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Antimicrobial resistance

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Antimicrobial resistance (AMR) is one of the most urgent and cross-cutting challenges to public health, society and the environment, due to the increasing ability of pathogens to develop resistance to drugs. This world-spread resistance is making infections harder to treat, raising the risk of higher and higher mortality. The One Health framework, which acknowledges the interconnectedness of human, animal and environmental health, provides an integrated approach to tackle this phenomenon on a global scale.

In this context, machine learning and explainable artificial intelligence (XAI) offer powerful tools to analyze large datasets and uncover complex patterns underlying the emergence of AMR. However, to fully harness their potential, it is crucial to ensure a comprehensive and harmonized data collection at national, regional and local levels, accounting for territorial and socio-economic differences.

In our research, we employ a XAI approach to identify the most influential factors driving antimicrobial resistance in diverse territorial contexts, which vary significantly in terms of climate, economic conditions and social structures. Specifically, we use a wide set of indicators defined within the One Health framework to predict country-level mortality associated with antimicrobial resistance to five key pathogens: *Acinetobacter baumannii*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, and *Streptococcus pneumoniae*. Our analysis highlights the critical role of water accessibility and quality indicators in determining AMR-related mortality across countries, pointing to their potential as valuable tools for decision support and ongoing monitoring efforts.

Presenter: CARUSO, M.**Session Classification:** Session 4