H1N1 Flu: Swine Flu: A Global Perspective

R Islam, M Rahman

Citation

R Islam, M Rahman. *H1N1 Flu: Swine Flu: A Global Perspective*. The Internet Journal of Health. 2009 Volume 10 Number 2.

Abstract

INTRODUCTION

Swine influenza virus (SIV) is an infection caused by any strain of the influenza family of viruses that is usually prevalent in pigs[1]. It is also called H1N1 flu, swine flu, hog flu, and pig flu. Actually, swine influenza (swine flu) is a common respiratory disease of pigs caused by type "A" influenza viruses. As of 2009, the known SIV strains include influenza "C" and the subtypes of influenza "A" known as H1N1, H1N2, H3N1, H3N2, and H2N3. Transmission of the virus from pigs to humans is not common and does not always lead to human influenza, often resulting only in the production of antibodies in the blood. If transmission does cause human influenza, it is called Zoonotic swine flu. Symptoms of Zoonotic swine flu in humans are similar to those of influenza and of influenza-like illness in general, namely chills, fever, sore throat, muscle pains, severe headache, coughing, weakness and general discomfort. People with regular exposure to pigs are at increased risk of swine flu infection. The meat of an infected animal poses no risk of infection when properly cooked. Infact, it is a literature work. So, the objective of this paper is to study the present global situation of swine flu with its historical perspective.

TYPES OF SWINE FLU

Of the three genuses of influenza viruses that cause human flu, two also cause influenza in pigs. With influenza "A" is being widespread in pigs and influenza "C" being rare[2]. These two are briefly in below:

INFLUENZA "C"

Influenza "C" virus infects both human and pigs, but does not infect birds[3]. Transmission between pigs and human was occurred in the past[4]. For example, influenza "C" caused small outbreaks of a mild form of influenza amongst children in Japan and California[5]. Due to its limited host range and the lack of genetic diversity in influenza "C", this form of influenza does not cause pandemics in human[6].

INFLUENZA "A"

Swine influenza is known to be caused by influenza "A" of subtypes H1N1, H1N2, H3N1, H3N2, and H2N3[7]. In pigs, three subtypes of influenza "A" virus (H1N1, H3N2, and H1N2) are the most common strains worldwide[8]. In the United States, the H1N1 subtype was exclusively prevalent among swine populations before 1998; however, since late August 1998, H3N2 subtypes have been isolated from pigs. As of 2004, H3N2 virus was isolated in US swine and turkey stocks were triple re-assortments, containing genes from human (HA, NA, and PB1), swine (NS, NP, and M), and avian (PB2 and PA) lineages[9].

HISTORICAL BACKGROUND

During the flu pandemic in 1918, swine influenza was first proposed to be a disease, related to human influenza when pigs became sick as well as human[10]. The first identification of an influenza virus as a cause of disease in pigs occurred about ten years later, in 1930[11]. For the following 60 years, swine influenza strains were almost exclusively H1N1. Then, between 1997 and 2002, new strains of three different subtypes and five different genotypes emerged as causes of influenza among pigs in North America. In 1997-1998, H3N2 strains emerged. These strains, which include genes derived by re-assortment from human, swine and avian viruses, have become a major cause of swine influenza in North America. Re-assortment between H1N1 and H3N2 produced H1N1. In 1999 in Canada, a strain of H4N6 crossed the species barrier from birds to pigs, but was contained on a single farm[11]. As well as persisting in pigs, the descendants of the 1918 virus have also circulated in human through the 20th century, contributing to the normal seasonal epidemics of influenza[12]. However, direct transmission from pigs to human is rare, with only 12 cases in the U.S. since 2005[13]. Nevertheless, the retention of

influenza strains in pigs after these strains have disappeared from the human population might make pigs a reservoir where influenza viruses could persist, later emerging to reinfect humans once human immunity to these strains has waned[2]. Swine flu has been reported numerous times as a Zoonosis in human, usually with limited distribution, rarely with a widespread distribution. Outbreaks in swine are common and cause significant economic losses in industry, primarily by causing stunting and extended time to market. For example, this disease costs the British meat industry about £65 million every year[14].

OUTBREAK OF SWINE FLU IN HUMAN AT 2009

The H1N1 viral strain implicated in the 2009 flu pandemic among human often is called "swine flu" because initial testing showed many of the genes in the virus were similar to influenza viruses normally occurring in North American swine[15]. But further research has shown that the outbreak is due to a new strain of H1N1 not previously reported in pigs.

In late April, Margaret Chan, the World Health Organization's director-general, declared a "public health emergency of international concern" under the rules of the WHO's new International Health Regulations when the first cases of the H1N1 virus were reported in the United States[16]. Following the outbreak, on May 2, 2009, it was reported in pigs at a farm in Alberta, Canada, with a link to the outbreak in Mexico. The pigs are suspected to have caught this new strain of virus from a farm worker who recently returned from Mexico, then showed symptoms of an influenza-like illness[17]. These are probable cases, pending confirmation by laboratory testing.

The new strain was initially described as an apparent re-assortment of at least four strains of influenza "A" virus subtypes H1N1, including one strain endemic in human, one endemic in birds, and two endemic in swine (New York Times, 2009). Subsequent analysis suggested it was a re-assortment of just two strains, both found in swine[18]. Although initial reports identified the new strain as swine influenza (i.e., a Zoonosis originating in swine), its origin is unknown. Several countries took precautionary measures to reduce the chances for a global pandemic of the disease[19]. Swine flu has been compared to other similar types of influenza virus in terms of mortality: "in the US it appears that for every 1000 people who get infected, about 40 people need admission to hospital and about one person dies". There are fears that swine flu will become a major global pandemic in the winter months, with many countries planning major vaccination campaigns.

PANDEMIC (H1N1) 2009

The number of human cases of pandemic (H1N1) 2009 is still increasing substantially as well as alarming in many countries, even in countries that have already been affected for some time. This disease continues to evolve as new countries become affected, as community-level spread extends in already affected countries, and as information is shared globally. Many countries with widespread community transmission have moved to testing only samples of ill persons and have shifted surveillance efforts to monitoring and reporting of trends. This shift has been recommended by WHO, because as the pandemic progresses, monitoring trends in disease activity can be done better by following trends in illness cases rather than trying to test all ill persons, which can severely stress national resources. It remains a top priority to determine which groups of people are at highest risk of serious disease so steps to best to protect them can be taken.

In addition to surveillance information, WHO is relying on the results of special research and clinical studies and other data provided by countries directly through frequent expert teleconferences on clinical, virological and epidemiological aspects of the pandemic, to gain a global overview of the evolving situation. In most countries the majority of pandemic (H1N1) 2009 cases are still occurring in younger people, with the median age reported to be 12 to 17 years (based on data from Canada, Chile, Japan, UK and the United States of America). Some reports suggest that persons requiring hospitalization and patients with fatal illness may be slightly older. As the disease expands broadly into communities, the average age of the cases is appearing to increase slightly. This may reflect the situation in many countries where the earliest cases often occurred as school outbreaks but later cases were occurring in the community. Some of the pandemic disease patterns differ from seasonal influenza, where fatal disease occurs most often in the elderly (>65 years old). However, the full picture of the pandemic's epidemiology is not yet fully clear because in many countries, seasonal influenza viruses and pandemic (H1N1) 2009 viruses are both circulating and the pandemic remains relatively early in its development.

LABORATORY-CONFIRMED CASES OF PANDEMIC (H1N1) 2009

The countries and overseas territories/communities that reported their first pandemic (H1N1) 2009 confirmed case(s)

since 6 July 2009 as of 22 July 2009:
Afghanistan, Andorra, Belize, Bhutan, Botswana, La Réunion (French Overseas Community), Haiti, the Marshall Islands, the Federated States of Micronesia, Namibia, Sint Eustatius (Netherlands Antilles) , Saint Kitts and Nevis, Saint Vincent and the Grenadines, Seychelles, Solomon Islands, the Sudan, Tonga, Turks and Caicos Islands (UK Overseas Territory), the United Republic of Tanzania, American Samoa (US), Guam (US). Map of the spread of pandemic (H1N1) 2009: number of laboratory conformed cases and deaths is in the following Table.

References

1. The Merck Veterinary Manual: Swine Influenza. 2008 http://www.merckvetmanual.com/mvm/index.jsp?cfile=htm/bc/121407.htm.
Retrieved on April 30, 2009.
2. Heinen P: Swine Influenza: A Zoonosis. Veterinary Sciences Tomorrow; 2003; 1–11. http://www.vetscite.org/publish/articles/000041/print.html, retrieved on 2009-05-04.
3. Bouvier NM, Palese P: The Biology of Influenza Viruses. Vaccine 26, Suppl 4; 2008; D49–53; PMID 19230160.
4. Kimura H, Abiko C, Peng G et al.: Interspecies Transmission Of Influenza C Virus Between Humans And Pigs. Virus Res.; 1997; 48(1):71–9. PMID 9140195. http://linkinghub.elsevier.com/retrieve/pii/S0168-1702(96)01427-X.
5. Matsuzaki Y, Sugawara K, Mizuta K et al.: Antigenic and Genetic Characterization of Influenza C Viruses which Caused Two Outbreaks in Yamagata City, Japan, in 1996 and 1998. J. Clin. Microbiol.; 2002; 40 (2): 422–429; PMID 11825952. http://jcm.asm.org/cgi/pmidlookup?view=long&pmid=11825952.
6. Lynch JP, Walsh EE: Influenza: Evolving Strategies in Treatment and Prevention. Semin Respir Crit Care Med; 2007; 28 (2):144–58; PMID 17458769.
7. Ma W, Vincent AL, Gramer MR, Brockwell CB, Lager KM, Janke BH, Gauger PC, Patnayak DP, Webby RJ, Richt JA: Identification of H2N3 Influenza A Viruses from Swine in the United States. Proc Nat Acad Sci, USA; 2007; 104 (52): 20949–54; PMID 18093945. http://www.pnas.org/content/104/52/20949.full.
8. Kothalawala H, Toussaint MJ, Gruys E: An Overview of Swine Influenza. Vet Q; 2006; 28 (2): 46–53; PMID 16841566.
9. Yassine HM, Al-Natour MQ, Lee CW, Saif YM: Interspecies And Intraspecies Transmission Of Triple Reassortant H3N2 Influenza A Viruses. Virol J; 2007; 28 (4): 129; PMID 18045494.
10. Knobler S, Mack A, Mahmoud A, Lemon S: The Story of Influenza and The Threat of Pandemic Influenza: Are We Ready? The National Academies Press; 2005; 75; Workshop Summary, Washington, D.C.
11. Olsen CW: The Emergence of novel Swine Influenza Viruses in North America. Virus Research; 2002; 85 (2): 199–210; PMID 12034486. http://linkinghub.elsevier.com/retrieve/pii/S0168170202000278.
12. Taubenberger JK, Morens DM: 1918 Influenza: The Mother of All Pandemics. Emerg Infect Dis; 2006; 12(1):15–22; PMID 16494711. http://www.cdc.gov/ncidod/eid/vol12no01/05-0979.htm.
13. U.S. (2009). Pork Groups Urge Hog Farmers to Reduce Flu Risk". http://www.reuters.com/article/latestCrisis/idUSN26488473.
14. Kay RM, Done SH, Paton DJ: Effect of Sequential Porcine Reproductive and Respiratory Syndrome and Swine Influenza on the Growth and Performance of Finishing Pigs. Vet. Rec.; 1994; 135 (9): 199–204; PMID 7998380.
15. New York Times: The Naming of Swine Flu, a Curious Matter. 2009. http://www.nytimes.com/2009/04/29/world/asia/29swine.html. Retrieved on 2009-07-22.
16. Centers for Disease Control: Outbreak of Swine-Origin Influenza A (H1N1) Virus Infection, Mexico. 2009. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm58d0430a2.htm.
17. The Canadian Food Inspection Agency: An Alberta Swine Herd Investigated for H1N1 Flu Virus. 2009. http://www.inspection.gc.ca/english/corpaffr/newcom/2009/20090502e.shtml. Retrieved on 2009-05-03.
18. Trifonov V, Khiabanian H, Greenbaum B, Rabadan R: The Origin of the Recent Swine Influenza A (H1N1) Virus Infecting Humans. Eurosurveillance; 2009; 4 (17). http://www.eurosurveillance.org/dynamic/EE/V14N17/art19193.pdf.
19. World Takes Drastic Steps to Contain Swine Flu (2009). http://news.yahoo.com/s/ap/20090430/ap_on_he_me/eu_swine_flu_drastic_measures.

Author Information

Rafiqul Islam
Associate Professor and Ex-Chairman, Department of Population Science & Human Resource Development, University of Rajshahi

Mahfuzar Rahman, M.Sc
Research Fellow, Department of Population Science & Human Resource Development, University of Rajshahi