Avian and other zoonotic influenzas

INTRODUCTION

Photo credits: FAO

Learning objectives

By the end of this module, you will:

- Describe transmission, symptoms, and treatment for zoonotic influenza.
- Describe why zoonotic influenza viruses are of potential concern to public health.
- Describe the role of public health authorities in reducing the risk of human infections with zoonotic influenza viruses.
- List key preventive strategies.

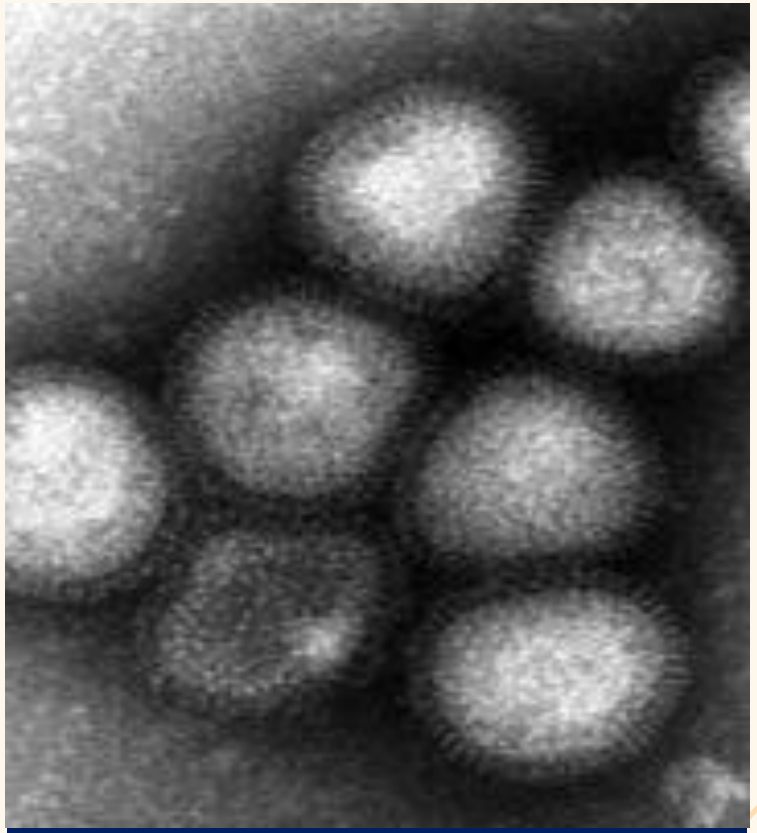
Outline

1. Introduction
2. Infections in humans
3. Public health preparedness and response
4. References and resources

1. Introduction

The Pathogen

- There are 4 types of influenza viruses, types A, B, C and D.
- Influenza A and B viruses circulate and cause seasonal epidemics of disease in humans although only type A viruses can cause global pandemics based on current knowledge and understanding.
- Influenza A viruses are established in many animal species. The emergence of an influenza A virus, with the ability to infect people and sustain human-to-human transmission, could cause an influenza pandemic.



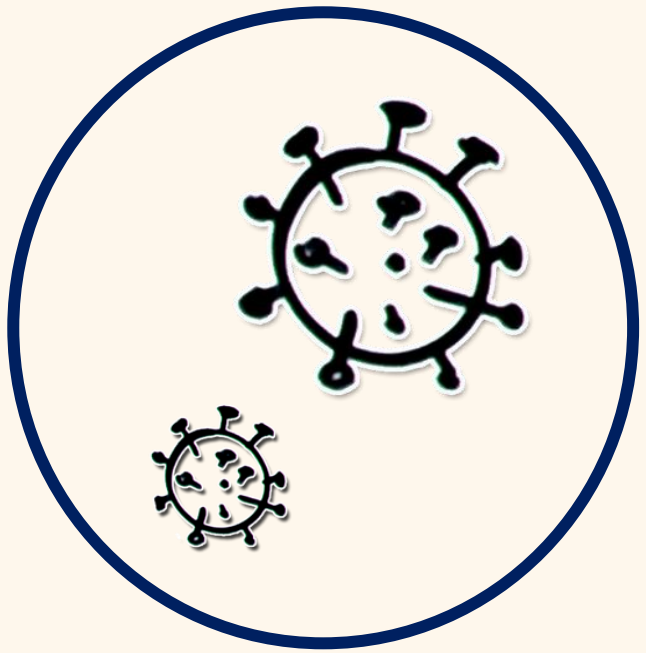
Courtesy of WHO Collaborating Centre for Reference and Research on Influenza, National Institute of Infectious Diseases, Japan

The Pathogen

- Influenza A viruses are classified according to the two glycoproteins on their surface - **Haemagglutinin (HA)** and **Neuraminidase (NA).**
- The subtype of any given influenza virus denotes the combination of the different HA and NA types exhibited by the virus (for example, H1N1, H5N1, H7N9, etc.).
- When animal influenza viruses infect their host species, they are named according to the host (avian influenza viruses, swine influenza viruses, etc.)
- Animal influenza viruses are distinct from human influenza viruses and do not easily transmit to and among humans.

FAO/Pius Utomi Ekpei

Avian Influenza



- Wild aquatic birds are the primary natural reservoir for most subtypes of influenza A viruses.
- Avian influenza outbreaks in poultry can have immediate and severe consequences for the agricultural sector.
- Avian influenza viruses are classified as either low or high pathogenicity depending on the clinical signs and disease severity in experimentally infected poultry, and on the molecular signature of the cleavage site on the HA protein.
- The classification is not related to clinical signs in infected humans.

Swine influenza

- Swine influenza is a respiratory disease of pigs caused by influenza A viruses.
- Swine influenza viruses (SIVs) exhibiting H1 or H3 HA – particularly A(H1N1), A(H1N2) and A(H3N2) subtypes – are enzootic in swine populations around the world.

WHO / Yoshi Shimizu

2. Infections in humans

Transmission to humans

WHO / Yikun Wang

Poultry meat vendor in the market of Zuojiazhuang Sub-district

- Animal influenza viruses – most commonly avian and swine influenza viruses – can occasionally infect humans, resulting in zoonotic infections.
- Avian influenza viruses have sporadically caused disease in humans following infection.
- Swine influenza viruses have sporadically caused disease in humans following infection. When these viruses infect humans, they are labelled as variant (v) viruses, such as A(H1N1)v.

Transmission to humans

WHO / Yoshi Shimizu

A farmer feeding his poultry animals at his farm in Lao People's Democratic Republic

- Animal influenza viruses can be transmitted from sick or healthy-appearing animals to humans by direct or indirect contact.
- In rare instances, these zoonotic influenza viruses have been transmitted among close contacts of infected persons, without further spread.
- Current influenza viruses that cause zoonotic infections have not demonstrated sustained person-to-person transmission.

Epidemiology of zoonotic influenza

- From 2003 through 2023, over 880 human cases of infection, including over 460 deaths, with avian influenza A(H5N1) have been detected in 23 countries.

- Human infections with the following avian viruses have also been detected:
  - H3N8, H5, H5N6, H5N8, H6N1, H7N2, H7N3, H7N4, H7N7, H7N9, H10N3, H10N7, H10N8, H9N2
- Human infections with the following swine viruses been detected:
  - H1N1v, H1N2v and H3N2v

FAO

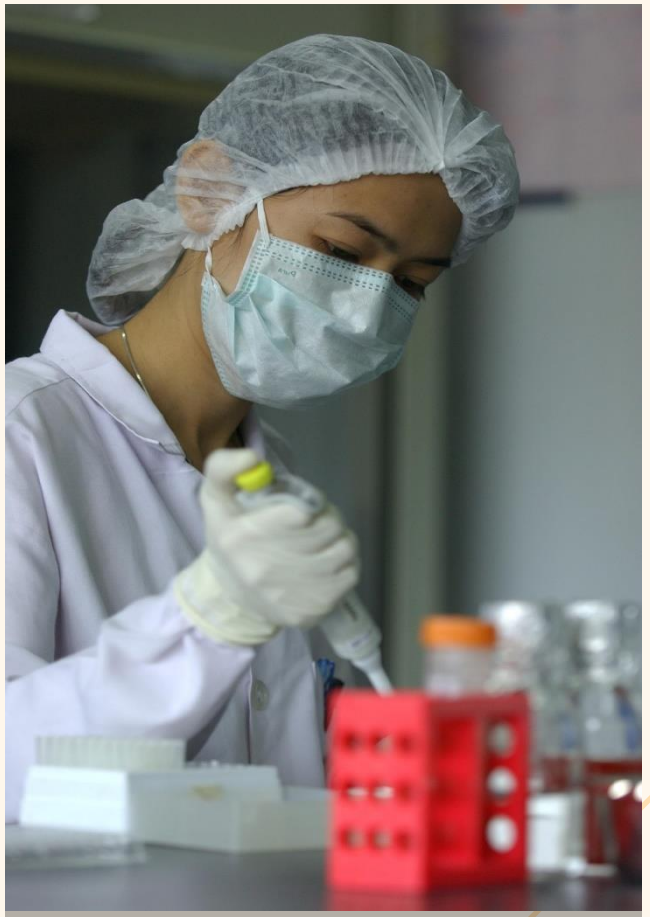
Signs and symptoms in humans

- Exposure to animal influenza viruses can lead to infection and disease in humans.
- Disease severity depends upon the virus causing the infection and the characteristics of the infected individual.
- Severity and symptoms from infection with avian influenza viruses can range from conjunctivitis or mild, flu-like symptoms to severe, acute respiratory disease – and/or death. Rarely, gastrointestinal and neurological symptoms have been reported.
- Human infections with swine influenza viruses have generally been associated with mild, flu-like symptoms.

WHO / Julio Takayama

Diagnosis in humans

- Laboratory tests are required to diagnose human infection and testing should be done at a lab capable of safely processing and confirming zoonotic infections.
- The collection of appropriate specimens from human cases for virus identification is essential for the early detection of cases, proper management of patients, public health risk assessment and developing proper response measures.
- Rapid and precise characterization of the virus and/or its isolate is done at specialized reference laboratories.



FAO/Bay Ismoyo

A lab technician conducting tests on poultry samples as part of Thailand's surveillance program to control the spread the Avian Influenza virus

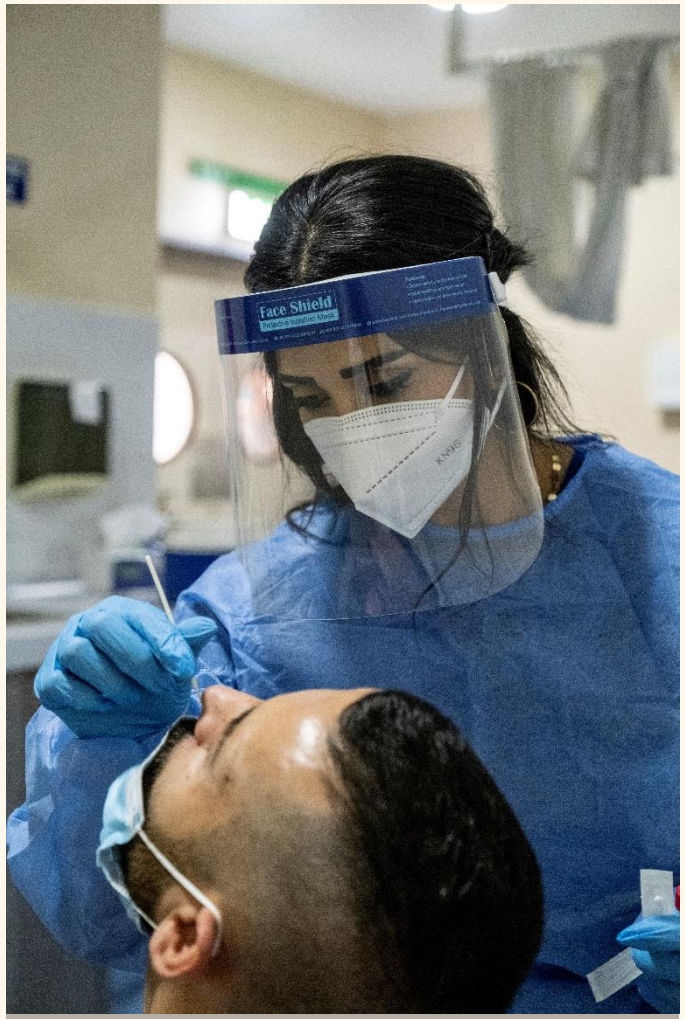
Clinical management in humans

- Influenza patients should be managed properly to prevent severe illness and death.
- In some circumstances, patients with laboratory-confirmed influenza virus infections can be treated with antiviral drugs.
- Optimized supportive care is essential when treating patients with progressive or severe influenza virus infection.

WHO / Mukhsin Abidjanov

3. Public health preparedness and response

Public health response



WHO / Natalie Naccache

- Any suspected human cases must be investigated in order to provide proper clinical management, identify other potential human cases through monitoring contacts and other exposed persons, and determine if human-to-human transmission is occurring.

- Public health authorities should report any laboratory-confirmed case to WHO under the International Health Regulations (IHR, 2005) and initiate other important response activities such as contact tracing and risk assessment.

Public health response

- A **One Health** approach is important when responding to cases of zoonotic influenza.
  - Public health and animal health authorities should work together and share information.
  - Multisectoral coordination and communication are essential in outbreak response.

Reducing exposure

- Practice good hygiene, especially regular hand washing, before and after touching animals at farms, markets, or other places where animals may be present.
- Avoid direct and indirect contact with infected animals.
- Avoid the consumption of raw or undercooked animal products.
- Special precautions are to be taken in healthcare settings to prevent the spread of the virus among patients and between patients and healthcare providers.

Preparedness

- Ensure continuous, quality surveillance at the human-animal interface (in both animal and human populations).
- Alert health-care providers to the possibility of human cases and/or clusters of human infections with zoonotic influenza viruses.
- Assist in risk-based pandemic planning.
- Encourage virus sharing and characterization, in particular antigenic characterization and full-genome sequencing, to assess the pandemic potential of these viruses.

WHO activities

WHO Global Influenza Surveillance and Response System (GISRS)

- Monitors the evolution of influenza viruses and provides recommendations in laboratory diagnostics, vaccines, antiviral susceptibility and risk assessment.
- Serves as a global alert mechanism for the emergence of influenza viruses with pandemic potential.

Partnerships

- World Organisation for Animal Health (WOAH)
- Food and Agriculture Organization of the United Nations (FAO)
- OFFLU

4. References and resources

References and resources

1. WHO – Avian and other zoonotic influenza fact sheet, 3 October 2023 www.who.int/news-room/fact-sheets/detail/influenza-(avian-and-other-zoonotic)
2. WHO - Human-animal interface www.who.int/teams/global-influenza-programme/avian-influenza
3. Public health resource pack for countries experiencing outbreaks of influenza in animals: revised guidance, 10 August 2023 https://www.who.int/publications/i/item/9789240076884
4. Managing epidemics: key facts about major deadly diseases, 2nd edition, 14 November 2023 https://www.who.int/publications/i/item/9789240083196
5. International Health Regulations https://www.who.int/health-topics/international-health-regulations