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Why should veterinarians be involved in the struggle against COVID-19?

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Since December 2019, the world is undergoing an unprecedented mayhem. This situation is not due to a third world war or an economic crisis but to the fast spread of a novel virus called SARS-CoV2 (Yan, 2020). This virus is responsible of a respiratory illness named COVID-19 (Coronavirus disease 2019). Since its first apparition in Wuhan (China), this disease is spiraling like wild fire and is now reported in 187 countries and regions in the world (Musunguzi and Asamoah, 2020). With more than 9 million COVID-19 positive cases and more than 450,000 deaths (JHI, 2020), most health systems are overpassed in different countries which are gathering their efforts to mitigate and flatten the epidemic curve. In this situation, the involvement of multidisciplinary professionals is crucial to properly and effectively handle this pandemic (Lorusso *et al.*, 2020a). Indeed, veterinarians have a crucial role and central tasks in the struggle of this 'human' disease. We will describe here why and how can veterinarians be involved in the prevention of this viral disease:

First: All recent human health hazards were caused by zoonotic agents (Lorusso *et al.*, 2020b) that originate from animals. It is reported that zoonoses constitute about 70% of all known emerging diseases (Volpato *et al.* 2020), and of which 71.8% originate from wildlife (Lin *et al.*, 2020).

Also, Pandemic/epidemic diseases outbreaken in the 21st century, such as the SARS in 2003, H1N1 influenza in 2009, H7N9 influenza in 2013, the Ebola hemorrhagic fever in West Africa in 2014, MERS in 2014, the Zika virus epidemics in South America in 2016, yellow fever in Angola and Brazil in 2017 (Lin *et al.*, 2019) and COVID-19 are all of animal origin. Furthermore, all the highly pathogenic HCoV's originate from animals (SARS-CoV and Civets, MERS-CoV and dromedary, SRAS-CoV2 and pangolins?) (Contini *et al.*, 2020).

On the other hand, as certain studies demonstrated that domestic animals can get infected from COVID-19 infected humans or following experimental infection, this would involve veterinary virologists to try to understand SARS-CoV-2 virulence factors interactions between human and animals (Lorusso *et al.*, 2020a). Their key role in the field of discovery, viral evolution, genome manipulation and pathogenesis studies of CoVs has been highlighted over recent years (Lorusso *et al.*, 2020a).

Second: Veterinarians have an extensive knowledge and a historical relation with animal CoVs and related diseases since the early 1900. Infectious bronchitis virus (IBV) of poultry, feline infectious peritonitis virus (FIPV), swine CoVs, canine coronavirus (CCoV), feline enteric coronavirus (FECV) and Bovine coronavirus are well-known and their evolution and pathobiology were well described serving as a model for human coronaviruses. Furthermore, some drugs such as protease inhibitors and nucleoside analogues have shown a promising antiviral activity against feline infectious peritonitis. Interestingly, a similar compound, the adenosine nucleoside monophosphate prodrug GS-5734, is the active molecule of remdesivir, largely employed as a potential antiviral against COVID-19 (Decaro *et al.*, 2020). On the other hand, different vaccines have been developed for animal enteric CoVs (BCoV and swine CoVs) and respiratory CoV (IBV) which may represent excellent models for the development of SARS-CoV-2 vaccines (Charley and Audonnet, 2020). Recent trials of vaccination of animals against SARS and MERS diseases should also be of great interest in the COVID-19 vaccination trials (Charley and Audonnet, 2020)

Third: Veterinarians have certainly a large experience in handling outbreaks in fully susceptible population of livestock and poultry such as avian flu, bluetongue, foot and mouth disease, Pox virus diseases and BSE which are responsible for substantial economic losses (Lorusso *et al.*, 2020a). Also, the veterinary sector has a skilled, well-developed and trialled emergency response in most countries (Foddai *et al.*, 2020a) giving them the aptitude of being "ready to action" during a health emergency.

In this way, a variety of surveillance methods to understand the spread and to support effective control decisions in real time, have been successfully applied and resulted in elimination of the disease from the populations (Foddai *et al.*, 2020a).

Public authorities may benefit from collaboration with veterinary epidemiologists, to build on their experience from epidemics in animals. The proposed protocols of Foddai *et al.* (2020a) could be very helpful in the control decision on the current COVID-19 outbreak (Foddai *et al.*, 2020a, b).

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Fourth: Even veterinarians are not included in public health system in most countries, their medical background could be very useful in an emergency health state as it is the case with the COVID-19. They could also be very helpful for their notions in surfaces and materials disinfection (Lacamp, 2020).

In some countries, veterinarians are supporting core functions of the public health response, such as screening and testing of surveillance and diagnostic samples from humans. Veterinary laboratories are well adapted for massive screening with PCR or serological tests. Veterinary clinics in some countries are also supporting the public health response by donating essential materials such as personal protective equipments, ventilators, oxygen concentrators and essential drugs (Lacamp, 2020; OIE, 2020).

Fifth: Veterinary practitioners could also contribute to the information and the sensitization about the monitoring of the disease due to their contact with animal owners especially those of rural activity in developing countries where most of farmers and livestock breeders are generally of low income categories that most often live in rural areas and little informed about this disease.

In the light of the above, we confirm the crucial role of veterinarians in the prevention of infectious diseases which may push public and health authorities to involve them in the fighting against the current COVID-19 pandemic.

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