**MICRO.AST.1.0 Guidelines for Reporting Antimicrobials**

**STATEMENT OF PURPOSE**

Selection of the most appropriate antimicrobial agents to test and to report is a decision made best by each clinical laboratory in consultation with the infectious disease practitioners and the pharmacy, as well as the pharmacy and therapeutics and infection control committees of the medical staff. The choice of antimicrobial used to treat an infection must consider the mode of action of the antimicrobial, as well as the level achieved at the infection site. The route of excretion of the drug is also important (i.e. some drugs are concentrated in the urine, some drugs do not cross the blood/brain barrier effectively).

The antimicrobial susceptibility, reported by the laboratory, is important in guiding the treatment of the patient by the physician.

**OWNERS**

Regional Microbiology Manager  
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**PROCEDURE**

1. Antimicrobial agents reported by Mid America Clinical Laboratories are based on the current Clinical Laboratory Standards Institute (CLSI) suggested groupings based upon the organism recovered and the specimen source. Refer to the attached tables for a listing of the antimicrobials routinely reported.
2. MIC and disk diffusion results are interpreted using criteria published by the CLSI, if available. Susceptible, intermediate, or resistant interpretations are reported and defined as follows:
   1. Susceptible (S)— implies that isolates are inhibited by the usually achievable concentrations of antimicrobial agent when the recommended dosage is used for the site of infection.
   2. Intermediate (I)— includes isolates with antimicrobial agent MICs that approach usually attainable blood and tissue levels and for which response rates may be lower than for susceptible isolates. The intermediate category implies clinical efficacy in body sites where the drugs are physiologically concentrated (e.g., quinolones and β-lactams in urine) or when a higher than normal dosage of a drug can be used (e.g., β-lactams). This category also includes a buffer zone, which should prevent small, uncontrolled, technical factors from causing major discrepancies in interpretations, especially for drugs with narrow pharmacotoxicity margins.
   3. Resistant (R)— implies that isolates are not inhibited by the usually achievable concentrations of the agent with normal dosage schedules, and/or isolates that demonstrate MICs or zone diameters that fall in the range where specific microbial resistance mechanisms (e.g., β-lactamases) are likely, and clinical efficacy of the agent against the isolate has not been reliably shown in treatment studies.
   4. Nonsusceptible (NS)—A category used for organisms that have only a susceptible interpretive category, but no intermediate or resistant interpretive categories. A susceptible-only interpretive category may be applied to new antimicrobial agents for which no resistant isolates have been encountered at the time the initial interpretive criteria are determined. Isolates that test with an MIC above or a zone measurement below the susceptible interpretive breakpoint are designated as nonsusceptible. A designation of nonsusceptible does not necessarily mean that a resistance mechanism exists in the isolate. The MIC of the isolate in the nonsusceptible range may be within the previously recognized wild-type distribution of susceptibility results; however, there is limited clinical experience with these isolates in clinical trials.
3. The following antimicrobials should not be reported on CSF isolates:
   1. First generation cephalosporins such as Cefazolin and Cephalothin
   2. Second generation cephalosporins such as Cefamandole. (with the exception of Cefuroxime)
   3. Cephamycins such as cefoxitin
   4. Clindamycin
   5. Fluoroquinolones
   6. Macrolides such as erythromycin
   7. Tetracyclines
4. The following antimicrobials should only be reported on urine cultures, not on systemic isolates:
5. Nitrofurantoin
6. Naladixic acid
7. Norfloxacin
8. Sulfisoxazole
9. Trimethoprim
10. Gatifloxacin
11. Strains of Escherichia coli, Klebsiella pneumonia, Klebsiella oxytoca and Proteus mirabilis (isolated from sterile sites) exhibiting elevated MICs to cephalosporins must be tested for the production of extended spectrum beta lacamases (ESBL). Refer to procedure Laboratory Detection of Extended Spectrum Beta Lactamases.
12. Dangerously misleading results can occur when certain antimicrobial agents are tested and reported as susceptible against specific organisms. The following antimicrobialagent/organism combinations may appear active in vitro, but are not effective clinically and should not be reported as susceptible.

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| Organism | Antimicrobial agents that must not be reported as susceptible |
| ESBL-producing *K. pneumoniae*, *K. oxytoca*, *E. coli*, and *P. mirabilis* | penicillins, cephalosporins, and aztreonam |
| *Salmonella* spp., *Shigella* spp. | 1st- and 2nd-generation cephalosporins, cephamycins, and aminoglycosides |
| oxacillin-resistant *Staphylococcus* spp. (MRSA) | penicillins, β-lactam/β-lactamase inhibitor combinations, cephems, and carbapenems |
| ICR positive *Staphylococcus* sp, Group A and Group B Beta hemolytic *Streptococcus* | Clindamycin |
| *Enterococcus* spp. | aminoglycosides (except high concentrations), cephalosporins, clindamycin, and trimethoprim-sulfamethoxazole |
| *Yersinia pestis* | β-lactams |

1. Interpretation of penicillin MIC results for S. pneumoniae is based upon the specimen source. There are different breakpoints utilized for meningococcal and non-meningococcal isolates. In order to notify clinicians of the breakpoints used to determine the susceptibility interpretations, the following English text codes are appended to the organism ID.

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| Specimen Source | Code | Translation |
| CSF | PNCSF | PENICILLIN INTERPRETATIONS BASED UPON CLSI GUIDELINES FOR THE TREATMENT OF MENINGITIS ISOLATES (IV ADMINISTRATION). |
| Any source other than CSF | PNNON | PENICILLIN INTERPRETATIONS BASED UPON CLSI GUIDELINES FOR THE TREATMENT OF NONMENINGITIS ISOLATES (IV ADMINISTRATION). |

1. The beta-hemolytic group includes the large-colony-forming pyogenic strains of streptococci with Group A, C or G antigens and strains with Group B antigen. Small-colony-forming strains with Group A, C, F or G antigens are considered part of the viridans group, and interpretive criteria for the viridans group should be used. In Sunquest, use the following organism ID codes to denote small-colony-forming strains.

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| Code | Translation |
| BSASM | STREPTOCOCCI, BETA HEMOLYTIC GROUP A (SMALL COLONY FORMING STRAIN) |
| BSCSM | STREPTOCOCCI, BETA HEMOLYTIC GROUP C (SMALL COLONY FORMING STRAIN) |
| BSGSM | STREPTOCOCCI, BETA HEMOLYTIC GROUP G (SMALL COLONY FORMING STRAIN) |

1. Acceptable results derived from testing QC strains do not guarantee accurate results testing patient isolates. It is important to review all of the results obtained from all drugs tested on a patient’s isolate prior to reporting the results. This should include but not be limited to ensuring that: 1) the antimicrobial susceptibility results are consistent with the identification of the isolate; 2) the results from individual agents within a specific drug class follow the established hierarchy of activity rules; and 3) the isolate is susceptible to those agents for which resistance has not been documented and for which only “susceptible” interpretive criteria exist. For additional information, refer to procedure Troubleshooting guidelines for unusual or inconsistent antimicrobial susceptibility results.
2. Subsequent isolates of the same species from a similar body site may be referred to the initial susceptibility results for the 3 days following the initial test. Isolates that are initially susceptible may become intermediate or resistant after initiation of therapy. Therefore, subsequent isolates recovered outside of the 3 day window should be tested in order to detect resistance that may have developed.