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Risk factors for nasal colonization by methicillin-resistant staphylococci in healthy humans in professional contact with companion animals in Portugal

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Background: Methicillin-resistant staphylococci (MRS), namely *Staphylococcus aureus* (MRSA) and *S. pseudintermedius* (MRSP) are opportunistic agents of great importance in Human and Veterinary Medicine. The aims of this study were to investigate the frequency, persistence and risk factors associated with nasal colonization by MRS in people in daily contact with animals in Portugal.

Material/methods: Nasal swabs were collected from 71 veterinarians, 34 students (veterinary medicine and veterinary nursing) and 24 veterinary nurses/technicians. MRS were screened on mannitol salt agar and Brilliance™ MRSA2 agar (Oxoid). Species identification was obtained by species-specific PCR. Methicillin-resistance was confirmed by PCR amplification of the *mecA* and *mecC* genes. Strains were characterized at the molecular level (*spa*, *SCCmec*, MLST and PFGE typing) for clone identification. Data collected through a questionnaire was analysed by logistic regression. Individuals colonized by MRS were contacted to participate in a follow-up study.

Results: Of the 129 participants, 79 (61%) were colonized by at least one MRS species [*S. epidermidis* (MRSE, n=68), MRSA (n=19), *S. haemolyticus* (MRSH, n=7), MRSP (n=2) and other coagulase-negative staphylococci (n=4)]. These MRS were isolated from 51 veterinarians, 18 veterinary nurses/technicians and 10 students. MRSE – CC5, MRSA - ST22-t032-IV (EMRSA-15), MRSA - ST398-t108-V (LA-MRSA), MRSA - ST105-t002-II (New York/Japan related clone) and MRSP – European clone ST71-II-III were the clonal lineages detected. Veterinary professionals (veterinarians and veterinary nurses/technicians) were more likely to be colonized by MRS (P<0.0001, OR=6.369, [2.683-15.122]) than students. However, the comparison between veterinarians and veterinary nurses/technicians did not show significant differences (P=0.7635). It was also identified as a risk factor the contact with a MRSA- or MRSP-positive animal (P=0.0361, OR=2.742, [1.067-7.045]). The follow-up study, carried out in 54 individuals, showed that the majority (85%) remained colonized, after

1 to 4 months, by one of the initial MRS species, with this persistence being due to the presence of similar or indistinguishable isolates or successive isolates acquisition.

Conclusions: The high prevalence of MRS colonization, the clonal lineages detected and the risk factors identified suggests occupational exposure, emphasizing the importance and the need of implementing infection control and preventive measures to minimize the spread of these pathogens in veterinary clinical practice.