

Novel Influenza H1N1 in Children
 Lessons Learned and Strategies for the 2009-2010 Season
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H1N1 and Children - Themes

- Novel virus with ability to cause an explosive outbreak in school or community setting
- Epidemiology in children
 - High attack rate of ILI, mostly mild
 - Rate of hospitalization and death similar to seasonal influenza but numbers higher due to AR
 - Effects on fetus and neonate not known
- Underlying conditions important risk factors
- Vaccination, early empiric Rx critical to preventing serious outcome (no point of care test)
- School closures
- ED overuse major problem
- Health care and medication access

Apr 27, 2009 6:01 am US Eastern

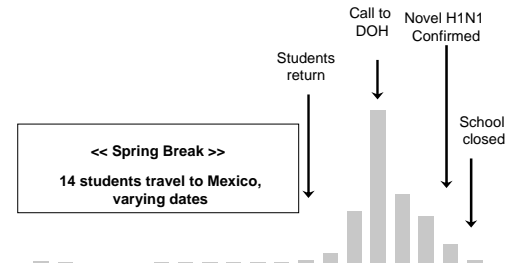
CONFIRMED: Swine Flu Outbreak At Queens School
 Department of Health Tests Students At St. Francis Prep In Queens, Examine Travel Histories

QUEENS (CBS) — Mayor Bloomberg announced in a news conference Sunday morning that the Centers for Disease Control confirm ed cases of swine flu in a Queens school.

Reporting: Dave Cahn

The mayor said St. Francis Preparatory School will be closed on Monday, and asked students, faculty and staff at the school who are feeling flu-like symptoms to stay home for at least 48 hours.

Epidemic Curve



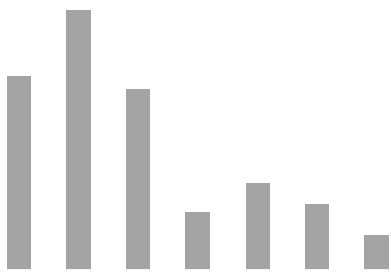
St. Francis Prep

- Novel virus with ability to cause an explosive outbreak
- School closed for one week (April 27 – May 3)
- Novel H1N1 confirmed in 124 students/staff
 - Most disease was mild
 - No severe hospitalized or fatal cases
- Estimated ill: 900 students, 30 staff

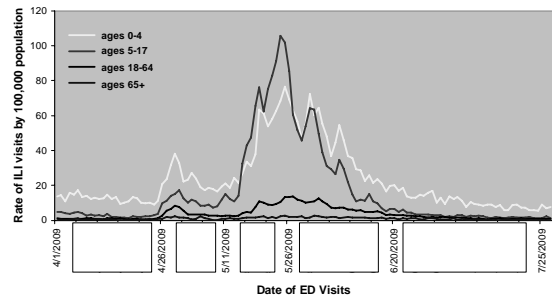
St. Francis Prep

- NYC DOH conducted two on-line surveys
 - Student (N~2700): Attack rate: 35%
 - 82% reported illness onset between April 22-25th
 - Faculty/staff (N~300): Attack rate: 10%
- CDC-NYCDOH Household transmission study showed secondary attack rate of 11.3%

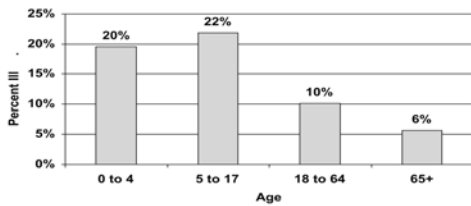
Attack Rates in Household Members Declined with Age
St. Francis Prep Outbreak



Rate of Influenza-like Illness (ILI) Syndrome Visits to NYC Emergency Departments by Age Group April 01, 2009 - July 27, 2009



12% of New Yorkers Reported Flu-Like Illness in May - June 2009

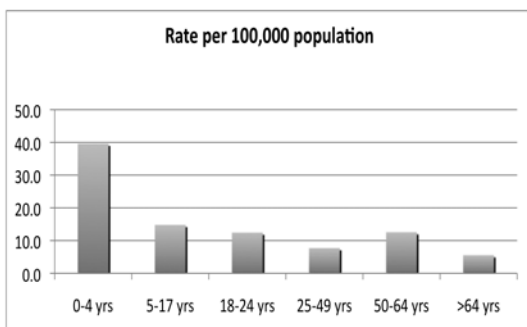


Illness by self report in telephone survey of 961 households, conducted June 15-20, 2009

Severe H1N1 Surveillance Findings, NYC, Spring 2009

- Triaged > 2600 reports – 1,317 total confirmed cases
- 929 confirmed hospitalized cases – Median age 23 yr
 - 0-4 years: 224 (23%)
 - 5-17 yrs: 197 (20%)
 - 18-24 yrs: 100 (10%)
 - 25-64 yrs: 419 (42%)
 - > 65 yrs: 56 (6%)
- Severity by ICU stay (25%), ventilator status (14%) and deaths (n=47)
- 4% of all hospitalized flu A cases tested (+) for seasonal influenza (H3N2)

Rates of Hospitalization for Confirmed or Probable Novel H1N1, NYC Spring, 2009

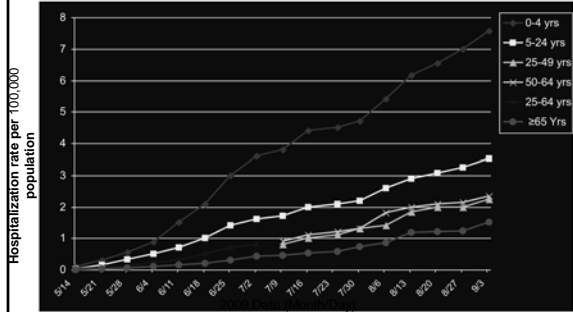


Percent Population Below Poverty Line

Poverty Rate by zipcode*	Hospitalized H1N1 patients	Citywide
High (> 30% below)	42%	23%
Medium High (20-29.9% below)	20%	24%
Medium Low (10-19.9%)	26%	33%
Low poverty (< 10% pop below poverty)	12%	20%

*Source 2000 Census

Cumulative Hospitalization Rates per 100,000 US population from State Aggregate Data



*Hospitalizations with unknown ages are not included
 *Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at: <http://www.census.gov/sopest/national/ash/files/NC-EST2007-ALldata-R-File24.csv>

Severity of Illness, Confirmed and Probable Novel H1N1 Influenza, Hospitalized Cases NYC, Spring 2009

	Age Group			
	0-4 yrs	5-12 yrs	13-17 yrs	18 and over
Hospitalized patients	224	135	62	996
ICU admission	38 (13%)	36 (13%)	12 (4%)	237 (24%)
Required mechanical ventilation	14 (5%)	11 (4%)	3 (1%)	131 (13%)

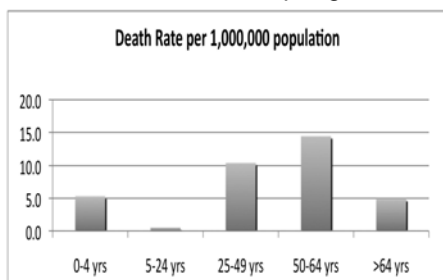
Clinical features of Novel H1N1

- Mild Illness
 - Symptoms similar to seasonal influenza
 - Slightly more GI symptoms
 - Fever may be absent
- Severe illness
 - Primary viral pneumonitis
 - ARDS
 - Superinfection with *S. pneumo*, MRSA, GAS
- Pathology – lower airway involvement

Fatal H1N1 Surveillance, NYC As of July 7, 2009 (n=47)

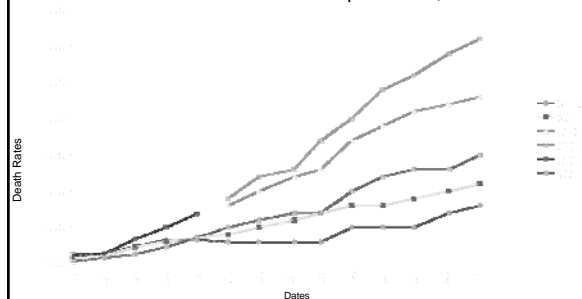
- 45 (96%) fatal cases < 65 years
 - Median age: 43 years
 - Age range: 7 weeks – 82 years
- 89% had underlying risk condition

Rates of Death due to Confirmed or Probable Novel H1N1, Spring 2009, NYC

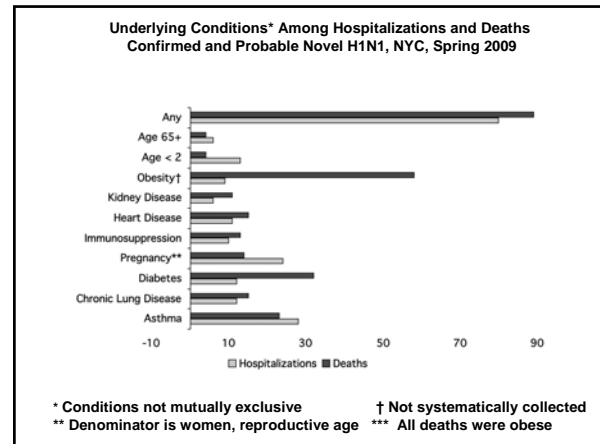
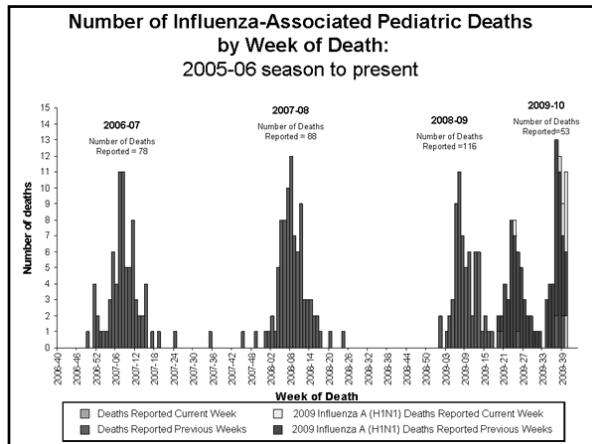


Median age of deaths = 43 yrs (range 7 wks – 82 yrs)
 CFR unquestionably less than 0.1%

Cumulative Death Rates per 100,000 US population from State Aggregate Data by Age Group 2009-H1N1 – June 4 to September 3, 2009



*Hospitalizations with unknown ages are not included
 *Rate / 100,000 by Single Year Age Groups: Denominator source: 2008 Census Estimates, U.S. Census Bureau at: <http://www.census.gov/sopest/national/ash/files/NC-EST2007-ALldata-R-File24.csv>



Underlying Medical Conditions, Deaths due to Confirmed Novel H1N1 Influenza Spring 2009

	NYC (all ages, N=47)	US (age < 18 yrs, N=36)
Obesity	58%*	N/A
Asthma, COPD and/or other chronic lung disease	38%	28%
Diabetes	32%	6%
Immunosuppression	28%	6%
Heart disease	15%	8%
Neuromuscular or Cognitive	4-10%	61%
NONE	11%	33%

•Among obese, 60% were morbidly obese. An additional 16% were overweight.
 •Conditions listed above are not mutually exclusive.
 •Data are preliminary, as of 9/10/09

- ### Pediatric Deaths due to H1N1, Spring 2009
- MMWR – US case series, 36 deaths
 - 10 (19%) < 5 yrs
 - 7 (14%) < 2 yrs
 - 43% had bacterial infection
 - More common among children > 5 with no risk factors
 - S. pneumo, S. aureus (MRSA), GAS
 - Only 13% had antivirals within 2 days after admission to the hospital

- ### Important underlying conditions for pediatric patients - AAP
- Neurologic disorders
 - Seizures, CP, MR/DD
 - Neuromuscular
 - Asthma or other chronic lung disease
 - Severe persistent
 - Oxygen, trach or vent dependent
 - Immune deficiencies due to disease or meds
 - Congenital heart disease, metabolic or endocrine disorders

- ### Public Health Messages in the Spring
- Stay home if ill, cover cough, hand hygiene
 - No Rx needed if mild illness and not in underlying risk group (2 vs. 5 yrs)
 - Early Rx needed if in risk grp or severe illness

Public Health/Clinical Issues in the Spring

- Confusion re. need for testing (pts and providers)
- Unclear initially if bacterial co-infection important
- Special pediatric issues
 - EUA
 - Dosing, compounding, availability of oseltamivir (zanamavir not approved under age 7 or with asthma)
 - Management of newborns with mothers with ILI

School Closures



- 1,579 public schools, 1.1 million children
- 57 schools closed to prevent transmission to those at high risk *in that school community*
- Decisions based on trends in ILI nurse visits (sustained or sudden increase), absenteeism and special considerations
- Challenges:
 - Data collection and interpretation
 - Infection control

Effect of Spring School Strategy

- Probably some reduction in infections
- Disadvantages
 - Caused community alarm
 - Disruption of school schedule/education
 - Economic impact on family and workplace due to missed work
 - Impact on other child services
 - Risks of unattended children
- Mixed public messages
 - Similar to seasonal flu, but why are schools closing?
- Likely contributed to overwhelming of ED's

Healthcare Issues

- Some ED/clinics saw ~ 200% increase in # patients
 - Worst for pediatric ED's – up to 5x normal volume
 - Impact on wait times, staff stress and burn-out, infection control
 - Many needed to implement their mass screening and isolation protocols ("Flu Clinics")
 - Set up telephone triage systems
- Reasons for ED visit
 - Wanted testing, meds, diagnosis, MD note, reassurance
 - Inability to see primary care providers
 - Access to care or ability to afford antivirals
- Antiviral supply issues – esp. pedi oseltamivir

Strategies for the 2009-2010 Season

- Vaccination
- Base clinical decisions on local surveillance data – do not wait for test results
- Early empiric antiviral Rx for pts in risk grps and anyone with severe illness
- Open school policy
- ED preparedness – alternate care sites
- Improve access to care and medications for under- and uninsured
- Infection control – home and health care
- Website, subway ads, media to communicate to public

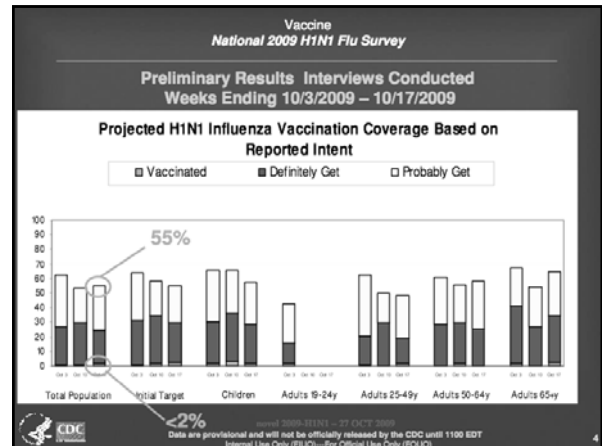
H1N1 Vaccine Recommendations*: Priority Groups

- Pregnant women
- Children and young adults 6 months through 24 years of age
- Adults 25 through 64 years of age with underlying medical conditions
- Health care workers and EMS
- Household contacts and care givers of children <6 months of age

* CDC, MMWR August 28,2009/Vol. 58/No. RR-10

School Vaccination Plan

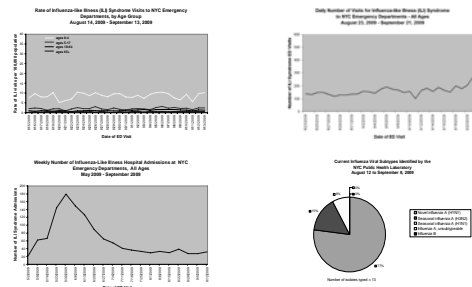
- Goal to Provide H1N1 vaccines to school age children
 - Purpose: prevent illness in children and in people to whom they might spread it
- Changes possible depending on vaccine availability and timing of virus activity
- Current plan:
 - On-site vaccination in elementary schools
 - Weekend vaccine clinics where parents can bring school-age children
 - Late October - December
 - Voluntary: vaccine only given with parental consent



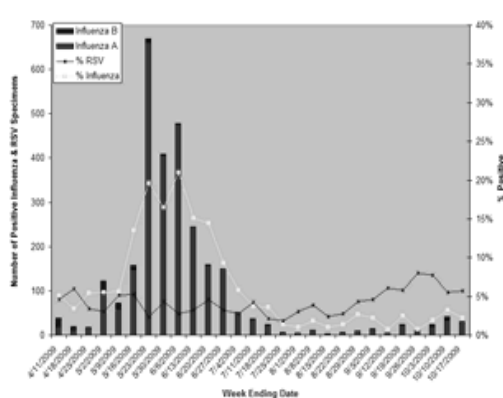
Influenza Assumptions Fall/Winter 2009 – 2010

- Both seasonal influenza and H1N1 will circulate, may overlap
- H1N1 not likely to cause high rates of severe illness
 - Virus has not changed since spring
- Number of people ill cannot be predicted
- Date of first cases cannot be predicted – now likely to be early in season
- Other viruses likely to circulate and cause ILI (esp. RSV)

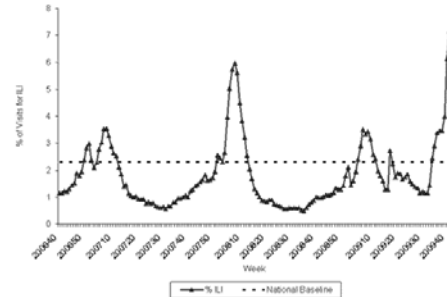
Weekly Surveillance Updates at www.nyc.gov/flu

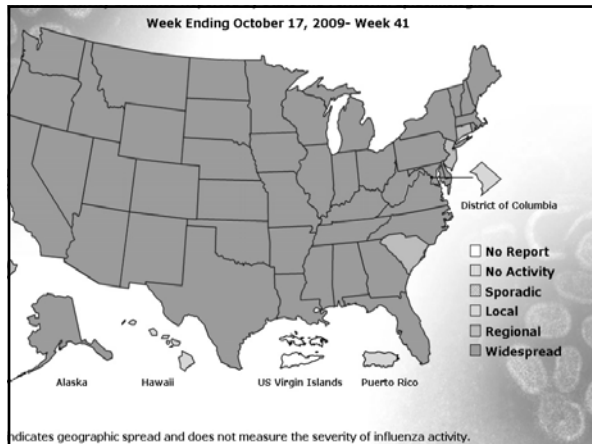


Influenza and RSV Testing, April 11-October 17, 2009



Percentage of Visits for Influenza-like Illness (ILI) Reported by the U.S. Outpatient Influenza-like Illness Surveillance Network (ILINet), Weekly National Summary, October 1, 2006 - October 17, 2009



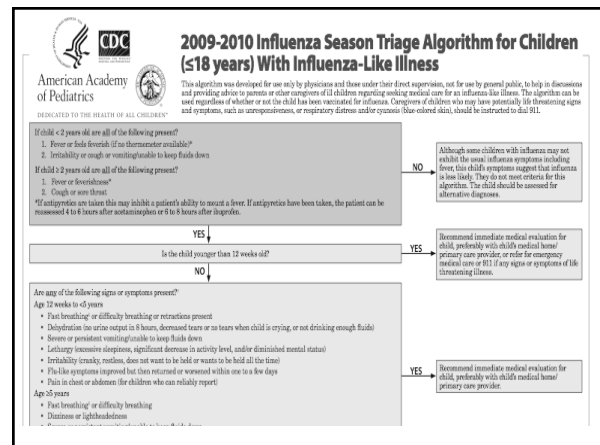


Clinical Management of Suspected Influenza

- Mild ILI, no risk factors
 - No need to test (rapid EIA insensitive, other methods not widely available and TAT likely too long for most pts)
 - No need to treat
 - Stay home until 24 hrs after fever resolves
- Mild ILI, risk factors
 - No need to test
 - TREAT as early as possible with antivirals
 - Stay home, seek care if worse
- AVOID GOING TO ER

Clinical Management of Influenza During Influenza Season

- For patients with underlying medical conditions
 - Advise patients to call right away if they become ill with ILI
 - Make staff available to consult by phone
 - Consider offering Rx to have on hand
- Severe illness
 - Pt should go to ED
 - Empiric antiviral Rx; consider empiric antibiotics
- Clinicians should look for info at www.nyc.gov/flu

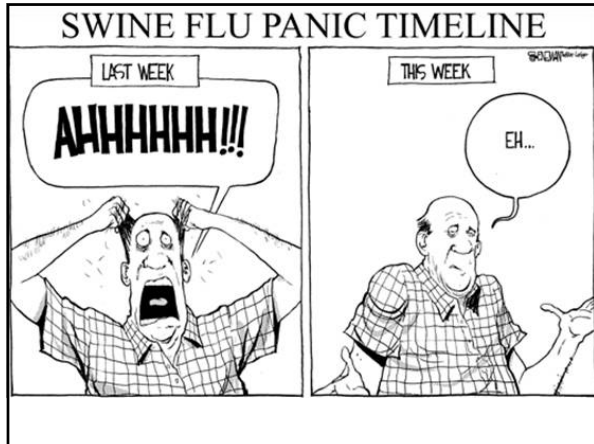


Open Schools Policy

- Emphasis on preventive measures
 - Education program for students on hand and respiratory hygiene
 - Parents should keep kids home from school if they have a fever and cough or sore throat
 - H1N1 vaccinations available with parental consent
- Frequent communication with parents
- Post daily updates on ILI activity and absenteeism by school at www.nyc.gov/flu
- Active on site assessments for schools with increasing/persistent ILI

Limiting Health Care Surge

- Public messages
 - Medical visits not needed for questions, doctor notes, mildly ill
 - Health Bulletin, subway ads, radio spots
- Medical call center with nurse advice line
- Alternate treatment sites
 - Community health centers
 - HHC flu centers
- Hospital ED surge plans
- Free antivirals for under- and uninsured



Public Health is a Partnership

- Website portal: www.nyc.gov/flu
- Provider Access Line 1-866-NYC DOH1
- Register for our NYC Health Alert Network at www.nyc.gov/health/nycmed
- To become eligible to receive/offer H1N1 vaccine register with the Citywide Immunization Registry (CIR) at:
 - www.nyc.gov/html/doh/html/cir/a03c.html
 - Or by calling 212-676-2323

Acknowledgments



Thanks to the hundreds of people who were part of the NYC DOH 2009 Swine Influenza Investigation Team and to all of the providers and institutions in NYC who reported cases and responded to the outbreak.

Thank you!

