

Improving Population Health through Targeted Decision Support

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Keeneland PHSSR Conference

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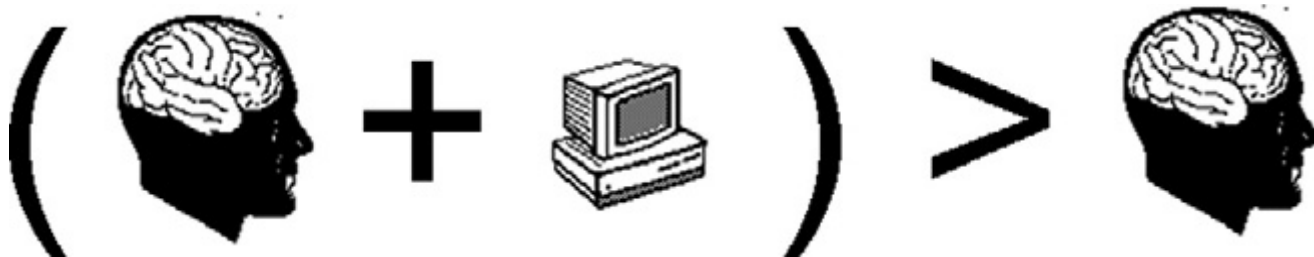
Better Health Through Informatics

Agenda

- Population Health Decision Support
- Case Reporting Then and Now
- A Pop Health Decision Support Intervention
- Preliminary Findings

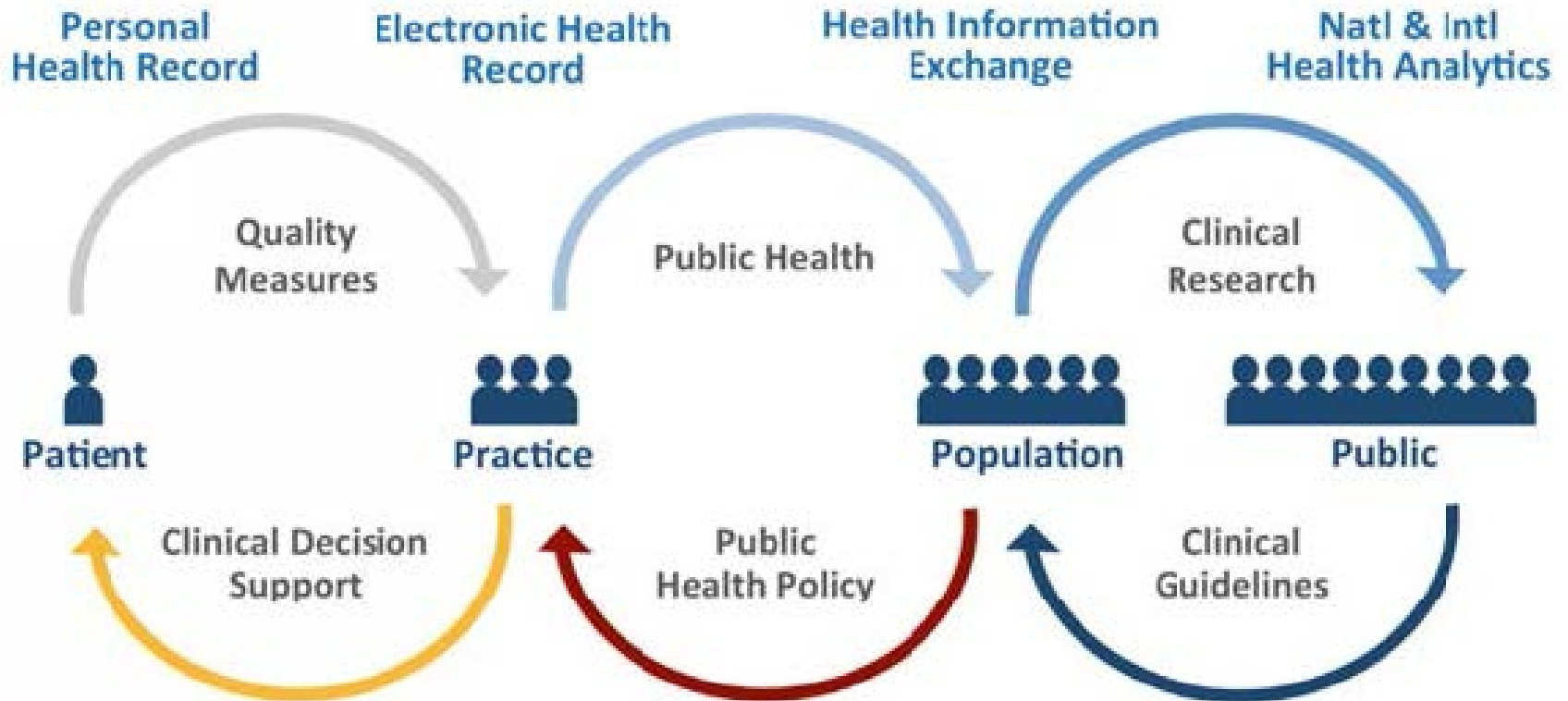
Clinical Decision Support

- 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?

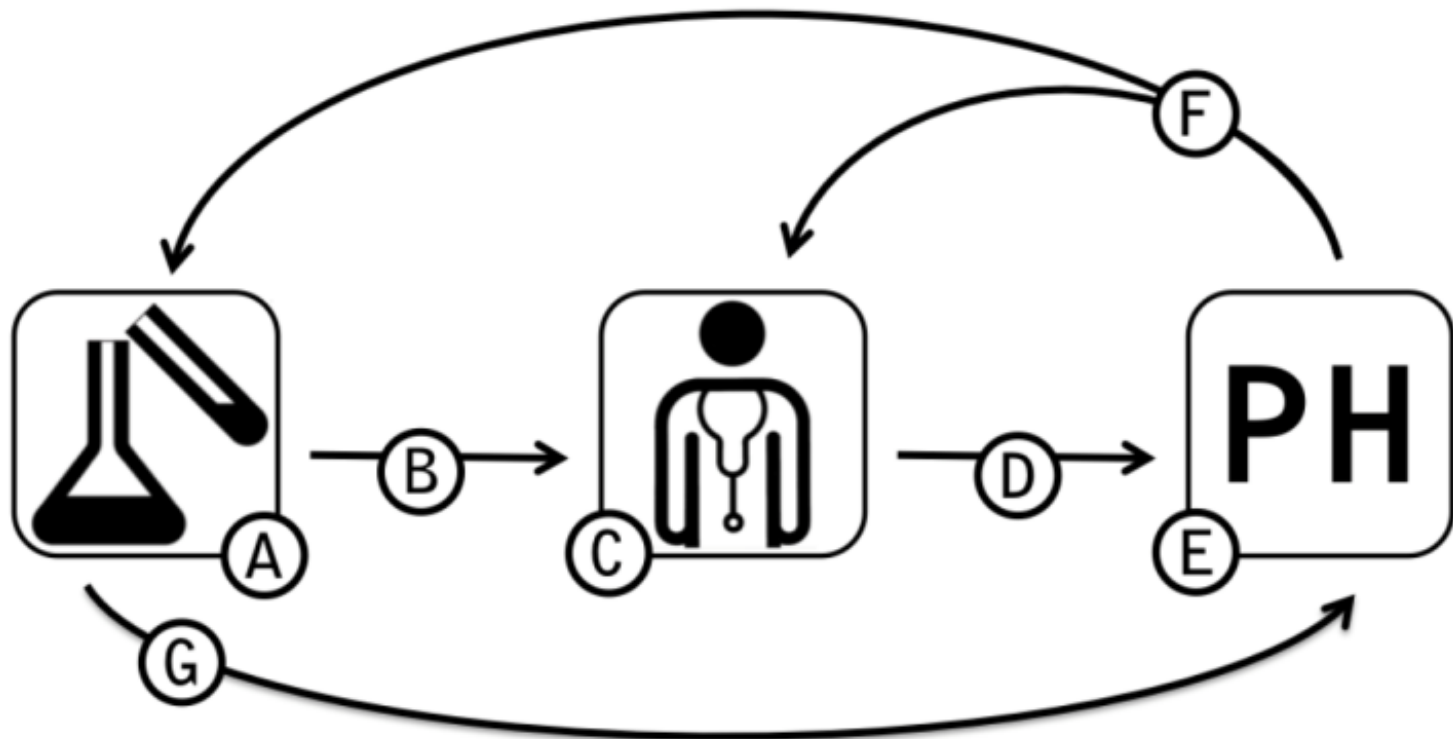


Office of the National Coordinator for Health IT, 2014

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



Official State CDR Form

CONFIDENTIAL REPORT OF COMMUNICABLE DISEASES
 State Form 43823 (R2 / 11-96)
 THIS FORM CONTAINS CONFIDENTIAL INFORMATION PER 410 IAC 3.1-2-18.

DISEASE

patient Information

Name (last, first, m.i.)
 If child, name of parent (last, first, m.i.)
 Address (number and street)
 City, ZIP code
 County
 Telephone number ()
 Date of birth (month, day, year)
 Age
 SEX: Male Female
 RACE: White Black Unknown Multi-Racial
 ETHNICITY: Hispanic Non-Hispanic Unknown
 Pregnant? Yes No Unknown
 (Not Required For STD's) Check all that apply:
 Health Care Worker
 Food Service
 School (student / staff)
 Day Care (attendant / staff)
 Name of school / day care?
 Part of an outbreak? Yes No Unknown

lab Information

Etiologic agent
 Date of diagnosis (month, day, year)
 Stage (syphilis only)
 Symptoms associated with infection? Yes No Unknown
 (Not Required for STD's) Onset date (month, day, year)
 Died? Yes No
 IF YES Pertinent symptoms, signs:
 Lab test(s) and result(s)
 Date(s)
 Treatment (name of antibiotic)
 Dosage
 Date initiated
 Antibiotic resistance: Yes No NOT DONE
 If Yes, what antibiotic?

provider Information

Reporting Facility Code (see other side for codes)
 Name of physician and address
 Telephone number ()
 Date of report
 If hospital, name of hospital
 Record number
 Person reporting (other than physician)
 Telephone number ()
 Check here if you need more cards

LOCAL HEALTH DEPARTMENT USE ONLY

Date received (month, day, year)
 Name of investigator
 Follow-up initiated? Yes No

patient Information

Name
 Address
 Phone#
 DOB
 Gender
 Race/ethnicity

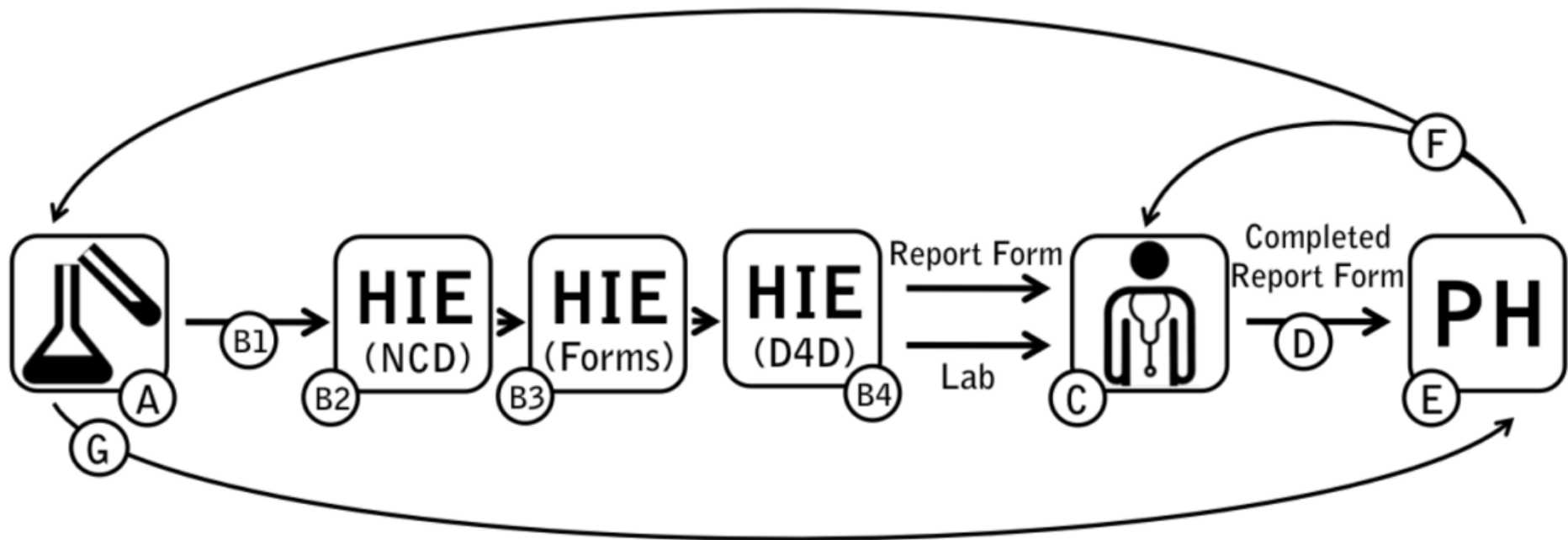
provider Information

Physician name
 Physician address
 Phone#
 Reported by
 Report date

lab Information

Etiologic agent
 Test name
 Test date
 Treatment initiation date
 Treatment (drugs)

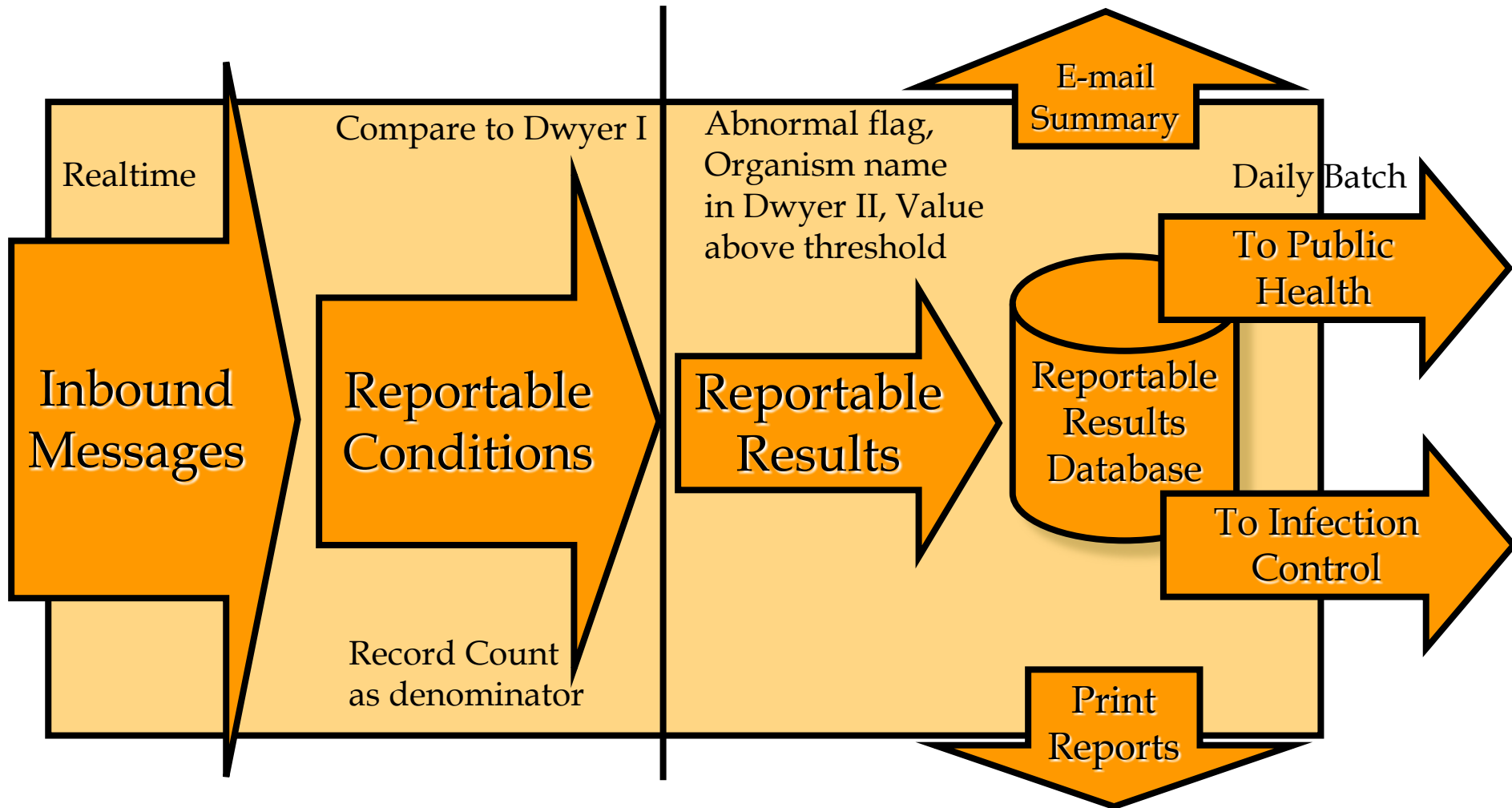
Enhanced Case Reporting Workflow



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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Indiana Health Information Exchange portal

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 A to Z Family Practice
 DOCUMENT INBOX

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Holds all new documents. VT is 'visit type': OP (Outpatient), IP (Inpatient), ER (Emergency), MC (Misc) or blank if not known.

Filters:

Actions:

<input type="checkbox"/>	Provider	MRN	Patient Name	Arrival	VT	Doc Type	Doc Details
<input type="checkbox"/>	Benton, Peter	000000	AUSTIN, SAM	2007 10/04 01:27 AM		Lab (St. Francis)	Basic Metabolic Panel
<input type="checkbox"/>	Benton, Peter	000000	BENTON, PETER	2007 10/04 01:27 AM		Microbiology (St. Francis)	TRICHOMONAS WET PREP EXAM
<input type="checkbox"/>	Benton, Peter	003768	BRADY, VICTOR	2007 10/04 01:27 AM		Transcription (Morgan)	CONSULTATION REPORT
<input type="checkbox"/>	Benton, Peter	10709	BRADY, VICTOR	2007 10/04 01:27 AM	!	Lab (St Vincents)	HEMATOCRIT POC
<input type="checkbox"/>	Benton, Peter	200072	BROWN, JAMES	2007 10/04 01:27 AM		Radiology (St Vincents Mercy)	BONE SCAN
<input type="checkbox"/>	Benton, Peter	90004	BROWN, JAMES	2007 10/04 01:27 AM		Radiology (SERH)	CR TIBIA FIBULA 2 VW RT 73590 [prelim]
<input type="checkbox"/>	Benton, Peter	60000	BRADY, VICTOR	2007 10/04 01:27 AM		Radiology (St Clare)	CT PELVIS W 72193
<input type="checkbox"/>	Benton, Peter	90008	BROWN, JAMES	2007 10/04 01:27 AM		Radiology (St Vincents Mercy)	CHEST-PA & LATERAL
<input type="checkbox"/>	Benton, Peter	000000	BROWN, JAMES	2007 10/04 01:27 AM		Radiology (St Clare)	CR WRIST MIN 3 VW RT 73110
<input type="checkbox"/>	Benton, Peter	16000	BROWN, JAMES	2007 10/04 01:27 AM	!	Lab (St. Francis)	STAT CBC w/DIFF
<input type="checkbox"/>	Benton, Peter	07200	BROWN, JAMES	2007 10/04 01:27 AM	!	Lab (St Vincents)	STAT TOTAL PROTEIN PE
<input type="checkbox"/>	Benton, Peter	000000	BROWN, JAMES	2007 10/04 01:27 AM		Transcription (Morgan)	HISTORY
<input type="checkbox"/>	Benton, Peter	000000	BROWN, JAMES	2007 10/04 01:27 AM		Lab (St Vincents)	Allocated Unit
<input type="checkbox"/>	Benton, Peter	70000	BROWN, JAMES	2007 10/04 01:27 AM		Radiology (St Francis)	US PELVIS + TRANSVAGINAL [prelim]
<input type="checkbox"/>	Benton, Peter	70000	BROWN, JAMES	2007 10/04 01:27 AM		Face Sheet (St Vincents)	Patient Registration
<input type="checkbox"/>	Benton, Peter	48000	GIFFORD, JAMES	2007 10/04 01:27 AM		Radiology (St Clare)	RF UGI W/SMALL BOWEL 74245
<input type="checkbox"/>	Benton, Peter	10008	GIFFORD, JAMES	2007 10/04 01:27 AM	!	Lab (St Vincents)	STAT CBC
<input type="checkbox"/>	Benton, Peter	90000	GIFFORD, JAMES	2007 10/04 01:27 AM	!	Lab (GLHS)	CBC/AUTO DIFF
<input type="checkbox"/>	Benton, Peter	45000	GORDON, GORDON	2007 10/04 01:27 AM	!	Lab (Morgan)	COMPREHENSIVE PROFILE
<input type="checkbox"/>	Benton, Peter	45000	GORDON, GORDON	2007 10/04 01:27 AM		Lab (Morgan)	AMYLASE LEVEL
<input type="checkbox"/>	Benton, Peter	45000	GORDON, GORDON	2007 10/04 01:27 AM		Lab (Morgan)	CREATINE PHOSPHOKINASE
<input type="checkbox"/>	Benton, Peter	88000	GORDON, GORDON	2007 10/04 01:27 AM		Radiology (St Clare)	CR CHEST PA/LAT 71020
<input type="checkbox"/>	Benton, Peter	90000	GRACE, MARY	2007 10/04 01:27 AM	!	Lab (St Vincents)	STAT TOTAL PROTEIN PE
<input type="checkbox"/>	Benton, Peter	50000	GRACE, MARY	2007 10/04 01:27 AM	!	Lab (St Vincents)	GLUCOSE POC
<input type="checkbox"/>	Benton, Peter	000000	GRACE, MARY	2007 10/04 01:27 AM		Radiology (St Clare)	MRI BRAIN W/WO CONTRAST 70553
<input type="checkbox"/>	Benton, Peter	000000	GRACE, MARY	2007 10/04 01:27 AM	!	Lab (St Vincents)	TOTAL PROTEIN PE
<input type="checkbox"/>	Benton, Peter	60000	HANCOCK, JEFFREY	2007 10/04 01:27 AM		Transcription (Morgan)	EEG AWAKE AND DROWSY AMBULATE
<input type="checkbox"/>	Benton, Peter	000000	HANCOCK, JEFFREY	2007 10/04 01:27 AM		Microbiology (St. Anthony CP)	Urine Culture [prelim]
<input type="checkbox"/>	Benton, Peter	000000	HANCOCK, JEFFREY	2007 10/04 01:27 AM		Lab (St Vincents)	AMNIO FL ACHE
<input type="checkbox"/>	Benton, Peter	000000	HANCOCK, JEFFREY	2007 10/04 01:27 AM	!	Lab (St Vincents)	STAT CHLAM GC DNA SDA
<input type="checkbox"/>	Benton, Peter	50000	HANCOCK, JEFFREY	2007 10/04 01:27 AM		Lab (Morgan)	VALPROIC ACID (DEPAKENE) LEVEL
<input type="checkbox"/>	Benton, Peter	60000	HANCOCK, JEFFREY	2007 10/04 01:27 AM		Lab (St. Francis)	Basic Metabolic Panel
<input type="checkbox"/>	Benton, Peter	28000	JANSEN, JAYL	2007 10/04 01:27 AM		Radiology (St Clare)	CT CHEST WO 71250

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INBOX Review

Navigation:

Actions:

Copy for: **Benton, Peter** Pt: _____



St. Clare
MEDICAL CENTER

Sisters of St. Francis Health Services

St. Clare Medical Center
 1710 Lafayette Road
 Crawfordsville, IN 47933
 (765) 362-2800

Pt: D1	MR#: _____	DOB: 1 / 1 / 19	Sex: M
Acct: 30 01	Location: SCEDE		
Accession#: 322227	Pt Class: E	Admit Date:	Primary Care:
Order#: _____			
Ordered by: CARTER, JOHN			
Attending:			

Final Report

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

ADMITTING DIAGNOSIS: EXTREMITY PN

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 ulnar 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

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Select All Unselect All Selected Providers Selected Patients

Filters: Checkmark first-last

Actions: Review Selected Print/Keep Print/Remove Remove Selected Forward Selected

	Provider	MRN	Patient Name	Arrival	!	VT	Doc Type	Doc Details
<input type="checkbox"/>	UNKNOWN (NPI_ALL_PP_MASTER: 000000001)			2012 09/24 04:46 PM			Disease Reporting (Indiana Dept Health)	Public health notifiable condition
<input type="checkbox"/>	UNKNOWN (NPI_ALL_PP_MASTER: 000000001)			2012 09/24 04:46 PM			Disease Reporting (Indiana Dept Health)	Public health notifiable condition
<input type="checkbox"/>	UNKNOWN (NPI_ALL_PP_MASTER: 000000001)			2012 09/24 04:46 PM			Disease Reporting (Indiana Dept Health)	Public health notifiable condition
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<input type="checkbox"/>	UNKNOWN (NPI_ALL_PP_MASTER: 000000001)			2012 09/24 04:46 PM			Disease Reporting (Indiana Dept Health)	Public health notifiable condition

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COMMUNICABLE DISEASES**
 State Form 43823 (R2 / 11-96)
 THIS FORM CONTAINS CONFIDENTIAL
 INFORMATION PER 410 IAC 3.1-2-18.

DISEASE
HEPATITIS C

Name (last, first, m.i.)			<p>(Not Required For STD's) Check all that apply:</p> <input type="checkbox"/> Health Care Worker <input type="checkbox"/> Food Service <input type="checkbox"/> School (student / staff) <input type="checkbox"/> Day Care (attende / staff)
If child, name of parent (last, first, m.i.)			
Address (number and street)		Telephone number	
City, ZIP code		Name of school / day care?	
County			
Date of birth (month, day, year)	Age		
SEX	RACE	ETHNICITY	
<input checked="" type="checkbox"/> Male <input type="checkbox"/> Female	<input checked="" type="checkbox"/> White <input type="checkbox"/> Black <input type="checkbox"/> Unknown	<input type="checkbox"/> Hispanic <input type="checkbox"/> Non-Hispanic <input type="checkbox"/> Unknown	
Pregnant?			

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

- Key folks supporting my work
 - Shaun Grannis (IUSM and Regenstrief)
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 - Jennifer Williams (Regenstrief)
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Questions?

Answers

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Health Research Scientist, Department of Veterans Affairs

<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