Updates to CLSI M100

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The presenter states no conflict of interest and has no financial relationship to disclose relevant to the content of this presentation.

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OUTLINE

I. General acclimation to M100 document

II. Objectives of webinar

Describe significant changes relevant to pre-existing antimicrobial susceptibility breakpoints…

Describe significant changes relevant to antimicrobial susceptibility testing methodology…

Identify (new) organism/antimicrobial combinations for which susceptibility breakpoints now exist…

as outlined in the CLSI M100-S29 document.

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The Small Roman Numerals

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WHAT'S IN THERE?

- Overview of changes
- Processes for establishing breakpoints, QC ranges
- CLSI reference vs. commercial methods
  CLSI reference vs. FDA breakpoints
- Breakpoint additions/revisions since 2010
  ECV additions/revisions since 2015

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BREAKPOINT ADDITIONS FOR 2019

Investigational cefiderocol BMD for:

Enterobacteriaceae
Pseudomonas aeruginosa
Acinetobacter spp.
Stenotrophomonas maltophilia

Requires iron-depleted CAMHB

- Meropenem-vaborbactam
  Enterobacteriaceae (DD, BMD)
- Azithromycin
  Neisseria gonorrhoeae (MIC, S only)

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Instructions for Use of Tables

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INSTRUCTIONS FOR USE I

- Selecting antimicrobial agents for testing, reporting
- Breakpoint and interpretive category definitions
- Reporting results

  Organisms excluded from Table 2 (CLSI M45)
  Reporting concentrations (report to hundredths)

  ≤ 0.125 μg/mL reported as ≤ 0.12 μg/mL

- Therapy-related comments

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INSTRUCTIONS FOR USE II

- Testing of repeat isolates (as little as 3-4 days)

3° cephems	*Klebsiella aerogenes* *Citrobacter* spp. *Serratia* spp.
All agents	*Pseudomonas aeruginosa*
Fluoroquinolones	Staphylococci

- Supplemental (D-test), screening (vancomycin agar screen), surrogate agent (cefoxitin), equivalent agent (amp predict amox for *Haemophilus*) tests

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Surrogate Agent Tests

Surrogate Agent	Organisms	Test Description	Results	Table Location
Cefazolin	• *E. coli* • *Klebsiella* ***pneumoniae*** • *P. mirabilis*	Broth microdilution or disk diffusion	When used for therapy of uncomplicated UTIs, predicts results for the following oral antimicrobial agents: cefaclor, cefdinir, cefpodoxime, cefprozil, cefuroxime, cephalexin, and loracarbef Cefazolin as a surrogate may overcall resistance to cefdinir, cefpodoxime, and cefuroxime. If cefazolin tests resistant, test these drugs individually if needed for therapy.	1A, 2A
Cefoxitin	• *S. aureus* • *S. lugdunensis* • ***S. epidermidis*** • **Other *Staphylococcus* spp. (excluding *S. pseudintermedius* and *S. schleiferi*)**	Broth microdilution (*S. aureus* and *S. lugdunensis* only) or disk diffusion	Predicts results for *mecA*-mediated oxacillin resistance **NOTE: For *Staphylococcus* spp. other than *S. aureus, S. lugdunensis, S. epidermidis, S. pseudintermedius,* and *S. schleiferi,*** oxacillin MIC breakpoints may overcall resistance. Isolates for which the oxacillin MICs are 0.5–2 µg/mL have been shown to be *mecA* positive and *mecA* negative. Isolates from serious infections with MICs in this range may be tested for *mecA* or for PBP2a.	1A, 2C
Oxacillin	• *S. pneumoniae*	Disk diffusion	Predicts penicillin susceptibility if oxacillin zone is ≥ 20 mm. If oxacillin zone is ≤ 19 mm, penicillin MIC must be done.	1B, 2G
Pefloxacin	• *Salmonella* spp.	Disk diffusion	Predicts reduced susceptibility to ciprofloxacin	2A
Colistin	• ***Enterobacteriaceae*** • ***P. aeruginosa**** • ***A. baumannii* complex**	**Broth microdilution**	**MICs obtained from testing colistin predict MICs for polymyxin B.**	**2B-1, 2B-2, Appendix G**

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Table 1

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TABLE 1A

Table 1A. Suggested Groupings of Antimicrobial Agents Approved by the US Food and Drug Administration for Clinical Use That Should Be Considered for Testing and Reporting on Nonfastidious Organisms by Microbiology Laboratories in the United States

	Enterobacteriaceae	*Pseudomonas aeruginosa*	*Staphylococcus* spp.	*Enterococcus* spp.[m]
GROUP A PRIMARY TEST AND REPORT	Ampicillin[c]	Ceftazidime	Azithromycin[b] or clarithromycin[b] or erythromycin[b]	Ampicillin[n] Penicillin[o]
	Cefazolin[d]	Gentamicin Tobramycin		
	Gentamicin[c] Tobramycin[c]	Piperacillin-tazobactam	Clindamycin[b]	
			Oxacillin[k,r,t,g] Cefoxitin[k,r,t] (surrogate test for oxacillin)	
			Penicillin[l]	
			Trimethoprim- sulfamethoxazole	

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TABLE 1A

Table 1A. (Continued)

"Warning": The following antimicrobial agents that are included in this document should not be routinely reported for bacteria isolated from CSF. These antimicrobial agents are not the drugs of choice and may not be effective for treating CSF infections caused by these organisms (ie, the bacteria included in Tables 2A through 2J):

- Agents administered by oral route only
- 1st- and 2nd-generation cephalosporins and cephamycins
- Clindamycin
- Macrolides
- Tetracyclines
- Fluoroquinolones

Footnotes

General

a. Organisms that are susceptible to tetracycline are also considered susceptible to doxycycline and minocycline. However, some organisms that are intermediate or resistant to tetracycline may be susceptible to doxycycline, minocycline, or both.

b. Not routinely reported on organisms isolated from the urinary tract.

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NON-FASTIDIOUS GROUPINGS

- Group A Primary test and report
- Group B Optional primary test, report selectively
- Group C Supplemental report selectively
- Group U Supplemental for urine only

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NON-FASTIDIOUS GROUPINGS

These exist for:

Enterobacteriaceae
Pseudomonas aeruginosa (no group C or group U)
Acinetobacter spp. (no group C)
Burkholderia cepacia complex (no group U)
Stenotrophomonas maltophilia (no group U)
Other non-*Enterobacteriaceae*
Staphylococcus spp.
Enterococcus spp.

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CHANGES TO TABLE 1A

- Added meropenem-vaborbactam as group B testing agent for *Enterobacteriaceae*
- Clarified staphylococci that can be subject to oxacillin broth microdilution (footnote to Table)

S. aureus
S. lugdunensis
Other staphylococci EXCEPT *epidermidis*
pseudintermedius
schleiferi

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TABLE 1B

Table 1B
Suggested Fastidious Groupings
M02 and M07

Table 1B. Suggested Groupings of Antimicrobial Agents Approved by the US Food and Drug Administration for Clinical Use That Should Be Considered for Testing and Reporting on Fastidious Organisms by Microbiology Laboratories in the United States

	Haemophilus influenzae[d] and *Haemophilus parainfluenzae*	*Neisseria gonorrhoeae*[i]	*Streptococcus pneumoniae*[j]	*Streptococcus* spp. β-Hemolytic Group[p]	*Streptococcus* spp. Viridans Group[p]
GROUP A PRIMARY TEST AND REPORT	Ampicillin[d,r]	Azithromycin[af]	Erythromycin[ac]	Clindamycin[c,o]	Ampicillin[m,r] Penicillin[m,r]
		Ceftriaxone[t] Cefixime[t]			
		Ciprofloxacin[t]	Penicillin[k] (oxacillin disk)	Erythromycin[ac,o]	
		Tetracycline[d,t]		Penicillin[n,t] or ampicillin[n,t]	
			Trimethoprim-sulfamethoxazole		

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TABLE 1B

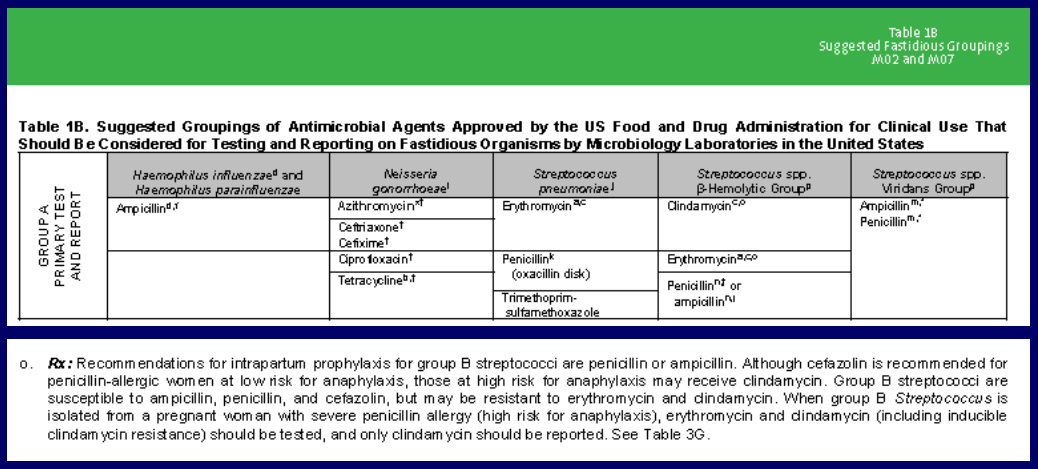

Table 1B
Suggested Fastidious Groupings
M02 and M07

Table 1B. Suggested Groupings of Antimicrobial Agents Approved by the US Food and Drug Administration for Clinical Use That Should Be Considered for Testing and Reporting on Fastidious Organisms by Microbiology Laboratories in the United States

	Haemophilus influenzae[d] and *Haemophilus parainfluenzae*	*Neisseria gonorrhoeae*[l]	*Streptococcus pneumoniae*[l]	*Streptococcus* spp. β-Hemolytic Group[p]	*Streptococcus* spp. Viridans Group[p]
GROUP A PRIMARY TEST AND REPORT	Ampicillin[d,r]	Azithromycin[s†]	Erythromycin[a,c]	Clindamycin[c,o]	Ampicillin[m,r] Penicillin[m,r]
		Ceftriaxone[†] Cefixime[†]			
		Ciprofloxacin[†]	Penicillin[k] (oxacillin disk)	Erythromycin[a,c,o]	
		Tetracycline[a,†]		Penicillin[n,r] or ampicillin[n,r]	
			Trimethoprim-sulfamethoxazole		

o. ***Rx:*** Recommendations for intrapartum prophylaxis for group B streptococci are penicillin or ampicillin. Although cefazolin is recommended for penicillin-allergic women at low risk for anaphylaxis, those at high risk for anaphylaxis may receive clindamycin. Group B streptococci are susceptible to ampicillin, penicillin, and cefazolin, but may be resistant to erythromycin and clindamycin. When group B *Streptococcus* is isolated from a pregnant woman with severe penicillin allergy (high risk for anaphylaxis), erythromycin and clindamycin (including inducible clindamycin resistance) should be tested, and only clindamycin should be reported. See Table 3G.

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FASTIDIOUS GROUPINGS

- Group A Primary test and report
- Group B Optional primary test, report selectively
- Group C Supplemental report selectively

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FASTIDIOUS GROUPINGS

These exist for:

Haemophilus influenzae
Haemophilus parainfluenzae
Neisseria gonorrhoeae (no group B or no group C)
Streptococcus pneumoniae
β-hemolytic *Streptococcus*
viridans group *Streptococcus*

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CHANGES TO TABLE 1B

- Added azithromycin as group A testing agent for *Neisseria gonorrhoeae*
- Susceptibility and resistance to dirithromycin (as well as azithromycin and clarithromycin) can be predicted by testing erythromycin

  Streptococcus pneumoniae
  β-hemolytic *Streptococcus*
  viridans group *Streptococcus*

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THERE'S AN ANAEROBE TABLE

Table 1C
Suggested Anaerobe Groupings
M11

Table 1C. Suggested Groupings of Antimicrobial Agents Approved by the US Food and Drug Administration for Clinical Use That Should Be Considered for Testing and Reporting on Anaerobic Organisms by Microbiology Laboratories in the United States

	Gram-Negative Anaerobes	Gram-Positive Anaerobes[a]
GROUP A PRIMARY TEST AND REPORT	Amoxicillin-clavulanate Ampicillin-sulbactam Piperacillin-tazobactam	Ampicillin[b] Penicillin[b]
		Amoxicillin-clavulanate Ampicillin-sulbactam Piperacillin-tazobactam
	Clindamycin	Clindamycin
	Doripenem Ertapenem Imipenem Meropenem	Doripenem Ertapenem Imipenem Meropenem
	Metronidazole	Metronidazole
GROUP C SUPPLEMENTAL REPORT SELECTIVELY	Penicillin[b] Ampicillin[b]	
	Cefotetan Cefoxitin	Cefotetan Cefoxitin
	Ceftizoxime Ceftriaxone	Ceftizoxime Ceftriaxone
	Chloramphenicol	
	Moxifloxacin	Moxifloxacin
		Tetracycline

"Testing may not be necessary for isolates associated with polymicrobial anaerobic infections."
Test only isolate most likely to be resistant; *Bacteroides* spp., *Parabacteroides* spp.

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Table 2

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TABLE 2

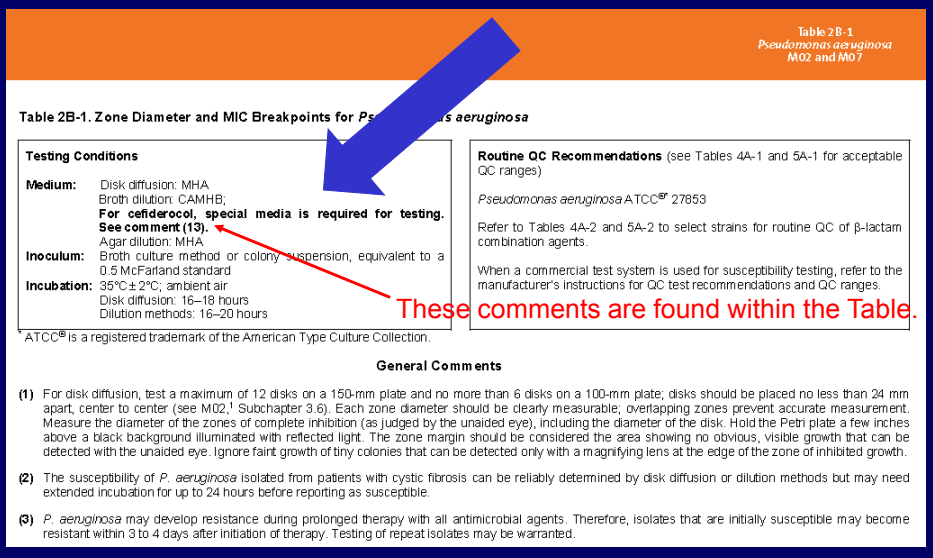

Table 2B-1
Pseudomonas aeruginosa
M02 and M07

Table 2B-1. Zone Diameter and MIC Breakpoints for *Ps…s aeruginosa*

Testing Conditions

Medium: Disk diffusion: MHA
Broth dilution: CAMHB;
For cefiderocol, special media is required for testing. See comment (13).
Agar dilution: MHA

Inoculum: Broth culture method or colony suspension, equivalent to a 0.5 McFarland standard

Incubation: 35°C ± 2°C; ambient air
Disk diffusion: 16–18 hours
Dilution methods: 16–20 hours

Routine QC Recommendations (see Tables 4A-1 and 5A-1 for acceptable QC ranges)

Pseudomonas aeruginosa ATCC® 27853

Refer to Tables 4A-2 and 5A-2 to select strains for routine QC of β-lactam combination agents.

When a commercial test system is used for susceptibility testing, refer to the manufacturer's instructions for QC test recommendations and QC ranges.

These comments are found within the Table.

® ATCC® is a registered trademark of the American Type Culture Collection.

General Comments

(1) For disk diffusion, test a maximum of 12 disks on a 150-mm plate and no more than 6 disks on a 100-mm plate; disks should be placed no less than 24 mm apart, center to center (see M02,[1] Subchapter 3.6). Each zone diameter should be clearly measurable; overlapping zones prevent accurate measurement. Measure the diameter of the zones of complete inhibition (as judged by the unaided eye), including the diameter of the disk. Hold the Petri plate a few inches above a black background illuminated with reflected light. The zone margin should be considered the area showing no obvious, visible growth that can be detected with the unaided eye. Ignore faint growth of tiny colonies that can be detected only with a magnifying lens at the edge of the zone of inhibited growth.

(2) The susceptibility of *P. aeruginosa* isolated from patients with cystic fibrosis can be reliably determined by disk diffusion or dilution methods but may need extended incubation for up to 24 hours before reporting as susceptible.

(3) *P. aeruginosa* may develop resistance during prolonged therapy with all antimicrobial agents. Therefore, isolates that are initially susceptible may become resistant within 3 to 4 days after initiation of therapy. Testing of repeat isolates may be warranted.

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TABLE 2

Table 2B-1. *Pseudomonas aeruginosa* (Continued)

Test/Report Group	Antimicrobial Agent	Disk Content	Interpretive Categories and Zone Diameter Breakpoints, nearest whole mm			Interpretive Categories and MIC Breakpoints, µg/mL			Comments
			S	I	R	S	I	R	
PENICILLINS									
O	Piperacillin	100 µg	≥ 21	15–20	≤ 14	≤ 16	32–64	≥ 128	**(5)** Breakpoints for piperacillin (alone or with tazobactam) are based on a piperacillin dosage regimen of at least 3 g **administered** every 6 h.
β-LACTAM COMBINATION AGENTS									
A	Piperacillin-tazobactam	100/10 µg	≥ 21	15–20	≤ 14	≤ 16/4	32/4–64/4	≥ 128/4	**(6)** Breakpoints for piperacillin (alone or with tazobactam) are based on a piperacillin dosage regimen of at least 3 g **administered** every 6 h.
B	Ceftazidime-avibactam	30/20 µg	≥ 21	–	≤ 20	≤ 8/4	–	≥ 16/4	**(7)** Breakpoints are based on a dosage regimen of 2.5 g (2 g ceftazidime + 0.5 g avibactam) **administered** every 8 h over 2 h.
B	Ceftolozane-tazobactam	30/10 µg	≥ 21	17–20	≤ 16	≤ 4/4	8/4	≥ 16/4	**(8)** Breakpoints are based on a dosage regimen of 1.5 g **administered** every 8 h.
O	Ticarcillin-clavulanate	75/10 µg	≥ 24	16–23	≤ 15	≤ 16/2	32/2–64/2	≥ 128/2	**(9)** Breakpoints for ticarcillin (alone or with clavulanate) are based on a ticarcillin dosage regimen of at least 3 g **administered** every 6 h.
CEPHEMS (PARENTERAL) (Including cephalosporins I, II, III, and IV. Please refer to Glossary I.)									
A	Ceftazidime	30 µg	≥ 18	15–17	≤ 14	≤ 8	16	≥ 32	**(10)** Breakpoints are based on a dosage regimen of 1 g **administered** every 6 h or 2 g **administered** every 8 h.
B	Cefepime	30 µg	≥ 18	15–17	≤ 14	≤ 8	16	≥ 32	**(11)** Breakpoints are based on a dosage regimen of 1 g **administered** every 8 h or 2 g **administered** every 12 h.

Disk diffusion

Broth microdilution

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TABLE 2

Inv.	Cefiderocol	–	–	–	–	≤4	8	≥16	(12) Breakpoints are based on a dosage regimen of 2 g every 8 h administered over 3 h. (13) Testing cefiderocol requires iron-depleted CAMHB. Chelation is used for iron depletion, which also removes other cations (ie, calcium, magnesium, and zinc). Following this process, cations are added back to concentrations of calcium 20–25 mg/L, magnesium 10–12.5 mg/L, and zinc 0.5–1.0 mg/L.
MONOBACTAMS									
B	Aztreonam	30 µg	≥ 22	16–21	≤ 15	≤8	16	≥ 32	(14) Breakpoints are based on a dosage regimen of 1 g **administered** every 6 h or 2 g **administered** every 8 h.

Comment 13 from two slides ago

Table 2 B-1
Pseudomonas aeruginosa
M02 and M07

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TABLE 2

These exist for:

Enterobacteriaceae
Pseudomonas aeruginosa
Acinetobacter spp.
Burkholderia cepacia complex
Stenotrophomonas maltophilia
Other non-*Enterobacteriaceae*
Staphylococcus spp.
Enterococcus spp.

Haemophilus influenzae
Haemophilus parainfluenzae
Neisseria gonorrhoeae
Streptococcus pneumoniae
β-hemolytic *Streptococcus*
viridans group *Streptococcus*
Neisseria meningitidis
Anaerobes

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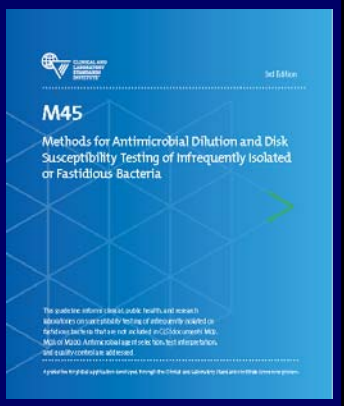
CAVEATS

Table 2B-5. Other Non-*Enterobacteriaceae* (Continued)

Test/Report Group	Antimicrobial Agent	Disk Content	Interpretive Categories and Zone Diameter Breakpoints, nearest whole mm			Interpretive Categories and MIC Breakpoints, µg/mL		
			S	I	R	S	I	R
PENICILLINS								
O	Piperacillin	–	–	–	–	≤16	32–64	≥128
β-LACTAM COMBINATION AGENTS								
B	Piperacillin-tazobactam	–	–	–	–	≤16/4	32/4–64/4	≥128/4
O	Ticarcillin-clavulanate	–	–	–	–	≤16/2	32/2–64/2	≥128/2
CEPHEMS (PARENTERAL) (including cephalosporins I, II, III, and IV. Please refer to Glossary I.)								
A	Ceftazidime	–	–	–	–	≤8	16	≥32
B	Cefepime	–	–	–	–	≤8	16	≥32
C	Cefotaxime	–	–	–	–	≤8	16–32	≥64
C	Ceftriaxone	–	–	–	–	≤8	16–32	≥64
O	Cefoperazone	–	–	–	–	≤16	32	≥64
O	Ceftizoxime	–	–	–	–	≤8	16–32	≥64
O	Moxalactam	–	–	–	–	≤8	16–32	≥64
MONOBACTAMS								
B	Aztreonam	–	–	–	–	≤8	16	≥32
CARBAPENEMS								
B	Imipenem	–	–	–	–	≤4	8	≥16
B	Meropenem	–	–	–	–	≤4	8	≥16
AMINOGLYCOSIDES								
A	Gentamicin	–	–	–	–	≤4	8	≥16
A	Tobramycin	–	–	–	–	≤4	8	≥16
B	Amikacin	–	–	–	–	≤16	32	≥64
O	Netilmicin	–	–	–	–	≤8	16	≥32
TETRACYCLINES								
(3) Organisms that are susceptible to tetracycline are also considered susceptible to doxycycline and minocycline. However, some org tetracycline may be susceptible to doxycycline, minocycline, or both.								
U	Tetracycline	–	–	–	–	≤4	8	≥16
O	Doxycycline	–	–	–	–	≤4	8	≥16
O	Minocycline	–	–	–	–	≤4	8	≥16
FLUOROQUINOLONES								
B	Ciprofloxacin	–	–	–	–	≤1	2	≥4
B	Levofloxacin	–	–	–	–	≤2	4	≥8



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FLUOROQUINOLONES

Organism	Method	Ciprofloxacin Previous			Ciprofloxacin New		
		S	I	R	S	I	R
Enterobacteriaceae	BMD	≤ 1	2	≥ 4	≤ 0.25	0.5	≥ 1
P. aeruginosa	BMD	≤ 1	2	≥ 4	≤ 0.5	1	≥ 2
Enterobacteriaceae	DD	≥ 21	16-20	≤ 15	≥ 26	22-25	≤ 21
P. aeruginosa	DD	≥ 21	16-20	≤ 15	≥ 25	19-24	≤ 18

Organism	Method	Levofloxacin Previous			Levofloxacin New		
		S	I	R	S	I	R
Enterobacteriaceae	BMD	≤ 2	4	≥ 8	≤ 0.5	1	≥ 2
P. aeruginosa	BMD	≤ 2	4	≥ 8	≤ 1	2	≥ 4
Enterobacteriaceae	DD	≥ 17	14-16	≤ 13	≥ 21	17-20	≤ 16
P. aeruginosa	DD	≥ 17	14-16	≤ 13	≥ 22	15-21	≤ 14

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WISCONSIN SURVEILLANCE

Organism	n	Ciprofloxacin Previous			Ciprofloxacin New		
		%S	%I	%R	%S	%I	%R
Escherichia coli	1114	80.4	0.1	19.5	77.4	2.2	20.4
Proteus mirabilis	916	78.5	3.6	17.9	76.0	1.4	22.6
Pseudomonas aeruginosa	801	86.8	3.7	9.5	82.4	4.4	13.2

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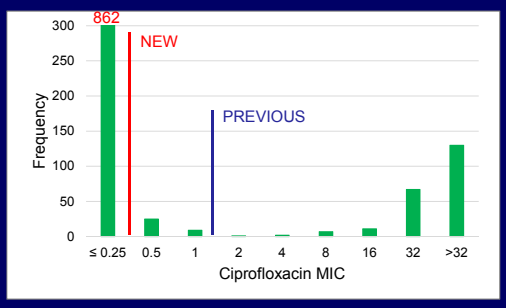
WISCONSIN SURVEILLANCE

Organism	n	Ciprofloxacin Previous			Ciprofloxacin New		
		%S	%I	%R	%S	%I	%R
Escherichia coli	1114	80.4	0.1	19.5	77.4	2.2	20.4
Proteus mirabilis	916	78.5	3.6	17.9	76.0	1.4	22.6
Pseudomonas aeruginosa	801	86.8	3.7	9.5	82.4	4.4	13.2



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WISCONSIN SURVEILLANCE

Organism	n	Levofloxacin Previous			Levofloxacin New		
		%S	%I	%R	%S	%I	%R
Escherichia coli	1114	80.6	0.4	18.9	79.5	0.9	19.6
Proteus mirabilis	916	83.0	2.5	14.5	76.9	2.5	20.6
Pseudomonas aeruginosa	801	86.3	4.6	9.1	81.1	5.1	13.7

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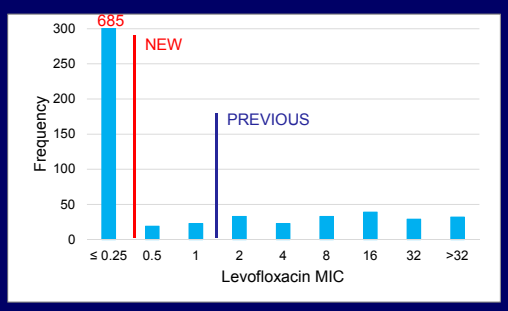
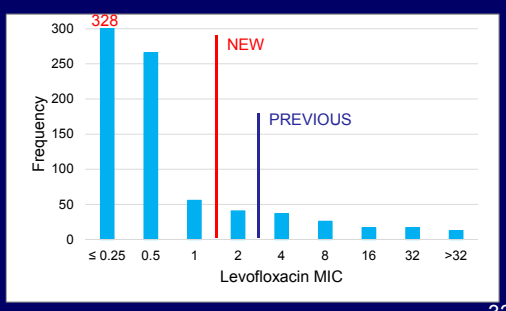
WISCONSIN SURVEILLANCE

Organism	n	Levofloxacin Previous			Levofloxacin New		
		%S	%I	%R	%S	%I	%R
Escherichia coli	1114	80.6	0.4	18.9	79.5	0.9	19.6
Proteus mirabilis	916	83.0	2.5	14.5	76.9	2.5	20.6
Pseudomonas aeruginosa	801	86.3	4.6	9.1	81.1	5.1	13.7





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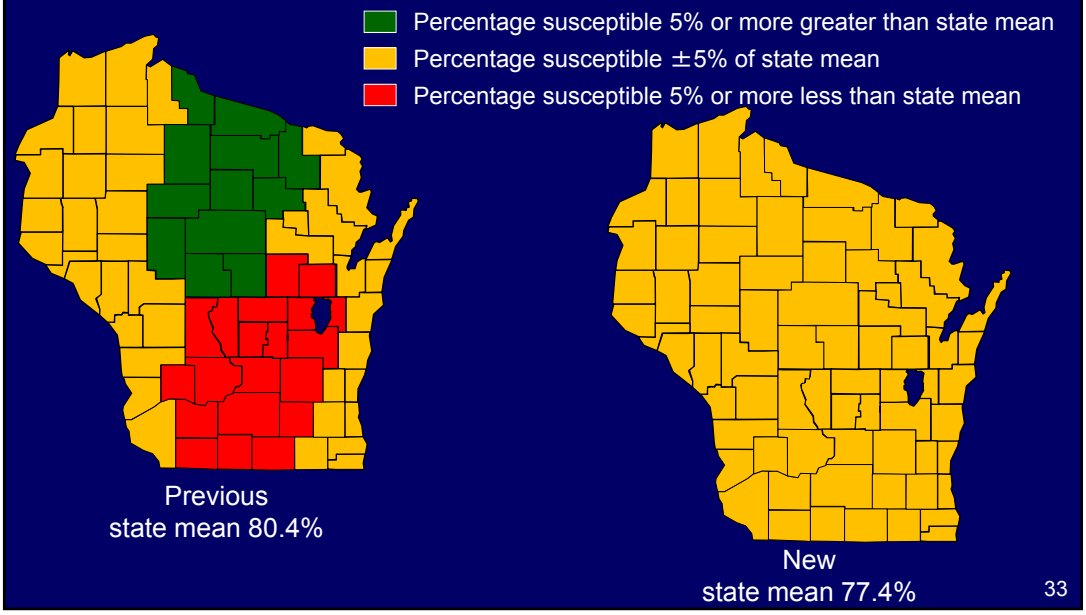
E. coli / CIPROFLOXACIN



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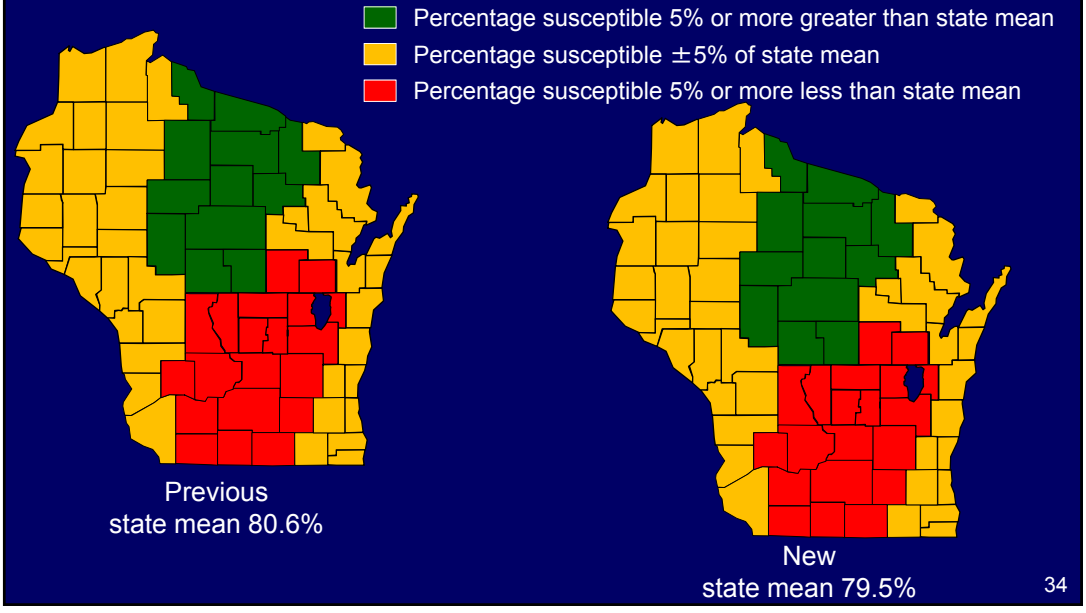
E. coli / LEVOFLOXACIN



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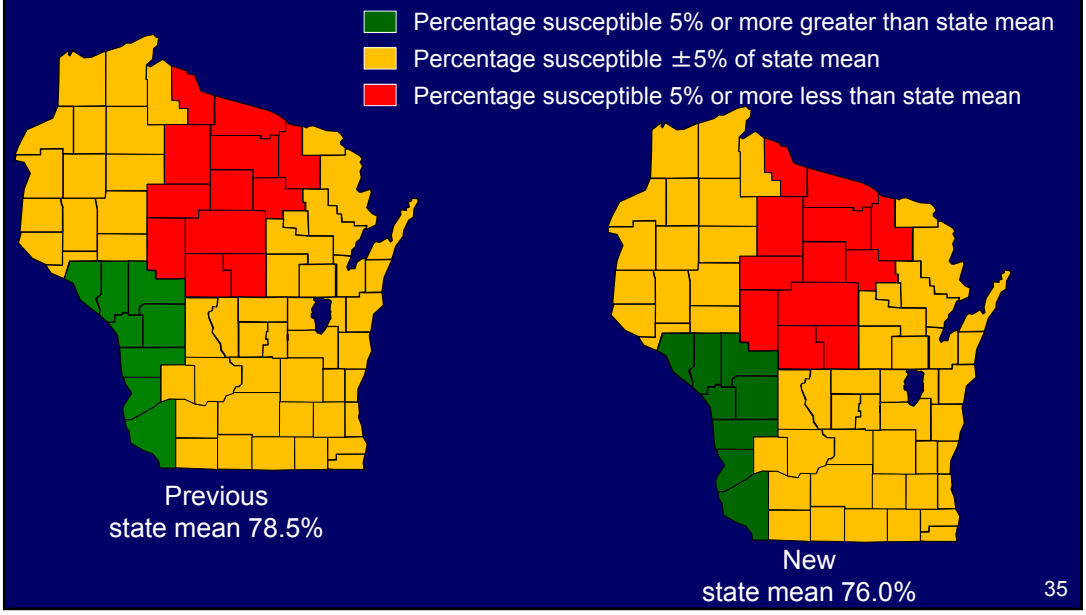
P. mirabilis / CIPROFLOXACIN



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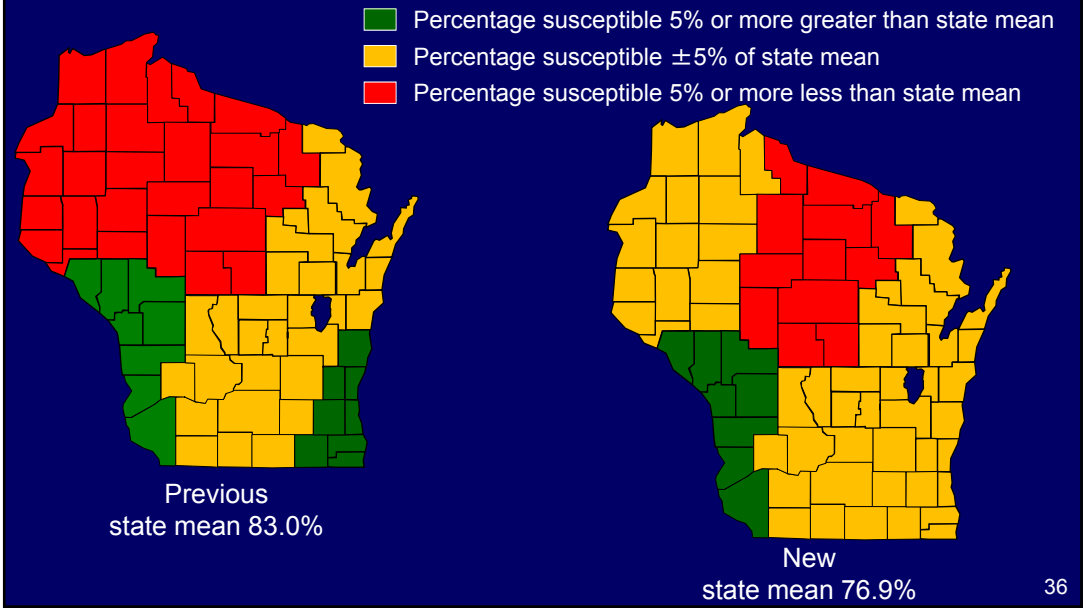
P. mirabilis / LEVOFLOXACIN



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CEFTAROLINE

Organism	Method	Ceftaroline Previous			Ceftaroline New		
		S	I	R	S	SDD	R
S. aureus (incl. MRSA)	BMD	≤ 1	2	≥ 4	≤ 1	2-4	≥ 8
S. aureus (incl. MRSA)	DD	≥ 24	21-23	≤ 20	≥ 25	20-24	≤ 19

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CEFTAROLINE

Organism	Method	Ceftaroline Previous			Ceftaroline New		
		S	I	R	S	SDD	R
S. aureus (incl. MRSA)	BMD	≤ 1	2	≥ 4	≤ 1	2-4	≥ 8
S. aureus (incl. MRSA)	DD	≥ 24	21-23	≤ 20	≥ 25	20-24	≤ 19

MIC	Number of Wisconsin Isolates
≤ 0.12	126
0.25	133
0.5	49
1	1
2	0
4	1
8	0

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SUSCEPTIBLE DOSE DEPENDENT

- Intermediate
  - Approach attainable blood and tissue levels but have less clinical response than “susceptible”
  - Also implies clinical efficacy in sites where agents are physiologically concentrated
- Susceptible dose dependent (multiple regimens)
  - Implies that susceptibility of isolate is dependent on dosing regimen
  - Higher dose or more-frequent dosing results in higher drug exposure

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REVISED LANGUAGE

- Appendix E lists doses used for establishing SDD; drug label should be consulted for recommended doses and adjustment for organ function
- SDD category may be assigned when doses well above “susceptible” breakpoint are/have:
  - Supported by literature
  - Widely used clinically
  - Sufficient data to justify

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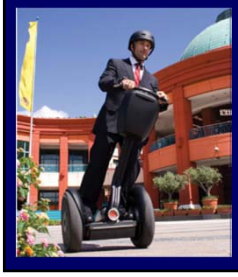
WISCONSIN SURVEILLANCE

Organism	n	% Cefepime Susceptible Dose Dependent (MIC 4-8 μg/mL)
Escherichia coli	1114	1.5
Proteus mirabilis	916	0.4
Enterobacter cloacae	277	4.7
Klebsiella pneumoniae	304	0.0



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DAPTOMYCIN

Organism	Method	Daptomycin Previous			Daptomycin New		
		S	I	R	S	SDD	R
Enterococcus spp.	BMD	≤ 4			≤ 1	2-4	≥ 8

- Should not be reported for respiratory isolates
- SDD breakpoint based on dosage regimen of 8-12 mg/kg per day in adults
- Intended for serious *Enterococcus* spp. infections

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OTHER TABLE 2 ADDITIONS

- Follow-up MIC testing for *Enterobacteriaceae* / ceftazidime-avibactam zone sizes of 18-20 mm (disk diffusion may overcall resistance)

Organism	Acceptable Methods				
	Cefoxitin MIC	Cefoxitin disk diffusion	Oxacillin MIC	Oxacillin disk diffusion	Oxacillin salt agar
S. aureus	Yes	Yes	Yes	No	Yes
S. lugdunensis	Yes	Yes	Yes	No	No
S. epidermidis	**No**	**Yes**	**Yes**	**Yes**	**No**
S. pseudintermedius	No	No	Yes	Yes	No
S. schleiferi	No	No	Yes	Yes	No
Other *Staphylococcus* spp. (not listed above)	No	Yes	Yes[a]	No	No

[a] For **other *Staphylococcus* spp.** with oxacillin MICs between 0.5–2 µg/mL, see comment (17) for recommendations on testing for *mecA* or for PBP2a.

Mechanisms of oxacillin resistance other than *mecA* are rare and include a novel *mecA* homologue, *mecC*.[3] MICs for strains with *mecC* are typically **cefoxitin resistant and oxacillin susceptible;** *mecC* resistance cannot be detected by tests directed at *mecA* or PBP2a.

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STAPHYLOCOCCI AND *mecA*

- Added *S. epidermidis*-specific breakpoints
  - Oxacillin disk diffusion
  - Oxacillin broth microdilution
  - Cefoxitin disk diffusion (cefoxitin MIC not reliable)
- Noteworthy revisions
  - Oxacillin disk diffusion not reliable for *S. aureus* and *S. lugdunensis*
  - Oxacillin MIC (0.5-2 µg/mL) may overcall resistance in staphylococci other than…*S. aureus S. schleiferi S. pseudintermedius S. lugdunensis S. epidermidis*

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MORE TABLE 2 ADDITIONS

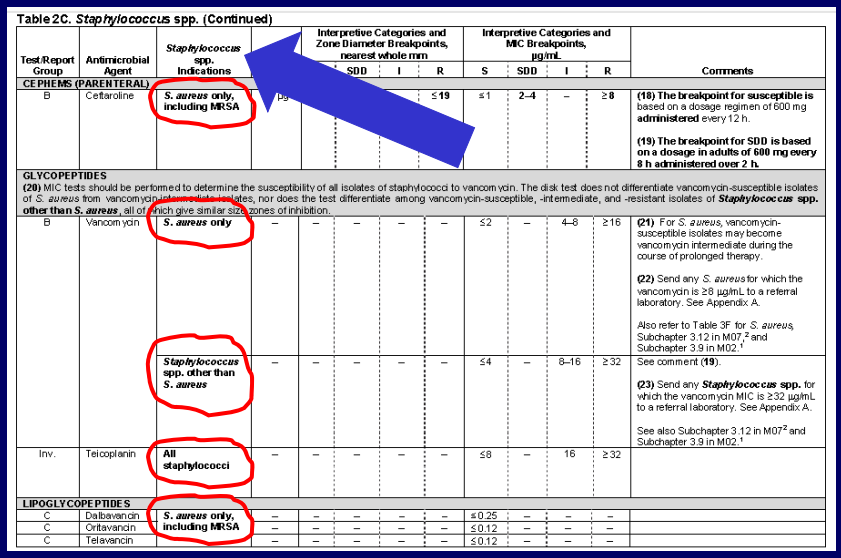

Table 2C. *Staphylococcus* spp. (Continued)

Test/Report Group	Antimicrobial Agent	*Staphylococcus* spp. Indications	Disk Content	Interpretive Categories and Zone Diameter Breakpoints, nearest whole mm				Interpretive Categories and MIC Breakpoints, µg/mL				Comments
				S	SDD	I	R	S	SDD	I	R	
CEPHEMS (PARENTERAL)												
B	Ceftaroline	***S. aureus* only, including MRSA**	5 µg				≤19	≤1	2–4	–	≥8	**(18) The breakpoint for susceptible is** based on a dosage regimen of 600 mg **administered** every 12 h. **(19) The breakpoint for SDD is based on a dosage in adults of 600 mg every 8 h administered over 2 h.**
GLYCOPEPTIDES												
(20) MIC tests should be performed to determine the susceptibility of all isolates of staphylococci to vancomycin. The disk test does not differentiate vancomycin-susceptible isolates of *S. aureus* from vancomycin-intermediate isolates, nor does the test differentiate among vancomycin-susceptible, -intermediate, and -resistant isolates of ***Staphylococcus* spp. other than *S. aureus***, all of which give similar size zones of inhibition.												
B	Vancomycin	***S. aureus* only**	–	–	–	–	–	≤2	–	4–8	≥16	**(21)** For *S. aureus*, vancomycin-susceptible isolates may become vancomycin intermediate during the course of prolonged therapy. **(22)** Send any *S. aureus* for which the vancomycin is ≥8 µg/mL to a referral laboratory. See Appendix A. Also refer to Table 3F for *S. aureus*, Subchapter 3.12 in M07,[2] and Subchapter 3.9 in M02.[1]
		Staphylococcus* spp. other than *S. aureus	–	–	–	–	–	≤4	–	8–16	≥32	See comment (**19**). **(23)** Send any ***Staphylococcus* spp.** for which the vancomycin MIC is ≥32 µg/mL to a referral laboratory. See Appendix A. See also Subchapter 3.12 in M07[2] and Subchapter 3.9 in M02.[1]
Inv.	Teicoplanin	**All staphylococci**	–	–	–	–	–	≤8	–	16	≥32	
LIPOGLYCOPEPTIDES												
C	Dalbavancin	***S. aureus* only, including MRSA**	–	–	–	–	–	≤0.25	–	–	–	
C	Oritavancin		–	–	–	–	–	≤0.12	–	–	–	
C	Telavancin		–	–	–	–	–	≤0.12	–	–	–	

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OTHER TABLE 2 DELETIONS

- Norfloxacin disk diffusion and MIC breakpoints

  Enterobacteriaceae *Pseudomonas aeruginosa*
  Staphylococcus spp. *Enterococcus* spp.
  Non-*Enterobacteriaceae* (MIC breakpoints)

- Telrithromycin disk diffusion and MIC breakpoints

  Staphylococcus spp. *Haemophilus influenzae*
  Haemophilus parainfluenzae
  Streptococcus pneumoniae

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OTHER TABLE 2 DELETIONS

- *N. gonorrhoeae* disk diffusion and MIC breakpoints

Cefuroxime	Cefmetazole
Ceftazidime	Cefetamet
Enoxacin	Fleroxacin
Lomefloxacin	Ofloxacin

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TABLE 2 CLARIFICATIONS

- Organisms susceptible to tetracycline also susceptible to doxycycline and minocycline; resistance to doxycycline and minocycline cannot be inferred by resistance to tetracycline

Haemophilus influenzae
Haemophilus parainfluenzae
Streptococcus pneumoniae
β-hemolytic *Streptococcus*
viridans group *Streptococcus*

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Table 3

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WHAT'S IN THERE?

- ESBL detection in *E. coli*, *K. pneumoniae*, *K. oxytoca*, *P. mirabilis*
- Carbapenemase production in *Enterobacteriaceae* and *Pseudomonas aeruginosa*

  2010 breakpoints: CarbaNP, mCIM, eCIM, molecular
  Current breakpoints: may not need additional tests

  No longer necessary to edit carbapenem results to resistant if a carbapenemase producer is detected

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WHAT ELSE IS IN THERE?

- β-lactamase detection *Staphylococcus* spp.
- Methicillin (oxacillin) resistance *Staphylococcus* spp.
- Vancomycin agar screen *Staphylococcus aureus* and *Enterococcus* spp.
- Inducible clindamycin resistance
- High-level mupirocin resistance *S. aureus*
- High-level aminoglycoside resist *Enterococcus* spp.

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Table 4

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TABLE 4

Table 4A-1
Nonfastidious Disk Diffusion QC Excluding β-Lactam Combination Agents
M02

E. coli ATCC 25922
P. aeruginosa ATCC 27853
S. aureus ATCC 25923

Table 4A-2
Nonfastidious Disk Diffusion QC for β-Lactam Combination Agents
M02

Same as left; add:
E. coli ATCC 35218
K. pneumoniae ATCC 700603
E. coli NCTC 13353
K. pneumoniae ATCC BAA-1705
K. pneumoniae ATCC BAA-2814
A. baumannii NCTC 13304

Table 4B
Fastidious Disk Diffusion QC
M02

H. influenzae ATCC 49247
H. influenzae ATCC 49766
N. gonorrhoeae ATCC 49226
S. pneumoniae ATCC 49619

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DISK DIFFUSION QC RANGES

- Noteworthy additions

  ATCC 25922 and ATCC 27853 range for tebipenem
  ATCC 49226 ranges for azithromycin, gepotidacin
  Acinetobacter baumannii NCTC 13304 as QC strain
  Caveat for imipenem-relebactam (one manufacturer)

- Noteworthy deletions

  Ranges for methicillin
  Ranges for mezlocillin
  Ranges for norfloxacin

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DISK DIFFUSION QC ADDED RANGES

E. coli ATCC 25922	cefepime-zidebactam imipenem-relebactam
P. aeruginosa ATCC 27853	cefepime-zidebactam imipenem-relebactam
K. pneumoniae ATCC 700603	cefepime; cefepime-zidebactam imipenem; imipenem-relebactam
E. coli NCTC 13353	cefepime; cefepime-zidebactam
K. pneumoniae ATCC BAA-1705	imipenem; imipenem-relebactam
K. pneumoniae ATCC BAA-2814	imipenem; imipenem-relebactam
A. baumannii NCTC 13304	cefepime; cefepime-zidebactam

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Table 5

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TABLE 5

Table 5A-1
Nonfastidious MIC QC Excluding β-Lactam Combination Agents
M07

E. coli ATCC 25922
P. aeruginosa ATCC 27853
S. aureus ATCC 29213
E. faecalis ATCC 29212

Table 5A-2
Nonfastidious MIC QC for β-Lactam Combination Agents
M07

Same as left; add:
E. coli ATCC 35218
K. pneumoniae ATCC 700603
E. coli NCTC 13353
K. pneumoniae ATCC BAA-1705
K. pneumoniae ATCC BAA-2814
A. baumannii NCTC 13304

Table 5B
Fastidious MIC QC Broth Dilution
M07

H. influenzae ATCC 49247
H. influenzae ATCC 49766
N. gonorrhoeae ATCC 49226 (agar dilution)
S. pneumoniae ATCC 49619

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MORE TABLE 5

Table 5D
Anaerobe MIC QC
Agar Dilution
M11

Table 5E
Anaerobe MIC QC
Broth Microdilution
M11

B. fragilis ATCC 25285
B. thetaiotaomicron ATCC 29741
C. difficile ATCC 700057
E. lenta ATCC 43055

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MIC QC RANGES

- Noteworthy additions

  ATCC 27853 range for meropenem
  QC ranges established for tebipenem

- Noteworthy revisions

  ATCC 27853 range for ciprofloxacin
  ATCC 35218 and NCTC 13353 for cefepime

- Noteworthy deletions

  Ranges for methicillin, norfloxacin
  Ranges for mezlocillin (including anaerobe agar dilution)

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MIC QC ADDED RANGES

E. coli ATCC 25922	meropenem-nacubactam; nacubactam
P. aeruginosa ATCC 27853	meropenem-nacubactam; nacubactam
E. coli ATCC 35218	cefpodoxime
K. pneumoniae ATCC 700603	cefpodoxime
E. coli NCTC 13353	cefpodoxime
K. pneumoniae ATCC BAA-2814	meropenem-nacubactam; nacubactam

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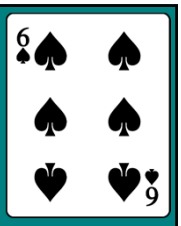

Tables 6-8

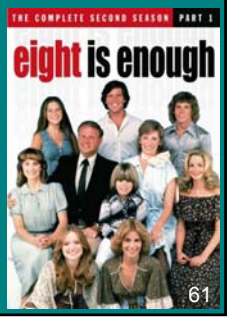

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TABLE 6 PREPARING STOCK SOLNS

- Added solvent and diluent information for:

  Nacubactam
  Tebipenem
  Zidebactam

- Prep instructions for meropenem/nacubactam
- Deleted solvent and diluent information for:

  Methicillin
  Mezlocillin
  Norfloxacin

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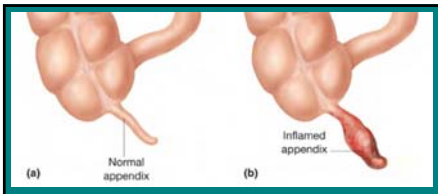

Appendices

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APPENDIX A; SUGGESTED CONFIRM

Appendix A. (Continued)

Organism or Organism Group	Resistance Phenotype Detected[a]	Occurrence and Significance of Resistance and Actions to Take Following Confirmation of Results[a]		
		Category I	Category II	Category III
		Not reported or only rarely reported to date	Uncommon in most institutions	May be common but generally considered of epidemiological concern
Stenotrophomonas maltophilia	Trimethoprim-sulfamethoxazole – I or R		x	
Haemophilus influenzae	Carbapenem – NS Ceftaroline – NS Extended-spectrum cephalosporin[c] – NS Fluoroquinolone – NS	x		
	Amoxicillin-clavulanate – R Ampicillin – R and β-lactamase negative		x	
Neisseria gonorrhoeae	**Azithromycin – NS**		**x**	
	Extended-spectrum cephalosporin[c] – NS		x	
	Fluoroquinolone – I or R			x
Neisseria meningitidis	Ampicillin or penicillin – R Extended-spectrum cephalosporin[c] – NS Meropenem – NS	x		
	Ampicillin or penicillin – I Azithromycin – NS Chloramphenicol – I or R Fluoroquinolone – I or R Minocycline – NS Rifampin – I or R		x	
Enterococcus spp.	Dalbavancin – NS Oritavancin – NS Telavancin – NS	x		
	Daptomycin – NS Linezolid – R Tedizolid – NS		x	
	High-level aminoglycoside – R Vancomycin – R			x

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APPENDIX B; INTRINSIC RESISTANT

Appendix B. (Continued)

B1. *Enterobacteriaceae*

Organism \ Antimicrobial Agent	Ampicillin	Amoxicillin-clavulanate	Ampicillin-sulbactam	Piperacillin	Ticarcillin	Cephalosporins I: Cefazolin, Cephalothin	Cephamycins: Cefoxitin, Cefotetan	Cephalosporin II: Cefuroxime	Imipenem	Tetracyclines	Tigecycline	Nitrofurantoin	Polymyxin B Colistin	Aminoglycosides
Citrobacter freundii	R	R	R			R	R	R						
Citrobacter koseri, ***Citrobacter amalonaticus* group**[a]	R				R									
Enterobacter cloacae complex[b]	R	R	R			R	R							
Escherichia coli	There is no intrinsic resistance to β-lactams in this organism.													
Escherichia hermannii	R				R									
Hafnia alvei	R	R	R			R	R							
Klebsiella (formerly *Enterobacter*) *aerogenes*	R	R	R			R	R							
Klebsiella pneumoniae, ***Klebsiella oxytoca*, *Klebsiella variicola***	R				R									
Morganella morganii	R	R				R		R	[c]		R	R	R	
Proteus mirabilis	There is no intrinsic resistance to penicillins and cephalosporins in this organism.								[c]	R	R	R	R	
Proteus penneri	R					R		R	[c]	R	R	R	R	
Proteus vulgaris	R					R		R	[c]	R	R	R	R	
Providencia rettgeri	R	R				R			[c]	R	R	R	R	
Providencia stuartii	R	R				R			[c]	R	R	R	R	[d]
***Raoultella* spp.**[e]	**R**				**R**									

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APPENDIX B; INTRINSIC RESISTANT

B2. Non-*Enterobacteriaceae*

Organism \ Antimicrobial Agent	Ampicillin, Amoxicillin	Piperacillin	Ticarcillin	Ampicillin-sulbactam	Amoxicillin- clavulanate	Piperacillin-tazobactam	Cefotaxime	Ceftriaxone	Ceftazidime	Cefepime	Aztreonam	Imipenem	Meropenem	Ertapenem	Polymyxin B Colistin	Aminoglycosides	Tetracyclines/ Tigecycline	Trimethoprim	Trimethoprim-sulfamethoxazole	Chloramphenicol	Fosfomycin
Acinetobacter baumannii/ Acinetobacter calcoaceticus complex	R				R						R			R				R		R	R
***Burkholderia cepacia* complex**[a]	**R**	**R**	**R**	**R**	**R**	[a]	[a]	[a]		[a]	[a]	[a]		**R**	**R**	[a]		[a]			R
Pseudomonas aeruginosa	R			R	R		R	R						R			R	R	R	R	
Stenotrophomonas maltophilia	R	R	R	R	R	R	R	R			R	R	R	R		R	[b]	R			R

Abbreviation: R, resistant.

** [a] insufficient *in vitro* / *in vivo* correlation

Additional tables for *Staphylococcus* spp., *Enterococcus* spp., *Bacteroides* spp.; select *Clostridium* spp., *Fusobacterium* spp.

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APPENDIX C; QC STRAINS

Appendix C. (Continued)

QC Strains	Organism Characteristics	Disk Diffusion Tests	MIC Tests	Other Tests	Comments
Escherichia coli ATCC® 25922	• β-lactamase negative	• Nonfastidious gram-negative bacteria • *Neisseria meningitidis*	• Nonfastidious gram-negative bacteria • *N. meningitidis*		
E. coli ATCC® 35218[a,b,1,2]	• TEM-1	• β-lactam combination agents	• β-lactam combination agents		
E. coli NCTC 13353[a,b,3]	• CTX-M-15 (ESBL)	• β-lactam combination agents	• β-lactam combination agents		
Haemophilus influenzae ATCC® 10211					• Assess each batch/lot of HTM for growth capabilities.
H. influenzae ATCC® 49247	• BLNAR	• *H. influenzae* • *Haemophilus parainfluenzae*	• *H. influenzae* • *H. parainfluenzae*		
H. influenzae ATCC® 49766	• Ampicillin susceptible	• *H. influenzae* • *H. parainfluenzae*	• *H. influenzae* • *H. parainfluenzae*		• More reproducible than *H. influenzae* ATCC® 49247 with selected β-lactam agents
Klebsiella pneumoniae ATCC® 700603[a,b]	• SHV-18 (ESBL)[1,2] • OXA-2 • Mutations in OMPK35 and OMPK37	• β-lactam combination agents	• β-lactam combination agents	• ESBL tests	
K. pneumoniae ATCC® BAA-1705™[a,b]	• KPC-2 (carbapenemase) • TEM • SHV	• β-lactam combination agents	• β-lactam combination agents	• Carbapenemase tests	
K. pneumoniae ATCC® BAA-1706™	• Resistant to carbapenems by noncarbapenemase mechanism			• Carbapenemase tests	
***K. pneumoniae* ATCC® BAA-2146™**	• **NDM**			• **Carbapenemase tests**	

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APPENDIX D; N ANTIBIOGRAM

Appendix D. Cumulative Antimicrobial Susceptibility Report for Anaerobic Organisms[1]

NOTE: Isolates collected from selected US hospitals from 1 January 2013 to 31 December 2016.[a]

Six US laboratories
Agar dilution

D1. *Bacteroides* spp. and *Parabacteroides* spp.

Anaerobic Organisms	Number of Strains	Ampicillin-sulbactam		Number of Strains	Piperacillin-tazobactam		Number of Strains	Cefoxitin		Number of Strains	Ertapenem		Number of Strains	Imipenem		Number of Strains	Meropenem	
Percent susceptible (%S) and percent resistant (%R)[c]		%S	%R		%S	%R		%S	%R		%S	%R		%S	%R		%S	%R
Breakpoints, µg/mL		≤ 8/4	≥ 32/16		≤16/4	≥ 128/4		≤ 16	≥64		≤4	≥ 16		≤4	≥ 16		≤4	≥16
B. fragilis	129	84	2	1030	96	1	830	100	0	133	82	14	189	97	1	1505	93	5
B. thetaiotaomicron	76	82	5	252	87	0	258	13	54	–	–	–	70	100	0	328	99	0
B. ovatus	30	80	3	206	94	0	177	20	34	19[b]	84[b]	16[b]	49	100	0	236	95	1
B. vulgatus	20[b]	45[b]	15[b]	168	92	0	153	73	14	–	–	–	35	97	0	171	96	4
B. uniformis	19[b]	84[b]	0[b]	78	96	0	72	85	10	–	–	–	19[b]	100[b]	0[b]	93	100	0
Parabacteroides distasonis	27[b]	59[b]	19[b]	92	95	1	82	29	43	–	–	–	26[b]	100[b]	0	119	97	2

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APPENDIX D; N ANTIBIOGRAM

D2. Anaerobic Organisms Other Than *Bacteroides* spp. and *Parabacteroides* spp.

Anaerobic Organisms	Number of Strains	Ampicillin-sulbactam		Number of Strains	Piperacillin-tazobactam		Number of Strains	Imipenem		Number of Strains	Meropenem		Number of Strains	Penicillin	
Percent susceptible (%S) and percent resistant (%R)[b]		%S	%R		%S	%R		%S	%R		%S	%R		%S	%R
Breakpoints, µg/mL		≤ 8/4	≥ 32/16		≤ 32/4	≥ 128/4		≤ 4	≥ 16		≤ 4	≥ 16		≤ 0.5	≥ 2
Prevotella spp.	29[c]	97[c]	3[c]	63	100	0	29[c]	100	0	92	98	0	63	100	0
Fusobacterium spp.	20[c]	100[c]	0[c]	55	96	2	75	95	4	20[c]	100[c]	0[c]	–[d]	–[d]	–[d]
Anaerobic gram-positive cocci[e]	–[d]	–[d]	–[d]	1853	99	1	134	99	0	1647	100	0	1647	100	0
Cutibacterium (formerly *Propionibacterium*) *acnes*[f]	–[d]	–[d]	–[d]	18[c]	100[c]	0[c]	17[c]	94[c]	0[d]	–[d]	–[d]	–[d]	–[d]	–[d]	–[d]
Clostridium perfringens	15[c]	100[c]	0	410	100	0	23[c]	100[c]	0[c]	417	100	0	402	90	4
Clostridioides (formerly *Clostridium*) *difficile*[g]	76	99	0	542	93	0	480	69	4	609	99	0	533	6	37
Other *Clostridium* spp.	–[d]	–[d]	–[d]	439	94	1	71	99	0	390	100	0	390	69	13

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APPENDIX E; S and SDD DOSING

Appendix E. Dosage Regimens Used to Establish Susceptible or Susceptible-Dose Dependent Breakpoints

The evolving science of pharmacokinetics-pharmacodynamics has become increasingly important in recent years in determining minimal inhibitory concentration (MIC) breakpoints. Recently approved susceptible or susceptible-dose dependent (SDD) breakpoints for a number of agents have been based on a specific dosage regimen(s); these dosage regimens are listed in the table below. Proper application of the breakpoints necessitates drug exposure at the site of infection that corresponds to or exceeds the expected systemic drug exposure at the dose listed in adult patients with normal renal function. This information should be shared with pharmacists, infectious diseases staff, and others making dosing recommendations for the institution.

Antimicrobial Agent	Breakpoints and Interpretive Categories			
	Susceptible		SDD	
	MIC	Dose	MIC	Dose
Table 2A. *Enterobacteriaceae*				
Azithromycin (*Salmonella* Typhi)	≤ 16 µg/mL	500 mg **administered** daily	N/A	
Aztreonam	≤ 4 µg/mL	1 g **administered** every 8 h	N/A	
Cefazolin	≤ 2 µg/mL	2 g **administered** every 8 h	N/A	
Ceftaroline	≤ 0.5 µg/mL	600 mg **administered** every 12 h	N/A	
Cefepime	≤ 2 µg/mL	1 g **administered** every 12 h	4 µg/mL	1 g **administered** every 8 h or 2 g **administered** every 12 h
			8 µg/mL or zone diameter: 19–24 mm	2 g **administered** every 8 h (Because it is not possible to correlate specific zone diameters with specific MICs, an isolate with a zone diameter in the SDD range should be treated as if it might be an MIC of 8 µg/mL.)

Big susceptible dose dependent Q & A in Appendix F

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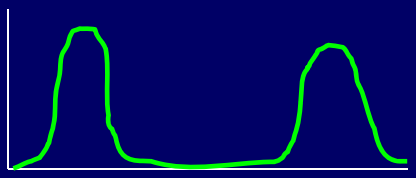
EPIDEMIOLOGICAL CUTOFF VALUE

- MIC values that separate bacterial populations into those that have (don't have) resistance mechanisms strictly on basis of phenotype
- Strictly *in vitro*;
  no clinical correlation



- Wild type below ECV
  Non-wild type above ECV (presumed resistant)

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ECV DETERMINATION

- Only within same species
- Use a CLSI reference method for testing
- ≥ 100 unique strains; ≥ 3 laboratories
- Must be "on-scale"; lowest concentration tested cannot be the mode
- Data can be augmented with molecular profiles

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APPENDIX G; ECV

Table G1. ECVs for *Enterobacteriaceae*

Antimicrobial Agent	Disk Content	Zone Diameter ECV, mm		MIC ECV, µg/mL		Comments
		WT	NWT	WT	NWT	
Azithromycin[1-6]	15 µg	≥16	≤15	≤8	≥16	For use with *Shigella flexneri*. See Table 2A for azithromycin and *Salmonella* spp.
	–	–	–	≤16	≥32	For use with *Shigella sonnei*.
Colistin	–	–	–	≤2	≥4	For use with *Klebsiella* (formerly *Enterobacter*) *aerogenes*, *Enterobacter cloacae*, *Escherichia coli*, *Klebsiella pneumoniae*, and *Raoultella ornithinolytica*. The only approved method for testing colistin is MIC by broth microdilution. Disk diffusion and gradient diffusion methods should not be used. **The MICs obtained from testing colistin predict MICs for polymyxin B.**

Abbreviations: ECV, epidemiological cutoff value; MIC, minimal inhibitory concentration; NWT, non-wild-type; WT, wild-type.

Table G2. ECVs for Specific Anaerobic Species

Antimicrobial Agent	MIC ECV, µg/mL		Comments
	WT	NWT	
Vancomycin	≤2	≥4	For use with *Cutibacterium* (formerly *Propionibacterium*) *acnes*[1-4] and *Clostridioides* (formerly *Clostridium*) *difficile*.[5-7]

Abbreviations: ECV, epidemiological cutoff value; MIC, minimal inhibitory concentration; NWT, non-wild-type; WT, wild-type.

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APPENDIX H; MOLECULAR ASSAYS

- Strategies for reporting methicillin (oxacillin) results when using molecular/phenotypic AST methods for *S. aureus*
- Strategies for reporting vancomycin results when using molecular/phenotypic AST methods for *Enterococcus* spp.
- Reporting results from ESBL and carbapenemase molecular tests for *Enterobacteriaceae*

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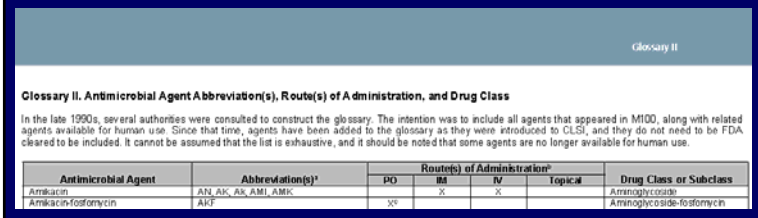
GLOSSARIES

Glossary I

Glossary I (Part 1). β-Lactams: Class and Subclass Designations and Generic Name

In the late 1990s, several authorities were consulted to construct the glossary. The intention was to include all agents that appeared in M100, along with related agents available for human use. Since that time, agents have been added to the glossary as they were introduced to CLSI, and they do not need to be FDA cleared to be included. It cannot be assumed that the list is exhaustive, and it should be noted that some agents are no longer available for human use.

Antimicrobial Class	Antimicrobial Subclass(es)		Agent(s) Included; Generic Name(s)
Penicillins	Penicillinase-labile penicillins[a]	Penicillin	Penicillin
		Aminopenicillins	Amoxicillin Ampicillin
		Carboxypenicillins	Carbenicillin Ticarcillin
		Ureidopenicillins	Azlocillin Piperacillin
	Penicillinase-stable penicillins[b]		Cloxacillin Dicloxacillin Nafcillin Oxacillin
	Aminopenicillin		Mecillinam



Glossary II

Glossary II. Antimicrobial Agent Abbreviation(s), Route(s) of Administration, and Drug Class

In the late 1990s, several authorities were consulted to construct the glossary. The intention was to include all agents that appeared in M100, along with related agents available for human use. Since that time, agents have been added to the glossary as they were introduced to CLSI, and they do not need to be FDA cleared to be included. It cannot be assumed that the list is exhaustive, and it should be noted that some agents are no longer available for human use.

Antimicrobial Agent	Abbreviation(s)[a]	Route(s) of Administration[b]				Drug Class or Subclass
		PO	IM	IV	Topical	
Amikacin	AN, AK, Ak, AMI, AMK		X	X		Aminoglycoside
Amikacin-fosfomycin	AKF	X[c]				Aminoglycoside-fosfomycin

Additions

meropenem-nacubactam
tebipenem
imipenem-relebactam

Deletions

methicillin
mezlocillin
norfloxacin

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