

## Anti-infective Agents on Formulary

| IV PENICILLINS                         |                    | Cost/day | ORAL PENICILLINS                 |              | Cost/day |
|--|--------------------|----------|----------------------------------|--------------|----------|
| Penicillin G                           | 2 million unit q4h | \$14.20  | Penicillin VK                    | 500mg QID    | \$1.30   |
| Ampicillin                             | 1gm q6h            | \$6.50   | Ampicillin                       | 500mg QID    | \$0.45   |
| Nafcillin                              | 2gm q4h            | \$67.40  | Amoxicillin                      | 500mg TID    | \$0.20   |
| Unasyn                                 | 1.5gm q6h          | \$5.10   | Dicloxacillin                    | 500mg QID    | \$2.30   |
|  | 3gm q6h            | \$9.90   | Augmentin                        | 500mgTID     | \$2.45   |
| Zosyn                                  | 2.25gm q8h         | \$17.00  |                                  | 875mg BID    | \$2.00   |
|  | 3.375gm q8h        | \$22.10  | <b>ORAL CEPHALOSPORINS</b>       |              |          |
|  | 4.5gm q8h          | \$27.80  | Cephalexin                       | 500mg QID    | \$0.50   |
| <b>IV CEPHALOSPORINS</b>               |                    |          | Cefuroxime                       | 250mg BID    | \$3.00   |
| Cefazolin                              | 1gm q8h            | \$3.10   |                                  | 500mg BID    | \$5.90   |
|  | 2gm q8h            | \$19.70  | Cefaclor                         | 250mg TID    | \$2.30   |
| Cefuroxime                             | 750 mg q8h         | \$6.40   |                                  | 500mg TID    | \$4.60   |
| Cefoxitin                              | 1gm q8h            | \$28.80  | <b>ORAL QUINOLONES</b>           |              |          |
|  | 2gm q8h            | \$52.95  | Levofloxacin                     | 250mg daily  | \$0.25   |
| Ceftriaxone                            | 1gm q24h           | \$1.10   |                                  | 500mg daily  | \$0.25   |
|  | 2gm q12h           | \$4.25   |                                  | 750mg daily  | \$0.35   |
| Ceftazidime                            | 1gm q8h            | \$9.25   | Ciprofloxacin                    | 250mg BID    | \$0.30   |
|  | 2gm q8h            | \$14.80  |                                  | 500mg BID    | \$0.30   |
| Cefotaxime                             | 1gm q8h            | \$3.65   | <b>ORAL ANTIFUNGALS</b>          |              |          |
| Cefepime                               | 1gm q8h            | \$10.70  | Fluconazole                      | 100mg daily  | \$1.40   |
|  | 2gm q8h            | \$17.10  |                                  | 200mg daily  | \$2.10   |
| Ceftaroline                            | 600mg q12h         | \$215.00 | Itraconazole                     | 200mg BID    | \$24.45  |
|  |                    |          | Ketoconazole                     | 200mg daily  | \$1.30   |
| <b>CARBAPENEMS</b>                     |                    |          |                                  |              |          |
| Imipenem                               | 250mg q6h          | \$15.80  | <b>ORAL MISC. ANTIMICROBIALS</b> |              |          |
|  | 500mg q6h          | \$29.80  | Acyclovir                        | 200mg 5x/d   | \$0.20   |
| Ertapenem                              | 1gm q24h           | \$77.40  | Azithromycin                     | 250mg daily  | \$1.40   |
| <b>IV QUINOLONES</b>                   |                    |          | Clindamycin                      | 300mg QID    | \$1.90   |
| Levofloxacin                           | 250mg q24h         | \$3.10   | Doxycycline                      | 100mg BID    | \$4.70   |
|  | 500mg q24h         | \$4.50   | Linezolid                        | 600mg BID    | \$264.20 |
|  | 750mg q24h         | \$5.00   | Rifaximin                        | 200mg TID    | \$41.70  |
| Ciprofloxacin                          | 200mg q12h         | \$3.70   | Vancomycin                       | 125mg QID    | \$22.95  |
|  | 400mg q12h         | \$4.05   |                                  | 250mg QID    | \$45.85  |
| <b>IV ANTIFUNGALS</b>                  |                    |          | Metronidazole                    | 500mg q8h    | \$3.60   |
| Amphotericin-B                         | 50mg q24h          | \$12.55  | SMZ/TMP                          | DS BID       | \$0.30   |
| Ambisome                               | 300mg q24h         | \$328.50 | Nitrofurantoin                   | 100mg BID    | \$3.80   |
| Fluconazole                            | 200mg q24h         | \$3.40   | Acyclovir                        | 400mg q8h    | \$10.60  |
|  | 400mg q24h         | \$5.45   | Azithromycin                     | 500mg q24h   | \$3.50   |
| Micafungin                             | 100mg q24h         | \$69.90  | Aztreonam                        | 1gm q8h      | \$61.00  |
| <b>IV MISCELLANEOUS ANTIMICROBIALS</b> |                    |          | Clindamycin                      | 600mg q8h    | \$18.15  |
|  |                    |          | Daptomycin                       | 6 mg/kg q24h | \$379.20 |
|  |                    |          | Doxycycline                      | 100mg q12h   | \$26.30  |
|  |                    |          | Erythromycin                     | 500mg q6h    | \$184.50 |
|  |                    |          | Linezolid                        | 600mg q12h   | \$182.85 |
|  |                    |          | Metronidazole                    | 500mg q8h    | \$1.85   |
|  |                    |          | SMX/TMP                          | 5 mg/kg q6h  | \$76.70  |
|  |                    |          | Tigecycline                      | 50mg q12h    | \$212.40 |
|  |                    |          | Vancomycin                       | 1gm q12h     | \$7.25   |

\*cost is based on 70kg person

References available on Dignity Health Online  
<http://employee.dignityhealth.org>

## Antimicrobial Prophylaxis Recommendations

| Surgery Type  | First Choice   | Alternative  |
|---|--|--|
| Cardiac, Non-cardiac<br>Thoracic, Vascular,<br>Neurosurgery,<br>Orthopedic, Spine | Cefazolin  | Vancomycin   |
| Head and Neck   | Cefazolin +<br>Metronidazole   | Gentamicin +<br>Clindamycin  |
| Colon and Abdominal   | Cefoxitin OR Unasyn<br>OR Cefazolin +<br>Metronidazole OR<br>Ertapenem | Levofloxacin +<br>Metronidazole<br>OR Clindamycin +<br>Levofloxacin<br>OR Clindamycin +<br>Aztreonam |
| OB/GYN<br>(hysterectomy)  | Cefazolin OR<br>Cefoxitin  | Clindamycin +<br>Gentamicin  |

Implementation of an antimicrobial stewardship program will help ensure that hospitalized patients receive the right antibiotic, at the right dose, at the right time, and for the right duration. As a result, there is reduced mortality, reduced risks of Clostridium difficile-associated diarrhea, shorter hospital stays, reduced overall antimicrobial resistance within the facility, and cost savings.

### Daptomycin (Cubicin):

- Skin and skin structure infections  
- Vancomycin (MRSA) and nafcillin (MSSA) are considered first line therapy
- S. aureus bacteremia, including right-side endocarditis
- VRE bacteremia not responding to linezolid, or methicillin resistant coagulase negative staph bacteremia not clearing with vancomycin and removal of infected lines
- CANNOT be used to treat pneumonia

### Imipenem/cilastatin (Primaxin):

- ESBL producing enterobacteriaceae
- Complicated severe intra-abdominal infections
- Complicated urinary tract infections
- Pulmonary infection in cystic fibrosis patients colonized with P. aeruginosa or Burkholderia cepacia
- Nosocomial pneumonia, including ventilator-associated pneumonia (VAP)
- Febrile neutropenia

### Linezolid (Zyvox):

- MRSA pneumonia
  - Patients not responding to or are intolerant of vancomycin
  - Patients with renal failure or on concurrent nephrotoxic agents
- Serious documented VRE infections such as bacteremia, pyelonephritis, pneumonia, wound infection or other skin and soft tissue infection (for uncomplicated UTI or cystitis with VRE, consider the use of nitrofurantoin or tetracycline)
- Use oral route when possible – 100% bioavailable

### Ertapenem (Invanz): USAGE RESTRICTED

- Peri-operative one time dose
- Diabetic foot infections
- Orders by infectious disease physicians
- NOT active against Pseudomonas, Acinetobacter, or Enterococcus

### Tigecycline (Tygacil):

- BLACK BOX WARNING: increased mortality compared with other antibiotics; reserve for situations when alternative treatments are not suitable
- NOT active against Pseudomonas aeruginosa

## Antimicrobial Guideline

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## 2015 Recommended Empiric Antibiotic Therapy of Selected Infections in Adults Requiring Hospitalization

| Infection                                      | 1st Line                              | Alternative / Allergy                              |
|--|---------------------------------------|--|
| Community Acquired Pneumonia                   | Ceftriaxone + Azithromycin            | Levofloxacin                                       |
| Aspiration Pneumonia                           | Levofloxacin + Clindamycin            | Unasyn OR Zosyn                                    |
| Hospital Acquired Pneumonia                    | Zosyn + Tobramycin ± Vancomycin       | Cefepime + Levofloxacin OR Gentamicin ± Vancomycin |
| Suspected Pseudomonas Infection                | Zosyn + Tobramycin                    | Cefepime OR Ciprofloxacin + Tobramycin             |
| UTI, Uncomplicated                             | TMP/SMX                               | Levofloxacin OR Nitrofurantoin                     |
| UTI, Complicated                               | Ceftriaxone ± Gentamicin              | Levofloxacin                                       |
| Sepsis of Unknown Etiology                     | Imipenem + Vancomycin                 | Zosyn + Vancomycin                                 |
| Intra-Abdominal Sepsis                         | Ceftriaxone + Metronidazole           | Levofloxacin + Metronidazole                       |
| Endocarditis                                   | Ceftriaxone ± Vancomycin              | Vancomycin ± Gentamicin                            |
| Bacterial Meningitis                           | Ceftriaxone + Vancomycin ± Ampicillin | None   |
| Pelvic Inflammatory Disease                    | Cefoxitin + Doxycycline               | Clindamycin + Gentamicin                           |
| Cellulitis, Uncomplicated                      | Cefazolin OR Nafcillin                | Vancomycin OR Clindamycin                          |
| Cellulitis, Complicated OR Diabetic Foot Ulcer | Unasyn OR Zosyn                       | Levofloxacin + Clindamycin OR Ertapenem            |
| Febrile Neutropenia (ANC less than 500)        | Zosyn OR Imipenem OR Cefepime         | Ciprofloxacin + Vancomycin                         |

**St. Joseph's Medical Center**  
**Antibiogram 01/01/2014- 12/31/2014**

| Percent (%) susceptible             | # Tested (n) | Penicillins |             |           |            |                   |              | Cephalosporins |           |          |            |             | Carbapenems |           |          | Aminoglycosides |          |            | Fluoroquinolones |               | Other        |                 |             |              |           |          |               |            |              |             |            |
|-------------------------------------|--------------|-------------|-------------|-----------|------------|-------------------|--------------|----------------|-----------|----------|------------|-------------|-------------|-----------|----------|-----------------|----------|------------|------------------|---------------|--------------|-----------------|-------------|--------------|-----------|----------|---------------|------------|--------------|-------------|------------|
|                                     |              | Ampicillin  | Amoxicillin | Oxacillin | Penicillin | Piperacillin/Tazo | Piperacillin | Unasyn         | Cefazolin | Cefepime | Cefotaxime | Ceftazidime | Ceftriaxone | Ertapenem | Imipenem | Meropenem       | Amikacin | Gentamicin | Tobramycin       | Ciprofloxacin | Levofloxacin | Chloramphenicol | Clindamycin | Erythromycin | Linezolid | Rifampin | Sulfa/trimeth | Daptomycin | Tetracycline | Tigecycline | Vancomycin |
| <b>Gram negative rods:</b>          |              |             |             |           |            |                   |              |                |           |          |            |             |             |           |          |                 |          |            |                  |               |              |                 |             |              |           |          |               |            |              |             |            |
| <i>Acinetobacter baumannii</i>      | 60           |             |             |           |            | 36                | 58           |                | 48        | 35       | 37         | 12          |             | 84        | 81       | 92              | 77       | 92         | 50               | 50            |              |                 |             |              |           |          | 62            |            | 57           |             |            |
| <i>Enterobacter aerogenes</i>       | 40           | 0           |             |           | 83         |                   |              | 0              | 100       |          | 83         | 84          | 100         | 100       |          | 100             | 100      | 100        | 98               | 98            |              |                 |             |              |           |          | 98            |            |              |             | 5          |
| <i>Enterobacter cloacae</i>         | 119          | 0           |             |           | 83         |                   |              | 0              | 98        |          | 83         | 83          |             | 100       |          | 97              | 95       | 95         | 95               | 95            |              |                 |             |              |           |          | 89            |            |              |             | 20         |
| <i>Escherichia coli</i>             | 2342         | 46          |             |           | 96         |                   | 56           | 81             | 89        |          | 88         | 88          | 100         | 100       |          | 100             | 91       | 91         | 74               | 75            |              |                 |             |              |           | 73       |               |            |              | 90          |            |
| <i>Klebsiella oxytoca</i>           | 55           | 0           |             |           | 96         |                   | 67           | 71             | 100       |          | 100        | 100         | 100         | 100       |          | 100             | 96       | 96         | 100              | 98            |              |                 |             |              |           |          | 85            |            |              | 64          |            |
| <i>Klebsiella pneumoniae</i>        | 469          | 0           |             |           | 89         |                   | 83           | 88             | 92        |          | 91         | 91          | 100         | 100       |          | 98              | 95       | 93         | 94               | 94            |              |                 |             |              |           |          | 88            |            |              | 20          |            |
| <i>Morganella morganii</i>          | 34           | 3           |             |           | 100        |                   | 3            | 3              | 97        |          | 88         | 97          | 100         |           |          | 100             | 82       | 97         | 50               | 50            |              |                 |             |              |           | 56       |               |            |              | 0           |            |
| <i>Proteus mirabilis</i>            | 242          | 77          |             |           | 100        |                   | 87           | 90             | 99        |          | 98         | 99          | 100         |           |          | 100             | 84       | 90         | 62               | 69            |              |                 |             |              |           | 74       |               |            |              | 0           |            |
| <i>Serratia marcescens</i>          | 69           | 0           |             |           |            |                   |              | 0              | 100       |          | 94         | 97          | 100         |           |          | 100             | 100      | 96         | 94               | 99            |              |                 |             |              |           | 100      |               |            |              | 0           |            |
| <i>Pseudomonas aeruginosa</i>       | 294          |             |             |           |            | 90                |              |                | 88        |          | 88         |             |             | 77        | 87       | 99              | 92       | 97         | 70               | 63            |              |                 |             |              |           |          |               |            |              |             |            |
| <i>Stenotrophomonas maltophilia</i> | 50           |             |             |           |            |                   |              |                |           |          | 32         |             |             |           |          |                 |          |            |                  | 72            |              |                 |             |              |           | 84       |               |            |              |             |            |
| <b>Gram positive cocci:</b>         |              |             |             |           |            |                   |              |                |           |          |            |             |             |           |          |                 |          |            |                  |               |              |                 |             |              |           |          |               |            |              |             |            |
| <i>Enterococcus faecalis</i>        | 489          | 99          |             |           | 99         |                   |              |                |           |          |            |             |             |           |          |                 |          |            | *63              | *64           |              |                 |             | 100          |           |          | 100           |            | 100          | 95          | 97         |
| <i>Enterococcus faecium</i>         | 100          | 20          |             |           | 18         |                   |              |                |           |          |            |             |             |           |          |                 |          |            | *10              | *13           |              |                 |             | 100          |           |          |               |            |              | 29          | 19         |
| <i>Staph. aureus</i>                | 795          |             |             | 49        |            |                   |              |                |           |          |            |             |             |           |          |                 | 93       |            | 50               | 51            |              | 68              | 37          | 100          | 98        | 98       | 100           | 97         | 100          | 99          |            |
| <i>Staph. epidermidis</i>           | 134          |             |             | 37        |            |                   |              |                |           |          |            |             |             |           |          |                 |          |            | 40               | 40            |              | 59              | 36          | 100          | 94        | 47       |               | 85         |              | 97          |            |
| <i>Strep. pneumoniae</i>            | 53           |             | 100         |           | 84         |                   |              |                |           | 100      |            | 100         | 100         |           |          |                 |          |            |                  | 100           | 98           |                 |             | 100          |           | 81       |               | 91         |              | 100         |            |

\* Urinary Tract isolates only

Non urine

**NOTES:**

**A.** Some strains of *Escherichia coli*, *Klebsiella sp.*, and *Proteus mirabilis* can produce Extended Spectrum Beta Lactamases (ESBLs). These strains should be considered resistant to all penicillins, cephalosporins, and monobactams. Treatment with a carbapenem is recommended.

**B.** Emerging resistance in Gram negative rods due to Carbapenemase and Metallo Beta Lactamase production is increasing world wide. These strains should be considered resistant to all penicillins, cephalosporins, carbapenems, and aztreonam. Resistance may also be demonstrated to the aminoglycosides and fluoroquinolones. Infectious Disease consult is recommended.

 >= 5% more resistant 2014 than 2013

**C.**

Per SJMC Infection Control Dept. policy for Multi-Drug Resistant Organisms: In addition to appropriate antibiotic therapy, patients must be placed in CONTACT ISOLATION PRECAUTIONS.

**D.**

51% of the *Staph aureus* isolates are MRSA (methicillin resistant) Susceptibility results for both hospital-acquired and community acquired MRSA isolates are combined on this antibiogram. Community acquired isolates tend to be susceptible to a greater number of antibiotics than hospital acquired MRSA strains, but they can be associated with more virulent infections.

**E.**

15% of the *Strep. pneumoniae* isolates were intermediate for penicillin. High doses of IV penicillins or ampicillin can be used to treat pneumococcal pneumonia caused by strains in the intermediate category, however patients with pneumococcal meningitis require therapy with maximum doses of ceftriaxone or cefotaxime.

 >= 5% more sensitive 2014 than 2013