

Learning from 2009 H1N1 about Public Health Surveillance

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Research Question

- What can we learn about the public health surveillance's *response capabilities* from 2009 H1N1?
 - Outbreak detection
 - Characterization of
 - Severity
 - Who's at risk
 - Situational awareness
- Beyond *preparedness capacities*
- Not H1N1 epidemiology



Did Developments in Global Surveillance and Notification Systems Make a Difference?

- Enhanced lab capacity in US and Canada led to earlier identification of novel H1N1
 - Early characterization of viral strain → earlier development of pandemic vaccine
- Improved global notification systems led to earlier detection and characterization of the outbreak
- Syndromic surveillance systems did not contribute to detection of the outbreak
 - Too few insufficiently differentiated cases during normal flu season



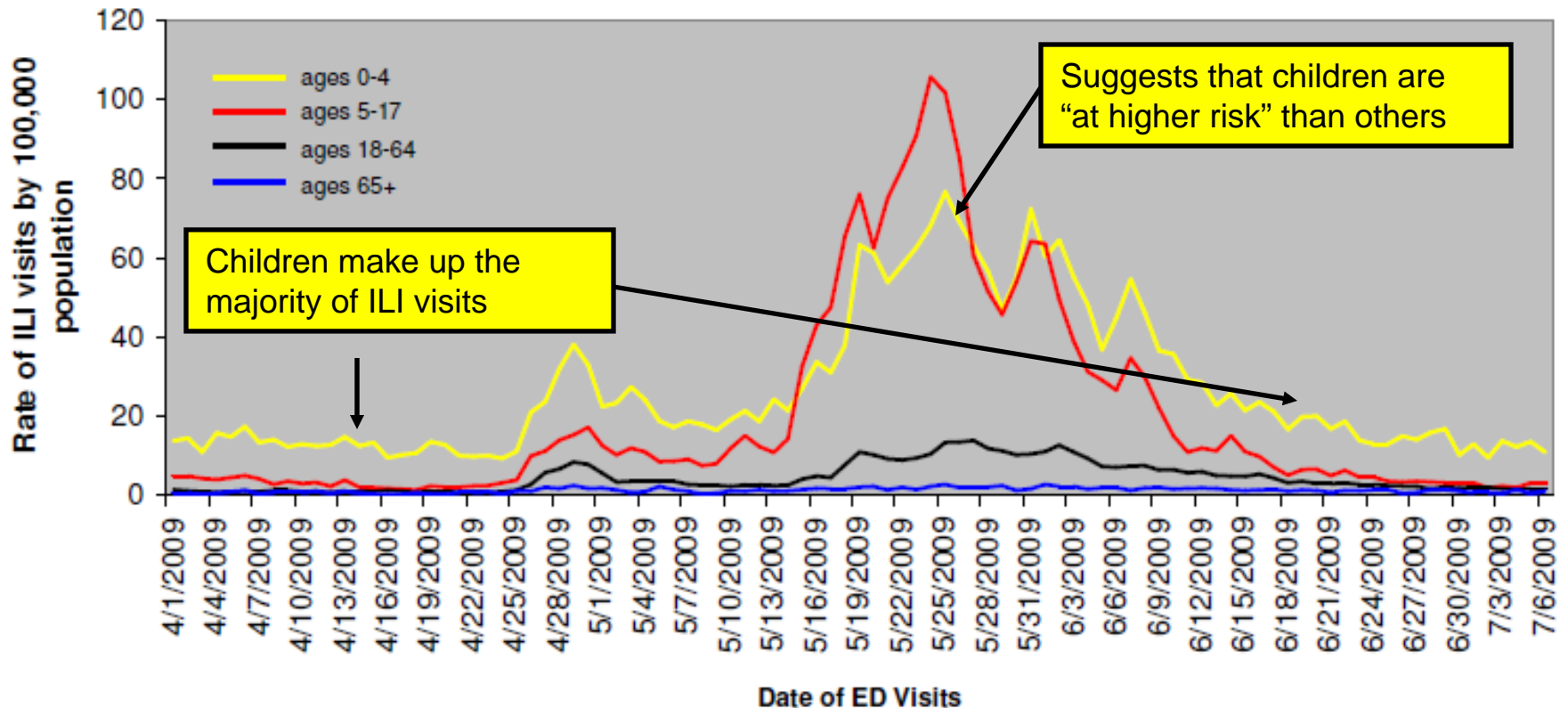
How Severe is the 2009 H1N1 Outbreak?

- Severity =
 - Virulence (case fatality rate, etc.) (CDC)
 - Speed/extent of spread through the globe (WHO)
- Case definition and ascertainment
 - Mexico: surveillance concentrated in hospitals
 - U.S.: testing focused on travelers, hospitalized patients, clusters of respiratory illness
- Focus on ascertainment of serious cases → higher apparent case fatality rate
 - especially for Mexico

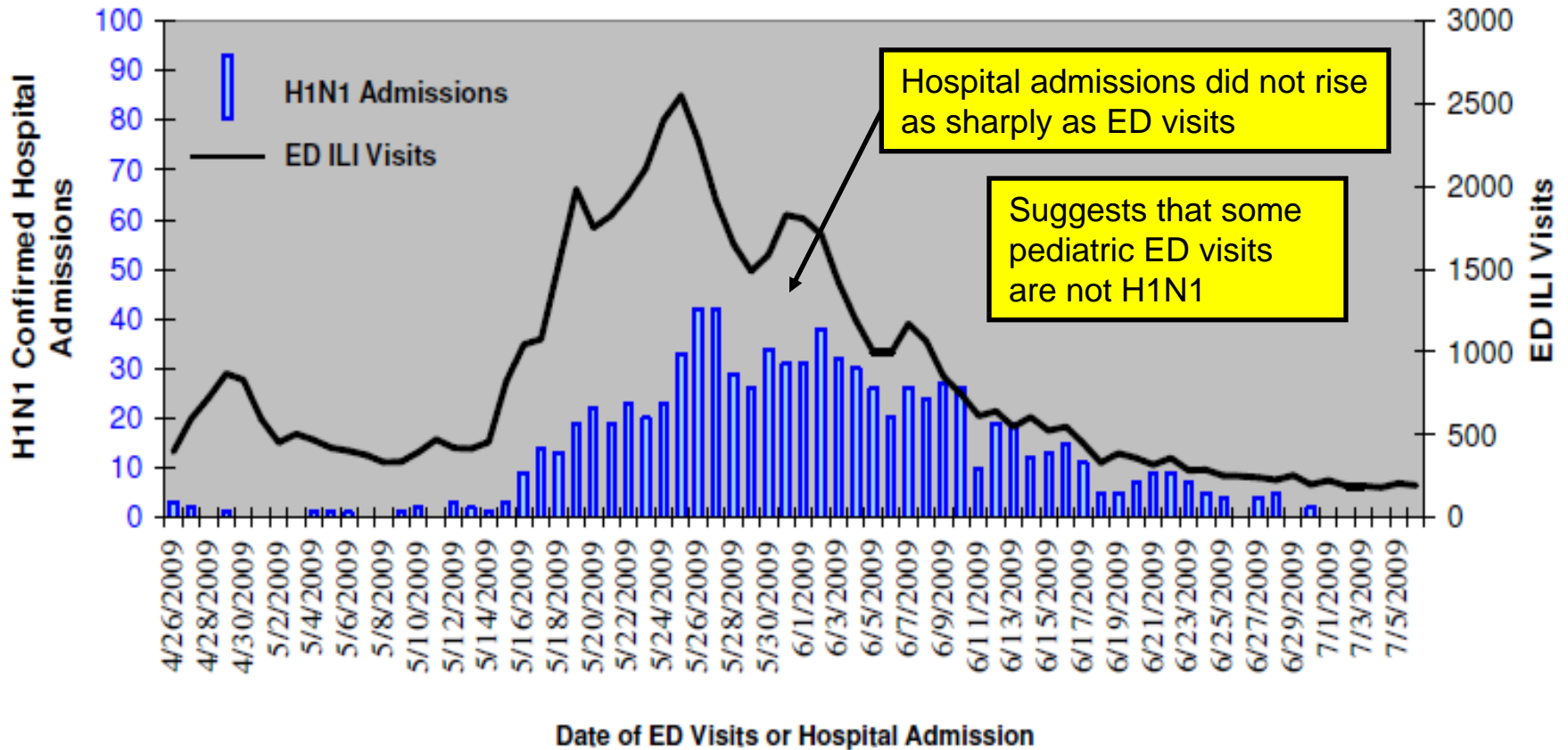


Are Children and Young Adults More Likely to be Affected?

Rate of Influenza-like Illness (ILI) Syndrome Visits (based on chief complaint) to NYC Emergency Departments by Age Group
April 01, 2009 - July 06, 2009



Laboratory Confirmed H1N1 Hospital Admissions and Emergency Department (ED) Visits for Influenza-like Illness (ILI) in NYC April 26 - July 06, 2009



2009 H1N1-related incidence, hospitalizations and deaths rates, U.S. April 2009 – Jan. 16, 2010

Age	Attack rate (%)	Hospitalizations per 100,000	Deaths per 100,000	CFR
0-17	23.4	104.0	1.56	0.007%
18-64	17.5	79.2	4.72	0.027%
≥65	14.2	65.4	3.88	0.027%
Total	18.6	83.8	3.81	0.020%

Source: Author's calculations based on CDC EIP program estimates

Linking Assessment and Measurement to Performance in PHEP Systems

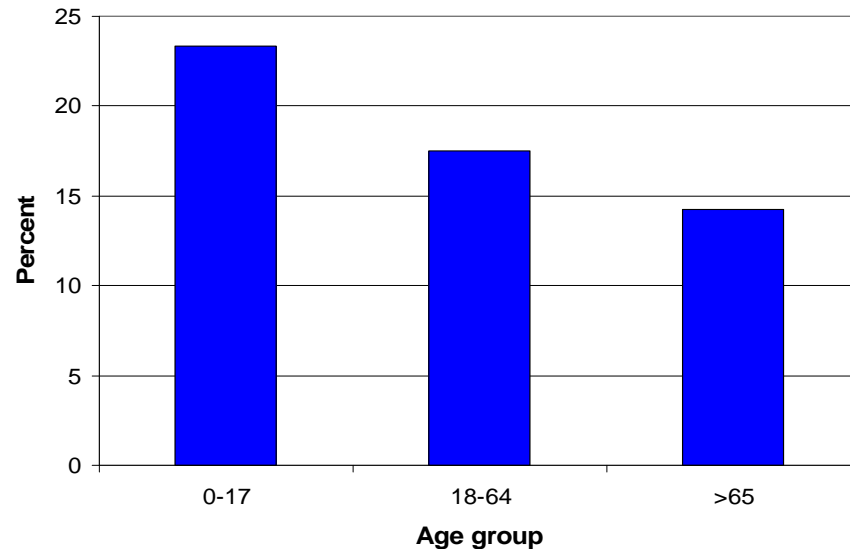


2009 H1N1-Related Deaths, Hospitalizations and Cases

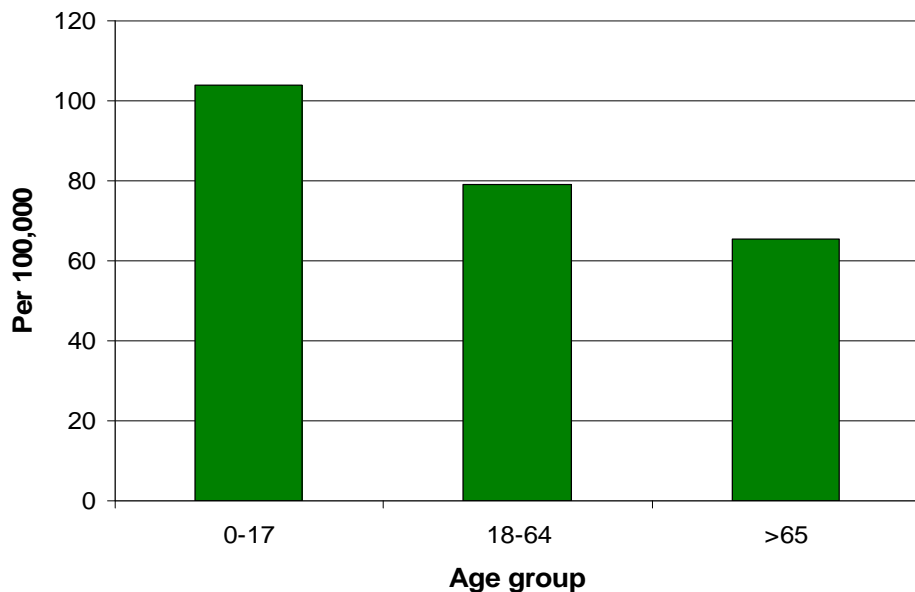
U.S. April 2009 – Jan. 16, 2010

Source: CDC EIP program estimates

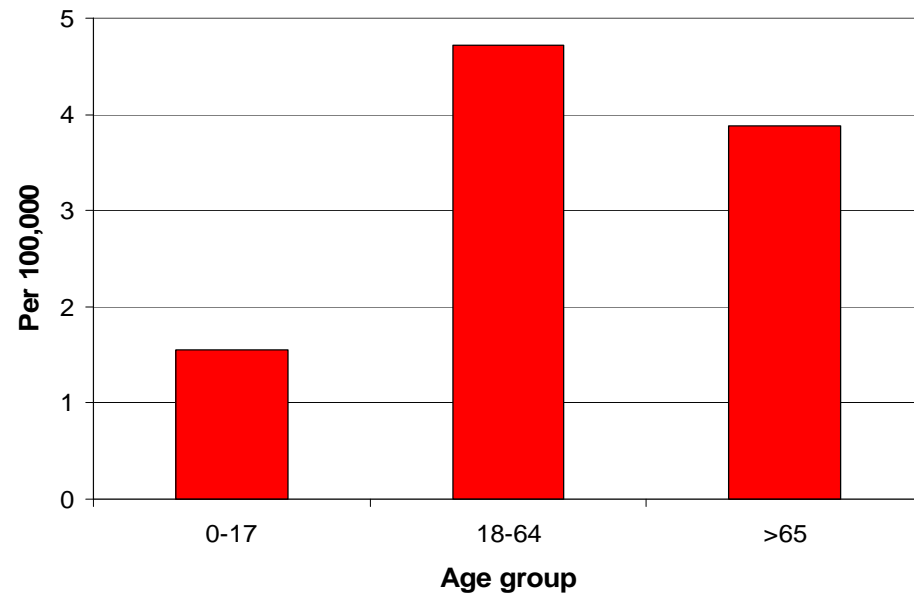
Attack rate



Hospitalizations



Deaths



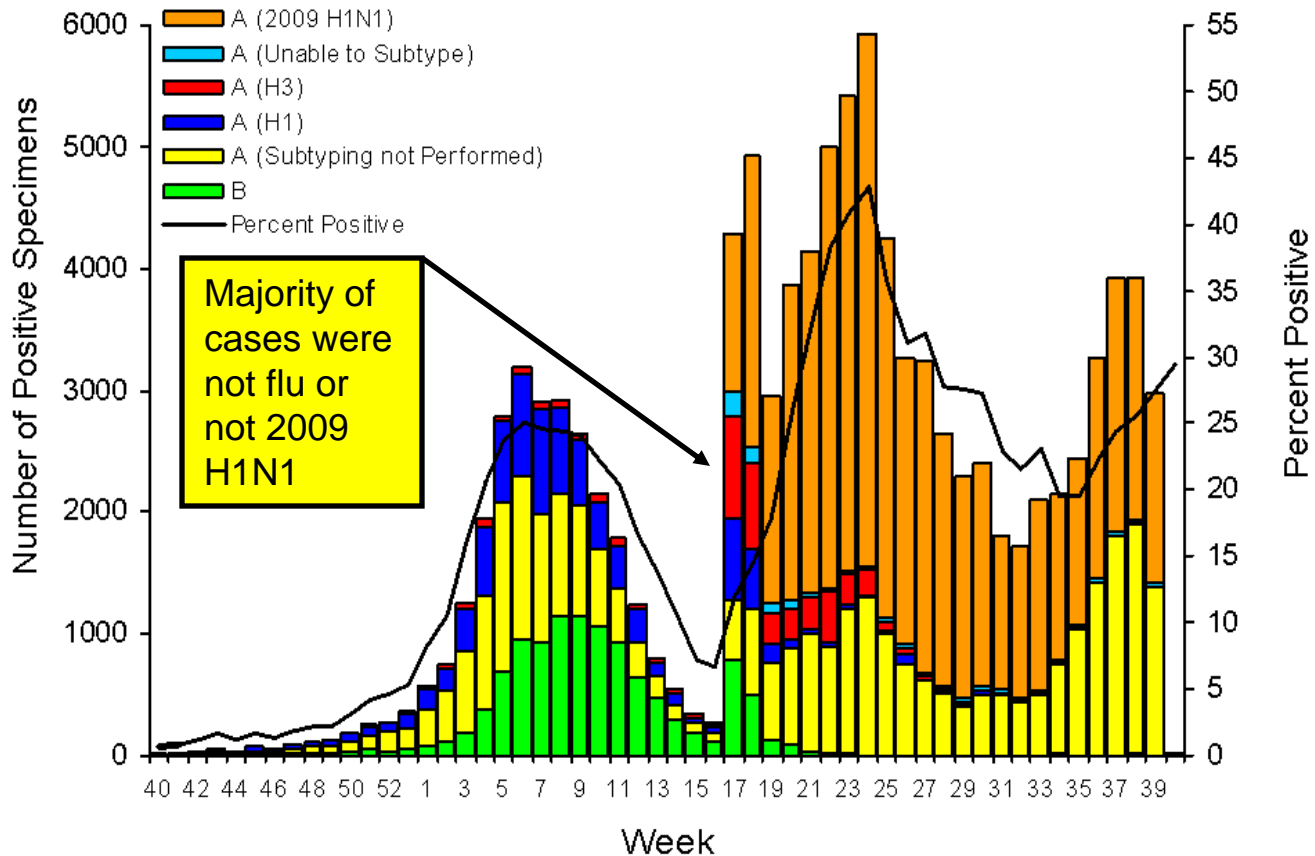
Are Children and Young Adults More Likely to be Affected?

- Most available data subject to two biases
 - ↑ in children due to illness not otherwise treated
 - ↓ older adults due to cases not tested
- Two different risks in question
 - incidence (risk of becoming infected) ✓
 - severity (risk of suffering consequences such as severe illness requiring hospitalization or death) ?
- Biased reporting (e.g. CIDRAP 10/8/09)
 - “reports published by the *NEJM* ... generally confirm previous findings that most of them occur in non-elderly people who have chronic health conditions”



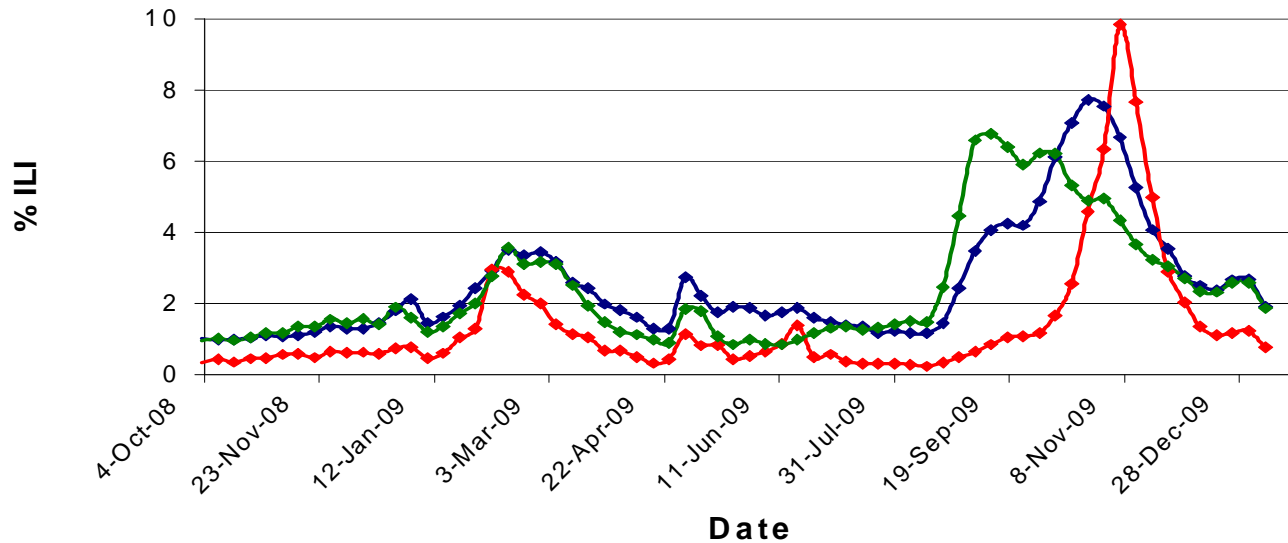
Does Syndromic Surveillance Work Better for Situational Awareness?

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



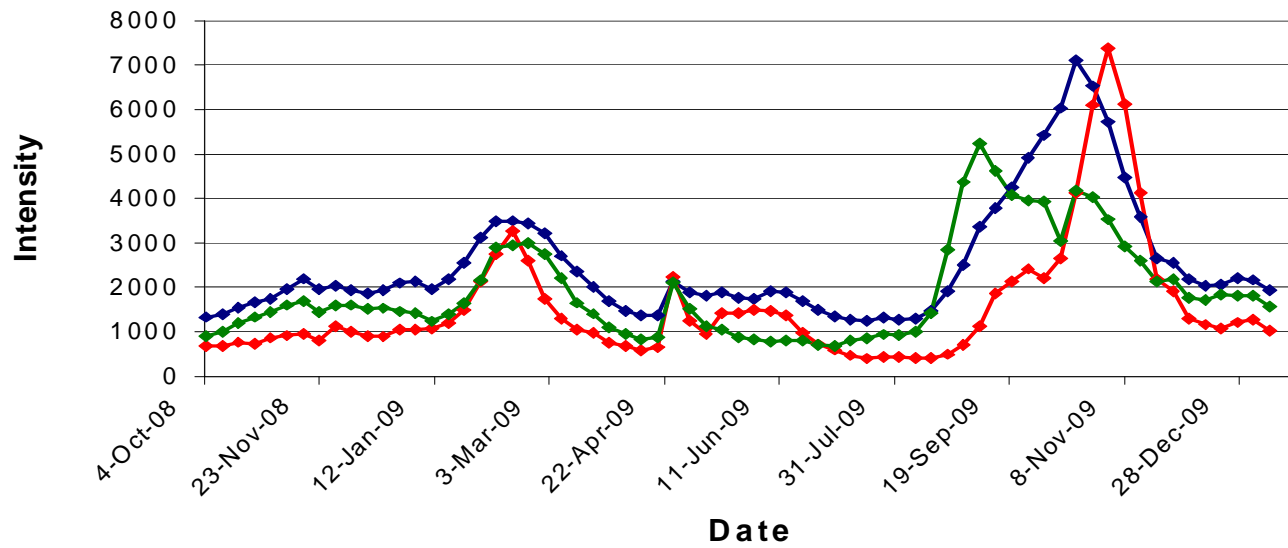
Since early May (week 17), lab testing not recommended unless needed to guide clinical decisions

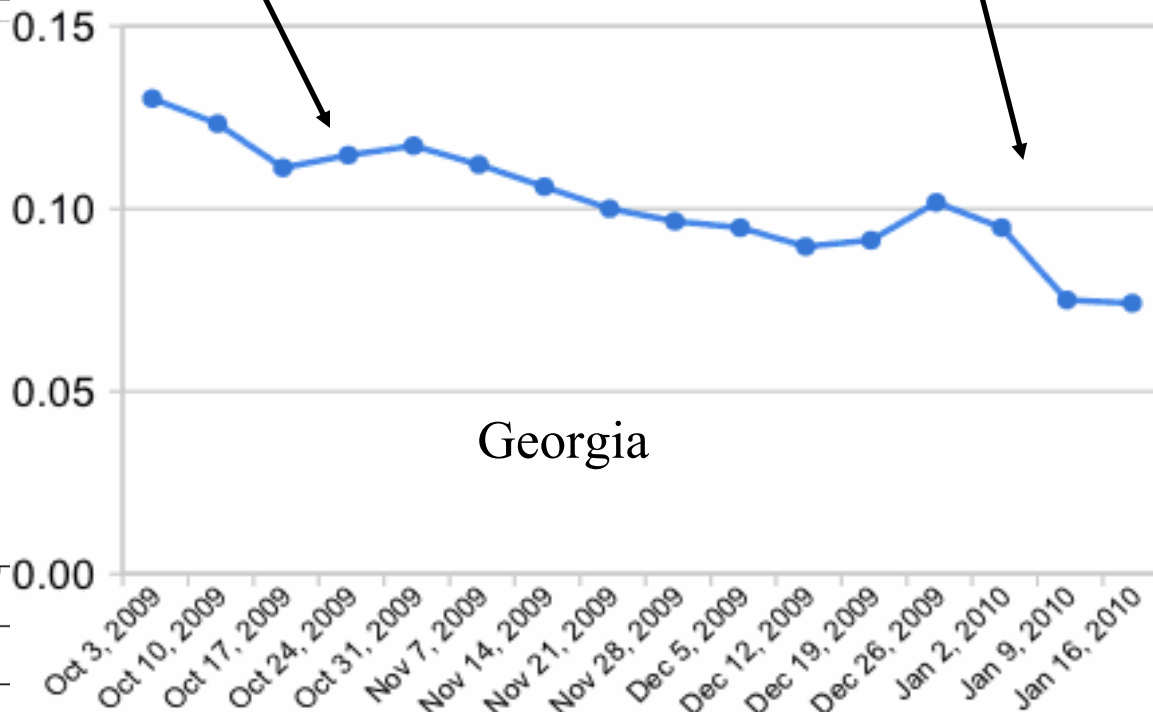
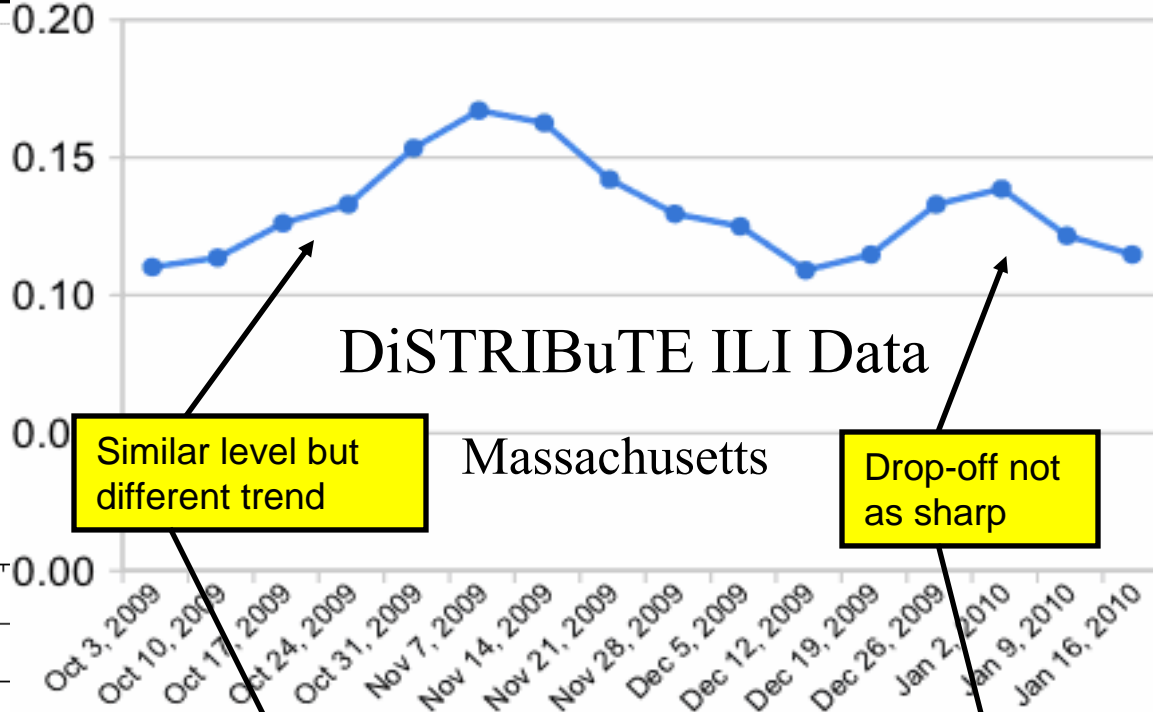
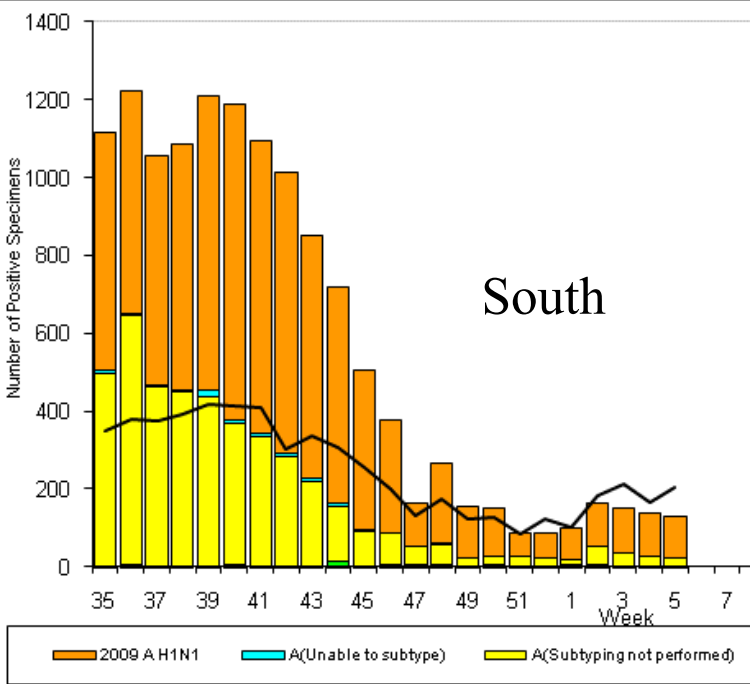
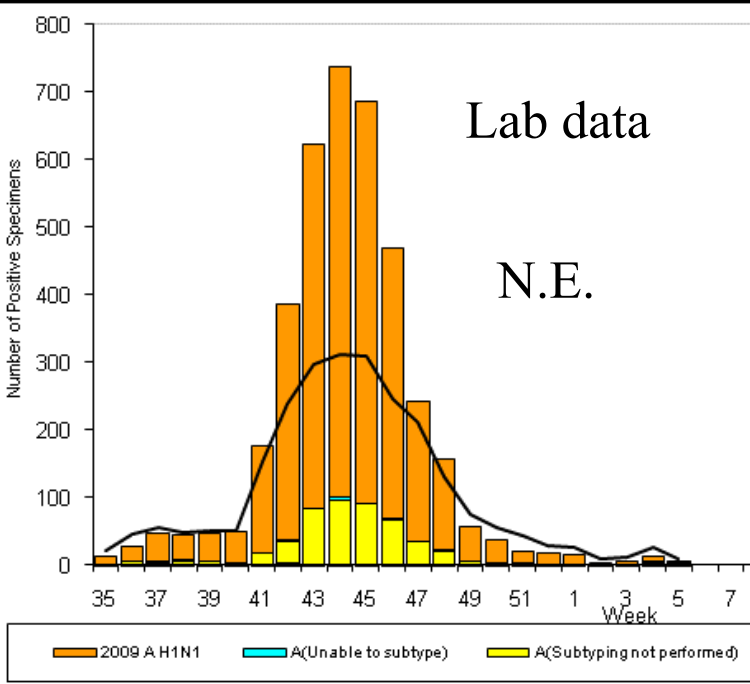
CDC ILINet



Remarkable similarity nationally and regionally

Google Flu Trends





Does Syndromic Surveillance Work Better for Situational Awareness?

- Case-based surveillance depend on
 - Case definitions and ascertainment
 - Patients' decisions to seek care
 - Physicians' decisions to test
 - Laboratory capacity
 - Media and official recommendations
- All change over time → surveillance “artifacts”
 - Reporting cumulative numbers reflects the testing process rather than the underlying epidemiology
- Possible solutions: population-based statistical approaches rather than case reporting
 - Self-reported symptoms
 - Serological surveys



Surveillance and Epidemiology: What can we learn from H1N1?

- Challenges of early detection in the “fog of war”
 - Outbreak of a new pathogen is intrinsically characterized by uncertainty that takes weeks to months to resolve
 - → expect uncertainty
- Limitations of case-based surveillance for characterizing severity, populations at risk, and situational awareness
 - Population-based statistical surveillance
- Measuring public health system’s capability to detect outbreaks and characterize pathogen goes beyond current surveillance and lab capacity measures

Acknowledgements

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