

BOOK OF ABSTRACTS



U. PORTO



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21149 | Assessment of antimicrobial resistance spread in surface aquatic systems: a study of four rivers in North Portugal

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Abstract

Background: Antimicrobial resistance (AMR) spread in surface water systems, providing water for drinking or for recreational activities, can have serious implications to human, animal and environmental health. The standard criteria to assess water quality are based in the absence of specific bacteria, and do not include AMR study. Here we evaluate the spread of AMR bacteria in rivers of North Portugal under diverse anthropogenic activities.

Methods: Samples from four rivers (8 water+7 sediments) were collected (Dec-2022/Jan-2023). The fecal indicators *Enterococcus* and *Escherichia coli* as well as the pathogen *Salmonella enterica* were recovered using standard methodologies to assess water quality. *Salmonella*, *Enterococcus* species or *E. coli* phylogenetic groups (PhG) were identified by PCR, and *Salmonella* serogroups by serologic reactions. Antibiotic susceptibility (n=26) was studied by disk diffusion (EUCAST/CLSI guidelines).

Results: *Enterococcus* (n=46; 19-*E.hirae*, 13-*E.faecalis*, 4-*E.faecium*, 3-*E.lactis*, 3-*E.durans*, 4-other species), *E. coli* (n=43; PhG: 16-A/C; 13-B2; 1-B1; 3-E; 2-D/E; 3-A; 5-other) and *Salmonella* (n=16; C2 serogroup) were recovered from 87%, 80% or 20% of the samples, respectively. Multidrug-resistant (MDR) bacteria were found in 53% of samples, including *E.coli* in 58% (most from PhG A/C and B2) and *Enterococcus* in 31% (*E.faecalis*, *E faecium*, *E.hirae*). AMR among *E.coli* and *Enterococcus* were very diverse, including to the clinically relevant beta-lactams, quinolones or aminoglycosides.

Conclusions: Diverse fecal indicators/pathogens with/without AMR are present among a high number of water/sediments samples, including to antibiotics of clinical relevance. More studies are needed to assess if such bacteria also have tolerance to other antimicrobials sustaining their presence in the aquatic environment, as these rivers are under multiple pollution types.

Keywords: Antimicrobial resistance; Environment; Public health; One Health; Surface waters

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