

Flu pandemic: focusing on the social response

■ Background

- ◆ Several pandemics ever occurred
 - **Spanish flu 1918 (H1N1): 20-40 million deaths**
 - **Asian flu 1957 (H2N2)**
 - **Hong Kong flu 1968 (H3N2)**
 - **Russian flu 1977 (H1N1)**
- ◆ Newly introduced strains generally had high virulence
- ◆ Avian flu (H5N1) since 1997 had high virulence for birds, and some human patients also suffered from it
 - **Case Fatality Rate for human was more than 60%**
 - **No human to human infection**
- ◆ WHO and CDC noticed the possibility of coming pandemic by H5N1 when it would acquire infectivity from human to human
- ◆ **"International Health Regulations"** were updated in 2005 (activated since 15 June 2007)
 - <http://www.who.int/ihr/en/>



Contribution of mathematical models

- **Containment of initial epidemic by ring-vaccination**
 - Ring vaccination of residents around the initially imported cases can prevent extensive transmission
 - "WHO pandemic influenza draft protocol for rapid response and containment" (updated draft 30 May 2006)
 - Longini IM, et al. Science 309: 1083-1087, 2005
 - Ferguson NM, et al. Nature 437: 209-214, 2005
- **School closure as soon as possible after initial case detection may contribute to suppression of epidemic**
 - Based on realistic transmission parameter in French, simulation model clarified its possibility
 - Japanese Government decided that all the school within a prefecture should be closed just after the initial case detection
 - Cauchemez S, Valleron AJ, Boëlle PY, Flahault A, Ferguson NM. Estimating the impact of school closure on influenza transmission from Sentinel data. Nature. 452:750-754, 2008.
- **The number of patients projected by CDC FluAid2.0 (Meltzer, Cox, Fukuda 2000)**

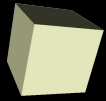


■ Theoretical Epidemiologists

- ◆ Imperial College Group (UK) – followers of Anderson RM
 - Niel M Ferguson (who also suggested the necessity of behavioral followup)
[<http://www1.imperial.ac.uk/medicine/people/neil.ferguson/publications/>]
- ◆ Several Groups in USA
 - Ira M. Longini, University of Washington
[http://www.biostat.washington.edu/sites/www/content/files/misc/longini_ira_490c90ca28.pdf]
 - Marc Lipsitch, Harvard University
[<http://www.hsph.harvard.edu/faculty/marc-lipsitch/>]
 - Carlos Castillo-Chavez, Arizona State Univ.
[<https://webapp4.asu.edu/directory/person/566521>]
- ◆ Germany (Klaus Dietz), Netherlands (Odo Diekmann, J.A.P. Heesterbeek, Hiroshi Nishiura), Japan (Yasushi Ohkusa, etc.)

■ Virologists / Medical zoologists

- ◆ Yoshihiro Kawaoka's group (Univ. Tokyo, Japan)
 - Takeshi Noda et al. *Nature* 15 June 2009
- ◆ Hiroshi Kida's group (Hokkaido Univ., Japan)
- ◆ Elodie Ghedin (Univ. Pittsburgh)
- ◆ Nancy J. Cox (CDC), Keiji Fukuda (WHO)



Preparation by several countries

- **USA (<http://www.pandemicflu.gov/index.html>)**
 - ◆ "Monitoring Outbreaks" have undergone
 - ◆ 100 million dollars were invested to vaccine study
 - ◆ FluAid2.0, FluSurge2.0, FluWorkLoss1.0 (CDC)
- **UK**
 - ◆ A national framework for responding to an influenza pandemic
- **Canada**
 - ◆ The Canadian Pandemic Influenza Plan for the Health Sector
- **Australia**
 - ◆ Australian Health Management Plan for PANDEMIC INFLUENZA
- **NZ**
 - ◆ New Zealand Influenza Pandemic Action Plan 2006
- **EU**
 - ◆ EWRS; Early Warning and Response System
 - ◆ HEDIS; Health Emergency and Disease Information System
 - ◆ MedISys; Medical Intelligence System
- **Japan (<http://www.cas.go.jp/jp/influenza/index.html>)**
 - ◆ Cabinet Secretariat and Ministry of Health, Labor and Welfare
 - ◆ Team acting against novel influenza was made in MHLW since 2008
 - ◆ Law to prevent infectious diseases changed in 2007
 - ◆ Guideline for novel influenza was made on 17 Feb 2009



WHO's response since 26 April 2009

■ <http://www.who.int/csr/disease/swineflu/en/index.html>

Swine flu illness in the United States and Mexico - update 2

26 April 2009 -- As of 26 April 2009, the United States Government has reported 20 laboratory confirmed human cases of swine influenza A/H1N1 (8 in New York, 7 in California, 2 in Texas, 2 in Kansas and 1 in Ohio). All 20 cases have had mild Influenza-Like Illness with only one requiring brief hospitalization. No deaths have been reported. All 20 viruses have the same genetic pattern based on preliminary testing. The virus is being described as a new subtype of A/H1N1 not previously detected in swine or humans.

Also as of 26 April, the Government of Mexico has reported 18 laboratory confirmed cases of swine influenza A/H1N1. Investigation is continuing to clarify the spread and severity of the disease in Mexico. Suspect clinical cases have been reported in 19 of the country's 32 states.

WHO and the Global Outbreak Alert and Response Network (GOARN) are sending experts to Mexico to work with health authorities. WHO and its partners are actively investigating reports of suspect cases in other Member States as they occur, and are supporting field epidemiology activities, laboratory diagnosis and clinical management.

On Saturday, 25 April, upon the advice of the Emergency Committee called under the rules of the International Health Regulations, the Director-General declared this event a Public Health Emergency of International Concern.

WHO is not recommending any travel or trade restrictions.



Tracking Swine Flu (April 27, 2009 NYTimes)

- **United States officials declared a public health emergency on Sunday (26 April) over increasing cases of swine flu, but continued to urge Americans not to panic on Monday, as most of the cases have been mild.**
- **Confirmed cases**
 - As of Monday (27 April), officials had confirmed 42 cases of a new A(H1N1) swine flu virus in the United States, including 28 New York City high school students. Six cases were identified in Canada — all linked to travel in Mexico. While the World Health Organization says 20 swine flu cases in Mexico have been confirmed, officials say there are at least 1,600 suspected infections and at least 149 suspected deaths. One infection was confirmed in eastern Spain.
- **Precautions**
 - The Centers for Disease Control and Prevention recommends washing hands frequently, avoiding touching the face, covering the nose and mouth when sneezing and staying home when sick. People cannot be infected by eating pork.
- **Swine flu and humans**
 - Swine flu viruses can be passed between pigs and humans, but human infections are not common. Most infections occur among people with direct pig contact. Sometimes a flu virus can mutate to be more transmissible to humans. An outbreak occurred among soldiers in Fort Dix, N.J., in 1976, resulting in 200 infections, several serious illnesses and one death.



Global Response to Swine Flu (Source: NY Times)

- The global spread of swine flu, a contagious respiratory illness, has caused governments to react. Homeland Security Secretary Janet Napolitano declared a public health emergency on Sunday (26 April 2009) after announcing that 20 cases had been confirmed in the United States.
- Officials confirmed eight cases in New York, seven in California, two in Kansas, and one in Ohio. About 100 students at St. Francis Preparatory School in Fresh Meadows, Queens, became sick in the last few days. New York Mayor Michael R. Bloomberg said that all the cases had been mild.
- Quarantine officers monitored travelers with a thermographic device at the arrival gate at Narita International Airport, which serves Tokyo.
- Travelers with face masks at Mexico City's international airport. Because of the outbreak, events were canceled, and schools and museums were closed. The swine flu has killed more than 80 people in Mexico and infected 1,300 more, reported the Associated Press.
- A member of the Mexican army handed out face masks to tourists and pedestrians in Mexico City on Sunday (26 April 2009).
- A priest talked with a group of nuns wearing masks as a preventive measure in front of the Basilica of Guadalupe in Mexico City.
- Even Sunday Mass was affected. The Roman Catholic Church gave worshipers the option to listen to services on the radio, and priests who decided to hold services were told to be brief. Priests were also encouraged to put Communion wafers in worshipers' hands instead of their mouths. At the Basilica of Guadalupe, only two church workers attended Mass.



A side effect – computer virus

- **29 April 2009: Fake CDC's alert e-mail with the attachment named "Swine influenza frequently asked questions.pdf." It contained a computer virus.**
https://forums2.symantec.com/t5/blogs/blogarticlepage/blog-id/malicious_code/article-id/268
- **In the end of April 2009: "Search Engine Optimization Poisoning" is reported. When a user searched web sites using "swine" as a search word, malware containing sites was listed in top page.**
IPA [<http://www.ipa.go.jp/security/txt/2009/06outline.html>]
- **30 April 2009: In Japan, virus containing e-mails were found. It is pretended as sent by the National Institute for Infectious Diseases, and the attached file titled "Knowledge about swine flu " (actually in Japanese) included a computer virus.**
Yomiuri Shimbun [<http://www.yomiuri.co.jp/feature/20090425-436828/news/20090430-OYT1T00396.htm>]

From "Swine flu" to "Influenza A(H1N1)"

- **A/H1N1 influenza like human illness in Mexico and the USA: OIE [World Organization for Animal Health] statement (Paris, April 27 2009)**

It would be logical to call this disease "North-American influenza"

[http://www.oie.int/eng/press/en_090427.htm]

- **WHO stopped using "swine", by pork industry's request**

- In addition, the Egyptian government, where the national religion is Islam, decided to kill all pigs raised by minor Christians within the country to prevent publics from "swine flu" on 29 April 2009.

- **Joint FAO/WHO/OIE Statement on influenza A(H1N1) and the safety of pork (May 7 2009; To avoid any misunderstanding FAO, WHO and OIE would like to reissue their joint statement originally issued on 30 April)**

- In the ongoing spread of influenza A(H1N1), concerns about the possibility of this virus being found in pigs and the safety of pork and pork products have been raised.
- Influenza viruses are not known to be transmissible to people through eating processed pork or other food products derived from pigs.
- Heat treatments commonly used in cooking meat (e.g. 70°C/160°F core temperature) will readily inactivate any viruses potentially present in raw meat products.
- Pork and pork products, handled in accordance with good hygienic practices recommended by the WHO , Codex Alimentarius Commission and the OIE, will not be a source of infection
- Authorities and consumers should ensure that meat from sick pigs or pigs found dead are not processed or used for human consumption under any circumstances.
- [http://www.who.int/mediacentre/news/statements/2009/h1n1_20090430/en/index.html]

- Enserink M: Swine flu names evolving faster than swine flu itself. *Science*, 324(5929): 871, 15 May 2009



Academic responses

■ Many scientific journals opened special sites, rushed!

- Science [<http://blogs.sciencemag.org/scienceinsider/swine-flu/>]
- Nature [<http://www.nature.com/news/specials/swineflu/index.html>]
- NEJM [<http://h1n1.nejm.org/>]
- Lancet [<http://www.thelancet.com/H1N1-flu>]
- BioMed Central [<http://www.biomedcentral.com/gateways/influenza>]
- Cohen J: Flu researchers train sights on novel tricks of novel H1N1. Science, 324(5929): 870. [<http://www.sciencemag.org/cgi/content/full/324/5929/870>]

■ Health Education via Internet

- Supercourse in the University of Pittsburgh
 - [<http://www.pitt.edu/~super1/lecture/lec34601/index.htm>]
 - The latest information is given by the specialists and translated into Spanish, Russian, Farsi, Arabic, Vietnamese, Bahasa Melayu (Malay), French, Macedonian, Chinese, Hebrew, Bosnian, and Japanese, which are freely accessed via Internet
- Peter M. Sandman's article as a risk communication
 - A short version was published as a commentary to Nature.
 - [<http://www.nature.com/nature/journal/v459/n7245/full/459322a.html>]
 - Original long version is given as an online article [<http://www.psandman.com/col/swineflu1.htm>]
 - The Nature article is translated into French, which is also given online [<http://www.zonegrippeaviaire.com/showthread.php?t=973#2>]



Some social impacts in Japan

■ **Masks sold out**

- In mid-May, face masks disappeared. Net auction price was raised up to 10 times higher than original.

■ **School closure**

- Hyogo and Osaka prefectures closed all schools for 1 week (though the closure is decided by the principal, it was requested by the government).
- Several Universities in Kansai area closed for 5-7 days, but Kyoto University didn't.

■ **Many events were suspended or prolonged.**

■ **Emergency medicine delayed due to intensive setting of "Special department for fever outpatient"**

■ **Patients were refused to treat in some hospitals (Japan's Minister of Health, Labor and Welfare MASUZOE criticized it but not efficiently assisted.)**



Japanese Newspapers opened special-site.

■ THE KOBE SHIMBUN (16 May 2009, First Japan's confirmed patients found in Kobe, the newspaper was filled up by Influenza information, 30 topics given)

- ♦ Reported information on the case fatality/severity was only based on Mexico/USA data.
- ♦ In Hyogo prefecture (incl. Kobe city), all schools were closed for 1 week. Many students went to Karaoke, but were denied to enter.
- ♦ Initial epidemic among high school students were not reported in detail (due to ethical reason).

■ Yomiuri Shimbun

- <http://www.yomiuri.co.jp/feature/20090425-436828/index.htm>
- [1] 24 April 2009: US Swine? flu 7 patients, possible human to human infection (only 1 article)
 - [2] 25 April 2009: Suspected 60 deaths by swine origin flu to human in Mexico and other countries [+8 articles]
 - [3] 26 April 2009: WHO's alert of public health, but declaration of phase 4 was prolonged [+11 articles]
 - [4] 27 April 2009: Matsuya stopped to sell "Ton-teki set" (incl. Mexican pork) [+15 articles]
 - [5] 28 April 2009: WHO declared phase 4 [+33 articles]
 - [6] 29 April 2009: Egyptian government decided to kill all pigs [+18 articles]
 - [7] 30 April 2009: WHO declared phase 5 [+22 articles]
 - [8] 1 May – 7 May [114 articles]
 - [9] 8 May – 14 May [103 articles]
 - [10] 15 May – 21 May [123 articles] incl. 16 May
 - [11] 22 May – 28 May [48 articles]
 - [12] 29 May – 4 June [30 articles] 3 June "It's ease" by Hyogo
 - [13] 5 June – 11 June [26 articles]
 - [14] 12 June – 18 June [20 articles] WHO phase 6 on 12 June
 - [15] 19 June – 24 June [15 articles]

■ Mainichi Shimbun

<http://mainichi.jp/select/science/swineinfluenza/>

■ Asahi Shimbun

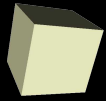
<http://www.asahi.com/health/pandemicflu/>

Numbers of articles were peaked around the finding 1st patient in Japan



"Pandemic" (June 12 2009, NY Times)

- **The announcement (of phase 6 "pandemic") does not mean that the illness, which has been mild in most people, has become any worse. The term pandemic reflects only the geographic spread of a new disease, not its severity. Pandemics typically infect about a third of the world in a year or two, and sometimes strike in successive waves.**
- **The government of Hong Kong on Thursday (11 June) ordered all primary schools in the city to be closed for two weeks after the first cluster of local swine flu cases was found. Above (right), kindergarten students at a local school on Thursday (11 June).**

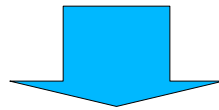


Current strategy in Japan

1. Basic Framework since 19 June 2009 (MHLW)

[World situation]

- Patients are still increasing, especially in the Southern hemisphere
- On 12 June, WHO declared "phase 6"
- WHO requests for the countries, (1) continuous attention, (2) flexible response to avoid socio-economical confusion



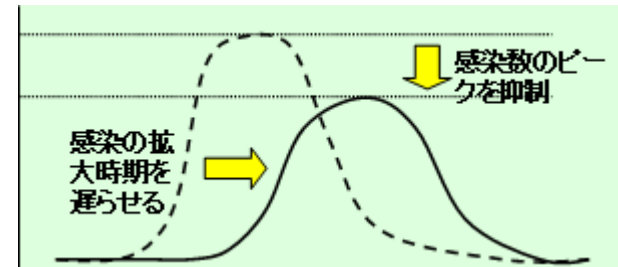
[Future projection in Japan]

- Stopping influx of patients from overseas is impossible and incidence will continue
- Some sporadic cases whose transmission pathway cannot be specified occur, it is not strange that national large-scale increase of patients may occur in coming fall/winter
- Severe cases may increase among the patients who have underlying diseases, who must be appropriately treated



[Basic Concept]

- nationwide strategy in fall/winter
- * From the viewpoint of that there may be large increase of the number of patients, the destination is followings
- (1) Rapid and large increase should be suppressed and/or delayed, to minimize the effect of this disease on social activity and medical supply



- (2) Minimize the disease burden on the medical facilities to supply appropriate medical treatment for the severe cases
- (3) Not to count each occurrence of infection, but to capture the clue of large increase of patients cluster
- (4) Set now as preparatory period, to avoid social confusion in fall/winter

Patients Distribution in Japan (23 June)

■ Number of patients by prefecture in 23 June 2009

- ◆ More than 100 only in Hyogo and Osaka
- ◆ 50-99 in Tokyo, Chiba, Kanagawa and Fukuoka
- ◆ 1-49 patients found in 29 prefectures
- ◆ No patient found in 12 prefectures

■ Severity in Japan

- ◆ No severe cases were reported for these 881 patients.
- ◆ If real rate of case severity was p , setting type 2 error of severe case detection as 0.2, upper limit of p was:
 $1 - 0.2^{(1/881)} = 0.0018$
- ◆ (additional comments on 16 July 2009) No severe case found among more than 3000 patients in Japan.
Hence upper limit of p is 0.00054 (However, of course, this value ignore the age distribution and high risk group proportion in the patients)

■ Problems and riddle

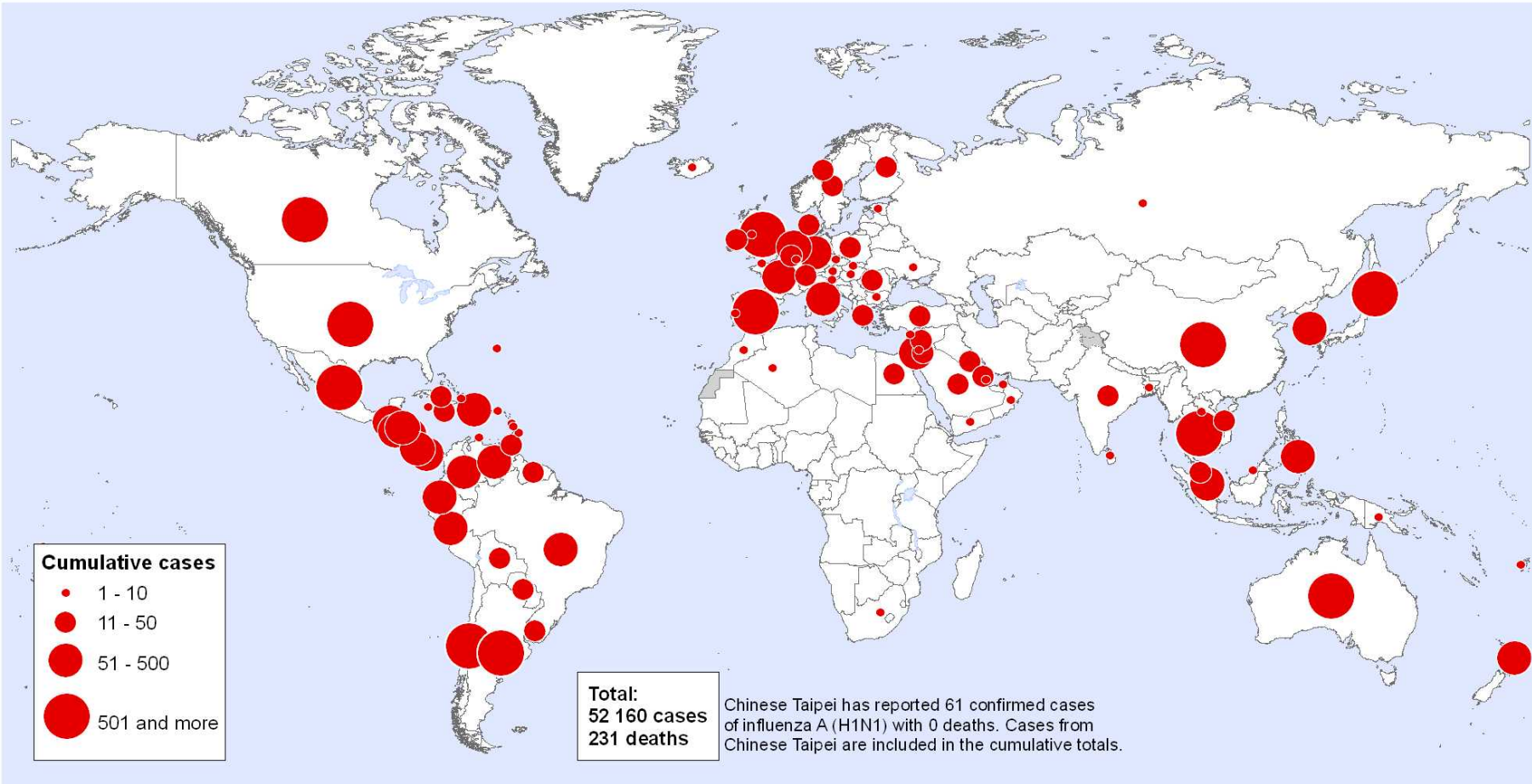
- ◆ Do confirmed cases truly reflect occurrence?
- ◆ Why does severity differ in American Continents from elsewhere?

Number of patients by country (22 June 2009)

Source: WHO web site

New Influenza A (H1N1),
Number of laboratory confirmed cases as reported to WHO

Status as of 22 June 2009
06:00 GMT



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines on maps represent approximate border lines for which there may not yet be full agreement.

Data Source: World Health Organization
Map Production: Public Health Information
and Geographic Information Systems (GIS)
World Health Organization



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Map produced: 22 June 2009 06:55 GMT

- 2 deaths in Australia (age 26 and 37 males with underlying disease)
- 1 death in Phillipine (age 49 female with CVD)
- All other deaths in North/South Americas