



Electronic medical record
Support for
Public Health

NIH Collaboratory Grand Rounds
October 20, 2017

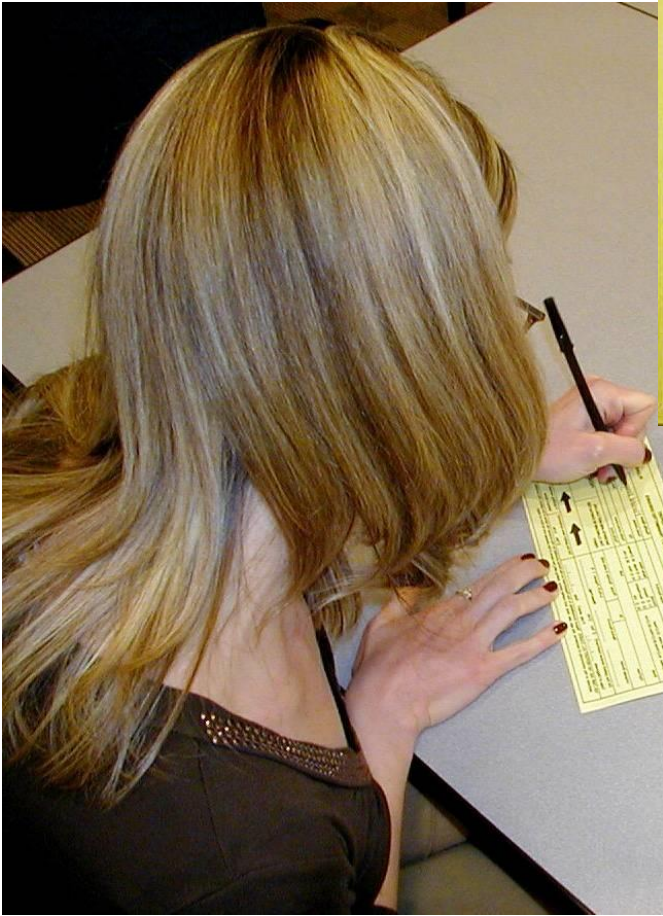
Michael Klompas MD, MPH

Department of Population Medicine

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



MDPH/STD CONTROL 305 South St., Jamaica Plain, MA 02130 617-983-6940		CONFIDENTIAL REPORT FOR SEXUALLY TRANSMITTED DISEASES		PLEASE PRINT	
Last Name		First (full name)		Facility Name <i>Harvard Vanguard Medical Associates</i>	
D.O.B.		Age		Facility Address	
Sex <input type="checkbox"/> M <input type="checkbox"/> F		Social Security #		City State Zip Code	
Race (1) <input type="checkbox"/> American Indian (2) <input type="checkbox"/> Asian (3) <input type="checkbox"/> Black (4) <input type="checkbox"/> White (5) <input type="checkbox"/> Other (6) <input type="checkbox"/> Unk		Ethnicity (1) <input type="checkbox"/> Hispanic (2) <input type="checkbox"/> Non-Hispanic (3) <input type="checkbox"/> Other (4) <input type="checkbox"/> Unk		Marital Status (1) <input type="checkbox"/> Single (2) <input type="checkbox"/> Married (3) <input type="checkbox"/> Other (4) <input type="checkbox"/> Unk	
Street		Apt#		Facility contact person	
City/Town		Zip		Facility phone	
Language Spoken		Medical Record #		PATIENTS ARE NOT CALLED, THE CLINICIAN IS CONTACTED FIRST	
Is this PL Pregnant Y N		Weeks Preg: _____		PROVIDER CODE	
Did the patient receive treatment? <input type="checkbox"/> Yes <input type="checkbox"/> No		Date of Diagnosis ____/____/____		Did the patient have symptoms? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, when? Date ____/____/____		If reporting neonatal: Mother's Name _____		→ → →	
105 CMR 340.100 REPORT ALL CASES. Report immediately to the Department on the forms provided for this purpose the name of the patient, the complete address or the community of residence, the age, sex, race, and marital status, stating also the name of the disease and its form or stage.					

<p>SYPHILIS (700)</p> <p>(1) <input type="checkbox"/> Primary (chancre) (710) (2) <input type="checkbox"/> Secondary (rash, other symptoms) (720) (3) <input type="checkbox"/> Early Latent (asymptomatic, less than 1 year) (730)</p> <p>Recommended Regimen <input type="checkbox"/> Benzathine Penicillin G 2.4 million units IM, 2 doses, 1 week apart. Alternative regimen for penicillin allergic non-pregnant non-HIV infected adult patients <input type="checkbox"/> Doxycycline 100 mg po bid x 14 days or <input type="checkbox"/> Ceftriaxone 1 gm IM or IV daily for 8-10 days or <input type="checkbox"/> Azithromycin 2 g orally single dose or <input type="checkbox"/> Other _____</p> <p>(4) <input type="checkbox"/> Late Latent (asymptomatic, over 1 year) (745) Recommended Regimen <input type="checkbox"/> Benzathine Penicillin G 2.4 million units IM, 3 doses, 1 week apart. Alternative regimen for penicillin allergic non-pregnant non-HIV infected adult patients <input type="checkbox"/> Doxycycline 100 mg po bid x 28 days or <input type="checkbox"/> Other _____</p> <p>(5) <input type="checkbox"/> Neurosyphilis (760) Recommended Regimen <input type="checkbox"/> Aqueous crystalline penicillin G 18 - 24 million units per day, administered as 3-4 million units IV every 4 hours or continuous infusion, for 10-14 days <input type="checkbox"/> Other _____</p> <p>(6) <input type="checkbox"/> Congenital (Infant) (790) Recommended Regimen <input type="checkbox"/> Aqueous crystalline penicillin G 50,000 units/kg/day IV every 12 hours for the first 7 days of life and every 8 hours thereafter for a total of 10 days</p> <p>(7) <input type="checkbox"/> Adult Congenital</p>	<p>GONORRHEA (300)</p> <p><input type="checkbox"/> Cervical DX by culture yes <input type="checkbox"/> no <input type="checkbox"/> <input type="checkbox"/> Urethral DX by culture yes <input type="checkbox"/> no <input type="checkbox"/> <input type="checkbox"/> Rectal DX by culture yes <input type="checkbox"/> no <input type="checkbox"/> <input type="checkbox"/> Pharyngeal DX by culture yes <input type="checkbox"/> no <input type="checkbox"/> <input type="checkbox"/> Other _____</p> <p>Recommended Regimen for Uncomplicated Infections: Because of continuing increases in the number of reported cases of fluoroquinolone resistant gonorrhea, Ceftriaxone 250 mg IM is the preferred regimen for the treatment of uncomplicated gonococcal infections.</p> <p>Unless antibiotic susceptibility testing performed on a positive culture excludes resistance to quinolones, we no longer recommend the use of quinolones for the presumptive treatment of gonorrhea or treatment based on a non-culture test result.</p> <p><input type="checkbox"/> Ceftriaxone 250 mg IM or <input type="checkbox"/> Other _____ PLUS (Treatment for Chlamydia Infection) <input type="checkbox"/> Doxycycline 100 mg po bid x 7 days or <input type="checkbox"/> Azithromycin 1 gm po single dose or <input type="checkbox"/> Other _____</p> <p>Questions about treatment for any STD? Call the Division of STD Prevention at (617) 983-6940.</p> <p>Disease control and prevention requires evaluation and treatment of partners. Please counsel your patient to refer their partners.</p> <p>The STD program can provide confidential partner notification services. Do you want this service for your patient? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, we will call you first</p> <p>If you are reporting a disease in a minor, did you file a 51A? <input type="checkbox"/> Yes <input type="checkbox"/> No If you would like more cards please check here _____</p>	<p>CHLAMYDIA (200)</p> <p><input type="checkbox"/> Cervical <input type="checkbox"/> Urethral <input type="checkbox"/> Rectal <input type="checkbox"/> Pharyngeal <input type="checkbox"/> Other _____</p> <p>Recommended Regimen for Uncomplicated Infection (non-pregnant adult patient) <input type="checkbox"/> Azithromycin 1 g po single dose or <input type="checkbox"/> Doxycycline 100 mg po bid x 7 days or <input type="checkbox"/> Other _____</p> <p>Recommended Regimen for Uncomplicated Infection (pregnant patients) <input type="checkbox"/> Erythromycin base 500 mg po qid x 7 days or <input type="checkbox"/> Amoxicillin 500 mg bid x 7 days or <input type="checkbox"/> Azithromycin 1 gm single dose or <input type="checkbox"/> Other _____</p> <p>Treatment Provided <input type="checkbox"/> Outpatient <input type="checkbox"/> Inpatient</p>	<p>OTHER REPORTABLE SEXUALLY TRANSMITTED DISEASES</p> <p><input type="checkbox"/> CHANCROID (100) - Recommended Regimen <input type="checkbox"/> Ceftriaxone 250 mg IM once or <input type="checkbox"/> Azithromycin 1 gm po single dose or <input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> LYMPHOGRANULOMA VENEREUM (600) - Recommended Regimen <input type="checkbox"/> Doxycycline 100 mg po bid x 21 days or <input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> GRANULOMA INGUINALE (500) - Recommended Regimen <input type="checkbox"/> Doxycycline 100 mg po bid x at least 21 days or <input type="checkbox"/> Trimethoprim-sulfamethoxazole 1 DS tablet (800mg/160mg) bid x at least 21 days or <input type="checkbox"/> Other _____</p> <p><input type="checkbox"/> NEONATAL HERPES (850) <input type="checkbox"/> OPHTHALMIA NEONATORUM <input type="checkbox"/> CONDYLOMA ACUMINATA (EXTERNAL GENITAL WARTS) (900) PHV-13 (Rev. 1/04)</p>
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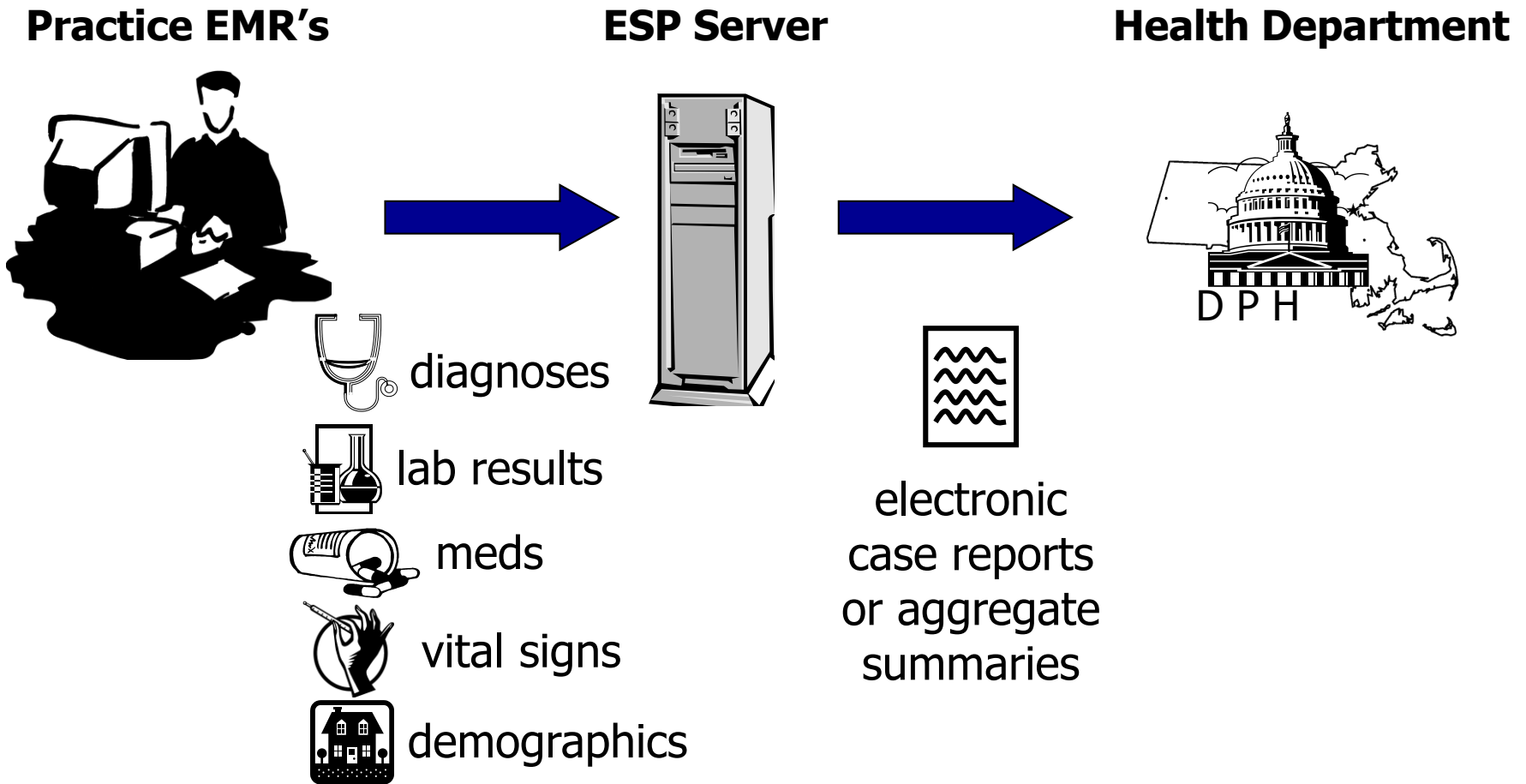
from www.sciencewatch.com (November 12, 2010)

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



Current ESP Installations



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

Cambridge Health Alliance
20 sites • 400,000 patients

Planned Parenthood
Fenway Health
4 Sites • 50,000 pts

Atrius Health
27 Sites • 800,000 pts



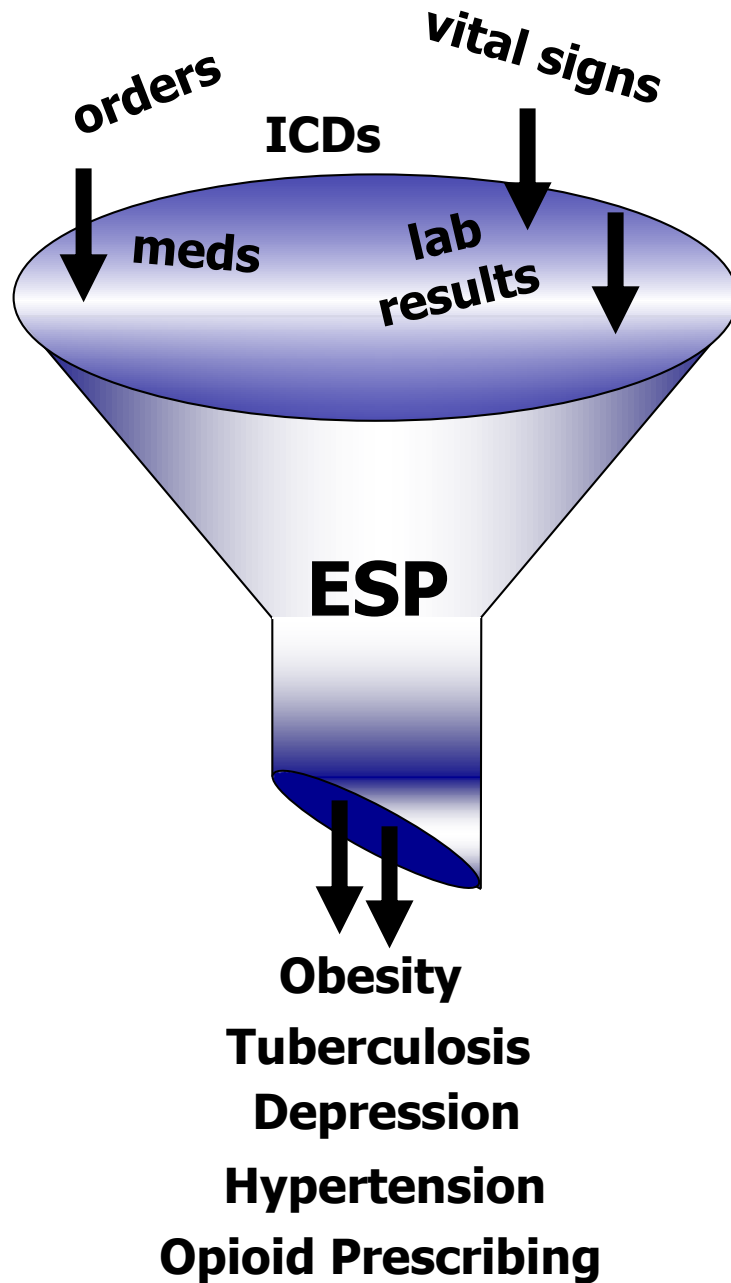
MetroHealth
Cleveland, OH



Tarrant
County, TX

Current Modules

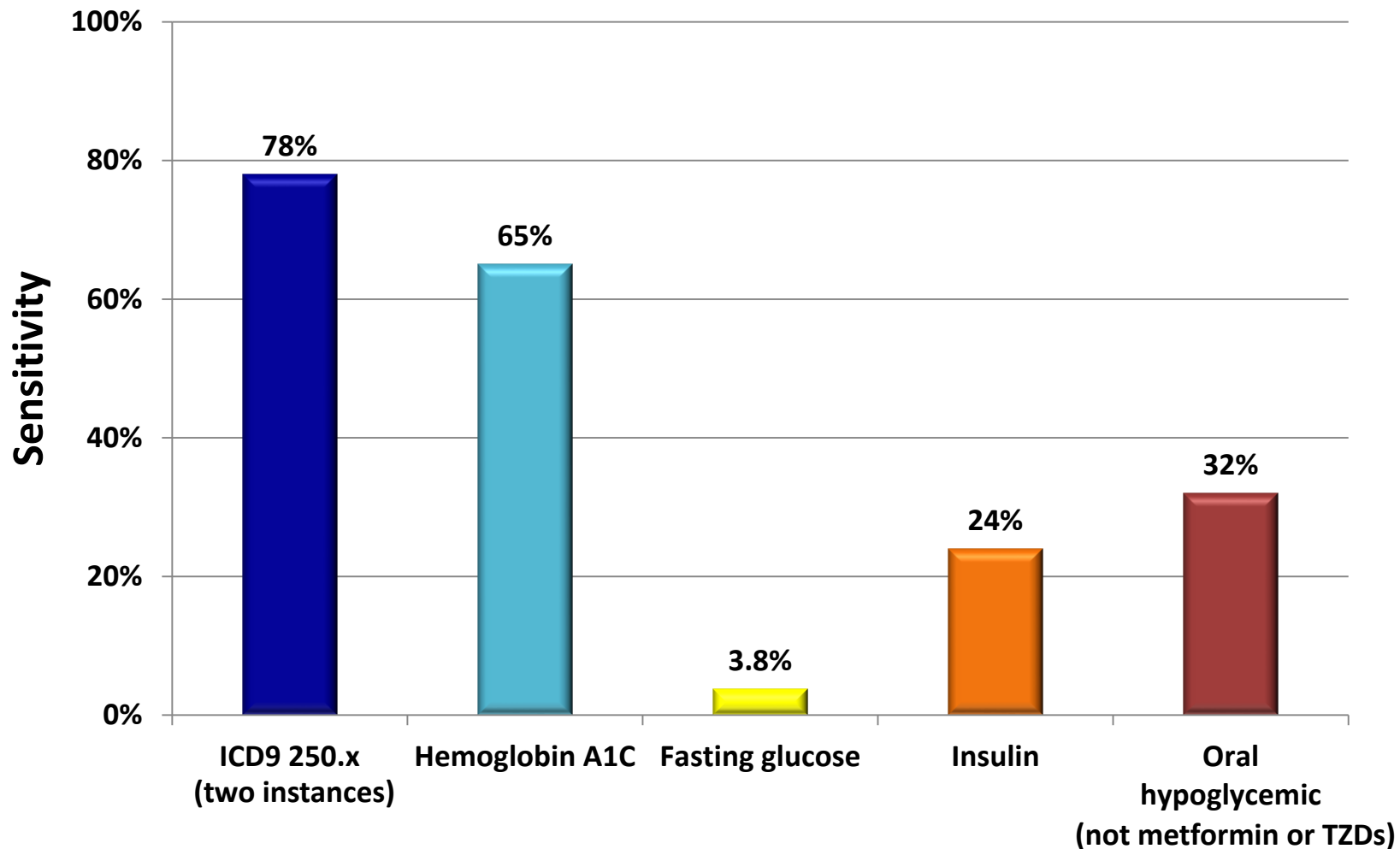
- Notifiable diseases
- Influenza-like illness
- Chronic diseases
- Vaccine adverse events



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



Syphilis

Any of the following:

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

OR

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

OR

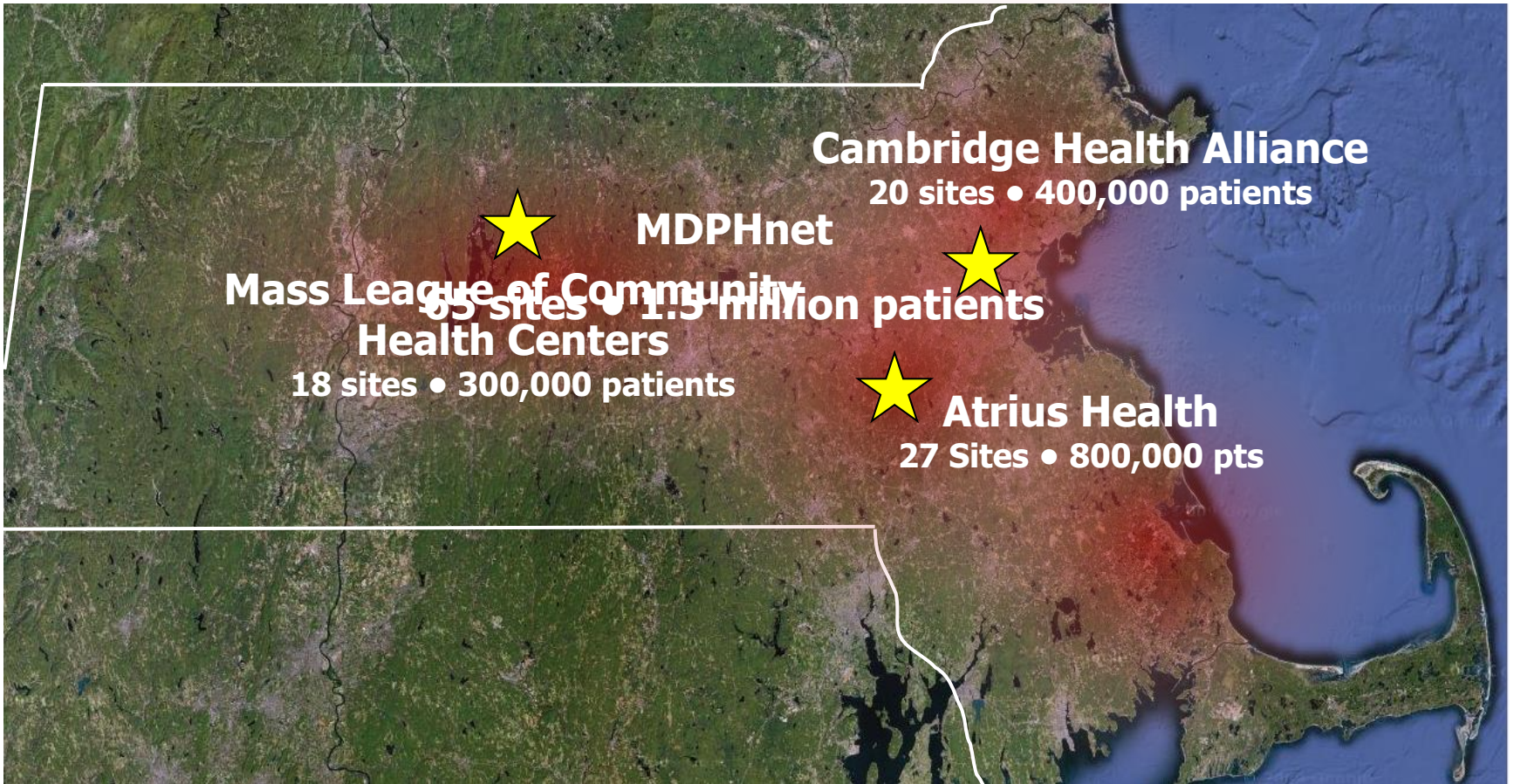
- Positive CSF test (VDRL \geq 1:1, TPPA, or FTA-ABS)

ESP Case Reporting

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

Condition	Total Cases
Chlamydia	34,725
Gonorrhea	8,028
Pelvic inflammatory disease	359
Acute hepatitis A	40
Acute hepatitis B	131
Acute hepatitis C	316
Syphilis	1973

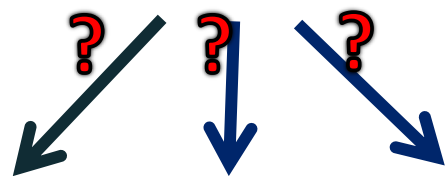
MDPHnet



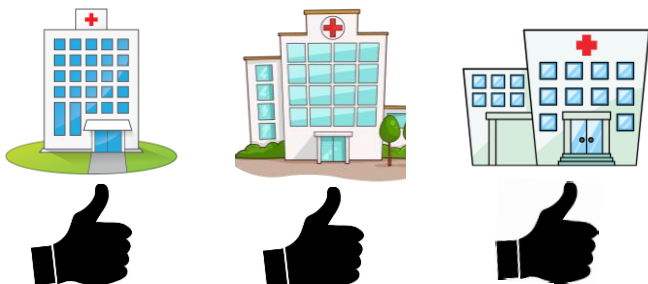
MDPHnet



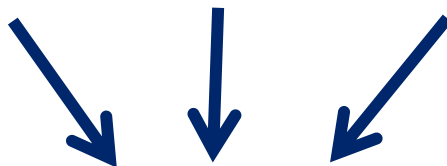
Step 1. Health department creates a query.



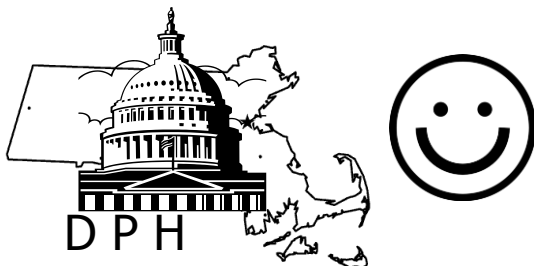
Step 2. MDPHnet distributes queries to practices



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

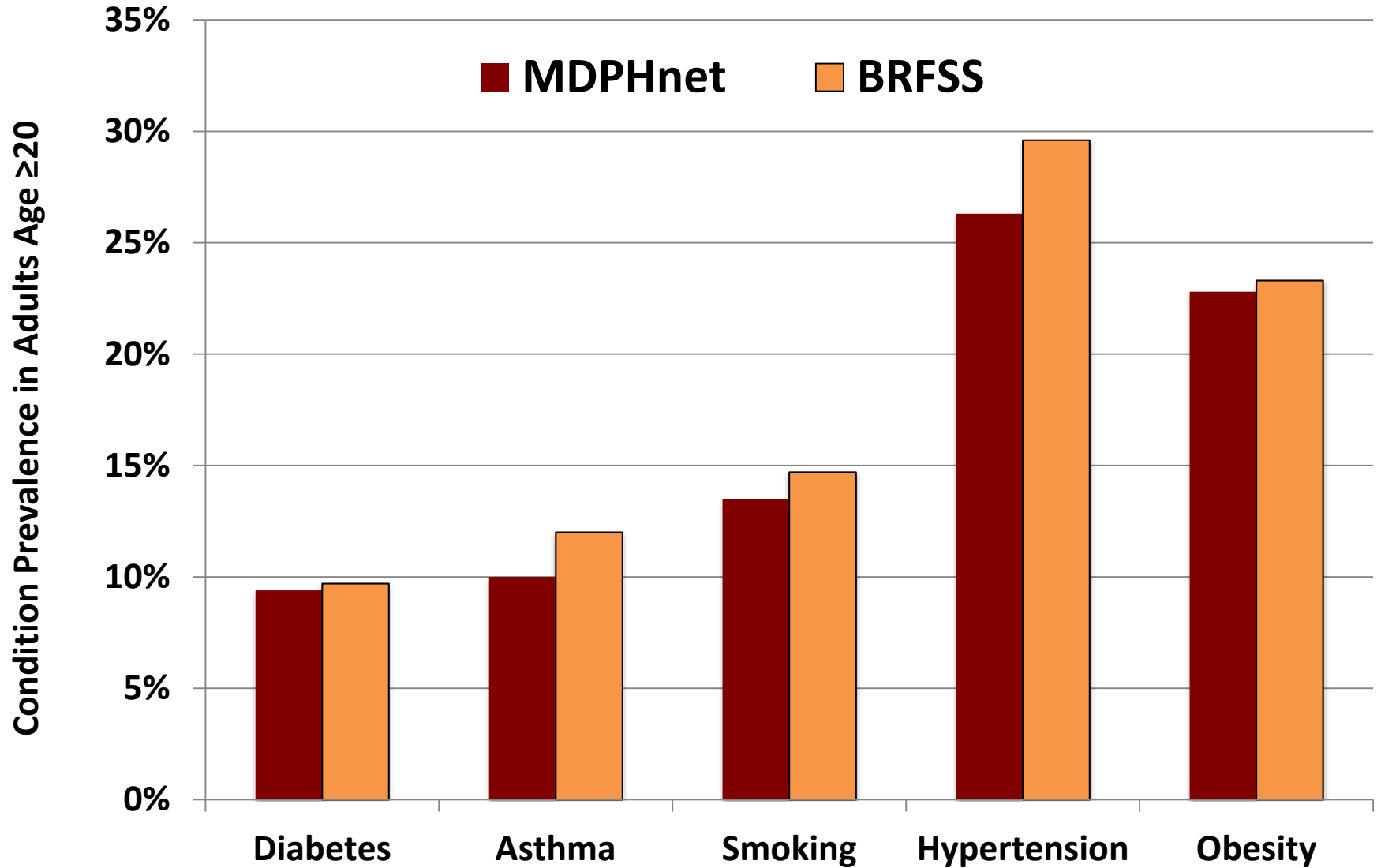


Step 4. MDPHnet integrates results and returns them to the health department



MDPHnet Estimates vs BRFSS Estimates

Massachusetts 2014



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

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

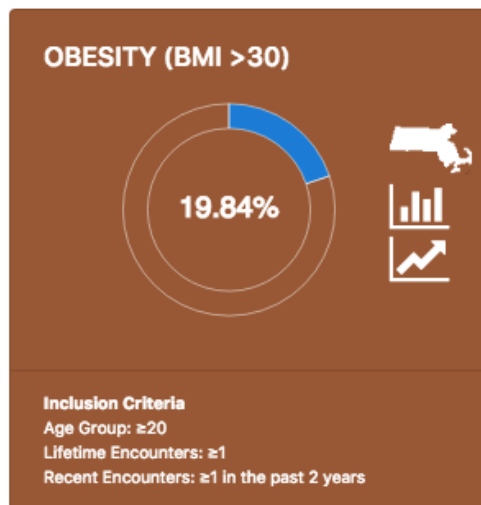
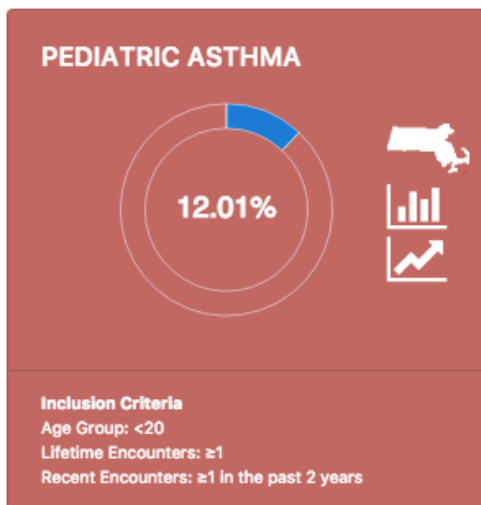
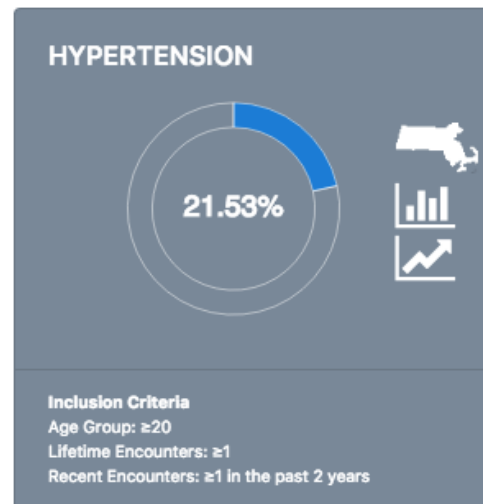
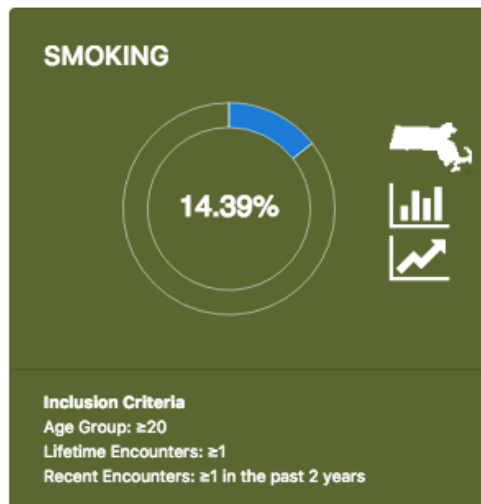
RiskScape



Data Last Updated March 30, 2017
Population Under Surveillance: 1,591,782

- Dashboard
- Pick Conditions
- Map
- Demographics & Comorbidities
- Timeseries
- Continuity of Care
- Condition Definitions
- About

Select Condition Definition or [Create your Own Q](#)





Dashboard



Pick Conditions



Map



Demographics & Comorbidities



Timeseries



Continuity of Care



Condition Definitions



About MDPHnet

Outcome(s) of Interest ☰

BMI: Obese (BMI >30.0)

Inclusion Criteria ☰

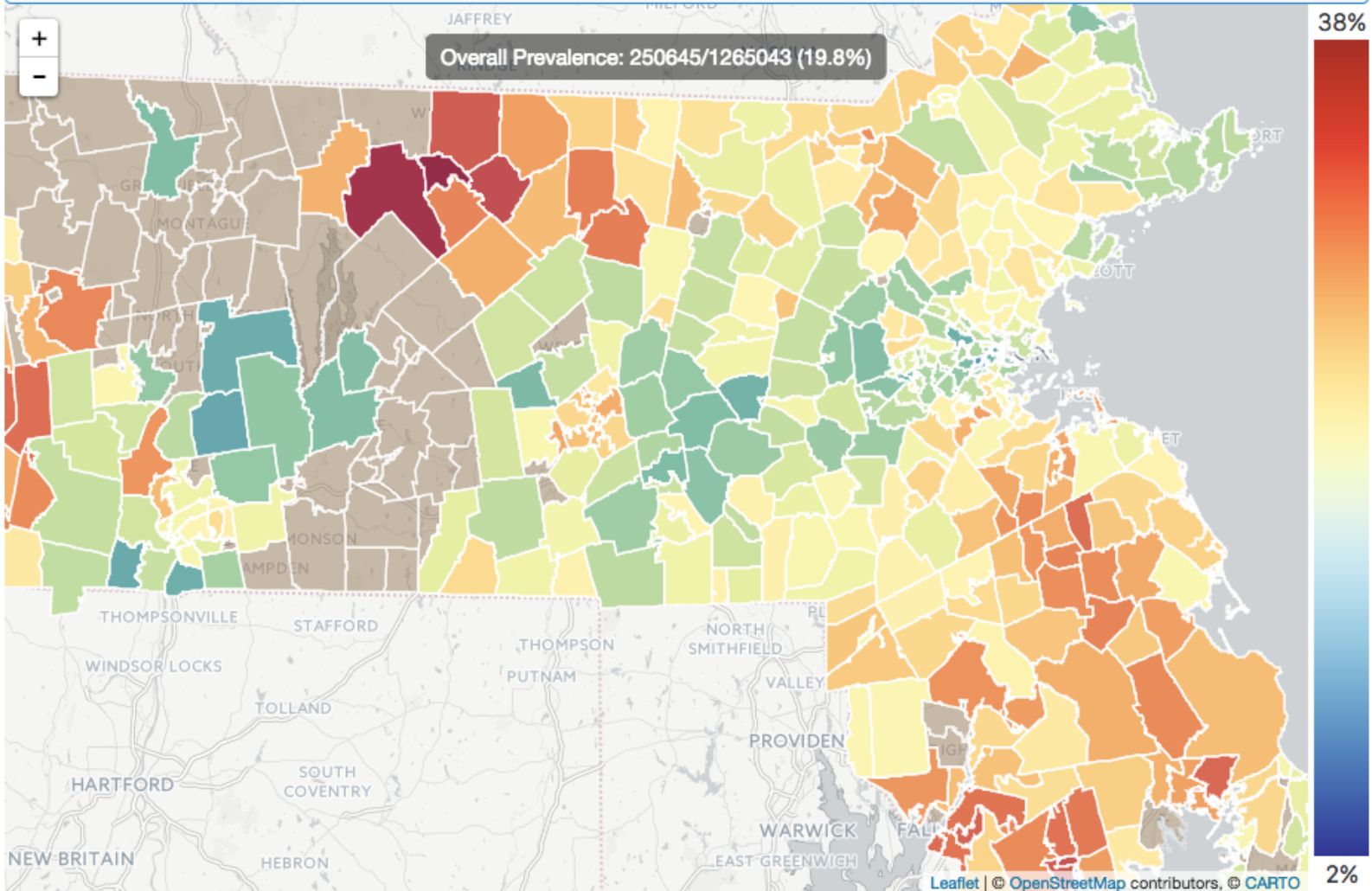
Age Group: ≥20 / Lifetime Encounters: ≥1 / Recent Encounters: ≥1 in the past 2 years

Hide Map Underlay



Highlight Zip

Highlight



Obesity in Adults

Massachusetts



Map



Demographics & Comorbidities



Timeseries



Continuity of Care



Condition Definitions

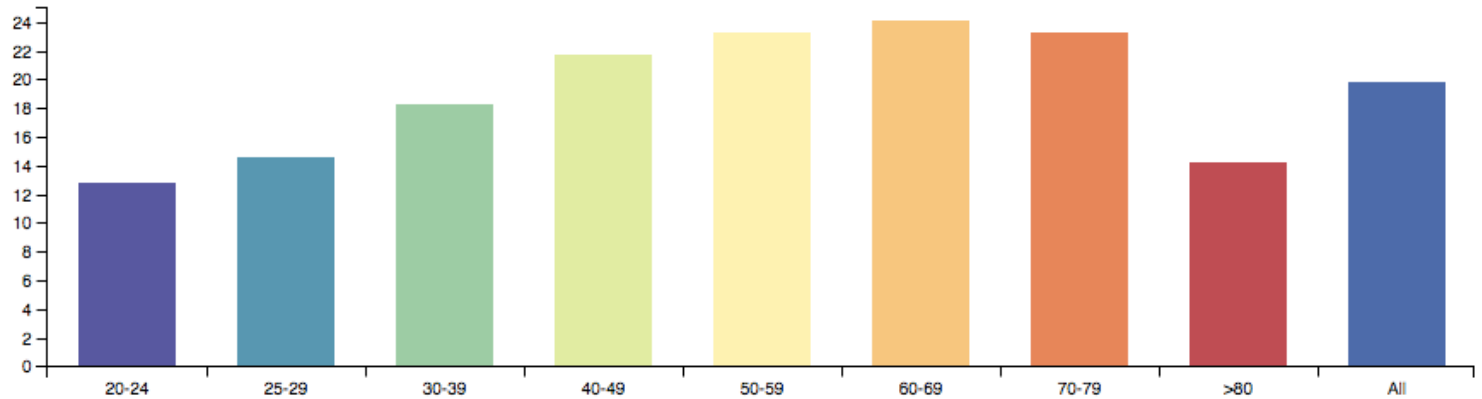


About MDPHnet

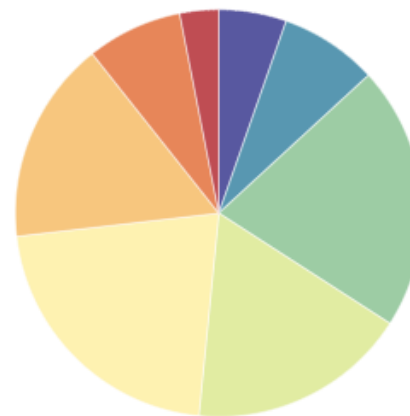


Logout

Prevalence of the Selected Outcome by Age



Age of Patients with the Selected Outcome



20-24 25-29 30-39 40-49 50-59 60-69 70-79 >80

Obesity in Adults



Map



Demographics & Comorbidities



Timeseries



Continuity of Care



Condition Definitions



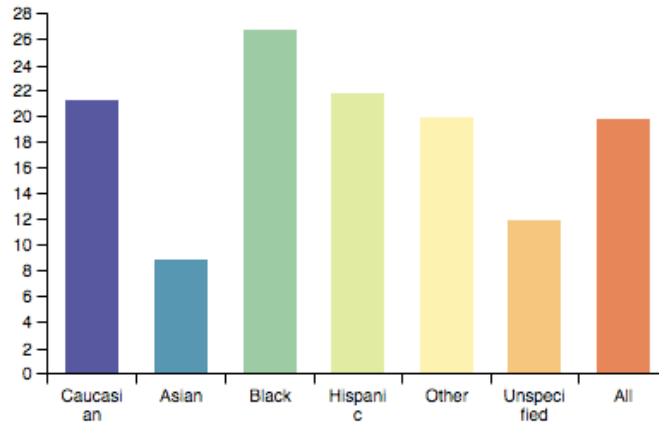
About MDPHnet



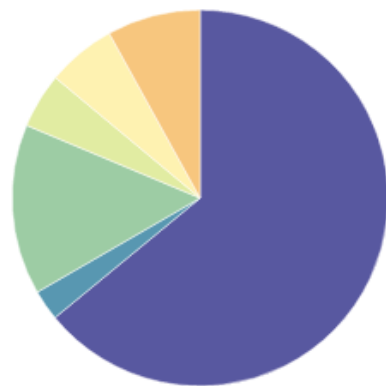
Logout

Massachusetts

Prevalence of the Selected Outcome by Race



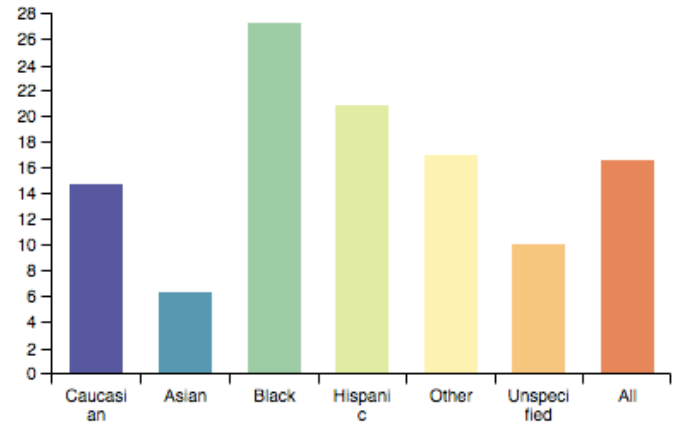
Race of Patients with the Selected Outcome



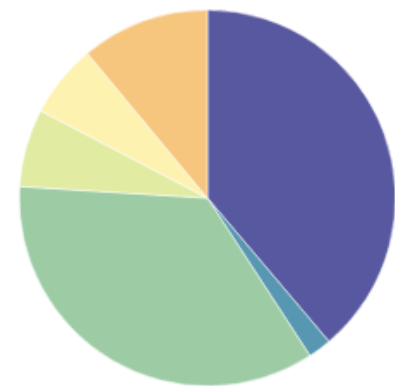
■ Caucasian ■ Asian ■ Black ■ Hispanic ■ Other ■ Unspecified

Boston

Prevalence of the Selected Outcome by Race



Race of Patients with the Selected Outcome



■ Caucasian ■ Asian ■ Black ■ Hispanic ■ Other ■ Unspecified

Type 2 Diabetes in Adults



Dashboard



Pick Conditions



Map



Demographics & Comorbidities



Timeseries



Continuity of Care



Condition Definitions



Outcome(s) of Interest

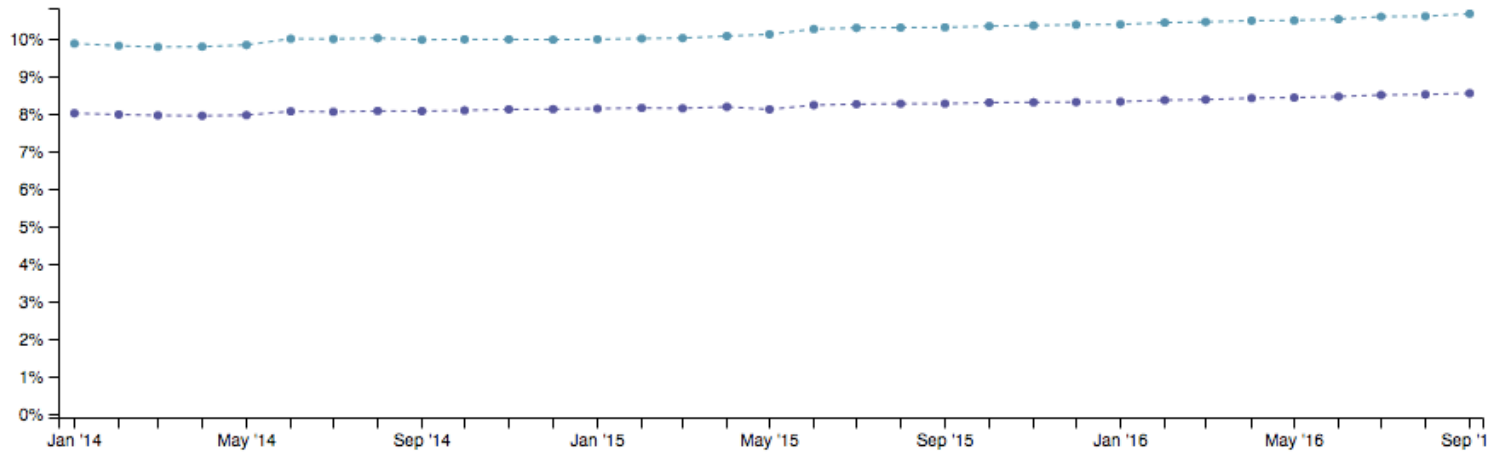
Type 2 Diabetes

Inclusion Criteria

Age Group: ≥ 20 / Lifetime Encounters: ≥ 1 / Recent Encounters: ≥ 1 in the past 2 years

Graph Stratifiers and Parameters

By: Sex / In: Massachusetts / From: Jan '14 To: Sep '16



Show Trendlines

Click on Graph to select Inflection Point

	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Female	Male
Massachusetts <input checked="" type="checkbox"/>		

-- View Trendline Summary --

Type 2 Diabetes in Adults

	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Female	Male
Massachusetts <input checked="" type="checkbox"/>		

-- View Trendline Summary --

GLS Regression Results

```
=====
Dep. Variable:          Reference    R-squared:                0.996
Model:                  GLS          Adj. R-squared:           0.996
Method:                 Least Squares F-statistic:              8369.
Date:                   Mon, 03 Apr 2017 Prob (F-statistic):       2.77e-39
Time:                   01:23:11     Log-Likelihood:          70.004
No. Observations:      33            AIC:                     -136.0
Df Residuals:          31            BIC:                     -133.0
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    Durbin-Watson:            1.656
Prob(Omnibus):          0.004    Jarque-Bera (JB):        14.516
Skew:                   -0.776    Prob(JB):                 0.000705
Kurtosis:                5.854    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 the power of EHR data to to track disease incidence rates, characteristics, and trends

Thank you!

Atrius Health

Ben Kruskal • Deborah Bradford

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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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