Study of BIOMIC® V3 (Giles Scientific Inc) Automated versus Manual Reading of MicroScan® ESBL Plus Panel Results

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Abstract

This study compared the BIOMIC V3 Microbiology System (Giles Scientific Inc, Santa Barbara, CA, USA) automated well reader results to manual reading results for reading MicroScan ESBL Plus (Siemens Healthcare Diagnostics Inc, West Sacramento, CA, USA) panels. Overall, BIOMIC V3 readings demonstrated 97.4% agreement with +/- 1 dilution of the manual reading results. BIOMIC V3 provides faster and more standardized reading and interpretation of these panels, and enables users to visually review and save enlarged high quality screen images.

Background

The package insert for the Siemens MicroScan ESBL Plus panel states they are to be are read manually by eye, however, that can be very time consuming and inefficient for microbiologists, and requires significant training and experience. This is one of the few Siemens 96-well microtiter panels that cannot be read in the automated MicroScan Walkaway or AutoScan Systems. Manual reading of the MicroScan ESBL Plus panels may also be problematic with: visually-impaired users, unusual/uncommon/fastidious organisms, certain drug resistance patterns, and vary with the skill level of the users. Enabling microbiologists to review and adjust the BIOMIC V3 automated test well turbidity readings with clear enlarged images and instructions on-screen, and to save test panel images can be a significant advantage. This study evaluated the results of BIOMIC V3 automated well reading of turbidity endpoints to manual reading with MicroScan ESBL Plus panels.

Methods and Materials

A standard commercially available BIOMIC V3 reader system was used. This system consisted of the BIOMIC V3 reader cabinet containing LED lighting with a high resolution color digital camera and BIOMIC clinical microbiology software (current at time of testing 2010-2012). The new and optional BIOMIC 96 well software module that automatically reads and interprets turbidity was specifically evaluated in this study. MicroScan ESBL Plus panels were first read manually by eye by an experienced microbiologist, then read immediately after in the BIOMIC V3 reader. All test results and all panel images read by BIOMIC were saved. Relative to this new 96-well software application: Note in USA: For Research Use Only. Not for use in diagnostic procedures

Summary of BIOMIC V3 Reading MicroScan® ESBL Plus Panel Results

• # is the number of drug/organism combinations.

Drug	#	# (%) with Exact MIC Match	# (%) within +/- 1 Dilution	# (%) > +/- 1 Dilution
Aztreonam	93	81 (87.1)	89 (95.7)	4 (4.3)
Cefepime	93	89 (95.7)	91 (97.8)	2 (2.1)
Cefotaxime	93	86 (92.5)	88(94.6)	5 (5.3)
Cefotaxime-clavulanate	93	83 (89.2)	92(98.9)	1 (1.0)
Cefotetan	93	83 (89.2)	91(97.8)	2(2.1)
Cefoxitin	93	86 (92.5)	92 (98.9)	1 (1.0)
Cefpodoxime	93	92 (98.9)	93(100)	0
Ceftazidime	93	79(84.9)	88 (94.6)	5(5.3)
Ceftazidime-clavulanate	93	70 (75.3)	90(96.8)	3 (3.2)
Ceftriaxone	93	83 (89.2)	86(92.5)	7 (7.5)
Imipenem	93	87 (93.5)	93(100)	0
Meropenem	93	93 (100)	93(100)	0
Piperacillin	93	89 (95.7)	91 (97.8)	2(2.1)
Total	**1209**	**1101 (91.1)**	**1177 (97.4)**	**32 (2.6)**

ESBL Plus Panel Reading Screen in the BIOMIC Software.

Data Analysis

This study was started in November 2010 and completed in October 2012 at the Saskatchewan Disease Control Lab in Saskatchewan Canada. 93 routine sequential unselected fresh clinical isolates were tested to eliminate a selection bias. 1209 drug-organism combinations in MicroScan ESBL Plus AST panels were read. Quality control testing was performed using standard manufacturer recommended ATCC strains.

BIOMIC automated turbidity test results and interpretations were transferred to Giles Scientific for analysis by secure internet upload. These BIOMIC automated readings did not include any user visual endpoint changes (UVEC), however, UVEC is a standard feature of the BIOMIC reading procedure. Printed paper copies of manually read test results and interpretations were provided to Giles Scientific via email and manually entered into a master database for analysis. Data was verified by Giles Scientific using ANSI/ASQC Z1.4 sampling plans.

Results

A total of 1209 drug-organism combinations (DOC) were read (Table). 97.4% (1177/1209) of DOC were within +/- 1 dilution and 2.6% (32/1209) were > +/- 1 dilution. 91.1% (1101/ 1209) of well results were an exact MIC match, and 6.3% (76/1209) of well results were read with only 1 dilution difference. Additionally, 325 quality control DOC were tested and results were 96.9% within +/- 1 dilution, with 93.2% achieving an exact MIC match.

Conclusion

BIOMIC was shown to provide accurate automated turbidity reading and interpretation of MicroScan ESBL Plus panel results. BIOMIC saved user reading time relative to manual reading and enabled the microbiologist to more clearly see turbidity endpoint results on the enlarged high quality screen image, and make adjustments as needed on screen. The fact that all test panel images were saved routinely proved to be valuable for subsequent review. As an alternative to manual reading, we concluded that BIOMIC provides a more standardized turbidity reading of test well end points, while eliminating variation inherent between different microbiologists. Standardization is particularly useful in reading the MicroScan ESBL Plus panel because they tend to be more difficult to read and interpret.

References

1. Siemens Healthcare Diagnostics Inc. 2009. Dried ESBL Confirmation Panel Procedural Manual. 3251-1168A. Siemens Healthcare Diagnostics, West Sacramento, CA.
2. **ANSI/ASQ Z1.4-2003.** 2003. Sampling Procedures and Tables for Inspection by Attributes. American National Standard Institute, Washington, DC.