

# Anthroponotic risk of SARS-CoV-2, precautionary mitigation, and outbreak management



Following early reports of anthroponotic infection with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), and mixed messages over anthroponotic risk, some pets were reportedly abandoned to fend for themselves or killed.<sup>1</sup> Thus, policy and public perception of risk must be grounded in up-to-date evidence. Evidence of infection of animals with SARS-CoV-2 has been shown experimentally both in vivo and in vitro for mammals including monkeys, cats, ferrets, rabbits, foxes, and hamsters, while bioinformatic studies also predict infectivity of pigs and wild boar among other mammals.<sup>2</sup>

We should also consider the potential for transmissibility not simple infection. Aerosol transmission has been shown experimentally in ferrets and cats.<sup>3,4</sup> SARS-CoV-2 can survive on different surfaces.<sup>5</sup> Dogs can be asymptomatic yet excrete SARS-CoV-2 in their faeces,<sup>4</sup> raising the as yet unproven possibility of faecal-oral transmission.<sup>6</sup> Additional experimental inoculation of animals would not help because small sample sizes and bioinformatic studies alone cannot confirm that a whole species is incapable of being infected by SARS-CoV-2.

We should review our inability to manage outbreaks in susceptible animals. Outbreaks of SARS-CoV-2 in 11 mink farms in The Netherlands were detected only because of substantially greater than usual mortality while some mink showed symptoms and tested positive for the virus.<sup>7</sup> Circumstantial evidence pointed to possible human infection from mink, leading the Dutch Ministry of Agriculture to cull all mink on the farms.<sup>8</sup> By contrast, the Bronx Zoo (New York, NY, USA) attempted to care for eight big cats infected with SARS-CoV-2 with keepers now wearing protective equipment.<sup>9</sup>

To become reservoir species, animals must live in sufficient numbers and densities to perpetuate transmission. As with mink, pigs are often farmed intensively so could in theory sustain transmission if infected. Moreover, free-range animals could have closer physical contact with wildlife. Taking an ecological view, individual animals (eg, foxes) could act as vectors between groups of animals. Indeed, seven stray cats

found in the vicinity of the first affected Dutch mink farm had antibodies against SARS-CoV-2, and one cat was positive for viral RNA.<sup>7</sup> Culling wildlife that might be infectious is much more controversial than culling farmed animals, and even the idea of vaccinating wildlife has its critics.

To balance the need for more evidence against the need to make policy, we suggest that targeted surveillance studies should be initiated. Indeed, studies are already underway in the USA, although they have not been mandated by the US Centers for Disease Control and Prevention.<sup>10</sup> At the same time, we suggest adopting mitigation measures for precautionary reasons. Those in close contact with animals could wear protective clothing and maintain good hygiene practice. Screening could also be considered. Advice from the US Food and Drug Administration for pet owners is similarly in line with physical distancing rules for humans while allowing exercise for animal welfare. The public should take general precautions especially when good reasons exist for doing so—eg, not littering. Sufficient evidence exists of anthroponosis of SARS-CoV-2 on which to base precautionary steps to mitigate the risks it poses.

We declare no competing interests.

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*Lancet Microbe* 2020

Published Online  
July 2, 2020  
[https://doi.org/10.1016/S2666-5247\(20\)30086-0](https://doi.org/10.1016/S2666-5247(20)30086-0)

For FDA advice for pet owners about COVID-19 see <https://www.fda.gov/consumers/consumer-updates/helpful-questions-and-answers-about-coronavirus-covid-19-and-your-pets>

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