



## COMMENTARY

## Emerging Strain (H5N8) of Highly Pathogenic Avian Influenza Virus: An Impending Pandemic Threat

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### Abstract

The rapid evolution and spread of the highly pathogenic avian influenza HPAI A(H5N1) viruses is a global threat not only to poultry farming and wildlife conservation but also to the public health communities as a result of the animal-human (zoonosis) cases of its genetic reassortant (H5N8) recently detected in seven poultry workers in Russia. However, considering the increased fatalities in poultry and wild birds, and the potential of zoonosis in escalating to a deadly pandemic, there is a need for concerted efforts between human and animal health institutions such as World Health Organization and World Organization for Animal Health, and wildlife conservation communities for birds. This is to mitigate the threat occurring at the human-environment-animal interface. In this commentary, we explicate the evolution and spread of HPAI A(H5N1) viruses and recommend some measures that could be taken to mitigate this threat, particularly on its pandemic potential.

### Keywords

Highly pathogenic avian influenza virus, HPAI A(H5N1), H5N8, Pandemic threat, Zoonosis

### Introduction

The highly pathogenic avian influenza HPAI A(H5N1) viruses that continue to circulate rapidly in farm poultry (goose, duck, and chicken) and wild birds (whooper swan, spot-billed duck, and long-eared owl) pose a serious global threat due to increase morbidity and mortality in these animals, with humans, being the dead-end host [1,2]. The increased evolution (through genetic drift from point mutation and exchange of genetic material caused as a result of reassortment

of the segmented genomes) and circulation of these viruses (through migratory wild birds) is a burning issue across the globe [3]. This is evident from the evolution of the HPAI A(H5N1) subtype reported in Guangdong in 2010 and the recent spread of its genetic reassortant i.e. H5N8 in poultry and/or wild birds in Japan, the United Kingdom, Romania, Russia, and some other parts of the world [4,5]. Therefore, the fact is that HPAI A(H5N1) viruses is likely to continue to evolve and spread in the mammalian population. However, the first human cases of the HPAI A(H5N1) genetic reassortant i.e. H5N8 virus reported in Russia in 2021 is an impending pandemic threat. As a result of this, it has become a concern not only for poultry farming and wildlife conservation but also for the global health communities.

The first strain of highly pathogenic avian influenza HPAI A(H5N1) viruses that belong to the A/Goose/Guangdong/1/96 lineage was identified in the Guangdong province of China (also referred to as the birthplace of flu due to increased animal-human viral transmission i.e. zoonosis) in 1996, since then, the viruses have evolved into different clades and sub-clades [1]. In 2010, a novel sub-clade of HPAI A(H5N8), 2.3.4.4, which evolved from the HPAI A(H5N1) clade 2.3.4, was isolated from domestic ducks at the wet market in Jiangsu Province-the Eastern part of China [4]. However, several outbreaks of HPAI A(H5N8) virus spread by the long-distance wild migratory birds have occurred causing massive fatalities and illnesses in wild birds and poultry across the world since its first

isolation, and the first animal-human i.e. zoonosis case of the virus has been recorded, of which we would like to discuss and provide some recommendations to mitigate its further spread [6].

Since November 2020, some prefectures in Japan like Ibaraki and Chiba where poultry farming is highly practiced have been battling with the outbreaks of HPAI A(H5N8), this virus, which continues to spread at an alarming rate has led to the culling of ~10 million birds by the veterinary authorities in May 2021 [7]. This measure was taken to mitigate the further spread of the virus in the poultry farm where the outbreaks occurred. However, this is quite alarming, particularly because the population of birds culled from 2010-2011 (~2 million) is much lower than the birds culled in May 2021 [7]. In March 2021, Public Health England reported the outbreaks of the virus in captured wild birds and poultry in some parts of the United Kingdom including England, Wales, Scotland, and Northern Ireland respectively [8]. This has thus led to the culling of flocks of infected birds [8]. Consequently, the World Organization for Animal Health (OIE) reported the outbreaks of the virus in poultry farms located in the Northern part of Romania where domestic birds are raised [9]. This outbreak has led to the death of about 11,190 of 18,699 birds and the rest of the birds were culled [5,9]. Also, multiple outbreaks of the virus have been reported in some parts of Russia such as Chelyabinskaya Oblasts, Peschanoe, Tyumenskaya, Maloe Shumakovo, Astrakhan Oblast, and others between early and late 2020 leading to infection of millions of birds as well as death and culling of thousands [5,10]. However, in February 2021, the State Research Centre for Virology and Biotechnology VECTOR (WHO H5) Rospotrebnadzor in Russia Federation reported and notified the World Health Organization of the first human cases of HPAI A(H5N8) infection in seven Vladimirskaya farm workers who were exposed to the virus when they participated in containing its outbreaks in the farm in December 2020 [5]. All these pieces of evidence establish HPAI A(H5N8) virus as a global threat not only to poultry farming and wildlife conservation but also an impending pandemic to the public health communities and that concerted efforts between multiagency and multidiscipline are needed to mitigate this threat, particularly on the reported animal-human transmission i.e. zoonosis, that has the potential of escalating to a deadly pandemic if adequate measures are not taken.

To win the battle against the highly pathogenic avian influenza HPAI A(H5N1) virus that continues mutating to different genetic reassortants, especially H5N8, there is a need for collaborations between researchers from different disciplines including virologists, epidemiologists, veterinarians, microbiologists, and public health scientists to develop disease control programs, seminars, and workshops that seeks to

understand the process underlying the constant antigenic variation, evolution, pathogenicity, and transmission of the HPAI A(H5N1) subtype and its reassortant (H5N8) in animals as well as humans. To mitigate the H5N8 virus from escalating to a pandemic-in case of human-human transmission-which has not been reported, research priorities should focus on the development and screening of antiviral therapies/vaccines to counteract antigenic variations in animals as well as the development of human vaccines. The World Organization for Animal Health and relevant institutions are encouraged to adopt a precautionary-based approach such as effective surveillance of the viruses in poultry farms, markets, and migratory wild birds as well as alert systems and implement control strategies once the viruses are detected. The availability of national reference laboratory well-equipped with differential molecular diagnostic tools should be made available in all countries for early detection and response to HPAI A(H5N8) virus as soon as they emerge in the human population. Since HPAI A(H5N8) virus is zoonotic, activities such as hunting of wild birds and butchering of their carcasses that could result in animal-human contact should be avoided. Public enlightenment on the risk of the HPAI A(H5N8) virus, and community involvement in the fight against the virus such as monitoring and reporting of its outbreaks will help in curtailing the spread. Prompt reviewing of global influenza virus control strategies should be done by a committee of experts across the world. Effective screening of humans, poultry, and wild birds for HPAI A(H5N8) virus is highly recommended at the borders, airports, and seaports of each country of the world and this will prevent the influx of the virus between countries. Environmental sanitation, hand-washing practices, and limiting contact with birds and their products can be a way forward in preventing zoonotic transmission that could result in a pandemic.

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## Competing Interest

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## Author Statement

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