Serratia spp (LTR62264)

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Organism

Serratia spp.

- *S. ficaria*
- *S. fonticola*
- *S. grimesii*
- *S. liquefaciens*
- *S. marcescens*
- *S. odorifera*
- *S. plymuthica*
- *S. proteamaculans*
- *S. rubidaea*
- *S. quinivorans*

Clinical

These organisms may be found in a variety of environmental sources. They may colonize the urinary or respiratory tracts of individuals who have received previous antibiotic therapy. *Serratia* spp. are considered opportunistic pathogens. They are an important cause of nosocomial infections including pneumonia, septicemia, bacteremia, wound and urinary tract infections. They have been associated with endocarditis (intravenous drug addicts), chronic osteomyelitis, wound infections and bacteremia.

Usual susceptibility pattern

These organisms produce an inducible chromosomal beta-lactamase (AmpC cephalosporinase) and are resistant to penicillins and first/second generation cephalosporins. Although they may appear susceptible in vitro to third generation cephalosporins, use of these agents may result in selection of resistant strains. In addition, to an AmpC cephalosporinase, *S. fonticola* and *S. rubidaea* also produce a chromosomal cefotaximase (CTX-M ESBL). The beta-lactamase produced by these organisms is not inhibited by beta-lactamase inhibitors and as such, beta-lactam/beta-lactamase inhibitor combinations should not be reported. Although these organisms are typically susceptible to carbapenems, resistance can be mediated by a either a chromosomal (SME) or plasmid mediated carbapenemase, as well as outer membrane protein loss.

Extended spectrum beta-lactamase (ESBL) may be found in these organisms, however conventional ESBL testing is not reliable due to interference with the chromosomal cephalosporinase. Cefepime +/- clavulanic acid may detect an ESBL enzyme.

These organisms are intrinsically resistant to nitrofurantoin, tetracycline, doxycycline (but not minocycline or tigecycline), colistin and have variable susceptibility to aminoglycosides, TMP-SMX, and quinolones. Some strains exhibit resistance to tobramycin while remaining susceptible to gentamicin.

Serratia spp., Continued

Susceptibility method

VITEK2 (except *S. quinivorans*). Additional tests (Disc diffusion or Etest method) are performed using Mueller-Hinton agar incubated in ambient air at 35°C for 16-20 hours.

Note: For Etest use 0.5 McFarland suspension in saline.
For mucoid strains use 1.0 McFarland.

Susceptibility reporting

	CSF/ Brain	Blood/ Sterile Body Site/ Endovascular Catheter	Urine	Other	Comments
Amikacin		3	3	3	3rd line if gent and tobra I/R Disc diffusion
Ampicillin	R	R	R	R	
Cefazolin		R	R	R	
Cefixime			R		
Ceftriaxone	R	R			
Ciprofloxacin		✓	✓	✓	Do not report in patients < 18 y
Ertapenem		✓	2	2	2nd line if cipro or TMP-SMX I/R If S do not report in patients < 3 months
Gentamicin	*	✓**	✓	✓**	* Report only in neonates (< 1 month) ****See Special Considerations**
Imipenem		✓	2	2	2nd line if cipro or TMP-SMX I/R Serratia marcescens – Always test by disc diffusion– **See Special Considerations**
Meropenem	✓	✓	2*	2*	2nd line if cipro or TMP-SMX I/R * Report 1st line in neonates (< 1 month)
Nitrofurantoin			R		Add comment: For uncomplicated lower UTI only #f1
TMP-SMX	*	✓	✓	✓	* Report only at physician request
Tobramycin		2*	2	2*	2nd line if gent I/R ***See Special Considerations**

Special considerations

Gentamicin/ tobramycin:	Organisms testing at upper limit of susceptibility (4µg/mL) may not achieve optimal pharmacokinetics/pharmacodynamics. **For non-urine isolates:** If MIC 4.0 µg/mL add comment: "This isolate tests at the upper limit of susceptibility for gentamicin. Clinical failure may occur despite in vitro susceptibility". #A312 **or** "This isolate tests at the upper limit of susceptibility for tobramycin. Clinical failure may occur despite in vitro susceptibility". #A313 **or** "This isolate tests at the upper limit of susceptibility for both gentamicin and tobramycin. Clinical failure may occur despite in vitro susceptibility". #A314
Imipenem	For Serratia marcescens VITEK 2 results are not recommended due to a card limitation. Perform disc diffusion prior to reporting of results.

Interpretation

For Etest, report actual MIC result. For interpretation (S, I, and R) report according to nearest higher doubling dilution **(Appendix 1)**.

Use **CLSI** interpretive document for **Enterobacterales**.

For Beta-lactam drugs – Refer to Beta-lactam Resistance Detection Charts.
For gentamicin and tobramycin – Refer to Special Considerations