Need for Rapid Detection of Avian Influenza Virus in Antarctic Wildlife

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Summary

Recent global outbreaks of highly pathogenic avian influenza (HPAI) and its potential impact on Antarctic wildlife call for proactive monitoring and rapid diagnosis. Birds and seals in the Antarctic region are at risk, with some species being susceptible to high mortality rates. Rapid diagnosis tool can be used to detect the virus in accordance with established protocols by WHO and WOAH. Prompt response and control measures are crucial to prevent further transmission, requiring collaboration among the Parties, particularly between those operating in the Antarctic Peninsula region.

Background

The Committee for Environmental Protection and the Consultative Parties have been continuing their efforts to prevent the introduction of non-natives species including viruses and micro-organisms in accordance with Annex II (Art. 4, Appendix C) and Annex III (Art. 2). Discussions on the concerns of infectious disease outbreaks in Antarctic wildlife had been actively held among the Committee, SCAR, COMNAP, and relevant organizations (ATCM XXII-CEP I−IP4, ATCM XXIII-CEP II−WP32, SATCM XII-CEP III−WP20, ATCM XXIV-CEP IV−WP10, 11, ATCM XXVIII-CEP VIII−WP28, IP63).

The Antarctic Environments Portal has provided a comprehensive information summary on Antarctic wildlife diseases and pointed out the need to establish a structured Antarctic wildlife health surveillance program, as well as the limited or lack of diagnostic investigations in the majority of mortality cases (<https://environments.aq/publications/antarctic-wildlife-diseases-2>).

Since 2022, thousands of highly pathogenic avian influenza (HPAI) outbreaks have been recorded worldwide, and these outbreaks of HPAI (H5N1) have raised concern for wildlife conservation. Avian influenza virus (AIV) can infect birds and mammals, and it is transmitted through feces, contaminated water and soil, direct contact and respiratory droplets. Massive mortality associated with a HPAI in sea lions were reported in Peru (Gamarra-Toledo et al. 2023) and the outbreak of HPAI (H5N1) in non-poultry has also been detected in Chile and Ecuador (WOAH 2023). The recent outbreaks in the countries of South America suggest high risk of introduction to the sub-Antarctic and Antarctic regions. These regions host a diverse range of bird species and seals which are exposed to the risk of HPAI. In this context, the Scientific Committee on Antarctic Research (SCAR) Expert Group of Birds and Marine Mammals (EG-BAMM)’s Antarctic Wildlife Health Working Group (AWHWG) has released a practical guide for operators who will interact with Antarctic wildlife in August 2022 (Dewar et al. 2022). Given the worldwide reports of outbreaks, particularly in the Antarctic gateway countries, and SCAR’s high alertness, a proactive and collaborative approach is required to monitor and reduce the risk of the HPAI.

Rapid Detection of Avian Influenza Virus and Response

Aquatic birds, Anseriformes (e.g. ducks and geese) and Charadriiformes (e.g. gulls and terns), are natural reservoir for avian influenza virus. The HPAI virus can be sufficiently spread by asymptomatic aquatic birds (Khomenko et al. 2018). However, in the case of African penguins, they are more susceptible to the HPAI infection, resulting in high mortality (Mollini et al. 2020). Antarctic seabirds are taxonomically close to Southern Ocean birds; therefore, monitoring and rapid diagnosis of AIV infection in unsusceptible as well as susceptible species are important.

For rapid AIV detection, commercial diagnostic kits can be used for seabirds and seals in Antarctica, sub-Antarctic regions and neighbouring areas in accordance with the official diagnostic protocols established by the World Health Organization (WHO) and the World Organization for Animal Health (WOAH). Monitoring efforts for early detection of AIV can involve using antigen kits such as AIV Ag Rapid Kit, which can detect AIV antigen in the fecal matter from the cloaca and in scattered feces. The diagnostic reagent in the test kit can detect AIV antigens at 15 minutes after injection of samples. User manual provided by the manufacturer is attached to this information paper. The rapid kits will be distributed free of charge upon request to the monitoring team at the Korea Polar Research Institute (KOPRI), the lead agency for the Korean Antarctic Program (please refer to contact information below for details).

**Rapid Diagnosis Procedures**

*First step*

Researchers, experts and trained staffs perform early diagnosis using the pre-provided AIV Ag rapid kit. The sample to be used is cloacal swab, oral swab or feces. The attached manual provides detailed introduction.

*Second step*

The samples that were diagnosed as positive or suspected to be positive through the test kit should be sent to King Sejong station or KOPRI to identify their genotypes and low or high pathogenicity of AIV. The entire process will take 1 to 2 weeks for the results to be obtained after the sample arrives.

If any of the samples are positive for the HPAI, the findings will be immediately notified to the sample collector and the Parties conducting activities near the sampling site, and will also be reported to the SCAR’s EG-BAMM and COMNAP.

**Response, Prevention and Control**

In the event that HPAI is detected in Antarctic wildlife, SCAR AWHWG Guide should be consulted first. In addition, the following measures could be suggested:

*Control measures*

To reduce the risk of further transmission of HPAI, control measures should be implemented to restrict the movement of people and to exhaustively disinfect the outer clothing and equipment of researchers who had been in contact with the infected animals, and those who are authorized to be close contact with wild animals.

*Communication and coordination*

It is crucial to communicate the situation to the Antarctic Treaty parties, coordinate with the relevant stakeholders, and seek expert advice from organizations such as the World Health Organization (WHO) and the World Organization for Animal Health (WOAH).

*Research and investigation*

Further research should be conducted to better understand the transmission and ecology of HPAI in the Antarctic ecosystem to inform future prevention and control measures.

*Monitoring and surveillance*

All wildlife populations in the affected area should be closely monitored and tested for HPAI to detect any further cases of the disease and prevent its spread.

Conclusion and Call for Collaboration

Early detection of HPAI in wildlife can help prevent the spread of the virus, reduce its impact on the Antarctic wildlife populations, and protect the health of ecologically related animals and humans that may come into contact with infected animals. In this light, we propose a collaborative effort among the Parties the members of the Committee, and especially the operators who are currently operating in the Antarctic Peninsula region.

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Bibliography

Dewar M. et al. 2022. The risk of avian influenza in the Southern Ocean. Ecoevorxiv. <https://doi.org/10.32942/osf.io/8jrbu>

Gamarra-Toledo, V. et al. 2023. First mass mortality of marine mammals caused by Highly Pathogenic Influenza virus (H5N1) in South America. bioRxiv.

Khomenko S. et al. 2018. 2016-2018 spread of H5N8 highly pathogenic avian influenza (HPAI) in sub-Saharan African. Food and Agriculture Organization of the United Nations.

Molini, U, Aikukutu, G, Roux, J.P, Kemper, J, Ntahonshikira, C, Marruchella, G, Khaiseb, S, Cattoli, G, Dundon, W.G. 2020. Avian Influenza H5N8 Outbreak in African Penguins (Spheniscus demersus), Namibia, 2019. Journal of Wildlife Disease 56(1) pp. 214-218.

WOAH (World Organisation for Animal Health) 2023. Highly Pathogenic Avian Influenza (HPAI)-Situation report. 11.03.2023.