Improving Population Health through Targeted Decision Support

Brian E. Dixon, MPA, PhD, FHIMSS Keeneland PHSSR Conference April 21, 2015





INDIANA UNIVERSITY Indianapolis



Regenstrief Center for Biomedical Informatics

Better Health Through Informatics

Agenda

• Population Health Decision Support

• Case Reporting Then and Now

• A Pop Health Decision Support Intervention

• Preliminary Findings

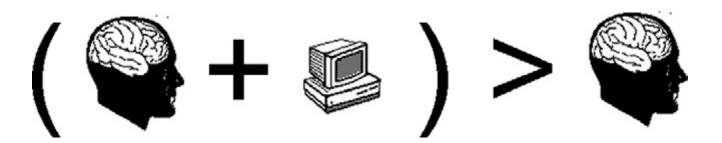




Clinical Decision Support

 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

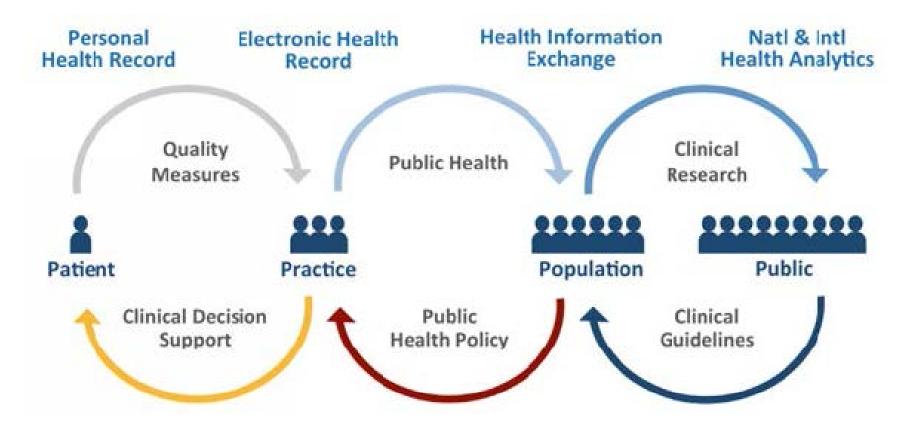


Friedman, JAMIA, 2008





How Does CDS 'Fit' into Public Health?



Office of the National Coordinator for Health IT, 2014





PH Decision Support

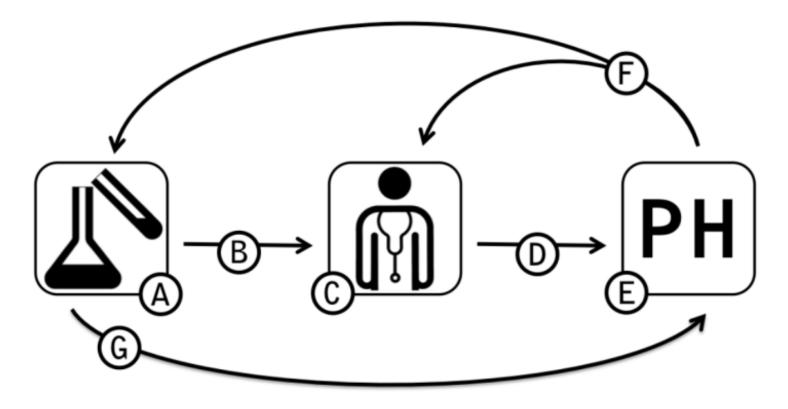
- Public health decision support (PHDS) can be defined as the use of the computer to bring *relevant knowledge* to bear on the *health* and *well-being* of a *population*.
 - Dixon, Gamache, Grannis, 2013

- Examples:
 - Vaccine forecasting report
 - Suggestion for ordering stool culture





Traditional Case Reporting Workflow







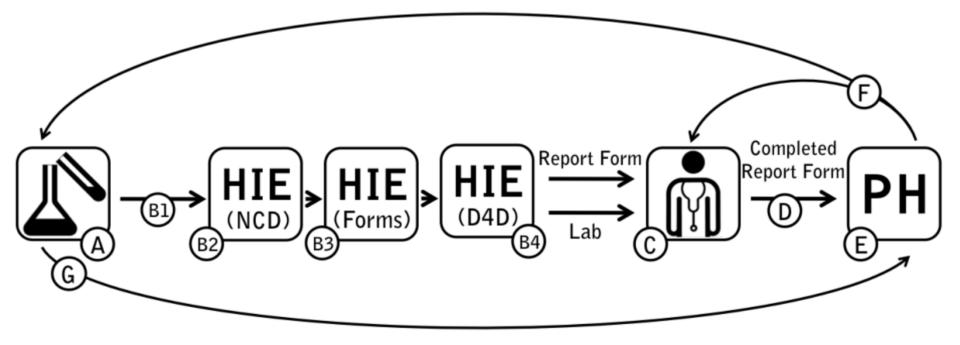
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Enhanced Case Reporting Workflow







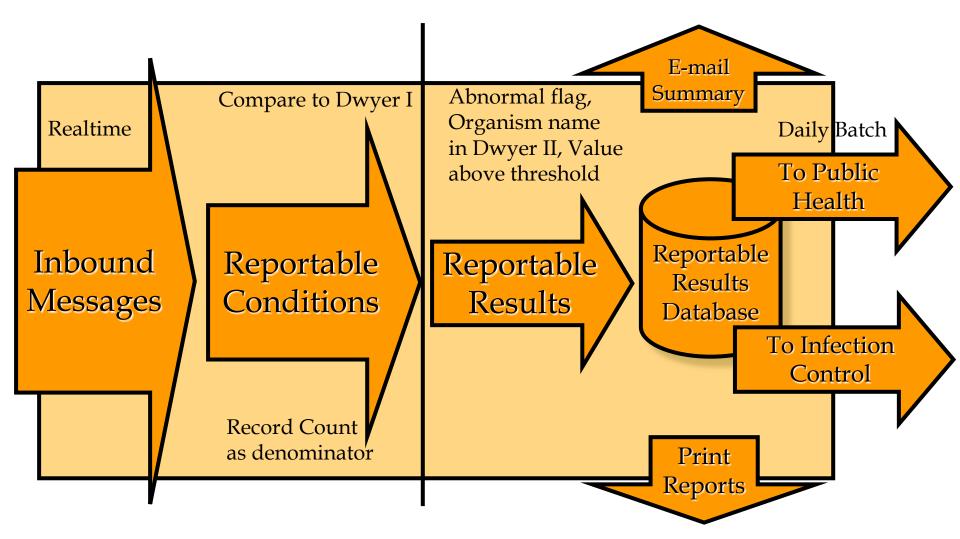
Enhancement Builds Upon Core Infrastructure

- 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







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







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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



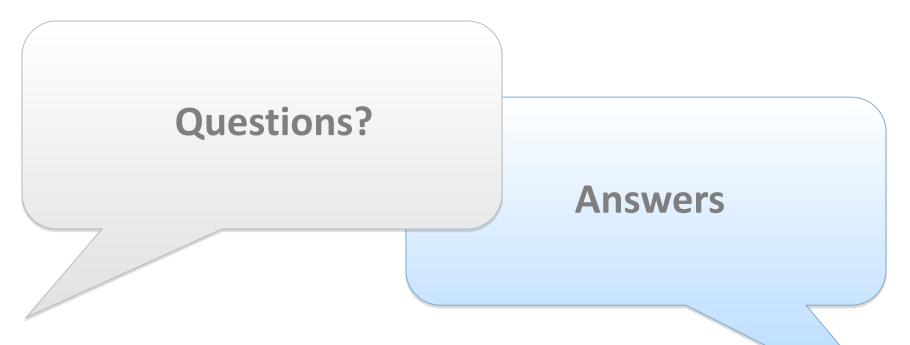


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http://tinyurl.com/fsphbed Twitter: @dpugrad01







References

- Dixon BE, Grannis SJ, Revere D. Measuring the impact of a health information exchange intervention on provider-based notifiable disease reporting using mixed methods: a study protocol. BMC Medical Informatics and Decision Making 2013; 13:121.
- Revere D, Hills RA, Williams J, Grannis SJ, Dixon BE. Leveraging health information exchange to improve population health reporting processes: Lessons in using a collaborative-participatory design process. eGEMs (Generating Evidence & Methods to improve patient outcomes). 2014; 2(3):12. doi: 10.13063/2327-9214.1082



