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Temporal profile of antimicrobial resistance exhibited by strains of Staphylococcus spp. isolated from cases of bovine mastitis for 20 years (1992-2011)

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Background: The emergence of antimicrobial resistance has consequences in both human and animal health. The selective pressure imposed by the constant use of antimicrobials and the presence of resistance genes are the most important features in the occurrence of this phenomenon. Several studies with microorganisms isolated from the milk of cows with mastitis reported different patterns of susceptibility to antimicrobial agents. Nevertheless, there is a lack of information regarding the temporal changes in the susceptibility of these pathogens to antimicrobial agents used in the treatment of this disease. The aim of this retrospective study was to determine the antimicrobial resistance profile of *Staphylococcus* spp. isolated from bovine milk samples with mastitis over a period of 20 years (1992-2011).

Material/methods: The results of 2,430 staphylococci isolates tested by disk diffusion technique for susceptibility to oxacillin, penicillin, ampicillin, cephalexin, norfloxacin, tetracycline, sulfazotrim, gentamicin, and neomycin and the results were analysed in accordance with the Clinical and Laboratory Standards Institute (CLSI). Comparisons were performed between the percentages of resistance to antimicrobials and their classes and also between the decades studied. Additionally, the possible tendency or changes in the behavior of these pathogens against the major drugs used in the last two decades were evaluated using regression analysis.

Results: The highest rates of resistance ($P<0.0001$) were observed for the beta-lactams (34.3%), with exception of cephalexin (6.9%), and for the tetracyclines (28%). Similar resistance rates (7.6% to 15.7%) were observed among the other drugs. Regression analysis showed a reduction in resistance to penicillin and ampicillin throughout the period, whilst for oxacillin and neomycin a decrease in the resistance was observed during the first decade, followed by an increase. A trend towards decreased resistance was found for sulfazotrim, whereas for the other antimicrobials no decrease was observed.

Conclusions: The results indicated no trend towards increased resistance for most antimicrobials tested. Suggested strategies to reduce the use of antimicrobial treatments in dairy cattle include the treatment of subclinical mastitis cases in the dry period only, and selective dry cow therapy, a strategy that restricts the treatment to infected quarters. The emergence of antibiotic-resistant microorganisms in farm animal environments poses a potential public health concern and the use of this measures can help to reduce the probability of selection of resistant strains among bacterial populations.

Nevertheless, it is necessary to monitor the resistance patterns of these pathogens in order to save these drugs as a therapeutic reserve.