

## **Public Health on FHIR**

A Panel Presentation Aasa Dahlberg Schmit Mike Berry (HLN), Sarah Solarz (MDH), Nate Imihy Bean (Hennepin County, MN) June 2024



## **Welcome the Panel**

- Mike Berry (HLN)
- Aasa Dahlberg Schmit (representing Sarah Solarz)
- Nate Imihy Bean (Hennepin County, MN)
- Non-speaking authors
- Jeffrey Goggin (RI)
- Sarah Solarz (MDH)



## Thanks to:

 Craig Newman, Forrest White and Sujata Malik, program managers of the Helios activities

- Jeffrey Goggin, Rhode Island department of Health
- Sarah Solarz, Minnesota Department of Health
- Office of Data Strategy and Interoperability (MDH)



### Agenda

- What is FHIR and why does it matter for public health?
- State example:
  - FHIR projects at the RI department of Health
- Local example:
  - FHIR data exchange between Hennepin county and MDH
- State participation in FHIR accelerator project:
  - Helios
- Discussion and Q&A





We help public health Public Health solve informatics Informatics Consulting Company problems Founded in 1997 Academic heritage Partnership Unique combination approach with of strategic and

#### Engagement in IIS, eCR, Helios, DMI, PHIG, **TEFCA**, **USCDI**+ activities

tactical projects

clients leveraging Agile methodologies

## What is FHIR in a Nutshell

- Fast Healthcare Interoperability Resources
- The scope of FHIR includes all aspects of healthcare related interoperability, clinical care, administration, research etc.
- Set of Resources and a modern RESTful API for accessing them
- Next generation HL7 standard
  - Introduced in 2010 fairly new with broad uptake

Source: Introduction to FHIR training, FHIR.org





### Structure

 FHIR data is organized into resources



#### First time here? See the executive summary, the developer's introduction, clinical introduction, patient introduction, or architect's introduction, and then the FHIR overview & how FHIR versions work. See also the open license (CCO) (and don't miss the full Table of Contents and the Community Credits or you can search this specification). Level 1 Basic framework on which the specification is built Foundation Base Documentation, XML, JSON, RDF, Datatypes, Extensions Level 2 Supporting implementation and binding to external specifications Implementer Support Security & Privacy **Exchange** Conformance Terminology Downloads, Security, StructureDefinition, CodeSystem, REST API + Search Version Mgmt, Consent, CapabilityStatement, ValueSet, Documents Use Cases, Provenance, ImplementationGuide, ConceptMap, Messaging Testing AuditEvent Profiling Terminology Svc Services Databases Subscriptions Level 3 Linking to real-world concepts in the healthcare system Patient, Practitioner, CareTeam, Device, Organization, Location, Healthcare Service Administration Level 4 Record-keeping and Data Exchange for the healthcare process (୧) Medications À Sinancial **Diagnostics** Clinical Workflow Allergy, Problem, Observation, Medication, Introduction + Claim, Account, Procedure, Report, Specimen, Request, Dispense, Task, Appointment, Invoice, ChargeItem, CarePlan/Goal, ImagingStudy, Administration, Schedule, Referral, Coverage + Eligibility Family History, Genomics, etc. Statement, PlanDefinition, etc. Request & Response, ExplanationOfBenefit, RiskAssessment, Immunization, etc. etc. etc. Level 5 Providing the ability to reason about the healthcare process P Clinical Reasoning **Medication Definition** Library, PlanDefinition & GuidanceResponse, Medicinal, Packaged & Administrable product definitions, Measure/MeasureReport, etc. Regulated Authorization, etc.



#### Example of a resource: Immunization

#### 11.7.4 Resource Content

Structure UML XML JSON Turtle R4 Diff All

#### Structure

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Name	Flags	Card	Type	Description & Constraints
	TII	Caru	DomainResource	Immunization event information
	10		DomainResource	
				Elements defined in Ancestors: id, meta, implicitRules, language, text, contained, extension,
		0 *	T de estat en	modifierExtension
		0*	Identifier	Business identifier
🗗 basedOn	Σ	0*	Reference(CarePlan	Authority that the immunization event is based on
			MedicationRequest	
			ServiceRequest	
💶 status	?!Σ	11	code	completed   entered-in-error   not-done
				Binding: Immunization Status Codes (Required)
- 🗊 statusReason		01	CodeableConcept	Reason for current status
🕥 vaccineCode	Σ	1 1	CodeableConcept	Vaccine administered
Vacanceouc	2		obucableooncept	Binding: Vaccine Administered Value Set (Example)
- 🗹 administeredProduct		01	CodeableReference(Medication)	Product that was administered
- 🗹 manufacturer		01	CodeableReference(Organization)	Vaccine manufacturer
- 💶 lotNumber		01	string	Vaccine lot number
- 💷 expirationDate		01	date	Vaccine expiration date
- 🗗 patient	Σ	11	Reference(Patient)	Who was immunized
- 🗗 encounter		01	Reference(Encounter)	Encounter immunization was part of
- 🗹 supportingInformation		0*	Reference(Any)	Additional information in support of the immunization
occurrence[x]	Σ	11		Vaccine administration date
occurrenceDateTime			dateTime	
occurrenceString			string	
- 🛄 primarySource	Σ	01	boolean	Indicates context the data was captured in
- 🗗 informationSource		01	CodeableReference(Patient	Indicates the source of a reported record
			Practitioner   PractitionerRole	Binding: Immunization Origin Codes (Example)
rd location		0 1	RelatedPerson   Organization)	Where immunization accurred
		01		
- 🔰 site		01	CodeableConcept	Body site vaccine was administered Binding: Codes for Immunization Site of Administration (Example)
noute		0 1	CodeableConcent	How varcine entered body



Consulting

### **FHIR Server Models**

#### • FHIR Façade

- <u>Data translation</u> translate FHIR REST calls to the underlying legacy database or service (no native FHIR storage)
- Intermediate FHIR server synchronize native FHIR storage to underlying legacy database or service
- Native FHIR server
  - FHIR storage is the operational data store



## Why FHIR?

- Increased use of FHIR standards in healthcare -> greater need for adoption of FHIR in Public Health.
- Created by HL7, community driven.
- Created with the intention to be easier to develop and implement than earlier HL7 standards.
- Open standard, while it is developed by HL7 there is no need to be an HL7 member to use it.



## **FHIR Strengths and Weaknesses**

- Accessible to general purpose developers
- Modern APIs, software, tools, resources, and support
- + Great for queries and bulk queries
- + Good fit for DMI
- + New and exciting
- + SMART and SMART Authentication
- + Subscriptions

- Strong client/server model
- Challenges in representing unsolicited push, HL7 V2 and CDA
- Implementation variations and extended operations
- Challenges with implementing granulated access control
- Not the answer for everything
- Facade architecture can sometimes add a layer of abstraction



#### **3 Examples of a few FHIR Projects in Public Health**

- Local/State: PHFIC activities in MN
- State: FHIR IIS activities in Rhode Island
- State Participation in FHIR accelerator project (Helios)



## **FHIR projects in Minnesota**

- Vital records
  - Pilot and test FHIR interoperability for death reporting to MDH Vital records from medical examiners
- FHIR Bi-directional exchange for STI data
  - Started as one of the PHFIC projects
  - Funding provided to MDH and Hennepin county thru CSTE, initial technical assistance from MITRE
  - Replace current manual methods of exchanging STI data



### **MDH – Hennepin County data flow**





## **Hennepin County**

Nate Imihy Bean





#### HENNEPIN COUNTY MINNESOTA

Public Health



## Hennepin County

- Largest county in Minnesota
- 1.28 million residents
- 45 cities, including Minneapolis
- Public health department (HCPH) has ~400 employees



# Background

- Syphilis data was identified as the pilot use case
  - Concerning increase in Hennepin County
- HCPH previously received syphilis case data from MDH through a manual monthly process
  - Existing data sharing agreement
- HCPH had no previous experience with FHIR



# HCPH project staffing

- Utilized existing staff plus TA from MITRE (Phase 1) and Leap Orbit (Phase 2)
- Informatics team
- Integrated Data and Analytics engineer
- Epidemiologists



## HCPH data infrastructure

- Databricks
- Azure Data Lake
- Other Azure resources
- HCPH did not set up a server/API





## Project structure

- Phase 1 began in January 2023
  - MDH created a FHIR API that HCPH can query on-demand
- Phase 2 began in January 2024
  - HCPH sends back updated patient data from its Public Health Clinics

## Phase 1 data flow





## Phase 2 data flow







- Lack of an existing implementation guide
- Integrating FHIR and existing data standards
- Little prior FHIR experience
- Staff turnover and bandwidth



## Lessons learned

- Building FHIR capacity and knowledge takes time
- Importance of regular meetings with technical staff
- Begin work on data sharing agreements as soon as possible



## Results

- HCPH has better access to syphilis data
- Staff gained valuable FHIR experience
- Stronger connections between MDH and HCPH





## **Rhode Island IIS Implementation**

**Mike Berry** 



## **Example 3: Rhode Island IIS Implementation**

- Rhode Island Child and Adult Immunization Registry (RICAIR)
- FHIR Façade Model using open source HAPI FHIR server and SMART Backend Services Authorization
- Bulk Query Helios FHIR Accelerator for Public Health
  - Match and Bulk Match
  - Predefined Groups, or search and define custom groups
  - Query Patient, Immunization, ImmunizationRecommendation, and ImmunizationEvaluation resources
  - Download up to 100k patients or more in a fraction of the time of HL7 v2 QBP/RSP

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Server has flexibility in scheduling and allocating resources to query



## **Leveraging FHIR Bulk Data for DMI**

- FHIR Server for IIS can double as an application modernization strategy
- Replace legacy web applications with modern front-ends that communicate with the FHIR back-end:
  - Immunization Data Entry/Update
  - Other potential uses:
    - Immunization Display, Patient Demographics, SMART Health Cards, School Forms, etc.

- SMART on FHIR apps
- Consumer apps
- IIS-to-IIS IZ Gateway





## Helios

Aasa Dahlberg Schmit on behalf of Sarah Solarz



## **Helios: HL7 FHIR Public Health Accelerator**

Helping public health to align with and benefit from the widespread standardization and transformation that is happening around digital health data,

- Focusing on impact
- Bring People Together
- Aligning Effort



#### Helios: 2024-Community led priority areas







Deliver Aggregate data to public health Make data in public health systems accessible in bulk Public Health Query and Response



## **Helios: Examples of use cases**



#### Aggregate data:

ICU Beds reporting.

- ICU Beds Current occupancy.
- ICU Bed staffed capacity.
- Confirmed COVID Patients.



#### Bulk FHIR

Efficient access of large volume of information on a group of individuals. Designed to support sharing any data that can be represented in FHIR. Primary use case is providing immunization data in bulk from jurisdictional immunization registries.



#### Query and Response

Obtain demographic and contact info.

Query EHR for supplemental information (Newborn screening, infectious disease).





#### From a participant's perspective: How does this work?

- Calls to discuss the use cases, learn from each other and drill down into the details
- Participating in connectathons to develop solutions and try things out.
- Feedback learnings to the community
- Begin pilot projects with an aim to move to real-world use



## **Get involved! Everyone is welcome**

#### Bulk Data

- Bi-weekly on Mondays at 12:00PM
- Contact: <u>craig.newman@altarum.org</u>
- Aggregate Data
  - Bi-weekly on Wednesdays at 1:00PM
  - Contact: <u>forrest.white@altarum.org</u>
- Query & Response
  - Bi-weekly on Thursdays at 1:00PM
  - Contact: <u>helios@hl7.org</u>

- Helios Email Inbox: <u>helios@hl7.org</u>
- Helios Conference Calls: <u>http://www.hl7.org/concalls/index.cfm</u>
- Helios Confluence Page: <u>https://confluence.hl7.org/display/PH/Helios+FH</u> <u>IR+Accelerator+for+Public+Health+Home</u>
- Helios HL7 Homepage: <u>https://www.hl7.org/helios/</u>
- Helios Zulip Chat: <u>https://chat.fhir.org/#narrow/stream/307807-</u> <u>Helios-Accelerator</u>
- Helios HL7 ListServ: <u>http://www.hl7.org/myhl7/managelistservs.cfm</u> (manage ListServ subscriptions)

## **Other FHIR project and activities in public health**

- PACER (Public Health Automated Case Event Reporting) Automates case reporting between public health and health care by leveraging ELR data and using FHIR. Pilot project to query appropriate healthcare system to collect relevant data to support public health case investigation and follow-up for STI cases. (Presentation on Tue, June 11, 2024: 2:15 PM - 3:30 PM, "Fast Healthcare Interoperability Resources - FHIRing on all Cylinders")
- CCHD/Newborn Screening
- Clinical decision support with FHIR (ImmDS Immunization Decision Support)
- <ADD CDC Foundation>





Discussion and Q & A







# Thank you!

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