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OUTBREAK OF A NOVEL STRAIN OF AVIAN INFLUENZA VIRUS H7N9 IN CHINA – AN ADVISORY NOTE FOR AFRICAN COUNTRIES

Introduction

In about a decade the world has witnessed the emergence of deadly influenza viruses from animals that have infected and caused serious illness and death in humans. The emergent viruses were mainly reassortant avian influenza viruses namely H5N1 in 2003 and H1N1 in 2009. Currently, a new type of avian influenza, the novel influenza AH7N9 has emerged in mainland China, with the first human infection reported in Shanghai on 19th February, 2013. As of 6th May 2013 a total of 128 cases have been laboratory confirmed with avian influenza A (H7N9) on the Mainland, comprising Zhejiang (46 cases), Shanghai (33 cases), Jiangsu (27 cases), Anhui (four cases), Henan (four cases), Jiangxi (five cases), Fujian (four cases), Shandong (two cases), Beijing (one case) and Hunan (two cases). Among the 128 infected persons, 31 have died so far indicating a mortality rate of 24.2%, while 42 have fully recovered upon treatment and the rest are still hospitalized.

The virus

The novel reassortant influenza virus AH7N9 carries six internal gene segments of poultry A(H9N2) viruses, supplemented with a haemagglutinin (HA) subtype 7 and a neuraminidase (NA) subtype 9 originating from wild birds (Kageyama et.al., 2013). Sequences from viruses infecting 12 humans, five birds and two from viruses collected from the environment indicate that all eight genes of the H7N9 virus are of avian origin. Worryingly, the sequences also indicate genetic changes in the sequences that have been associated with adaptations leading to enhanced virus binding to and replication in mammalian respiratory cells and increased severity of infection (Gao et.al., 2013; CDC 2013; Chen et al., 2013). Influenza viruses are said to be promiscuous because they constantly change into new forms.

The H7N9 virus could therefore change and become able to easily and sustainably spread between people, triggering a pandemic.

An Electron Micrograph Image of H7N9 Virus



The epidemiology

As of 26th April 2013, reports from the China Ministry of Agriculture indicate that 68,060 bird and environmental specimens have been tested of which, 46 (0.07%) were confirmed H7N9 positive by culture (7). The H7N9 virus has been confirmed in chickens, ducks, pigeons (feral and captive), and environmental samples in four of the eight provinces and in Shanghai municipality (Figure 1) and genotyping has proved attribution between some avian and human infections.

As of 17th April 2013, approximately 4,150 swine and environmental samples from farms and slaughterhouses were reported to have been tested. All swine samples were negative. Preliminary results from studies performed on poultry by ARS in high-containment laboratories indicate that chickens and quail are showing no signs of illness but are shedding avian influenza A (H7N9) virus in these studies (MMWR, 2013).

The source of H7N9 human infections is unclear, but based on past experience and epidemiological investigation, H7N9 virus infection is believed to be contracted from poultry in their secretions or excretions, wild birds and contaminated environmental sources. However, it is notable that about 40% of the patients have not been in contact with poultry prior to infection. Although no evidence of sustained human-to-human spread of this virus has been identified, small family clusters have occurred where human-to-human spread cannot be conclusively ruled out. Limited person-to-person spread of bird flu is thought to have occurred rarely in the past, most notably based on this previous experience with avian influenza A (H5N1). Some limited human-to-human spread of this H7N9 virus would not be surprising. Most important, however, is that this transmission has not been sustained (ongoing).

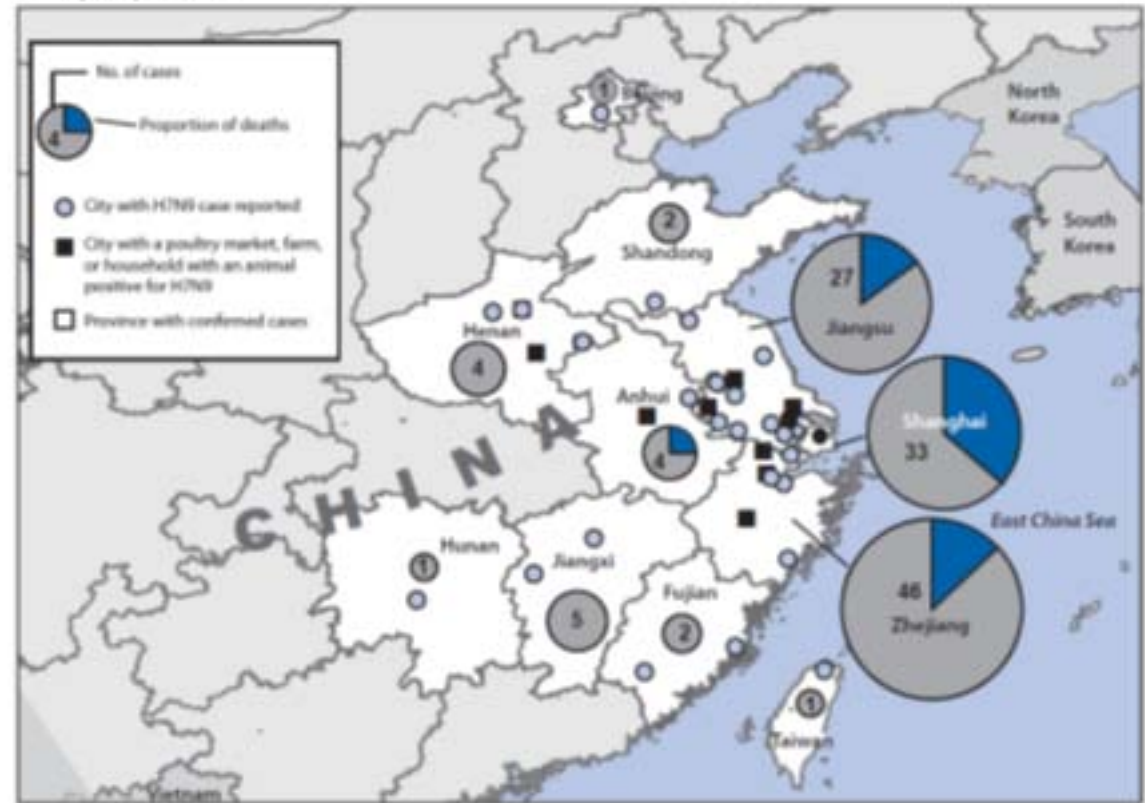
There is also the risk that mutations could take place in the virus that could ease the human-human spread. Influenza viruses constantly change and it's possible that this virus could become able to easily and sustainably spread between people, triggering a pandemic.

However, no evidence of sustained human-to-human transmission has been found, and no to date human cases of H7N9 virus infection have been detected outside China.

Clinical Nature of Infection

The human disease caused by the novel influenza AH7N9 virus is currently considered a sporadic infection by a low pathogenic avian influenza virus. Although infection in poultry has so far been asymptomatic indicating that the H7N9 virus is low pathogenic in birds, infection in humans has been associated with serious disease characterized by fever, cough, and respiratory tract infection during the early stages, progressing into severe pneumonia and progressive respiratory distress with lethal outcome in a significant proportion of the patients.

FIGURE 1. Location of confirmed cases of human infection (n = 126) with avian influenza A(H7N9) virus and deaths (n = 24) — China, February 19–April 29, 2013



Implications for Africa

The H7N9 outbreak in China is still evolving and more information and understanding of its epidemiology is gradually becoming available. No outbreaks have been reported in Africa thus far, and the risk of disease introduction and spread is yet to be assessed. However, because of the heavy commercial and human traffic between China and Africa, it is possible to foresee the possibility of infection getting introduced through travelers, live birds or their products. This possibility of introduction via poultry and poultry products can be aided by the fact that the disease is low pathogenic in poultry and therefore cannot be observed clinically. Further, the quick daily travel via African and international airlines plying between China and Africa could mean infected passengers can reach Africa before developing clinical disease.

All in all, Africa should be on the lookout to ensure any introduction can be detected and controlled early enough.

Africa is, however considered to have a high level of vulnerability due to several inherent factors. The early detection of new infection, especially by novel agents requires well-functioning surveillance systems backed up by laboratories with the equipment, technology and ability (human) to accurately run tests. The majority of African countries are constrained in this respect, especially disease surveillance both in resident animal populations and at border points.

The epidemiology, social and public implications of H7N9 are quite intriguing. Although the origin of infections in humans and poultry is still unclear, the virus is already exacting enormous impacts on livelihoods, food security, social and public health wellbeing in China that could well be exponentially magnified if it is introduced into Africa.

Precautionary Measures

To stem the risk and reduce the potential impact of H7N9 introduction into Africa, all countries on the continent should take measures to revitalize their Integrated National Action Plans (INAPs), surveillance, emergency preparedness and response systems established for H5N1 and consider other relevant pandemic preparedness measures for H7N9 in terms of clinical management and mass vaccination should it become necessary, as well create awareness and risk communication. Thus, in view of the available circumstantial evidence of viral spread and the heavy traffic between Africa and China, it is advisable for African countries to institute cautionary measures to check the introduction and spread of H7N9 in the continent.

- Due to the asymptomatic nature of H7N9 in poultry, poultry production and markets value chains should be closely monitored through active and passive surveillance to ascertain the presence or absence of the virus and inform appropriate action. Screening and confirmatory tests have become available since advent of the H7N9 outbreak in China that can be acquired for retrospective use on specimens collected for H5N1 or prospectively in freshly collected specimens. This requires enhancing laboratory diagnostic capacities.
- The importation of live birds, poultry, and hatching eggs from countries affected with highly pathogenic avian influenza should be closely monitored and if future risk assessments indicate so, be halted altogether.
- Although no infections have been detected in Africa to date, it is advisable for national health authorities (both animal and human) and preparedness agencies at national and regional levels to take time to review and update their pandemic influenza preparedness plans initially developed for H5N1 to activate and adjust them accordingly for H7N9 to attain a reasonable level of readiness for rapid response in case of viral introduction because it could take a while to mount a response from scratch if such an eventuality becomes necessary. Simulation exercises to test the updated plans and test their administrative readiness are advised.
- The continued collaboration between the human and animal health sectors in line with the one health approach is essential to better target control actions, understand the epidemiology and ecology of H7N9 infections among humans and animals and utilize available resources

- There is a need for African countries to follow closely this situation, to mobilize resources for their surveillance, emergency preparedness and response systems and to coordinate with domestic and international partners.
- There is also a need to provide guidance to clinicians and public health authorities in countries, as well as provide information for people traveling to China.
- The WHO does not recommend restricting travel to or from China at this time. However if travelers to or from China become ill with influenza signs or symptoms (e.g., fever, cough, or shortness of breath) during or after returning from visit, they should seek medical treatment and inform their doctor about their recent travel for appropriate follow-up
- This is an evolving situation and there is still much to learn.
- Update information will be provided, as it becomes available.

The African Union has initiated discussions with partners to mobilize resources to support risk assessment, disease surveillance and emergency preparedness in member states.

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This message has been prepared by a taskforce established by the African Union - Interafrican Bureau for Animal Resources (AU-IBAR) and the Directorate of Social Affairs of the African Union Commission, to track the H7N9 situation to inform and advice African Union- Member States appropriately. The interim focal points are Drs. Samuel Muriuki (Samuel.muriuki@au-ibar.org) at AU-IBAR and Marie-Goretti Harakeye Ndayisaba (Harakeyem@africa-union.org) at the Directorate of Social Affairs.