SURVEILLANCE REPORT

Annual Epidemiological Report for 2016

Zoonotic influenza

Key facts

- No human cases of avian influenza were reported in the EU/EEA.
- Human cases of avian influenza A(H5N1) were reported from Egypt and A(H7N9) infections from mainland China, Hong Kong Special Administrative Region (SAR) and Taiwan.
- Sporadic human cases of avian influenza A(H5N6), A(H7N2) and A(H9N2) were reported worldwide.
- In 2016, several outbreaks and detections of highly pathogenic avian influenza viruses such as A(H5N1), A(H5N2), A(H5N3) or A(H5N8) were reported in poultry, wild and captured birds worldwide.
- Two severe human infections due to swine-originated influenza virus A(H1N1)v were reported in the EU/EEA. Influenza viruses A(H1N1)v, A(H1N2)v, and A(H3N2)v of swine origin also caused human cases in Canada, Switzerland and the United States.

Methods

This report is based on data for 2016 retrieved from Epidemic Intelligence on 27 September 2017.

This report includes 2016 events and data and does not follow the entire winter season pattern. For a detailed description of methods used to produce this report, please refer to the *Methods* chapter [1].

An overview of the national surveillance systems is available online [2].

Additional data on influenza are accessible from ECDC's online *Surveillance atlas of infectious diseases* [3].

Suggested citation: European Centre for Disease Prevention and Control. Chlamydia. In: ECDC. Annual epidemiological report for 2016. Stockholm: ECDC; 2018.

Stockholm, March 2018

Epidemiology

Avian and swine influenza in humans

Avian influenza virus A(H5N1)

In 2016, highly pathogenic avian influenza A(H5N1) virus caused continued outbreaks and was detected in poultry and wild birds [4,5]. Sporadic transmission to humans was observed in Egypt, with 10 reported cases of which three died [6-9]. Transmission patterns were similar as in previous years: cases were associated with close contact to infected poultry [10]. Between 2003 and 2016, WHO reported 856 human cases due to influenza A(H5N1), including 452 deaths [11].

Avian influenza virus A(H5N6)

In 2016, China reported nine human cases infected with avian influenza A(H5N6) virus, with the likely source of infection being exposure to infected poultry [6,7,12-15].

Avian influenza virus A(H7N9)

After the identification of a novel reassortant low pathogenic avian influenza virus A(H7N9) in China in March 2013, human cases were reported from mainland China, Hong Kong, and Taiwan; Canada and Malaysia have reported travel-related cases. In 2016, WHO reported 965 laboratory-confirmed human cases due to avian influenza A(H7N9) viruses, including at least 181 deaths China alone reported 265 cases, including 70 (26%) deaths [6,16]. The main sources of infection were exposure to infected poultry or contaminated environments. No sustained human-to-human transmission has been recorded, although clusters of human cases were identified [14,15].

Avian influenza virus A(H9N2)

In 2016, mild infections with avian influenza A(H9N2) virus were reported by China (eight cases) and Egypt (one case) [8,9,13,16,18].

Low pathogenic avian influenza virus A(H7N2)

In 2016, a mild infection with a low pathogenic avian influenza A(H7N2) virus in a veterinarian was reported from New York City. The case was related to an outbreak of the virus in cats in an animal shelter [16,19].

Swine influenza virus A(H1N1)v

The Netherlands and Italy each reported a severe human case infected with swine-derived influenza A(H1N1)v virus [14,20-23]. Another mild human infection was detected during a study in Switzerland [22].

Swine influenza virus A(H1N2)v

The United States reported four human cases infected with a variant swine-origin influenza A(H1N2)v virus following exposure to swine. Two of the four human cases were hospitalised [15].

Swine influenza virus A(H3N2)v

The United States reported eighteen human cases infected with swine-origin influenza A(H3N2)v viruses, of whom one was admitted to hospital [9,12,24]. Canada also reported one case of influenza A(H3N2)v [15].

Avian influenza detections in birds

Highly pathogenic avian influenza A(H5N1)

Highly pathogenic avian influenza A(H5N1) virus recurred globally in 2016 and affected poultry and wild birds in several countries in Asia (Bangladesh, Bhutan, Cambodia, China, India, Indonesia, Laos, Myanmar, and Vietnam), Africa (Cote d'Ivoire, Cameroon, Egypt, Ghana, Togo, Niger and Nigeria) and the Middle East (Iraq and Lebanon) [4,5].

France reported a highly pathogenic avian influenza A(H5N1) reassortant virus not related to A(H5N1) viruses circulating in Africa or south-east Asia, but there were no human cases [25].

Highly pathogenic avian influenza A(H5N2)

In 2016, detections of influenza A(H5N2) virus were reported from different countries and areas worldwide: China, France, the United States, and South Africa. However, the genetic composition of these viruses differed between countries, e.g. viruses in France were reassortant viruses not related to the viruses detected in China [4,5].

Highly pathogenic avian influenza A(H5N5)

During the influenza A(H5N8) outbreaks in Europe, reassortant influenza A(H5N5) viruses were detected in Italy, Montenegro and the Netherlands [24].

Highly pathogenic avian influenza A(H5N6)

In 2016, continued circulation and outbreaks related to highly pathogenic avian influenza A(H5N6) viruses were reported from mainland China, Hong Kong, Japan, Myanmar, South Korea, and Vietnam [4,5].

Highly pathogenic avian influenza A(H5N8)

In 2016, large outbreaks affecting poultry, captured and wild birds were reported from different continents [4,5]. In the EU/EEA, 17 countries reported outbreaks: Austria, Bulgaria, Croatia, Denmark, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Netherlands, Poland, Romania, Slovakia, Sweden, and the United Kingdom [27]. EU neighbouring countries were also affected, and the Russian Federation, Serbia, Switzerland and Ukraine reported detections. ECDC published an updated rapid risk assessment related to the introduction of A(H5N8) into Europe and assessed the risk for the general population as very low [28].

Previously affected and new countries in Asia reported outbreaks: China, India, and South Korea. Newly affected countries were in the Middle East (Iran, Israel, and Kuwait) and Africa (Egypt, Nigeria, and Tunisia). In addition to farmed poultry, influenza A(H5N8) virus was detected in migratory wild bird populations, but also in domestic locally resident bird species.

No transmission to humans, but transmission to dogs has been reported from natural infections and under laboratory conditions [29,30].

Highly pathogenic avian influenza A(H5N9)

In early 2016, France continued to report outbreaks due to newly reassorted highly pathogenic influenza A(H5N9) viruses, particularly in the south-western part of the country [4,5].

Low pathogenic avian influenza viruses of subtype A(H5)

France, Germany, the United States and the United Kingdom reported detections of low pathogenic A(H5N1) viruses [5].

High and low pathogenic avian influenza viruses of subtype A(H7)

Mexico reported persistent outbreaks of highly pathogenic avian influenza A(H7N3) virus. In Germany, low pathogenic A(H7N3) virus was observed in poultry [4,5].

In 2016, an outbreak of highly pathogenic avian influenza A(H7N7) was reported from Italy, and low pathogenic A(H7N7) virus was detected in Denmark [4,5].

Low pathogenic A(H7N8) viruses were reported from the United States.

No transmission to humans was observed in relation to any of these outbreaks.

Low pathogenic avian influenza A(H7N9) viruses were continuously reported from China [4,5]. Low pathogenic A(H7N9) virus was also detected in the Netherlands, but this virus was not related to the viruses circulating in poultry in China that have caused severe infections in humans [27].

Discussion

Despite various outbreaks of highly pathogenic avian influenza virus in wild birds and poultry holdings in EU/EEA countries in 2016, no human cases of avian influenza were reported in EU/EEA countries. However, human cases of avian influenza A(H5N1), A(H5N6), A(H7N9), A(H7N2) and A(H9N2) were reported from countries outside the EU/EEA.

Two human infections with influenza viruses of swine origin were reported from EU/EEA countries (the Netherlands and Italy); several cases occurred in the United States and Canada. Viruses of animal origin continue to evolve genetically and reassort with influenza viruses better adapted to, and transmissible among, humans. Such emerging new avian influenza viruses have the potential to infect humans and cause severe disease.

Public health implications

Zoonotic influenza viruses remain a concern for human health in Europe. Therefore, rigorous surveillance among animals is needed. Reassortment events between swine, avian and human viruses should be monitored carefully, and any transmission to humans should be identified as early as possible to prevent further human-to-human spread. To be better prepared for a new pandemic possibly arising from any of these new strains, WHO has published a list of candidate vaccines [31].

References

1. European Centre for Disease Prevention and Control (ECDC). Introduction to the Annual epidemiological report for 2016. Stockholm: ECDC; 2017 [cited 27 Sep 2017]. Available from: https://ecdc.europa.eu/en/annual-epidemiological-reports-2016/methods.

2. European Centre for Disease Prevention and Control. Surveillance systems overview [internet]. Stockholm: ECDC; 2017. Available from: https://ecdc.europa.eu/sites/portal/files/documents/Table-surveillance_systems_overview_0.xlsx

3. European Centre for Disease Prevention and Control. Surveillance atlas of infectious diseases [internet]. Stockholm: ECDC; 2017 [cited 30 May 2017]. Available from: http://atlas.ecdc.europa.eu.

4. World Organisation for Animal Health (OIE). Avian influenza portal – Update on avian influenza in animals (types H5 and H7) 2016. Paris: OIE; 2016 [cited 27 Sep 2017]. Available from: http://www.oie.int/animal-health-in-the-world/update-on-avian-influenza/2016/.

5. Food and Agriculture Organization of the United Nations (FAO). Global Animal Disease Information System (EMPRES-i) [internet]. Rome: FAO; 2015 [cited 10 March 2015]. Available from: http://empres-i.fao.org/eipws3g/.

6. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 25 February to 4 April 2016 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_04_04_2016.pdf.

7. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 9 May to 13 June 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_06_13_2016.pdf.

8. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 13 June to 19 July 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_07_19_2016.pdf.

9. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 20 July to 3 October 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_10_03_2016.pdf.

10. World Health Organization (WHO) – Regional Office for the Eastern Mediterranean. Egypt: upsurge in H5N1 human and poultry cases but no change in transmission pattern of infection 2015. Cairo: WHO – Regional Office for the Eastern Mediterranean; 2015. Available from: http://www.emro.who.int/egy/egypt-news/upsurge-h5n1-human-poultry-cases-may-2015.html.

11. World Health Organization (WHO). Cumulative number of confirmed human cases of avian influenza A(H5N1) reported to WHO 2017. Geneva: WHO; 2017 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/2017_09_27_tableH5N1.pdf.

12. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment as of 20 January 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_20_Jan_2016.pdf.

13. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 5 April to 9 May 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_05_09_2016.pdf.

14. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 4 October to 21 November 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_11_15_2016.pdf.

15. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 22 November to 19 December 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_12_19_2016.pdf.

16. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 20 December to 16 January 2017. Geneva: WHO; 2017 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_01_16_2017_FINAL.pdf.

17. World Health Organization. WHO risk assessment of human infections with avian influenza A(H7N9) virus 2015. Geneva: WHO; 2016 [cited 20 Sep 2016]. Available from: http://www.who.int/influenza/human_animal_interface/influenza_h7n9/RiskAssessment_H7N9_23Feb20115.pdf.

18. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 21 January to 25 February 2016. Geneva: WHO; 2016 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_25_02_2016.pdf.

19. Belser JA, Pulit-Penaloza JA, Sun X, Brock N, Pappas C, Creager HM, et al. A novel A(H7N2) influenza virus isolated from a veterinarian caring for cats in a New York City animal shelter causes mild disease and transmits poorly in the ferret model. J Virol. 2017 Aug 01;91(15).

20. Fraaij PL, Wildschut ED, Houmes RJ, Swaan CM, Hoebe CJ, de Jonge HC, et al. Severe acute respiratory infection caused by swine influenza virus in a child necessitating extracorporeal membrane oxygenation (ECMO), the Netherlands, October 2016. Euro Surveill. 2016 Dec 01;21(48).

21. Rovida F, Piralla A, Marzani FC, Moreno A, Campanini G, Mojoli F, et al. Swine influenza A (H1N1) virus (SIV) infection requiring extracorporeal life support in an immunocompetent adult patient with indirect exposure to pigs, Italy, October 2016. Euro Surveill. 2017 Feb;22(5).

22. World Health Organization (WHO). Influenza at the human-animal interface; summary and assessment, 17 January to 14 February 2017. Geneva: WHO; 2017 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/human_animal_interface/Influenza_Summary_IRA_HA_interface_02_14_2017.pdf.

23. Adlhoch C, Penttinen P. Letter to the editor: Just a coincidence? Two severe human cases due to swine influenza (SIV) A(H1N1)v in Europe, October 2016. Euro Surveill. 2017 Mar 09;22(10).

24. Centers for Disease Control and Prevention (US CDC). Case count: Detected U.S. human infections with H3N2v by state since August 2011. Atlanta: CDC; 2017 [cited 27 Sep 2017]. Available from: https://www.cdc.gov/flu/swineflu/h3n2v-case-count.htm.

25. European Centre for Disease Prevention and Control (ECDC). Situation overview: highly pathogenic avian influenza virus A of H5 type. Stockholm: ECDC; 2015. Available from: https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/highly-pathogenic-avian-influenza-virus-A-H5-rapid-risk-assessment-2-dec-2015.pdf.

26. Fusaro A, Monne I, Mulatti P, Zecchin B, Bonfanti L, Ormelli S, et al. Genetic Diversity of Highly Pathogenic Avian Influenza A(H5N8/H5N5) Viruses in Italy, 2016–17. Emerg Infect Dis. 2017 Sep;23(9):1543-7.

27. EFSA AHAW Panel (EFSA Panel on Animal Health and Welfare), More S, Bicout D, Bøtner A, Butterworth A, Calistri A, Depner K, et al. Urgent request on avian influenza 2016. Available from: https://www.efsa.europa.eu/sites/default/files/4687.pdf.

28. European Centre for Disease prevention and Control (ECDC). Outbreaks of highly pathogenic avian influenza A(H5N8) in Europe. Updated 18 November 2016. Stockholm: ECDC; 2016. Available from: https://ecdc.europa.eu/sites/portal/files/media/en/publications/Publications/risk-assessment-avian-influenza-H5N8-europe.pdf.

29. Kim Y-I, Pascua PNQ, Kwon H-I, Lim G-J, Kim E-H, Yoon S-W, et al. Pathobiological features of a novel, highly pathogenic avian influenza A(H5N8) virus. Emerg Microbes Infect. 2014 10/22/online;3:e75.

30. Yoon H, Moon O-K, Jeong W, Choi J, Kang Y-M, Ahn H-Y, et al. H5N8 Highly Pathogenic Avian Influenza in the Republic of Korea: Epidemiology During the First Wave, from January Through July 2014. Osong Public Health and Research Perspectives. 2015 2015/04/01/;6(2):106-11.

31. World Health Organization (WHO). Antigenic and genetic characteristics of zoonotic influenza viruses and development of candidate vaccine viruses for pandemic preparedness, September 2017. Geneva: WHO; 2017 [cited 27 Sep 2017]. Available from: http://www.who.int/influenza/vaccines/virus/201709_zoonotic_vaccinevirusupdate.pdf.