RWJF Product Cover Page

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Affiliation: IU Richard M Fairbanks School of Public Health, Regenstrief Institute, Department of Veterans Affairs  
Title: Improving Population Health through Targeted Decision Support  
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Date and Location: April 20-22, 2015; Lexington, KY
Brian Dixon, PhD, MPA, BA

Improving Population Health through Targeted Decision Support

Co-Investigator(s): Zuoyi Zhang, PhD; P. Joe Gibson, PhD, MPH; Xiaochun Li, PhD; Patrick Lai, MPH; Uzay Kirbiyik, MD, MPH; Jennifer Williams, MPH, BS; Rebecca Hills, PhD; Debra Revere, MS; & Shaun Grannis, MD, MS

Background: Surveillance is the cornerstone of public health practice. Traditionally, health departments have relied on passive, manual reporting of communicable diseases by hospitals, laboratories and clinics. Yet passive approaches can be burdensome for reporters, producing incomplete, delayed reports which impede follow-up and delay recognition of community disease patterns and outbreaks.

Research Objective: We seek to understand the various sources and methods by which hospitals, labs, and clinics report communicable disease information to public health authorities.

Data Sets and Sources: The Indiana Health Information Exchange (IHIE) is a large, robust HIE network in which clinical messages (such as laboratory results) are electronically delivered to over 25,000 physicians. In addition, the HIE network reports positive laboratory results for communicable and infectious notifiable diseases to the Marion County Public Health Department (MCPHD), which is responsible for communicable disease surveillance for its jurisdiction.

Study Design: We are evaluating an intervention designed to pre-populate the official communicable disease reporting form with patient demographics, lab results, and provider information available from the IHIE electronic health record system. The pre-populated form is delivered electronically to providers. Prior to deploying the intervention, we gathered baseline reporting information from fax, paper, and electronic reports that constitute a reported case and were submitted by both providers and labs to MCPHD.

Analysis: Key data required to investigate and close cases were manually abstracted from each report. We measured the completeness of reporting data elements separately for paper, fax, and electronic reports, stratifying by report type. We also calculated reporting rates and examined the results stratified by clinical source, disease and report type.

Principal Findings: We collected 11,997 reports submitted to public health for 8,754 unique cases across seven conditions (chlamydia, gonorrhea, syphilis, Hepatitis C, Acute Hepatitis B, Salmonella, and Histoplasmosis). Completeness of data elements varied by report type: lab report completeness averaged 73% with a range from 2.3% to 100% while provider report completeness averaged 64% with a range from 18.6% to 100%. Lab report completeness was higher than corresponding provider report fields for 12 of 15 critical fields. Lab reporting rates also matched or exceeded the rates for provider reports across all conditions.

Conclusions: The rise of ELR capacity among health departments and the superior completeness of lab reports may improve disease reporting to public health agencies and decrease the amount of information collected from providers. Yet lab report completeness remains problematic in many cases. Health information exchanges may help support more complete capture and synthesis of multiple reports from labs and providers in support of surveillance practice.

Implications for Public Health Practice and Policy PHSSR: Contributes to PH practice by exploring not only which interventions are effective but also why they are effective. Our intervention seeks to streamline clinical and public health workflow related to notifiable condition reporting. Moving forward, we will analyze the impact of pre-populated forms on report completeness, clinical staff burden, reporting rates, and timeliness to further understand how HIE networks can support notifiable disease reporting.
Agenda

• Population Health Decision Support

• Case Reporting Then and Now

• A Pop Health Decision Support Intervention

• Preliminary Findings
Clinical Decision Support

• Computer-based clinical decision support (CDS) can be defined as the use of the computer to bring *relevant knowledge* to bear on the *health care* and *well being* of a patient.

  – Greenes, 2007

\[
(\text{brain} + \text{computer}) > \text{brain}
\]

Friedman, JAMIA, 2008
How Does CDS ‘Fit’ into Public Health?

Office of the National Coordinator for Health IT, 2014
PH Decision Support

• Public health decision support (PHDS) can be defined as the use of the computer to bring relevant knowledge to bear on the health and well-being of a population.
  – Dixon, Gamache, Grannis, 2013

• Examples:
  – Vaccine forecasting report
  – Suggestion for ordering stool culture
Traditional Case Reporting Workflow
### Official State CDR Form

#### Patient Information
- Name
- Address
- Phone#
- DOB
- Gender
- Race/ethnicity

#### Lab Information
- Etiologic agent
- Test name
- Test date
- Treatment initiation date
- Treatment (drugs)

#### Provider Information
- Physician name
- Physician address
- Phone#
- Reported by
- Report date
Enhanced Case Reporting Workflow
Enhancement Builds Upon Core Infrastructure

• Automated case detection
  – Identification of cases that must be reported

• Clinical messaging
  – Getting information to its recipient in a way that is integrated into workflow

• Public health communication pathways
  – Electronic laboratory reporting
  – Fax communications
The Notifiable Condition Detector

Inbound Messages

Realtime

Reportable Conditions

Compare to Dwyer I

Record Count as denominator

Reportable Results

Abnormal flag, Organism name in Dwyer II, Value above threshold

Reportable Results Database

E-mail Summary

Daily Batch

To Public Health

To Infection Control

Print Reports

To Public Health

To Infection Control

Regenstrief Center for Biomedical Informatics
Triggers for Case Detection

• ICD-9 / ICD-10 / SNOMED CT
  – Clear signal of clinical or lab confirmed diagnosis

• LOINC
  – Clear signal of test that examines PH condition
  – Yet the “result” can be hard to confirm

• Natural Language Processing
  – Hard but necessary as labs “dump” results into standard messages
Clinical Messaging/Public Health Communication

Docs 4 Docs® Service
Welcome

Please enter your username and password, then press "Log in".

Username: 
Password: 

Forgot your password?
<table>
<thead>
<tr>
<th>Provider</th>
<th>MRN</th>
<th>Patient Name</th>
<th>Arrival</th>
<th>VT</th>
<th>Doc Type</th>
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**VT Options:**
- OP (Outpatient)
- IP (Inpatient)
- ER (Emergency)
- MC (MCO)
- Blank (if not known)
Pt:  
St. Clare Medical Center  
1710 Lafayette Road  
Crawfordsville, IN 47933  
(765) 362-2800  
DOB: 12/19/1961  
Sex: M  
Pt Class: E  
Admit Date: 

St. Clare Medical Center 
Sisters of St. Francis Health Services 

***Final Report***

EXAM: CR WRIST MIN 3 VV RT 73110  
EXAM DATE: Sep 10 2007 11:17AM  
ACCESSION#: 3291227  

ADMITTING DIAGNOSIS: EXTREMITY PW  

CLINICAL HISTORY: Recent trauma. The patient presents with pain in wrist.  

IMPRESSION: No evidence of an acute or healing fracture.  

RESULT: Three views of the right wrist show no evidence of an acute or healing fracture. The distal radius and ulna are intact. The carpals are normal in appearance, position and alignment. Incidental note is made of metallic plates and screws in the fourth and fifth metacarpals, consistent with open reduction of prior fractures.  

Read by: JAMES PEARCE MD  

Reviewed and Electronically signed by:  
JAMES PEARCE MD  
d: Sep 10 2007 12:07A
<table>
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CONFIDENTIAL REPORT OF COMMUNICABLE DISEASES
State Form 43823 (R2/11-96)
THIS FORM CONTAINS CONFIDENTIAL INFORMATION PER 410 (AC 3.1-2-18).

Name (last, first, m.i.)
If child, name of parent (last, first, m.i.)
Address (number and street)
City, ZIP code
County
Date of birth (month, day, year)
Age

SEX                      RACE             ETHNICITY

☐ Male                        ☐ White            ☐ Hispanic
☐ Female                      ☐ Black            ☐ Non-Hispanic
Pregnant?                     ☐ Unknown          ☐ Unknown

DISEASE
HEPATITIS C

Copy for: UNKNOWN (NPI_ALL_FF_MASTER: 000000001)
Pt: 1234567890123456
So What Happens Next?

• Today clinics must print these forms, complete them manually, and submit them to local health departments using Fax
  – Some use electronic fax

• In the future, we hope to work with SHA to deliver completed forms electronically directly into the state NEDSS system
ARF Project Status

• Baseline data collection completed
  – Existing counts of disease cases, data quality, and processes within public health department
  – Continuing to analyze baseline numbers

• Intervention went live in Sept 2013
  – Turned on intervention in clinics using a rolling approach through end of 2013
  – Collecting post-intervention data
  – Beginning analysis of post-intervention data
Baseline Completeness

• 12,309 reports for 8,353 unique patients
  – Chlamydia, gonorrhea, syphilis, Hepatitis C, Acute Hepatitis B, Salmonella, and Histoplasmosis

• Data Completeness (Not NULL)
  – Provider: 65% mean (Range 33.6% - 100%)
  – Fax-based Lab: 75% mean (Range 14.2% - 100%)
    • ELR: 73% mean (Range 0.01% - 100%)
  – ELR completeness higher for 11 of 15 fields
    • Lab higher compared to provider except race and ethnicity
  – Similar patterns across all conditions
Completeness Discussion

• What can lab reports not provide?
  – Ethnicity; sometimes race
  – Treatment: was order written; med dispensed?
  – Clinical symptoms

• Strategies for getting these data electronically
  – CPOE, eRx and Pharmacy systems
  – Direct EHR access for PH workers
Timeliness Results*

• Most cases are reported within 1 day
  – >80% reported within 3 days

• For nearly all cases, lab is the *first* signal
  – Only 11% cases have provider report at all

• Lab report types
  – ELR, Fax, PH clinic, NEDSS
Next Steps

• Enhanced form generation
  – Currently developing enhanced forms across the various condition groups
  – Turn on enhanced form in mid-2015

• Analysis and dissemination
  – Continue to analyze baseline, post-intervention
  – Synthesize qualitative data
  – Publish findings
Acknowledgements

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  – Shaun Grannis (IUSM and Regenstrief)
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  – Jennifer Williams (Regenstrief)
  – P. Joe Gibson (Marion Co. Public Health Dept.)
  – Debra Revere and Becky Hills (U. Washington)
  – Patrick Lai, MPH (SOIC) and Uzay Kirbiyik (FSPH)

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Questions?

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Health Research Scientist, Department of Veterans Affairs

http://tinyurl.com/fsphbed
Twitter: @dpugrad01
References
