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Antimicrobials: Epidemiology of MRSA, VRE and other Gram-positives

Resistance profiles of staphylococcal isolates from orthopaedic patients' infections

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Objectives: Orthopaedic infections can be devastating, leading to prolonged hospital stay, increased readmission rates; they may become chronic and are associated with increased mortality. The causative agents of more than half of the infections are Gram positive bacteria, namely staphylococcus species. The aim of the present study was to assess resistance rates to various antimicrobials of different staphylococcal species isolated from orthopaedic patients for a period of four years.

Methods: During a 4-year period, from 2009 to 2012, a total of 2529 pus samples were processed using standard culture methods. Samples were collected from wound, surgical site, soft tissue, fracture, implant and internal fixation devices infections, from patients hospitalized in the eight orthopaedic departments of our hospital that is mainly a traumatology center. 1695 cultures yielded a positive result. Identification and susceptibility testing were performed using the Vitek 2 automated system (BioMérieux, France). The antimicrobials tested for staphylococcus were oxacillin, penicillin, erythromycin, clindamycin, ciprofloxacin, moxifloxacin, ofloxacin, gentamicin, tobramycin, rifampicin, fosfomycin, fucidic acid, tetracycline, trimethoprim/sulfamethoxazole, vancomycin, teicoplanin, tigecyclin, linezolid, and daptomycin. MIC values of vancomycin, teicoplanin, tigecyclin, linezolid, and daptomycin were confirmed by E-test (BioMérieux, France) according to CLSI guidelines.

Results: A total of 1026 staphylococci were isolated. These included 450 *Staphylococcus epidermidis,* 427 *S. aureus,* 68 *S. hominis,* 24 *S. lugdunensis* and another 57 CNS isolates. A total of 279 (65.3%) *S. aureus* isolates were susceptible to methicillin, thus the MRSA were at 34.7%. Resistance rates were for erythromycin 27%, clindamycin 22%, ciprofloxacin 20%, gentamicin 11%, rifampicin 12%, fosfomycin 8%, fucidic acid 35%, tetracycline 31%, and trimethoprim/sulfamethoxazole 8%. All isolates were susceptible to vancomycin teicoplanin, tigecyclin, linezolid, and daptomycin. MIC values were elevated for vancomycin; 4% of isolates had MIC 2 μg/ml and 24% had MIC 1 μg/ml. As for linezolid, 6% of the isolates showed MIC 4 μg/ml. Resistance rates of *S. epidermidis* were for methicillin 64%, erythromycin 66%, clindamycin 60%, ciprofloxacin 40%, gentamicin 24%, rifampicin 20%, fosfomycin 21%, fucidic acid 85%, tetracycline 17%, and trimethoprim/sulfamethoxazole 26%. All isolates were susceptible to vancomycin tigecyclin, linezolid, and daptomycin. 8 *S. epidermidis* and 2 *S.hominis* isolates were intermediate resistant to teicoplanin.
Conclusions: Resistance to methicillin remains at a comparatively low level for *S. aureus*. There was no resistance to vancomycin teicoplanin, tigecyclin, linezolid, and daptomycin. Newer antimicrobials should be kept as a reserve for curative therapy of serious orthopaedic infections.