

The Lebanese LSIDCM

Antimicrobial Resistance in the One Health Concept in Lebanon

Ziad Daoud¹

Faculty of Medicine and Medical Sciences, University of Balamand, Lebanon

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According to the Center of Disease Control and Prevention, “One health” is a concept organized to produce a clear-cut connection between humans, animals, and the environment. In this context, our purpose is to look at bacterial resistance from this perspective and recognize the interrelationship in this tripartite in Lebanon and the Middle East.

The Overuse, abuse, and misuse of antibiotics among humans at both hospital and community levels has led to a significant increase in bacterial resistance. In this Mediterranean country, many studies have addressed and reported the emergence of bacterial resistance such as ESBL, AmpC, and carbapenemases in Gram negative bacteria, Methicillin and Vancomycin resistance in gram positive organisms, penicillin resistance in *Streptococcus pneumoniae*, etc. Moreover, throughout the past years, the molecular mechanisms of bacterial resistance in Lebanese patients have been well characterized and described. Related publications report a significant increase in bacterial resistance and suggest an endemicity of resistance in Lebanon. The clinical setting addressing humans is being, so far, well described, however, less effort has been put to understand the situation in the animals and the environment. Being a small country, rural farming communities are not isolated from the more developed cities and transmission of resistance in this context cannot be restricted to one specific area. As a result, the transfer of resistance from animals to humans is facilitated. Furthermore, the environmental characteristics of Lebanon play an important role in the development and transmission of antimicrobial resistance. The absence of efficient public sanitation systems as well as appropriate sewage disposal contribute in many ways, directly and indirectly to this catastrophic situation. One of our works identified

NDM-1 producing *Enterobacter cloacae* in a hospital waste water, a year before the first similar resistance was observed in the patients of this hospital.

In a first nationwide study addressing the epidemiology of multidrug resistant Gram-negative bacilli in Lebanese poultry, our group detected ESBL and AmpC producers which are cross-resistant to antibiotics used in human medicine are highly prevalent across the territory. In addition, this study reported the first *mcr-1 Klebsiella pneumoniae* isolated from poultry in Lebanon, suggesting therefore the potential role of reservoirs for resistance. This is especially true if no strict rules are implemented in order to control the over- and misuse of antibiotics as growth promoters and as prophylaxis in Lebanese agriculture. We believe that the prescription of antibiotics used in human medicine should be reduced or even banned in the veterinary sector

All this should motivate researchers, to join and put more effort in attempt to unveil the channels of transmission of resistance existing between humans, animals, and the environment in this particular part of the world.

Corresponding author

Ziad Daoud, PhD.
Faculty of Medicine and Medical Sciences
University of Balamand
Balamand Al Kurah,
Lebanon
Tel: +961-6-930250
Email: ziad.daoud@balamand.edu.lb

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