Leveraging a Health Information Exchange Innovation to Improve the Efficiency of Public Health Disease Investigation

Thursday, January 21, 2016, 1:00–2:00pm ET/10:00-11:00am PT

Presenters

Janet Baseman, PhD, MPH is Associate Professor of Epidemiology at the University of Washington (UW) School of Public Health. Dr. Baseman’s research centers around applied epidemiology in public health practice, strategies for improving disease surveillance systems, and public health informatics. She is also adjunct faculty in the Department of Health Services and is a member of the Northwest for Public Health Practice (NWCPHP) Research Team. jbaseman@uw.edu

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Commentary

Shandy Dearth, MPH, is the Administrator of the Epidemiology Department for the Marion County Public Health Department in Indianapolis, Indiana. Since 2003, she has worked with the infectious disease and emergency preparedness programs of the Marion County Public Health Department. She concentrates on health informatics and emergency preparedness. sdearth@marionhealth.org

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PHSSR Research In Progress Webinar
Thursday, January 21, 2015 1:00-2:00pm ET/ 10:00-11:00am PT

Bridging Health and Health Care

Leveraging a Health Information Exchange Innovation to Improve the Efficiency of Public Health Disease Investigation

Note: Download today’s presentation and speaker bios from the ‘Resources’ box in the top right corner of the screen.

Funded by the Robert Wood Johnson Foundation
Agenda

Welcome: Richard Ingram, DrPH, RWJF Systems for Action program co-director; Assistant Professor, U. of Kentucky College of Public Health

“Leveraging a Health Information Exchange Innovation to Improve the Efficiency of Public Health Disease Investigation”

Presenters: Janet Baseman, PhD, MPH, Associate Professor, Epidemiology, U. Washington School of Public Health jbaseman@uw.edu
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Ian Painter, PhD, MSc, Biostatistician ipainter@u.washington.edu
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Commentary:
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and Joseph Gibson, MPH, PhD, Director, Epidemiology JGibson@MarionHealth.org
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Questions and Discussion
Presenters

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Leveraging a Health Information Exchange innovation to improve the efficiency of public health disease investigation

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University of Washington
Seattle, WA
Outline

Project Description

Natural Experiments: The need for a Plan B (and C and D...)

RWJF Project: An example of unanticipated and numerous detours with a happy ending

Lessons Learned: Conducting research to inform public health practice
Project: Impact of HIE Intervention on Public Health

Goals of HIE Intervention:
- Streamline clinic CDR reporting process
- Reduce provider reporting burden
- Improve quality of CDR reporting data

(Original) Goals of RWJF Project:
Investigate impact of the HIE reporting intervention on public health communications burden, case follow-up, investigations & system
The Project Ideal (Good Intentions)...

Plan

Time

Vision

INPUTS

ACTIVITIES

OUTPUTS

OUTCOMES

IMPACT
The Concept
The Project Reality

Vision and Mission

Inputs → Activity → Output → Outcome

Time
RWJF Project:
An example of unanticipated and numerous detours with a happy ending
**AHRQ (HIE) & RWJF (Public Health) Project Interdependencies**

<table>
<thead>
<tr>
<th><strong>AHRQ Project</strong></th>
<th><strong>Baseline: CDR &amp; ELR Data, Comm Burden, Report Timeliness, Report Data Quality/Completeness</strong></th>
<th><strong>Deploy Pre-populated Form Intervention</strong></th>
<th><strong>12 months of Deployed Intervention: Comparison of Comm Burden, Report Timeliness, Report Data Quality</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>MD-PH Call Frequency &amp; Duration</td>
<td>Lab test reports → PH</td>
<td>MD CDR forms → PH</td>
<td>MD-PH Call Frequency &amp; Duration</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RWJF Project</strong></th>
<th><strong>Baseline: InSight &amp; SWIMSS Data, Comm Burden, Report Timeliness &amp; Volume, Case Close Timeliness</strong></th>
<th><strong>Deploy Pre-populated Form Intervention</strong></th>
<th><strong>12 months of Deployed Intervention: Comm Burden, Report Timeliness &amp; Volume, Case Close Timeliness</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Communication Burden</td>
<td>Volume (Lab &amp; MD)</td>
<td>Time to Receive</td>
<td>Time to Close</td>
</tr>
</tbody>
</table>

\(< 6 \text{ months}\)
Project Plan D:

Baseline = 01/01/2012 – 09/15/2013
Intervention = 09/16/2013 – 03/01/2014
Post-Intervention = 03/02/2014 – 09/15/2014

Reporting Volume
Number of cases received by each public health agency (total and by condition by month)

“Time to Receipt”
Time between "notify public health" by provider or lab and receipt of report or inclusion of report into SWIMSS or InSight

“Time to Close”
Time between "Time to Receipt" and last date of activity in the record by each public health agency

Case Burden
Number of cases handled by individual public health workers at each agency
Data & Data Cleaning

**InSight Data Pull**
- Conditions: Hep B, Hep C, Histo, Salm
- Time frame: 01/01/2012 – 09/15/2014
- N = 3,719 records
- Missing Data: 325
- Date Anomalies: 388

**SWIMSS Data Pull**
- Conditions: Chlamydia, Gono, Syphilis
- Time frame: 01/01/2012 – 09/15/2014
- N = 48,250 records
- Missing Data: 5392
- Date Anomalies: 3121

**InSight Analysis Dataset N = 3,006**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chlamydia</td>
<td>28,018</td>
</tr>
<tr>
<td>Gonorrhea</td>
<td>7,791</td>
</tr>
<tr>
<td>Syphilis</td>
<td>810</td>
</tr>
<tr>
<td>Syphilis, Reactor</td>
<td>3,118</td>
</tr>
<tr>
<td>Acute Hep B</td>
<td>563</td>
</tr>
<tr>
<td>Chronic Hep C</td>
<td>2,160</td>
</tr>
<tr>
<td>Histoplasmosis</td>
<td>73</td>
</tr>
<tr>
<td>Salmonella</td>
<td>210</td>
</tr>
</tbody>
</table>
Establishing Overall Context: Reporting Volume

Number of cases received by each PHA between 01/01/2012 – 09/15/2014

Analyses:
Number of cases, all conditions combined, received per month into each reporting system (SWIMSS or InSight)
Number of cases received per month by condition into each reporting system (SWIMSS or InSight)

Findings: Descriptive

InSight #cases/month

SWIMSS #cases/month

SWIMSS #cases with interview/mo
Reporting Volume by Condition/Month

- Chlamydia w/interview
- Gonorrhea w/interview
- Syphilis w/interview
- Hep B
- Hep C
- Histoplasmosis
- Salmonella
Establishing Individual Context: Case Burden

Number of report cases handled by individual PH workers at each PHA

Analyses:
- Number of cases assigned to each PH investigator over time
- Number of cases assigned to each PH investigator over time by condition

Findings: Descriptive
- Little consistency in case assignment over time
- Few investigators assigned cases uniformly over time

SWIMSS/BF Investigators w interview
Outcome: “Time to Receipt”

Time lapse between "notify public health" status for reporters and receipt of report or inclusion of the report into its respective reporting system

Analyses:
Difference in calendar days between the date of lab test result and the earliest date of any PH activity
Difference between earliest date of provider or lab report and time to inclusion into the reporting system by condition by work days (i.e., days PHAs are open, excluding holidays)
Difference between earliest date of provider or lab report and time to inclusion into the reporting system by day of the week

Findings:
Over 95% of the time the first notification to PH of a reportable condition was the lab report
Month-to-month variation in reporting timeliness could not be explained by changes in rates of disease reporting
Systematic differences observed in reporting timeliness depending on condition and day of the week
### Reporting Timeliness: Calendar Days

**SWIMSS ONLY**

Time, in calendar days, between laboratory test result date and date received by PH by:

<table>
<thead>
<tr>
<th>Condition</th>
<th>Chlamydia</th>
<th>Gonorrhea</th>
<th>Syphilis</th>
<th>Syphilis, Reactor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunday</td>
<td>0.69</td>
<td>0.25</td>
<td>0.00</td>
<td>0.05</td>
</tr>
<tr>
<td>Monday</td>
<td>0.71</td>
<td>0.19</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Tuesday</td>
<td>0.71</td>
<td>0.20</td>
<td>0.02</td>
<td>0.07</td>
</tr>
<tr>
<td>Wednesday</td>
<td>0.69</td>
<td>0.19</td>
<td>0.02</td>
<td>0.10</td>
</tr>
<tr>
<td>Thursday</td>
<td>0.72</td>
<td>0.19</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Friday</td>
<td>0.70</td>
<td>0.20</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Saturday</td>
<td>0.71</td>
<td>0.24</td>
<td>0.01</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* Statistically significant, p<0.01, Kruskall-Wallis test
Reporting Timeliness: Work Days

SWIMSS ONLY:
Number of **work days** between laboratory test result date and date received by PH by day of the week and by:

* Statistically significant, p<0.01, Kruskall-Wallis test
Outcome: “Time to Close”

Time lapse between "Time to Receipt" and last date of activity in the record by each PHA

Analyses:
Number of work days from date a case was assigned to an investigator to date the case was closed
Number of work days to close a case by condition; by day of the week; by day of the week of lab test result

Additional SWIMSS analyses:
Number of work days to close a case with interview
Number of work days to close a case with interview by investigator
Case burden: Number of work days to close a case with interview by investigator case load

Findings:
Possible co-variates on case completion rates:
Condition
Investigator
Day of the week
Caseload
Case Closed in Work Days – InSight Data

Findings:
48.8% of InSight cases closed within 17 work days

Median case close time in work days varied by condition

Median case close time in work days varied by investigator

Median case close time in work days did not vary by day of the week

Case close differences could not be explained by investigator case burden or changes in rates of disease reporting
Case Closed in Work Days – InSight Data

Time to close by condition*

Time to close by investigator*

Mean time to close by month$

*statistically significant, $p<0.01$, ANOVA F test

$statistically significant, $p<0.01$ ANOVA for generalized linear models
Findings:
54.7% of SWIMSS cases closed within 4 work days

Median case close time in work days varied by month and showed a clear decline from 10 days in 2012 to 5 days in 2014

The majority (>77%) of SWIMSS cases did not have interviews

For cases w/o interviews: statistically significant effects between "time to close" and condition, public health investigator, day of week, and mean number of cases per week

For cases w/o interviews, interaction effect between condition and investigator

*statistically significant, p<0.01, F test for Poisson regression model
Case Closed in Work Days – SWIMSS Data

Statistically significant associations in “time to close” w/o interview and:

Condition

Individual investigator

Caseload per investigator/week

Day of the week

Day of the week & mean number of cases per investigator/week

Providers who reported 50 or more cases

*statistically significant, p<0.01 ANOVA F test
Case Closed in Work Days – SWIMSS Data

Statistically significant associations in “time to close” w interview and:

Condition

Individual investigator

Caseload per investigator/week

Day of the week

Day of the week & mean number of cases per investigator/week

*statistically significant, p<0.01 ANOVA F test
Intervention Matched Analysis

25 pre-populated forms sent to PH between 09/16/2013 – 03/01/2014

Matched intervention to non-intervention/control cases during same time period by: condition, time to receipt, reporter, day of week of receipt

13 pre-pop cases could be matched to at least one control case

Used multiple level hierarchical random effects model to compare difference in days between controls and pre-pop cases

Findings:
Lower “time to receipt” in work days for pre-pop cases (2.4 days) than controls
Lower “time to close” in work days for pre-pop cases (1.3 days) than controls

<table>
<thead>
<tr>
<th></th>
<th>Estimated mean difference in days $</th>
<th>Std Error</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time to receive case*</td>
<td>2.4</td>
<td>1.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Time to close case</td>
<td>1.3</td>
<td>0.82</td>
<td>0.12</td>
</tr>
</tbody>
</table>

* statistically significant, ANOVA F test

$ Time difference = controls – pre-pop cases
Lessons Learned:
Conducting research to inform public health practice
Unexpected Benefits

New perspectives on day-to-day public health work:

• Seeing workflow delays could inform organizational level modifications in policies and protocols

• Day-of-the week analyses provided insights into which days are busiest which could inform changes in staffing to accommodate known workload issues

• Stratifying by individual investigators could be a new baseline for assessing quarterly or yearly workload

Opportunity for PH to voice concerns about reporting

Keeping research “real”
Acknowledgements

RWJF Project Team
Janet Baseman, PhD, MPH
Joseph Gibson, PhD, MPH
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Debra Revere, MLIS, MA

Public Health Agency Volunteer Reviewers:
Kari Haecker
Joel Hartsell
Justin Holderman
Melissa McMasters

Collaborators & Contributors:
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Thank You!

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Questions and Discussion
# Upcoming Webinars

**Wed, Feb 3 (12-1p ET/9-10a PT)**

**INTER-ORGANIZATIONAL COLLABORATION IN LOCAL PUBLIC HEALTH SYSTEMS: IMPLICATIONS FOR COSTS, IMPACT, AND MANAGEMENT CAPACITY [MULTI-PBRN DIRECTIVE STUDY]**

Justin Marlowe, PhD, MPA, and Betty Bekemeier, PhD, MPH, RN, U. of Washington and WA Public Health PBRN

**Wed, Feb 10 (12-1p ET)**

**IMPLEMENTATION AND DIFFUSION OF THE NEW YORK CITY MACROSCOPE ELECTRONIC HEALTH RECORD SURVEILLANCE SYSTEM**

Katharine H. McVeigh, PhD, MPH, NYC Department of Health and Mental Hygiene

**Thurs, Feb 18 (1-2p ET/ 11a-12p MT)**

**STATE DISSEMINATION AND IMPLEMENTATION STRATEGIES ON LOCAL HEALTH DEPARTMENT ACCREDITATION READINESS AND QUALITY IMPROVEMENT MATURITY**

Adam J. Atherly, PhD, Colorado School of Public Health, & Lisa N. VanRaemdonck, MPH, MSW, Colorado Association of Local Public Health Officials
Thank you for participating in today’s webinar!

For more information about the webinars, contact:
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