Evaluation of Sigma Transwab® (liquid medium swabs) for the Rapid Detection of MRSA using the GeneXpert® PCR Analyser

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Introduction

With recent advances of automation within microbiology, such as automated plate spreading techniques, the use of liquid swabs has become popular. Liquid medium transport swabs are known to work well for the culture of specimens onto solid media; however PCR analysis is also becoming routine, especially with the identification of many important pathogens, including MRSA from nasal swabs. The GeneXpert® system is currently only validated for use with a dedicated swab device (Copan), which has to be used completely, and so unavailable for further tests.

This study was designed to show if Sigma Transwab® could be used with the GeneXpert® platform. The same specimen could be used for further testing.

Method

Testing was according to Cumitech 31A, Verification & Validation Procedures in the Clinical Microbiology Laboratory (ASM, 2009). Sigma Transwab® tubes were inoculated with dilutions (100 µl of 10⁻¹, 10⁻², 10⁻³, 10⁻⁴ dilutions of 0.5 McFarland) of MRSA control strain. After vortexing, 100 µl of medium was added to lysis buffer, vortexed again and transferred to the GeneXpert® cartridge and processed. Copan Duo swabs were also inoculated with 100 µl of the same dilutions, and processed by breaking the complete swab head into the lysis buffer, which is then vortexed and transferred to the cartridge.

Negative samples were also run on each platform (as required by Cumitech).

Results

Of the 200 negative samples run, all were negative. For the positive samples, in total 100 assays were performed - 50 for the Cepheid/Copan collection kits, and 50 for the Sigma Transwab®. For both systems, the average cycle threshold (CT) value for the mecA gene was plotted on a graph against the dilution concentration to show that both swabs are comparable in their results. (Fig1)

At the 10⁻¹ concentration the average CT value was 23.4 for the Cepheid/Copan swab, and 24.4 for the Sigma-Transwab®. At the 10⁻⁴ concentration the average CT values were 32.3 (Cepheid/Copan) and 32.5 for Sigma-Transwab®.

Conclusion

Cumitech 31A, Verification & Validation Procedures in the Clinical Microbiology Laboratory (ASM, 2009) is a recognised method for validation of alternative (off-label) devices for use with particular analytical systems. At the time of performing the study, only the Cepheid (Copan) collection device was validated for use with the GenXpert system for MRSA. However many other devices are routinely used in healthcare establishments for the collection of specimens for MRSA screening, and it would be useful if these could also be used with PCR systems such as GenXpert for confirmation, or rapid testing in acute cases.

In this study the Sigma-Transwabs® were able to detect the MRSA organism at all the dilutions used. The CT values at each dilution for both swabs were similar in their readings. In fact Sigma-Transwab® has effectively a further dilution because of the adding of the suspension to the liquid medium, and is yet able to match the Cepheid/Copan controls. The lowest concentration, 10⁻⁴, still produced a reliable result from the Sigma-Transwabs® with MRSA being detected. This study has shown that even at relatively low concentrations of organism, PCR analysis can be performed directly from the liquid transport medium of the Sigma-Transwab®. The Sigma-Transwab® also performed just as well as the Cepheid/Copan collection kit, with the added advantage of being able to use the same swab on automated platforms such as those for inoculation and suspension.

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