# P1582 MIC distributions of MRSA to ceftaroline, vancomycin, teicoplanin and daptomycin: potential problems for routine susceptibility testing

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## Introduction

➢MRSA infection, though now in decline in some European countries, still remains a major healthcare burden and therapeutic challenge.
➢As the number of available IV therapies have increased then the problem of routine susceptible testing has also multiplied.
➢Present EUCAST clinical breakpoints define ceftaroline susceptibility as an MIC ≤1mg/L; vancomycin susceptibility as an MIC ≤2mg/L but warn of poor clinical outcomes if the MIC is 2mg/L and published clinical data have associated vancomycin and teicoplanin MICs of >1.5mg/L with increased mortality.[1]

## Purpose

To determine the likely testing problems, we determined the MIC distributions of 139 MRSA strains – mainly from Blood Stream Infections (BSI) to ceftaroline, vancomycin, teicoplanin and daptomycin.

## Materials and methods

➢MICs were determined using CLSI agar dilution (AD) methodology for 139 MRSA isolates mainly from BSI from two periods 2005-6 and 2009-12.[2]
➢Vancomycin MICs were also determined by gradient strip method on Mueller Hinton agar (MHA).
➢Daptomycin MICs were performed on MHA adjusted to contain 50mg/L calcium.

## Results

➢Figure 1 shows the distribution of the 139 MRSA strains for ceftaroline, vancomycin, teicoplanin and daptomycin.
7/139 (5%) of MRSA were non-susceptible to ceftaroline: all seven strains had MIC 2mg/L on repeat testing.
➢Figure 2 shows the vancomycin distribution by AD and gradient strip; 0.7% (1/139) of MRSA had a vancomycin MIC of 2mg/L by agar dilution and gradient method: on retesting the strain had an MIC of 2mg/L whether tested by agar dilution or gradient method.
➢8.6% (12/139) strains had vancomycin MIC ≥1mg/L by agar dilution while 45.3% (63/139) had MIC ≥1mg/L tested by gradient strip.
➢One strain had a teicoplanin MIC >1.5mg/L whilst no strains had daptomycin MICs >0.5mg/L.

## Conclusions

➢5% of MRSA strains are non-susceptible to ceftaroline and 0.7% of strains have vancomycin or teicoplanin MIC values associated with poor clinical outcomes.
➢Repeat testing showed ceftaroline and vancomycin MICs to be reliably elevated.
➢Higher vancomycin MICs are given when tested by gradient strip.
➢However, reproducible and accurate routine detection of such strains will represent a formidable challenge for diagnostic clinical laboratories.

Table 1, showing the range, MIC50, MIC 90 for 139 MRSA strains

| | ceftaroline | vancomycin agar dilution | vancomycin gradient strip | teicoplanin | daptomycin |
|---|---|---|---|---|---|
| range | ≤0.25 - 2 | 0.5 - 2 | ≤0.25 - 2 | ≤0.25 - 2 | ≤0.25 - 0.5 |
| MIC 50 | 0.5 | 0.75 | 0.75 | 0.75 | ≤0.25 |
| MIC 90 | 1 | 0.75 | 1.5 | 1.5 | 0.5 |
| % susceptible | 95 | 100 | 100 | 100 | 100 |

References
1.http://www.eucast.org/clinical_breakpoints/
2.Clinical Standards and laboratory Standards Institute. *Methods for dilution Susceptibility Tests for Bacteria That Grow Aerobically –Eigth Edition: Approved standard M7-A8.* CLSI Wayne PA, USA, 2009

**Figure 1 Distribution of Ceftaroline, Vancomycin, Teicoplainin and Daptomycin MICs**

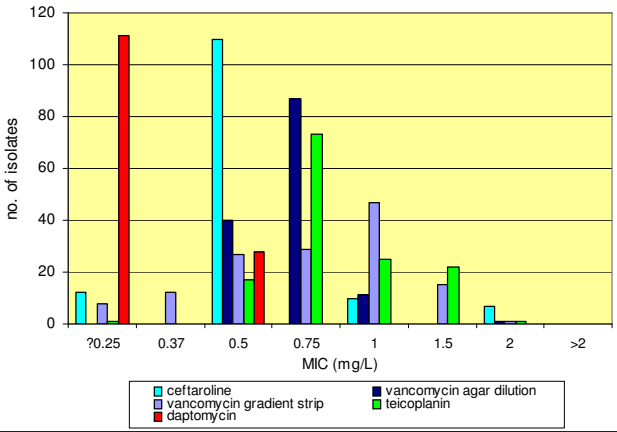
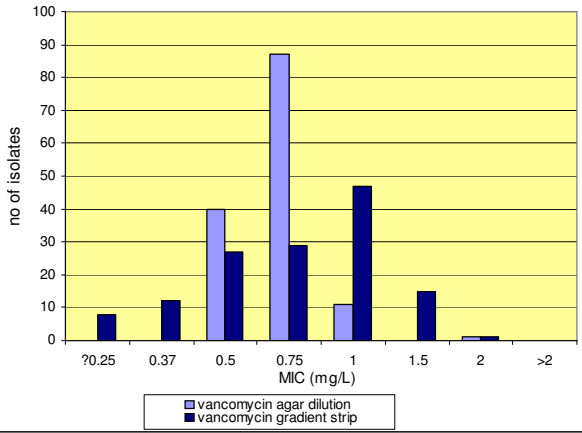



**Figure 2 Comparison of Vancomycin MIC by agar dilution and gradient strip**

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