

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

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Objectives: To investigate associations with persistent MRSA bacteraemias. **Methods:** 581 patients with MRSA bacteraemia were reported at our US hospital from 1999-2008 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 smaller cohort consisting of 59 isolates not meeting the 2 criteria was randomly selected from the remaining isolates. MRSA was characterised by spa type, staphylococcal cassette chromosome mec (SCCmec) allotype and MIC to vancomycin (VA), and daptomycin (DP) performed by e-test. SCCmec IV isolates were tested for carriage of the Panton-Valentine leukocidin (PVL). To explore possible associations with MICs, cut-offs of ≥ 1.5 and ≥ 1 mg/L were chosen for VA and DP respectively. Clones were defined by using Based Upon Repeat Pattern (BURP) clustering with a calculated cost between lineages of 4 and PVL data. 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. **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, HIV status, and VA MIC ≥ 1.5 mg/L. VA MIC (adjusted odds ratio (AOR) 83.8, 95% confidence interval (CI) 9.9-710.1, $p < .001$) and one clone, USA500, CC8-IV, PVL-negative (AOR 6.4, 95% CI 1.1-36.1, $p = .036$) remained independently associated with persistent bacteraemia in the multivariate analysis. DP MIC ≥ 1 mg/L was not associated with persistent bacteraemia. **Conclusion:** 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 infected with a particular clone. Other studies have indicated that VA MIC, agr function and other factors are associated with persistent bacteraemia. 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.

Table. Associations with persistent bacteraemia at a US hospital.

	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	0.445	-
	n (%)	n (%)			
Clone					
CC5-II	71 (79.8)	18 (58.1)	0.01	Ref	-
CC8-IV (PVL-)	9 (10.1)	10 (32.3)	-	0.036	6.4 (1.1-36.1)
Other	9 (10.1)	3 (9.7)	-	0.769	-
PVL carriage	4 (4.5)	0 (0.0)	0.07	-	-
Pigment >0.3	49 (55.1)	17 (54.8)	0.94	-	-
Vancomycin MIC ≥ 1.5 mg/L	30 (33.7)	30 (96.8)	<0.001	<0.001	83.8 (9.9-710.1)
Daptomycin MIC ≥ 1 mg/L	19 (21.3)	2 (6.4)	0.06	-	-
HIV positive	16 (18.0)	0 (0.0)	0.01	0.998	-
Patient died	52 (58.4)	14 (45.2)	0.20	-	-