This document describes methods for recording and analysis of antimicrobial susceptibility test data, consisting of cumulative and ongoing summaries of susceptibility patterns of clinically significant microorganisms.

A guideline for global application developed through the Clinical and Laboratory Standards Institute consensus process.
Clinical and Laboratory Standards Institute

Setting the standard for quality in clinical laboratory testing around the world.

The Clinical and Laboratory Standards Institute (CLSI) is a not-for-profit membership organization that brings together the varied perspectives and expertise of the worldwide laboratory community for the advancement of a common cause: to foster excellence in laboratory medicine by developing and implementing clinical laboratory standards and guidelines that help laboratories fulfill their responsibilities with efficiency, effectiveness, and global applicability.

Consensus Process

Consensus—the substantial agreement by materially affected, competent, and interested parties—is core to the development of all CLSI documents. It does not always connote unanimous agreement, but does mean that the participants in the development of a consensus document have considered and resolved all relevant objections and accept the resulting agreement.

Commenting on Documents

CLSI documents undergo periodic evaluation and modification to keep pace with advancements in technologies, procedures, methods, and protocols affecting the laboratory or health care.

CLSI’s consensus process depends on experts who volunteer to serve as contributing authors and/or as participants in the reviewing and commenting process. At the end of each comment period, the committee that developed the document is obligated to review all comments, respond in writing to all substantive comments, and revise the draft document as appropriate.

Comments on published CLSI documents are equally essential, and may be submitted by anyone, at any time, on any document. All comments are addressed according to the consensus process by a committee of experts.

Appeals Process

If it is believed that an objection has not been adequately addressed, the process for appeals is documented in the CLSI Standards Development Policies and Process document.

All comments and responses submitted on draft and published documents are retained on file at CLSI and are available upon request.

Get Involved—Volunteer!

Do you use CLSI documents in your workplace? Do you see room for improvement? Would you like to get involved in the revision process? Or maybe you see a need to develop a new document for an emerging technology? CLSI wants to hear from you. We are always looking for volunteers. By donating your time and talents to improve the standards that affect your own work, you will play an active role in improving public health across the globe.

For further information on committee participation or to submit comments, contact CLSI.

Clinical and Laboratory Standards Institute
950 West Valley Road, Suite 2500
Wayne, PA 19087 USA
P: 610.688.0100
F: 610.688.0700
www.clsi.org
standard@clsi.org
Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline—Fourth Edition

Volume 34 Number 2

Janet A. Hindler, MCLS, MT(ASCP)
Michael Barton, PharmD
Sharon M. Erdman, PharmD
Alan T. Evangelista, PhD, D(ABMM)
Stephen G. Jenkins, PhD, D(ABMM), F(AAM)
Judith Johnston, MS
James S. Lewis II, PharmD
Dyan Luper, BS, MT(ASCP)SM, MB
Ronald N. Master, MS, SM(AAM)
Graeme Nimmo, MBBS, MSc, MPH, MD
John Stelling, MD, MPH

Abstract

Susceptibility statistical data, consisting of the cumulative and ongoing summary of the patterns of antimicrobial susceptibility of clinically important microorganisms, are important to the practice of medicine on several levels.

If the methods used to create, record, and analyze the data are not reliable and consistent, many of the most important applications and benefits of the data will not be realized. Clinical and Laboratory Standards Institute document M39-A4—Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline—Fourth Edition is an attempt 1) to develop guidelines for clinical laboratories and data analysis software providers for the routine generation and storage of susceptibility data, and for the compilation of susceptibility statistics; and 2) to provide suggestions to clinical laboratories and clinicians for effective use of their cumulative susceptibility statistics.


The Clinical and Laboratory Standards Institute consensus process, which is the mechanism for moving a document through two or more levels of review by the health care community, is an ongoing process. Users should expect revised editions of any given document. Because rapid changes in technology may affect the procedures, methods, and protocols in a standard or guideline, users should replace outdated editions with the current editions of CLSI documents. Current editions are listed in the CLSI catalog and posted on our website at www.clsi.org. If you or your organization is not a member and would like to become one, and to request a copy of the catalog, contact us at: Telephone: 610.688.0100; Fax: 610.688.0700; E-Mail: customerservice@clsi.org; Website: www.clsi.org.

CLINICAL AND LABORATORY STANDARDS INSTITUTE
## Contents

Abstract .................................................................................................................................................... i  
Committee Membership ........................................................................................................................ iii 
Foreword ................................................................................................................................................ ix 

1  Scope .......................................................................................................................................... 1 
2  Introduction ................................................................................................................................ 1 
3  Standard Precautions .................................................................................................................. 2 
4  Terminology ............................................................................................................................... 2  
  4.1 Definitions .................................................................................................................... 2  
  4.2 Abbreviations and Acronyms ....................................................................................... 5 
5  Information System Design ....................................................................................................... 6  
  5.1 Data Export or Transmission ........................................................................................ 6  
  5.2 Desirable Attributes of the Data Analysis System ......................................................... 7  
  5.3 Patient Demographic Information ...................................................................................... 7  
  5.4 Specimen Information ........................................................................................................ 7  
  5.5 Organism Information ....................................................................................................... 8  
  5.6 Antimicrobial Susceptibility Test Information ............................................................... 8

Part I. The Routine Cumulative Antibiogram ......................................................................................... 9 

6  Data Analysis ............................................................................................................................. 9  
  6.1 Data Verification ........................................................................................................... 9  
  6.2 Facility ........................................................................................................................ 10  
  6.3 Frequency .................................................................................................................... 10  
  6.4 Isolates ........................................................................................................................ 10  
  6.5 Antimicrobial Agents .................................................................................................. 11  
  6.6 Calculations ................................................................................................................ 13  
  6.7 Validation of Calculations .......................................................................................... 16  
  6.8 Supplemental Analyses and Selection Criteria Options for the Routine Cumulative  
      Antibiogram ................................................................................................................ 18

7  Data Presentation ..................................................................................................................... 20  
  7.1 Items to Consider in Constructing the Table .............................................................. 20  
  7.2 Items to Consider Within Specific Tables .................................................................. 20  
  7.3 Other Presentation Options ......................................................................................... 22

8  Use of Cumulative Antimicrobial Susceptibility Reports ........................................................ 24  
  8.1 Use of the Report ........................................................................................................ 24  
  8.2 Distribution of the Report ........................................................................................... 24

9  Limitations of Data, Data Analysis, and Data Presentation ..................................................... 25  
  9.1 Culturing Practices ...................................................................................................... 25  
  9.2 Influence of Small Numbers of Isolates ...................................................................... 25  
  9.3 Comparing Results of Individual Antimicrobial Agent Results ................................. 26  
  9.4 Identification of New Patterns of Resistance .............................................................. 26
Contents (Continued)

10 Statistical Considerations......................................................................................................... 26
  10.1 Confidence Intervals ................................................................................................... 27
  10.2 Statistical Significance of Changes in Susceptibility Rates ........................................ 27
  10.3 Use and Limitations of Statistical Methods ................................................................. 28

Part II. The Enhanced Antibiogram ...................................................................................................... 28

11 Stratifying Cumulative Antibiogram Data by Various Parameters .......................................... 28
  11.1 Examples of Selection Criteria for Supplemental Analyses ....................................... 28

12 Supplemental Analyses of Multidrug-Resistant Organisms .................................................... 29
  12.1 Simple Listing of the Percentage of Resistant Organisms ........................................... 29
  12.2 Supplemental Analyses of Multidrug-Resistant Organisms ........................................... 29

13 Examining Percent Susceptible for Combinations of Antimicrobial Agents.............................. 30

14 Analysis of Susceptibility Profiles of Select Organisms ............................................................. 31

15 Calculating Percent Susceptible on Select Groups of Organisms ............................................ 32

16 Graphic Presentation of Percent Susceptible Data to Illustrate Trends in Susceptibility .......... 33
  16.1 Emerging Resistance Trends .......................................................................................... 33

17 Local Cumulative Antibiograms vs External Antibiograms (eg, Data From External
Surveillance Programs) ................................................................................................................. 33
  17.1 Local Cumulative Antibiograms vs Data From External Surveillance Programs .......... 33
  17.2 The Use of Local Cumulative Antibiograms ................................................................. 33
  17.3 The Use of Data From External Surveillance Programs ................................................. 33
  17.4 Some Situations in Which Data From External Surveillance Programs May Be Useful................................................................................................................. 34
  17.5 Considerations When Using Data From External Surveillance Programs to Guide
Local Empirical Therapy Recommendations ................................................................................. 34

References............................................................................................................................................. 36

Additional References........................................................................................................................... 37

Appendix A. Suggestions for Confirmation of Resistant (R), Intermediate (I), or Nonsusceptible
(NS) Antimicrobial Susceptibility Test Results and Organism Identification .................................... 40

Appendix B. Rationale Behind the “First Isolate per Patient” Analysis Recommendation........... 44

Appendix C. Example of Using a Line Listing to Verify Susceptibility Rates Determined by the
Analysis Software .................................................................................................................................. 47

Appendix D. Examples of Supplemental Analyses – Stratifying Cumulative Antibiogram Data by
Various Parameters ............................................................................................................................ 49

Appendix E1. Cumulative Antimicrobial Susceptibility Report Example – Antimicrobial Agents
Listed Alphabetically (Hypothetical Data) ........................................................................................ 51
Contents (Continued)

Appendix E2. Cumulative Antimicrobial Susceptibility Report Example – Antimicrobial Agents Listed by Class (Hypothetical Data) ......................................................................................................................... 52

Appendix F. Examples of Graphs to Illustrate Trends in Susceptibility ............................................................................. 53

Appendix G. Steps for Presenting Local Cumulative Antibiogram Report to Health Care Professionals ........................................................................................................................................ 56

Appendix H. Statistical Methods for Examining Percent Susceptible ...................................................................................... 60

Appendix I. Glossaries of β-Lactams and Non–β-Lactams: Class and Subclass Designation and Generic Name, and Abbreviations/Routes of Administration/Drug Class for Antimicrobial Agents ........................................................................................................................................ 67

Appendix J. Intrinsic Resistance ............................................................................................................................................... 73

The Quality Management System Approach .............................................................................................................................. 78

Related CLSI Reference Materials .......................................................................................................................................... 80
Foreword

The antimicrobial susceptibility data generated from testing individual patients’ microbial isolates are helpful if cumulative data from such tests are assembled and appropriately reported at regular intervals. For the cumulative reports to be useful and comparable with those of previous years or other institutions, data must be obtained and presented in a clear and consistent manner.

The primary aim of this document is to guide the preparation of cumulative antimicrobial susceptibility test data reports that will prove useful to clinicians in the selection of the most appropriate agents for initial empirical antimicrobial therapy. Other analyses of antimicrobial susceptibility test data may also be of significant value to clinicians, infection control personnel, epidemiologists, pharmacists, and others. These reports are often used to support antibiotic stewardship efforts. Several examples are included in M39.

Overview of Changes From M39-A3

Below is a summary of the changes in this document, which supersede the information presented in previous editions of M39. The list includes “major” changes. Other minor or editorial changes that have been made to the general formatting are not listed here.

General

M39 has been reorganized into two parts: Part I describes the routine cumulative antibiogram, and Part II describes what is referred to as the “enhanced antibiogram.” Part II includes suggestions for analyzing and presenting cumulative antibiogram data to answer specific questions about susceptibility patterns in a particular facility. These reports may not be needed on a routine basis.

During this revision, the following sections were updated and relocated to Part II:

Section 6.8.2, Supplemental Analyses of Multidrug-Resistant Organisms (now Section 12)

Section 6.8.3, Additional Data Stratification (now Section 11, Stratifying Cumulative Antibiogram Data by Various Parameters)

Section 6.8.4, Examples of Selection Criteria for Supplemental Analyses (now Section 11.1)

Section 6.8.5, Examining Percent Susceptible for Combinations of Antimicrobial Agents (now Section 13)

Section 7.3.2, Specific Locations (now Section 11, Stratifying Cumulative Antibiogram Data by Various Parameters)

Section 7.3.3, Emerging Resistance Trends (now Section 16.1)

Part I

Section 1, Scope
Added notation that those involved with antibiotic stewardship programs often use cumulative antibiogram data.
**Definitions**
Added definitions for antimicrobial susceptibility test interpretive categories (susceptible, susceptible-dose dependent, intermediate, resistant, nonsusceptible); line listing of antimicrobial susceptibility test data; multidrug-resistant organism.

**Section 6.5.2, Selective Reporting**
Expanded section and described a method that could be used to estimate the percent susceptible (%S) for drugs routinely tested but reported selectively.

**Section 6.6.1, Changes in Interpretive Breakpoints (previously Section 6.6)**
Expanded recommendations for handling changes in interpretive breakpoints and included a table and graphic examples that highlight the changes.

**Section 6.6.2, Issues Related to Determining the Interpretation of Minimal Inhibitory Concentration Values (previously Section 6.6.1)**
Added an example.

**Section 6.8.1, S. pneumoniae**
Modified footnotes to *Streptococcus pneumoniae* example of reporting %S for drugs that have both meningitis and nonmeningitis breakpoints.

**Section 6.8.3, Susceptible-Dose Dependent**
Added information for reporting antimicrobial agents that have susceptible-dose dependent interpretive criteria.

**Section 7.2.1, Organisms**
*For gram negatives:*
Added *Klebsiella oxytoca*.

Suggested that it may be useful to separate gram-negative organisms into glucose-fermenting and nonglucose-fermenting bacilli in antibiogram tables.

*For anaerobes:*
Added *Bacteroides fragilis* group (other than *B. fragilis*).

**Section 7.3.2, Change in Drug Panel During Analysis Period (eg, Antimicrobial Agent Is Removed or Added to Routine Testing Panel)**
Added suggestions for analyzing data when drugs included on a specific panel change during analysis period.

**Part II**
Added, updated, expanded, and relocated information contained in the following sections of the previous edition of M39:

Section 6.8.3, Additional Data Stratification
Section 6.8.4, Examples of Selection Criteria for Supplemental Analyses
Section 6.8.5, Examining Percent Susceptible for Combinations of Antimicrobial Agents

Section 7.3.2, Specific Locations
Section 7.3.3, Emerging Resistance Trends

The following represent substantive additions to the original recommendations:
Section 12, Supplemental Analyses of Multidrug-Resistant Organisms
Added suggestions for highlighting multidrug-resistant organisms (MDROs) on a routine cumulative antibiogram report and added example (*Klebsiella pneumoniae*) of a supplemental report that might be generated for MDROs.

Section 13, Examining Percent Susceptible for Combinations of Antimicrobial Agents
Moved from Part I to Part II, and revised to reflect this change.

Section 14, Analysis of Susceptibility Profiles of Select Organisms
Added new section that describes preparation of a report that lists the numbers/percent of patients who harbored an isolate of a given species with a specific resistance profile.

Section 15, Calculating Percent Susceptible on Select Groups of Organisms
Added new section that describes preparation of a report that lists the %S for all isolates within an organism group.

Section 16, Graphic Presentation of Percent Susceptible Data to Illustrate Trends in Susceptibility
Added examples to include various presentation options.

Section 17, Local Cumulative Antibiograms vs External Antibiograms (eg, Data From External Surveillance Programs)
Added new section that discusses use of local vs surveillance data and when either might be advantageous.

Additional References
Updated references.

Appendix A. Suggestions for Confirmation of Resistant (R), Intermediate (I), or Nonsusceptible (NS) Antimicrobial Susceptibility Test Results and Organism Identification
Imported updated table from CLSI document M100.1

Appendix C. Example of Using a Line Listing to Verify Susceptibility Rates Determined by the Analysis Software
Updated example data.

Appendix D. Examples of Supplemental Analyses – Stratifying Cumulative Antibiogram Data by Various Parameters
Updated example data.

Appendix E1. Cumulative Antimicrobial Susceptibility Report Example – Antimicrobial Agents Listed Alphabetically (Hypothetical Data)
Incorporated suggestion to insert “R” in cells denoting intrinsic resistance for the drug/organism combination.

Appendix E2. Cumulative Antimicrobial Susceptibility Report Example – Antimicrobial Agents Listed by Class (Hypothetical Data)
Incorporated suggestion to insert “R” in cells denoting intrinsic resistance for the drug/organism combination.

Appendix F. Examples of Graphs to Illustrate Trends in Susceptibility
Added examples to include various presentation options.
Appendix G. Steps for Presenting Local Cumulative Antibiogram Report to Health Care Professionals
Updated primary recommendations for analysis and data to consider highlighting.

Appendix I. Glossaries of β-Lactams and Non–β-Lactams: Class and Subclass Designation and Generic Name, and Abbreviations/Routes of Administration/Drug Class for Antimicrobial Agents
Imported updated table from CLSI document M100.¹

Appendix J. Intrinsic Resistance
Imported updated table from CLSI document M100.¹

Key Words
Antibiogram, antimicrobial agent, cumulative antibiogram, epidemiology, resistance
Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline—Fourth Edition

1 Scope

The recommendations set forth in this document are intended to be used by individuals involved in the following:

- Analyzing and presenting antimicrobial susceptibility test data (eg, clinical microbiologists, pharmacists, physicians)
- Using cumulative antimicrobial susceptibility test data to make clinical decisions and/or participate in antibiotic stewardship programs (ASPs) (eg, clinical microbiologists, infectious disease specialists and other clinicians, infection control practitioners, pharmacists, epidemiologists, other health care personnel, and public health officials)
- Designing information systems for the storage and analysis of antimicrobial susceptibility test data (eg, LIS vendors, manufacturers of diagnostic products that include epidemiology analysis software, and manufacturers of epidemiology analysis or surveillance software)

The cumulative antimicrobial susceptibility report generated, according to recommendations presented in this guideline, may not reveal some trends in emerging resistance, and thus cannot substitute for the careful analysis of all susceptibility data derived from examining and/or analyzing all antimicrobial susceptibility test results for individual patient management. For reports intended for other purposes (eg, emergence of resistance during therapy, empirical therapy of subsequent infections), other inclusion criteria may be appropriate.

2 Introduction

This guideline presents specific recommendations for the collection, analysis, and presentation of cumulative antimicrobial susceptibility test data. Among the issues addressed are the way in which multiple isolates from the same patient should be handled, the species included or combined in a statistic, the frequency of data analysis, and the format for data presentation. This guideline also identifies additional data analysis and presentation options that may be useful to certain clinicians for specialized applications.

It is important to recognize that many of the specific recommendations presented here (eg, inclusion of only the first isolate of a given species from an individual patient during the analysis period) have been made with the primary aim of guiding clinicians in the selection of initial empirical antimicrobial therapy for infections.

The following recommendations have been made with the primary aim of preparing a report to guide clinicians in the selection of empirical antimicrobial therapy for initial infections:

- Analyze and present a cumulative antibiogram report at least annually.
- Include only final, verified test results.
- Include only species with testing data for ≥30 isolates (see Sections 6.4 and 7.2.2).
- Include only diagnostic (not surveillance) isolates (see Section 6.4).
• Eliminate duplicates by including only the first isolate of a species/patient/analysis period, irrespective of body site or antimicrobial susceptibility profile (see Section 6.4 and Appendix B).

• Include only antimicrobial agents routinely tested and calculate the percent susceptible (%S) from results reported, as well as those that might be suppressed on patient reports using selective reporting rules; do not report supplemental agents selectively tested on resistant isolates only (see Section 6.5.1).

• Report the %S and do not include the percent intermediate (%I) in the statistic (see Section 6.6).

• *Streptococcus pneumoniae* and cefotaxime/ceftriaxone/penicillin: list the %S using both meningitis and nonmeningitis breakpoints (see Section 6.8.1); for penicillin, also consider indicating the %S using oral breakpoints.

• Viridans group streptococci and penicillin: list both the %I and the %S (see Section 6.8.2).

• *Staphylococcus aureus*: list the %S for all isolates and the methicillin-resistant *S. aureus* (MRSA) subset (see Section 6.8.4).

In addition, some factors that can affect cumulative antibiogram data include:

• Patient population served
• Culturing practices
• Laboratory antimicrobial susceptibility testing and reporting policies
• Temporal outbreaks

See Section 9 for additional information.

### 3 Standard Precautions

Because it is often impossible to know what isolates or specimens might be infectious, all patient and laboratory specimens are treated as infectious and handled according to “standard precautions.” Standard precautions are guidelines that combine the major features of “universal precautions and body substance isolation” practices. Standard precautions cover the transmission of all known infectious agents and thus are more comprehensive than universal precautions, which are intended to apply only to transmission of blood-borne pathogens. The Centers for Disease Control and Prevention (CDC) address this topic in published guidelines that address the daily operations of diagnostic medicine in human and animal medicine while encouraging a culture of safety in the laboratory. For specific precautions for preventing the laboratory transmission of all known infectious agents from laboratory instruments and materials and for recommendations for the management of exposure to all known infectious diseases, refer to CLSI document M29.

### 4 Terminology

#### 4.1 Definitions

**antibiogram** – for the purpose of this document, see cumulative antimicrobial susceptibility test data summary.

**antimicrobial susceptibility test interpretive category** – a classification based on an *in vitro* response of an organism to an antimicrobial agent at levels corresponding to blood or tissue levels attainable with usually prescribed doses of that agent.
The Quality Management System Approach

Clinical and Laboratory Standards Institute (CLSI) subscribes to a quality management system approach in the development of standards and guidelines, which facilitates project management; defines a document structure via a template; and provides a process to identify needed documents. The quality management system approach applies a core set of “quality system essentials” (QSEs), basic to any organization, to all operations in any health care service’s path of workflow (i.e., operational aspects that define how a particular product or service is provided). The QSEs provide the framework for delivery of any type of product or service, serving as a manager’s guide. The QSEs are as follows:

<table>
<thead>
<tr>
<th>Organization</th>
<th>Personnel</th>
<th>Process Management</th>
<th>Nonconforming Event Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer Focus</td>
<td>Purchasing and Inventory</td>
<td>Documents and Records</td>
<td>Assessments</td>
</tr>
<tr>
<td>Facilities and Safety</td>
<td>Equipment</td>
<td>Information Management</td>
<td>Continual Improvement</td>
</tr>
</tbody>
</table>

M39-A4 addresses the QSE indicated by an “X.” For a description of the other documents listed in the grid, please refer to the Related CLSI Reference Materials section on page 80.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Customer Focus</th>
<th>Facilities and Safety</th>
<th>Personnel</th>
<th>Purchasing and Inventory</th>
<th>Equipment</th>
<th>Process Management</th>
<th>Documents and Records</th>
<th>Information Management</th>
<th>Nonconforming Event Management</th>
<th>Assessments</th>
<th>Continual Improvement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>M29</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Path of Workflow**

A path of workflow is the description of the necessary processes to deliver the particular product or service that the organization or entity provides. A laboratory path of workflow consists of the sequential processes: preexamination, examination, and postexamination and their respective sequential subprocesses. All laboratories follow these processes to deliver the laboratory’s services, namely quality laboratory information.

M39-A4 addresses the clinical laboratory path of workflow step indicated by an “X.” For a description of the other documents listed in the grid, please refer to the Related CLSI Reference Materials section on the following page.

<table>
<thead>
<tr>
<th>Preexamination</th>
<th>Examination</th>
<th>Postexamination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination ordering</td>
<td>Sample collection</td>
<td>Sample transport</td>
</tr>
</tbody>
</table>
Related CLSI Reference Materials*


M23-A3 Development of In Vitro Susceptibility Testing Criteria and Quality Control Parameters; Approved Guideline—Third Edition (2008). This document addresses the required and recommended data needed for the selection of appropriate interpretive criteria and quality control ranges for antimicrobial agents.


M29-A3 Protection of Laboratory Workers From Occupationally Acquired Infections; Approved Guideline—Third Edition (2005). Based on US regulations, this document provides guidance on the risk of transmission of infectious agents by aerosols, droplets, blood, and body substances in a laboratory setting; specific precautions for preventing the laboratory transmission of microbial infection from laboratory instruments and materials; and recommendations for the management of exposure to infectious agents.


M45-A2 Methods for Antimicrobial Dilution and Disk Susceptibility Testing of Infrequently Isolated or Fastidious Bacteria; Approved Guideline—Second Edition (2010). This document provides guidance to clinical microbiology laboratories for standardized susceptibility testing of infrequently isolated or fastidious bacteria that are not presently included in CLSI documents M02 or M07. The tabular information in this document presents the most current information for drug selection, interpretation, and quality control for the infrequently isolated or fastidious bacterial pathogens included in this guideline.

M100-S24 Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Fourth Informational Supplement (2014). This document provides updated tables for the Clinical and Laboratory Standards Institute antimicrobial susceptibility testing standards M02-A11, M07-A9, and M11-A8.

* CLSI documents are continually reviewed and revised through the CLSI consensus process; therefore, readers should refer to the most current editions.
Explore the Latest Offerings from CLSI!

As we continue to set the global standard for quality in laboratory testing, we’re adding initiatives to bring even more value to our members and customers.

Shop Our Online Products
Including eM100, the interactive searchable database for drug selection, interpretation, and quality control procedures within M100.

Visit the CLSI U Education Center
Where we provide the convenient and cost-effective education resources that laboratories need to put CLSI standards into practice, including webinars, workshops, and more.

Find Membership Opportunities
See the options that make it even easier for your organization to take full advantage of CLSI benefits and our unique membership value.

Shop Our Online Products
Including eCLIPSE Ultimate Access™, CLSI’s cloud-based, online portal that makes it easy to access our standards and guidelines—anytime, anywhere.

For more information, visit www.clsi.org today.