Assessing Environmentally Transmitted Pandemic Threats:
Evaluating Emerging Health Threats: RealScience or Emotional (gov’t) Fiat

1. Threat Evaluation: How Bad Will It Be?
Science based? Politically Driven? Fear mongered?
Public Health Paradigm or Military/Legal Standard

2. Resources? Unilateral or Global:
Obama Plans to Fund H1N1 with BioShield $

Real WMD vs. imaginary (but dangerous) WMH

Barbara P Billauer June 2009
Pandemic flu is virulent human flu that causes a global outbreak, or pandemic of serious illness. Because there is little natural immunity, the disease can spread easily from person to person. Currently, there is no pandemic flu.

- Novel Agent
- Low Immunity
- Fast Transmission
“Another pandemic will occur someday”
Secular Trends:

Germ Theory not yet embraced

NO QUARANTINE
No Antibiotics
Which Pandemic? CDC Webcast: 6/8

✦ SARS (2002) spared the U.S. but did real damage to Toronto

✦ Avian Influenza (H5N1) is deadly and continues to slowly spread

✦ H1N1 spread rapidly around the world and IS NOT OVER but has been relatively mild

✦ Our luck is running out!

Steven D. Gravely, J.D., M.H.A.

Barbara P Billauer June 2009
A TIME special report on the avian-flu outbreak reveals how hard it will be to put this genie back in the bottle.
Case Fatality: 262 deaths/ ?? cases
Attack Rate = 433 cases/?? years

Barbara P Billauer June 2009
Trend Comparisons 2003-2009:
Case Fatality v. Attack Rate

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STILL WORRIED ABOUT TERRORISTS?

NO... CANADIANS
Global Epidemic-Curve: SARS

Probable cases of SARS by week of onset
Worldwide* (n=5,910), 1 November 2002 - 10 July 2003

* This graph does not include 2,527 probable cases of SARS (2,521 from Beijing, China), for whom no dates of onset are currently available.

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H1N1
Canadian Epidemic Curve for H1N1
Mexican Epidemic Curve (CF=.2%)
INTELLIGENCE ON H1N1:

- WE NEED GOOD DATA: **CASE FATALITY**
- WE NEED DAILY RECORDS/TRENDS
- WE NEED INSTANT (HOME) TESTS
H1N1 Case Fatality Rate/ WHO Data
So, it’s a Pandemic, but it’s a MILD one

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HHS Pandemic Severity Index

February, 2007 Classification

- **Category 1:** CFR < .1%
- **Category 2:** CFR .1%-.5% 1957/68:
- **Category 3:** CFR: .5%-1%
- **Category 4:** CFR: 1%-2%
- **Category 5:** CFR: >2%: 1918

Problems with scheme

- Too high a CFR – self destructs
- Too few people infected (low transmissibility and threshold won’t be reached)
- Epidemics can occur without being pandemics
- Arbitrary scheme: 1918 CFR ==
- On average; CFR varies over course of Disease (1918: 0-4.3%); which part do we care most about?? And by locality

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H1N1 Virus
Swine Flu
Mexico

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3. Competing Threats

Two security guards wear surgical masks while manning the entrance of the University of the East in Manila as a precaution against the swine flu virus. - R. Reyes
Competing Threats for Manilla

**Dengue**
- 50 Million Cases Worldwide
- Epidemic in 100 countries
- 275 Cases/yr in Quezon City
- 14 people died 2009 in Quezon City, alone

**New Flu**
- 27,000 cases
- Epidemic in 74 countries
- 77 Cases in Philippines
- No deaths in all of the Philippines

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## Competing Threats from Smallpox—Where’s the Data?

*from the Dark Winter War Game*

<table>
<thead>
<tr>
<th></th>
<th>SARS</th>
<th>Avian Flu</th>
<th>H1N1</th>
<th>Smallpox</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cases</strong></td>
<td>8096</td>
<td>433</td>
<td>25,000 (-8000)</td>
<td>10 Mill</td>
</tr>
<tr>
<td><strong>Deaths</strong></td>
<td>774</td>
<td>262</td>
<td>139</td>
<td>3 Mill</td>
</tr>
<tr>
<td><strong>Case-Fatality</strong></td>
<td>9.6</td>
<td>60</td>
<td>.05-.02 (.1 v .5)</td>
<td>30%</td>
</tr>
<tr>
<td><strong>Replication</strong></td>
<td>?? 1</td>
<td>??1</td>
<td>1.6 (1.3-)</td>
<td>10</td>
</tr>
<tr>
<td><strong>Generations</strong></td>
<td>1</td>
<td>1</td>
<td>??</td>
<td>3-4 : 1 = 1000</td>
</tr>
</tbody>
</table>
Facts: Epidemic Assessment
Public Health Paradigm>>> Magnitude

1. **CASE FATALITY** (varies over course of disease)
2. Replication Rate (virulence/logistics)
3. **Attack rate** (population immunity/spread)
4. No. of **Generations** in Epidemic’s Lifetime
5. Transmission Rate (contagious)
6. Engineering Logistics, deployment, seasonality
7. hardiness of microbe
8. Secular trends, changing times, fear
9. Evolutionary biology: parasitic survival
10. Signal Features: Age Demographics
Bioterrorism: New Threat from Mexico
Anthrax

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A Few Flu Concerns

1. Natural **Antigenic Shift** of H1N1
2. **Recombination**: H1N1 and H3N2
   - India
   - Australia
   - Hawaii
   - Vaccine program (double dose/ herd contagion)
   - Recombination of H1N1 & other RNA Virus
3. **Bacterial infection**? Pneumonia Vaccines?
4. **Laboratory Error** (?Baxter)

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Predominantly younger age groups (<30 years) are affected. (c) Range of age medians: 16–25 years, (b, c, d) & increasing

AGE DISTRIBUTION GRAPHS
CHANGING SCALES
Utah flu Hospitalizations 2005-6 by age> typical U shape

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Flu Mortality Age Distribution
1911-7 vs. 1918 = peaks for child bearing years (consider impact on planning current population immunity)
Age Distribution UK: flu 2007-8
October, 1918

by Molly Billings, June, 1997 modified RDS
February, 2005

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Average Age Distribution Weeks 6-11 in 2008 for the 4th of the five periods.
Facts: Epidemic Assessment
Public Health Paradigm>>>Magnitude

1. average **CASE FATALITY** (varies over time & locality)
2. Replication Rate (virulence/logistics)
3. Attack rate (population immunity/spread)
4. No. of **Generations** in Epidemic’s Lifetime
5. Transmission Rate (contagious)
6. Engineering Logistics, deployment, seasonality
7. hardness of microbe
8. Secular trends, changing times, fear
9. Evolutionary biology: parasitic survival
10. Signal Features: Age Demographics
Assessing Emerging Health Threats

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So, what have we learned

- Record-keeping must be more transparent
- Record keeping must be better, faster, > local
- NB No Hospitalization data for 1957 and 1968
- **Reliable** data for comparison purposes
- **Valid** data for planning purposes
- >> complete historical data (1951, 76, 98)
- **Relevant** data, please! (distinguish 1918)
- Worst-case scenarios don’t **fit**
- **consider Panic** induced responses ????
  – kill all the chickens, the cows, the spinach??
Canadian flu Watch 2008-9

- **Definitions for 2008-09:**
  - **Schools and work sites:** greater than 10% absenteeism on any day most likely due to ILI
  - **Residential institutions:** two or more cases of ILI within 7 days; 1 laboratory confirmed. Report within 24 hours of identification.

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Additional References

• 1918 Influenza Pandemic Caused by Highly Conserved Viruses with Two Receptor-Binding Sites, Ann H Reid, et al J Emerging Infectious Diseases, CDC, vol 9, No. 10., 2003

• The Center for the History of Medicine, @ The University of Michigan, “The 1918-20 Influenza Pandemic; Escape Community Digital Archive.” 2006.


• Hammond, Roland and Shore, The Lance, July 14, 1917

In Manila – “The chief epidemiologist said attention should not veer away from dengue because it has long been established that the virus when left unaddressed could claim many lives. But focus should be given to the A(H1N1) virus because – though having a low one-percent fatality rate – it remains shrouded in mystery.”

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Canadian Epidemic Graph: SARS

Probable cases of SARS by date of onset
Canada, 1 February - 4 July 2003 (n=250*)

*As of 4 July 2003, 251 probable cases of SARS were reported from Canada. This graph does not include one additional case of SARS for whom no date of onset was available. Between 4 and 10 July 2003, 2 probable cases were discarded and one additional probable case was reported. As of 10 July 2003, a total of 250 probable cases of SARS were reported.
Source: Health Canada