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SHORT COMMUNICATION

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Responding to avian influenza A H5N1 detection on a hospital property in Maine—An interdisciplinary approach

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Abstract

Background: The risk of infection with avian influenza A viruses currently circulating in wild and domestic birds in the Americas is considered low for the general public; however, detections in humans have been reported and warning signs of increased zoonotic potential have been identified. In December 2022, two Canada geese residing on the grounds of an urban hospital in Maine tested positive for influenza A H5N1 clade 2.3.4.4b.

Aims: Given the opportunity for exposure to staff and hospital visitors through potentially infected faeces on the property, public health authorities determined mitigation efforts were needed to prevent the spread of disease. The ensuing response relied on collaboration between the public health and animal health agencies to guide the hospital through efforts in preventing possible zoonotic transmission to humans.

Materials and Methods: Mitigation efforts included staff communication and education, environmental cleaning and disinfection, enhanced illness surveillance among staff and patients, and exposure and source reduction.

Results: No human H5N1 cases were identified, and no additional detections in birds on the property occurred. Hospital staff identified barriers to preparedness resulting from a lack of understanding of avian influenza A viruses and transmission prevention methods, including avian influenza risk in resident wild bird populations and proper wildlife management methods.

Conclusion: As this virus continues to circulate at the animal-human interface, this event and resulting response highlights the need for influenza A H5N1 risk awareness and guidance for facilities and groups not traditionally involved in avian influenza responses.

KEYWORDS
Canada geese, hospital, infection prevention, influenza A H5N1, public health

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1 | INTRODUCTION

The A/goose/Guangdong/1/1996 lineage of avian influenza H5 virus was first identified in Southeast Asia in 1996 and has since repeatedly spilled over from poultry to wild birds, leading to the emergence of clade 2.3.4.4b (Verhagen et al., 2021). This clade appears to be particularly fit with the expansion of its geographical and host range. In December 2021, the first detection of H5N1 virus in clade 2.3.4.4b in the Americas occurred in Newfoundland, Canada (Caliendo, Lewis, et al., 2022). Subsequently, routine surveillance efforts lead to its detection in an American Wigeon collected on December 30, 2021, from South Carolina (Bevins et al., 2022).

Despite the high mortality rates in humans associated with previous iterations of H5N1 viruses, (Loeffelholz, 2010), those in clade 2.3.4.4b are considered to be a low risk of infection to the general population (Kniss et al., 2023; Pulit-Penaloza et al., 2022). However, warning signs of increased zoonotic risk, including limited transmission to humans, transmission to mammals, sporadic identification of viruses with mutations associated with mammalian adaptation (Bordes et al., 2023; Vreman et al., 2023) and ongoing evolution (Adlhoch et al., 2022), make this new virus a potential pandemic risk. Therefore, efforts to reduce exposure to humans and monitor those who have been exposed are vital (EFSA et al., 2023). Multisectoral collaboration among the animal health, environmental and public health sectors is essential in monitoring and responding to this virus (Yamaji et al., 2020).

Between January 2021 and May 2023, the World Health Organization reported 11 detections of H5N1 in humans (World Health Organization, 2023). Reducing the possibility of zoonotic transmission through mitigation efforts such as avoiding contact with infectious materials and monitoring close contacts are essential prevention tools (Arriola et al., 2015). The United States Centers for Disease Control and Prevention (CDC) recommends that persons with direct contact with H5 viruses monitor for signs and symptoms of infection for 10 days following their exposure (Olsen et al., 2019).

Maine is the northeasternmost state in the United States. With 3500 miles of coastline and 2300 square miles of inland water, this sparsely populated state boasts ample habitat for shorebirds and other migrating waterfowl species (Rolfe et al., 2023; Weik, 2005). From the first detection of H5N1 in Maine on 17 February 2022 through May 2023, 17 domestic backyard chicken or mixed species flocks and 86 wild birds tested positive for the virus. During this time, two red foxes (*Vulpes vulpes*) were also confirmed to be infected with H5N1. Additionally, spillover of this virus into grey seals (*Halichoerus grypus atlantica*) and New England harbour seals (*Phoca vitulina vitulina*) off the coast of Maine resulted in an unusual mortality event declared in 2022. Evidence of mammal adaption existed among those tested (Puryear et al., 2023).

In late December 2022, an urban hospital in Maine notified the United States Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (USDA-WS) of two deceased Canada geese (*Branta canadensis*) on their grounds. Testing confirmed H5N1 clade 2.3.4.4b. These geese were part of a resident population on the grounds who frequented a pond between the staff parking lot and the hospital entrance. To prevent the possible introduction of zoonotic virus into a setting with at-risk populations, the hospital worked with state and federal public health, domestic animal and wildlife health authorities to facilitate surveillance and countermeasures.

Impacts

- As widely circulating avian influenza A virus H5N1 continues to be detected in areas where people are frequently present, the potential for human infection may be increasing. Currently, few recommendations or resources are available that describe best practices for human mitigation of H5N1 on facilities not typically associated with avian influenza responses.
- We add to this knowledge base by describing the mitigation efforts taken following the detection of H5N1 in highly trafficked areas at a hospital.
- Facilities not traditionally involved in avian influenza responses should assess for the possibility of avian influenza on their property and determine whether a plan is needed.

2 | METHODS

Maine Department of Agriculture, Conservation & Forestry (MDACF), Division of Animal and Plant Health, veterinarians collected cloacal swabs from each goose and pooled the swabs in brain heart infusion broth viral transport media on December 29, 2022. The pooled specimen resulted as presumptive positive for influenza A H5 at Cornell Animal Health Diagnostic Center USDA National Veterinary Services Laboratories confirmed the virus as H5 clade 2.3.4.4b on 28 April 2023. Wildlife samples were collected opportunistically from naturally deceased Canada geese. Procedures were not conducted on live animals, and animals were not collected or euthanized for the purposes of this project. All human monitoring activities were conducted for public health surveillance purposes. Ethics approval was not required for this study.

According to standard practice, Maine Center for Disease Control and Prevention (Maine CDC) monitored all individuals in direct contact with the infected geese, including one hospital employee and one MDACF responder, for 10 days following exposure. One close contact who did not utilize proper personal protective equipment (PPE) was contacted daily by Maine CDC to document any signs or symptoms. The other, who utilized appropriate PPE, was instructed to self-monitor and contact the health department if any signs or symptoms developed In both cases, specimens would be collected and tested for influenza if any relevant signs or symptoms were reported.

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At the time of specimen collection, approximately 25 adult Canada geese resided on the property and the remainder appeared visibly normal. No culling of the remaining birds occurred. Testing of the environment or additional birds on the property was not a surveillance priority and would not change response activities, therefore, additional sampling was not conducted. This stable resident population of Canada geese grazed widely on the hospital grounds and frequented a partially fenced-off retention pond located between the staff parking lot and the hospital entrance. A walking path bordered the pond and wrapped around its circumference, adjoining a network of city-wide walking and biking trails. The walkways and surrounding grassy areas were heavily contaminated by geese faeces.

Maine CDC considered the detection of H5N1 in birds on the property to represent increased potential for environmental contamination with this virus and identified the risk to human health as significant enough to recommend mitigation and prevention measures. Minimal, if any, guidance for reducing potential zoonotic transmission in public or highly trafficked areas is available. Maine CDC used existing knowledge of the virus to suggest mitigation efforts, including rerouting foot traffic away from the likely contaminated areas, wearing proper PPE when handling faeces inside the building, increasing surveillance for unexplained influenza-like illness among staff and patients and subtyping specimens from patients who tested positive for influenza A after admission to the hospital. Maine Department of Inland Fisheries and Wildlife (IFW), USDA-WS and MDACF worked with the hospital to adjust human behaviour and discussed methods for discouraging geese and other wild birds from frequenting the property.

The hospital implemented a cross-discipline goose management workgroup, comprised of all interested employees from across the organization on a volunteer basis. The workgroup virtually met monthly to discuss and review professional recommendations with the goal of developing an evidence-based approach to deterring geese activity.

3 | RESULTS

Effective communication between agencies ensured consistency in response and recommendations. This rapid interagency communication and organization was a result of the cooperative relationships established and maintained through participation in daily HPAI H5N1 incident planning meetings, which began following the first H5N1 detection in Maine in February 2022. Though these regular meetings had ceased prior to this incident, the relationships were ongoing.

The hospital implemented efforts to reduce potential contamination and transmission, including staff communication and education, environmental cleaning and disinfection, enhanced surveillance, and exposure and source reduction. The landscape vendor, director of security and other groundskeeping staff were trained on proper PPE use in the case of carcass removal (NCIRD, 2022). No additional carcasses were found. Department manager meetings and an email message notified all hospital staff of the presence of H5N1 on the hospital campus. Staff were instructed to avoid contact with living or deceased wildlife on the property and surfaces contaminated with faeces and to avoid using the walkway from the employee parking lot. No notification to the public or visitors was provided.

Initially, faeces on the walkway and grounds were tracked in the hospital on the shoes of staff and visitors. To reduce faecal transportation into the hospital, the walkway and areas that were frequented by geese were closed to all pedestrian traffic. Signage placed in prominent areas discouraged further contact with wild birds. Disposable disinfectant wipes were made available at entryways for staff use. The hospital attempted to reduce contamination by removing entryway doormats or frequently washing those that could not be removed. Standard precautions were used when handling bird faeces inside the hospital. When there was a concern for generating aerosols, airborne precautions were implemented.

The hospital did not routinely subtype influenza specimens, preventing them from distinguishing between influenza A H5N1 and seasonal influenza A viruses. Instead, the hospital implemented a protocol to send all influenza A positive specimens to Maine CDC for patients who developed influenza-like illness or tested positive for influenza A at 48 h or more after admission. This new process required providers to notify infection preventionists (IPs) of symptomatic patients. The hospital identified this step as labour-intensive since the IPs required more time and resources for the increased education and communication needed. The hospital did not implement protocols to increase testing among patients or staff. During this period, the hospital did not identify patients meeting these requirements and did not submit any specimens for subtyping.

Due to community transmission levels of SARS-CoV-2 at the time, all staff, visitors and patients were subject to source control and symptom screening. Additionally, staff were required to self-monitor for symptoms of COVID-19, which included influenza-like illness. The hospital identified the ongoing SARS-CoV-2 mitigation efforts as useful for H5N1 prevention and detection. There was no illness attributable to H5N1 identified in patients or staff. Furthermore, the two close contacts to the H5N1 confirmed carcasses completed the monitoring period with no symptoms.

The hospital completed the fencing around the pond and observed an immediate decline in time geese spent on the property. Per USDA-WS recommendations, the hospital also left grass at 7–14 inches long to deter geese. Following prolonged freezing temperatures, heavy snowfall and completion of the retaining pond fence, the resident geese left the area. At this time, the hospital reopened the walkway and ceased other H5N1-specific mitigation measures outlined above.

Overall, the response culminated in no identified transmission of H5N1 to humans or additional detections in birds on the property. The hospital stated that collaboration with public health and animal health agencies was instrumental in developing and initiating appropriate guidance and recommendations. The hospital identified

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a need for a better understanding of avian influenza A viruses and transmission prevention methods, including proper wildlife management and awareness of avian influenza risk in resident wild bird populations.

4 | CONCLUSIONS

Since the emergence of clade 2.3.4.4b, H5N1 appears to be maintained in wild bird populations and persists in residential birds, making it harder to control than avian influenza viruses localized to domestic bird populations (Caliendo, Leijten, et al., 2022). Consequently, it is likely that this virus will continue presenting at the animal–human interface, adding new mitigation responsibilities to facilities and organizations not previously experienced with preventing or controlling avian influenza viruses.

No additional detections in humans or wild birds occurred during the course of the hospital's heightened response. It is not possible to determine whether this was due to the hospital's efforts, the nature of the virus, or unknown factors. These results, coupled with the minimal existing guidance for avian influenza virus detection in public or highly trafficked areas, mean appropriate courses of action during similar future scenarios remain unclear. However, due to the pervasiveness of this virus and the zoonotic potential, it is important for facilities to be aware of the risk of H5N1 detection on their property and it may be helpful to have a plan of action. Ultimately, the global H5N1 response would benefit from developing clearer prevention and response guidance for affected facilities not traditionally associated with domestic or wild birds.

As the virus continues to circulate, posing a threat to birds and mammals, including humans, the question of responsible wildlife management at the animal–human interface comes to light. In the case of the hospital described above, relatively simple but potentially costly control measures proved beneficial. Though this did result in reduction of geese on the property, it remains to be seen how long the efforts will succeed in deterring wild birds. A better understanding of H5N1 virus longevity and transmissibility in different environments will help to guide facilities' wildlife management.

As the virus continues to circulate and more people are exposed, prevention and mitigation efforts will be essential in minimizing the risk of zoonotic transmission. Increased risk awareness and prevention communication to those not traditionally involved in avian influenza virus responses is warranted.

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CONFLICT OF INTEREST STATEMENT

The authors declare that there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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