

# Meticillin Resistance as a risk factor for mortality in *Staphylococcus aureus* bacteraemia: an analysis from the EARSS Enhanced Bacteraemia Surveillance in Ireland, 2005

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## INTRODUCTION AND PURPOSE

- Meticillin-resistant *Staphylococcus aureus* (MRSA) blood-stream infections (BSI) are associated with increased mortality<sup>1</sup>
- There is a need to adjust for age and other important confounding variables in any analysis
- International studies are too heterogeneous to apply evidence from literature to the local situation
- In this poster, we examine the risk factors for mortality among patients with *S. aureus* BSI in Ireland in 2005

## METHOD

- Irish hospital laboratories provide enhanced (clinical, demographic and risk factor) data on episodes of BSI reported to the European Antimicrobial Resistance Surveillance System (EARSS)<sup>2</sup>
- Outcome data has also been reported by a subset of laboratories since the beginning of 2005
- We examined mortality occurring before the end of each of the four quarters of 2005 (in-hospital mortality)
- We also examined 14-day and 30-day mortality
- SPSS 13.0 was used for statistical analysis

## RESULTS

- Five hospital laboratories provided data on 269 BSI episodes
- Table 1** shows the patient characteristics of those with MRSA and meticillin-sensitive *S. aureus* (MSSA) bacteraemia
  - Age and length of stay (LOS) before the detection of BSI were significantly different in the two patient groups
  - In-hospital mortality was significantly different in patients with MRSA (42%) than in patients with MSSA (20%)
  - The differences in mortality were also significant at 14-days and 30-days

TABLE 1. Patient characteristics with respect to meticillin resistance

	MRSA (n = 116)		MSSA (n = 153)		P value
	n	%	n	%	
Mean Age, years	66.46		49.67		<0.001
Mean Length of stay, days	20.63		5.65		<0.001
Sex = female	70	60%	88	59%	0.9
Stay in ICU	22	19%	16	10%	0.053
Presence of secondary focus	6	5%	13	8%	0.343
Number of risk factors					
0	22	19%	43	28%	0.185
1	71	61%	79	52%	
>1	23	20%	31	20%	
Entry portal of bacteraemia					
CVC	25	22%	35	23%	0.883
Resp tract	15	13%	10	7%	0.09
Skin/soft tissue	6	5%	28	18%	0.001
Surgical wound	6	5%	6	4%	0.767
Other	13	11%	18	12%	1
Unknown	51	44%	56	37%	0.258
Mortality					
14-day	36	31%	21	14%	0.001
30-day	43	37%	28	18%	0.001
In-hospital	49	42%	31	20%	<0.001

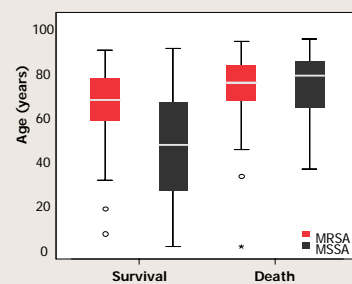


FIGURE 1. Patient age grouped by in-hospital mortality and survival

TABLE 3. Multivariate analysis for 14-day, 30-day and in-hospital mortality. Odds ratio (95% CI); P value

	14-Day Mortality			30-Day Mortality			In-hospital Mortality		
	Odds Ratio	95% CI	P value	Odds Ratio	95% CI	P value	Odds Ratio	95% CI	P value
Age	1.04	(1.02-1.06);	P<0.001	1.05	(1.03-1.07);	P<0.001	1.05	(1.03-1.07);	P<0.001
Length of stay				1.02	(1.00-1.03);	P=0.05	1.02	(1.01-1.04);	P<0.001
Number of risk factors				0.58	(0.37-0.91);	P=0.02			
Surgical wound as entry portal							0.10	(0.01-0.80);	P=0.03
CVC as entry portal	0.37	(0.15-0.95);	P=0.04						
Meticillin resistance	1.95	(1.02-3.76);	P=0.04						

## REFERENCES

- Cosgrove *et al.* 2003. *Clinical Infectious Diseases* **36**: 53-59
- Oza and Cunney. 2005. *Epi-Insight* **9**:2-3

TABLE 2. Univariate analysis for in-hospital mortality

	Odds Ratio (95% CI)		P value
	Odds Ratio	95% CI	
Age, years	1.05	(1.03-1.07)	<0.001
Length of stay, days	1.03	(1.01-1.04)	<0.001
Sex = female	0.81	(0.47-1.38)	0.43
Stay in ICU	1.90	(0.94-3.84)	0.08
Presence of secondary focus	0.61	(0.20-1.90)	0.39
Number of risk factors	0.72	(0.49-1.06)	0.10
Entry portal of bacteraemia			
CVC	0.59	(0.30-1.16)	0.12
Resp tract	2.86	(1.24-6.59)	0.01
Skin/soft tissue	0.13	(0.03-0.54)	0.01
Surgical wound	0.20	(0.03-1.61)	0.13
Meticillin resistance	2.88	(1.68-4.94)	<0.001

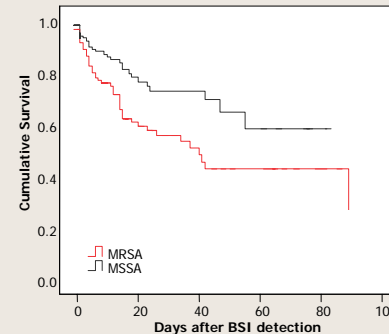


FIGURE 2. Survival curve for patients with *S. aureus* bacteraemia

## RESULTS – continued

**Table 2** shows the univariate analysis for in-hospital mortality

- Age and LOS were significant factors for mortality
- Meticillin resistance was highly significant with an odds ratio of 2.88 (95% Confidence Intervals 1.68 – 4.94)

**Figure 1** shows the age breakdown of in-hospital mortality or survival in patients with MRSA or MSSA bacteraemia

- Older patients were more likely to acquire MRSA BSI and less likely to survive than younger patients and those with MSSA BSI

**Figure 2** shows the survival curve for MRSA and MSSA bacteraemic patients

- Log-Rank test produced P=0.004, but note small differences in rates at different time points
- Cox Regression revealed age as the only significant factor with a hazard ratio of 1.04 (95% Confidence Intervals 1.02 – 1.05)

**Table 3** shows the results of the multivariate analyses (binomial logistic regression) for 14-day, 30-day and in-hospital mortality

- Age was consistently significant throughout
- LOS was not significant for 14-day mortality, while presence of other factors showed a protective effect
- Meticillin resistance was a significant contributor to 14-day mortality

## CONCLUSIONS

- Meticillin resistance remains a significant risk factor for 14-day mortality among patients with *S. aureus* BSI after controlling for age, LOS and other factors
- Age, LOS and other factors become more significant for 30-day and in-hospital mortality
- In this context, enhanced surveillance can inform appropriate measures for the control of MRSA infections