Clonal dissemination of clinically relevant multidrug-resistant
Salmonella Typhimurium, S. 4,[5],12:i:- and S. Rissen in Portugal

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Non-typhoidal Salmonella infections represents a global public health burden, being crucial to identify and follow clones of clinically relevant serotypes to contain its spread. Our goal was to assess clonal distribution trends in three clinically relevant Salmonella serotypes and their association with antimicrobial resistance in Portuguese isolates. Results were also compared with previous data from the last decade (2002-2009).

Isolates of S.Typhimurium/n=253, S.4,[5],12:i:-/n=158 and S.Rissen/n=26 from different sources (clinical/food/animal) and regions (2009-2014) were screened by PCR for sulfamethoxazole resistance genes (sul1/sul2/sul3) and genes linked with class 1 integrons (intI1/antibiotic resistance gene cassettes). Detection of other antibiotic resistance genes by PCR, resistance to 10 antibiotics [ampicillin-A/chloramphenicol-C/gentamicin-G/kanamycin-nalidixic-acid/ciprofloxacin/streptomycin-S/sulfametoxazol -Su/tetracycline-T/trimethoprim-Tr] and DDST by disk diffusion (CLSI/EUCAST) and clonal relatedness by PFGE were performed in representative isolates.

In S.Typhimurium we detected 3 predominant clones: i) "S. Typhimurium DT104" (43%; intl1; 5′CS-aadA2±5′CS-blaPSE-1; sul1±sul2; qacEΔ1), with identical MDR profiles (mostly ACSSuT-blapse-1-floR-aadA-sul1-tetG) and PFGE-types to those described since 2002; ii) "S. Typhimurium European clone" (23%; sul2 and absence of intl1/sul1/qacEΔ1) with the same or very closely related PFGE-types and MDR profiles (mostly ASSuT-blapse-1-strA-strB-sul1-tetB) as the "European clone" of S.4,[5],12:i:-; iii) "S. Typhimurium OXA-30-producing" (17%; intl1; 5′CS-blaOXA-30; sul1±sul2; qacEΔ1), with the same MDR profile (mostly ASSuT-bloxaOXA-30-catA-aadA-sul1-tetB) and PFGE-type circulating since 2002. In S.4,[5],12:i:- it was found the presence of the 3 clones currently circulating in Europe: i) “European clone” (75%; sul2 and absence of intl1/sul1/qacEΔ1; mostly ASSuT-blapse-1-strA-strB-sul2-tetB), which has expanded throughout this study period; ii) “Spanish clone” [6%; intl1; qacEΔ1+qacH; mostly AC(G)SuTTTr-blatem-cmlA-floR-(aac(3)-IV)-aadA-sul1-sul2-sul3-tetA-dfrA12] and iii) “Southern-European clone” [1%; intl1; qacH; CSSuTTTr-cmlA-aadA-strA-strB-sul3-tetB-dfrA12] mostly with similar MDR and/or PFGE-types described since 2002. In S. Rissen stands out the maintenance of the clone frequently associated with class 1 integrons [38%; intl1; 5′CS-dfrA12-aadA-5′CS-dfrA12-aadA; sul1/sul3; qacEΔ1/qacH] and MDR profiles [mostly A(C)SuTTTr-blatem-(cmlA)-aadA-sul1-tetA-dfrA12].

In the three Salmonella serotypes we observed the persistence of the MDR clones and corresponding PFGE-types more frequently identified in the last decade. It is of note the decreased frequency of S.4,[5],12:i:- “Spanish” and “Southern-European” clones and the expansion of a new clonal group with ASSuT profile among isolates of S.Typhimurium and S.4,[5],12:i:-.

The follow-up of population dynamics and the understanding of factors promoting survival/persistence of Salmonella clones is crucial to improve effective strategies and interventions in food safety at global level.