

Antimicrobial susceptibilities of USA300 methicillin-resistant *Staphylococcus aureus* isolates in Stockholm, Sweden

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Background

USA300 isolates were initially resistant only to methicillin, macrolides, and, increasingly, fluoroquinolones. It has been reported that several USA300 isolates have developed reduced susceptibility to vancomycin, and, in some cases, to daptomycin, in addition to occasional resistance to gentamicin and trimethoprim-sulfamethoxazole.

This study aimed to investigate the antimicrobial susceptibilities of USA300 isolates in Stockholm during 2008-2016.

Materials and methods

In total, 291 consecutive non-duplicate MRSA isolates, with the pulsed-field gel electrophoresis (PFGE) pattern USA300 in Stockholm during January 2008 – December 2016 were investigated. USA300 accounted for 5.3% of all MRSA cases recovered during this period.

The minimum inhibitory concentrations (MICs) of 19 antimicrobial agents for each isolate were determined by broth microdilution following EUCAST guidelines.

Results

Table 1. Resistance profiles of the 291 USA300 isolates in Stockholm during 2008-2016

	CLI	ERY*	FOX	FUS	GEN*	LVX	MXF	NOR*	TET	TOB*
MIC range (mg/L)	<=0.12 - >1	0.5 - >4	8 - >8	<=0.5 - >4	<=0.25 - 64	<=0.5 - >4	<=0.25 - >2	<=4 - >16	<=0.5 - >4	<=0.25 - >8
MIC ₅₀ (mg/L)	<=0.12	>4	>8	<=0.5	<=0.25	>4	2	>16	1	<=0.25
MIC ₉₀ (mg/L)	<=0.12	>4	>8	<=0.5	<=0.25	>4	>2	>16	1	0.5
MIC breakpoint, R (mg/L)	>0.5	>2	>4	>1	>1	>1	>0.25	(>4)	>2	>1
Resistance (%)	2.4/2.7 [#]	86	100	1	3	68.38	68.73	(69.76)	9	3

NA: not available. *p<0.05 for MIC-values between years. #Data are resistant isolates/resistant plus inducible isolates.

CLI: clindamycin; ERY: erythromycin; FOX: ceftoxitin; FUS: fusidic acid; GEN: gentamicin; LVX: levofloxacin; MXF: moxifloxacin; NOR: norfloxacin; TET: tetracycline; TOB: tobramycin.



Figure 1. The number of USA300 isolates and the percentage of USA300 cases out of all MRSA cases per year between 2008 and 2016 in Stockholm.

Ceftaroline, daptomycin, linezolid, mupirocin, rifampicin, teicoplanin, telavancin, trimethoprim-sulfamethoxazole and vancomycin retain full activity against USA300 isolates in Stockholm. Four isolates (1.4%) were found to be susceptible to all non-β-lactam antibiotics tested.

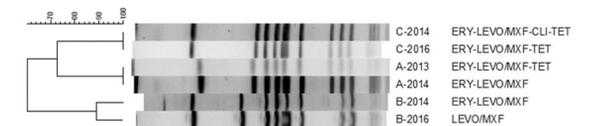


Figure 2. PFGE and resistance patterns of six isolates, named as “case-isolated year”, from cases A-C.

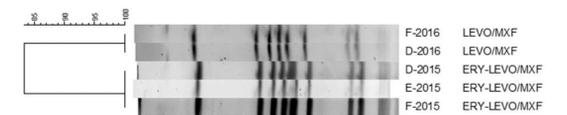


Figure 3. PFGE and resistance patterns of isolates from cases D-F in a family

Conclusions

Although there were few multidrug resistant isolates, the Stockholm USA300 isolates were no longer multi-susceptible to non-β-lactam agents. With its potential to become resistant to additional antibiotic classes, USA300 MRSA should be well monitored when identified in an area.