



Economics of Pandemic Influenza Planning

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*The views in this presentation reflect the views of the speaker, not
the views of DHS.*

Definitions of Flu

- ***Seasonal (or common) flu***
 - Can be transmitted person to person
 - Most people have some immunity
 - Vaccine is available

- ***Avian (or bird) flu (AI)***
 - Disease primarily of birds—not readily transmitted from birds to humans
 - No human immunity
 - No human vaccine is commercially available

- ***Pandemic flu***
 - Novel virus emerges
 - Little or no natural immunity
 - Can spread easily from person to person –causes illness
 - No vaccine available

Why should YOU care about the Avian Flu?

1918-19 Pandemic, "Spanish flu" H1N1 (Severe Case)

- The most devastating flu pandemic in recent history, killing more than 500,000 people in the United States, and 20 million to 50 million people worldwide.

National Institute of Allergy and Infectious Disease

1957-58 Pandemic, "Asian flu" H2N2 (Moderate Case)

- First identified in China, this virus caused roughly 70,000 deaths in the United States during the 1957-58 season. Because this strain has not circulated in humans since 1968, no one under 40 years old has immunity to this strain.

National Institute of Allergy and Infectious Disease

1968-69 Pandemic, "Hong Kong flu" H3N2 (Mild Case)

- First detected in Hong Kong, this virus caused roughly 34,000 deaths in the United States during the 1968-69 season. H3N2 viruses still circulate today.

National Institute of Allergy and Infectious Disease

2003 Severe Acute Respiratory Syndrome (SARS)

- Almost 9000 individuals infected with approximately 800 deaths, but had an estimated cost for the Asian regional economy of US\$20 billion in GDP terms.

Oxford Economic Forecasting Group

Every year Seasonal flu

- On average, there are approximately 36,000 US deaths per year.

www.pandemicflu.gov/general/season

Estimated Impact of Future Pandemic on the US

Characteristic	Moderate 1958/68-like	Severe (1918-like)
Illness	90 million	90 million
Outpatient medical care	45 million	45 million
Hospitalization	865,000	9.9 million
ICU care	128,750	1.485 million
Mechanical ventilation	64,875	742,500
Deaths	209,000	1.9 million

Source: U.S. Dept Health and Human Services Pandemic Influenza Plan: Part 1. Page 18. Available at:
<http://www.dhhs.gov/pandemicflu/plan/pdf/part1.pdf>

According to World Health Organization (WHO) – Cases and Deaths from A/H5N1

Country	2003		2004		2005		2006		2007		2008		Total	
	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths	cases	deaths
Azerbaijan	0	0	0	0	0	0	8	5	0	0	0	0	8	5
Cambodia	0	0	0	0	4	4	2	2	1	1	0	0	7	7
China	1	1	0	0	8	5	13	8	5	3	0	0	27	17
Djibouti	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Egypt	0	0	0	0	0	0	18	10	25	9	0	0	43	19
Indonesia	0	0	0	0	20	13	55	45	42	36	1	1	118	95
Iraq	0	0	0	0	0	0	3	2	0	0	0	0	3	2
Lao PDR	0	0	0	0	0	0	0	0	2	2	0	0	2	2
Myanmar	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Nigeria	0	0	0	0	0	0	0	0	1	1	0	0	1	1
Pakistan	0	0	0	0	0	0	0	0	1	1	0	0	1	1
Thailand	0	0	17	12	5	2	3	3	0	0	0	0	25	17
Turkey	0	0	0	0	0	0	12	4	0	0	0	0	12	4
Viet Nam	3	3	29	20	61	19	0	0	8	5	0	0	101	47
Total	4	4	46	32	98	43	115	79	86	58	1	1	350	217

As reported by the WHO as of January 15, 2008,
http://www.who.int/csr/disease/avian_influenza/country/cases_table_2008_01_15/en/print.html

Criterion Required for a Pandemic

- ☑ The Avian H5N1 is widespread and endemic
- ☑ There are continuous outbreaks in poultry
- ☑ It has resulted in lethal mammalian infections
- ☑ Virus is evolving
- ☑ Sporadic human cases
 - Mostly young and healthy **350 / 217 (Jan 15, 2008)**
 - Case fatality rate is **62%**
 - Rare instances of person-to-person transmission
- ☐ **Sustained and rapid person-to-person transmission**

To Date--

Numerous studies have been performed to examine the effects of an influenza pandemic. These studies have looked at possible effects on the GDP (regionally, nationally & globally), the population, and potential/proposed treatments and/or responses.

Here are some examples of what have been found.

Studies of Macroeconomic Effects of AI Pandemic

Study	Method	Assumptions	Deaths	GDP Loss	% GDP Loss
			(thousands)	(\$ billions)	(% GDP)
CBO	Judgemental		U.S. / Global	U.S. / Global	U.S. / Global
Mild		1968-type scenario	100 / --	-165 / --	-1.50 / --
Severe		1918-type scenario	2,000 / --	-550 / --	-5.00 / --
McKibbin	MSG - G**3		U.S. / Global	U.S. / Global	U.S. / Global
Mild		1968-type scenario	20 / 1,422	-64 / -330	-0.58 / -0.8 --
Moderate		1957-type scenario	202 / 14,217	-152 / --	-1.38 / --
Severe		1918 (low) type scenario	1,009 / 71,082	-330 / --	-3.00 / --
Ultra		1918-(high)type scenario	2,019 / 142,165	-600 / -4,400	-5.50 / -12.6
World Bank	Judgemental		U.S. / High Income	U.S. / High Income	U.S. / High Income
		SARS Extrapolation	100 to 200 / --	-100 to -200 / -550	-1.40 / --
CDC	Monte Carlo		U.S. / Global	U.S. / Global	U.S. / Global
[direct health/death costs only]		1968-type scenario	207 / --	-167 / --	-1.50 / --
ADB	Oxford		Asia / Global	Asia / Global	Asia / Global
Mild		2 Quarter Duration	-- / --	-123 / --	-2.60 / --
Severe		4 Quarter Duration	49,600 / --	-283 / -2,500	-6.50 / -0.60
CIA	Judgemental		S.E. Asia / Global	S.E. Asia / Global	S.E. Asia / Global
Mild		1968-type scenario	938 / 2,000	-35 / --	-- / --

Sources: see below

Source: Summary compiled by Stephan Thurman, State Department
Further sources available upon request.

Limitations.... Populations

Conflicting arguments as to which populations groups will be infected

- HHS reports that the young, old, and pregnant will be more severely affected due to immature or reduced immune systems.
- Others estimate that working age adults (approx. 18 – 64) will be more likely to be infected due to stronger immune systems reacting more aggressively against the virus- the 'cytokine storm' issue as occurred in the 1918 pandemic.

Limitations.... Behavior

Behavioral/cultural changes and compliance with proposed health protocols were not looked at in these studies.

If people:

- Complied voluntarily to wash hands after sneezing or coughing
- Were required/practiced social distancing
- Were required to be vaccinated/take antivirals
- Had movement/travel restrictions

Limitations.... Vaccine Development

Currently there are two vaccines being developed based on 2 identified clades (subtypes) of A/H5N1.

- Indonesian
- Vietnamese

(There are four officially identified clades by the WHO.)

Acknowledged time lag – time required to make vaccine after introduction of human pandemic virus into global community is approximately 6 months from identification through implementation of new pandemic virus vaccines.

Limitations.... Drug Treatments

There are currently two antiviral drugs supported by CDC to treat acute, uncomplicated influenza (**not avian influenza per se**):

- **Osetamivir phosphate (Tamiflu)** – approved for treatment of acute uncomplicated illness due to influenza A and B since 1999
- **Zanamivir (Relenza)** – approved for treatment of acute uncomplicated illness due to influenza A and B since 1999

The following two medications are no longer supported by the CDC due to the finding of a high proportion of influenza A viruses that are resistant to them.

- **Amantadine (Symmetrel)** – approved for treatment and prevention of influenza A since 1966
- **Rimantadine (Flumadine)** – approved for treatment and prevention of influenza A since 1993

CDC, Updated January 16, 2006

Limitations.... Drug Treatments

Tamiflu

- Produced by Roche Laboratories, Inc.
- Forms- Capsule and Powder for Oral Suspension
- Used for treating adults, adolescents, and pediatric patients 1 yr + with the flu whose symptoms started within the last day or two
- The manufacture of Tamiflu is a complex, 10-step process that takes approximately 6-8 months to complete.



Relenza

- Produced by GlaxoSmithKline.
- Forms- Relenza Rotadisk with Diskhaler Inhalation Device
- Used to treat uncomplicated illness due to influenza virus in people 7 years and older, who have been symptomatic for no more than 2 days

How they work: Both Tamiflu and Relenza are neuraminidase inhibitors. They work by blocking the action of a protein called neuraminidase, which sits on the surface of a cell and normally helps the influenza virus enter and leave the cell. Neuraminidase inhibitors trap the virus once it enters a cell.

Overcome Limitations- Populations

We can take a closer look at both the pandemics historically and SARS, to look for possible corollaries:

- Age groups infected/non-infected; then potentially extrapolate
- Risk-based/age-based populations with/without compliance
- Risk-based/age-based populations with/without treatments and/or vaccine protocols
- Some combination of all of the above

Overcome Limitations - Behaviors

Utilize decision trees for voluntary and/or enforced adherence to health protocols.

- Hand washing
- Usage of hand sanitizers
- Disinfecting items more often
- Social distancing (keeping 6 feet of space between persons in face to face situations, and includes quarantine, isolation, cancellation of public events...) – recently changed to 6 feet from 3 feet
- Fear factor
- Receiving of vaccines and taking of antiviral treatments

Overcome Limitations- Vaccines/Antiviral Treatments

Look more closely at proposed antiviral/vaccination options to examine potential effectiveness.

- Effectiveness of existing antivirals/vaccines against unknown clade of pandemic influenza, such as A/H5N1.
- Effectiveness of seasonal influenza vaccine's ability to 'prime the pump'.

What's Still Missing...

- Current impact of the avian flu on the poultry and food markets – domestically and internationally
- Internet usage/capacity, IT issues
- Travel/Tourism – internationally and domestically
- Probable school closures – Chicago
- How to keep business as near normal as possible
 - How to account for the US dependence on just-in-time deliveries/manufacturing
 - Businesses reliant on face-to-face/person on the job contact (fast food operations, factories, etc.)
- Assessments on firm resiliency to recover from a pandemic

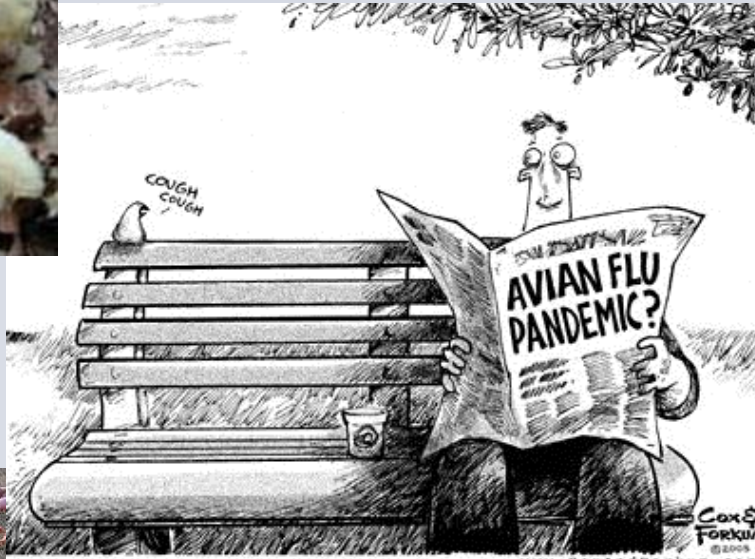
Benefits of Pandemic Planning

- Planning initiatives can be translated into all hazards planning for those without contingency plans.
- More time we have to prepare from now until an actual pandemic the better off we are in terms of refining the plans' processes and protocols.
- Spillover benefits to research and development – mass vaccination protocols, enhanced virus surveillance and identification instruments and processes, new drugs/treatments.
- Stimulates innovative thinking to mass casualty situations, stockpiling issues, etc.
- Assist firms/agencies in accrued long-term benefits – lower health insurance premiums, more worker productivity, etc.

Lessons/Things to Remember

- Today's society is very different from those of 1918, 1957 and 1968.
- The virus is on a faster timeline due to our growing technology and connectivity.
- At the same time that our 'global village' contributes to the spread of a pandemic, it also provides for faster and more effective response due to advancements in technology, connectivity and global cooperation.
- This type of event requires innovative and 'outside the box' thinking.

Bird Flu on the Wire



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