isolates | Penicillins | | | Cephalosporins | | | Carbapenem | Aminoglycosides | | | Fluoroquinolone | Other |
|-------------------------------|--------|-----------------|----------------|----------------------|-------------------------|----------------|-------------|----------------|------------|-----------------|------------|------------|-----------------|---------------------------------|
| | | | Ampicillin | Ampicillin-sulbactam | Piperacillin-tazobactam | Cefazolin | Ceftazidime | Ceftriaxone | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Trimethoprim – sulfamethoxazole |
| <i>Enterobacter cloacae</i> | OP | 43 | R ¹ | R ¹ | 88 | R ¹ | 88 | 88 | 100 | 100 | 98 | 98 | 100 | 91 |
| | IP | 49 | R ¹ | R ¹ | 78 | R ¹ | 71 | 74 | 98 | 98 | 92 | 90 | 96 | 92 |
| | ICU | 63 | R ¹ | R ¹ | 68 | R ¹ | 63 | 64 | 99 | 100 | 97 | 97 | 98 | 92 |
| <i>Escherichia coli</i> | OP | 133 | 48 | 60 | 97 | 84 | 87 | 87 | 100 | 100 | 86 | 84 | 70 | 65 |
| | IP | 131 | 26 | 34 | 86 | 68 | 76 | 76 | 100 | 99 | 82 | 79 | 51 | 47 |
| | ICU | 117 | 32 | 38 | 74 | 62 | 75 | 76 | 100 | 97 | 80 | 77 | 63 | 56 |
| <i>Klebsiella pneumoniae</i> | OP | 52 | R ¹ | 76 | 90 | 88 | 90 | 90 | 96 | 94 | 94 | 90 | 88 | 84 |
| | IP | 87 | R ¹ | 61 | 76 | 77 | 82 | 82 | 98 | 92 | 89 | 81 | 77 | 72 |
| | ICU | 108 | R ¹ | 67 | 85 | 80 | 82 | 82 | 96 | 93 | 83 | 80 | 82 | 82 |
| <i>Proteus mirabilis</i> | OP | 36 | 89 | 97 | 100 | 94 | 100 | 100 | 100 | 100 | 100 | 100 | 92 | 89 |
| | IP | 13 ² | 62 | 89 | 100 | 92 | 92 | 92 | 100 | 100 | 69 | 75 | 54 | 62 |
| | ICU | 16 ² | 81 | 82 | 100 | 88 | 88 | 88 | 100 | 100 | 89 | 94 | 81 | 69 |
| <i>Pseudomonas aeruginosa</i> | OP | 240 | R ¹ | R ¹ | 83 | R ¹ | 85 | R ¹ | 94 | 92 | 86 | 91 | 75 | R ¹ |
| | IP | 115 | R ¹ | R ¹ | 68 | R ¹ | 72 | R ¹ | 82 | 98 | 87 | 88 | 64 | R ¹ |
| | ICU | 165 | R ¹ | R ¹ | 66 | R ¹ | 72 | R ¹ | 78 | 98 | 86 | 87 | 73 | R ¹ |

OP, outpatient (excludes EMC); IP, inpatient (excludes ICU); ICU, intensive care unit

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Calculated from fewer than the standard recommendation of 30 isolates

Table 8. Gram-negative Bacteria – Urine Isolates, Percent Susceptible

| Organism | Source | No. Isolates | Penicillin | Cephalosporins | | Aminoglycoside | Fluoroquinolone | Other | |
|--|--------|--------------|----------------|----------------|-------------------------|----------------|-----------------|----------------|---------------------------------|
| | | | Ampicillin | Cefazolin | Cefotaxime ² | Gentamicin | Ciprofloxacin | Nitrofurantoin | Trimethoprim – sulfamethoxazole |
| <i>Enterobacter cloacae</i> | OP | 79 | R ¹ | R ¹ | 77 | 95 | 96 | 51 | 85 |
| | IP | 42 | R ¹ | R ¹ | 79 | 86 | 91 | 37 | 76 |
| <i>Escherichia coli</i> | OP | 3230 | 51 | 89 | 95 | 90 | 79 | 99 | 73 |
| | IP | 463 | 35 | 75 | 85 | 82 | 58 | 98 | 64 |
| <i>Klebsiella pneumoniae</i> | OP | 483 | R ¹ | 91 | 95 | 96 | 94 | 54 | 83 |
| | IP | 121 | R ¹ | 80 | 87 | 93 | 88 | 55 | 74 |
| <i>Proteus mirabilis</i> | OP | 263 | 81 | 96 | 99 | 92 | 86 | R ¹ | 74 |
| | IP | 44 | 75 | 86 | 99 | 93 | 71 | R ¹ | 68 |
| <i>Pseudomonas aeruginosa</i> ³ | OP | 138 | R ¹ | R ¹ | R ¹ | 91 | 78 | R ¹ | R ¹ |
| | IP | 117 | R ¹ | R ¹ | R ¹ | 82 | 67 | R ¹ | R ¹ |

OP, outpatient (includes EMC); IP, inpatient (includes all wards and ICUs)

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance)

² Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*

³ Ceftazidime: OP 83%, IP 75%, Piperacillin-tazobactam: OP 80%, IP 72%

Table 9. *Pseudomonas aeruginosa* – Percent Susceptible to One or Two Antimicrobials

Percent Susceptible to seven drugs and Percent Susceptible to either or both when two drugs are evaluated¹
 (Note: Information provided for two drugs does NOT imply synergism, antagonism or likely activity in vivo)

| | Amikacin (94) ² | Gentamicin (85) | Tobramycin (89) | Ciprofloxacin (70) |
|---------------------------------|-------------------------------|--------------------|--------------------|-----------------------|
| Ceftazidime (76) | 99 ³ | 94 | 95 | 91 |
| Meropenem (83) | 99 | 96 | 96 | 93 |
| Piperacillin-tazobactam (72) | 99 | 93 | 94 | 89 |
| Ciprofloxacin (70) | 98 | 92 | 93 | – |

¹ 732 patients; included the most resistant result for each drug if patient had >1 isolate

² Percent susceptible for individual drug in parenthesis

³ Percent susceptible for either or both drugs (e.g. %S to amikacin and/or ceftazidime)

Table 10. Gram-positive Cocci, Percent Susceptible

| Organism | Source | No. Isolates | Penicillins | | | Amino-glycosides | | | Other | | | | | | | | | |
|--|--------|--------------|-------------|-----------|------------|------------------|--------------------|----------------------|---------------|-------------|------------|-------------|--------------|-----------|---------------------------|----------|-------------------------------|------------|
| | | | Ampicillin | Oxacillin | Penicillin | Gentamicin | Gentamicin synergy | Streptomycin synergy | Ciprofloxacin | Clindamycin | Daptomycin | Doxycycline | Erythromycin | Linezolid | Quinupristin-dalfopristin | Rifampin | Trimethoprim-sulfamethoxazole | Vancomycin |
| <i>Staphylococcus aureus</i> ¹ | All | 1552 | — | 66 | <10 | 96 | — | — | 62 | 73 | 99 | 98 | 49 | 99 | 99 | 98 | 98 | 99 |
| Oxacillin-resistant <i>S. aureus</i> (MRSA) ¹ | OP | 301 | — | 0 | 0 | 97 | — | — | 19 | 69 | 99 | 99 | 11 | 99 | 99 | 99 | 98 | 99 |
| | IP | 98 | — | 0 | 0 | 88 | — | — | 13 | 49 | 99 | 97 | 8 | 99 | 99 | 99 | 96 | 99 |
| | ICU | 91 | — | 0 | 0 | 86 | — | — | 9 | 40 | 99 | 93 | 11 | 99 | 98 | 88 | 90 | 99 |
| Oxacillin-susceptible <i>S. aureus</i> (MSSA) | OP | 750 | — | 100 | <10 | 98 | — | — | 84 | 78 | 99 | 98 | 67 | 99 | 99 | 99 | 99 | 100 |
| | IP | 168 | — | 100 | <10 | 97 | — | — | 86 | 76 | 99 | 98 | 64 | 99 | 99 | 98 | 99 | 100 |
| | ICU | 179 | — | 100 | <10 | 98 | — | — | 91 | 78 | 99 | 99 | 72 | 99 | 99 | 97 | 98 | 100 |
| Coagulase-negative <i>Staphylococcus</i> ^{1,2} | All | 520 | — | 35 | <10 | 66 | — | — | 45 | 54 | 99 | 93 | 29 | 98 | 99 | 96 | 56 | 100 |
| <i>Enterococcus</i> spp. ³ | All | 817 | 66 | — | — | — | 71 | 62 | 40 | — | 99 | 51 | 9 | 99 | 39 | 37 | — | 69 |
| <i>Enterococcus faecalis</i> ⁴ | All | 62 | 99 | — | — | — | 71 | 74 | 63 | — | 99 | 52 | 12 | 99 | — | 51 | — | 95 |
| <i>Enterococcus faecium</i> ⁵ | All | 86 | 7 | — | — | — | 80 | 45 | 0 | — | 99 | 80 | 6 | 98 | 94 | 2 | — | 23 |

OP, outpatient (includes EMC); IP, inpatient (excludes ICU); ICU, intensive care unit

¹ *Staphylococcus* resistant to oxacillin are resistant to cefazolin, cephalixin, ceftriaxone and all other beta-lactams

² *S. saprophyticus* urinary tract infections respond to antibiotic concentrations achieved in urine with agents commonly used to treat acute uncomplicated UTIs

³ Includes isolates identified to genus only (non-sterile sites) and those identified to species (sterile sites)

⁴ Sterile sites; 17% High-level resistance to both gentamicin and streptomycin

⁵ Sterile sites; 5% High-level resistance to both gentamicin and streptomycin

Table 10. Gram-positive Cocci, Percent Susceptible
(cont.)

| Organism | No. Isolates | Penicillins | | Cephalosporins | | Other | | | | | |
|---|--|-------------|-----------------|----------------|-------------|-------------|--------------|--------------|--------------|---------------------------------|------------|
| | | Amoxicillin | Penicillin | Cefotaxime | Ceftriaxone | Clindamycin | Erythromycin | Levofloxacin | Tetracycline | Trimethoprim – sulfamethoxazole | Vancomycin |
| <i>Streptococcus pneumoniae</i> | 75 | 89 | — | — | — | 82 | 72 | 97 | 78 | 74 | 100 |
| Meningitis ¹ | | — | 61 | 85 | 85 | — | — | — | — | — | — |
| Non-meningitis ² | | — | 89 | 88 | 89 | — | — | — | — | — | — |
| Viridans group <i>Streptococcus</i> | 80 | — | 70 ³ | 95 | 96 | — | 46 | — | — | — | 100 |
| beta-hemolytic group <i>Streptococcus</i> spp. | All remain predictably susceptible to penicillin; resistance rates nationwide for Group B streptococci are approximately 30% for erythromycin and 15% for clindamycin. Resistance rates for <i>S. pyogenes</i> can be as high as 25% for erythromycin, 5% for clindamycin and 20% for tetracyclines. | | | | | | | | | | |

¹ % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients with meningitis.

² % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients without meningitis.

³ Resistant (R) includes 24% Intermediate (MIC 0.25-2 µg/ml)—and 6% High-level (MIC >2 µg/m) R.

Table 11. Miscellaneous Gram-negative Bacteria

| Organism | No. Strains | Percent beta-lactamase positive ¹ |
|-------------------------------|---|--|
| <i>Haemophilus influenzae</i> | 117 | 21 |
| <i>Moraxella catarrhalis</i> | 49 | 90 |
| <i>Neisseria gonorrhoeae</i> | Because of the high incidence of penicillin resistance and increasing incidence of fluoroquinolone (e.g. ciprofloxacin) resistance in California, the current therapy recommendation is ceftriaxone. Routine susceptibility testing not performed due to low incidence of ceftriaxone resistance. | |
| <i>Neisseria meningitidis</i> | <i>Neisseria meningitidis</i> remain susceptible to penicillin and ceftriaxone, the drugs of choice for treating meningococcal infections. However, recent reports (MMWR. 2008. 57:173-175) have noted some isolates with resistance to fluoroquinolones, agents often used for prophylaxis. | |

¹ Resistant to ampicillin, amoxicillin, and penicillin

Table 12A. Pediatrics (Patients ≤ 21 y/o) Gram-negative Bacteria – Excludes Urine Isolates, Percent Susceptible

| Organism | No. Isolates | Penicillins | | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoroquin- olone | Other |
|---|--------------|----------------|--------------------------|-----------------------------|----------------|-------------|----------------|-----------------|-----------------|------------|------------|----------------------------|------------------------------------|
| | | Ampicillin | Ampicillin- sulbactam | Piperacillin- tazobactam | Cefazolin | Ceftazidime | Ceftriaxone | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin ² | Trimethoprim – sulfamethoxazole |
| <i>Enterobacter cloacae</i> | 45 | R ¹ | R ¹ | 73 | R ¹ | 61 | 64 | 98 | 100 | 87 | 87 | 96 | 82 |
| <i>Escherichia coli</i> | 74 | 34 | 41 | 93 | 73 | 78 | 78 | 100 | 97 | 84 | 82 | 77 | 61 |
| <i>Klebsiella pneumoniae</i> | 51 | R ¹ | 68 | 94 | 84 | 86 | 86 | 100 | 100 | 90 | 88 | 100 | 92 |
| <i>Acinetobacter baumannii</i> ³ | 18 | R ¹ | 56 | 33 | R ¹ | 44 | 22 | 77 | 61 | 50 | 61 | 56 | 50 |
| <i>Pseudomonas aeruginosa</i> | 119 | R ¹ | R ¹ | 77 | R ¹ | 79 | R ¹ | 87 | 98 | 90 | 92 | 79 | R ¹ |

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and is currently not FDA approved for pediatric use.

³ Calculated from fewer than the standard recommendation of 30 isolates

Table 12B. Pediatrics (Patients ≤ 21 y/o) Gram-negative Bacteria – Urine Isolates, Percent Susceptible

| Organism | No. Isolates | Penicillins | | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoroquin- olone | Other | |
|--|--------------|----------------|--------------------------|-----------------------------|----------------|-------------|-------------------------|-----------------|-----------------|------------|------------|----------------------------|------------------------------------|----------------|
| | | Ampicillin | Ampicillin- sulbactam | Piperacillin- tazobactam | Cefazolin | Ceftazidime | Cefotaxime ² | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin ³ | Trimethoprim – sulfamethoxazole | Nitrofurantoin |
| <i>Enterobacter cloacae</i> ⁴ | 19 | R ¹ | R ¹ | 79 | R ¹ | 53 | 61 | 89 | 100 | 74 | 63 | 100 | 79 | 44 |
| <i>Escherichia coli</i> | 362 | 46 | 52 | 99 | 90 | 94 | 95 | 97 | 99 | 89 | 91 | 90 | 66 | 99 |
| <i>Klebsiella pneumoniae</i> | 50 | R ¹ | 86 | 96 | 88 | 98 | 98 | 100 | 100 | 100 | 100 | 98 | 84 | 70 |
| <i>Pseudomonas aeruginosa</i> | 36 | R ¹ | R ¹ | 83 | R ¹ | 83 | R ¹ | 92 | 100 | 100 | 100 | 94 | R ¹ | R ¹ |

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*

³ Ciprofloxacin is associated with arthropathy and histological changes in weight-bearing joints of juvenile animals and is currently not FDA approved for pediatric use.

⁴ Calculated from fewer than the standard recommendation of 30 isolates

Table 13. Pediatrics (Patients ≤ 21 y/o) Gram-positive Cocci, Percent Susceptible

| Organism | Source | No. Isolates | Penicillins | | | Aminoglycosides | | Other | | | | | | | | | |
|--|--------|-----------------|-------------|-----------|------------|--------------------|----------------------|----------------------------|-------------|------------|-------------|--------------|-----------|---------------------------|----------|-------------------------------|------------|
| | | | Ampicillin | Oxacillin | Penicillin | Gentamicin synergy | Streptomycin synergy | Ciprofloxacin ¹ | Clindamycin | Daptomycin | Doxycycline | Erythromycin | Linezolid | Quinupristin-Dalfopristin | Rifampin | Trimethoprim-sulfamethoxazole | Vancomycin |
| <i>Staphylococcus aureus</i> (All) ² | OP | 235 | - | 73 | <10 | - | - | 71 | 81 | 99 | 99 | 52 | 100 | 100 | 100 | 99 | 100 |
| | IP | 116 | - | 78 | <10 | - | - | 88 | 80 | 99 | 99 | 66 | 100 | 99 | 99 | 99 | 100 |
| Oxacillin-resistant <i>S. aureus</i> (MRSA) ² | OP | 63 | - | 0 | 0 | - | - | 18 | 87 | 99 | 99 | 8 | 100 | 100 | 100 | 100 | 100 |
| | IP | 26 ³ | - | 0 | 0 | - | - | 31 | 62 | 99 | 100 | 19 | 100 | 96 | 100 | 100 | 100 |
| Oxacillin-susceptible <i>S. aureus</i> (MSSA) | OP | 173 | - | 100 | <10 | - | - | 91 | 79 | 99 | 99 | 68 | 100 | 100 | 99 | 99 | 100 |
| | IP | 92 | - | 100 | <10 | - | - | 96 | 85 | 99 | 99 | 79 | 100 | 100 | 99 | 99 | 100 |
| <i>Enterococcus</i> spp. ⁴ | All | 135 | 69 | - | - | 72 | 79 | 53 | - | 99 | 58 | - | 100 | 45 | 39 | - | 75 |
| <i>Enterococcus faecalis</i> ⁵ | All | 25 ³ | 100 | - | - | 80 | 88 | 88 | - | 99 | 52 | - | 100 | - | 44 | - | 100 |
| <i>Enterococcus faecium</i> ⁶ | All | 19 ³ | 21 | - | - | 68 | 68 | 0 | - | 99 | 84 | - | 100 | 100 | 5 | - | 32 |

OP, outpatient (includes EMC); IP, inpatient (includes ICU)

¹ Ciprofloxacin is associated with arthropathy and histological changes in weight bearing joints of juvenile animals and is currently not FDA approved for pediatric use.

² *Staphylococcus* resistant to oxacillin are resistant to cefazolin, cephalixin, ceftriaxone and all other beta-lactams

³ Calculated from fewer than the standard recommendation of 30 isolates.

⁴ Includes isolates identified to genus only (non-sterile sites) and those identified to species (sterile sites).

⁵ Sterile sites; 8% High-level resistance to both gentamicin and streptomycin.

⁶ Sterile sites; 0% High-level resistance to both gentamicin and streptomycin.

Table 13. Pediatrics (Patients ≤ 21 y/o) Gram-positive Cocci, Percent Susceptible (cont.)

| Organism | No. Isolates | Penicillins | | Cephalosporins | | Other | | | |
|---------------------------------|-----------------|-------------|------------|----------------|-------------|-------------|--------------|---------------------------------|------------|
| | | Amoxicillin | Penicillin | Cefotaxime | Ceftriaxone | Clindamycin | Erythromycin | Trimethoprim – sulfamethoxazole | Vancomycin |
| <i>Streptococcus pneumoniae</i> | 25 ¹ | 96 | — | — | — | 92 | 84 | 76 | 100 |
| Meningitis ² | | — | 60 | 92 | 92 | — | — | — | — |
| Non-meningitis ³ | | — | 96 | 96 | 96 | — | — | — | — |

¹ Calculated from fewer than standard recommendation of 30 isolates

² % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients with meningitis.

³ % susceptible for penicillin, cefotaxime and ceftriaxone applies to patients without meningitis.

Table 14. Yeasts, Percent Susceptible, 2009–2010

- When antifungal therapy is necessary, most yeast infections can be treated empirically. Antifungal testing of yeasts may be warranted for the following:
 - 1) oropharyngeal infections due to *Candida* spp. in patients who appear to be failing therapy
 - 2) management of invasive *Candida* spp. infections when utility of an azole agent is uncertain (e.g., *Candida* spp. other than *C. albicans*)
- Yeast isolates from sterile body sites are tested every 7 days; isolates from other sources are tested upon special request.

| Organism | No. Isolates ² | Percent Susceptible/Dose Dependent/Resistant at Breakpoints ¹ (µg/ml) | | | | | | | |
|-----------------------------------|---------------------------|--|----------------|----------------|----------------|--------------|------|-------------|-------|
| | | Flucytosine | | Fluconazole | | Voriconazole | | Caspofungin | |
| | | ≤ 4 S | ≤ 8 S | 16-32 DD | ≥64 R | ≤ 1 S | 2 DD | ≥4 R | ≤ 2 S |
| <i>C. albicans</i> ³ | 134 | 97 | 98 | 0 | 2 | 99 | 0 | 1 | 100 |
| <i>C. glabrata</i> | 98 | 97 | 72 | 0 | 28 | 93 | 0 | 7 | 100 |
| <i>C. parapsilosis</i> | 51 | 100 | 96 | 0 | 4 | 100 | 0 | 0 | 100 |
| <i>C. tropicalis</i> ⁴ | 25 | 92 | 96 | 0 | 4 | 96 | 0 | 4 | 100 |
| <i>C. krusei</i> ⁴ | 18 | 0 | R ⁵ | R ⁵ | R ⁵ | 100 | 0 | 0 | 100 |

¹ S = susceptible. DD = Dose dependent; susceptibility dependent on achieving maximal possible blood level; no dose dependent category for flucytosine and caspofungin. R = Resistant

² Not all isolates were tested against all four antifungal agents.

³ *C. albicans* usually susceptible to fluconazole, but may develop resistance during therapy

⁴ Calculated from fewer than the standard recommendation of 30 isolates

⁵ *C. krusei* are intrinsically resistant to fluconazole

Table 15. Yeasts, Cumulative Percent Susceptible at MIC, 2009–2010

| Fluconazole (µg/ml) | | | | | | | | | |
|------------------------|-----------------|--|-----|-----|-----|------|------|------|-----|
| Organism | No. Isolates | ≤1 | 2.0 | 4.0 | 8.0 | 16.0 | 32.0 | 64.0 | >64 |
| <i>C. albicans</i> | 132 | 95 | 96 | 96 | 98 | 98 | 98 | 98 | 100 |
| <i>C. glabrata</i> | 55 | 2 | 9 | 29 | 72 | 72 | 72 | 79 | 100 |
| <i>C. parapsilosis</i> | 51 | 88 | 94 | 94 | 96 | 96 | 96 | 96 | 100 |
| <i>C. tropicalis</i> | 24 ¹ | 58 | 79 | 96 | 96 | 96 | 96 | 100 | - |
| <i>C. krusei</i> | - | intrinsically resistant to fluconazole | | | | | | | |

| Voriconazole (µg/ml) | | | | | | | | | |
|------------------------|-----------------|-------|------|-----|-----|-----|-----|----|-----|
| Organism | No. Isolates | ≤0.12 | 0.25 | 0.5 | 1.0 | 2.0 | 4.0 | 8 | >8 |
| <i>C. albicans</i> | 133 | 95 | 95 | 97 | 99 | 99 | 99 | 99 | 100 |
| <i>C. glabrata</i> | 88 | 28 | 58 | 84 | 93 | 93 | 98 | 99 | 100 |
| <i>C. parapsilosis</i> | 49 | 100 | - | - | - | - | - | - | - |
| <i>C. tropicalis</i> | 25 ¹ | 84 | 88 | 96 | 96 | 96 | 100 | - | - |
| <i>C. krusei</i> | 18 ¹ | 17 | 45 | 100 | - | - | - | - | - |

| Caspofungin (µg/ml) | | | | | | |
|------------------------|-----------------|-------|-----|-----|-----|------|
| Organism | No. Isolates | ≤0.25 | 0.5 | 1.0 | 2.0 | >2.0 |
| <i>C. albicans</i> | 68 | 89 | 94 | 100 | 100 | - |
| <i>C. glabrata</i> | 56 | 70 | 93 | 98 | 100 | - |
| <i>C. parapsilosis</i> | 32 | 3 | 37 | 94 | 100 | - |
| <i>C. tropicalis</i> | 16 ¹ | 75 | 94 | 100 | - | - |
| <i>C. krusei</i> | 10 ¹ | 0 | 60 | 100 | - | - |

¹ Calculated from fewer than the standard recommendation of 30 isolates

Table 16. Mycobacteria Antimicrobial Susceptibility Testing

1. *Mycobacterium tuberculosis*:

Performed on first isolate per patient; performed on additional isolates recovered after 3 months.

| Primary agents | Secondary agents |
|-----------------------|-------------------------|
| ethambutol | amikacin |
| isoniazid (INH) | capreomycin |
| pyrazinamide | ciprofloxacin |
| rifampin | ethionamide |
| streptomycin | p-aminosalicylic acid |

In 2009, 33 (1.7%) of 1,910 *M. tuberculosis* cases in the State of California were MDR TB (resistant to at least INH and rifampin): 9.9% resistant to INH, 1.9% resistant to rifampin.

2. *Mycobacterium avium* complex:

Performed on first isolate per patient.

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. (*M. abscesses*, *M. chelonae*, *M. fortuitum* and *M. mucogenicum*):

Performed on one isolate per patient, by request.

| Agents routinely reported | Agents conditionally reported |
|----------------------------------|--------------------------------------|
| amikacin | imipenem |
| cefoxitin | linezolid |
| ciprofloxacin | tobramycin |
| clarithromycin | |
| doxycycline | |
| sulfamethoxazole | |

4. *Mycobacteria* other than *tuberculosis* (MOTT):

Performed on one isolate per patient, by request.

Table 17. Mycobacteria, One Isolate per Patient per Source, 2010

| | # Patients By Source* | | |
|-----------------------------------|-----------------------|-------|--------------------------------|
| | respiratory | blood | abscess/wound/ tissue/other |
| Mycobacterium tuberculosis | 4 | | 5 |
| <i>M. bovis</i> | | | 1 |
| <i>M. avium</i> complex | 55 | 3 | 2 |
| <i>M. goodii</i> | 40 | | 1 |
| <i>M. kansasii</i> | 2 | | 1 |
| <i>M. xenopi</i> | 1 | | 1 |
| <i>M. gastri</i> | 1 | | |
| Rapid growers | | | |
| <i>M. fortuitum</i> | 3 | | |
| <i>M. mucogenicum</i> | 1 | | 1 |
| Total mycobacteria | 107 | 3 | 12 |

* Some patient have isolates in more than one source

Table 18. Ronald Reagan UCLA Medical Center Emerging Resistance Concerns (Percent Resistant)

When specific antimicrobial resistance (R) is detected, an Infectious Disease consult is strongly suggested. The consult can help optimize therapy and reduce nosocomial transmission of resistant organisms.

| Organism | Resistant to: | UCLA Percent Resistant: | Therapeutic Options | Comments |
|--|---|---|---|---|
| <i>Staphylococcus aureus</i> | oxacillin (MRSA) | Inpatients (n=536) 35% Outpatients (n=1051) 29% | vancomycin | Oxacillin-resistant <i>S. aureus</i> are clinically resistant to all β -lactams including β -lactam / β -lactamase inhibitor combinations and carbapenems. ^{1,2} Fluoroquinolones are usually inactive also. |
| <i>Streptococcus pneumoniae</i> (non-meningitis) | Penicillin (MIC > 2 μ g/ml) | All isolates (n = 75) 11% | ceftriaxone or cefotaxime or vancomycin | If susceptible (MIC \leq 2.0 μ g/ml), high dose penicillin has been shown to be effective for infections other than meningitis. ^{1, 2} |
| <i>Streptococcus pneumoniae</i> (non-meningitis) | cefotaxime, ceftriaxone (penicillin resistant always) | All isolates (n = 75) low level R 0% high level R 12% | vancomycin levofloxacin | If low-level resistance (MIC=2.0 μ g/ml), high dose cefotaxime or ceftriaxone may be effective for infections other than meningitis. ^{1, 2} |

Table 18. Ronald Reagan UCLA Medical Center Emerging Resistance Concerns (cont.) (Percent Resistant)

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

| Organism | Resistant to: | UCLA Percent Resistant: | Therapeutic Options | Comments |
|--|---|---|---|--|
| Viridans group <i>Streptococcus</i> | penicillin | Blood isolates (n = 41) low level R 29% high level R 2% | penicillin + aminoglycoside or vancomycin | Level of penicillin resistance is particularly useful in guiding therapy for endocarditis. ⁵ For low level resistance, MICs are 0.25–2.0 µg/ml; for high level, MICs are >2.0 µg/ml. |
| <i>Enterococcus</i> spp. | vancomycin (VRE) | Blood isolates <i>E. faecium</i> (n = 84) 77% <i>E. faecalis</i> (n = 56) 4% | Check in vitro susceptibility results and contact ID. | Vancomycin-resistant <i>Enterococcus</i> (VRE) are often resistant to many potentially useful agents. Therapeutic management must be determined on a case-by-case basis. |
| | gentamicin synergy screen (GENT) streptomycin synergy screen (STR) | Blood isolates <i>E. faecium</i> (n = 84) GENT 20% STR 54% <i>E. faecalis</i> (n = 56) GENT 29% STR 29% | Check in vitro susceptibility results and contact ID. | Both aminoglycoside and cell wall active agent (ampicillin, penicillin, or vancomycin) must be susceptible for synergistic interaction. |

Table 18. Ronald Reagan UCLA Medical Center Emerging Resistance Concerns (cont.) (Percent Resistant)

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

| Organism | Resistant to: | UCLA Percent Resistant: | Therapeutic Options | Comments |
|--|--|--|--|---|
| <i>Klebsiella</i> spp. <i>E. coli</i> | ceftazidime or other 3rd generation cephalosporin | Blood isolates: <i>Klebsiella</i> spp. (n=80) 15% <i>E. coli</i> (n=112) 13% | ertopenem aminoglycoside ciprofloxacin | In vitro resistance to 3rd generation cephalosporins suggests the strain is producing extended-spectrum β -lactamases (ESBL), which confers resistance to all penicillins, cephalosporins and aztreonam. |
| <i>K. pneumoniae</i> and other <i>Enterobacteriaceae</i> | ertapenem | All isolates: <1% | Check in vitro susceptibility results and contact ID. | Decreased susceptibility to carbapenems is increasing primarily among ICU patients' isolates. These isolates may be resistant to all available antimicrobial agents. |
| <i>Acinetobacter</i> spp. <i>Citrobacter freundii</i> <i>Enterobacter</i> spp. <i>Providencia / Proteus</i> (except <i>P. mirabilis</i>) <i>Serratia marcescens</i> | 3rd generation cephalosporins (e.g. ceftriaxone) | See comments | aminoglycoside ciprofloxacin ertapenem meropenem trimeth-sulfa | Organisms listed typically produce inducible β -lactamases. Isolates that appear susceptible to 3rd generation cephalosporins may develop resistance during therapy. ^{1,2} Judicious use of 3rd generation cephalosporins is needed to curtail the increase in cephalosporin-resistant <i>Enterobacteriaceae</i> . (i. e. ceftazidime should be reserved for highly suspected or documented pseudomonal infections). |
| <i>Pseudomonas aeruginosa</i> | cefepime and/or piperacillin-tazobactam | All isolates: 21% | Check in vitro susceptibility results and contact ID. | Combination therapy with a beta-lactam plus ciprofloxacin or an aminoglycoside (with susceptible results in vitro) should be considered. Therapeutic management must be determined on a case by case basis. |
| <i>Acinetobacter baumannii</i> | amikacin, ampicillin-sulbactam, cefepime, ceftazidime, ciprofloxacin, meropenem, pip-tazo, trimeth-sulfa | All isolates: 21% | Check in vitro susceptibility results and contact ID. | Therapeutic management must be determined on a case by case basis. |

Table 18. Ronald Reagan UCLA Medical Center Emerging Resistance Concerns (cont.) (Percent Resistant)

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

| Organism | Resistant to: | Therapeutic Options | Comments |
|---|---------------|---|---|
| <i>Candida krusei</i> <i>Candida (Torulopsis) glabrata</i> | fluconazole | amphotericin voriconazole caspofungin | Typically resistant to fluconazole. ^{4,5} |
| <i>Candida albicans</i> | fluconazole | amphotericin | Typically susceptible to fluconazole but resistance can develop during therapy. Amphotericin is the drug of choice for systemic infections in patients without baseline renal dysfunction. ^{4,5} |
| Cytomegalovirus ⁶ | ganciclovir | foscarnet | |
| Herpes simplex | acyclovir | foscarnet | Cross-resistance to ganciclovir is typically seen with acyclovir-resistant HSV isolates. ⁷ |
| <i>Clostridium difficile</i> ^{8,9} | metronidazole | vancomycin | Reoccurrences common, retreatment with vancomycin recommended |

For additional resistance data, see tables

¹ Treatment Guidelines from the Med. Letter-Choice of Antibacterial Drugs. 2007. **5**:33-50

² The Sanford Guide. 2011

³ Circulation. 2005. **23**:e394

⁴ Clin. Infect. Dis. 2006. **42**:244-251

⁵ Treatment Guidelines from the Med. Letter-Antifungal Drugs. 2009. **7**:1-10

⁶ Antiviral Research. 2006. **71**:154-163

⁷ Int. J of Derm. 2007. **46**: 1263-1266

⁸ J of Antimicrobial Chemo. 2008. **62**: 1046-1052

⁹ Current Infect. Dis. Reports. 2009. **11**: 3-6

Table 19. UCLA Resistance Trends, 1990–2010

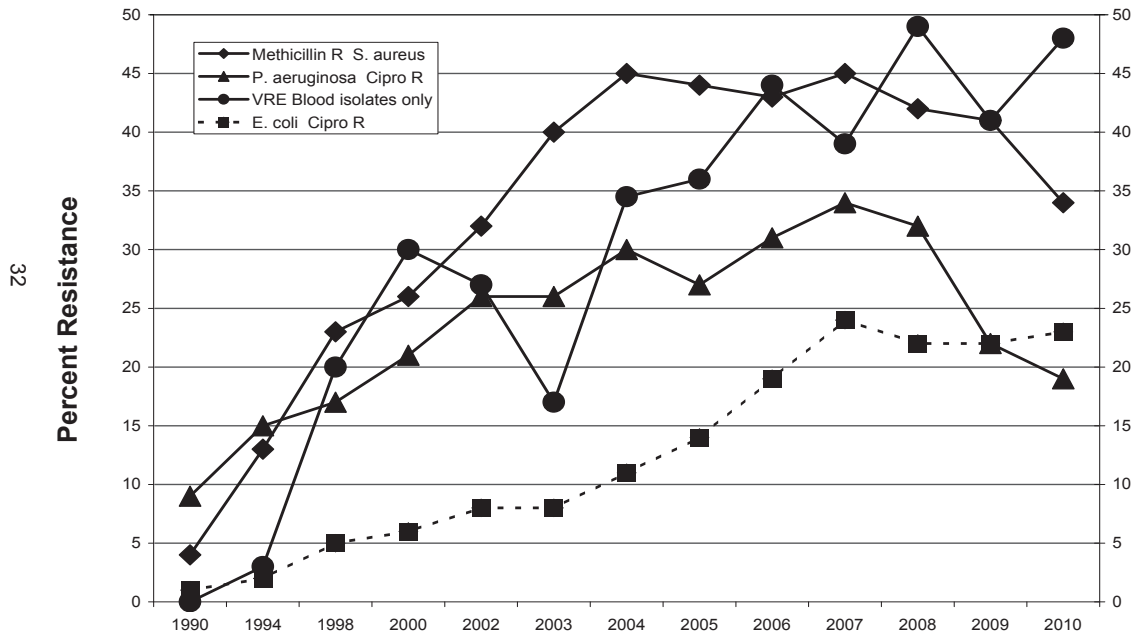
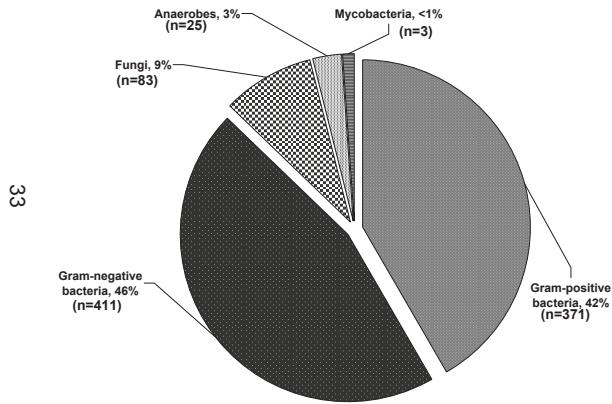


Table 20. Blood, One Isolate per Patient, 2010



| Organism | n | % of Total Blood Isolates |
|--|-----|---------------------------|
| 1 <i>Enterococcus</i> spp., 46% VRE | 147 | 16 |
| 2 <i>Escherichia coli</i> | 112 | 12 |
| 3 <i>Staphylococcus aureus</i> , 36% MRSA | 99 | 11 |
| 4 <i>Klebsiella</i> spp. | 80 | 9 |
| 5 Viridans group <i>Streptococcus</i> | 62 | 7 |
| 6 Other <i>Enterobacteriaceae</i> spp. | 46 | 5 |
| 7 <i>Pseudomonas aeruginosa</i> | 32 | 4 |
| 8 <i>Candida albicans</i> | 29 | 3 |
| 9 <i>Enterobacter cloacae</i> | 27 | 3 |
| 10 <i>Candida (Torulopsis) glabrata</i> | 24 | 3 |
| Other isolates (includes 7 <i>S. lugdunensis</i>) | 235 | 27 |

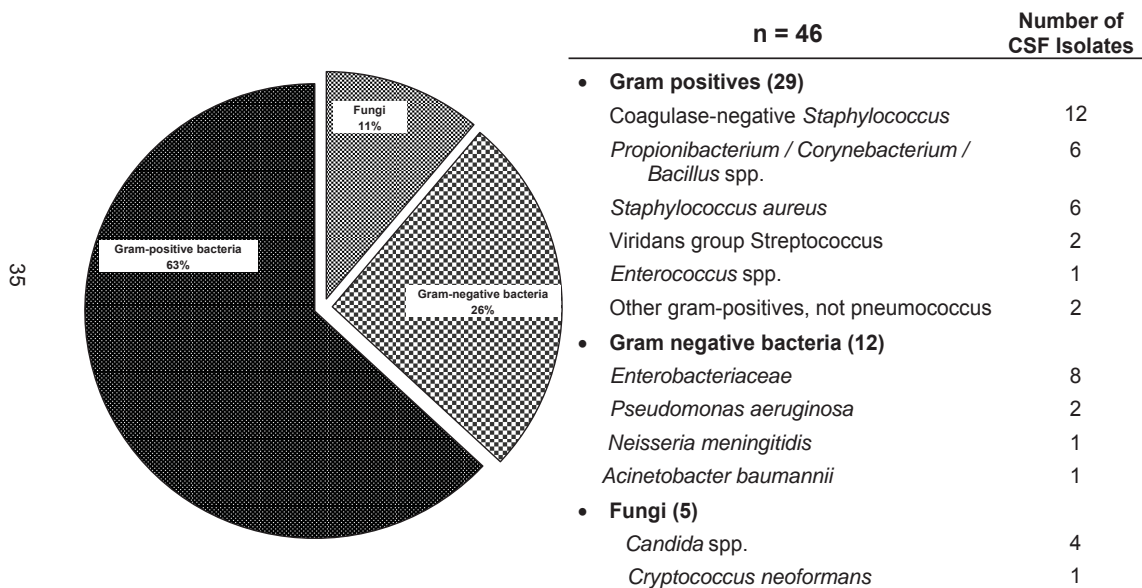
Total blood isolates 893*

*Excludes coagulase-negative staphylococcus (n=542), *Corynebacterium* spp. (n=69), *Bacillus* spp. (n=21), *Micrococcus* spp. (n=3), *Propionibacterium* spp. (n=7)

Table 20. Blood, One Isolate per Patient, 2010
(cont.)

| By Organism Group | | | | |
|---|------------|-----------------------------|---|------------------------------------|
| Gram-positive Bacterial Isolates | | | Fungal Isolates | |
| | n | % of Gram-positive Isolates | | % of Fungal Isolates |
| <i>Enterococcus</i> spp., 46% VRE | 147 | 40 | <i>Candida albicans</i> | 29 |
| <i>Staphylococcus aureus</i> , 36% MRSA | 99 | 27 | <i>Candida (Torulopsis) glabrata</i> | 24 |
| Viridans group <i>Streptococcus</i> | 62 | 17 | <i>Candida parapsilosis</i> | 9 |
| Beta-hemolytic <i>Streptococcus</i> | 19 | 5 | <i>Candida tropicalis</i> | 8 |
| <i>Streptococcus pneumoniae</i> | 12 | 3 | <i>Candida lusitanae</i> | 4 |
| Other gram-positives | 32 | 8 | <i>Candida krusei</i> | 3 |
| Total gram-positive bacterial isolates | 371 | | Other fungi (mold) | 6 |
| (excludes coagulase –negative staphylococcus, <i>Corynebacterium</i> spp., <i>Bacillus</i> spp., <i>Micrococcus</i> spp.) | | | <i>Malassezia furfur</i> (6) | 7 |
| | | | Total fungal isolates | 83 |
| Gram-negative Bacterial Isolates | | | Anaerobic Bacterial Isolates | |
| | n | % of Gram-negative Isolates | | % of Anaerobic Bacterial Isolates |
| <i>Escherichia coli</i> | 112 | 27 | <i>Prevotella</i> spp. | 6 |
| <i>Klebsiella</i> spp. | 80 | 20 | <i>Bacteroides</i> spp. | 5 |
| <i>Enterobacter cloacae</i> | 27 | 7 | <i>Lactobacillus</i> spp. | 4 |
| Other <i>Enterobacteriaceae</i> spp. | 46 | 11 | <i>Clostridium</i> spp. | 4 |
| <i>Pseudomonas aeruginosa</i> | 32 | 8 | Other anaerobes | 6 |
| <i>Acinetobacter</i> spp. | 14 | 3 | Total anaerobic bacterial isolates | 25 |
| <i>Stenotrophomonas maltophilia</i> | 13 | 3 | | |
| Other gram-negatives | 87 | 21 | | |
| Total gram-negative bacterial isolates | 411 | | Mycobacterial Isolates | % of Mycobacterial Isolates |
| | | | <i>Mycobacterium avium</i> complex | 3 |
| | | | | 100 |

Table 21. CSF, One Isolate per Patient, 2010



n = 46 **Number of CSF Isolates**

- **Gram positives (29)**
 - Coagulase-negative *Staphylococcus* 12
 - Propionibacterium* / *Corynebacterium* / *Bacillus* spp. 6
 - Staphylococcus aureus* 6
 - Viridans group *Streptococcus* 2
 - Enterococcus* spp. 1
 - Other gram-positives, not pneumococcus 2
- **Gram negative bacteria (12)**
 - Enterobacteriaceae* 8
 - Pseudomonas aeruginosa* 2
 - Neisseria meningitidis* 1
 - Acinetobacter baumannii* 1
- **Fungi (5)**
 - Candida* spp. 4
 - Cryptococcus neoformans* 1

Table 22. Anaerobic Bacteria, Percent Susceptible

Gram negative anaerobic bacteria – antimicrobials listed in alphabetical order within percent susceptible categories¹

| Percent Susceptible | <i>Bacteroides fragilis</i> | Other <i>B. fragilis</i> Group ² | <i>Fusobacterium nucleatum</i> and <i>F. necrophorum</i> | <i>Prevotella</i> spp. |
|---------------------|--|---|---|--|
| >95 | ertapenem, meropenem, metronidazole, piperacillin-tazobactam | ertapenem, meropenem, metronidazole | ampicillin, ampicillin-sulbactam, cefoxitin, clindamycin, ertapenem, meropenem, metronidazole, moxifloxacin, penicillin piperacillin-tazobactam | ampicillin-sulbactam, cefoxitin, ertapenem, meropenem, metronidazole, piperacillina-tazobactam |
| 85–95 | ampicillin-sulbactam, cefoxitin | piperacillin-tazobactam | | |
| 70–84 | | | | |
| 50–69 | clindamycin, moxifloxacin | ampicillin-sulbactam | | clindamycin, moxifloxacin |
| <50 | | cefoxitin, clindamycin, moxifloxacin | | ampicillin, penicillin |

¹ Adapted from West Los Angeles VA Medical Center and CLSI tables.

² *B. fragilis* Group includes ssp. *distasonis*, *uniformis*, *vulgatus*, *ovatus*, and *thetaitaomicron*.

Table 22. Anaerobic Bacteria, Percent Susceptible (cont.)

Gram positive anaerobic bacteria – antimicrobials listed in alphabetical order within percent susceptible categories.

| Percent Susceptible | <i>Clostridium difficile</i> | <i>Clostridium perfringens</i> | Other <i>Clostridium</i> spp. (other than <i>C. difficile</i>) | <i>Propionibacterium acnes</i> | Anaerobic gram positive cocci |
|---------------------|---|--|---|--------------------------------|---|
| >95 | ampicillin-sulbactam, meropenem, metronidazole ¹ , piperacillin-tazobactam | ampicillin, ampicillin-sulbactam, ceftiofur, clindamycin, ertapenem, meropenem, metronidazole, moxifloxacin, penicillin, piperacillin-tazobactam | ampicillin-sulbactam, ertapenem, metronidazole, piperacillin-tazobactam | clindamycin, moxifloxacin | ampicillin, ampicillin-sulbactam, ceftiofur, ertapenem, meropenem, metronidazole, penicillin, piperacillin-tazobactam |
| 85–95 | | | | penicillin | |
| 70–84 | | | ampicillin, moxifloxacin, penicillin | | clindamycin, moxifloxacin |
| 50–69 | | | clindamycin | metronidazole | |
| <50 | ampicillin, clindamycin, ceftiofur | | ceftiofur | | |

¹ Oral therapy. In cases of extraintestinal infection, Infectious Disease Consultation strongly recommended.

Table 23. Santa Monica UCLA Hospital: Gram-negative Bacteria – Urine Isolates, Percent Susceptible

| Organism | Source | No. Isolates | Penicillins | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoro- quinolone | Other | |
|-------------------------------|--------|--------------|----------------|-----------------------------|----------------|-------------------------|-------------|-----------------|-----------------|------------|------------|----------------------|----------------|------------------------------------|
| | | | Ampicillin | Piperacillin- tazobactam | Cefazolin | Cefotaxime ² | Ceftazidime | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Nitrofurantoin | Trimethoprim – sulfamethoxazole |
| <i>Escherichia coli</i> | OP | 623 | 45 | 99 | 86 | 93 | 92 | 100 | 99 | 87 | 87 | 79 | 98 | 70 |
| | IP | 210 | 42 | 98 | 81 | 87 | 87 | 100 | 99 | 82 | 83 | 61 | 99 | 72 |
| <i>Klebsiella pneumoniae</i> | OP | 102 | R ¹ | 87 | 75 | 80 | 78 | 100 | 92 | 82 | 77 | 78 | 55 | 72 |
| | IP | 66 | R ¹ | 86 | 71 | 79 | 74 | 98 | 92 | 91 | 77 | 76 | 44 | 74 |
| <i>Proteus mirabilis</i> | OP | 73 | 70 | 99 | 89 | 96 | 96 | 100 | 100 | 93 | 78 | 56 | R ¹ | 59 |
| | IP | 34 | 56 | 99 | 88 | 94 | 91 | 100 | 100 | 85 | 79 | 56 | R ¹ | 50 |
| <i>Pseudomonas aeruginosa</i> | OP | 41 | R ¹ | 59 | R ¹ | R ¹ | 66 | 68 | 95 | 73 | 76 | 49 | R ¹ | R ¹ |
| | IP | 54 | R ¹ | 67 | R ¹ | R ¹ | 72 | 70 | 96 | 78 | 83 | 52 | R ¹ | R ¹ |

OP, outpatient (includes EMC); IP, inpatient (includes ICU)

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*

Table 24. Santa Monica UCLA Hospital: Gram-negative Bacteria – Non - Urine Isolates, Percent Susceptible

Outpatients

| Organism | No. Isolates | Penicillins | | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoro- quinolone | Other |
|-------------------------------|--------------|----------------|--------------------------------------|-----------------------------|----------------|-------------|--------------------------|-----------------|-----------------|------------|------------|----------------------|------------------------------------|
| | | Ampicillin | Ampicillin- subactam ¹ | Piperacillin- tazobactam | Cefazolin | Ceftazidime | Ceftriaxone ² | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Trimethoprim – sulfamethoxazole |
| <i>Escherichia coli</i> | 73 | 33 | 39 | 93 | 81 | 92 | 92 | 100 | 99 | 85 | 80 | 69 | 62 |
| <i>Pseudomonas aeruginosa</i> | 57 | R ¹ | R ¹ | 68 | R ¹ | 68 | R ¹ | 72 | 98 | 82 | 90 | 60 | R ¹ |

Inpatients

| Organism | No. Isolates | Penicillins | | | Cephalosporins | | | Carba- penem | Aminoglycosides | | | Fluoro- quinolone | Other |
|--|--------------|----------------|--------------------------|-----------------------------|----------------|-------------|--------------------------|-----------------|-----------------|------------|------------|----------------------|------------------------------------|
| | | Ampicillin | Ampicillin- sulbactam | Piperacillin- tazobactam | Cefazolin | Ceftazidime | Ceftriaxone ² | Meropenem | Amikacin | Gentamicin | Tobramycin | Ciprofloxacin | Trimethoprim – sulfamethoxazole |
| <i>Enterobacter cloacae</i> ³ | 29 | R ¹ | R ¹ | 72 | R ¹ | 72 | 69 | 100 | 97 | 90 | 93 | 97 | 90 |
| <i>Escherichia coli</i> | 120 | 33 | 38 | 92 | 72 | 82 | 82 | 98 | 99 | 82 | 80 | 60 | 49 |
| <i>Klebsiella pneumoniae</i> | 77 | R ¹ | 50 | 68 | 60 | 67 | 66 | 92 | 84 | 87 | 69 | 68 | 77 |
| <i>Proteus mirabilis</i> | 49 | 59 | 72 | 100 | 67 | 71 | 71 | 100 | 100 | 61 | 80 | 35 | 49 |
| <i>Serratia marcescens</i> | 34 | R ¹ | R ¹ | 91 | R ¹ | 88 | 88 | 100 | 97 | 91 | 79 | 82 | 94 |
| <i>Pseudomonas aeruginosa</i> | 144 | R ¹ | R ¹ | 61 | R ¹ | 63 | R ¹ | 72 | 96 | 77 | 82 | 50 | R ¹ |

¹ R = intrinsic resistance (inherent or innate antimicrobial resistance).

² Cefotaxime and ceftriaxone have comparable activity against *Enterobacteriaceae*

³ Calculated from fewer than the standard recommendation of 30 isolates

Table 25. Santa Monica UCLA Hospital: Gram-positive Bacteria (Inpatient), Percent Susceptible

| Organism | No. Isolates | Penicillins | | | Cephalosporin | Fluoroquinolones | | Tetracyclines | | Other | | | | | | | | | |
|---|----------------|----------------|-----------|------------|---------------|------------------|--------------|---------------|--------------|-------------|------------|--------------|----------------|-----------|---------------------------|----------|-------------------------------|------------|--|
| | | Ampicillin | Oxacillin | Penicillin | Ceftriaxone | Ciprofloxacin | Levofloxacin | Doxycycline | Tetracycline | Clindamycin | Daptomycin | Erythromycin | Nitrofurantoin | Linezolid | Quinupristin-dalfopristin | Rifampin | Trimethoprim-sulfamethoxazole | Vancomycin | |
| <i>Staphylococcus aureus</i> (All) | 325 | — | 43 | <10 | — | 32 | — | 98 | — | 59 | 99 | 32 | — | 99 | 99 | 98 | 97 | 100 | |
| oxacillin-resistant (MRSA) ¹ | 187 | — | — | — | — | 5 | — | 97 | — | 44 | 99 | 5 | — | 99 | 99 | 97 | 96 | 100 | |
| oxacillin-susceptible (MSSA) | 141 | — | 100 | <10 | — | 69 | — | 99 | — | 78 | 99 | 66 | — | 99 | 99 | 99 | 98 | 100 | |
| <i>Staphylococcus coagulase negative</i> ² | 75 | — | 20 | <10 | — | 20 | — | 88 | — | 49 | 99 | 32 | — | 96 | 98 | 97 | 57 | 100 | |
| <i>Enterococcus</i> spp. (all) ^{3,4} | 188 | 68 | — | — | — | — | — | 49 | — | — | 99 | — | — | 99 | 34 ⁵ | — | — | 67 | |
| <i>Enterococcus</i> spp. (urine) | 100 | 74 | — | — | — | 36 | — | — | — | — | — | — | 81 | — | — | — | — | 68 | |
| <i>Streptococcus pneumoniae</i> (all) | 5 ⁶ | — ⁷ | — | — | — | — | 100 | — | 60 | — | — | 40 | — | — | — | — | 60 | 100 | |
| meningitis | | | | 60 | 80 | | | | | | | | | | | | | | |
| non-meningitis | | | | 80 | 80 | | | | | | | | | | | | | | |
| Viridans group <i>Streptococcus</i> (blood) ⁸ | 9 ⁶ | — | — | 78 | 89 | — | — | — | — | — | — | — | — | — | — | — | — | 100 | |

40

¹ *Staphylococcus* resistant to oxacillin are resistant to cefazolin, cephalixin, ceftriaxone and all other beta-lactams

² *S. saprophyticus* urinary tract infections respond to antibiotic concentrations achieved in urine with agents commonly used to treat acute uncomplicated UTIs

³ Includes 25 *E. faecalis*, 14 *E. faecium*, and 148 isolates not identified to species level

⁴ Gentamicin synergy 66% susceptible, streptomycin synergy 63% susceptible

⁵ Only *E. faecium* are susceptible

⁶ Calculated from fewer than the standard recommendation of 30 isolates

⁷ Amoxicillin 80% susceptible

⁸ Note: 2010 RRH data includes 11% Intermediate and 11% high-level resistance to penicillin.

Table 26. Santa Monica UCLA Hospital: Emerging Resistance Concerns

| Incidence of Resistant Organisms, 2010 | | | | Beta-lactamase Results for Respiratory Pathogens | | |
|--|--------------|--------------------|-------------|--|-----------------|--|
| Organism | No. Isolates | Resistant to: | % Resistant | Organism | No. Isolates | % beta-lactamase Positive ¹ |
| <i>Staphylococcus aureus</i> | | Methicillin (MRSA) | | <i>Haemophilus influenzae</i> | 26 ² | 27 |
| • Outpatient | 312 | | 57 | | | |
| • Inpatient | 325 | | 43 | <i>Moraxella catarrhalis</i> | 11 ² | 100 |
| <i>Enterococcus</i> spp. (blood isolates only) | 53 | Vancomycin (VRE) | 42 | | | |

¹ Resistant to ampicillin, amoxicillin, penicillin

² Calculated from fewer than the standard recommendation of 30 isolates

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