Australia's first human case of H5N1 and the current H7 poultry outbreaks: implications for public health and biosecurity measures

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Dear Editor,

Australia has long been free of the highly pathogenic avian influenza (HPAI)-H5N1, but recent developments have changed this status. The first confirmed human case of HPAI-H5N1, involved a 2.5-year-old girl who contracted the virus in Kolkata India between 12 and 29 February, 2024.[1,2] The case was confirmed on 18 May, 2024 and the WHO was notified on 22 May. While in India, the girl visited the doctor due to, loss of appetite, fever, cough and vomiting on 28 February and received paracetamol treatment. Upon returning to Australia on 1 March, the illness was not reported to Australian airport biosecurity.[1] The child sought medical attention and was admitted to the ICU in Melbourne on 4 March, and discharged 2.5 weeks after initial admission. The patient was infected with clade 2.3.2.1a, common in South Asian birds, especially in Bangladesh and India. This clade is different from clade 2.3.2.1c, found in Cambodian and Vietnamese poultry, which occasionally infects humans.[3] The case marks a significant epidemiological event, emphasising the importance of vigilance against avian influenza.

H5N1 is divided into several clades, each with its geographic and clinical significance. The global spread of H5N1, particularly the clade 2.3.4.4b, poses ongoing challenges for public health and poultry industries worldwide.[4] Clade 2.3.4.4b, spreading since 2020, is the most lethal identified so far, with wide geographical reach and severe impacts on multiple species.[2] Globally, 16 human cases of clade 2.3.4.4b include recent cases in dairy workers, one in Texas two in Michigan, and one in Colorado.[5]

Clade 2.3.2.1 of HPAI-H5N1 has caused significant outbreaks in domestic poultry in several countries. These viruses bind exclusively to avian-type receptors (α2,3-linked sialic acids), limiting their ability to infect humans.[6] They exhibit varying pathogenicity in mice and have evolved through mutations and reassortments into subclades (2.3.2.1a–2.3.2.1f), with specific mutations affecting virulence and host range. Vaccines targeting this clade require ongoing updates to match circulating strains.[6,7] In contrast, clade 2.3.4.4 of HPAI-H5N1 is globally distributed and infects a wide range of species, including humans, by binding to both avian (α2,3-linked) and human (α2,6-linked) receptors. Mutations like PB2 E627K enhance its virulence in mammals. This clade's ability to bind to human receptors increases the risk of cross-species transmission and human infection.[8]

Reassortment between H5 and H7 influenza strains, where RNA segments mix in co-infected hosts, can produce novel viruses with unpredictable characteristics, such as high virulence or efficient human transmission. Continuous monitoring of these viruses in birds and humans is vital for early detection and risk mitigation. Historical pandemics, like the 1918 Spanish flu, likely stemmed from such reassortment events.[9] The presence of H5N1 and H7 in wild birds and domestic poultry highlights the need for vigilant surveillance and biosecurity measures to prevent the spread of these potentially dangerous reassorted viruses.[2]

Australia's poultry industry is currently facing significant challenges due to multiple avian influenza outbreaks, specifically involving H7N3, H7N9, H7N8 strains. The first detection of H7N3 occurred at an egg farm near Meredith, with a further six properties confirmed (most recent confirmed on 24 June 2024), and, one property near Terang reported an H7N9 outbreak, totalling eight HPAI-H7 cases in Victoria's poultry sector as of 10 July, 2024. On June 19 and June 22, 2024, New South Wales confirmed HPAI-H7N8 at poultry egg farms.[1,10] Australia's H7 outbreaks date back to Melbourne in the 1970s, with the most recent in Lethbridge, Victoria, in 2020[3] (Fig. 1). In the Australian

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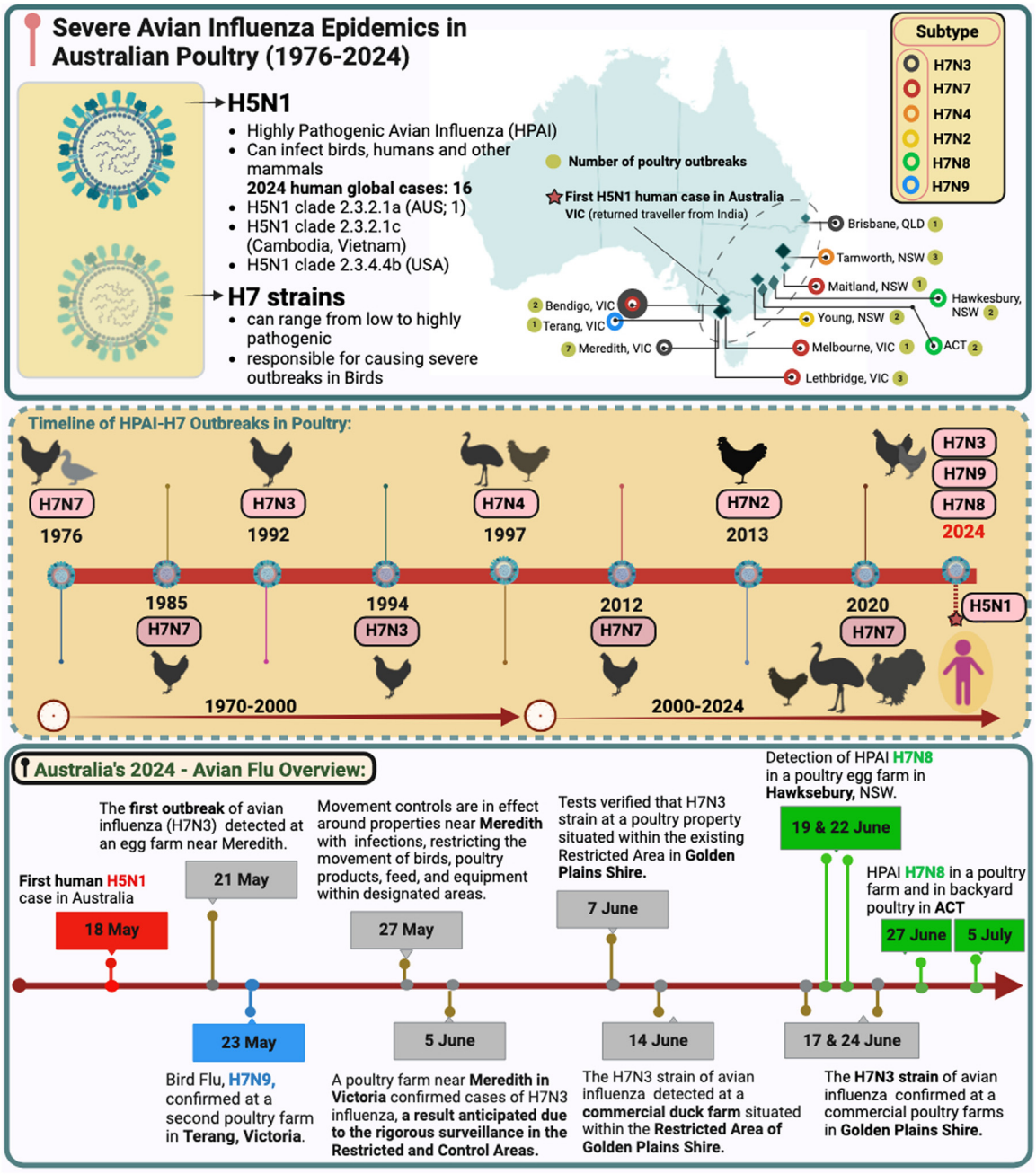

Fig. 1: **Avian influenza in Australia.** Severe avian influenza epidemics in Australian poultry from 1976 to 2024, with a map showing outbreak locations and a timeline marking significant events. It also shows Australia's first human H5N1 case. Figure created with Biorender.com.

Capital Territory, HPAI-H7N8 was also confirmed at a poultry farm on 27 June, and on 5 July, a second H7N8 infection was found in backyard poultry.

Stringent biosecurity and public health measures are essential to prevent and control avian influenza, protecting both the poultry industry and public health. Poultry farms must maintain hygienic facilities, restrict contact between poultry and wild birds, and conduct ongoing surveillance to prevent virus spread. Travellers to affected areas should avoid poultry farms and live bird markets. Seasonal flu vaccination is recommended for poultry workers and travellers to outbreak regions to

reduce pandemic risks.[1] Health professionals should assess avian-flu in patients, perform PCR-tests, and educate patients on risks.[1]

H5N1's global presence increases the risk of mutations that could enable human transmission, posing a significant threat.[5] Continuous monitoring and research, alongside international surveillance and data sharing, are crucial to detect and address potential mutations. Enhanced global preparedness is essential to prevent a human pandemic.[2] Australia's first human HPAI-H5N1 case highlights the ongoing avian influenza threat. Although the transmission risk remains low in Australia, the global spread of H5N1 and other virulent strains necessitates continued vigilance, robust biosecurity, and proactive public health measures. Rigorous surveillance and preparedness are vital for managing these risks and safeguarding public health and the poultry industry.

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Pawan Kumar–literature search, figure, writing original draft.
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Editor note

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Declaration of interests

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