

History of Major Epidemics of Avian Influenza in Humans and Public Health Perspectives

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Abstract

Avian influenza (AI) has had great impacts on global health and socioeconomics in the past two decades. Among many newly emerged influenza viruses, avian influenza viruses (AIVs) have played either indirect or direct role in human infections. The continuous evolvement of AIVs through antigenic drift and genetic reassortment has led to emerging diversities of local virus strains or variants. These dynamic changes of AIVs, even low pathogenic avian influenza (LPAI) viruses, have not only affected poultry health but also resulted in severe and fatal human cases. Moreover, the persistence of these viruses at a population level may lead to outbreaks of AI occurring year after year in a vicious cycle, if they are not completely eradicated.

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In light of the emergence of novel H7N9 and other subtypes of AIVs in China in recent years, residents of Taiwan who live closely to this neighboring country must be well prepared in case these viruses are imported. Furthermore, the potential for interspecies transmission to humans from either of the two subtypes of avian H5N2 and H6N1 viruses increases the risk assessment of potential public health threats coming from continuous viral mutations. These two AIV subtypes are relevant in chickens and have been endemic in Taiwan for many years, and the newly emerged novel three subtypes (H5N2, H5N3, and H5N8 clade 2.3.4.4) of AIVs that have spread island-wide since January of 2015 must be expeditiously assessed for public health risks.

In summary, this article discusses the history, virology, and epidemiology of avian influenza in humans. We believe that fully understanding virological and epidemiological characteristics of avian influenza viruses and the history of past pandemics or major epidemics will help strengthen the effectiveness of prevention and control measures.

Keywords: Avian influenza, Global epidemiology, Taiwan epidemics, Prevention and control strategies

Border Quarantine Measures to Prevent Ebola at Taoyuan International Airport in 2014

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Abstract

On 8 August, 2014, the World Health Organization (WHO) declared the Ebola virus disease outbreak in West Africa as a Public Health Emergency of International Concern (PHEIC). In response, Taiwan Centers for Disease Control (Taiwan CDC) established the “Ebola Virus Disease Emergency Response Task Force”. This report addressed how Taoyuan International Airport implemented these policies from Taiwan CDC. The measures included: providing the latest update of health information for travelers, preparedness and drills at the airport, screening incoming passengers from Ebola-affected countries in West Africa. All passengers arriving by flights from Europe and Dubai were required to complete the blue “Ebola Declaration Form”. Immigration officers would request the presence of a Taiwan CDC’s quarantine officer when travelers from Ebola-affected countries were passing through immigration. These border quarantine measures will serve as a reference in the future on how to prevent the spread of diseases into the country.

Keywords: Taoyuan International Airport, Ebola virus disease, Quarantine

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First Case of Zika Virus Infection Imported from Thailand to Taiwan, January 2016

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Abstract

In January 2016, Taiwan Centers for Disease Control confirmed the first case of laboratory-confirmed Zika virus infection imported into Taiwan. The patient, 24-year-old male residing in northeastern Thailand, presented fever and headache for one day and was detected with a high body temperature at the quarantine station upon his arrival in Taiwan Taoyuan International Airport. His fellow travelers had sore throats but were tested negative for Zika virus and dengue virus. The public health authorities immediately implemented vector control measures after laboratory confirmation. Zika virus is primarily transmitted to humans by infected mosquitos. The vectors, *Aedes aegypti* and *A. albopituis*, are present in Taiwan, and early diagnosis and timely notification of public health authorities is the key to quickly implement vector control measurements. This report highlights the need for increasing physician and public awareness, education, enhance surveillance, and management of microcephaly and other neurological complications that might be related to Zika virus infection.

Keywords : Zika virus, Imported case

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Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis week		Week 7		Week 1–7	
Classification	Disease Diagnosed ¹	2016	2015	2016	2015
Category I	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
Category II	Acute Flaccid Paralysis	0	0	5	3
	Acute Viral Hepatitis type A	14	1	56	13
	Amoebiasis	1	5	31	51
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	2	1
	Cholera	0	0	0	0
	Dengue Fever	13	6	479	138
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	0	0
	Malaria	0	0	3	2
	Measles	0	0	0	0
	Meningococcal Meningitis	0	0	0	0
	Paratyphoid Fever	0	0	0	3
	Poliomyelitis	0	0	0	0
	Rubella	0	0	1	1
Shigellosis	2	1	18	42	
Typhoid fever	0	0	1	3	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	4	0	12	15
	Acute Viral Hepatitis type C ⁵	3	3	16	28
	Acute Viral Hepatitis type D	0	0	0	0
	Acute Viral Hepatitis type E	0	0	4	1
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	1
	Haemophilus Influenza type b Infection	1	0	1	1
	Japanese Encephalitis	0	0	0	0
	Legionellosis	3	6	20	35
	Mumps ²	6	4	72	87
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	1	1	28
	Tetanus ²	0	1	1	1
Category IV	Botulism	0	0	0	1
	Brucellosis	0	0	0	0
	Complicated Influenza	321	18	585	88
	Complicated Varicella ⁴	1	0	6	7
	Endemic Typhus Fever	0	0	2	0
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	30	12	126	113
	Leptospirosis	0	0	6	11
	Lyme Disease	0	0	0	0
	Melioidosis	0	0	0	7
	Q Fever	2	2	5	5
	Scrub Typhus	1	3	65	85
	Toxoplasmosis	0	0	1	0
Tularemia	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections ⁶	0	0	0	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
Yellow Fever	0	0	0	0	

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
4. Since 2014/3/6, the case definition for confirmed Acute hepatitis C was changed from "meet the clinical **and** laboratory conditions" to "meet the clinical **or** laboratory conditions".
5. Since 2014/7/1, various subtypes of human cases of avian influenza are reported as "novel influenza A virus infections", a Category V Notifiable Infectious Disease. The original "H5N1 flu" and "H7N9 flu", which were respectively listed as a Category I Notifiable Infectious Disease and a Category V Notifiable Infectious Disease were removed from the list on the same day.

Suspected Clusters

- Forty-two clusters were reported, including 19 diarrhea clusters, 10 upper respiratory tract infection clusters, 7 influenza-like illness clusters, 3 tuberculosis clusters, and 2 fever of unknown origin clusters, and 1 varicella cluster.

Imported Infectious Diseases

- 9 confirmed cases were imported from 7 countries during Week 7 of 2016.

Country Disease	Indonesia	Philippines	Myanmar	Malaysia	Maldives	Cambodia	Vietnam	Total
Dengue Fever	2	2		1	1		1	7
Hepatitis C			1					1
Amoebiasis						1		1
Total	2	2	1	1	1	1	1	9

Note: The statistics listed in this table include imported cases that were either confirmed or updated* in the previous week.

- A total of 85 confirmed cases were imported from 16 countries in 2016.
- Top 3 imported diseases : Dengue fever (53), Amoebiasis (11), Hepatitis A (6).
- Top 3 countries responsible for most imported cases : Indonesia (25), Philippines (13), Vietnam (11).

Summary of Epidemic

- **Influenza** : During Week 7, the ER consultation rate for influenza infection is lower than that during Week 6, which coincided with the Chinese Lunar New Year holiday. Since July 1, 2015, a cumulative total of 771 cases of severe complicated influenza have been confirmed. Among these cases, 69 died. H1N1 is currently the dominant strain circulating in the community. Thus far, none of the viruses identified has shown drug resistance.
- **Zika Virus Infection** : The global epidemic of Zika virus infection has continued to increase. Thus far, at least 40 countries and/or territories worldwide, have reported local outbreaks of Zika virus infection, including 29 countries and/or territories in Latin America and the Caribbean region, 8 countries and/or territories in Oceania, 2 countries in Asia, and 1 country in Africa. Taiwan CDC has issued a travel notice of Level 2: Alert for Zika virus for the aforementioned 40 countries and territories.

Weekly Data of Notifiable Infectious Diseases (by week of diagnosis)

Case diagnosis week		Week 8		Week 1–8	
Classification	Disease Diagnosed ¹	2016	2015	2016	2015
Category I	Plague	0	0	0	0
	Rabies	0	0	0	0
	SARS	0	0	0	0
	Smallpox	0	0	0	0
Category II	Acute Flaccid Paralysis	1	0	6	3
	Acute Viral Hepatitis type A	7	4	63	17
	Amoebiasis	8	4	39	55
	Anthrax	0	0	0	0
	Chikungunya Fever	0	0	2	1
	Cholera	0	0	0	0
	Dengue Fever	5	4	484	142
	Diphtheria	0	0	0	0
	Enterohemorrhagic E. coli Infection	0	0	0	0
	Epidemic Typhus Fever	0	0	0	0
	Hantavirus Pulmonary Syndrome	0	0	0	0
	Hemorrhagic Fever with Renal Syndrome	0	0	0	0
	Malaria	0	0	3	2
	Measles	0	0	0	0
	Meningococcal Meningitis	1	0	1	0
	Paratyphoid Fever	0	0	0	3
	Poliomyelitis	0	0	0	0
	Rubella	1	0	2	1
Shigellosis	6	1	24	43	
Typhoid fever	0	1	1	4	
West Nile Fever	0	0	0	0	
Category III	Acute Viral Hepatitis type B	4	4	16	19
	Acute Viral Hepatitis type C ⁵	2	3	18	31
	Acute Viral Hepatitis type D	1	0	1	0
	Acute Viral Hepatitis type E	0	0	4	1
	Acute Viral Hepatitis untype	0	0	0	0
	Congenital Rubella Syndrome	0	0	0	0
	Enteroviruses Infection with Severe Complications	0	0	1	1
	Haemophilus Influenza type b Infection	0	0	1	1
	Japanese Encephalitis	0	0	0	0
	Legionellosis	2	1	22	36
	Mumps ²	8	10	80	97
	Neonatal Tetanus	0	0	0	0
	Pertussis	0	2	1	30
	Tetanus ²	0	0	1	1
Category IV	Botulism	0	0	0	1
	Brucellosis	0	0	0	0
	Complicated Influenza	339	16	923	104
	Complicated Varicella ⁴	0	3	6	10
	Endemic Typhus Fever	1	0	3	0
	Herpesvirus B Infection	0	0	0	0
	Invasive Pneumococcal Disease	23	17	148	130
	Leptospirosis	0	3	6	14
	Lyme Disease	0	0	0	0
	Melioidosis	0	0	0	7
	Q Fever	1	0	6	5
	Scrub Typhus	2	0	67	85
	Toxoplasmosis	0	0	1	0
Tularremia	0	0	0	0	
Category V	Ebola Virus Disease	0	0	0	0
	Ebola-Marburg Hemorrhagic Fever	0	0	0	0
	Novel Influenza A Virus Infections ⁶	0	0	0	0
	Lassa Fever	0	0	0	0
	Rift Valley Fever	0	0	0	0
	Middle East Respiratory Syndrome Coronavirus	0	0	0	0
Yellow Fever	0	0	0	0	

1. The following 8 chronic diseases are excluded from the table: MDR-TB, Tuberculosis, Syphilis, Gonorrhoea, HIV Infection, AIDS, Hansen Disease and Creutzfeldt-Jakob Disease.
2. Reported cases.
3. Since 2014/1/1, "Varicella" was modified to "Complicated Varicella".
4. Since 2014/3/6, the case definition for confirmed Acute hepatitis C was changed from "meet the clinical and laboratory conditions" to "meet the clinical or laboratory conditions".
5. Since 2014/7/1, various subtypes of human cases of avian influenza are reported as "novel influenza A virus infections", a Category V Notifiable Infectious Disease. The original "H5N1 flu" and "H7N9 flu", which were respectively listed as a Category I Notifiable Infectious Disease and a Category V Notifiable Infectious Disease were removed from the list on the same day.

Suspected Clusters

- Forty-one clusters were reported, including 14 influenza-like illness clusters, 13 upper respiratory tract infection clusters, 12 diarrhea clusters, 1 fever of unknown origin cluster, and 1 varicella cluster.

Imported Infectious Diseases

- 7 confirmed cases were imported from 5 countries during Week 8 of 2016.

Country Disease	Indonesia	Philippines	China	Singapore	Vietnam	Total
Dengue Fever				1	1	2
Amoebiasis	1	1				2
Rubella			1			1
Hepatitis A		1				1
Shigellosis	1					1
Total	2	2	1	1	1	7

Note: The statistics listed in this table include imported cases that were either confirmed or updated* in the previous week.

- A total of 92 confirmed cases were imported from 16 countries in 2016.
- Top 3 imported diseases : Dengue fever (55), Amoebiasis (13), Hepatitis A (7).
- Top 3 countries responsible for most imported cases : Indonesia (27), Philippines (15), Vietnam (12).

Summary of Epidemic

- Influenza** : During Week 8, the number of visits to outpatient services for influenza infection has not fluctuated. Since July 1, 2015, a cumulative total of 1,109 cases of severe complicated influenza have been confirmed. Among these cases, 84 died. H1N1 is currently the dominant strain circulating in the community. Thus far, none of the viruses identified has shown drug resistance.
- Zika Virus Infection** : The global epidemic of Zika virus infection has continued to increase. Thus far, at least 42 countries and/or territories worldwide, have reported local outbreaks of Zika virus infection, including 31 countries and/or territories in Latin America and the Caribbean region, 8 countries and/or territories in Oceania, 2 countries in Asia, and 1 country in Africa. Taiwan CDC has issued a travel notice of Level 2: Alert for Zika virus for the aforementioned 42 countries and territories.

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