衞生防護中心
Centre for Health Protection

Scientific Committee on Emerging and Zoonotic Diseases

Avian influenza H5N1:
Assessing the current risk of human-to-human transmission

Background

Recent reports on family clusters of influenza A (H5N1) infection in Thailand and Viet Nam raise the concern of human-to-human transmission. This paper provides a summary of evidence and assesses the current risk of human-to-human transmission of H5N1.

H5N1 outbreak in Hong Kong in 1997

2. During the H5N1 outbreak in Hong Kong (1997), the main mode of transmission was from bird to humans. However, there were two studies that found evidence of limited human-to-human transmission. A cohort study among health care workers (HCW) found a significant difference in H5 seropositivity between HCW who took care of H5 patients and HCW who did not (3.7% among exposed HCW vs. 0.7% among non-exposed HCW, p=0.01) [1]. Sero-conversion against H5 was detected in two HCW who had been exposed to a case-patient but had no poultry contact. This study provided evidence of inefficient human-to-human transmission of the H5N1 virus in a healthcare setting.

3. In another study on household contacts, 6 out of 51 household contacts were H5 antibody-positive [2]. One of the positive household contact reported no history of poultry exposure, suggesting that human-to-human transmission of the virus might have occurred through close physical contact in a household setting.

Recent H5N1 outbreaks in Viet Nam and Thailand

4. Since December 2003, human cases of H5N1 were reported in Viet Nam and Thailand. As of March 11, 2005, a total of 68 cases (46 deaths) have been reported in these two countries. Among these cases, several family clusters of human cases were identified.

5. The first family cluster occurred in Viet Nam in January 2004. The cluster involved a 31-year-old man, his two sisters aged 23 and 30 years, and his 28-year-old wife. Both the man and his two sisters died. Laboratory tests confirmed H5N1 infection in the sisters but neither the man nor his wife was tested. The family members gathered in late December 2003 to prepare for the man's wedding on January 3, 2004. The man and one sister have handled ducks while preparing a meal on January 4. Disease investigation did not reveal any direct contact with poultry for the man's other sister and his wife. Both sisters have provided health care for their brother, prior to his hospitalization, and would thus have had opportunities for close exposure. In the absence of evidence of direct exposure to poultry in one sister and the wife, the World Health Organization (WHO) considered that direct transmission of H5N1 virus from human to human might have occurred [3-6].

6. In September 2004, Thailand reported a family cluster of H5N1 infection involving an 11-year-old girl, her 26-year-old mother and her 32-year-old aunt. The girl became ill three to four days after exposure to dying household chickens. Her mother came from another province to provide unprotected bedside care to her in the hospital. The mother developed symptoms three days after she had took care of her daughter. The aunt lived with the girl who had buried the dead chickens. She provided unprotected bedside care to the girl and developed symptoms after 9 days. The girl and her mother were dead and the aunt survived. Since the mother had no recognized history of exposure to poultry, it is possible that she had acquired the disease directly from her daughter [7-8].

7. The third reported family cluster occurred in Vietnam in late December 2004. A 46-year-old man developed symptoms on December 26, 2004 and died on January 9, 2005. His 42-year-old brother provided bedside care for him and developed symptoms on January 12 and had fully recovered. These brothers had shared a family meal in which a dish containing raw duck blood and raw organs was served. The WHO is of the view that they may acquired the infection from poultry (the meal with raw duck blood) but the possibility of direct human-to-human transmission cannot be excluded [9-11].

8. Another cluster of H5N1 infection involving possibly family member and HCW reported recently by WHO is being investigated. A 21-year-old man in Viet Nam developed symptoms on February 14, 2005 and his 14-year-old sister also developed symptoms on February 21 [12]. According to

information from the press, the man had drunk raw duck blood and his sister had contact with sick poultry. Their grandfather was tested positive for avian influenza but he did not show any symptoms. A 26-year-old male nurse who tended the 21-year-old man in hospital was infected. Further information and clarification is pending form WHO.

9. Despite the occurrence of these family clusters, two recent studies among HCW in Viet Nam and Thailand did not find evidence of human-to-human transmission. In the Viet Nam study, 83 HCW were recruited during December 2003 and January 2004 in a hospital in Hanoi, who had exposure to patients with confirmed or probable H5N1 [13]. None of these 83 HCW had detectable antibodies to influenza A H5N1. The Thailand study recruited 25 HCW exposed to a confirmed case of H5N1 in March 2004 [14]. The HCW did not use appropriate personal protective equipment during the initial 48 hours of exposure before the case was recognized as H5N1 infection. None of the 25 HCW developed temporally-related influenza-like-illness or fever, and none had evidence of anti-H5 seropositivity or seroconversion. Separately in another study yet to be published, no anti-H5 seroconversion was detected among 60 HCW in South Vietnam who worked with 2 confirmed H5N1 cases.

Virological studies

10. Gene sequencing of H5N1 viruses in the Hong Kong outbreak (1997) revealed that all the viral genes were avian in nature [15]. For H5N1 virus samples in early 2004, no human influenza genes were contained in the viruses but they were significantly different from the strains obtained during the Hong Kong (1997) outbreak [5, 7, 16-17]. For H5N1 virus samples between late December 2004 and January 2005, preliminary results of genetic analyses showed that these viruses were highly similar to the viruses isolated in 2004, and very little mutation has been observed since early 2004 [18].

Discussion

11. Evidence to date shows that H5N1 may have limited and inefficient transmission among humans, especially in the healthcare and household setting involving close and prolonged physical contact. In the healthcare setting, the WHO has published infection control guidelines that minimize the risk of transmission from patients to health care workers [11,19]. The virus has not yet reassorted with human influenza virus genes, and there is presently no evidence that it is becoming more readily transmissible among humans. Nonetheless, the occurrence of family clusters and infections in the healthcare setting deserve attention as they may generate the first signals of increased transmissibility of the virus.

Advice sought

12. Members' comment and advice is sought in relation to the assessment of risk of human-to-human transmission of H5N1. Subject to members' input, this paper can serve as a deliverable of the SCEZD for public viewing.

Centre for Health Protection
March 2005

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