Learning from 2009 H1N1 about Public Health Surveillance

4th National Emergency Management Summit
March 3, 2010

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Linking Assessment and Measurement to Performance in PHEP Systems
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 \(\rightarrow\) higher apparent case fatality rate
  - especially for Mexico
Are Children and Young Adults More Likely to be Affected?

Suggests that children are “at higher risk” than others.

Children make up the majority of ILI visits.
Hospital admissions did not rise as sharply as ED visits

Suggests that some pediatric ED visits are not H1N1

<table>
<thead>
<tr>
<th>Age</th>
<th>Attack rate (%)</th>
<th>Hospitalizations per 100,000</th>
<th>Deaths per 100,000</th>
<th>CFR</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-17</td>
<td>23.4</td>
<td>104.0</td>
<td>1.56</td>
<td>0.007%</td>
</tr>
<tr>
<td>18-64</td>
<td>17.5</td>
<td>79.2</td>
<td>4.72</td>
<td>0.027%</td>
</tr>
<tr>
<td>&gt;65</td>
<td>14.2</td>
<td>65.4</td>
<td>3.88</td>
<td>0.027%</td>
</tr>
<tr>
<td>Total</td>
<td>18.6</td>
<td>83.8</td>
<td>3.81</td>
<td>0.020%</td>
</tr>
</tbody>
</table>

Source: Author’s calculations based on CDC EIP program estimates
2009 H1N1-Related Deaths, Hospitalizations and Cases
Source: CDC EIP program estimates
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.

Majority of cases were not flu or not 2009 H1N1
Remarkable similarity nationally and regionally
Massachusetts

Lab data

N.E.

DiSTRIBuTE ILI Data

Similar level but different trend

Massachusetts

Drop-off not as sharp

South

Georgia

Similar level but different trend

Drop-off not as sharp
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
  - \(\rightarrow\) 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

This presentation was developed in collaboration with a number of partnering organizations, and with funding support awarded to the Harvard School of Public Health Center for Public Health Preparedness under cooperative agreements with the US Centers for Disease Control and Prevention (CDC) grant number 5P01TP000307-01 (Preparedness and Emergency Response Research Center). The content of this presentation as well as the views and discussions expressed are solely those of the authors and do not necessarily represent the views of any partner organizations, the CDC or the US Department of Health and Human Services nor does mention of trade names, commercial practices, or organizations imply endorsement by the U.S. Government.