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Towards the veterinary diagnostics of the future

Main topic :

AMR in a One Health perspective: which relevant issues for diagnostic and surveillance ?

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Antimicrobial resistance (AMR) is a health issue for humans and animals since the lack of efficacy of antibiotics directly impairs the capability of treating diseased individuals. AMR diagnostic is therefore of utmost importance in order to prescribe the most appropriate antibiotic to combat bacterial infections. Nonetheless, AMR diagnostic issues may also largely differ between human and animal contexts.
Veterinary medicine mostly deals with food-producing animals where AMR diagnostic usually refers to the group and not the individual level. Also, even though AMR diagnostic methods in routine are shared between the two sectors, such as disk diffusion or MIC determination, clinical breakpoints are hardly achieved in veterinary medicine due a major lack of data on PK/PD parameters for a vast number of antibiotic/bacterial species/animal species combinations. Accordingly, AMR diagnostic in animals often relies on epidemiological cut-offs which makes more sense in a surveillance perspective than towards clinical issues.
To this regard, contrary to human contexts where AMR diagnostic in clinics is the major source of AMR data, AMR diagnostic in animals is widely focused on healthy populations at slaughterhouse. Another major component where AMR diagnostic takes place is the food sector. Altogether, AMR diagnostic in animals is mostly not driven by therapeutic yet surveillance purposes.
In a One Health perspective, the next challenge will be in succeeding integrating AMR data of human and animal origins in a common analysis scheme to address and help quantifying the relevant risks of AMR to humans from non-human sectors. In this respect, advanced whole-genome sequencing (WGS) technologies have recently become at the forefront of AMR surveillance, and of AMR diagnostic to a certain extent. There is still little evidence of WGS in AMR significantly replacing phenotypic methods in clinics. However, AMR surveillance through WGS methods has made a big advance and offers major opportunities to understand and even tackle AMR in a One Health vision. It includes building common platforms to store and analyze intersectorial data. Such approaches may also have the ambition to consider AMR data from the environment, which still stand a step backwards compared to the other domains.