Anthroponosis and risk management: a time for ethical vaccination of wildlife?

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How SARS-CoV-2 originated to cause the current pandemic is unknown. Although genetically similar coronaviruses have been identified in non-human animal reservoirs, no intermediate hosts have been identified. SARS-CoV-2 is a human-adapted virus and is anthroponotic. Considering that the virus has a broad host range, it is likely to adapt to other non-human animal hosts as it circulates more widely.[1] A naturally occurring Asn501Tyr spike protein variation, as seen in the UK, South African, and Brazilian variants, has altered tropism and can now infect laboratory mice and rats.[2]

The fact that there is no current evidence to show that wildlife is substantially affected might not be altogether reassuring considering that there are currently no available surveillance programmes to generate such evidence. If such evidence were available, it could well be too late to contain any outbreaks successfully. Waiting for substantial evidence of community transmission in humans has made later containment efforts all but impossible. A 2021 risk assessment for European wildlife concluded that there is now a high risk of irreversible and substantial harm given the practical difficulties in containing outbreaks in mink.[1] The fact that close contact outdoors is not currently regarded as high risk for aerosol transmission between humans should not mean that transmission routes between wild animals enabled by faecal–oral mechanisms, saliva, and fomites, as shown for ferrets,[3] should be ignored.

The goal to vaccinate all humans is ambitious, costly, and time consuming, making it impossible to ensure that all humans coming into contact with vulnerable wildlife would themselves be vaccinated in time. Additionally, it is unclear if vaccination would be enough to prevent all transmission. Moreover, vaccine passports to enable ecotourism could simply be forged or flouted. In the meantime, poaching and trading of illegal wildlife continues.[4] Vaccination of non-human animals is a more direct, if controversial, protective strategy.[5]

Traditional mitigation measures of social distancing and personal protection equipment were adopted early to try to protect wild apes from human transmission. Rangers at chimpanzee sanctuaries in Kenya took robust measures,[6] while governments officially banned great ape trekking and ecotourism across Africa,[7] and shielded Europe's only surviving wild monkeys in Gibraltar.[8] However, such measures seem to have been either not universally adopted or have been ineffective. Otherwise, the confirmation of new cases would not be occurring, albeit in zoos and farms largely prompted by observing clinical signs.[1,9] For individuals who work closely with wild great apes, the distinction between wild and captive animals becomes blurred even without apparent constraints on their freedom of movement. Coupled with species living in very few but densely populated family groups or communities, the risk of disease transmission between individuals once introduced could be devastating.[5,7] Bonobos and mountain gorillas are but two examples of species in which every loss would be detrimental to the survival of the species. Just as in humans, some might be more susceptible to severe disease than others. At the San Diego zoo (CA, USA), a 49-year-old silverback gorilla, one of the nine infected with SARS-CoV-2, recovered from severe disease only after experimental antibody treatment, and the unaffected great apes have received vaccinations.[9] However, to administer vaccines to primates in the wild, the inevitable associated stress would need to be minimised and effective implementation strategies would need to be developed. Having a fully licensed vaccine whose efficacy is long lasting and can withstand new variants is still some way away. Given the biological similarity of great apes with humans, some evidence of safety and efficacy of first and new generations of vaccines in light of new variants could be extrapolated for use in great apes and species-specific adjuvants developed by Zoetis could be incorporated.[9] Great apes in the wild are most probably candidates to meet any standards we require to possess moral status and are subject to conservation efforts due to their endangered status. That said, selective vaccination of wildlife has the potential to introduce new evolutionary pressures, so the ecological context and potential wider impact requires careful attention. There are multiple issues to be considered, both moral and biological, but there is a strong and urgent need to prioritise the world's rarest species and develop specific risk-reduction strategies against SARS-CoV-2.[10]

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