

Microbiology Annual Antibigram 2019 for 2018 data

Notification Date: 02/15/2019

Effective Date: 02/18/2019

Microbiology Annual Antibigram Summary

The 2019 edition of “Susceptibility Patterns of Common Organisms” annual antibiogram summary report is available at <https://www.sbmf.org/client-notices>. The South Bend Medical Foundation is providing this information as a tool for antibiotic stewardship, to help guide the selection of antibiotics for empiric therapy.

The cumulative data derived from the 2018 antimicrobial susceptibility test results includes the most common organisms isolated from inpatients and outpatients in St. Joseph County combined with Elkhart County, as well as separate data for Elkhart County only.

- The data includes the first isolate of a given species per patient for the year, irrespective of body site
- For statistical purposes, the unique medical record number or patient identification number defines a “patient”
- The data consists of susceptible results only; Intermediate results are not included
- A minimum of 30 patient strains of each organism are required statistically
- Results are expressed as the percent susceptible for the number of patient isolates tested

A. Testing for mechanisms of resistance

Routine antimicrobial susceptibility testing includes screening organisms for associated intrinsic and inducible resistance mechanisms. Results for specific antimicrobials may be delayed for confirmation, when indicated by the organism’s phenotype and/or the published guidelines from the Clinical and Laboratory Standards Institute (CLSI).

B. Multiple drug resistant organisms (MDROs)

The number of MDROs in the community is increasing. The percentage of the total number of organisms is small; however, the potential for spreading is great, if insufficient [containment measures](#)¹ are in place. The consequence for the critically ill patient acquiring a MDRO, such as “CRE” (Carbapenem Resistant *Enterobacteriaceae*) is life threatening.

C. Surveillance information for organisms not routinely tested for antimicrobial susceptibility

The summary of susceptibility information for the following surveillance organisms is included, since routine susceptibility testing of patient isolates is usually not indicated:

- Published national data² for *Bacteroides fragilis* group
- *Salmonella* and *Shigella* isolates primarily of fecal origin over the past five years
- Random isolates of Group B streptococcus from vaginal/rectal sources

D. Trends

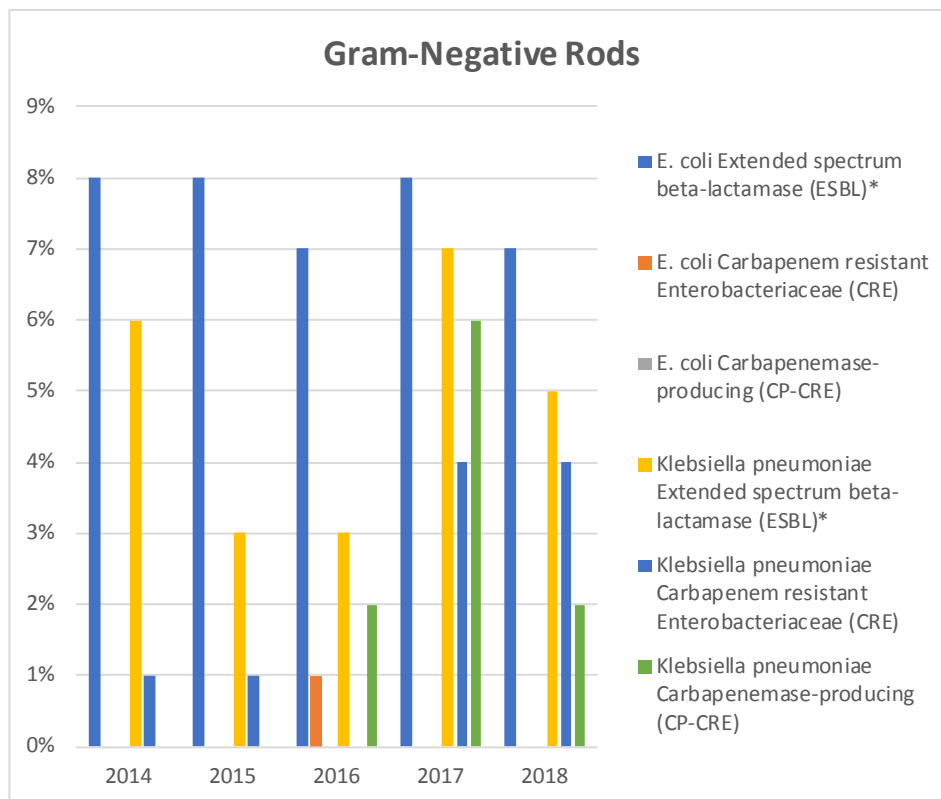
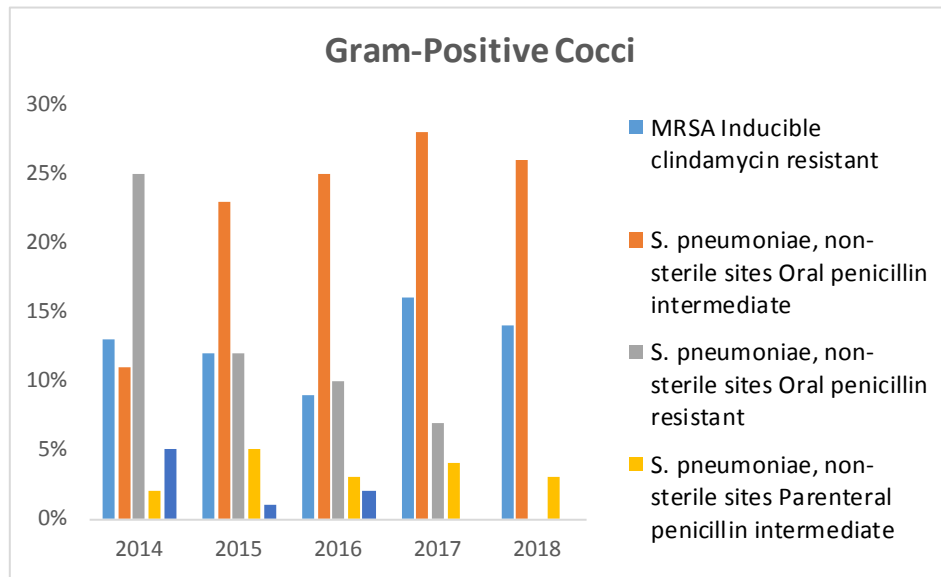
The frequency of antibiotic resistance for indicator organisms in the past five years is displayed in the [charts](#) below.

References:

1. CDC Healthcare-associated Infections (HAI), Containment Strategy Responding to Emerging Antibiotic Resistance Threats, April 2018. Atlanta, GA: US Department of Health and Human Services, CDC. Available from: <https://www.cdc.gov/hai/containment/index.html>
2. CLSI, Cumulative Antimicrobial Susceptibility Report for Anaerobic Organisms, Appendix D in *Performance Standards for Antimicrobial Susceptibility Testing*. 29th ed. CLSI supplement M100. Wayne, PA: Clinical and Laboratory Standards Institute; 2019.

SOUTH BEND MEDICAL FOUNDATION

530 North Lafayette Boulevard • South Bend, Indiana 46601
(574) 234-4176 • (800) 544-0925 • www.sbmf.org
Joyce L. Simpson, M.D. • Medical Director



SOUTH BEND MEDICAL FOUNDATION

530 North Lafayette Boulevard • South Bend, Indiana 46601
(574) 234-4176 • (800) 544-0925 • www.sbmf.org
Joyce L. Simpson, M.D. • Medical Director

[SBMF online Test Directory](#)

Questions: Please contact **CLIENT SERVICES 800-950-7263**

Technical Notices and Lab Alerts are distributed electronically.

Email addresses may be added/unsubscribed at our website: [Client Notices](#)

SOUTH BEND MEDICAL FOUNDATION

530 North Lafayette Boulevard • South Bend, Indiana 46601
(574) 234-4176 • (800) 544-0925 • www.sbmf.org
Joyce L. Simpson, M.D. • *Medical Director*

SUSCEPTIBILITY PATTERNS OF COMMON ISOLATES

St. Joseph County and Elkhart County of Indiana
January to December 2018

MOST COMMON NONURINE ISOLATES

(%) Represents the percent susceptible

(-) Test not performed or antibiotic not indicated for organism

ORGANISMS COUNTED First isolate per patient per year	MRSA ^{1, 2}	<i>Staph aureus</i> , ² not MRSA	<i>Staphylococcus</i> <i>lugdunensis</i>	<i>Staphylococcus</i> <i>epidermidis</i>	<i>Staphylococcus</i> coagulase neg	<i>Enterococcus</i> ^{3,}	<i>Streptococcus</i> <i>pneumoniae</i> ^{4, 5, 6}	<i>Escherichia coli</i> ⁷	<i>Pseudomonas</i> <i>aeruginosa</i>	<i>Proteus mirabilis</i>	<i>Klebsiella</i> <i>pneumoniae</i> ⁷	<i>Enterobacter</i> <i>cloacae</i>	<i>Klebsiella</i> <i>oxytoca</i>	<i>Serratia</i> <i>marcescens</i>
No. of isolates (5,967)	(1,119)	(1,432)	(221)	(201)	(144)	(674)	(147)	(623)	(522)	(218)	(196)	(194)	(107)	(94)
ANTIMICROBIALS	%	%	%	%	%	%	%	%	%	%	%	%	%	%
AMIKACIN	-	-	-	-	-	-	-	-	98	-	-	-	-	-
AMPICILLIN	-	-	-	-	-	90	-	50	-	87	-	-	-	-
AMP/SULBACTAM	-	-	-	-	-	-	-	59	-	94	89	-	65	-
CEFAZOLIN	-	100	90	42	68	-	-	89	-	96	95	-	83	-
CEFOXITIN	-	-	-	-	-	-	-	91	-	97	95	-	99	-
CEFTAZIDIME	-	-	-	-	-	-	-	92	91	97	95	91	100	100
CEFTRIAXONE ⁴	-	-	-	-	-	-	99	92	-	97	95	90	100	100
CLINDAMYCIN	76	84	83	65	75	-	86	-	-	-	-	-	-	-
ERYTHROMYCIN	-	69	82	35	60	-	62	-	-	-	-	-	-	-
GENTAMICIN	-	-	-	-	-	-	-	92	95	95	98	99	100	100
LEVOFLOXACIN	49	90	100	66	74	-	100	80	80	76	98	97	100	97
METRONIDAZOLE	-	-	-	-	-	-	-	-	-	-	-	-	-	-
OXACILLIN	-	100	90	43	67	-	-	-	-	-	-	-	-	-
PENICILLIN (parenteral) ⁶	-	-	-	-	-	90	96	-	-	-	-	-	-	-
PIP/TAZOBACTAM	-	-	-	-	-	-	-	95	87	100	94	88	99	96
TETRACYCLINE	92	95	95	80	81	-	80	-	-	-	-	-	-	-
TOBRAMYCIN	-	-	-	-	-	-	-	93	99	96	96	98	100	94
TRIMETH/SULFA	96	100	100	64	83	-	80	80	-	83	91	95	99	100
VANCOMYCIN	100	100	100	100	99	86	100	-	-	-	-	-	-	-

- 46% of all *Staphylococcus aureus* are MRSA.
- 14% of MRSA and 16% of *Staphylococcus aureus* other than MRSA have inducible clindamycin resistance.
- Synergy with penicillin and high levels of gentamicin or streptomycin is likely for 77% and 80% of *Enterococcus* respectively.
- Streptococcus pneumoniae* susceptibility data for ceftriaxone reflects the breakpoint for non-meningeal isolates.
- 26% of *Streptococcus pneumoniae* from non-sterile sites are non-susceptible to **oral** penicillin: intermediate (26%) or resistant (0%)
- 3% of *Streptococcus pneumoniae* from non-sterile sites are non-susceptible to **parenteral** penicillin: intermediate (3%) or resistant (0%)
- 7% of *E. coli* and 5% of *K. pneumoniae* are Extended-Spectrum Beta-lactamase producers (ESBLs).
- 46% of Group B Streptococcus from vaginal/rectal sources are susceptible to clindamycin.

SUSCEPTIBILITY PATTERNS OF COMMON URINE ISOLATES

**St. Joseph County and Elkhart County of Indiana
January to December 2018**

(%) Represents the percent susceptible

(-) Test not performed or antibiotic not indicated for organism

PATIENT LOCATION	ORGANISMS COUNTED First isolate per patient per year	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Enterococcus</i>	<i>Proteus mirabilis</i>	<i>Pseudomonas aeruginosa</i>	<i>Citrobacter freundii</i>	<i>Enterobacter cloacae</i>	<i>Klebsiella oxytoca</i>	<i>Enterobacter aerogenes</i>	<i>Staph aureus</i> not MRSA
OP	No. of isolates (7,226)	(4,679)	(852)	(578)	(348)	(278)	(144)	(139)	(115)	(93)	-
OP	ANTIMICROBIALS	%	%	%	%	%	%	%	%	%	%
OP	AMPICILLIN	57	-	94	85	-	-	-	-	-	-
OP	AMP/SULBACTAM	65	90	-	93	-	-	-	66	-	-
OP	CEFAZOLIN	92	97	-	94	-	-	-	83	-	-
OP	LEVOFLOXACIN	84	98	79	79	78	97	99	100	100	-
OP	NITROFURANTOIN	96	40	94	-	-	94	51	88	-	-
OP	PENICILLIN	-	-	94	-	-	-	-	-	-	-
OP	TETRACYCLINE	-	-	30	-	-	-	-	-	-	-
OP	TRIMETH/SULFA	81	93	-	83	-	92	90	99	100	-
IP	No. of isolates (5,575)	(3,504)	(615)	(508)	(264)	(258)	(75)	(130)	(91)	(67)	(63)
IP	AMPICILLIN	54	-	83	89	-	-	-	-	-	-
IP	AMP/SULBACTAM	62	88	-	95	-	-	-	69	-	-
IP	CEFAZOLIN	92	95	-	97	-	-	-	84	-	98
IP	LEVOFLOXACIN	84	98	63	71	80	99	97	100	100	79
IP	NITROFURANTOIN	96	40	86	-	-	95	52	90	24	100
IP	PENICILLIN	-	-	82	-	-	-	-	-	-	-
IP	TETRACYCLINE	86	-	26	-	-	-	-	-	-	90
IP	TRIMETH/SULFA	79	93	-	88	-	97	93	96	100	98

OP = Outpatients

IP = Inpatients

ROUTINE ANTIMICROBIAL SUSCEPTIBILITY REPORTING

GRAM-NEGATIVE	PRIMARY	SECONDARY
Enterobacteriaceae (non-urine)	ampicillin amp/sulbactam cefazolin levofloxacin gentamicin pip/tazobactam tobramycin trimeth/sulfa	ceftazidime
Report amikacin, if tobramycin is resistant. Report meropenem, if non-susceptible Report meropenem if 3 rd generation cephalosporins are resistant		
Enterobacteriaceae (Urine)	ampicillin amp/sulbactam cefazolin levofloxacin gentamicin nitrofurantoin tobramycin trimeth/sulfa	ceftazidime
Report meropenem, if non-susceptible Report meropenem if 3 rd generation cephalosporins are resistant		
Pseudomonas aeruginosa (All sites)	ceftazidime levofloxacin gentamicin tobramycin pip/tazobactam	amikacin
Report meropenem, if non-susceptible, and if only one primary or secondary drug is susceptible		
Salmonella spp./ Shigella spp.	ampicillin levofloxacin trimeth/sulfa	
Report chloramphenicol on request only. MIC information for stool isolates on request only.		
Haemophilus influenzae	Predictably susceptible to: cefotaxime ceftriaxone cefuroxime tetracycline	
MIC information for isolates from sterile body sites on request only. MIC information for Beta-lactamase positive isolates from other sites on request only		

GRAM-POSITIVE	PRIMARY	SECONDARY
Enterococcus spp.	ampicillin penicillin	
Report vancomycin on isolates from normally sterile sites Report vancomycin on isolates when ampicillin/penicillin is resistant. Report vancomycin whenever vancomycin is non-susceptible. Report gentamicin and streptomycin synergy results on CSF and blood isolates only. Report nitrofurantoin and tetracycline on urines.		
Staphylococcus spp.	cefazolin clindamycin^ oxacillin vancomycin	tetracycline trimeth/sulfa
^Isolates routinely screened for inducible clindamycin resistance. Report tetracycline and trimeth/sulfa if MRSA Report rifampin if MRSA on request only. Report levofloxacin on request only. Test and report daptomycin on request only		
Streptococcus pneumoniae	Sterile body sites ceftriaxone penicillin	Non-sterile sites ceftriaxone erythromycin penicillin tetracycline trimeth/sulfa
Report vancomycin, whenever isolate is resistant to both penicillin and ceftriaxone. Report levofloxacin if non-susceptible or on request only.		
Streptococcus spp.	Sterile body sites ceftriaxone erythromycin penicillin vancomycin	Non-sterile sites*
All Beta-hemolytic streptococci predictably susceptible to penicillin. *Susceptibility testing performed on request only.		
Group B Streptococcus	clindamycin penicillin	
MIC information on request only if patient is both pregnant and allergic to penicillin. Cefazolin information predictable based on penicillin Vancomycin reported on request only.		
Streptococcus anginosus Group	Predictably susceptible to: ceftriaxone penicillin vancomycin	
Susceptibility testing performed on request only		

Isolates saved from the following sources for additional susceptibility testing if indicated:

Blood cultures: One week from date of final report
 CSF: One week from date of final report
 Non-urine: One week from date of final report
 Urine: One week from date of final report

SURVEILLANCE MONITORS OF COMMON ISOLATES

**St. Joseph County and Elkhart County of Indiana
2013 to 2018**

CUMULATIVE ANTIBIOGRAMS	<i>Salmonella</i> ¹	<i>Shigella</i> ¹	<i>B. fragilis</i> Grp ²
ANTIMICROBIALS	%	%	%
AMPICILLIN	90	71	-
AMP/SULBACTAM	-	-	78
CEFOXITIN	-	-	70
CLINDAMYCIN	-	-	33
LEVOFLOXACIN	99	93	-
METRONIDAZOLE	-	-	100
PIP/TAZOBACTAM	-	-	94
TRIMETH/SULFA	100	41	-

1 Average for the past five years

2 Cumulative national data (U.S. hospitals)

SUSCEPTIBILITY TESTING BY SOURCE GROUP

Abscess (1,127)

MRSA (32%)
Staphylococcus aureus (25%)
Escherichia coli (9%)
 Enterococcus spp. (9%)
Staphylococcus lugdunensis (7%)

Blood (1,292)

Escherichia coli (23%)
Staphylococcus aureus (11%)
 MRSA (8%)
 Enterococcus spp. (7%)
Klebsiella pneumoniae (6%)

Body Fluid (321)

Staphylococcus aureus (21%)
Staphylococcus epidermidis (13%)
 Enterococcus spp. (11%)
Escherichia coli (8%)
 MRSA (7%)

Tissue (822)

Staphylococcus aureus (17%)
 Enterococcus spp. (16%)
 MRSA (10%)
Staphylococcus epidermidis (9%)
Pseudomonas aeruginosa (7%)

Wounds (2,412)

Staphylococcus aureus (25%)
 MRSA (18%)
 Enterococcus spp. (13%)
Pseudomonas aeruginosa (8%)
Escherichia coli (6%)

Lower respiratory (998)

Pseudomonas aeruginosa (20%)
Staphylococcus aureus (20%)
 MRSA (13%)
Streptococcus pneumoniae (9%)
Stenotrophomonas maltophilia (7%)

SUSCEPTIBILITY PATTERNS OF COMMON NON-URINE ISOLATES

**Elkhart County, IN
January to December 2018**

(%) Represents the percent susceptible

(-) Test not performed or antibiotic not indicated for organism

ORGANISMS COUNTED First isolate per patient per year	MRSA ^{1,2}	<i>Staphylococcus aureus</i> ²	<i>Staphylococcus lugdunensis</i>	<i>Staphylococcus epidermidis</i>	Coagulase neg <i>Staphylococcus</i>	<i>Enterococcus</i> ^{3,4}	<i>Streptococcus pneumoniae</i> ^{5,6}	<i>Escherichia coli</i> ⁷	<i>Pseudomonas aeruginosa</i>	<i>Proteus mirabilis</i>	<i>Enterobacter cloacae</i>	<i>Klebsiella pneumoniae</i> ⁷
No. of isolates (1,472)	(369)	(376)	(59)	(38)	(23)	(155)	(32)	(165)	(116)	(56)	(42)	(41)
ANTIMICROBIALS	%	%	%	%	%	%	%	%	%	%	%	%
AMIKACIN	-	-	-	-	-	-	-	-	100	-	-	-
AMPICILLIN	-	-	-	-	-	92	-	50	-	89	-	-
AMP/SULBACTAM	-	-	-	-	-	-	-	60	-	98	-	93
CEFAZOLIN	-	100	90	38	52	-	-	88	-	95	-	98
CEFOXITIN	-	-	-	-	-	-	-	92	-	100	-	92
CEFTAZIDIME	-	-	-	-	-	-	-	92	99	98	100	98
CEFTRIAXONE	-	-	-	-	-	-	97	93	-	98	98	98
CLINDAMYCIN	82	88	83	59	67	-	78	-	-	-	-	-
ERYTHROMYCIN	-	71	83	41	52	-	61	-	-	-	-	-
GENTAMICIN	-	-	-	-	-	-	-	95	97	98	100	100
LEVOFLOXACIN	57	93	98	51	-	-	100	88	91	80	100	100
OXACILLIN	-	100	90	37	52	-	-	-	-	-	-	-
PENICILLIN	-	-	-	-	-	92	90	-	-	-	-	-
PIP/TAZOBACTAM	-	-	-	-	-	-	-	93	95	100	94	98
TETRACYCLINE	95	94	95	73	81	-	78	-	-	-	-	-
TOBRAMYCIN	-	-	-	-	-	-	-	95	98	98	98	100
TRIMETH/SULFA	98	100	100	59	65	-	72	84	-	86	98	95
VANCOMYCIN	100	100	100	100	100	88	100	-	-	-	-	-

- 51% of all *Staphylococcus aureus* are MRSA.
- 12% of MRSA and 11% of *Staphylococcus aureus* other than MRSA have inducible clindamycin resistance.
- Synergy with penicillin and high levels of gentamicin or streptomycin is likely for 82% and 85% of *Enterococcus* respectively.
- Shaded areas: data based on too few isolates (<30) to be considered for empiric therapy
- 60% of *Streptococcus pneumoniae* from non-sterile sites are non-susceptible to **oral** penicillin: intermediate (47%) or resistant (13%)
- 13% of *Streptococcus pneumoniae* from non-sterile sites are non-susceptible to **parenteral** penicillin: intermediate (13%) or resistant (0%)
- 7% of *E. coli* and 2% of *K. pneumoniae*/*K. oxytoca* are Extended Spectrum Beta-lactamase (ESBL) producers
- 55% of Group B Streptococcus from vaginal/rectal sources are susceptible to clindamycin.

SUSCEPTIBILITY PATTERNS OF COMMON URINE ISOLATES

**Elkhart County, IN
January to December 2018**

(%) Represents the percent susceptible

(-) Test not performed or antibiotic not indicated for organism

PATIENT LOCATION	ORGANISMS COUNTED First isolate per patient per year	<i>Escherichia coli</i>	<i>Klebsiella pneumoniae</i>	<i>Enterococcus</i>	<i>Proteus mirabilis</i>	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella oxytoca</i>	<i>Citrobacter freundii</i>	<i>Enterobacter cloacae</i>	<i>Enterobacter aerogenes</i>
OP	No. isolates (2,910)	(1,970)	(319)	(209)	(130)	(67)	(53)	(50)	(44)	(35)
OP	ANTIMICROBIAL	%	%	%	%	%	%	%	%	%
OP	AMPICILLIN	59	-	94	84	-	-	-	-	-
OP	AMP/SULBACTAM	67	92	-	91	-	60	-	-	-
OP	CEFAZOLIN	94	98	-	94	-	83	-	-	-
OP	LEVOFLOXACIN	86	98	82	86	94	100	98	100	100
OP	NITROFURANTOIN	97	38	95	-	-	89	96	50	-
OP	PENICILLIN	-	-	94	-	-	-	-	-	-
OP	TETRACYCLINE	-	-	31	-	-	-	-	-	-
OP	TRIMETH/SULFA	81	96	-	85	-	98	98	89	100
IP	No. isolates (1,505)	(1,135)	(169)	(123)	(69)	(67)	(29)*	(24)*	(34)	(23)*
IP	AMPICILLIN	54	-	82	87	-	-	-	-	-
IP	AMP/SULBACTAM	61	93	-	91	-	66	-	-	-
IP	CEFAZOLIN	93	96	-	96	-	83	-	-	-
IP	LEVOFLOXACIN	87	99	60	74	91	100	100	97	100
IP	NITROFURANTOIN	96	46	84	-	-	94	100	39	-
IP	PENICILLIN	-	-	81	-	-	-	-	-	-
IP	TETRACYCLINE	-	-	23	-	-	-	-	-	-
IP	TRIMETH/SULFA	78	93	-	81	-	100	100	97	100

OP = Outpatients

IP = Inpatients

* Too few (<30) isolates to be used for empiric therapy