Augmentation and Automated Reconciliation of External Immunization Information in an Electronic Health Record

S73: Interoperability

Nicholas Riley, MD, PhD

Clinical Informatics Fellow, Case Western Reserve University / MetroHealth

Twitter: @nriley

#AMIA2018

Disclosure

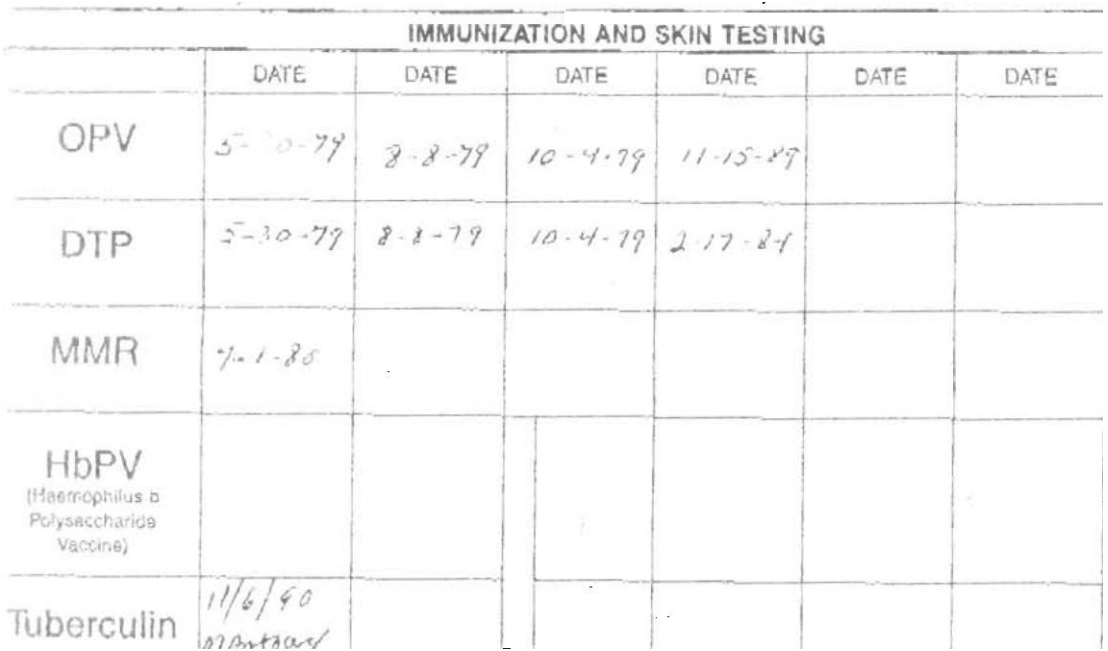
I have no relevant relationships with commercial interests to disclose.

Learning Objectives

After participating in this session the learner should be better able to:

- Develop awareness of technical, organizational and legal issues limiting US immunization information systems' role as a sole source of historical and forecasted immunizations
- Understand differences between immunization data sources
- Describe practical strategies for improving the completeness and accuracy of immunization information in an electronic health record (EHR) while reducing manual effort

Immunization information: before



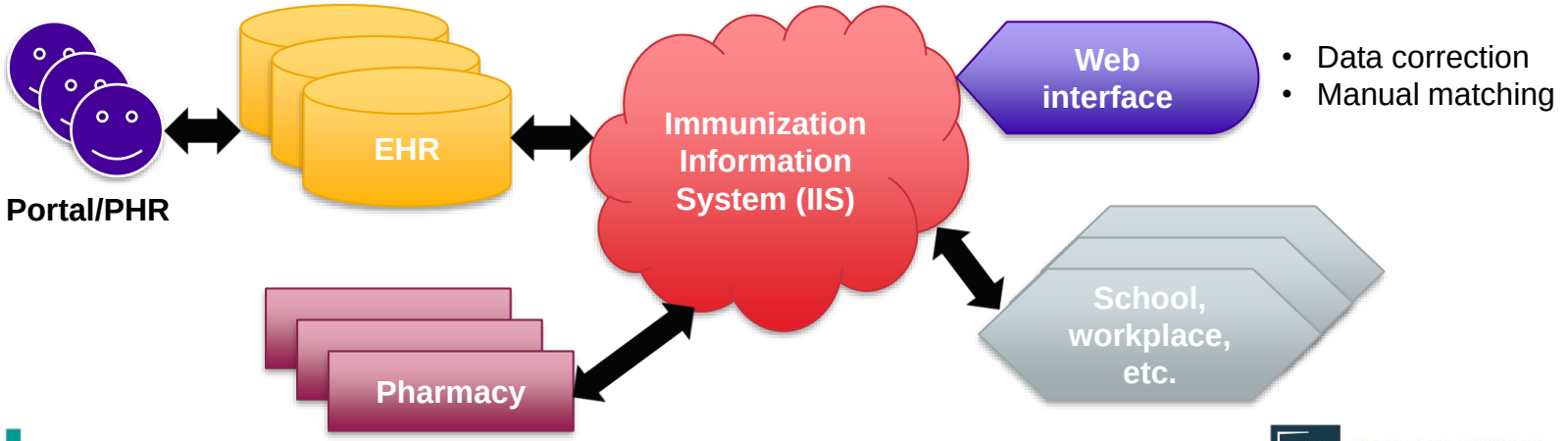
IMMUNIZATION AND SKIN TESTING

	DATE	DATE	DATE	DATE	DATE	DATE
OPV	5-30-79	8-8-79	10-4-79	11-15-87		
DTP	5-30-79	8-8-79	10-4-79	2-17-84		
MMR	7-1-85					
HbPV (Haemophilus b Polysaccharide Vaccine)						
Tuberculin	11/6/90 Montaux					

- PCP-centric
- Uncoordinated
- Sharing by mail, fax, humans

Immunization information: IIS-centric ideal

IIS receives immunization administration **reports** for every patient in its jurisdiction and provides **forecasts** of immunizations and dates due



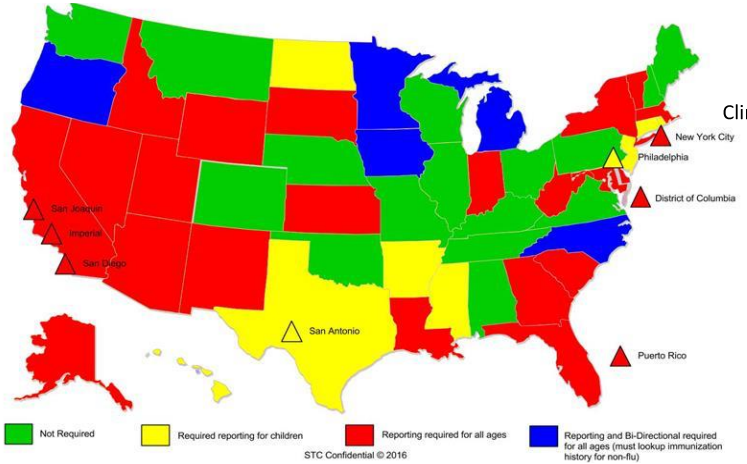
Immunization information in reality

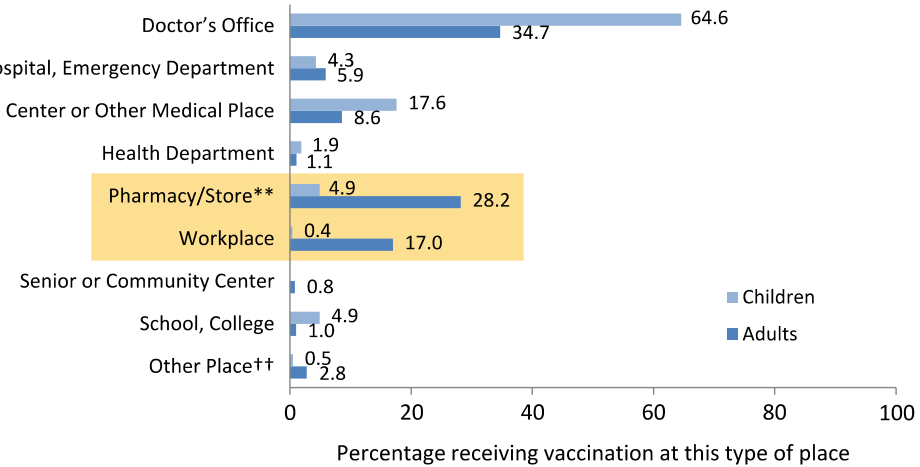
- Some IISes don’t include adults or are opt-in
- No inter-IIS interchange; clinicians can’t access non-local IIS (legal barriers)
- IIS interfaces are missing and limited
  - EHR ⟶ IIS only (MU1/2) — technical/staffing issues limit bidirectional communication
  - EHR ⟷ IIS interface is add/query only — can’t merge records or correct data
  - Instead must use IIS Web interface; changes (at least in Ohio) queued for manual review
  - IIS forecasts unreliable, so EHRs/pharmacy information systems must make their own
- Non-IIS sources add information
  - Pharmacy “dispenses”, insurance claims, other EHRs

MetroHealth

School of Medicine
Case Western Reserve University

Pharmacy/workplace administration

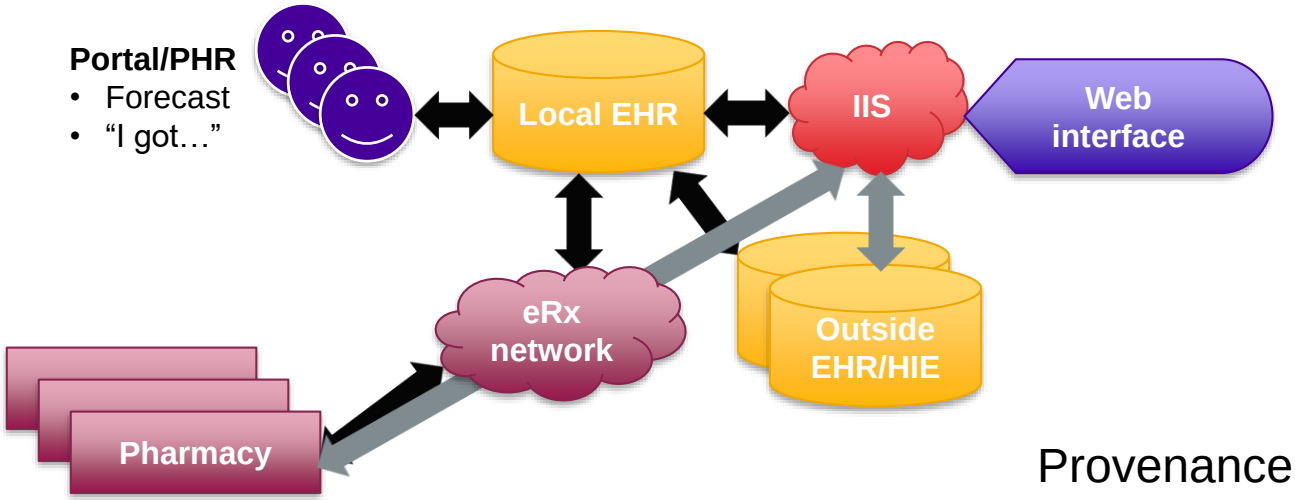




- Pharmacy reporting to IIS not required in many states
- "Nonmedical places" not required/permitted to report to IIS

Sources:
Walmart, Collaboration and coordination of complementary access points for adult vaccinations
CDC, Results of November 2017 Influenza Vaccination Coverage Surveys

An EHR-centric view of immunizations



Provenance not preserved

An EHR-centric view: pros and cons

+ eRx immunization “dispense” data are most consistent
  + Exact date and location, exact product administered, standardized coding
+ Outside EHR data transcends IIS jurisdictions
+ Portal/PHR data can encompass “nonmedical places”
– Outside EHR data may be incomplete, erroneous or unmapped

Pneumococcal Vac Conjugate(#7 thru APRIL 2010 then #13 thereafter)

n ~ 65 000

Baseline EHR deduplication

Discard external imms with **same CVX code** and **date** as local imms

CVX Code	CVX Short Description
135	Influenza, high dose seasonal
140	Influenza, seasonal, injectable, preservative free
141	Influenza, seasonal, injectable
144	influenza, seasonal, intradermal, preservative free
149	influenza, live, intranasal, quadrivalent
150	influenza, injectable, quadrivalent, preservative free
155	influenza, recombinant, injectable, preservative free
158	influenza, injectable, quadrivalent
160	Influenza A monovalent (H5N1), ADJUVANTED-2013
161	Influenza, injectable,quadrivalent, preservative free, pediatric
166	influenza, intradermal, quadrivalent, preservative free
168	influenza, trivalent, adjuvanted
171	Influenza, injectable, MDCK, preservative free, quadrivalent
185	influenza, recombinant, quadrivalent,injectable, preservative free
186	Influenza, injectable, MDCK, quadrivalent, preservative

Interventions

1. Augment with pharmacy-administered immunization “dispenses”
   - Fetch dispense data from eRx network for each visit, stored in EHR pending reconciliation
   - Convert unreconciled dispenses to administered immunizations in nightly batch process*
2. Automatically reconcile (import into local EHR) or discard as duplicate
   - Unreconciled data ignored in forecasting/reporting*
   - Match on vaccine groups in addition to CVX codes*
   - Replace MMR, DTAP vaccine groups
     - Example: MMR group contains MMR, M/R, MMRV
     - Instead, use antigen-based groups for M, M, R
   - Match combined vaccines with their components

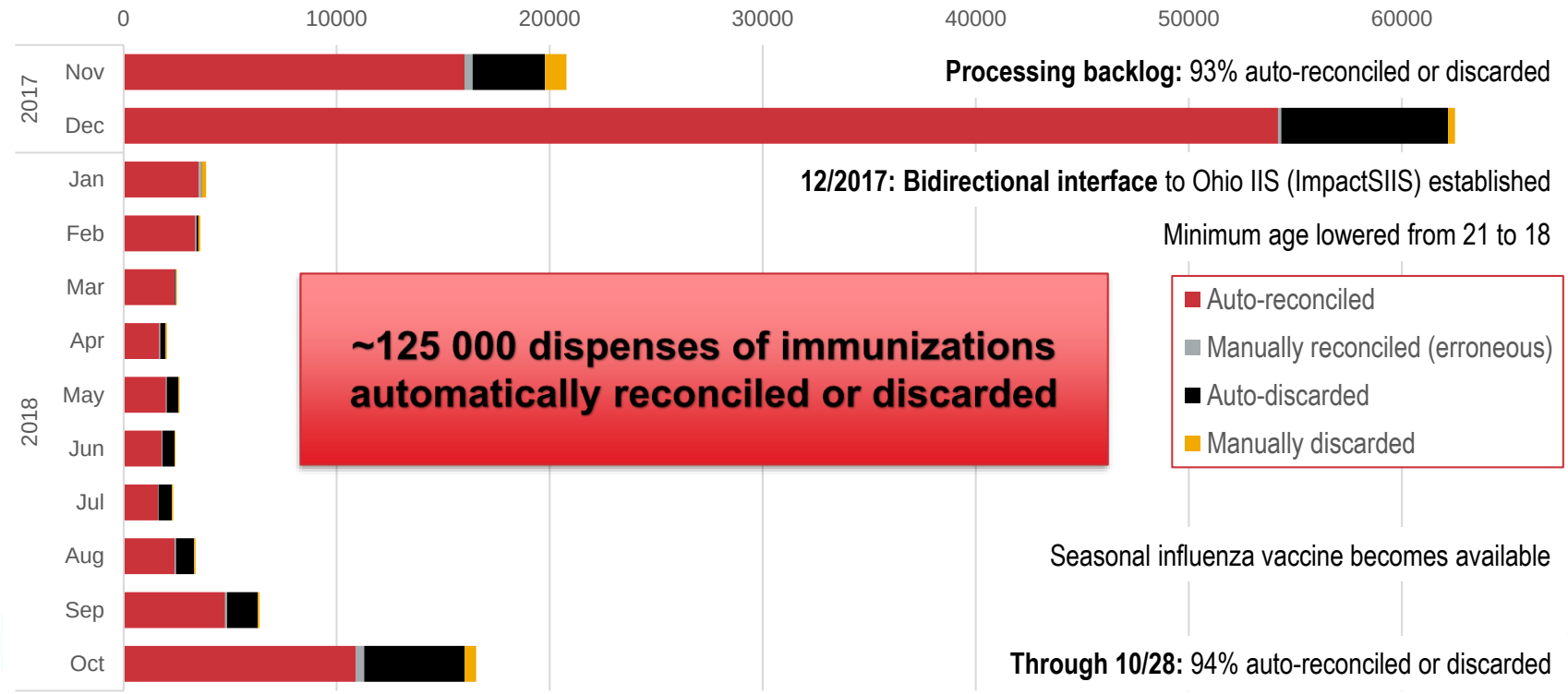
CVX Code	CVX Short Description	Group
135	Influenza, high dose seasonal	FLU
140	Influenza, seasonal, injectable, preservative free	FLU
141	Influenza, seasonal, injectable	FLU
03	MMR	MMR
04	M/R	MMR
05	measles	MMR
06	rubella	MMR
07	mumps	MMR
38	rubella/mumps	MMR
94	MMRV	MMR

MetroHealth

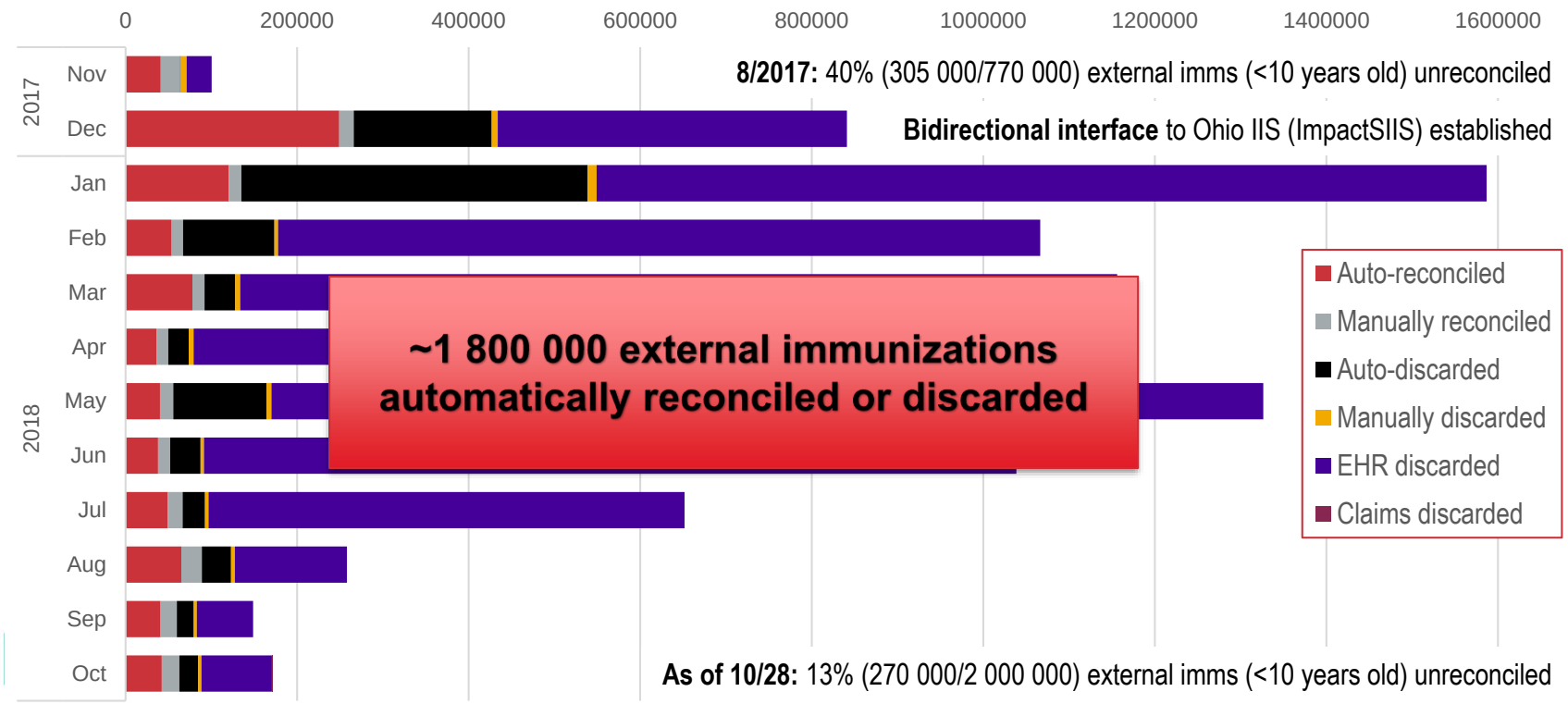
* Remedied in versions of our EHR released since submission

School of Medicine Case Western Reserve University

Intervention 1: incorporate dispenses



Intervention 2: auto-reconcile/discard



Conclusions

- IIS ⟷ EHR becoming more widespread
- Benefits from other immunization sources
- Reduce barriers to use of existing data

Many opportunities for improvement…

Next steps

- **EHR capabilities:** auto-reconciliation, sanity checking; merging imms
- **IIS:** sanity checking/normalization of patient and immunization information
- **IIS-EHR interface:** patient matching; forecasting based on provisional data?
- **Legal framework:** rule harmonization, facilitation of inter-IIS communication
- **CDC:** antigen-based vaccine groups, machine-readable availability
- **Overall:** maintain and propagate provenance and “eventual correctness”

Question

Which external source provides the most consistent and timely immunization information?

A. Another EHR
B. Insurance claims
C. E-prescribing network
D. Immunization information system (IIS)

Answer

A. Another EHR
B. Insurance claims
C. E-prescribing network
D. Immunization information system (IIS)

Explanation:

- “Dispenses” of immunizations include the product administered, the exact dispense date and clear provenance (pharmacy where given)
- IIS/EHR data is mixed historical/manual entry; EHR data may be unmapped; claims data includes no location/provenance and may be delayed

AMIA is the professional home for more than 5,400 informatics professionals, representing frontline clinicians, researchers, public health experts and educators who bring meaning to data, manage information and generate new knowledge across the research and healthcare enterprise.

INFORMATICS PROFESSIONALS. LEADING THE WAY.

@AMIAInformatics

@AMIAinformatics

Official Group of AMIA

@AMIAInformatics

#WhyInformatics

Thank you!

Email me at: nriley@metrohealth.org