Thermo Scientific Oxoid M.I.C.Evaluator Strips: An Effective Tool For Staphylococcal MIC Testing

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Overview

Purpose: To compare CLSI agar/broth dilution with M.I.C.Evaluator™ (M.I.C.E.™) Strips for staphylococcal minimum inhibitory concentration (MIC) testing.
Methods: Organism MICs when following CLSI agar dilution and M.I.C.Evaluator strip methods were compared.
Results: All antibiotics tested showed >90% essential agreement for streptococci when compared with CLSI agar dilution.

Introduction

Staphylococcus aureus is one of the leading causes of nosocomial infections worldwide[1]. Prevalence of *S. aureus* resistance shows regional variation, most notably with methicillin resistance of hospital-acquired *S. aureus* and coagulase-negative staphylococci (CNS). Although CNS are less pathogenic than *S. aureus,* they are important in line-associated bacteraemias and prosthetic device infections where they have been shown to be more resistant than *S. aureus* to teicoplanin[2].
This study looked at the use of 8 different M.I.C.Evaluator strips as an alternative to the CLSI agar dilution method for the MIC testing of staphylococci. The strips were: amikacin (MA0135), cefotaxime (MA0112), ceftriaxone (MA0122), clindamycin (MA0119), meropenem (MA0121), penicillin (MA0100), teicoplanin (MA0118) and tigecycline (MA0124).

FIGURE 1: M.I.C.E. strips on Mueller-Hinton Agar with 5% sheep blood.

Methods

Using sterile 0.9% saline, 0.5 McFarland suspensions of methicillin-resistant *S. aureus* (MRSA), methicillin-sensitive *S. aureus* (MSSA), CNS and glycopeptide-intermediate *S. aureus* (GISA) isolates were prepared from cultures grown on Columbia Agar with Horse Blood (PB0122A). Using a multipoint inoculator, the McFarland suspensions were inoculated onto Mueller-Hinton Agar dilution plates. The same suspension was used to create a bacterial lawn on Mueller-Hinton Agar and using sterile forceps M.I.C.E. strips were applied. All plates were incubated at 36±1°C in ambient air following CLSI guidelines[3]. Results were used to determine the percentage essential agreement (EA) between the CLSI reference method and M.I.C.E. strips.

Results

Amikacin, cefotaxime, daptomycin and tigecycline M.I.C.E. strips achieved 100% EA with the CLSI agar/broth dilution across all streptococci groups, with the other 3 compounds achieving an EA >90% for the group (as shown in table 1). S. pneumoniae were shown to have 100% EA for all 7 different M.I.C.E. strips.

Conclusion

Amikacin, cefotaxime, ceftriaxone, clindamycin, meropenem, penicillin, teicoplanin and tigecycline M.I.C.Evaluator strips offer an accurate, attractive alternative to the labour-intensive traditional agar dilution method for determining the MIC of staphylococci.

References

1. Clin Infect Dis. 2001 May 15;32 Suppl 2:S114-32. Survey of infections due to Staphylococcus species: frequency of occurrence and antimicrobial susceptibility of isolates collected in the United States, Canada, Latin America, Europe, and the Western
2. Livermore DM. Antibiotic resistance in staphylococci. Int J Antimicrob Agents. 2000 Nov;16 Suppl 1:S3-10.
3. CLSI Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Second Informational Supplement M100-S22 January 2012

TABLE 1: Essential agreement (shown as a percentage) for each organism group. The number of organisms tested is shown in brackets.

M.I.C.E. Strip	Organism				
	All Staphylococci	**MRSA**	**MSSA**	**CNS**	**GISA**
Amikacin	**100 (n=61)**	100 (n=30)	100 (n=11)	100 (n=20)	
Cefotaxime	**100 (n=30)**	100 (n=20)	100 (n=5)	100 (n=5)	
Ceftriaxone	**96.66 (n=30)**	100 (n=10)	100 (n=9)	90.91 (n=11)	
Clindamycin	**100 (n=101)**	100 (n=33)	100 (n=33)	100 (n=35)	
Meropenem	**93.33 (n=30)**	100 (n=10)	100 (n=9)	81.82 (n=11)	
Penicillin	**94.06 (n=101)**	91.67 (n=36)	97.14 (n=35)	93.33 (n=30)	
Teicoplanin	**93.38 (n=150)**	96 (n=49)	100 (n=63)	78.95 (n=38)	
Tigecycline	**97.01 (n=67)**	100 (n=30)	100 (n=9)	95 (n=20)	87.5 (n=8)

Folio no 2041/03/2012.