

<b><i>Acinetobacter baumannii</i></b> (n=2,723 from 75 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin-Sulbactam</b>	43% (28-64)	2,084	60
<b>Piperacillin-Tazobactam</b>	27% (19-54)	1,776	48
<b>Ceftriaxone</b>	10% (0-18)	1,320	45
<b>Ceftazidime</b>	27% (16-50)	1,894	61
<b>Cefepime</b>	40% (25-67)	1,139	34
<b>Imipenem</b>	27% (11-51)	1,120	25
<b>Meropenem</b>	39% (25-75)	1,436	48
<b>Amikacin</b>	36% (25-62)	1,925	45
<b>Gentamicin</b>	37% (28-65)	2,661	72
<b>Tobramycin</b>	40% (25-61)	2,084	56
<b>Ciprofloxacin</b>	27% (14-54)	2,030	58
<b>Levofloxacin</b>	26% (14.5-42.5)	1,985	52
<b>Trimethoprim/ Sulfamethoxazole</b>	48% (38-71)	2,287	66
<b>Minocycline</b>	79% (50-80)	154	5
<b>Tigecycline</b>	79% (70-100)	424	14

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:** The observed patterns of antibiotic resistance are worrisome. Caution should be used with tigecycline due to FDA black-box warnings of reduced clinical efficacy. Susceptibility of minocycline was tested in relatively few hospitals (n=5) and clinical experience with minocycline in treatment of *A. baumannii* is limited.

<b><i>Citrobacter freundii</i></b> (n=1,720 from 45 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Piperacillin-Tazobactam</b>	83% (81-95)	1,604	40
<b>Ceftriaxone</b>	79% (73.5-89)	1,629	42
<b>Ceftazidime</b>	80% (77-91)	1,370	36
<b>Cefepime</b>	98% (97.5-100)	1,579	37
<b>Ertapenem</b>	100% (100-100)	1,100	22
<b>Imipenem</b>	98% (97.5-100)	361	13
<b>Meropenem</b>	98% (100-100)	1,329	28
<b>Amikacin</b>	99% (100-100)	1,517	38
<b>Gentamicin</b>	92% (89-100)	1,720	44
<b>Tobramycin</b>	92% (89-100)	916	30
<b>Ciprofloxacin</b>	91% (88-97.5)	1,490	37
<b>Levofloxacin</b>	90% (86-95)	901	29
<b>Trimethoprim/ Sulfamethoxazole</b>	82% (76-90)	1,683	44
<b>Nitrofurantoin</b>	95% (94-100)	1,443	42
<b>Tigecycline</b>	100% (100-100)	254	11

<b><i>Citrobacter koseri</i></b> (n=561 from 19 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin-Sulbactam</b>	90% (69.5-93.5)	85	4
<b>Piperacillin-Tazobactam</b>	99% (98-100)	549	17
<b>Ceftriaxone</b>	96% (91-100)	527	17
<b>Ceftazidime</b>	97% (93-100)	383	14
<b>Cefepime</b>	99% (100-100)	483	16
<b>Cefazolin</b>	93% (85-96)	498	18
<b>Ertapenem</b>	100% (100-100)	248	9
<b>Imipenem</b>	99% (100-100)	161	5
<b>Meropenem</b>	100% (100-100)	364	11
<b>Amikacin</b>	99% (100-100)	450	16
<b>Gentamicin</b>	99% (100-100)	561	19
<b>Tobramycin</b>	97% (92-100)	427	14
<b>Ciprofloxacin</b>	99% (100-100)	372	14
<b>Levofloxacin</b>	98% (96-100)	450	14
<b>Trimethoprim/ Sulfamethoxazole</b>	96% (90-100)	550	18
<b>Nitrofurantoin</b>	86% (86-95)	542	18
<b>Tigecycline</b>	100% (100-100)	61	3

<b>Enterobacter species</b> (n=8,911 from 71 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Piperacillin-Tazobactam</b>	81% (74-88)	8,508	66
<b>Ceftriaxone</b>	79% (73-85)	7,918	61
<b>Ceftazidime</b>	81% (74-88)	6,816	55
<b>Cefepime</b>	96% (94-100)	8,044	58
<b>Ertapenem</b>	95% (93-100)	5,333	36
<b>Imipenem</b>	94% (92-100)	2,138	30
<b>Meropenem</b>	99% (99-100)	6,770	47
<b>Amikacin</b>	100% (100-100)	7,207	59
<b>Gentamicin</b>	97% (96-100)	8,818	69
<b>Tobramycin</b>	97% (93-100)	5,022	56
<b>Ciprofloxacin</b>	96% (94-100)	7,331	57
<b>Levofloxacin</b>	95% (93-100)	4,605	54
<b>Trimethoprim/ Sulfamethoxazole</b>	92% (87-100)	8,510	68
<b>Nitrofurantoin</b>	35% (18-47)	5,735	56
<b>Tigecycline</b>	99% (100-100)	1,650	12

<b><i>Escherichia coli</i></b> (n=143,153 from 82 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin</b>	38% (34-49)	15,318	73
<b>Ampicillin-Sulbactam</b>	50% (33-54)	59,750	62
<b>Piperacillin-Tazobactam</b>	94% (88-96)	135,592	79
<b>Ceftriaxone</b>	87% (71-91)	136,184	77
<b>Ceftazidime</b>	89% (75-94)	118,505	64
<b>Cefepime</b>	89% (59-94)	128,176	70
<b>Cefazolin</b>	83% (57-86)	123,386	67
<b>Ertapenem</b>	100% (99-100)	89,252	42
<b>Imipenem</b>	100% (99-100)	27,115	36
<b>Meropenem</b>	100% (99-100)	11,374	50
<b>Amikacin</b>	99% (97-100)	123,826	73
<b>Gentamicin</b>	88% (72-89)	142,208	80
<b>Tobramycin</b>	83% (51-88)	67,642	62
<b>Ciprofloxacin</b>	73% (30-76)	122,656	66
<b>Levofloxacin</b>	67% (21-71.5)	69,750	64
<b>Trimethoprim/ Sulfamethoxazole</b>	67% (50-69)	141,267	81
<b>Nitrofurantoin</b>	96% (94-97)	129,730	72
<b>Tigecycline</b>	100% (100-100)	8,523	14

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**

Percent susceptible for oral agents for management of urinary tract infection, particularly trimethoprim-sulfamethoxazole and fluoroquinolones, is relatively low. Nitrofurantoin remains highly active, but is only indicated for cystitis (see note on page 6).

<b><i>Klebsiella oxytoca</i></b> (n=3,248 from 49 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin-Sulbactam</b>	66% (58-73)	1,693	39
<b>Piperacillin-Tazobactam</b>	93% (90-99)	2,844	47
<b>Ceftriaxone</b>	93% (89-98)	2,842	44
<b>Ceftazidime</b>	96% (90-100)	2,448	39
<b>Cefepime</b>	97% (94-100)	2,772	41
<b>Cefazolin</b>	53% (41.5-74)	2,604	41
<b>Ertapenem</b>	100% (100-100)	1,890	26
<b>Imipenem</b>	100% (100-100)	717	16
<b>Meropenem</b>	100% (100-100)	2,408	34
<b>Amikacin</b>	100% (100-100)	2,679	43
<b>Gentamicin</b>	96% (94-100)	2,948	
<b>Tobramycin</b>	94% (90-97)	1,692	35
<b>Ciprofloxacin</b>	95% (93-100)	2,588	38
<b>Levofloxacin</b>	95% (91-98)	1,358	33
<b>Trimethoprim/ Sulfamethoxazole</b>	91% (86-96)	2,780	46
<b>Nitrofurantoin</b>	85% (81.5-92)	2,046	42
<b>Tigecycline</b>	100% (100-100)	479	11

<b><i>Klebsiella pneumoniae</i></b> (n=30,629 from 80 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin-Sulbactam</b>	71% (25.5-82)	13,763	59
<b>Piperacillin-Tazobactam</b>	87% (61-92)	24,936	72
<b>Ceftriaxone</b>	85% (45-93)	25,145	73
<b>Ceftazidime</b>	86% (18-93)	20,712	66
<b>Cefepime</b>	87% (39-94)	23,744	64
<b>Cefazolin</b>	81% (33-91)	21,631	63
<b>Ertapenem</b>	96% (83-100)	15,606	40
<b>Imipenem</b>	90% (69.5-97)	6,529	33
<b>Meropenem</b>	97% (94-100)	19,382	50
<b>Amikacin</b>	95% (81-99)	24,501	68
<b>Gentamicin</b>	90% (61-95)	25,802	75
<b>Tobramycin</b>	84% (42-90)	15,356	62
<b>Ciprofloxacin</b>	86% (42-93)	21,942	63
<b>Levofloxacin</b>	84% (44-90)	13,646	60
<b>Trimethoprim/ Sulfamethoxazole</b>	83% (50-87.5)	24,970	75
<b>Nitrofurantoin</b>	35% (23-41)	20,500	65
<b>Tigecycline</b>	93% (80-100)	1,948	11

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**  
Susceptibility of *K. pneumoniae* to meropenem remains relatively stable compared to data from 2015.

<b><i>Morganella morganii</i></b> (n=2,300 from 53 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin-Sulbactam</b>	10% (2-14)	1,362	38
<b>Piperacillin-Tazobactam</b>	96% (95-100)	2,223	52
<b>Ceftriaxone</b>	85% (78-93)	2,037	48
<b>Ceftazidime</b>	78% (70-86)	1,747	41
<b>Cefepime</b>	96% (94-100)	2,077	45
<b>Ertapenem</b>	100% (100-100)	1,300	28
<b>Imipenem</b>	55% (35-78)	439	16
<b>Meropenem</b>	99% (100-100)	1,599	33
<b>Amikacin</b>	99% (100-100)	2,119	47
<b>Gentamicin</b>	73% (65-83)	2,240	51
<b>Tobramycin</b>	85% (76-93)	1,325	38
<b>Ciprofloxacin</b>	63% (44-79)	1,876	43
<b>Levofloxacin</b>	54% (36-67)	1,401	40
<b>Trimethoprim/ Sulfamethoxazole</b>	56% (42-68)	2,178	52

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**

*Proteus*, *Providencia*, and *Morganella* are intrinsically less susceptible to imipenem than to meropenem. Imipenem should not be used to classify *Proteus* / *Providencia* / *Morganella* isolates as CRE.



<b><i>Proteus mirabilis</i></b> (n=19,503 from 80 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ampicillin</b>	70% (54-76)	17,791	72
<b>Ampicillin-Sulbactam</b>	77% (69-83)	9,969	57
<b>Piperacillin-Tazobactam</b>	97% (95-100)	17,599	76
<b>Ceftriaxone</b>	87% (76-96)	17,582	74
<b>Ceftazidime</b>	91% (81-98)	14,857	65
<b>Cefepime</b>	92% (75-99)	16,487	66
<b>Cefazolin</b>	74% (59-83)	16,657	67
<b>Ertapenem</b>	99% (99-100)	10,454	41
<b>Imipenem</b>	69% (12-91)	2,583	21
<b>Meropenem</b>	97% (98-100)	13,057	49
<b>Amikacin</b>	99% (98-100)	15,833	67
<b>Gentamicin</b>	83% (74-90)	18,733	78
<b>Tobramycin</b>	82% (75-90)	11,239	61
<b>Ciprofloxacin</b>	67% (39-79)	15,154	63
<b>Levofloxacin</b>	62% (41-70)	11,572	65
<b>Trimethoprim/ Sulfamethoxazole</b>	68% (54-75)	18,603	79

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**

*Proteus*, *Providencia*, and *Morganella* are intrinsically less susceptible to imipenem than to meropenem. Imipenem should not be used to classify *Proteus* / *Providencia* / *Morganella* isolates as CRE.

<b><i>Pseudomonas aeruginosa</i></b> (n=23,921 from 83 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Piperacillin-Tazobactam</b>	85% (79-93)	23,524	82
<b>Ceftazidime</b>	81% (71-90)	20,258	72
<b>Cefepime</b>	85% (75.5-90)	21,045	71
<b>Imipenem</b>	80% (62-88)	12,142	44
<b>Meropenem</b>	84% (74-93)	17,770	52
<b>Amikacin</b>	96% (94-98)	22,185	78
<b>Gentamicin</b>	85% (76-91)	23,575	81
<b>Tobramycin</b>	93% (90-97)	21,464	72
<b>Ciprofloxacin</b>	73% (57-83)	19,554	68
<b>Levofloxacin</b>	65% (50-71)	16,206	67

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**

Carbapenem resistance among *Pseudomonas* spp. is relatively common in Los Angeles County. These data are particularly relevant to the empiric management of sepsis, where microbiologically active therapy is crucial (Kolleff et al. Chest. 1999; Kumar et al. Critical care Medicine. 2006). One potential approach to improve the probability of microbiologically active therapy is the inclusion of adjunctive therapy with a non-beta-lactam antibiotic. (IDSA HAP/VAP guidelines – Kalil et al. Clinical Infectious Disease, 2016; Gutierrez-Gutierrez et al. Lancet Infectious Disease. 2017) Fluoroquinolone susceptibility is relatively low, compared to aminoglycosides. This may be relevant to management of pneumonia and other hospital-acquired infections where *Pseudomonas* spp. infection is likely.

<b><i>Serratia marcescens</i></b> (n=2,668 from 58 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Piperacillin-Tazobactam</b>	94% (92-100)	1,876	39
<b>Ceftriaxone</b>	90% (86-96)	2,376	54
<b>Ceftazidime</b>	92% (86-100)	2,047	46
<b>Cefepime</b>	95% (92-100)	2,401	48
<b>Ertapenem</b>	99% (100-100)	1,462	33
<b>Imipenem</b>	96% (94-100)	555	17
<b>Meropenem</b>	97% (99-100)	1,987	39
<b>Amikacin</b>	96% (95-100)	2,417	49
<b>Gentamicin</b>	97% (93-100)	2,663	59
<b>Tobramycin</b>	79% (70-86)	1,707	43
<b>Ciprofloxacin</b>	87% (71-98)	2,330	49
<b>Levofloxacin</b>	86% (72-98)	1,581	43
<b>Trimethoprim/ Sulfamethoxazole</b>	98% (95-100)	2,256	53
<b>Tigecycline</b>	100% (100-100)	550	14

<b><i>Stenotrophomonas maltophilia</i></b> (n=1,970 from 51 Hospitals)			
	<b>% Susceptible (IQR)</b>	<b>Number of Isolates</b>	<b>Number of Hospitals</b>
<b>Ceftazidime</b>	46% (29-59)	1,082	23
<b>Levofloxacin</b>	81% (75-88)	1,511	43
<b>Trimethoprim/ Sulfamethoxazole</b>	92% (92-100)	1,996	51
<b>Minocycline</b>	98% (91-97)	42	2

**Comments from LA County Healthcare-Associated Infection and Antibiotic Resistance Committee:**

Clinicians should be aware that several local laboratories reported susceptibility results for beta-lactam antibiotics to which *Stenotrophomonas maltophilia* are intrinsically resistant: piperacillin-tazobactam, ceftriaxone, cefepime, ertapenem, and meropenem.<sup>456</sup> We also note that the local antibiogram reports for *Stenotrophomonas maltophilia* from some laboratories included aminoglycoside antibiotics: amikacin, gentamicin, and tobramycin to which *S. maltophilia* are also intrinsically resistant. Clinicians should be aware that a result of “susceptible” is not reliable for drugs to which *S. maltophilia* are intrinsically resistant.

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<sup>4</sup> Sanchez et al. (2009). *Stenotrophomonas maltophilia* drug resistance. *Future Microbiology*, Vol 4(6).

<sup>5</sup> Sanford Guide Antimicrobial Therapy (2017).

<sup>6</sup> Brooke, JS. (2012). *Stenotrophomonas maltophilia*: An Emerging Global Opportunistic Pathogen. *Clinical Microbiology Reviews*, Vol 25 (1):2-41.