

Impact of an Automated Plate Reader for MRSA & Urine Chromogenic Culture Plates

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Introduction

Screening for MRSA colonisation is a routine task in the microbiology laboratory, with culture on chromogenic medium the standard method. The low prevalence (~1% in UK) of colonisation means much time is spent reading and reporting negative culture plates. Similarly, a large proportion of urine cultures yield no significant bacterial growth. As such a large amount of scientist time is spent reporting negative samples.

The APAS independence is an automated plate reader and sorter which can report culture results directly to tie with LIMS. Negative plates are directed for discard, and positives plates directed for BMS review. We evaluated the APAS independence culture plate reading system for the screening of negative MRSA and Urine culture plates in a busy laboratory.



IMAGE 1: The APAS Independence in action within the Halo Building



IMAGE 2: The installation of the analyser in 2020 (pre covid)

MRSA Module

The APAS MRSA module reads Brilliance MRSA II agar plates, and reports the presence of blue colonies as 'presumptive', which are reviewed by the scientist. Plates without blue colonies are reported as negative without the need for scientist review.

NPV = 100 %
PPV = 16.5 %
Sensitivity = 100 %
Specificity = 94.1 %

		BMS Read	
		Negative	Positive
APAS Designation	Negative	3459	0
	Presumptive	217	43

Urine Module

The APAS has a urine module for the Brilliance UTI clarity agar, which counts and differentiates colonies by colour, and sorts plates into the following categories:

- No growth - reported as 'negative'
- <10 colonies of a single type, of <100 colonies with two colony types (reported as 'doubtful')
- >100 colonies, with multiple organism types present - reported as 'review'
- >100 colonies with a pure or predominant organisms - reported as 'probable'

The laboratory currently reports culture results in 3 categories, No significant growth, Mixed growth of doubtful significance, and positive culture of a pathogen. We processed 1085 Urine cultures performed on Brilliance UTI clarity agar on the APAS independence and compared the results to a read by a trained member of laboratory scientific staff.

NPV = 595/595 = 100 %
PPV = 309/490 = 62 %
Sensitivity = 385/385 = 100 %
Specificity = 595/776 = 76 %

		BMS Read			TOTALS
		NSG	Mixed Growth	Positive Culture	
APAS Designation	No Growth	275	0	0	275
	Doubtful	320	0	0	320
	Review	16	51	38	105
	Positive	52	62	271	385
TOTALS		663	113	309	1085

Conclusion

Following the successful introduction of the APAS into clinical service, there has been a 93% reduction on plates requiring BMS review. Routine review of negative images demonstrates it maintains 100% negative predictive value.

For urine cultures, using a growth cut off of 10 cfu from a 10 microliter inoculum (equivalent to 103 cfu/ml) the APAS was able to screen out >50% of urine samples. Screening out of plates with <100 colonies with two colony morphologies detected screened out a further 11% of culture plates.

With an average laboratory workload of 1400 MRSA cultures per day, and 1100 urine cultures per day, taken together the APAS could reduce the number of plates requiring BMS review by 1995 per day, or by 79.8% across the two benches.



IMAGE 3: The APAS Independence in action within the Halo Building