

Vancomycin MIC and clone type are predictors of persistent MRSA bacteraemia at a US hospital

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1. Objectives

- To investigate associations with persistent MRSA bacteraemias.

2. Methods

- We investigated MRSA bacteraemias identified at the Hospital of Saint Raphael, CT, USA, from 1999-2008.
- 581 patients with MRSA bacteraemia were reported during this period and 61 isolates were selected for molecular analysis based on two factors: a) isolates with an initial vancomycin minimum inhibitory concentration (MIC) ≥ 2 mg/L and/or b) persistent bacteraemia.
- A further 59 isolates not meeting the 2 criteria were randomly selected from the remaining isolates.

- MRSA was characterised by *spa* type, staphylococcal cassette chromosome *mec* (SCC*mec*) allotype and MIC of vancomycin (VA), and daptomycin (DP) performed by e-test.¹
- SCC*mec* IV isolates were tested for carriage of the Panton-Valentine leukocidin (PVL).¹
- Clones were defined by using Based Upon Repeat Pattern (BURP) clustering with a calculated cost between lineages of 4 and PVL data.¹
- Persistence was defined as bacteraemia lasting 5 days or more.
- Univariate analysis of contingency tables was performed using Chi-squared tests to identify variables associated with persistent bacteraemia; multivariate binary logistic regression was used to identify independent predictors of persistent bacteraemia.

Table. Associations with persistent MRSA bacteraemia.

	No persistent bacteraemia (n=89)	Persistent bacteraemia (n=31)	Univariate p	Multivariate p	Odds ratio (95% confidence interval)
Age / years (mean +/- standard deviation)	67.3 +/- 16.7	75.5 +/- 12.1	0.02	0.012	1.1 (1.0-1.2)
Clone	n (%)	n (%)	0.01		
CC5-II	71 (79.8)	18 (58.1)	-	Ref	-
CC8-IV (PVL-)	9 (10.1)	10 (32.3)	-	0.045	4.2 (1.0-16.8)
Other	9 (10.1)	3 (9.7)	-	0.862	-
PVL carriage	4 (4.5)	0 (0.0)	0.07	-	-
Vancomycin MIC ≥ 1.5 mg/L	30 (33.7)	30 (96.8)	<0.001	<0.001	69.5 (8.5-569.5)
Daptomycin MIC ≥ 1 mg/L	19 (21.3)	2 (6.4)	0.06	-	-
Patient died	52 (58.4)	14 (45.2)	0.20	-	-

3. Results

- Persistent bacteraemia occurred in 31 (25.8%) of the 120 cases (Table).
- The univariate analysis indicated that persistent bacteraemia was associated with increasing age, clone type and VA MIC ≥ 1.5 mg/L.
- VA MIC (adjusted odds ratio (AOR) 69.5, 95% confidence interval (CI) 8.5-569.5, $p < 0.001$) one clone, USA500, CC8-IV, PVL-negative (AOR 4.2, 95% CI 1.0-16.8, $p = 0.036$) and age (AOR 1.1, 95% CI 1.0-1.2) remained associated with persistent bacteraemia in the multivariate analysis.
- DP MIC ≥ 1 mg/L was not associated with persistent bacteraemia.

4. Conclusions

- In our analysis, patients from a single institution with persistent MRSA bacteraemia were more likely to have a VA MIC ≥ 1.5 mg/L and be infected with a particular clone.
- Other studies have indicated that VA MIC, *agr* function and other factors are associated with persistent bacteraemia.¹⁻⁵
- Increasing age was associated with persistent bacteraemia in univariate but not multivariate analysis, which could be a function of sample size.
- Additional studies are required to confirm these findings and explore other possible predictors of persistent bacteraemia.

5. References

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