

## Can we clinically predict methicillin-resistance in community-onset *Staphylococcus aureus* infection?

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**Background:** Increasing methicillin-resistance among the community-onset *Staphylococcus aureus* infection is growing concern. We tried to identify demographic and clinical risk factors for methicillin-resistance in community-onset *S. aureus* bacteremia (CO-SAB) and developed a clinical risk score system. **Methods:** We reviewed the medical records of three multicenter, prospective cohort studies: the cohort from July, 2009 to June, 2011 at 9 hospitals, from May to December, 2012 at 16 hospitals, and from September, 2013 to March, 2015 at 13 hospitals. Using these data, we developed a risk score system. Point allocation in the methicillin-resistance was based on beta-coefficient in the final regression model. **Results:** We gathered a total of 1,802 cases of CO-SAB, 752 (41.7%) of which were methicillin-resistant *S. aureus* (MRSA) infections. MRSA bacteremia cases were significantly older, and more likely to have a history of MRSA infection or colonization within six months [Odds ratio(OR), 4.456; 95% confidence interval(CI), 2.974-6.677; 1.5 point], hospitalization or surgery (OR 2.050; 95% CI 1.640-2.563; 0.5 point), residence in a long term care facility (OR 1.679; 95% CI 1.297-2.173; 0.5 point) and dialysis (OR 1.475; 95% CI 1.075-2.024; 0.5 point) within the past year. On the other hand, they were less likely to have hematologic disease (OR 0.445; 95% CI 0.234-0.847; -1 point) and skin and soft tissue infection (OR 0.570; 95% CI 0.410-0.793; -0.5 point), bone and joint infection (OR 0.650; 95% CI 0.481-0.878; -0.5 point), or endovascular infection (OR 0.456; 95% CI 0.263-0.790; -1 point) as a primary site of infection. The area under the curve (AUC) was 0.684 and cut-off value was 0.75. The sensitivity, specificity, positive predictive value and negative predictive value were 0.543, 0.751, 0.610 and 0.696, respectively. **Conclusions:** We developed a clinical risk score system to predict methicillin-resistance in CO-SAB in this study. However, it was not possible to make a distinguishable system only based on demographic and clinical factors in spite of a large scale of cases. Other tools such as rapid microorganism identification technology will be necessary for early adequate antibiotic therapy in CO-SAB.

## Antibiotic Susceptibility Pattern of Isolated Microorganisms in Hematogenous Vertebral Osteomyelitis

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The identification of microorganisms is necessary to guide appropriate antibiotic therapy for hematogenous vertebral osteomyelitis (HVO), but causative microorganisms are often not identified microbiologically. The aims of our study were to analyze susceptibility patterns of microorganisms from culture-positive HVO and to assess the possibility of empirical combination antibiotic therapy for the treatment of culture-negative HVO. We conducted a retrospective chart review of adult patients with microbiologically diagnosed HVO from five tertiary-care hospitals over 6-year period. Based on antibiotic susceptibility testing results of isolated pathogens, the appropriateness of six antibiotic combinations (two oral and four intravenous) were analyzed: levofloxacin plus rifampin, ciprofloxacin plus amoxicillin-clavulanate, vancomycin plus ciprofloxacin, vancomycin plus ceftriaxone, vancomycin plus ceftazidime, and vancomycin plus cefepime. A total of 277 patients with microbiologically diagnosed HVO were included in final analysis. The main causative pathogens identified were methicillin-susceptible *Staphylococcus aureus* (32%), followed by methicillin-resistant *S. aureus* (MRSA) (26%), aerobic gram-negative bacteria (24%), and *Streptococcus* species (11%). Among MRSA isolates, resistance rates to clindamycin, levofloxacin, rifampicin, and fusidic acid were 62%, 53%, 25%, and 23%, respectively. Among Enterobacteriaceae isolates, 25% isolates were resistant to ciprofloxacin and 7% isolates were extended-spectrum beta-lactamase (ESBL) producer. Levofloxacin plus rifampicin was effective in 73% of cases and amoxicillin-clavulanate plus ciprofloxacin in 67% of cases. Vancomycin-containing intravenous therapy was effective in nearly 95% of cases irrespective of companion antibiotics for gram-negative coverage. Our study showed that HVO were frequently caused by antibiotic-resistant microorganisms, and empirical oral combination antibiotic therapy may be suboptimal for patients with culture-negative HVO. Our results suggest that best effort should be made to identify microorganisms in suspected HVO and clinicians should be cautious about prescribing oral antibiotic combination for culture-negative HVO.