ESPnet:
An Overview of Electronic Case Reporting using EHRs

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ESPnet: EHR Support for Public Health

Open-source software and architecture to query EHRs and extract, analyze, and transmit notifiable electronic health information from health care providers to public health

- Queries EHR data to identify patients with conditions of public health interest (per public health reporting regulations)
- Generates secure electronic reports for the state health department
- Designed to be compatible with any EHR system

JAMIA 2009;16:18-24
MMWR 2008;57:372-375
Am J Pub Health 2012;102:S325–S332

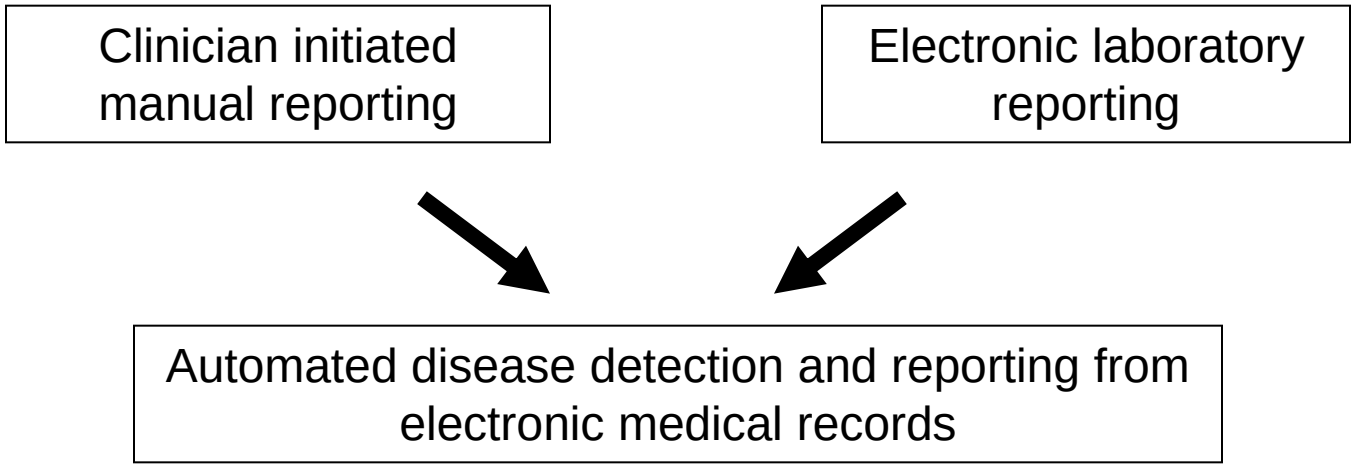
Limitations of Case Identification Using Manual Clinical Reporting

- Provider burden, esp. for high-volume diagnoses
  - e.g. chlamydia, HCV, Lyme
- Requires active communication between provider and public health
  - e.g. follow-up on risk history, pregnancy status, treatment
- Frequently results in missing information
  - Limits analysis and interpretation for action

Limitations of Case Identification Using Lab Reporting

- Labs are blind to purely clinical diagnoses
  - e.g. culture negative TB, early Lyme, PID
- Poor discriminator between active and resolved, or acute and chronic disease
  - e.g. acute vs. chronic hepatitis B and C, new versus old syphilis
- Key information is often missing and desired information not consistently reported
  - e.g., pregnancy status, race/ethnicity

ESPnet Goal



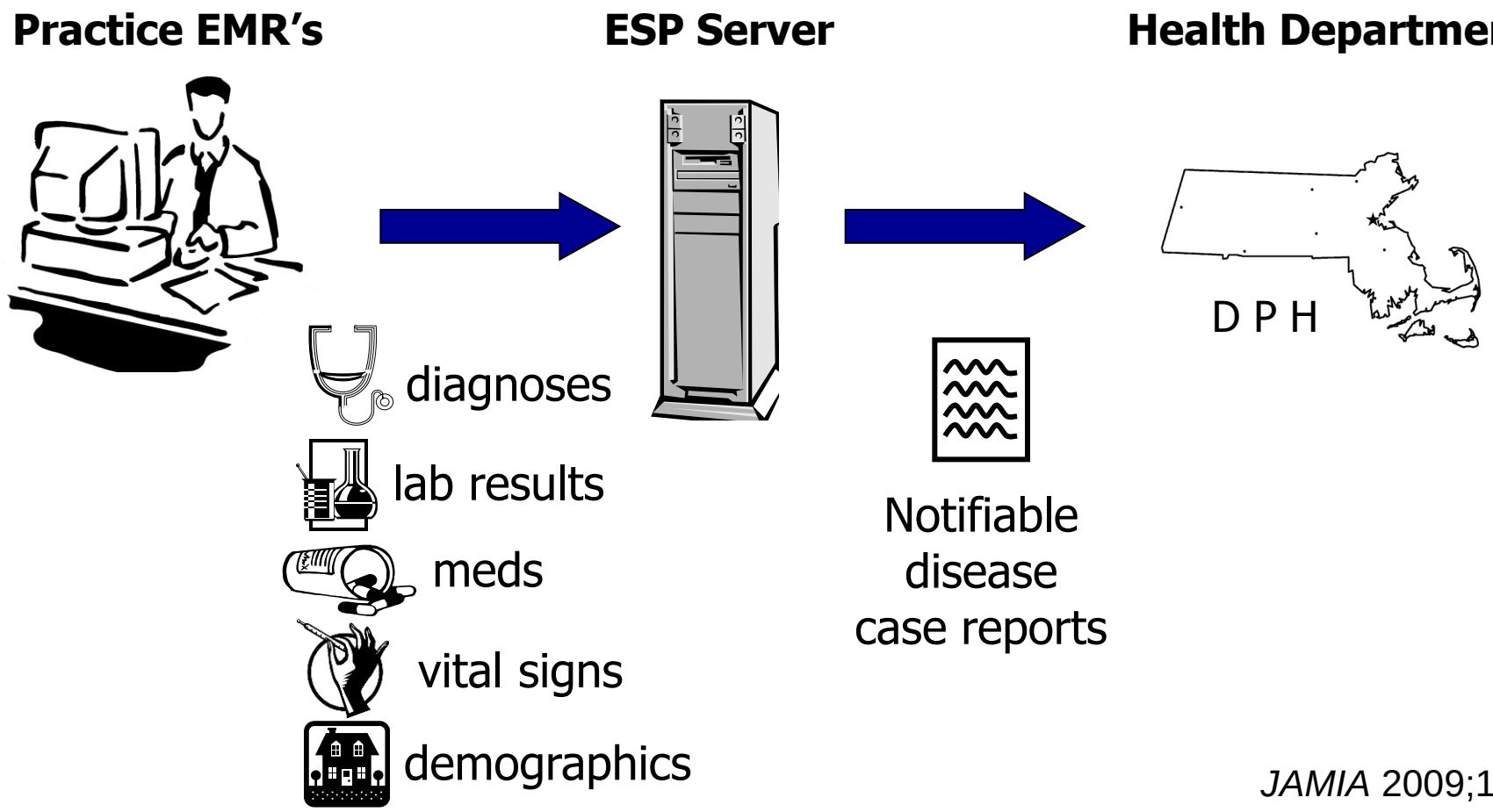
- Combine the best of traditional clinician-initiated reporting and electronic laboratory reporting systems:
  - fast, accurate, clinically detailed, digital reports
  - automated to reduce clinician reporting effort

Decoupled architecture

ESP is decoupled from host electronic health record

	Implications
Allows system to be agnostic to the source EMR (local codes mapped to common variable fields)	**Universal**
Offloads computing burden from clinical systems (and keeps ESP invisible to clinicians)	**Unobtrusive**
Can remain within host practice's firewall	**Secure**

ESPnet: Automated disease detection/reporting for public health



JAMIA 2009;16:18-24
Am J Public Health 2012;102:S325–S332
Am J Public Health 2014;104:2265-2270

Selected Diseases

- Acute hepatitides
- Active TB
- Chlamydia
- Syphilis
- Gonorrhea
- HIV
- PID
- Lyme, Pertussis

Capabilities and Features

- Individual-level notifiable disease reporting
  - Currently reporting:
    - Chlamydia
    - Gonorrhea
    - Syphilis
    - Acute hepatitis A
    - Acute hepatitis B
    - Acute hepatitis C

- New: Longitudinal case reporting/monitoring of chronic infections
  - In development:
    - HIV
    - Hepatitis C
    - TB infection
- Potential: Aggregate-level reporting of conditions/policies
    - Influenza vaccination
    - ILI reporting
    - HIV and HCV screening
    - Lyme disease
    - Program evaluation

Variables

- Patient demographics
- Responsible clinician, site, contact info
- Basis for condition being detected
- Treatments prescribed
- Symptoms (ICD9/10 code)
- Pregnancy status
- Vaccine history (when pertinent)

Potential Variables

- Expedited partner therapy (chlamydia)
- Test of cure/re-infection (chlamydia)
- Risk history
- Housing status
- Insurance status

Case Logic

- Based on CDC surveillance case definitions modeled for coded data captured by EHRs
  - Simple laboratory based definitions:
    - e.g. gonorrhea and chlamydia
  - Complex laboratory based definitions
    - e.g. acute hepatitis C
  - Clinical diagnoses +/- lab data
    - e.g. tuberculosis

HIV Case Detection Algorithm

Any of the following:

- Positive Western Blot
- Positive HIV Antigen/Antibody test **and** positive HIV ELISA
- HIV RNA Viral Load > 200 copies/mL
- HIV Qualitative PCR
- ≥2 ICD codes for HIV **and** history of prescription for ≥3 HIV meds ever
- HIV on problem list **and** history of prescription for ≥3 HIV meds ever
- Concurrent prescriptions for 2 sets of 3 or more *different* antiretrovirals at least 1 month apart

Acute Hepatitis B Case Detection Algorithm

- **Both** of the following:
  - ICD9/10 for jaundice OR liver function tests > 5x normal
  - IgM to core antigen

OR

- **All five** of the following:
  - ICD9 for jaundice OR liver function tests > 5x normal
  - Hep B surface antigen or ‘e’ antigen present
  - Total bilirubin > 1.5
  - No prior positive Hep B specific lab tests
  - No present or prior ICD9/10 code for chronic hepatitis B

PPV: 100.0% (95% CI: 98.5, 100.0); Sensitivity: 94.2% (90.5, 96.7).

PLoS ONE 2008:3:e2626

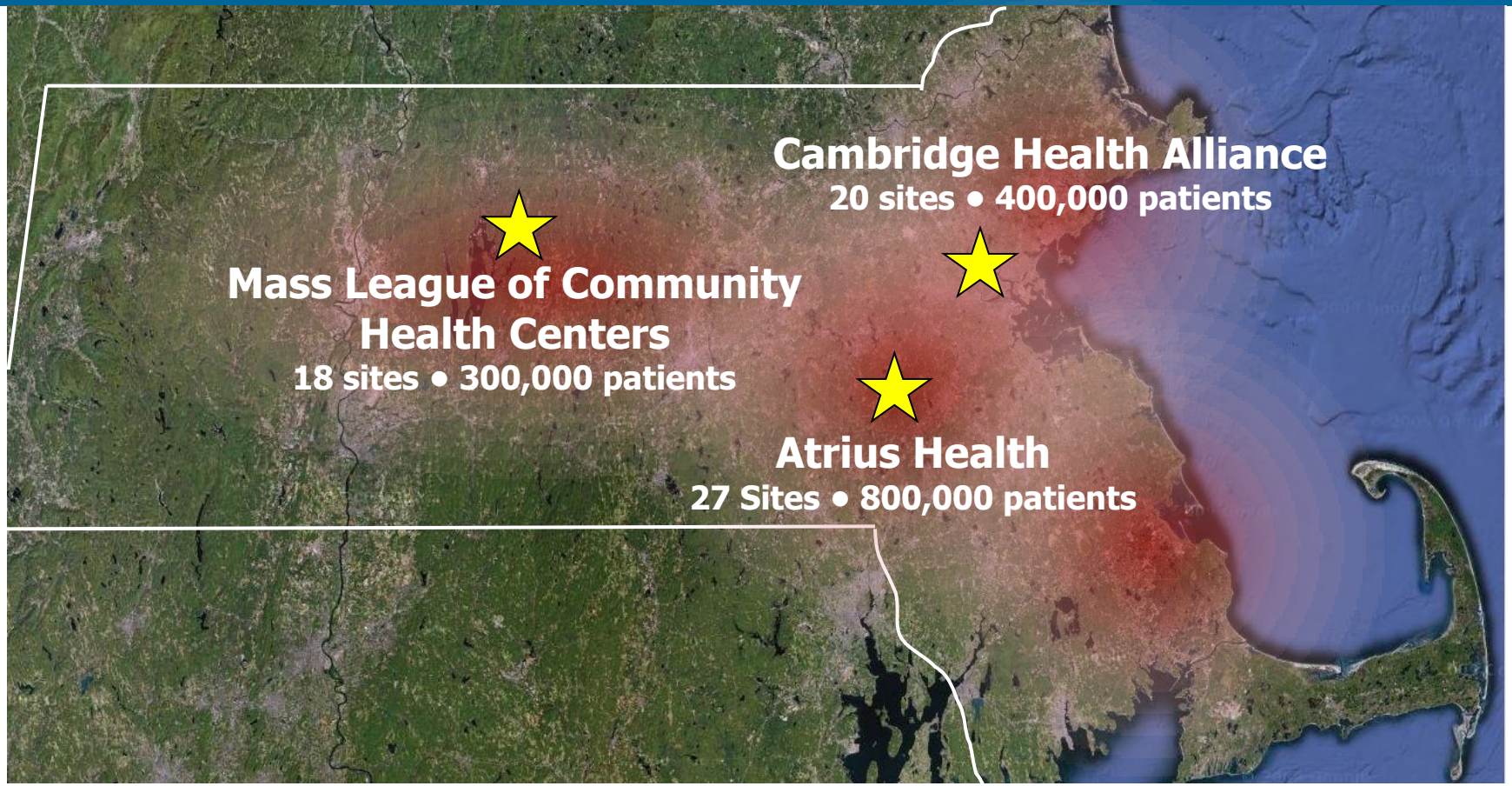
Algorithm Validation

- Algorithms are refined and validated by reviewing medical charts for a selection of cases
- Cases identified by ESPnet are compared to cases captured in MAVEN during the same time period
- Any discrepancies are documented and assessed by MDPH
- Modifications to algorithm are made if necessary

Nothing is Perfect

- Not all data elements of interest are systematically captured in EHR (e.g. sexual or substance use history)
- Patients may get some of their care outside of ESPnet partner practices (e.g. HIV/STI/HCV screenings)
- Ongoing mapping maintenance as lab and diagnostic codes changes; EHS adaptions
- Validation/QC of new data elements reported from the EHR

ESPnet participating sites



Currently 3 partnering networks in Massachusetts
~1.5 million patients (20% of MA population)
New partnerships under discussion: Partners Health Care, BMC, BMC Healthnet