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False-Positive Vancomycin resistant Enterococcus from the BD Phoenix Instrument

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ABSTRACT

Background: After nine months of routinely using the BD Phoenix Automated Microbiology System (BD Diagnostic Systems, Sparks, MD) for susceptibility testing of enterococci, we noticed an increase in the number isolates that were either non-viable in the Phoenix test medium or vancomycin resistant. From 2/1/07 – 4/17/07, 106/126 isolates identified as vancomycin resistant by Phoenix were tested using disk diffusion; 48% of those isolates could not be confirmed as vancomycin-resistant. Based on these observations, 58 consecutive isolates that did not grow or were determined to be vancomycin-resistant by the Phoenix were selected for further testing using three other commercially available systems to determine the reproducibility of the results.

Materials and Methods: Susceptibility testing of the 58 consecutive isolates was performed using Vitek II GP-63 (bioMerieux, Inc., Durham, NC), MicroScan Pos Combo Panel Type 21 (Dade Behring, West Sacramento, CA), and Sensititre GPN2F combined with the Vizion system (TREK Diagnostic Systems, Cleveland, OH) in addition to the Phoenix system.

Results: 6/58 (10%) of the isolates did not grow in the Phoenix system. All isolates grew in each of the other systems; 5/6 (83%) were susceptible to vancomycin (MIC of ≤ 4 µg/ml). Eight isolates had an MIC of 8 ug/ml as determined by the Phoenix system. 2/8 (25%) were identified as *E. casseliflavus*; only the Vitek II system correctly reported an MIC of 8 ug/ml on one of the two isolates. 7/8 (88%) were reported as susceptible (MIC ≤4 µg/ml) by all three systems. 42/43 (98%) having an MIC >16 ug/ml reported by the Phoenix were confirmed as susceptible (MIC ≤4 µg/ml) by all three systems, with one isolate that was nonviable in the Vitek II.

Conclusions: A concordance of 96% was achieved for the three comparison systems tested; with 2 vancomycin resistant and two vancomycin intermediate isolates being correctly called by the Phoenix system. 93% of the isolates were not determined to be vancomycin susceptible using the Phoenix system. We conclude that, at present, the Phoenix system cannot be used to reliably detect vancomycin-resistant enterococci in our patient population.

MATERIALS & METHODS

Isolates – 58 consecutive isolates which did not grow or were vancomycin-resistant as determined by the Phoenix system using PMIC/ID 102 with Epicenter software versionV5. 10A/V4.31A and instrument software 5.15.A.

Susceptibility testing – Susceptibility testing was performed according to manufacturer's recommendations for the following systems: Vitek II GP-63, (bioMerieux, Inc., Durham, NC), MicroScan Pos Combo Panel Type 21 (Dade Behring, West Sacramento, CA), and Sensititre GPN2F combined with the Vizion system (TREK Diagnostic Systems, Cleveland, OH). Reference broth microdilution (CLSI M7-A5) and E-test MIC (AB Biodisk, Solna, Sweden) were performed at Becton Dickinson and comprise the gold standard.

Becton Dickinson Studies – Studies were performed at BD to determine the nature of the problem and develop a new algorithm to accurately determine the MICs.

RESULTS

Of the 58 isolates, one was Vancomycin susceptible and was excluded from the analysis.

Six isolates did not grow in the Phoenix system.

Figure 1. No Growth in Phoenix panels

MIC	Vitek	MicroScan	Sensititre
≤5		4	
2		5	1
4			
8			
16			
>16	1	1	1

Eight isolates yielded MIC 8ug/ml (I) in Phoenix panels.

Figure 2. Vancomycin intermediate in Phoenix panels

MIC	Vitek	MicroScan	Sensititre
≤1	1		
2	4	8	3
4	2		5
8	1		
16			

Forty three isolates yielded MIC >16 (R) in Phoenix panels.

Figure 3. Vancomycin resistant in Phoenix panels

MIC	Vitek	MicroScan	Sensititre
≤1	34		24
2	6	42	14
4	1		4
8			
16			
>16	1	1	1
No growth	1		

RESULTS cont.

BD studies demonstrated that strains submitted by Dynacare show atypical growth relative to the normal Enterococcus population. They developed a modified algorithm to better differentiate noise from growth. In their hands, the new algorithm showed 93% concordance. The vancomycin intermediate isolates are no longer detected as such and 2 of the 3 isolates which previously did not grow remain nonviable in the system. This modification is not yet available and has not been tested outside BD.

Figure 4. Results of BD modified algorithm

New Algorithm	Original MIC Result		
MIC	8	16	No growth*
≤0.5		26	
1		9	
2	7	7	
4	1		
8			
16			
>16		1	
No growth			2

*Three of the isolates which originally did not grow were not tested in the new algorithm

CONCLUSION

- Vitek, MicroScan and Sensititre systems show 96% concordance and accurately determine vancomycin MICs in this "false vancomycin resistant" population.
- The Phoenix system currently cannot be used to reliably detect vancomycin resistant Enterococcus in our patient population. Vancomycin resistant Enterococcus should be confirmed by a second method.
- Modifications being made to the system may resolve the problem, but are not yet available.