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P1434 Epidemiology of biofilm formation and virulence in clinical methicillin-resistant Staphylococcus aureus (MRSA) isolates

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Background: MRSA is an important cause of nosocomial infections with a high rate of morbidity and mortality worldwide. The ability of certain isolates to form biofilms is an important aspect of the pathogenesis in Staphylococcus aureus infections. The goal of our study was to evaluate the extent to which the formation of biofilms and the specific strength of virulence patterns influenced the epidemiological spread and the persistence of distinct clones and lineages in the hospital setting.

Materials/methods: We analyzed 347 MRSA isolates, collected between 2015 and 2017 at the Heidelberg University Hospital, a large German 2,200 bed university teaching hospital. The epidemiological background of each collected isolate was analyzed by using Spa-typing and BURP-clustering. Native and induced biofilm formation properties of the MRSA isolates were analyzed by crystal violet technique. The presence of most relevant virulence factors (Panton-Valentine Leukocidin: PVL, Toxic shock syndrom toxin: TSST, and Enterotoxine A and B) were analyzed by PCR.

Results: The strongest native, as well as induced biofilm forming properties were associated to Spa-type t535 (mean 0.93 ± 0.093) and clonal complex cc008 (0.40 ± 0.19). PVL was detected in 41(11.8%), TSST in 31(8.9%), SEA in 53(15.2%) and SEB 27(7.8%) in 347 MRSA isolates. While presence of SEA was associated to elevated native biofilm formation as well as induced biofilm formation, the presence of lucPV and TSST was associated to elevated inducibility of biofilm formation ($p<0.05$). The tested clinical MRSA isolates showed a broad range of biofilm formation potential. The mean native biofilm formation was 0.32±0.15, while the mean glucose induced biofilm formation was 0.46±0.17. Addition of 2% glucose resulted in an average increase of 1.74 compared to the native formation. However, 54(15.6%) MRSA isolates showed no inducibility or even decreased biofilm formation.

Conclusions: Clinical MRSA isolates show a broad range of biofilm formation. Distinct MRSA types and clonal lineages with outstanding ability to form biofilms under native as well as induced conditions might therefore cause serious problems in treatment and infection control measures especially if linked to additional virulence patterns.