



TECHNICAL NOTICE

THE MEDICAL FOUNDATION

Antimicrobial Stewardship • Numeric MIC Data

Notification Date: 3 Nov 2017

Effective Date: 3 Nov 2017

Antibiotic Resistance, Antimicrobial Stewardship and 2017 U.S. Antibiotic Awareness Week November 13-19

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[Minimum Inhibitory Concentration](#); now including *numeric* MIC data on reports (see below)

	Escherichia coli	
	MIC Interp ¹	MIC Dilution ²
Ampicillin	R	>=32
Ampicillin/Sulbactam	S	8
Cefazolin	R	>=64
Cefepime ¹	R	2
Ceftazidime	R	4
Ceftriaxone	R	>=64
Ciprofloxacin	R	>=4
Ertapenem	S	<=0.5
Gentamicin	S	<=1
Levofloxacin	R	>=8
Meropenem	S	<=0.25
Nitrofurantoin	S	<=16
Pip/Tazo	S	<=4
Tobramycin	S	<=1
Trimeth/Sulfa	R	>=320

¹ Phenotypically consistent with an ESBL.

² MIC numeric dilutions of different drug classes are not directly comparable. Pharmacokinetics and pharmacodynamics must be considered.

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Antibiotic Use

Antibiotic resistance is one of the most serious public health problems in the United States. When first-line and then second-line antibiotic treatment options are limited by resistance or are unavailable, healthcare providers are forced to use antibiotics that may not only be more toxic to the patient but are frequently more expensive and less effective. This undermines the ability to fight infectious diseases and complicated infections in the most vulnerable patients. Research has shown that patients with resistant infections are often much more likely to die, and survivors have significantly longer hospital stays, delayed recuperation, and long-term disability.¹

Antibiotic Awareness

The Antibiotic Resistance Solutions Initiative by the Center for Disease Control and Prevention (CDC) has helped combat antibiotic resistance. There is an annual campaign, Antibiotic Awareness Week, each year in November. By collaborating with other public and private partners, CDC is supporting implementation of programs and practices that optimize antibiotic prescribing and use. This includes educating patients and healthcare providers about the benefits and risks of antibiotics.

Antimicrobial Stewardship

Antimicrobial stewardship is the multidisciplinary concerted effort to improve the use of antimicrobials in health care settings: inpatients, outpatients and long-term care. The primary objective of stewardship is to improve patient outcomes by ensuring the prescribing of “the right antibiotic, at the right dose, at the right time, and for the right duration.”

Microbiology Laboratory

The Microbiology Laboratory at The Medical Foundation has a key role in antimicrobial stewardship by compiling the annual cumulative antimicrobial susceptibility report pertinent to our regional patients to help guide the selection and prescribing of antibiotics. To ensure a positive impact on antimicrobial stewardship, Microbiology provides guidance on specimen collection, storage and transport, which are available in the Test Directory found at www.sbmf.org.

We have alert systems and surveillance to assist Infection Prevention with resistant organisms. Culture reports are enhanced with statements when a MIC is not indicated and when the organism isolated is a non-pathogen. We utilize rapid diagnostic testing and rapid reporting as much as possible. Rapid molecular assays are used on positive blood cultures to detect the most common pathogens and antibiotic resistance markers.

We also must communicate, cooperate and collaborate with each discipline in the antimicrobial stewardship committees of our client groups:

- Primary Care
- Infection Prevention
- Infectious Disease
- Information Technology
- Nursing
- Pharmacy
- Public Health

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Minimum Inhibitory Concentration (MIC)

To facilitate the selection of “the right antibiotic, at the right dose, at the right time, and for the right duration,” we will phase in the reporting of the actual numeric minimum inhibitory concentration dilution along with the traditional interpretation of “S-sensitive” “I-intermediate” or “R-resistant”. Depending on the specific format in the electronic medical record, the report will resemble the example.

When patients require hospital admission, the numeric MIC dilution can promote selection of the right antibiotic to optimize individual antimicrobial management. This is to minimize antimicrobial resistance, adverse drug reactions, antimicrobial toxicity, and *Clostridium difficile* diarrhea.

For other healthcare settings, the MIC Interpretation alone (S, I or R) is normally sufficient for prescribing antibiotics. **Please note that comparing numeric MIC dilutions between drug classes will result in erroneous conclusions.** Antibiotics with the lowest MIC are not necessarily the antibiotic of choice. Antibiotic concentration at the infection site, dosing requirements, renal function, and potential toxicity including suppression of normal GI flora must be considered. Comparisons between antibiotics must take into account pharmacokinetics and pharmacodynamics calculations.

References:

1. CDC. Antibiotic Resistance Threats in the United States, 2013. Atlanta, GA: US Department of Health and Human Services, CDC. Available from: <http://www.cdc.gov/drugresistance/threat-report-2013>
2. CDC Public Health Grand Rounds, Combating Resistance: Getting Smart About Antibiotics, US Department of Health and Human Services, CDC. Available from: <https://www.cdc.gov/cdcgrandrounds/archives/2013/November2013.htm>
3. CDC. Antibiotic Use in the United States, 2017: Progress and Opportunities. Atlanta, GA: US Department of Health and Human Services, CDC. Available from: <https://www.cdc.gov/antibiotic-use/stewardship-report/index.html>
4. MacVane, S.H., Hurst, J.M., and Steed, L. L., The Role of Antimicrobial Stewardship in the Clinical Microbiology Laboratory: Stepping Up to the Plate, Open Forum Infectious Disease, October 2016
5. Morency-Potvin, P., Schwartz, D.N., and Weinstein, R.A., “Antimicrobial Stewardship: How the Microbiology Laboratory Can Right the Ship” in Clinical Microbiology Reviews, Volume 30 Issue 1, January 2017

[TMF online Test Directory](#)

Questions: Please contact **CLIENT SERVICES 800-950-7263**, Kristen Jacobs MD, kjacobs@sbfm.org, Mary G. Stepney, Microbiology Specialist, mstepney@sbfm.org, or Nan Boston, Microbiology Manager, nboston@sbfm.org .

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