Exploring Changes in Disease Surveillance Data in Massachusetts

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Denver, CO
Presentation Outline

- Introduction & Background
- Goals & Objectives
- Dataset Preparation
- Summary & Discussion
- Questions
Approximately 80 reportable diseases
- ~150,000 annual events

Massachusetts lacks an active county system
- 351 cities/towns with legal disease surveillance responsibility

State Dept of Public Health (DPH) has “coordinate” role
- Oversight & advisory with some direct follow-up responsibility

Rolled out MA Virtual Epidemiology Network “MAVEN”
- Online Disease Surveillance & Case Mgmt System in 2007 to help coordinate & manage activities & communications
Disease event “life-cycle”
(simplified communication “loop”)

- **Creation**
  - Event first received @ DPH
  - ELR/FAX/Mail

- **Notification**
  - Required notification sent to city/town

- **Completion**
  - Local staff investigate and complete follow-up

- Distilling & quantifying this cycle lets us describe “how we’re doing”
Before MAVEN…

- Historically paper-based system
  - Mail / FAX / Phone / Electronic
  - Satellite databases for each program or project
  - Lacking centralized & standardized communications & workflow
After MAVEN…

“MAVEN” Online Disease Surveillance & Case Mgmt System
- Centralized database and communications hub
- Inbound data “feeds” all flow into single web-accessible system
- Outbound communications branch off (no mandate):
  - Online towns get email/pages and log into system
  - Offline towns get faxes and paper-mail

Provider Information
Rapid Influenza Test Data:
Record date of birth, zip code, and influenza type for each patient with a positive rapid influenza test in the last week. If patient was hospitalized or died from influenza mark the corresponding box. Use additional pages if needed.

Specimens collected for week ending Saturday:

Massachusetts Department of Public Health
Bureau of Communicable Disease Control
305 South Street, Jamaica Plain, MA 02130
Phone: 617-983-6801 Confidential Fax: 617-983-6220

Rapid Influenza Diagnostic Testing Report Form

<table>
<thead>
<tr>
<th>Pt</th>
<th>Date of Birth</th>
<th>Patient Zip Code</th>
<th>Flu Type</th>
<th>Hospitalized/Flu Death</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Avoid contact with the edges of the box.

Please print carefully and use additional pages if needed.

Rev. 09/2005 Draft
Rolling out MAVEN (2007-2009)
Project Goals & Objectives

- Bigger picture:
  - Build a framework for on-going system monitoring and evaluation.
  - Provide decision-makers with actionable information for system development and improvement

- Smaller picture:
  - Evaluate disease event life-cycle & communication channels
    - First: quantify & describe the percentage & timeliness of event notification and completion
    - Explore any possible association between MAVEN participation & these performance measures
Dataset Preparation

- **Data Extract**
  - Disease events created 2007-2009.
  - Variables:
    - City/Town
    - Creation <date>
    - Notification <y/n, date>
    - Completion <y/n, date>
  - Only selected* diseases

- **Analysis Dataset**
  - Aggregated by Month and/or City-Town
    - Total Events <N>
    - Notification <%>
    - Completion <%>
    - Avg. Time-to-Notification <wks>
    - Avg. Time-to-Completion <wks>

*Many diseases are not reportable nor the responsibility of local boards of health*
## Overall: Annual Trends

<table>
<thead>
<tr>
<th></th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>% Change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Events</strong></td>
<td>7345</td>
<td>7393</td>
<td>7317</td>
<td>0.00%</td>
</tr>
<tr>
<td><strong>Notification %</strong></td>
<td>86.18%</td>
<td>91.37%</td>
<td>92.81%</td>
<td>+ 7.69%</td>
</tr>
<tr>
<td><strong>Completion %</strong></td>
<td>72.01%</td>
<td>77.90%</td>
<td>75.66%</td>
<td>+ 5.07%</td>
</tr>
<tr>
<td><strong>Time-to-Notification (wks)</strong></td>
<td>1.22</td>
<td>1.45</td>
<td>2.07</td>
<td>- 69.67%</td>
</tr>
<tr>
<td><strong>Time-to-Completion (wks)</strong></td>
<td>6.54</td>
<td>6.37</td>
<td>6.54</td>
<td>0.00%</td>
</tr>
</tbody>
</table>
Overall: Notification & Completeness

- LBOH Notified %
- CRF Complete %
- Time-to-Notify
- Time-to-Complete

Percent vs. Average Weeks
Overall Trends & Patterns

**Notification**

**Completion**

**Percent**

**Timeliness**
Performance & Associations

- Collected local statistics for towns
  - MAVEN status (online/offline)
    - Total Full-Time-Equivalent Personnel (FTEs)
    - Time using Maven
    - Board of Health (BOH) Type <VNA-shared or Municipal>
# MAVEN Participation Status

<table>
<thead>
<tr>
<th>Towns</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Using Maven</td>
<td>13 (4%)</td>
<td>98 (28%)</td>
<td>138 (39%)</td>
</tr>
<tr>
<td>Population Covered (cen2K)</td>
<td>185,238 (3%)</td>
<td>1,692,908 (26%)</td>
<td>2,425,857 (37%)</td>
</tr>
<tr>
<td>Total FTEs (avg.) *</td>
<td>0.59</td>
<td>0.59</td>
<td>0.59</td>
</tr>
<tr>
<td>Weeks Using Maven (avg.)</td>
<td>7.76</td>
<td>21.43</td>
<td>46.82</td>
</tr>
</tbody>
</table>

*annual data unavailable.*
1. Notification %: Online vs Offline

Maven “live” date 9/2007
2. Completion %: Online vs Offline

CRF Complete % (online) vs CRF Complete % (offline)

Maven “live” date 9/2007
3. Time-to-Notify: Online vs Offline

Maven “live” date 9/2007
4. **Time-to-Complete: Online vs Offline**

- **Time-to-Complete (online)**
- **Time-to-Complete (offline)**

*Maven “live” date 9/2007*
Summary & Discussion

- **Smaller Picture** (Performance: online vs offline)
  - Doesn’t support “conclusions” yet
  - Confounded by many unknowns
  - Needs more investigation to understand why/how some towns do better than others

- **Bigger Picture** (Monitoring & Evaluation Framework)
  - Capability to even begin to discuss these issues and analyses
  - How can we help/model best practices

So many additional areas to explore…
- Are certain reportable disease records more complete and timely than others?
- Are shared/VNA contract groups more efficient than single, municipal towns?
- Are certain regions or demographics performing better than others?
Next Steps: GIS Tools

- Using GIS for exploration & monitoring
  - Common platform
  - Space-time visualization
  - Find trends & Isolate outliers
  - Reporting (data export/etc)
Visualization: Instant Atlas

Begun using interactive visualization tools to explore and present these data.
Questions & Ideas?

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