

## 04. Diagnostic bacteriology & general microbiology

4b. Lab management, automation and QC

### Second topic

04. Diagnostic bacteriology & general microbiology / 4a. Diagnostic bacteriology – culture based and general microbiology

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**Background** Culture-based MRSA screening is an important part of infection control in everyday clinical practice and fast and reliable results are essential. Artificial Intelligence (AI)-based systems may increase the sample throughput, decrease time to result and increase test accuracy. This study was conducted to validate the use of AI-based MRSA detection in combination with an automated inoculation system in a routine setup.

**Methods** As part of the routine MRSA screening in 3 west german hospitals, a total of 5122 screening samples were examined over a period of 3 months. After receipt, the samples were inoculated on Columbia Agar with Sheep Blood and chromogenic MRSA Agar (biplate) by an automated inoculation system. APAS Independence (CCS) AI-Algorithms were used to classify growth after 24 hours and all plates were additionally checked by experienced medical laboratory technicians and microbiologists. Results of AI-based classifications were compared to conventional plate reading.

**Results** From 5122 samples 65 (1.27%) were positive for MRSA. AI-based reading showed no false negative results leading to a sensitivity and negative predictive (NPV) of 100 %. Specificity of the APAS Independence (CCS) AI-Algorithms was 98.87 % (95 % CI: 98.54% to 99.13 %). False positive classification of samples by the AI-Algorithm could be categorized in (i) growth of MSSA or other pathogens (0.94 %), (ii) plate-issues (0.12 %), and (iii) artefacts (0.06 %).

**Conclusions** This study showed a sensitivity of 100 % and no false negative results using APAS Independence (CCS) AI-Algorithms under routine conditions to detect MRSA. The establishment of AI-based MRSA detection in the routine microbiological laboratory can significantly reduce the number of samples that must be processed manually by technical medical assistants. Thus, sample throughput can be upscaled with no loss of precision or accuracy. Furthermore, it was shown that false positive results were largely due to the quality of the agar plates used.

### Keyword 1

MRSA

### Keyword 2

Artificial Intelligence

### Keyword 3

Plate reading

Conflicts of interest