Climate & Health Syndromic Surveillance

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What is Syndromic Surveillance?

• CDC Definition: “an investigational approach where health department staff, assisted by automated data acquisition and generation of statistical alerts, monitor disease indicators in real-time or near real-time to detect outbreaks of disease earlier than would otherwise be possible with traditional public health methods”

http://www.cdc.gov/mmwr/preview/mmwrhtml/su5301a3.htm
What is Syndromic Surveillance? (2)

• The fundamental objective of syndromic surveillance is to:
  – identify illness clusters early, before diagnoses are confirmed and reported to public health agencies
  – and to mobilize a rapid response, thereby reducing morbidity and mortality.

http://www.cdc.gov/mmwr/preview/mmwrhtml/su5301a3.htm
What is Syndromic Surveillance? (3)

• Specific definitions for syndromic surveillance are lacking, and the name itself is imprecise.
  – Certain programs monitor surrogate data sources (e.g., over-the-counter prescription sales or school absenteeism), not specific disease syndromes.

• Emphasis on prediagnostic data

• Emphasis on monitoring the frequency of illnesses with a specific set of clinical features.
Meaningful Use and Arizona’s Public Health Systems

• As a part of the American Recovery and Reinvestment Act, Congress authorized:
  – $25 billion in incentive payments to hospitals and healthcare providers to facilitate the adoption of meaningful use of certified electronic health records (EHR’s).
  – Incentive payments of up to $44,000 through the Medicare incentive program or $63,750 through the Medicaid incentive program can be made to eligible professionals (EPs) and hospitals.

• To receive incentive payments, providers must meet and maintain a set of meaningful use measures using a certified EHR.
Why do we need Meaningful Use?

Meaningful Use provides an opportunity to create better integration between public health and health care.
Meaningful Use

• ADHS is using the **Biosense** system and the **PHIN Messaging Guides for Syndromic Surveillance** for Meaningful Use.

• *Meaningful Use Objective*
  Capability to submit electronic syndromic surveillance data to public health agencies and actual submission according to applicable law and practice.
SYNDROMIC SURVEILLANCE AND BIOSENSE 2.0
BioSense 2.0 System

- BioSense 2.0 is a cloud-enabled web application providing commercial hosting, provisioning, and support.

- The BioSense 2.0 application/environment has been authorized to operate through the CDC Certification and Accreditation process and is governed by ASTHO.

- The tool used to support Meaningful Use Public Health activities for Eligible Hospitals and Providers.
Data Elements – BioSense 2.0

Partial List of Current Elements

- Facility Information (name, address, city, zip, etc.)
- Visit Type
- Unique Patient ID
- Medical Record Number
- Demographics (age, gender, race)
- Triage Notes
- Diagnosis

Newly Added Elements

- Procedure Code, Text and Naming System
- Date of Birth
- Unique Visit ID
- Updated Visit
- Initial Emergency Department Assessment
- Patient Death Indicator, Death Date and Time
- Blood Pressure
BioSense 2.0

• BioSense 2.0 website: 

https://biosen.se
Output from BioSense 2.0

BioSense 2.0 BETA

Viewing 111 visits for 1 syndrome in 1 location from 5/1/2014 - 10/31/2014 from 13 sources for Male, Female, and Unknown, ages all ages.

Time Series

- AZ: Heat, excessive
- AZ: Heat, excessive 2013

Map of Arizona showing total visits categorized by color:
- total visits: 0
- 0 ≤ 16
- > 16 ≤ 32
- > 32 ≤ 48
- > 48

ZOOM TO:
- Continental US
- Alaska
- Guam
- Hawaii
- Puerto Rico
- US Virgin Islands

DISPLAY ON MAP:
- EPI intelligence
- facilities

MAP RESOLUTION:
- region
- state
- county

POLY COLOR:
- Blue

WATER COLOR:
- Grey

Map data ©2015 Google, INEGI. Terms of Use.

Health and Wellness for all Arizonans

azdhs.gov
Chi-squared test indicates that visits are not distributed equally between the categories of Sex ($p = 0.000$).

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
<th>Unknown</th>
<th>Total</th>
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<tbody>
<tr>
<td></td>
<td>70</td>
<td>41</td>
<td>0</td>
<td>111</td>
</tr>
</tbody>
</table>

**Reporting Details**

- **all hospitals reporting**
- **hospitals reporting syndrome**
Heat, excessive

- **Diagnosis Search Terms**
- **Include:** 992, E900

- **Diagnosis Text Search Terms**
- **Include:** demasiado caliente, to hot, too hot, excessive + heat, heat apoplexy, heat collapse, heat cramps, heat edema, heat effects, heat exhaustion, heat fatigue, heat prostration, heat pyrexia, heat stroke, heat syncope, over+heated, sunstroke

- **Chief Complaint Search Terms**
- **Include:** demasiado caliente, to hot, too hot, enlosacion, heat, hypertermia, hyperthermia, insolacion, over+heated, overheated, sobre calentado, sobre caliente
Syndrome (2)

Dehydration

- **Diagnosis Search Terms**
  - **Include**: 276.5, 2765

- **Diagnosis Text Search Terms**
  - **Include**: dehydrated, dehydration, hypovolemia, volume depletion

- **Chief Complaint Search Terms**
  - **Include**: dehydrated, dehydration, deshidratacion, deshidratado, desidratacion, desidratado, drymouth
How do we get more hospitals on BioSense/Syndromic Surveillance?

• First, they have a huge incentive over the next 5 years because of Meaningful Use (Syndromic Surveillance is required in Stage 2 – begins 2014)

• Second, Local Health Departments can recruit hospitals and assist in establishing a DUA by leveraging relationships with local facilities
International Climate/Health Syndromic Surveillance Workgroup - Participants

Signed Up:
- 62 People
- 21 States
- 1 City & 1 County Health Department
- 4 Canadian Public Health Agencies
- Non-profits: CSTE, NRDC

Representatives from various levels of government and programs:
- CDC BRACE States & Cities
- Environmental Public Health Tracking Network States
- State Health Agency Syndromic Surveillance Programs
- CDC
- Health Canada
- Health Agencies from Several Canadian Provinces
Goals for Syndromic Surveillance System Workgroup

• Learn about climate and health syndromic surveillance systems in the US and Canada (how they are set up, time commitment, range of coverage, benefits, drawbacks, usefulness, who has access to the data/how is data shared)

• Learn about how agencies started and then maintained their syndromic surveillance system (including legislative action, partnerships, funding)

• Share information on best practices for improving and using data from syndromic surveillance systems for climate change
Results

• 5 Webinars
  – 4 on heat and 1 on extreme cold

• 1 Workshop
  – Canadian Workshop on Climate & Health Syndromic Surveillance held in March 2014
  – Workshop Proceedings Report

• Survey on Climate & Health Syndromic Surveillance
  – Will inform Guidance Document

• CSTE Heat Syndrome Workgroup
The purpose of this survey is to gather information from organizations and agencies regarding the use of syndromic surveillance (SyS) systems for detecting and reducing illnesses/injuries related to weather events.

The survey results will serve as a source of information on best practices for usage in Canada and the US.

The results will also inform the development of a public health guidance document with recommendations on how to use SyS to respond to climate and weather-related events.
Example Survey Questions

• Target audience: Program managers overseeing implementation of SyS systems in jurisdiction

• Have you used your SyS system to track weather or climate-related events with potential health outcomes for (ex. Extreme heat)?

• What information does your system collect?

• From a public health or emergency management perspective: Benefits? Challenges? Lessons Learned?

• Did you implement an intervention related to information from analyses of SyS system data?
Overview

- Florida Department of Public Health Syndromic Surveillance System (ESSENCE)
  - Electronic Surveillance System for the Early Notification of Community-based Epidemics (ESSENCE)
  - Analytic tools used to identify outbreaks or unusual trends more rapidly, leading to a more timely public health response
AHEDD System Data Flow

1. Reviews alerts
2. Queries syndromes & symptoms
3. Investigates & monitors health activity
4. Follows up with hospitals

Disease Surveillance:

- Planning for Syndromic surveillance charting and data error feedback
- Transmit/update Real-time Electronic ED data Via HL7 and VPN
- Encountered chief complaints assigned to 8 syndromes and alerts set

NH DPHS

ED data repository

Secured Firewall

NH DIVISION OF Public Health Services
Improving health, preventing disease, reducing costs for all
Department of Health & Human Services
ED Syndrome Coding (1)

• Only includes chief complaint field -- availability of diagnostic field fluctuates, potentially influencing ability to track trends

• ED syndrome searches chief complaint field for keywords:
  - "HEAT" (first word in complaint), "HEAT"
    (surrounded by spaces), "HOT", "992", "HEAT ST", "HEATST", "SUNSTR", "OVERHEAT", "HYPERTHERMIA", "992"
  - "HEAT" AND any of the following words: CRAMP, EDEMA, PASS, DIZZY, FAINT, WEAK, SYNCOPE, PROSTRA, RASH, EX, PYREX, BREATHE
MICHIGAN SYNDROMIC SURVEILLANCE: THE BASICS

- Based on Real-Time Outbreak Detection System (RODS) developed at the University of Pittsburgh
- Virtual Private Network (VPN) HL7, a healthcare messaging standard, to exchange data in real-time between participants and MDCH
- Each message consists of:
  - Patient age, sex, home ZIP code
  - Visit date and time
  - Data exchange and acknowledgement information
  - Chief complaint
Heat illness syndromes

- For both ED and EMS data, we track three syndromes:
  - “Narrow Heat” (includes heat, heat stroke, heat exhaustion, heat stress, hyperthermia, sunstroke, and related terms)
  - “Broad Heat” (includes above plus dehydration, syncope, and related terms)
  - “Dehydration” (includes just dehydration and related terms)
Results of review

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<th></th>
<th>ED Case</th>
<th>Not ED Case</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detected by SSS Narrow</td>
<td>15</td>
<td>37</td>
<td>52</td>
</tr>
<tr>
<td>Not Detected by SSS Narrow</td>
<td>121</td>
<td>unknown</td>
<td>136</td>
</tr>
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</table>

Sensitivity of SSS Narrow for detecting ED case = 11%
Positive predictive value of SSS Narrow for ED case = 29%

<table>
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<th>Not ED Case</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detected by SSS Broad</td>
<td>49</td>
<td>636</td>
<td>685</td>
</tr>
<tr>
<td>Not Detected by SSS Broad</td>
<td>87</td>
<td>unknown</td>
<td>136</td>
</tr>
</tbody>
</table>

Sensitivity of SSS Broad for detecting ED case = 36%
Positive predictive value of SSS Broad for ED case = 7%

<table>
<thead>
<tr>
<th></th>
<th>ED Case</th>
<th>Not ED Case</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Detected by SSS Dehydration</td>
<td>8</td>
<td>111</td>
<td>119</td>
</tr>
<tr>
<td>Not Detected by SSS Dehydration</td>
<td>128</td>
<td>unknown</td>
<td>136</td>
</tr>
</tbody>
</table>

Sensitivity of SSS Dehydration for detecting ED case = 6%
Positive predictive value of SSS Dehydration for ED case = 7%
Acknowledgements

• Arizona Department of Health Services
• Florida Department of Health
• NYC Department of Health and Mental Hygiene
• Michigan Department of Community Health
• Minnesota Department of Health
• New Hampshire Division of Public Health Services
• Maine Center for Disease Control
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• CDC - Climate & Health Program/BRACE Cooperative Agreement - CDC-RFA-EH13-1305
Thank you & Questions!

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