

TITLE: Characterization of *Staphylococcus aureus* clinical isolates presenting different antimicrobial resistance patterns among five Brazilian states

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ABSTRACT:

Staphylococcus aureus is important human pathogen and highly prevalent in community and health-care associated infections.

In this study we aimed to determine the antimicrobial resistant profile and molecular characterization of methicillin-susceptible (MSSA) and methicillin-resistant *S. aureus* (MRSA), in isolates from five Brazilian states: Rio Grande do Sul (RS), Rio de Janeiro (RJ), Paraná (PR), São Paulo (SP) and Pernambuco (PE). Isolates were obtained from routine cultures of different clinical specimens submitted to decentralized sites of a nationwide laboratory. Specimens were cultivated on 5% sheep blood agar plates, in 35–37°C and 5–10% CO₂, and incubated for 24h to 48h. Bacterial identification was performed by Matrix-Assisted Laser Desorption Ionization Time of Flight Mass Spectrometry (MALDI-TOF MS) System (BD, USA). Antimicrobial susceptibility test (AST) was performed by disk-diffusion method to ceftiofur (30µg; CFO), clindamycin (CLI), erythromycin (ERI), gentamicin (GEN), trimethoprim-sulfamethoxazole (SMT) and ciprofloxacin (CIP) and interpreted according to European Committee on Antimicrobial Susceptibility Testing (EUCAST) criteria. Methicillin resistance was confirmed by polymerase chain reaction (PCR) for the *mecA* gene. Minimum inhibitory concentration (MIC) for vancomycin was determined using in-house prepared panels according to Clinical and Laboratory Standards Institute (CLSI)

guidelines. The *Staphylococcal cassette chromosome mec* (SCC*mec*) typing was performed by multiplex PCR assay. We evaluated 230 *S. aureus* clinical isolates; samples were from surgical wounds (28.7%), respiratory tract (20.7%), blood (20.2%), urine (12.2%), skin and soft tissue (12.8%) and others sites (5.3%). A total of 61/230 (26.5%) MRSA were detected, and overall susceptibility was: CLI 48.3%, ERY 27.5%, GEN 86%, SMT 91.8%, and CIP 35.7%. It was evidenced higher resistant rate to CIP ($p<.001$), GEN ($p=.004$) and SMT ($p=.006$) in MRSA than in MSSA isolates. Considering the AST according to the state of the sample: the isolates from PB present higher resistance to SMX (13.2%; $p<.001$), and isolates from RJ present higher resistance to GEN (15.0%; $p=.013$). All isolates were susceptible to vancomycin - MIC₅₀/MIC₉₀ were 0.5 and 0.75µg/ml. Most isolates were SCC*mec* type IV, and types II, III and V were also detected. No difference was evidenced among the SCC*mec* types according to states. This study evidenced differences in antimicrobial resistance patterns according to regions. This data highlights the need of larger epidemiological studies about the *S. aureus* resistance patterns in Brazil.

Keywords: *Staphylococcus aureus*, MSSA, MRSA, antimicrobial resistance.