Enterococcus faecalis (LTR79855)

Edit Approved By: Van der Walt, Peet (08/30/2023) **Revision: 6.00**

Organism	**Enterococcus faecalis**
Clinical	*E. faecalis* is part of the normal flora of the human gastrointestinal and female genital tract. It may also be recovered from various environmental sources (soil, water, plants, animals). This organism is an important nosocomial pathogen associated with urinary tract infections (commonly in persons with structural abnormalities or following urologic manipulation), intra-abdominal and pelvic infections, endocarditis, and bacteremia. The role of *E. faecalis* in polymicrobial wound infections and respiratory infections is controversial and requires clinical evaluation, as well as review of Gram stain. *E. faecalis* is the most common of the enterococcal isolates, especially in the urinary tract.
Usual susceptibility pattern	*E. faecalis* is usually susceptible to ampicillin, penicillin, vancomycin, linezolid and chloramphenicol. Linezolid resistance is increasing. This organism is resistant to cephalosporins, clindamycin, macrolides, TMP-SMX, fusidic acid and quinupristin/dalfopristin. (Note: some of these antibiotics may appear susceptible in vitro, but should not be used clinically.) Ciprofloxacin resistance is very common in urinary isolates. Gentamicin synergy resistance is common. Gentamicin is recommended in serious infections only as a synergistic agent if the gentamicin synergy is susceptible. Streptomycin may also be used for synergy if synergy susceptible. Other aminoglycosides should not be tested. Acquired vancomycin resistance via mobile genetic elements (commonly *vanA, vanB*), most often seen in *E. faecium* and less frequently in *E. faecalis*, are of epidemiological significance, as this type of resistance is transferable from one strain to another, and has been associated with outbreaks. In the laboratory, *vanA* isolates test resistant to vancomycin with an MIC range of 64 – 1,000 μg/mL (typically >128 μg/mL). *VanB* isolates typically produce MICs of 16 – 64 μg/mL, but MIC can range from 4 to 1,000 μg/mL. Additional types of vancomycin resistance, encoded by the *vanD*, *vanE*, *vanG*, *vanL*, *vanM*, and *vanN* genes occur rarely. Vancomycin-dependent and vancomycin-heteroresistant enterococcal isolates have been sporadically reported.

Enterococcus faecalis, Continued

Susceptibility method

VITEK2. Additional tests include disc diffusion and Etest method.

Etest	Vancomycin	Mueller-Hinton agar incubated in ambient air at 35°C for 24 hours. Use 0.5 McFarland suspension in saline. After 24 hours incubation if MIC is 3 or 4 ug/mL extend incubation to 48 hours.
	Other	Mueller-Hinton agar incubated in ambient air at 35°C for 16-20 hours. Use 0.5 McFarland suspension in saline.

Susceptibility reporting

	CSF/ Brain	Blood/ Endo vascular Catheter	Sterile Body Site	Deep Wound +	Urine +	Other	Comments
Ampicillin	✓*	✓	✓	✓	✓	✓	If amp R see **Special Considerations** *Etest method – see **Special Considerations**
Amoxicillin/ clavulanate (oral)				*	*	*	*Report same as amp if S. aureus (MSSA) or anaerobes co-isolated
Ciprofloxacin					✓		Do not report if patient <18 y - see **Special Considerations**
Daptomycin		2	2		*		Etest method 2nd line if amp and vanco I/R *Physician request only after microbiologist approval **See Special Considerations**
Gentamicin Synergy		✓					**See Special Considerations**
Imipenem		*	*	*			*Physician request only. **See Special Considerations**
Linezolid	2	2	2	2	2	2	2nd line if amp and vanco I/R If linezolid I/R see **Special Considerations**
Nitrofurantoin					✓		
Penicillin		*					Etest method *Physician request only after microbiologist approval.
Tetracycline					✓		Do not report if patient <8 y
Tigecycline			*	*			*Physician request only. Consult microbiologist **See Special Considerations**
Vancomycin	2	2	2	2	2	2	2nd line if amp I/R Always report vanco if I/R

+See note

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Note

All isolates	If reporting susceptibility results "Enterococcus species are uniformly resistant to all cephalosporins, clindamycin and trimethoprim-sulfamethoxazole." &2336
Deep wounds	If *E. faecalis* is co-isolated with multiple organisms susceptibility testing may not be required. At Supervisor discretion add comment: "This organism is predictably susceptible to ampicillin." &amp1
Urine	Susceptibility testing is not required for *E. faecalis* isolates from non-invasive urines. Add comment: "This organism is usually susceptible to ampicillin/amoxicillin and nitrofurantoin. Susceptibility to ciprofloxacin is variable. Enterococcus species are uniformly resistant to all cephalosporins, clindamycin and trimethoprim-sulfamethoxazole. &2337

Special considerations

Ampicillin:	*E. faecalis* isolates are usually susceptible to ampicillin. • If ampicillin is R, confirm identification and purity. If organism is also susceptible to quinupristin-dalfopristin (QDS) it is most likely E. faecium. • If identification confirmed, perform ampicillin disc diffusion • Consult Tech II with results
	CSF / Brain isolates: • Perform ampicillin Etest – report MIC value. • For susceptible isolates with MIC >2 µg/mL, add comment: "In serious infections, pharmacodynamic evaluation should be considered for optimal dosing of ampicillin." #amp1
Ciprofloxacin:	If patient < 18 years old, ciprofloxacin may be reported on urine specimens at physician request only, add comment: "Susceptibility testing requested by physician." #STRB
Daptomycin:	*Enterococcus sp.* should be susceptible to this antibiotic. Consult microbiologist if not susceptible.
	Daptomycin is inactivated by surfactant in the lungs. This antibiotic should not be used for the treatment of respiratory infections. For **blood isolates** where daptomycin is reported, add comment: "Daptomycin is inactivated by lung surfactant and should not be used for respiratory infections" **(21127)**
	If reporting daptomycin susceptibility results add comment: "The daptomycin interpretation is based on a dosage of 6 mg/kg q24h in adults with normal renal function." **(34509)**

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Special considerations (continued)

Gentamicin Synergy:	If gentamicin synergy **Sensitive**, "Combination therapy with a susceptible aminoglycoside for synergy is recommended for treatment of serious infections."#2114
	If gentamicin synergy **Resistant** "Combination therapy with gentamicin for synergy is NOT indicated#2116
Imipenem:	Imipenem is the only carbapenem with activity against *E. faecalis*. Ertapenem and meropenem are NOT active against enterococci.
	If imipenem requested by physician **and** ampicillin is susceptible, add comments: "This isolate is predictably susceptible to imipenem." **(21347)** **and** "Ertapenem and meropenem have no activity against Enterococcus spp." **(free text)**
	If imipenem requested by physician **and** ampicillin is resistant, consult Microbiologist.
Linezolid:	If linezolid susceptibility reported, confirm all I/R isolates with second method. If confirmed I/R, consult microbiologist.
Tigecycline:	This agent may be an option in non-urinary infections (hepatic metabolism) where therapeutic choices are limited. It may not achieve adequate serum levels to be effective in bacteremia. Consult microbiologist before testing and reporting. Send to reference lab for testing.
	Note: No CLSI breakpoints available, use EUCAST breakpoints: **EUCAST breakpoints:** **MIC** / **Interpretation** ≤ 0.25 µg/mL – S ≥ 0.5 µg/mL – R Add comment: "Interpretation is based upon EUCAST breakpoints." **(21178)**
	Enterococcus sp. are usually susceptible to this antibiotic. Consult microbiologist if not susceptible.

Interpretation

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

Use **CLSI** interpretive document for **Enterococcus spp.**