If Pigs Could Fly, Would They Carry Bird Flu?

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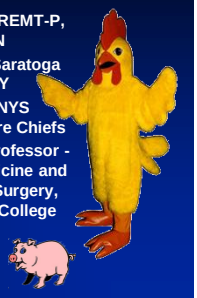


Disclosures

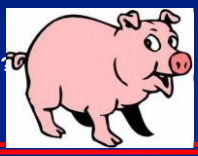
- I have no financial relationships to disclose.
- I am a pandemic advisor to the CDC and several major corporations.
- I am the EMS technical editor for Fire Engineering magazine.
- I do not intend to discuss any unlabeled or unapproved uses of drugs or products.

Not Suitable for Small Children

www.mikemcevoy.com

Outline

- Bioterrorism lessons
  - Past experience
  - H1N1: why Mother Nature is the greatest bioterrorist of all time
- The H1N1 pandemic
  - Separating facts from fiction
  - What is influenza?
- Public health response
  - What weaknesses were exposed?
- Lessons
  - Personal and professional

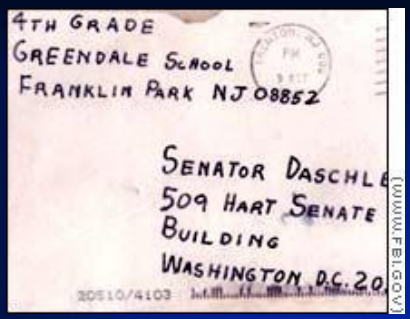


Potential Bioterrorism Agents

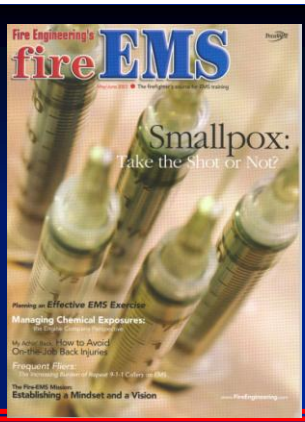
- **Bacterial Agents**
  - Anthrax
  - Brucellosis
  - Cholera
  - Plague, Pneumonic
  - Tularemia
  - Q Fever
- **Viruses**
  - Smallpox
  - VEE
  - VHF
- **Biological Toxins**
  - Botulinum
  - Staph Entero-B
  - Ricin
  - T-2 Mycotoxins

Source: U.S. A.M.R.I.I.D.

10-9-01



Fire Engineering's fireEMS May/June 2003



The Greatest Bioterrorist

Rap Sheet:

- Smallpox
  - ½ billion
- Influenza
  - ¼ million/year
- Plague
  - 137 million
- AIDS
  - 35 million
- SARS…
  - 916

Fire Police Captain John Brenckle
1947 - 2004

Berkeley Hills Fire Company Station 247

Pittsburgh, PA

LODD September 23, 2004

Necrotizing Fasciitis

We need to be smarter

Success is within reach

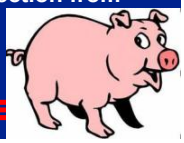
H1N1: What's the situation?

- 12 April Mexico Government requests WHO assistance with outbreak of acute respiratory infections in La Gloria, Veracruz
  - population 2155; 616 = 28.5% ill
- 23 April, CDC describes 5 cases of novel influenza virus (A/H1N1/North America/Human)
  - 3 from San Diego area, 2 from San Antonio, TX
- Subsequent WHO surveillance indicated a respiratory outbreak in Central Mexico, including Mexico City, for previous 3 weeks
  - 1 March-29 May = 41,998 acute respiratory infections
  - 5,337 (12.7%) cases confirmed new A/H1N1 flu
  - 97 deaths, mostly in young adults (20-45 years old)
  - Outbreak peaked nationally in late April
  - On 29 May, Mexico City highest # cases/deaths (1804/38)
  - Outbreak spread worldwide: total deaths ~ 17000 presently

WHO Weekly Epidemiological Record. 23; 2009, 84:213-219

What is H1N1 (a.k.a. "Swine") flu?

- H1N1 is a respiratory disease of pigs caused by type A flu virus; first isolated in 1930
- Circulates year round; ↑ during flu season
- High rates of illness, low death rates in pigs
- The 2009 human flu outbreak is a new strain of H1N1 influenza never isolated in swine (origin unknown)
- Pigs are very susceptible to infection from humans



Name Change: H1N1

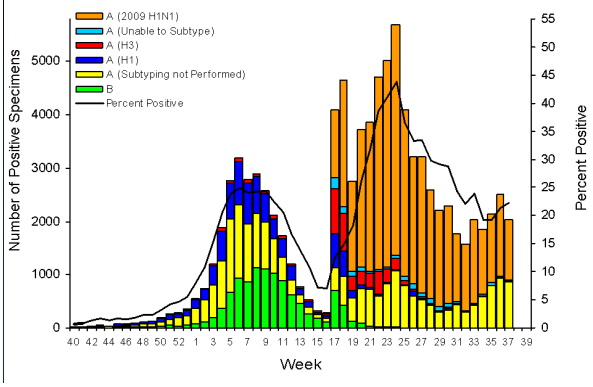
Swine were victimized

1. NA swine
2. European swine
3. Avian
4. Human

Novel A/H1N1 virus

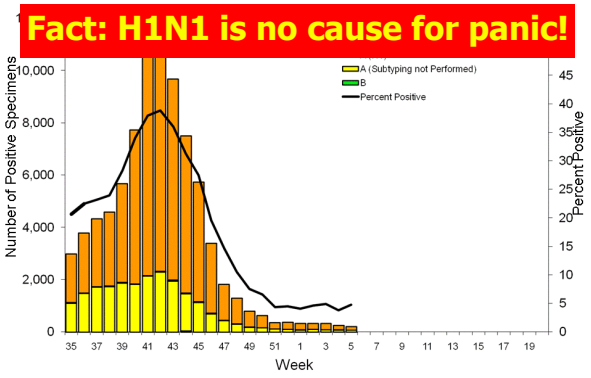
- Some nations began culling pigs!

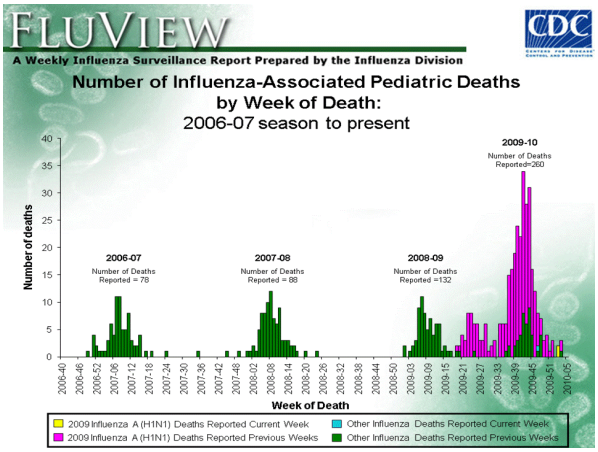
Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2008-09



Influenza Positive Tests Reported to CDC by U.S. WHO/NREVSS Collaborating Laboratories, National Summary, 2009-10

Fact: H1N1 is no cause for panic!



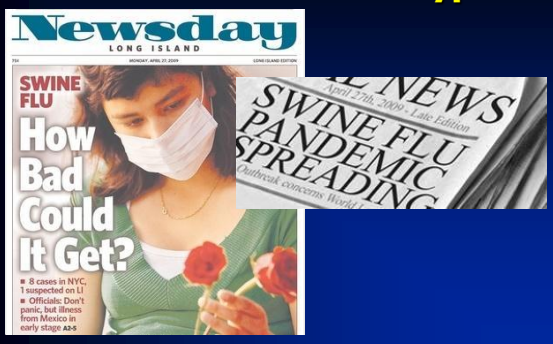


H1N1: the facts

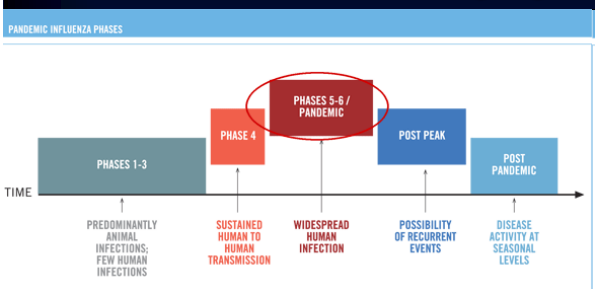
- Apparently easy human-to-human spread; ability attributed to (as-yet) unidentified mutation
- Most cases have only mild symptoms; infected people make full recovery without medical attention and without antiviral meds
- World Health Organization (WHO) stated that symptoms appear less severe than seasonal influenza

Why all the hysteria?

1. Incredible Media Hype



2. WHO Pandemic Staging



3. History (hystery)

4. Avian (bird) Influenza

U.S. Response

- CDC: notified clinicians, issued guidance
- Public Health Emergency declared
  - Allowed release of funds
  - ¼ SNS pushed to states (Rx, N-95s)
- Laboratory testing
  - Test kits developed for State labs
  - Sensitivity to Oseltamivir (Tamiflu®) & Zanamivir (Relenza®)
- States charged to direct local actions…
- Vaccine development begun

Did the plan work?

What plan?

US caught with pants down

- Pandemic plans were predicated on outbreaks starting in Europe
- Believed U.S. would have weeks or months to prepare
- Instead, outbreak started in U.S. !

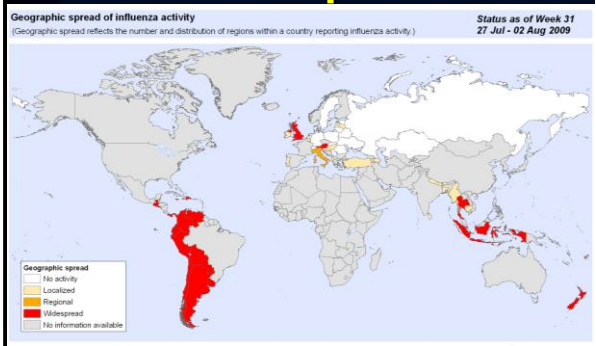
And this just in…

The Washington Post

June 4, 2010

- Parliamentary Assembly Council of Europe (PACE) denounces WHO's **"waste of large sums of public money…unjustified scares…undue influenced by pharmaceutical industry"**
- British Medical Journal (BMJ) investigation of WHO uncovered "lack of transparency…conflicts of **interest…key pandemic scientists funded by Roche and GSK (antiviral drug companies) that profited tremendously from WHO recommendations**"

Novel H1N1 Spread…



H1N1 projections

- US Population = 307 million
- Projected 20 – 60 % infected
  - CDC estimated 40% if no vaccine ready
  - Usually 5 – 20% infected with seasonal flu
  - Seasonal flu death rate is 1 per 1000 (0.1%)
  - H1N1 death rate turned out to be 1 per 48,000 (0.048%)

H1N1 actual

- US Population = 307 m
- 57 million became ill (19%)
  - 257,000 hospitalized
  - 11,690 deaths (rate = 0.0002%)
  - Over 8 month period, peaked in October
  - Was not widespread in any single state for greater than 1 month

Source: CDC 15 Feb 2010

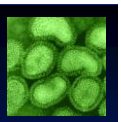
Influenza is a serious illness

- Annual deaths (US): 36,000*
- Hospitalizations: >200,000*

* 1990's estimates from average 500 million annual cases (Worldwide death rate > 250,000 annually)

- Who is at greatest risk for serious complications?
  - persons 65 and older (comprise 85% of deaths)
  - persons with chronic diseases
  - infants
  - pregnant women
  - nursing home residents (attack rates of 60% vs. general population attack rates of 5-20%)

Influenza



- Respiratory infection
- Transmission: Contact with respiratory secretions from an infected person who is coughing and sneezing
- Incubation period: 1 to 5 days from exposure to onset of symptoms (typical 2 days)
- Communicability: Maximum 1-2 days before and 4-5 days after onset of symptoms (kids > 10 days and possibly up to 6 months)
- Timing: Peak usually December - March (NA)

Flu or common cold?

What distinguishes flu from a butt kickin' common cold?

Influenza Symptoms

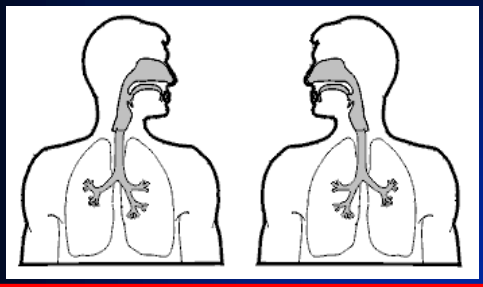
- Rapid onset of:
  - Fever (>100°F in 99.3%)
  - Chills
  - Body aches
  - Sore throat
  - Non-productive cough
  - Runny nose
  - Headache
- Hallmark = sudden onset

How you get the flu:

- Germs are transmitted
- Greatest period of infectivity correlates with fever

How close is too close?

Danger area around sick people is 3 feet



How germs are transmitted: Nose → Hand → Object

- Doorknob
- Telephone
- Radio mic
- Pens, keyboards
- SCBA, EMS bags
- Steering wheel
- Etc…

Influenza Viruses

- Hard non-porous surfaces 24-48°
  - Plastic, stainless steel, etc.
- Cloth, paper & tissue 8-12°
  - Transferable to hands for 15 minutes
- Hands → viable for < 5 min
- ↓ temp, ↓ humidity = ↑ survival

Prevention: Vaccination

Did you get a flu vaccine?

Vaccination is our single most powerful weapon

Vaccines

Protect people:

- Those vaccinated (somewhat)
- Family members/contacts (more)

- 22 diseases (US)
- >60,000 die annually from preventable diseases

The Proof is in the Pudding

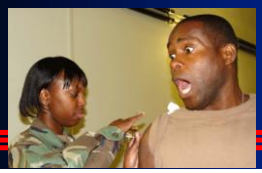
JAMA

Effect of Influenza Vaccination of Children on Infection Rates in Hutterite Communities
A Randomized Trial

Conclusion: Immunizing children and adolescents with inactivated influenza vaccine significantly protected unimmunized residents of rural communities against influenza.

Take Home Points: Flu Shot

1. Employers must offer flu shots.
2. Just because you never get sick:
   - Does not mean you don't infect family
   - Does not mean you don't infect patients
3. Unvaccinated HCW are negligent.




H1N1 Vaccine Chaos

- Trials began July 2009 (5 countries)
- 5 U.S. manufacturers
  - Sanofi Pasteur, Novartis, GSK, Medimmune, CSL
- 195 million doses ordered (120 seas)
- Likely distribution scheme:
  - 45 million mid-October followed by 20 million/week thereafter
  - Incredibly poor communication with manufacturers

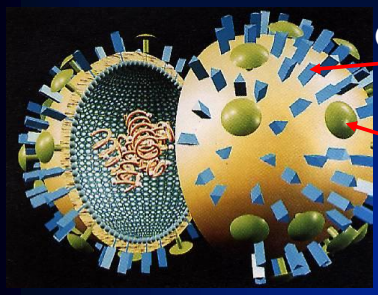
H1N1 Vaccine

- Children < 10 need 2 doses
  - Spacing 21-28 days apart, may give 1st dose with seasonal flu vaccine, but in separate sites
- Prioritization (5 groups = 159 million):
  - Pregnant women
  - People live/care for children < 6 mos. old
  - HCW and EMS personnel
  - People aged 6 months – 24 years old
  - People 25 – 64 yo with ↑ risk for H1N1
- Ultimately, many scrambled for scarce supplies while others had huge surpluses

Influenza Virus

- Orthomyxoviridae single strand RNA respiratory viruses
- Type A (most severe, 2 subtypes)
  - Humans, birds (avian)*, pigs (swine), horses (equine), other animals. * wild birds are natural hosts
  - Affects all ages
  - Epidemics and pandemics
- Type B (less severe, no subtypes)
  - Humans only
  - Primarily affects children (can be severe in elderly)
  - Milder epidemics, cannot cause pandemics
- Type C (mild to no symptoms)
  - Humans and pigs (swine)
  - Rare (?) - by age 15, most have antibodies

Influenza A - subtypes



HA (hemagglutinin)

15 types (H5, H7, H9)

NA (neuraminidase)

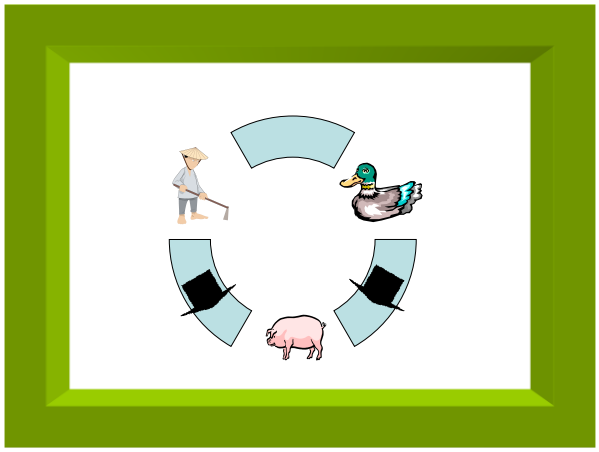
9 types (N1, N2)

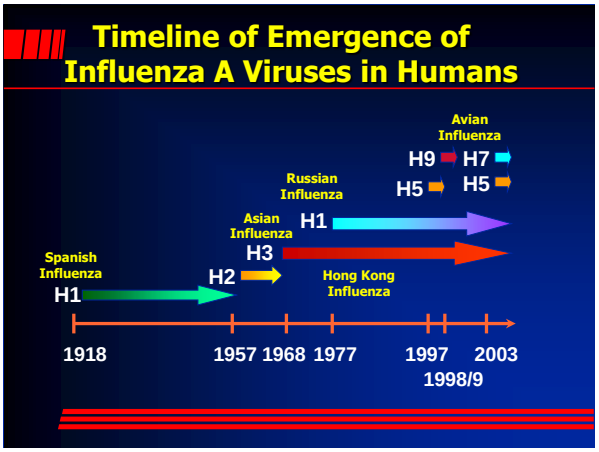
Influenza Epidemiology

- Viruses normally species specific
- "Spill over" extremely rare

Natural hosts of influenza viruses									
Haemagglutinin subtype					Neuraminidase subtype				
									
H1					N1				
H2					N2				
H3					N3				
H4					N4				
H5					N5				
H6					N6				
H7					N7				
H8					N8				
H9					N9				
H10									
H11									
H12									
H13									
H14									
H15									

From animals to people:





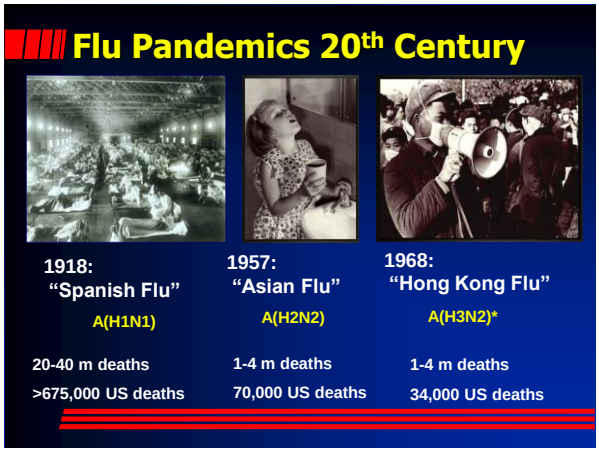
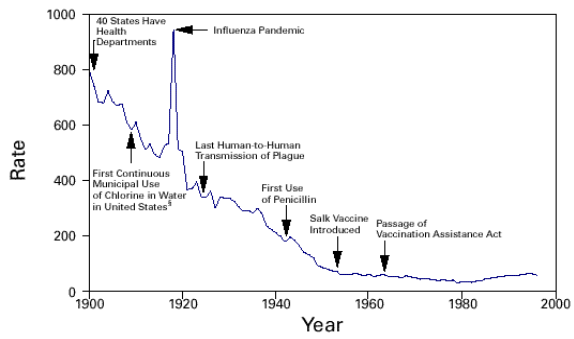


FIGURE 1. Crude death rate* for infectious diseases — United States, 1900–1996†

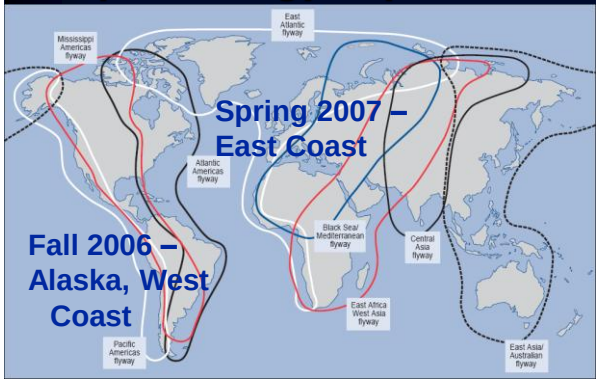


*Per 100,000 population per year.
†Adapted from Armstrong GL, Conn LA, Pinner RW. Trends in infectious disease mortality in the United States during the 20th century. JAMA 1999:281;61–6.
§American Water Works Association. Water chlorination principles and practices: AWWA manual M20. Denver, Colorado: American Water Works Association, 1973.

Pandemic oops:

1976: "Swine Flu"	2003: "SARS"	2003: "Bird Flu"
A(H1N1)	unknown	A(H5N1)
1 death (13 infected)	774 deaths	262 deaths to date
>25 GBS deaths from 40 m vaccines	No US deaths	No US deaths

Epidemiology Imprecise:



Spring 2007 – East Coast

Fall 2006 – Alaska, West Coast

Bird Flu: H5N1 Avian Flu

Type A flu has been:

- In Waterfowl for 105 million years
  - Asymptomatic intestinal infection, all subtypes, excreted in bodies of water
- In Domestic birds for 50 million years
  - Respiratory infection or illness, shed GI and respiratory fluids, may become very ill or die

Avian Influenza

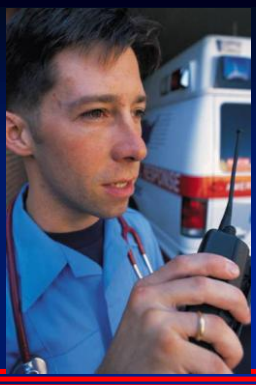
- Avian Flu type based on genetic features and/or severity of disease in poultry
  - Low pathogenic AI (LPAI) = weak type
    - H1 to H15 subtypes
  - Highly pathogenic AI (HPAI) = strong type
    - Some H5 or H7 subtypes

But were there lessons learned?

First Indian SARS patient, Punde,Goa NYT April 2003

Severe Acute Respiratory Syndrome (SARS)

Except:



Toronto EMS – Spring 2003

- 41 Stations
- 95 units/shift (180,000 transports/yr)
- 850 medics
- Over 400 medics quarantined for unprotected SARS exposures
- 4 actually infected w/ SARS
- Crippled 911 system

Is this JUST an EMS Problem?

- **Most certainly NOT!**
- *Total deaths worldwide from SARS: 916 (of total 8,422 cases reported from Nov 2002 through Aug 2003)*
- *25 % of deaths were HCWs (Health Care Workers). Fully one-quarter of SARS infections were HCWs.*
- *Reason? Breaks in infection control procedures!*

Tasmania, Australia EMS

- **10 ambulance officers isolated (15% of force) H1N1**
- **4 June 2009**


THE VOICE OF TASMANIA
MERCURY

Ambulance crew hit by flu

DANIELLE MCKAY
June 04, 2009 01:15pm

A TASMANIAN ambulance crew has been struck dc
nine ordered off work.

The North West ambulance service now has to opera

There are now five confirmed cases of swine flu in Ta

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- "If people don't take it seriously, this sort of thing will happen…"

Show me the money…

HCW non-adherence w/ PPE recommendations:

1. Believe not necessary, inconvenient, disruptive
2. Lack of PPE availability
3. Inadequate infection control training
4. Lack of systematic HCW safety approach
5. Failure to recognize need (situational)

Daugherty et al. Crit Care Med 2009;37:1210-6
Swaminathan et al. Emerg Infect Dis 2007;13:1541-7
Visentin et al. CJEM 2009;11:44-56

First Rule of Infection Control

Wash your hands!

- Alcohol based hand rubs
  - Superior (CDC, October 25, 2002)
- Soap & water when dirty

Second Rule of Infection Control

Stay Away!

- If you are sick, stay home! (until 24 hr w/o fever)
- If you must be around others, don't touch them and wear a mask.

Was there Influenza Panic?

H1N1: why children?

1. Infectious for longer than adults
2. More physical contact
3. No immune memory (60+ years)
4. ? More robust immune response

Antiviral Medications

- Uses
  - Prophylaxis (prevention)
  - Treatment
- Issues
  - RESISTANCE
  - Limited supply
  - Need for prioritization (among risk groups and prophylaxis versus treatment)
  - Unlikely to markedly affect course of pandemic
- SNS (Strategic National Stockpile)
  - Presently ~ 81 million doses
- States and Private sector
  - Up to 44 million doses stockpiled

NYC: Free antivirals…

The New York Times

This Time, City Says It's Ready for Swine Flu

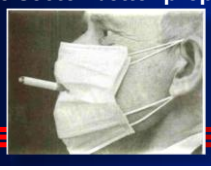
By SEWELL CHAN and LISA W. FODERARO

Students will get free vaccinations. Health clinics will turn into "flu centers" to relieve on the Web every day. And schools will close only as a last resort.

Hmmm…from the Strategic National Stockpile…meds about to expire.

What about Supplies?

- Extreme shortages
  - Masks
  - Hand gel
  - Gloves
- Many had no stockpiles
  - Private sector better prepared



US Hospitals: Reported shortages and backorders

	Prior to Dec. 2009	Jan. 2010 & beyond	Continued Jul. 2010
N-95 masks	58%	21%	26%
Surgical masks	38%	11%	17%
Eye Protection	11%	2%	9%
Needles	22%	10%	12%
Hand gels	28%	6%	11%

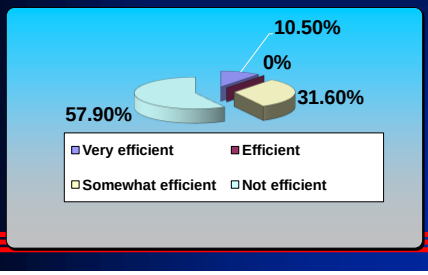
Materials Management in Healthcare, AHRMM and APIC: July 2010

More About Masks

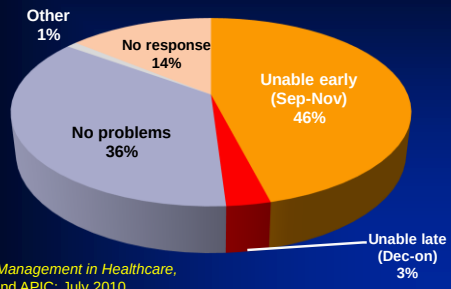
- Benefit of wearing masks by well persons in public settings has not been established
  - Persons may ***choose*** to wear a mask:
    - Keep hands away from your face!
    - Clean hands if you touch your mask!

NYS DOH Post Pandemic

- How would you rate vaccine and supply delivery from NYS?

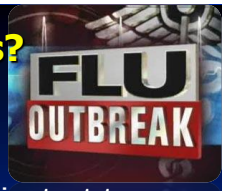


US Hospitals unable to vaccinate workers (H1N1)



Materials Management in Healthcare, AHRMM and APIC: July 2010

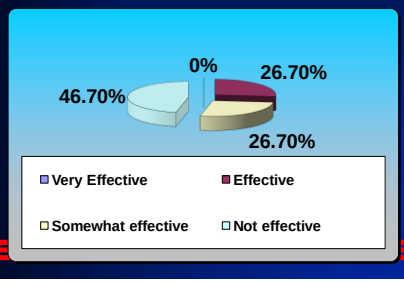
Communications?



- Generally poor
  - Feds did not pass information to states
  - States did not funnel info to counties
  - Localities were forced to "wing it"
  - Employers lacked reliable/credible info
  - Employees forced to "wing it"
- Frequent misinformation from feds

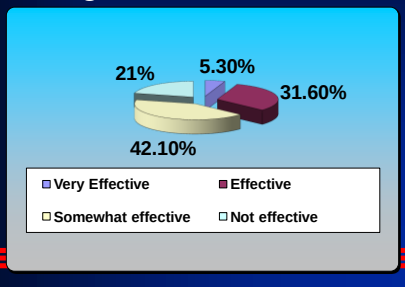
NYS DOH Post Pandemic

- How effective were State agencies at providing information/direction?



NYS DOH Post Pandemic

- How effective were Federal agencies at providing information/direction?



Public Safety Oversight

Does your 911 center question callers about severe respiratory illness?

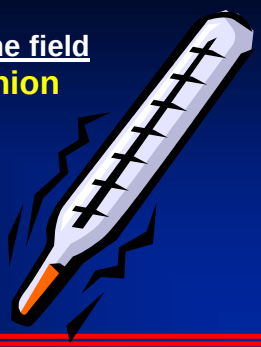
Infection Key:

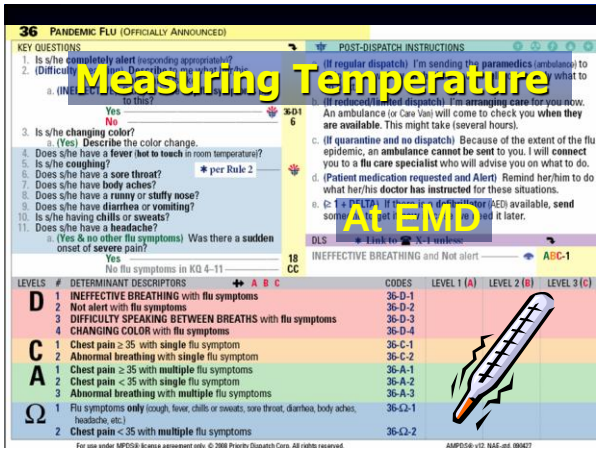
- High Fever
  > 100° F

Measuring Temperature

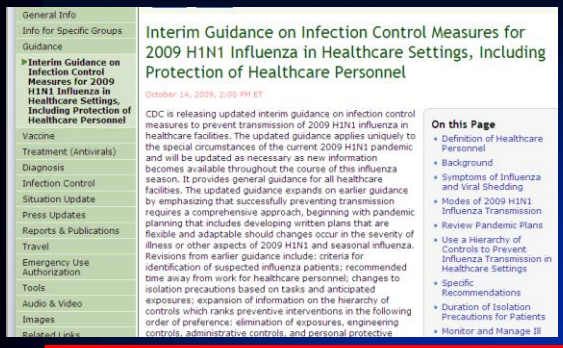
Prehospital – in the field

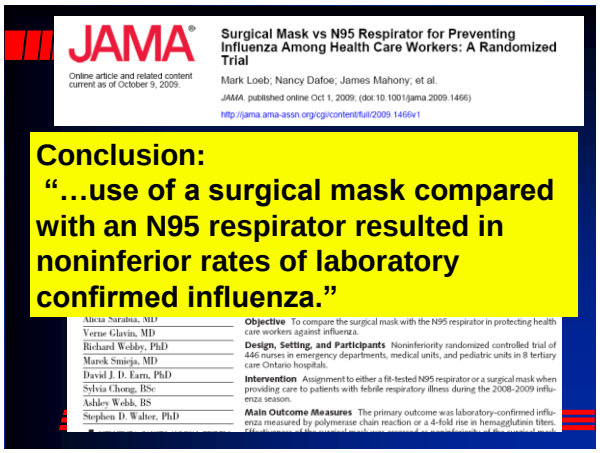
1. Patient opinion





CDC: Guidance Document





OSHA: H1N1 Inspections

CDC: Dental Offices

What to advise the public:

- Wash your hands
- Cover your cough
- If you're sick, stay home
- Be prepared:
  - Get a flu shot every year
  - Stay rested and eat a healthy diet
  - Keep supplies on hand for self & family

Who's Watching the Farm?

H1N1 could have been detected 6-8 months earlier with better surveillance.

H1N1 Lessons (so far):

1. Pandemic plans need work
2. Vaccination is our best weapon
3. HCW don't "get" infection control
4. Communication is key
   - Need credible info & SA systems
5. Supplies must be stockpiled
6. We have not been watching pigs

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Questions?

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