Electronic medical record
Support for Public Health

NIH Collaboratory Grand Rounds
October 20, 2017

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Harvard Medical School and Harvard Pilgrim Health Care Institute
“No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring”

Introductory statement printed each week in Public Health Reports, 1913-1951
### Confidential Report for Sexually Transmitted Diseases

**Please Print**

<table>
<thead>
<tr>
<th>Field</th>
<th>Information</th>
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<td>[Redacted]</td>
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<td>[Redacted]</td>
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<td>Is this Pt. Pregnant?</td>
<td>[Redacted]</td>
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<tr>
<td>Date of Diagnosis</td>
<td>[Redacted]</td>
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<tr>
<td>Did patient receive treatment?</td>
<td>[Redacted]</td>
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<tr>
<td>Did the patient have symptoms?</td>
<td>[Redacted]</td>
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</table>

### SYphilis (700)

- **Primary (Chancroid)**: (700)
- **Secondary** (Other symptoms X20)
- **Latent (Asymptomatic, less than 1 year)**: (710)
- **Late Latent (Asymptomatic, over 1 year)**: (715)

### Gonorrhea (300)

- **Cervix**
- **Venereal**
- **Pharynx**
- **Other**

### Chlamydia (200)

- **Cervix**
- **Urethra**
- **Pharynx**
- **Other**

### Chlamydia (200)

- **Cervix**
- **Urethra**
- **Pharynx**
- **Other**

### Other Reportable Sexually Transmitted Diseases

- **Chancroid**
- **Lymphogranuloma Venereum**
- **Granuloma Inguinale**
- **Necrotizing Herpes**
- **Dysgonia Acuta**
- **Condyloma Acuminata** (External Genital Warts)
- **PUB-13 (Lues)***

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**Questions about treatment for any STD?**

Call the Division of STD Prevention at (617) 963-6940.

**Disease control and prevention requires evaluation and treatment of partners. Please contact your provider to refer your partner.**

The STD program can provide confidential partner notification services. Do you want this service for your patient? Yes No If Yes, we will call you first!

If you are reporting a disease in a minor, did you fill out a 51A? Yes No If you would like more comment please check here...
Our Goal

automated disease surveillance using data routinely stored in electronic health records

clinically detailed, efficient, & timely disease surveillance from large, diverse populations with little or no added work or cost for health departments or clinicians
ESP: Automated disease detection and reporting for public health

Practice EMR’s → ESP Server → Health Department

- diagnoses
- lab results
- meds
- vital signs
- demographics

electronic case reports or aggregate summaries

JAMIA 2009;16:18-24
Am J Pub Health 2012;102:S325–S332
Current ESP Installations

- Cambridge Health Alliance
  - 20 sites • 400,000 patients
- Mass League of Community Health Centers
  - 18 sites • 300,000 patients
- Atrius Health
  - 27 Sites • 800,000 pts
- MetroHealth
  - Cleveland, OH
- Planned Parenthood
  - 4 Sites • 50,000 pts
- Fenway Health
  - 4 Sites • 50,000 pts
- Tarrant County
  - Texx
- Planned Parenthood
  - 4 Sites • 50,000 pts
- Fenway Health
  - 4 Sites • 50,000 pts
Current Modules

- Notifiable diseases
- Influenza-like illness
- Chronic diseases
- Vaccine adverse events
ICDs
Obesity
Tuberculosis
Depression
Hypertension
Opioid Prescribing
Diabetes Mellitus

- Hemoglobin A1C ≥ 6.5
- Fasting glucose ≥126
- Random glucose ≥200 on two or more occasions
- Prescription for INSULIN outside of pregnancy
- ICD9/10 code for DM on two or more occasions
- Prescription for any of the following:
  - GLYBURIDE, GLICLAZIDE, GLIPIZIDE, GLIMEPIRIDE
  - PIOGLITAZONE, ROSIGLITAZONE
  - REPAGLINIDE, NATEGLINIDE, MEGLITINIDE
  - SITAGLIPTIN
  - EXENATIDE, PRAMLINTIDE
Sensitivity of definition components

<table>
<thead>
<tr>
<th>Component</th>
<th>Sensitivity</th>
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<tbody>
<tr>
<td>ICD9 250.x (two instances)</td>
<td>78%</td>
</tr>
<tr>
<td>Hemoglobin A1C</td>
<td>65%</td>
</tr>
<tr>
<td>Fasting glucose</td>
<td>3.8%</td>
</tr>
<tr>
<td>Insulin</td>
<td>24%</td>
</tr>
<tr>
<td>Oral hypoglycemic (not metformin or TZDs)</td>
<td>32%</td>
</tr>
</tbody>
</table>

*Diabetes Care 2013;36:914-21*
Syphilis

Any of the following:

• ICD9/10 for syphilis and prescription for (penicillin G or doxycycline or ceftriaxone)

OR

• Serum RPR ≥ 1:8 and (TP-IGG or TPPA or FTA-ABS positive)

OR

• Positive CSF test (VDRL≥1:1, TPPA, or FTA-ABS)
# ESP Case Reporting

Atrius, CHA, MetroHealth, Fenway, Planned Parenthood of MA 2006-2016

<table>
<thead>
<tr>
<th>Condition</th>
<th>Total Cases</th>
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<tbody>
<tr>
<td>Chlamydia</td>
<td>34,725</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>8,028</td>
</tr>
<tr>
<td>Pelvic inflammatory disease</td>
<td>359</td>
</tr>
<tr>
<td>Acute hepatitis A</td>
<td>40</td>
</tr>
<tr>
<td>Acute hepatitis B</td>
<td>131</td>
</tr>
<tr>
<td>Acute hepatitis C</td>
<td>316</td>
</tr>
<tr>
<td>Syphilis</td>
<td>1973</td>
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</table>
MDPHnet

Mass League of Community Health Centers
18 sites • 300,000 patients

Cambridge Health Alliance
20 sites • 400,000 patients

Atrius Health
27 Sites • 800,000 pts
MDPHnet

Step 1. Health department creates a query.

Step 2. MDPHnet distributes queries to practices

Step 3. Practices review queries & authorize execution against their local ESPnet tables

Step 4. MDPHnet integrates results and returns them to the health department

Am J Public Health 2014;104:2265-70
Diabetes
Asthma
Smoking
Hypertension
Obesity

Condition Prevalence in Adults Age ≥20

MDPHnet Estimates vs BRFSS Estimates

Massachusetts 2014

MDPHnet vs BRFSS

Condition Prevalence in Adults Age ≥20

Diabetes
Asthma
Smoking
Hypertension
Obesity
### Surveillance for Certain Health Behaviors, Chronic Diseases, and Conditions, Access to Health Care, and Use of Preventive Health Services Among States and Selected Local Areas — Behavioral Risk Factor Surveillance System, United States, 2012

#### TABLE 47. Estimated prevalence of adults aged ≥18 years who are obese,* by metropolitan and micropolitan statistical area — Behavioral Risk Factor Surveillance System, United States, 2012

<table>
<thead>
<tr>
<th>MMSA(s)</th>
<th>Sample size</th>
<th>%</th>
<th>SE</th>
<th>95% CI</th>
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</thead>
<tbody>
<tr>
<td>Aguadilla-Isabela, Puerto Rico</td>
<td>519</td>
<td>23.8</td>
<td>2.2</td>
<td>(19.6–28.0)</td>
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<tr>
<td>Akron, Ohio</td>
<td>698</td>
<td>29.7</td>
<td>2.4</td>
<td>(25.0–34.4)</td>
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<tr>
<td>Albuquerque, New Mexico</td>
<td>3,137</td>
<td>25.1</td>
<td>1.0</td>
<td>(23.2–27.0)</td>
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<tr>
<td>Allentown-Bethlehem-Easton, Pennsylvania-New Jersey</td>
<td>1,270</td>
<td>28.8</td>
<td>1.9</td>
<td>(25.1–32.6)</td>
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<tr>
<td>Anaheim-Santa Ana-Irvine, California†</td>
<td>971</td>
<td>21.5</td>
<td>2.0</td>
<td>(17.7–25.4)</td>
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<tr>
<td>Anchorage, Alaska</td>
<td>1,426</td>
<td>25.3</td>
<td>1.4</td>
<td>(22.5–28.0)</td>
</tr>
<tr>
<td>Asheville, North Carolina</td>
<td>557</td>
<td>19.4</td>
<td>2.0</td>
<td>(15.5–23.3)</td>
</tr>
<tr>
<td>Atlanta-Sandy Springs-Roswell, Georgia</td>
<td>2,399</td>
<td>26.5</td>
<td>1.2</td>
<td>(24.1–28.9)</td>
</tr>
</tbody>
</table>
### GLS Regression Results

- **Dep. Variable:** Reference
- **Model:** GLS
- **Method:** Least Squares
- **Date:** Mon, 03 Apr 2017
- **Time:** 01:23:11
- **No. Observations:** 33
- **Df Residuals:** 31
- **Df Model:** 1
- **Covariance Type:** nonrobust

| Coef | Std. Err | t    | P>|t| | [95.0% Conf. Int.] |
|------|----------|------|-----|------------------|
| Intercept | 7.9137 | 0.015 | 520.456 | 0.000 | 7.883 - 7.945 |
| time | 0.0176 | 0.001 | 21.708 | 0.000 | 0.016 - 0.019 |

**Omnibus:** 10.985
**Prob(Omnibus):** 0.004
**Skew:** -0.776
**Kurtosis:** 5.854

**Durbin-Watson:** 1.656
**Jarque-Bera (JB):** 14.516
**Prob(JB):** 0.000795

**Cond. No.:** 35.9
Summary

- EHR data can be used to support rich, timely, and detailed public health surveillance.
- EHR data allows for more sensitive and specific disease detection compared to claims.
- ESP allows clinical practice groups to participate in public health surveillance while retaining ownership and control of their data.
- Interactive visualization software can help unlock the power of EHR data to track disease incidence rates, characteristics, and trends.
Thank you!

Atrius Health
Ben Kruskal • Deborah Bradford

Cambridge Health Alliance
James Griffith • Brian Herrick • Michelle Weiss

Commonwealth Informatics
Karen Eberhardt • Chaim Kirby • Catherine Rocchio • Bob Zambarano

Harvard Department of Population Medicine
Micaela Coady • Noelle Cocoros • Elizabeth Dee • Michael Klompas • Aileen Ochoa • Cara Smith

Massachusetts Department of Public Health
Heather Elder • Gillian Haney • Katherine Hsu • Victoria Nielsen • Natalie Nguyen • Liisa Randall
Sita Smith • Sanouri Ursprung

Massachusetts League of Community Health Centers
Diane Erani • Ellen Hafer • Mark Josephson

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