Influenza at the human-animal interface

Summary and assessment, 30 October to 7 December 2017

- **New infections**[1]**:** Since the previous update, new human infections with avian influenza A(H5N6), A(H7N9) and A(H9N2) viruses, and swine influenza A(H1N1)v, A(H1N2)v and A(H3N2)v variant[2] viruses were reported.
- **Risk assessment:** The overall public health risk from currently known influenza viruses at the human-animal interface has not changed, and the likelihood of sustained human-to-human transmission of these viruses remains low. Further human infections with viruses of animal origin are expected.
- **IHR compliance:** All human infections caused by a new influenza subtype are required to be reported under the International Health Regulations (IHR, 2005).[3] This includes any animal and non-circulating seasonal influenza A viruses. Information from these notifications is critical to inform risk assessments for influenza at the human-animal interface.

Avian Influenza Viruses

Current situation:

Avian influenza A(H5) viruses

Since the last update on 30 October 2017, one new laboratory-confirmed human case of influenza A(H5N6) virus infection was reported to WHO.

A 33-year-old male resident of Guangxi Province, China, developed symptoms on 7 November 2017. He was hospitalized on 12 November and passed away on 30 November. The patient had exposure to live poultry before illness onset; no further human cases were reported among three close contacts of this case. Additional information on the virus from the case is anticipated.

According to the animal health authorities in China[4,5], influenza A(H5N6) viruses have been detected in poultry in the first half of 2017 in many provinces in the country, including those that have reported human cases. Influenza A(H5) subtype viruses have the potential to infect humans and thus far, no human cases, other than those with influenza A(H5N1) and A(H5N6) viruses, have been reported to WHO. According to reports received by the World Organisation for Animal Health (OIE), various influenza A(H5) subtypes continue to be detected in birds in Africa, Europe and Asia.

Risk Assessment:

1. **What is the likelihood that additional human cases of infection with avian influenza A(H5) viruses will occur?** Most human cases were exposed to A(H5) viruses through contact with

[1] For epidemiological and virological features of human infections with animal influenza viruses not reported in this assessment, see the yearly report on human cases of influenza at the human-animal interface published in the Weekly Epidemiological Record. Available at: www.who.int/wer/en/

[2] World Health Organization. Standardization of terminology for the influenza virus variants infecting humans: Update. Available at: www.who.int/influenza/gisrs_laboratory/terminology_variant/en/

[3] World Health Organization. Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations (2005). Available at: www.who.int/ihr/Case_Definitions.pdf

[4] http://www.moa.gov.cn/zwllm/tzgg/gb/sygb/

[5] http://www.oie.int/wahis_2/public/wahid.php/Reviewreport/Review?page_refer=MapFullEventReport&reportid=19897

infected poultry or contaminated environments, including live poultry markets. Since the viruses continue to be detected in animals and environments, further human cases can be expected.

2. **What is the likelihood of human-to-human transmission of avian influenza A(H5) viruses?** Even though small clusters of A(H5) virus infections have been reported previously including those involving healthcare workers, current epidemiological and virological evidence suggests that this and other A(H5) viruses have not acquired the ability of sustained transmission among humans, thus the likelihood is low.
3. **What is the likelihood of international spread of avian influenza A(H5) viruses by travellers?** Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as evidence suggests these viruses have not acquired the ability to transmit easily among humans.

Avian influenza A(H7N9) viruses

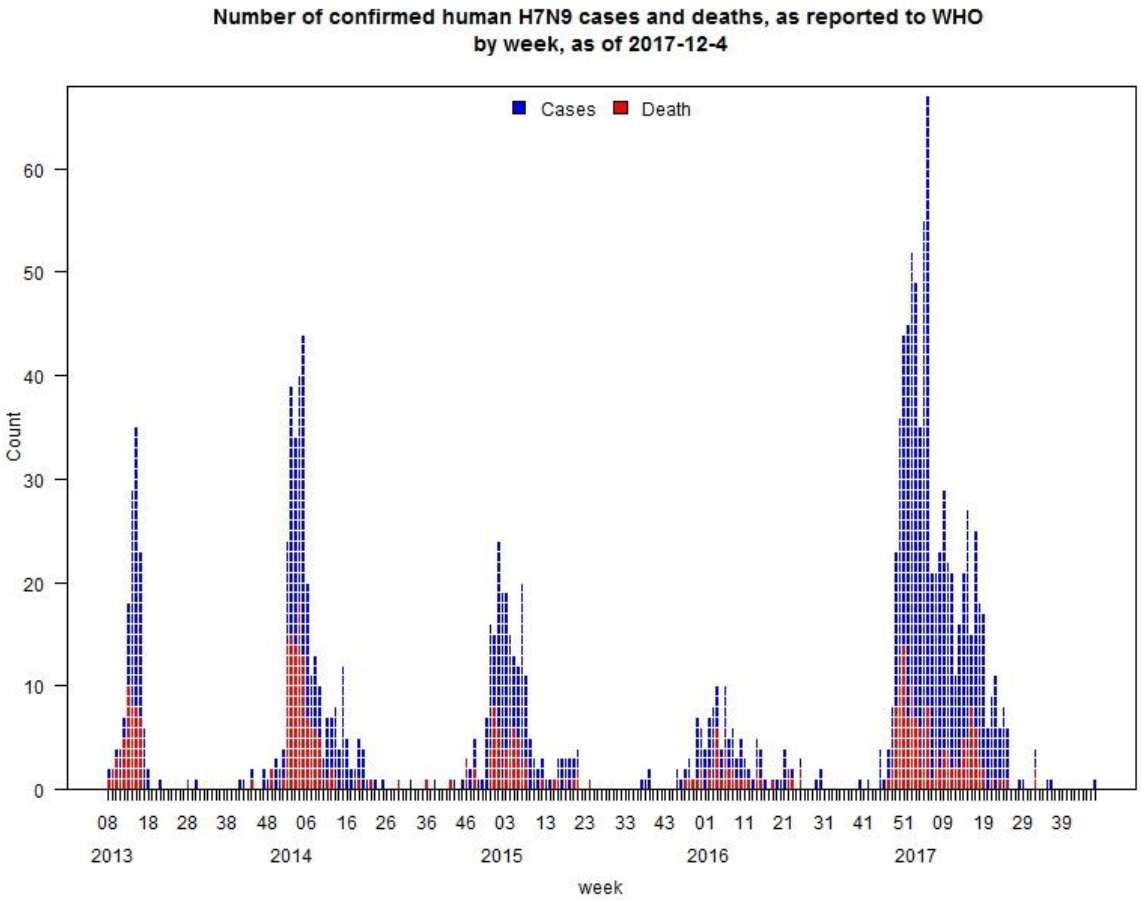
Since the last update on 30 October 2017, one new laboratory-confirmed human case of influenza A(H7N9) virus infection was reported to WHO. Case details are presented in the table in the Annex of this document. For additional details on the case, public health interventions and avian influenza A(H7N9) viruses, see the Disease Outbreak News.

Since 2013, a total of 1565 laboratory-confirmed cases of human infection with avian influenza A(H7N9) viruses, including at least 612 deaths[6], have been reported to WHO (Figure 1). If the incidence of human cases follows the trends seen in previous years, the number of reported human cases may rise over the coming months. Further sporadic cases of human infection with avian influenza A(H7N9) virus are therefore expected in affected and possibly neighbouring areas.

The agricultural authorities in China have announced that vaccination of domestic poultry against infection with avian influenza A(H7) viruses has commenced, in addition to the ongoing poultry vaccination program against avian influenza A(H5) viruses.[7]

Figure 1: Epidemiological curve of avian influenza A(H7N9) cases in humans by week of onset, 2013-2017.

[6] Total number of fatal cases is published on a monthly basis by China National Health and Family Planning Commission.
[7] H7N9 Situation Update, FAO. Available at: www.fao.org/ag/againfo/programmes/en/empres/H7N9/Situation_update.html



Overall, the risk assessment has not changed. The influenza A(H7N9) viruses have not exhibited sustained human-to-human transmission since their emergence in 2013 and no significant changes in the virus properties or the epidemiology of human infections have been observed. Rapid sharing of information and viruses is essential to detect emerging changes and conduct rapid risk assessment with increased confidence. WHO, through GISRS, and in collaboration with the OIE-FAO Network of Experts on Animal Influenza (OFFLU), research and academic institutions and national authorities, will continue monitoring the A(H7N9) virus situation very closely. WHO will continue to reach out to partners and reassess the risk as new information becomes available.

Risk Assessment:

1. What is the likelihood that additional human cases of infection with avian influenza A(H7N9) viruses will occur? Most human cases are exposed to the A(H7N9) virus through contact with infected poultry or contaminated environments, including live poultry markets. Since the virus likely continues to circulate in animals and environments, further human cases can be expected. Additional sporadic human cases of influenza A(H7N9) in other provinces in China that have not yet reported human cases are also expected.

2. What is the likelihood of human-to-human transmission of avian influenza A(H7N9) viruses? Even though small clusters of cases have been reported, including those involving healthcare workers, currently available epidemiological and virological evidence suggests that this virus has not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the likelihood of international spread of avian influenza A(H7N9) virus by travelers? Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community

level spread is considered unlikely as this virus has not acquired the ability to transmit easily among humans.

Avian influenza A(H9N2) viruses

Since the last update on 30 October 2017, one laboratory-confirmed human case of A(H9N2) virus infection was reported to WHO from China. The patient is a child who had mild illness onset on 1 December, received outpatient care and had exposure history to live poultry. Avian influenza A(H9N2) viruses are enzootic in poultry in China.

Risk Assessment:

1. What is the likelihood that additional human cases of infection with avian influenza A(H9N2) viruses will occur?

Most human cases are exposed to the A(H9N2) virus through contact with infected poultry or contaminated environments. Human infection tends to result in mild clinical illness. Since the virus continues to be detected in poultry populations, further human cases can be expected.

2. What is the likelihood of human-to-human transmission of avian influenza A(H9N2) viruses?

No case clusters have been reported. Current epidemiological and virological evidence suggests that this virus has not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the likelihood of international spread of avian influenza A(H9N2) virus by travellers?

Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as this virus has not acquired the ability to transmit easily among humans.

Swine Influenza Viruses

Current situation:

Influenza A(H1N1)v viruses

Since the last update on 30 October 2017, one new laboratory-confirmed human infection with influenza A(H1N1)v viruses was detected in the state of Iowa in the United States (U.S). The infection occurred in an adult who reported contact with swine prior to illness. The patient was not hospitalized and has fully recovered. No human-to-human transmission was identified. Characterization of the virus genome indicates the virus is similar to A(H1N1) viruses currently circulating in swine populations in the USA. This virus and related swine influenza viruses have HA and NA gene segments derived from the seasonal human H1N1pdm09 virus that was likely introduced into swine in the USA by a recent reverse zoonosis.[8] Ferret antisera raised against the current A(H1N1)pdm09 virus in the human seasonal influenza vaccine well inhibited this virus.

Since 2005, 21 cases of A(H1N1)v influenza virus infection have been reported to the U.S. Centers for Disease Control and Prevention (CDC).[9] This is the first case reported in 2017. Most cases are associated with mild illness, although several cases have been hospitalized and one case was reported as a fatal case (in 2015).

[8] Gao S, Anderson TK, Walia RR, Dorman KS, Janas-Martindale A, Vincent AL. The genomic evolution of H1 influenza A viruses from swine detected in the United States between 2009 and 2016. Journal of General Virology. 2017. 98:2001-2010.

[9] Centers for Disease Control and Prevention, USA. Reported Infections with Variant Influenza Viruses in the United States since 2005. Available at: https://www.cdc.gov/flu/swineflu/variant-cases-us.htm.

Influenza A(H1N2)v viruses

Since the last update on 30 October 2017, one new laboratory-confirmed human infection with influenza A(H1N2)v viruses was detected in the state of Colorado in the United States (U.S). The case reported exposure to swine at an agricultural event prior to illness. The case recovered and no human-to-human transmission was identified.

Since 2005, 13 cases of A(H1N2)v influenza virus infection have been reported to the U.S. Centers for Disease Control and Prevention (CDC) and 4 of these occurred in 2017.[10] Most cases are associated with mild illness, although several cases have been hospitalized.

Influenza A(H3N2)v viruses

Since the last update on 30 October 2017, 2 human infections with influenza A(H3N2)v viruses were detected in the U.S. in several states.[11] One case reported contact with swine more than a week prior to illness onset and the other case did not report exposure to swine but one household member did have exposure to swine. Thus, limited human-to-human transmission cannot be ruled out.

Since human infections with novel influenza A viruses became nationally notifiable in 2005, 433 human infections with influenza A(H3N2)v viruses have been reported to the U.S. CDC and 61 of these occurred in 2017.[6] Most cases are associated with mild illness, although several cases have been hospitalized and one case was reported as a fatal case (in 2012).

Risk Assessment:

1. What is the likelihood that additional human cases of infection with swine influenza viruses will occur? Swine influenza viruses circulate in swine populations in many regions of the world. Depending on geographic location, the genetic characteristics of these viruses differ. Most human cases are exposed to swine influenza viruses through contact with infected swine or contaminated environments. Human infection tends to result in mild clinical illness. Since these viruses continue to be detected in swine populations, further human cases can be expected.

2. What is the likelihood of human-to-human transmission of swine influenza viruses? Although limited human-to-human transmission may have taken place, current evidence suggests that these viruses have not acquired the ability of sustained transmission among humans, thus the likelihood is low.

3. What is the likelihood of international spread of swine influenza viruses by travelers? Should infected individuals from affected areas travel internationally, their infection may be detected in another country during travel or after arrival. If this were to occur, further community level spread is considered unlikely as these viruses have not acquired the ability to transmit easily among humans.

Overall Risk Management Recommendations:

- WHO does not advise special traveler screening at points of entry or restrictions with regard to the current situation of influenza viruses at the human-animal interface. For recommendations on safe trade in animals from countries affected by these influenza viruses, refer to OIE guidance.
- WHO advises that travelers to countries with known outbreaks of animal influenza should avoid farms, contact with animals in live animal markets, entering areas where animals may be

[10] Centers for Disease Control and Prevention, USA. Reported Infections with Variant Influenza Viruses in the United States since 2005. Available at: https://www.cdc.gov/flu/swineflu/variant-cases-us.htm.

[11] Centers for Disease Control and Prevention, USA. Weekly U.S. Influenza Surveillance Report. Available at: www.cdc.gov/flu/weekly/index.htm

slaughtered, or contact with any surfaces that appear to be contaminated with animal faeces. Travelers should also wash their hands often with soap and water. Travelers should follow good food safety and good food hygiene practices.

- Due to the constantly evolving nature of influenza viruses, WHO continues to stress the importance of global surveillance to detect virological, epidemiological and clinical changes associated with circulating influenza viruses that may affect human (or animal) health, especially over the coming winter months. Continued vigilance is needed within affected and neighbouring areas to detect infections in animals and humans. Collaboration between the animal and human health sectors is essential. As the extent of virus circulation in animals is not clear, epidemiological and virological surveillance and the follow-up of suspected human cases should remain high.
- All human infections caused by a new influenza subtype are notifiable under the International Health Regulations (IHR, 2005).[12] State Parties to the IHR (2005) are required to immediately notify WHO of any laboratory-confirmed[13] case of a recent human infection caused by an influenza A virus with the potential to cause a pandemic.[6] Evidence of illness is not required for this report.
- It is critical that influenza viruses from animals and people are fully characterized in appropriate animal or human health influenza reference laboratories. Under WHO's Pandemic Influenza Preparedness (PIP) Framework, Member States are expected to share their influenza viruses with pandemic potential on a regular and timely basis with the Global Influenza Surveillance and Response System (GISRS), a WHO-coordinated network of public health laboratories. The viruses are used by the public health laboratories to assess the risk of pandemic influenza and to develop candidate vaccine viruses.

Links:

WHO Human-Animal Interface web page
http://www.who.int/influenza/human_animal_interface/en/
Cumulative Number of Confirmed Human Cases of Avian Influenza A(H5N1) Reported to WHO
http://www.who.int/influenza/human_animal_interface/H5N1_cumulative_table_archives/en/
Avian Influenza A(H7N9) Information
http://who.int/influenza/human_animal_interface/influenza_h7n9/en/index.html
WHO Avian Influenza Food Safety Issues
http://www.who.int/foodsafety/areas_work/zoonose/avian/en/
World Organisation of Animal Health (OIE) web page: Web portal on Avian Influenza
http://www.oie.int/animal-health-in-the-world/web-portal-on-avian-influenza/
Food and Agriculture Organization of the UN (FAO) webpage: Avian Influenza
http://www.fao.org/avianflu/en/index.html
OFFLU
http://www.offlu.net/index.html

Annex:

Table 1: Laboratory-confirmed human case of avian influenza A(H7N9) virus infection (reported 1 December 2017)

[12] World Health Organization. Case definitions for the four diseases requiring notification in all circumstances under the International Health Regulations (2005). Available at: www.who.int/ihr/Case_Definitions.pdf
[13] World Health Organization. Manual for the laboratory diagnosis and virological surveillance of influenza (2011). Available at: www.who.int/influenza/gisrs_laboratory/manual_diagnosis_surveillance_influenza/en/

Province or region reporting (province of assumed exposure, if different from reporting province or region)	Age	Sex	Case condition at time of reporting	Date of onset (dd/mm/yyyy)	Exposure history (at time of reporting)
Yunnan	64	M	Severe	21/11/2017	Sick and dead poultry