

SESSION 07

FHIR TRAINING

CDC FOUNDATION
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Kaminker, Nguyen, Graham



Instructors



DIEGO KAMINKER
FHL7, FIAHSI,
HL7 CE, HL7 DCSIO



VIET NGUYEN, MD
HL7 CSIO



BENJI GRAHAM
HL7CE
FHIR EVANGELIST
BELLESE
TECHNOLOGIES

Session 7 – Implementation Guides

1. BLOCK 1: Implementation Guides Overview
 1. Overview and Navigating Implementation Guides
 2. Review of FHIR Igs / How they are organized – Key Terms
2. BLOCK 2: VRDR Vital Records Birth and Fetal Death Reporting IG
3. BLOCK 3: Who do you need/what do you need to start a FHIR project: team roles, skills and responsibilities/ services and components
4. BLOCK 4: FHIR Clue and FHIR Architecture Supermarket exercises

BLOCK 1 – IMPLEMENTATION GUIDES

1. Overview and Navigating Implementation Guides
2. Review of FHIR Igs / How they are organized – Key Terms

Overview of Navigating IGs

- All guides are published with the FHIR IG Publisher, so they have similar format. We will analyze it.
- And then...what we will do, is “Implementation Guide Surfing”
- Each group will explore one of them, to find out the relevant information, and we will share the conclusions with the rest of the class.
- I will help each group if/when they are stuck or petrified

Format for almost all FHIR IGs (1)

- Header with a Menu
- **Home:** return to home page, where we can find
 - Background
 - Scope
 - General Guidance
- **Profiles**
 - Constraint on resources
- **Extensions**
 - Extensions defined in the IG
- **Value Sets / Terminology**
 - Terminology defined by the IG
- **Operations**
 - Special Operations defined by the IG



Format for almost all FHIR IGs (2)

- **Downloads**
 - Examples, Constraints in processable format
- **Directory of Published Versions**
 - History of the IG
- **Guidance**
 - Handling of special cases
- **Use Cases**
 - Scenarios, Use Case and Interactions descriptions



Format for almost all FHIR IGs (3)

- Security
 - Authentication / Authorization and Transport Considerations
- Conformance
 - Conformance Requirements for Clients and Server
- Related IGs
 - Relationships with other IGs
- Use Cases
 - Scenarios, Use Case and Interactions descriptions



What we want to know about the IGs (1)

1- Goals and Scope

- Why was this guide created? What is OUTSIDE of scope?
- Who are the stakeholders?

2- Interactions/ Actors

- When is information exchanged? Which are the triggers?
- Who will be the client, and who the server?

What we want to know about the IGs (2)

- **3- Behavior**

- **FHIR Version(s) involved**
- **Paradigm**
 - How is information exchanged
- **Interactions**
 - When is information exchanged? Which are the triggers?
- **Operations**
 - Extended operations (\$operation) defined by this guide
- **Resource Search and Versioning**
 - Supported Search Parameters and Resource Version Support

What we want to know about the IGs (3)

- **5- Resources**

- Focus Resource per Interaction (if available)
- For each resource:
 - Mandatory / Unsupported elements / Slices / Must Support
 - / Extensions
 - Supported REST operations (if defined)
- Extensions
 - Extensions defined or used by this IG

- **6- Terminology**

- Terminology Bindings
- ValueSets and CodeSystems referenced by the IG

What we want to know about the IGs (4)

- **7- Security Considerations**

- Authentication/Authorization
- Safety / Audit requirements

- **8- Other related standards**

- CDS-Hooks? Smart-On-FHIR?
- Other FHIR IGs? DAMs?

- **9- Significative Examples**

- How will the exchanged artifacts look like?
- Any variations / Is there any sandbox or test site?

Let's go Implementation Guide Surfing!

WHY: Goals, scope, scenario, system-wide improvement

WHAT: What is exchanged: profile(s)/terminology, example

HOW: Exchange Paradigm(s), Security, Related Specs (Smart, US-Core, Bulk FHIR, etc.)

WHEN: Part(s) of the workflow when exchange happens

BLOCK 3 – VITAL RECORDS DEATH REPORTING

0. Where is the Specification
1. Goals, use cases and background
2. Interactions, Actors and Mappings
3. Exchange Mechanisms
4. Resource Profiles
5. Extensions
6. Terminology
7. Related Standards

0- Where is the specification?

STU-1 (Oct.2020): <http://hl7.org/fhir/us/vrdr/>

FHIR Version: R4

Realm: This is a **U.S. Realm Specification.**

This guide and related materials are based on reporting specifications in U.S. jurisdictions.

For this session we will focus on STU 3 (Fall 2024):
<http://build.fhir.org/ig/HL7/vrdr/>

Notice: All the info in these slides is from the IG

1a- Goals

- (1) **Bidirectional exchange of mortality data between State-run Public Health Agencies (PHA) Vital Records offices and U.S. CDC/NCHS**
- (2) Improve existing automation by **enabling wide-scale adoption and leveraging the potential of electronic health records** and clinical decision support systems.
- (3) Foundation for **expansion of automated standards-driven information exchange** to include **tributary flows** of information and **secondary users** of detailed mortality data and aggregate statistics.

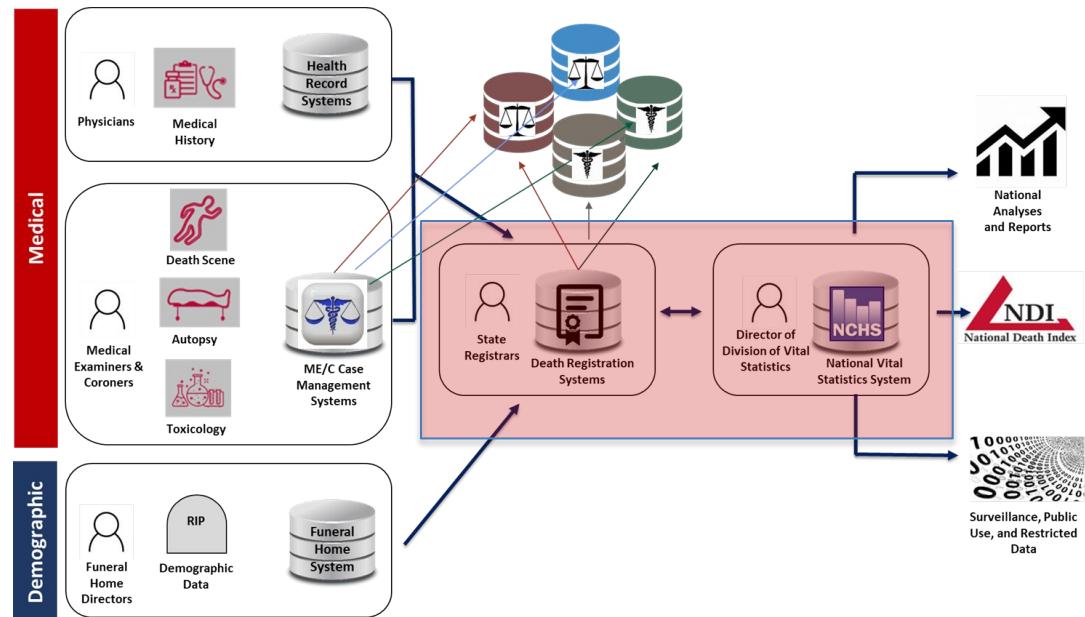
1b- Use Cases

1. Transmission of **Death Records by Jurisdictions to NCHS**
2. Transmission of **Coded Cause of Death and Demographics information by NCHS to Jurisdictions**
3. Transmission of **Death Records among Jurisdictions**
4. Transmission of **Mortality Rosters among Jurisdiction**

Because of time limitations we will focus on use case #1

1c- Background / Scope

Limited scope (focus in red rectangle)



2a- Interactions and Actors

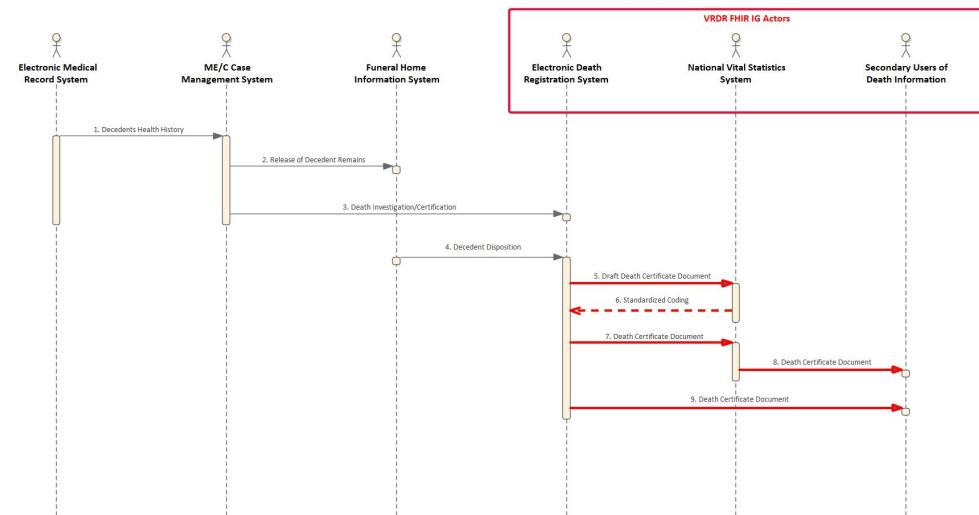
(5) Draft death certificate document from regional EDRS to the NVSS.

(6) Standardized cause of death and decedent race/ethnicity coding from the NVSS to regional EDRS.

(7) Final death certificate document from regional EDRS to the NVSS.

(8) Death certificate document from the NVSS to death information secondary users.

(9) Death certificate document from regional EDRS to death information secondary users.



2b- Mappings

The IG provides FHIR mappings from/to the existing exchange formats and original documents:

- InterJurisdictional Exchange ([IJE](#)) format
- Associated Transax ([TRX](#))
- Mortality ([MRE](#))

8 Death Record Data Dictionary

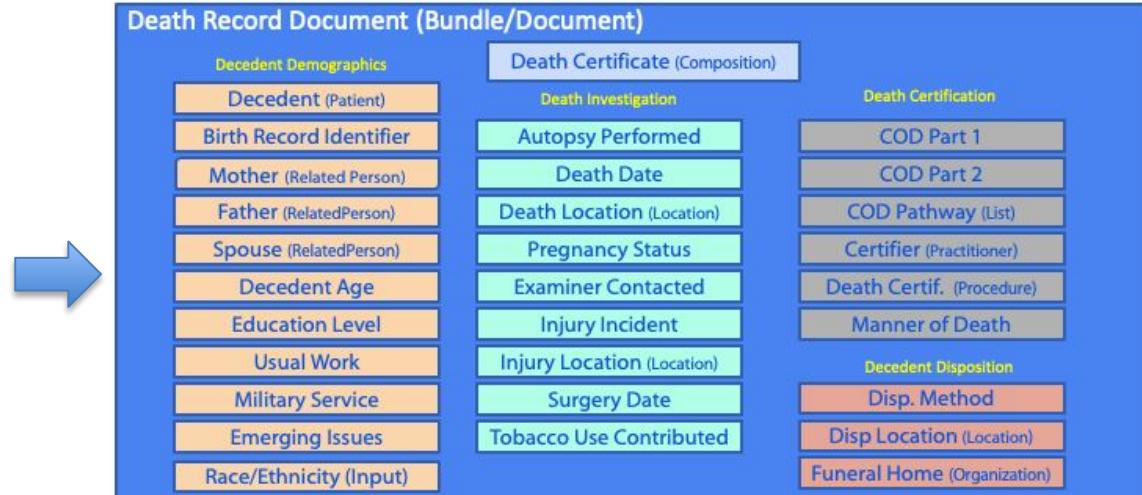
8.1 Death Record Data Dictionary

#	Description	IJE Name	Profile	IJE only	Field	Type	Value Set
109	Was Autopsy performed	AUTQP	AutopsyPerformedIndicator		value	codeable	YesNoUnknownVS
110	Were Autopsy Findings Available to Complete the Cause of Death?	AUTQPF	AutopsyPerformedIndicator		component[autopsyPerformedIndicator].value	codeable	YesNoUnknownNotApplicableVS
88	Infant Death/Birth Linking - birth certificate number	BCNO	BirthRecordIdentifier		value	string(6)	-
89	Infant Death/Birth Linking - year of birth	IDOB_YR	BirthRecordIdentifier		component[birthYear].value	dateTime	YYYY component
90	Infant Death/Birth Linking - State, U.S. Territory or Canadian Province of Birth - code	BSTATE	BirthRecordIdentifier		component[birthJurisdiction].value	string	JurisdictionVS
185	Cause of Death Part I Line a	COD1A	CauseOfDeathPart1		value.text, component[lineNumber] = 1	string(120)	-
186	Cause of Death Part I Interval, Line a	INTERVAL1A	CauseOfDeathPart1		component[interval].value, component[lineNumber] = 1	string(20)	-
187	Cause of Death Part I Line b	COD1B	CauseOfDeathPart1		value.text, component[lineNumber] = 2	string(120)	-
188	Cause of Death Part I Interval, Line b	INTERVAL1B	CauseOfDeathPart1		component[interval].value, component[lineNumber] = 2	string(20)	-
189	Cause of Death Part I Line c	COD1C	CauseOfDeathPart1		value.text, component[lineNumber] = 3	string(120)	-
190	Cause of Death Part I Interval, Line c	INTERVAL1C	CauseOfDeathPart1		component[interval].value, component[lineNumber] = 3	string(20)	-
191	Cause of Death Part I Line d	COD1D	CauseOfDeathPart1		value.text, component[lineNumber] = 4	string(120)	-
192	Cause of Death Part I Interval, Line d	INTERVAL1D	CauseOfDeathPart1		component[interval].value, component[lineNumber] = 4	string(20)	-

3a- Exchange Mechanism: Document

DeathCertificateDocument (FHIR Bundle Resource) based upon the [U.S. Standard Certificate of Death](#).

U.S. STANDARD CERTIFICATE OF DEATH										STATE FILE NO.			
LOCAL FILE NO.					DECEASED'S LEGAL NAME: (Include AKA's if any) (First, Middle, Last)					SEX		SOCIAL SECURITY NUMBER	
4a AGE- <u>Last</u> (Year) <small>(Years)</small>		4b. UNDER 1 YEAR <small>Months</small>		4c. UNDER 1 DAY <small>Days Hours Minutes</small>		5. DATE OF BIRTH (Mo/Day/Yr)		6. BIRTHPLACE (City and State or Foreign Country)					
7a. RESIDENCE-STATE <small>City, Street, Apartment No.</small>		7b. COUNTY		7c. CITY OR TOWN									
7d. STREET AND NUMBER		7e. APT. NO.		7f. ZIP CODE		7g. INSIDE CITY LIMITS? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No							
8. EVER IN U.S. ARMED FORCES?										9. MARITAL STATUS AT TIME OF DEATH <input type="checkbox"/> Married <input type="checkbox"/> Married, but separated <input type="checkbox"/> Widowed <input type="checkbox"/> Divorced <input type="checkbox"/> Never Married <input type="checkbox"/> Unknown		10. SURVIVING SPOUSE'S NAME (If wile, give name prior to first marriage)	
11. FATHER'S NAME (First, Middle, Last)										12. MOTHER'S NAME PRIOR TO FIRST MARRIAGE (First, Middle, Last)			
13a. INFORMANT'S NAME		13b. RELATIONSHIP TO DECEDED		13c. MAILING ADDRESS (Street and Number, City, State, Zip Code)									
14. PLACE OF DEATH (Check one box per line see instructions)													
IF DEATH OCCURRED IN A HOSPITAL: <input type="checkbox"/> Hospital <input type="checkbox"/> Emergency Room/Outpatient <input type="checkbox"/> Dead on Arrival <input type="checkbox"/> Hospice facility <input type="checkbox"/> Nursing home/Long term care facility <input type="checkbox"/> Deceased's home <input type="checkbox"/> Other (Specify): _____													
15. FACILITY NAME (If not institution, give street & number)										16. CITY OR TOWN, STATE, AND ZIP CODE		17. COUNTY OF DEATH	
18. METHOD OF DISPOSITION: <input type="checkbox"/> Burial <input type="checkbox"/> Cremation <input type="checkbox"/> Entombment <input type="checkbox"/> Removal from Site <input type="checkbox"/> Other (Specify): _____										19. PLACE OF DISPOSITION (Name of cemetery, crematory, other place)			
20. LOCATION-CITY, TOWN, AND STATE										21. NAME AND COMPLETE ADDRESS OF FUNERAL FACILITY			
22. SIGNATURE OF FUNERAL SERVICE LICENSE OR OTHER AGENT										23. LICENSE NUMBER (Of Licensee)			
ITEMS 24-28 MUST BE COMPLETED BY PERSON WHO PRONOUNCES OR CERTIFIES DEATH										24. DATE PRONOUNCED DEAD (Mo/Day/Yr)			
26. SIGNATURE OF PERSON PRONOUNCING DEATH (Only when applicable)										27. LICENSE NUMBER		28. DATE SIGNED (Mo/Day/Yr)	
29. ACTUAL OR PRESUMED DATE OF DEATH (Mo/Day/Yr) (Specify Month)										30. ACTUAL OR PRESUMED TIME OF DEATH		31. WAS MEDICAL EXAMINER OR CORONER CONTACTED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
32. PART I. Enter the chain of events—diseases, injuries, or complications—that directly caused the death. DO NOT ENTER terminal events such as cardiac arrest, respiratory arrest, or ventricular fibrillation without showing the etiology. DO NOT ABBREVIATE. Enter only one cause on a line. Add additional lines if necessary.										(Appropriate interval: Onset to death)			
IMMEDIATE CAUSE (Final disease or condition resulting in death) _____ Specifying conditions, if any, leading to the cause listed on line a. Enter the UNDERLYING CAUSE (Cause of death) or contributing conditions (disease or injury that initiated the events resulting in death). LAST										<p>a. _____ Due to (or as a consequence of): _____</p> <p>b. _____ Due to (or as a consequence of): _____</p> <p>c. _____ Due to (or as a consequence of): _____</p>			
PART II. Enter other significant conditions contributing to death, but not resulting in the underlying cause given in PART I										33. WAS AN AUTOPSY PERFORMED? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
35. DID TOBACCO USE CONTRIBUTE TO DEATH? <input type="checkbox"/> Yes <input type="checkbox"/> Probably										34. THERE ARE NO CONDITIONS AVAILABLE TO COMPLETE THE CAUSE OF DEATH? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
36. IF FEMALE: <input type="checkbox"/> Not pregnant within past year <input type="checkbox"/> Pregnant at time of death										37. MANNER OF DEATH <input type="checkbox"/> Natural <input type="checkbox"/> Homicide <input type="checkbox"/> Accident <input type="checkbox"/> Pending Investigation			



* All profiles are observations, unless noted

3b- Exchange Mechanism: Message

A message containing the document + changes in certificate status (coding, void, replacement, etc.)

<https://bit.ly/3pE87ob>

```
Message [FHIR Bundle]
|
|-- entry
  |
  |-- Header [FHIR MessageHeader]
  |
  |-- Record [FHIR Parameters]
  |
  |-- VRDR Death Certificate Document [FHIR Bundle]
```

4- Resource Profiles

- Bundle (Death Certificate)

7.0.6 F. Documents and Bundles

Documents and Bundles used to transmit death record content.

Cause of Death Coded Content Bundle	Cause of Death Coded Content Bundle (Bundle): A bundle containing instances of the resources comprising cause of death coded content. This bundle is information-content equivalent to the traditional NCHS TRX format.
Death Certificate	The body of the death certificate document (Composition).
Death Certificate Document	The resources comprising the death certificate composition (Bundle/Document).
Demographic Coded Content Bundle	Demographic Coded Content Bundle (Bundle): A bundle containing instances of the resources comprising demographic (race and ethnicity) coded content. This bundle is information-content equivalent to the traditional NCHS MRE format.
Mortality Roster Bundle	Mortality Roster Bundle (Bundle): A bundle containing instances of the resources comprising mortality roster content. This bundle is information-content equivalent to the traditional Mortality Roster. The mortality roster is a supplemental report of death for the purpose of notifying the decedent's jurisdiction of birth that the death has occurred. The roster data points are sufficient to locate the birth certificate of the decedent but do not otherwise contain the full death record. Once received, the jurisdiction of birth uses the mortality roster data to locate the record of birth and marks it as deceased.

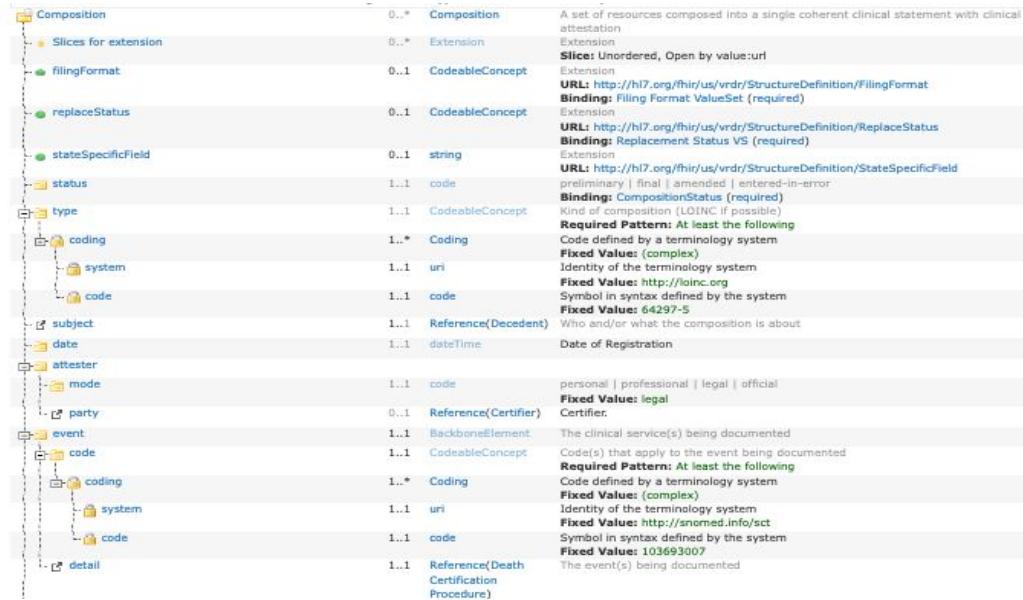
4b- Death Certificate Document

- Document (id) -> Death Certificate

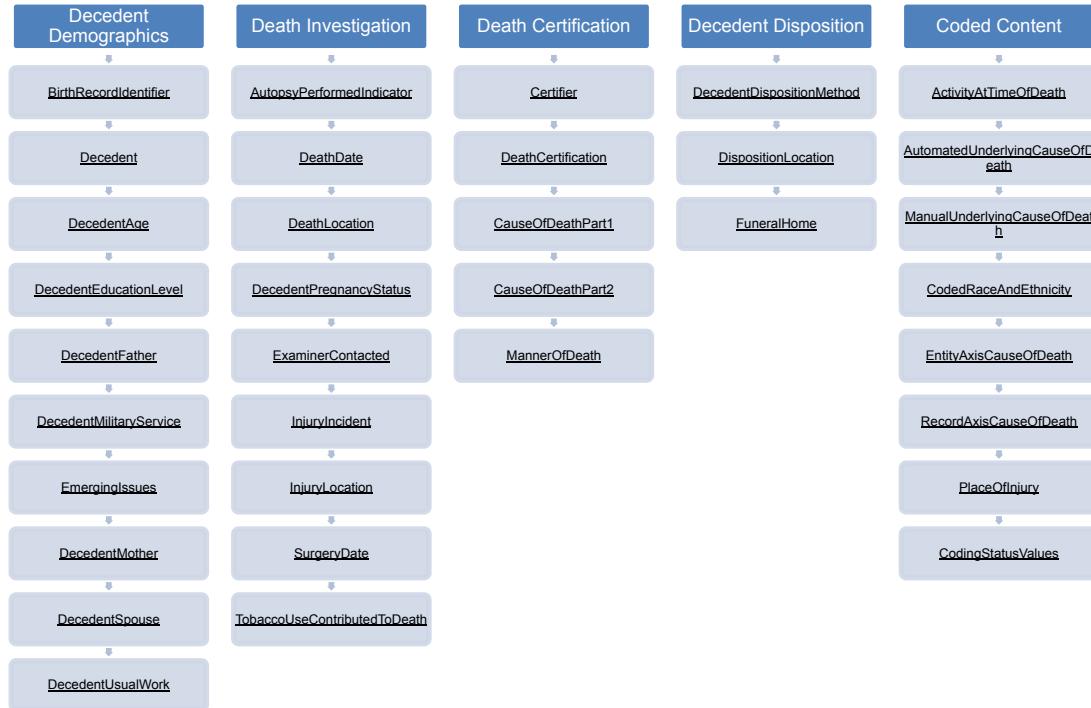
Text Summary				
Differential Table				
Snapshot Table				
Snapshot Table (Must Support)				
All				
This structure is derived from Bundle .				
Name	Flags	Card.	Type	Description & Constraints
Bundle		0..*	Bundle	Contains a collection of resources
identifier		1..1	Identifier	Persistent Identifier for the bundle
certificateNumber		0..1	string	Extension URL: http://hl7.org/fhir/us/vrdr/StructureDefinition/CertificateNumber
auxiliaryStateIdentifier1		0..1	string	Extension URL: http://hl7.org/fhir/us/vrdr/StructureDefinition/AuxiliaryStateIdentifier1
auxiliaryStateIdentifier2		0..1	string	Extension URL: http://hl7.org/fhir/us/vrdr/StructureDefinition/AuxiliaryStateIdentifier2
value		0..1	string	Death Record Identifier (YYYYJJNNNNNN) Max Length: 12
type		1..1	code	document message transaction transaction-response batch batch-response history searchset collection Fixed Value: document
Slices for entry		1..*	BackboneElement	Entry in the bundle - will have a resource or information Slice: Unordered, Open by profile:resource
entry>All Slices				Content/Rules for all slices
resource		1..1	Resource	A resource in the bundle
entry:DeathCertificate		1..1	BackboneElement	Death Certificate
resource		0..1	DeathCertificate	A set of resources composed into a single coherent clinical statement with clinical attestation
? Documentation for this format				

4c- Death Certificate : Composition

date, subject (Decedent), performer (Certifier)



4c- Death Certificate: Sections



5- Extensions

- Specific to these IG

7.0.7 Structures: Extension Definitions

These define constraints on FHIR data types for systems conforming to this implementation guide

Alias Status of a Death Roster	Alias Status of a Death Roster. If true, is an alias record.
Auxiliary State Identifier1	An identifier associated by the submitting jurisdiction with a specific death certificate number. Twelve digit with leading zeroes
Auxiliary State Identifier2	An identifier associated by the submitting jurisdiction with a specific death certificate number. Twelve digit with leading zeroes
BypassEditFlag	Extension to hold a codeable concept from one of several valuesets.
Certificate Number	Death certificate number. 6 digit with leading zeroes
City Code	City expressed as a numeric value. As of the date of publication, in accordance with the NCHS Instruction Manual Part 8, Vital Records Geographic Classification, 2014 (https://www.cdc.gov/nchs/data/dvs/IMP8_2014.pdf). (Extension)
Date Day	The day portion (DD) of the partial date. (Extension)
Date Month	The month portion (MM) of the partial date. (Extension)
Date Time	The time portion (DD) of the partial date. (Extension)
Date Year	The year portion (YYYY) of the partial date. (Extension)
District Code	District expressed as a numeric value. As of the date of publication, in accordance with the NCHS Instruction Manual Part 8, Vital Records Geographic Classification, 2014 (https://www.cdc.gov/nchs/data/dvs/IMP8_2014.pdf). (Extension)
Filing Format	Filing Format Extension.
Location Jurisdiction Id	Location Jurisdiction Id (Extension)
NVSS SexAtDeath	Sex on visual inspection at the time of death by the funeral home
Partial Date	Provides values of a partial date (Extension)
Partial Date Time	Provides values of a partial dateTime (Extension)
PostDirectional	PostDirectional
PreDirectional	PreDirectional
Replacement Status of a Death Record	Replacement Status of a Death Record.
Spouse Is Alive	Spouse is Alive.
State Specific Field	An arbitrary string included by a submitting jurisdiction
StreetDesignator	StreetDesignator
StreetName	StreetName
StreetNumber	StreetNumber
UnitOrAptNumber	UnitOrAptNumber
Within City Limits Indicator	Within City Limits Indicator (Extension)

6- Terminology

- ValueSet / CodeSystem
 - Defined by this IG

- ConceptMaps
 - Mappings from IJE

- Activity at Time of Death

7.68.1.1 Logical Definition (CLD)

This value set includes codes based on the following rules:

- Include these codes as defined in <http://hl7.org/fhir/us/vrdr/CodeSystem/vrdr-activity-at-time-of-death-cs>

Code Display

- 0 While engaged in sports activity
- 1 While engaged in leisure activities.
- 2 While working for income
- 3 While engaged in other types of work
- 4 While resting, sleeping, eating, or engaging in other vital activities
- 8 While engaged in other specified activities.
- 9 During unspecified activity

- Include these codes as defined in <http://terminology.hl7.org/CodeSystem/v3-NullFlavor>

Code Display Definition

UNK unknown **Description:**A proper value is applicable, but not known.

cf

Usage Notes: This means the actual value is not known. If the only thing that is unknown is how to constraints (value set, datatype, etc.), then the OTH or UNC flavor should be used. No properties should be

1. These properties themselves directly translate to a semantic of "unknown". (E.g. a local code sent as a
2. These properties further qualify the nature of what is unknown. (E.g. specifying a use code of "H" and a phone number that is unknown.)

7.129.2 CertifierTypes (<http://hl7.org/fhir/us/vrdr/ConceptMap/CertifierTypesCM>)

Mapping from (not specified) to <http://hl7.org/fhir/us/vrdr/ValueSet/vrdr-certifier-types-vs>

DRAFT. Published on 2022-08-17 08:42:20+0000 by HL7 Public Health Working Group (HL7 Public Health Working Group: <http://www.hl7.org/Special/committees/phr/lists.HL7.org>).

A mapping between NCHS IJE and FHIR CertifierTypes Value Sets

Source Code	Relationship	Destination Code
Mapping from IJE to SNOMED CT (all versions)		
D (Certifying Physician)	is equivalent to	434651000124107 (Certifying physician.)
P (Pronouncing and Certifying Physician)	is equivalent to	434641000124105 (Pronouncing & Certifying physician.)
M (Medical Examiner/Coroner)	is equivalent to	455381000124109 (Medical Examiner/Coroner)

Source Code	Relationship	Destination Code
Mapping from None to NullFlavor		
freetext (Other Individual Legally Allowed to Certify)	is equivalent to	OTH (Other - with full text in codeable concept text field)

7- Related Standards

- Other FHIR IGs
 - Extensive use of US Core: decedent, certifier, certification procedure & location
 - race/ethnicity are different from US Core, specific to VR
 - ODH (coded usual occupation info)
- Mention to **MDI** (Medico Legal Death Investigation, for Interaction #3): <https://build.fhir.org/ig/HL7/fhir-mdi-ig/>
- Other VR Specs: IJE, TRX, MRE

8- Examples

Are included for all profiles!

If you want to see a FHIR Death Certificate Document...go right here

<http://build.fhir.org/ig/HL7/vrdr/Bundle-DeathCertificateDocument-Example1.html>

Narrative Content XML JSON TTL

7.171.1 Example Bundle: DeathCertificateDocument-Example1

Generated Narrative: Composition

Resource Composition "DeathCertificate-Example1"
Profile: Death Certificate

Filing Format: Electronic ([Filing Formats CodeSystem#electronic](#))

Replacement Status of a Death Record: original record ([Replacement Status of Death Record Submission#original](#))

State Specific Field: State Specific Content

status: FINAL

type: Death certificate ([LOINC](#) (#64297-5))

date: 2020-11-15 04:39:54-0500

author: [Practitioner/Certifier-Example1](#) * BLACK*

title: Death Certificate

7.171.1.1 Attesters

Mode	Time	Party
Legal (CompositionAttestationMode#legal)	2020-11-14 04:39:40-0500	Practitioner/Certifier-Example1 * BLACK*

7.171.1.2 Events

Code	Detail
Diagnostic procedure (SNOMED CT#103693007)	Procedure/DeathCertification-Example1

7.171.2 Decedent Demographics

- Patient/Decedent-Example1 * PATEL*
- RelatedPerson/DecedentFather-Example1 * SMITH*
- RelatedPerson/DecedentMother-Example1 * SUZETTE*
- RelatedPerson/DecedentSpouse-Example1 * GAZETTE*
- Observation/DecedentAge-Example1
- Observation/BirthRecordIdentifier-Example1
- Observation/DecedentEducationLevel-Example1
- Observation/DecedentMilitaryService-Example1
- Observation/DecedentUsualWork-Example1
- Observation/InputRaceAndEthnicity-Example1
- Observation/EmergingIssues-Example1

7.171.3 Death Investigation

- Observation/ExaminerContacted-Example1
- Observation/DecedentPregnancyStatus-Example1
- Observation/TobaccoUseContributedToDeath-Example1

9- Reference Implementations

- GitHub: <https://github.com/nightingaleproject> (STU 2.1)
- Video (STU-1): <https://www.youtube.com/watch?v=3IV9VH7G4Kk>

Code Library ([Java](#) | [.Net](#))

Make VRDR FHIR data and convert from Inter-Jurisdictional Exchange (IJE) Mortality format

[Nightingale](#)

Reference implementation FHIR-based electronic death registration system (EDRS)

[Raven](#)

Reference implementation FHIR-based cause-of-death certification case management system

[Canary](#)

Open source testing framework for VRDR data

[Blackbird](#)

Reference implementation SMART on FHIR app for medical certifiers reporting to EDRS systems

Archive section

BLOCK 2 – ELECTRONIC CASE REPORTING

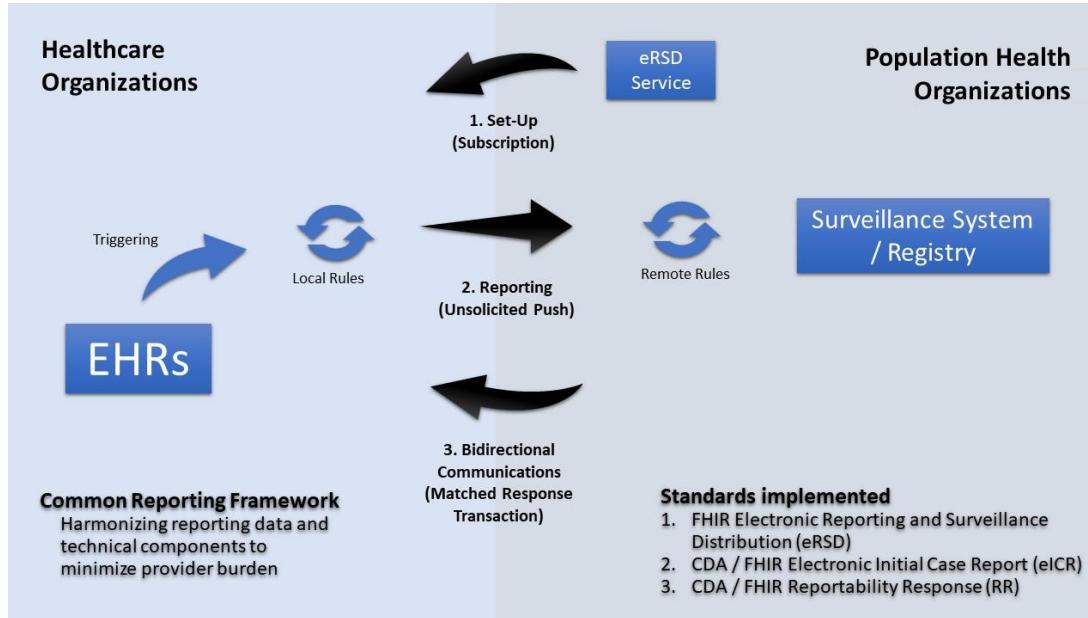
1. eCR = electronic case reporting
2. eICR = electronic initial case report
3. RR = reportability response
4. eRSD – Electronic Reporting and Surveillance Distribution

Notes:

- 1- Most sites are NOT yet sending via FHIR (e.g., as far as we know, there are 0 Epic clients using FHIR--they use Epic's eCR functionality and send CDA)
2. It's up to the healthcare sites to update the trigger codes and this may or may not be happening - and it's not an automatic update

Overall Diagram

- If you ever get lost...this is it:



eiCR – Case Reporting Using FHIR

- Specification (IG): <https://hl7.org/fhir/us/ecr/> (2.1.2)
- Build: <https://build.fhir.org/ig/HL7/case-reporting/>
- Example
- Components:
 - Triggers
 - Transactions
 - Transport
 - Data Elements
 - Terminology

eiCR – Case Reporting Using FHIR

- Example:
 - <https://hl7.org/fhir/us/ecr/Bundle-bundle-eicr-document-zika.html>
- **Do not get lost:**
 - It is a FHIR Bundle ("document").
 - Inside of the bundle ("document"): Composition with Sections
 - Composition: Link to Entities: Patient, Encounter, Custodian Author
 - Sections in Composition: Text and link to entries (processable information)

Example – Hierarchical Viewer 1 - <https://vhewer.com>

Composition
Type: Public Health Case Report [55751-2] (http://loinc.org)
Title: Initial Public Health Case Report - Zika Example
Author
Role - Primary Care Clinic/Center [261QP2300X] (http://nucc.org/provider-taxonomy)
Specialty: Family practice [419772000] (http://snomed.info/sct)
Practitioner
Name: Seven Henry M.D.
Location - Clinic Bldg A, Salem Medical Center
Organization - Salem Medical Center
Subject
Patient
Name: Eve L Everywoman
Gender: female
Gender Identity
Tribal Affiliation
Enrolled Tribe Member: true
Date of Birth: 1974-11-24
Identifier: 1032702 (http://hospital.smarthealthit.org) (usual)
Identifier Type: Medical Record Number [MR] (http://terminology.hl7.org/CodeSystem/v2-0203)
Deceased: false
Custodian
Organization - Salem Medical Center
Encounter
Encounter
Date: from 2018-04-01 Time: 15:00:00+00:00 to 2018-04-02 Time: 15:15:00+00:00
Type: 99202 (http://www.ama-assn.org/go/cpt) - Text: Office Visit
Diagnosis: Zika virus disease (disorder) (Condition) [skipping item diagnosis.extension.url='" http://hl7.org/fhir/us/ecr/StructureDefinition/eicr-trigger-code-flag-extension "']
Diagnosis: Common cold (disorder) (Condition)
Section
Title: Reason for Visit Section
Section
Title: Chief Complaint
Section
Title: History of Present Illness Section
Section
Title: Problems Section
Condition - Common cold (disorder) [82272006] (http://snomed.info/sct)

Example – Hierarchical Viewer 2 - <https://vhewer.com>

Section
Title: Medications Administered Section

Medication Administration

Status: completed
Date: from 2018-03-07 to 2018-03-07
Medication: Azithromycin 500 MG Oral Tablet [248656] (<http://www.nlm.nih.gov/research/umls/rxnorm>) - Text: Azithromycin 500 MG Oral Tablet

Dosage

Text: Two tablets at once
Route of Administration: Oral route [26643006] (<http://snomed.info/sct>)
Method: Swallow - dosing instruction imperative (qualifier value) [421521009] (<http://snomed.info/sct>)

Section
Title: Admission Medications Section

Medication Administration

Status: completed
Date: from 2018-03-07 to 2018-03-07
Medication: 1 ML naloxone hydrochloride 0.4 MG/ML Injection [1659929] (<http://www.nlm.nih.gov/research/umls/rxnorm>)

Dosage

Route of Administration: Gluteus maximus muscle [206007] (<http://snomed.info/sct>)
Method: Inject - dosing instruction imperative (qualifier value) [422145002] (<http://snomed.info/sct>)

[skipping item MedicationAdministration.extension.url='<http://hl7.org/fhir/us/ecr/StructureDefinition/us-ph-therapeutic-medication-response-extension>']

Section
Title: Medications Section

Medication Administration

Status: completed
Date: from 2018-03-07 to 2018-03-07
Medication: Azithromycin 500 MG Oral Tablet [248656] (<http://www.nlm.nih.gov/research/umls/rxnorm>) - Text: Azithromycin 500 MG Oral Tablet

Dosage

Text: Two tablets at once
Route of Administration: Oral route [26643006] (<http://snomed.info/sct>)
Method: Swallow - dosing instruction imperative (qualifier value) [421521009] (<http://snomed.info/sct>)

Section
Title: Results Section

Observation - Lymphocytes [#/volume] in Blood by Automated count [731-0] (<http://loinc.org>) +

Date: 2018-03-07
Value: 5.2 10³/uL [10³/uL] (<http://unitsofmeasure.org>)
Interpretation: High [H] (<http://terminology.hl7.org/CodeSystem/v3-ObservationInterpretation>)
Reference Range: from 1 10³/uL [10³/uL] (<http://unitsofmeasure.org>) to 4.8 10³/uL [10³/uL] (<http://unitsofmeasure.org>)

Example – Hierarchical Viewer 3 - <https://vhewer.com>

Section
Title: Plan of Treatment Section

Service Request
Identifier: 061ef612-344f-4e7b-81a8-1059ae7bbe19 (<http://lab.smarthealthit.org>)
Status: completed
Intent: order
Code: Zika virus envelope E gene [Presence] in Serum by NAA with probe detection [80825-3] (<http://loinc.org>) - Text: Zika RT-PCR
Category: Diagnostic procedure (procedure) [103693007] (<http://snomed.info/sct>) - Text: Diagnostics Procedure

Performer
Organization - Acme_Labs

Section
Title: Immunizations Section

Observation - Immunization status - Reported [11370-4] (<http://loinc.org>)
Date: 2020-11-10T22:33:22Z
Value: Yes [Y] (<http://terminology.hl7.org/CodeSystem/v2-0532>)

Immunization
Status: completed

Section
Title: Procedures Section

Procedure - Extracorporeal membrane oxygenation (procedure) [233573008] (<http://snomed.info/sct>) - Text: Extracorporeal membrane oxygenation (procedure)
Performed Period: from 2020-11-01 Time: 19:55:26+00:00 to 2020-11-01 Time: 20:25:26+00:00

Section
Title: Vital Signs Section

Observation - Blood pressure panel with all children optional [85354-9] (<http://loinc.org>) - Text: Blood pressure systolic and diastolic
Date: 2020-07-02
Component - Systolic blood pressure [8480-6] (<http://loinc.org>) - Text: Systolic blood pressure
Value: 109 mmHg [mm[Hg]] (<http://unitsofmeasure.org>)
Component - Diastolic blood pressure [8462-4] (<http://loinc.org>) - Text: Diastolic blood pressure
Value: 44 mmHg [mm[Hg]] (<http://unitsofmeasure.org>)

Section
Title: Social History Section

Observation - Ethnicity / related nationality data (observable entity) [186034007] (<http://snomed.info/sct>)
Date: 2020-11-10T22:33:22Z
Value: Australia [AU] (<urn:iso:std:iso:3166>)

Observation - Country of usual residence [77983-5] (<http://loinc.org>)
Date: 2020-11-10T22:33:22Z
Value: United Kingdom of Great Britain and Northern Ireland [GB] (<urn:iso:std:iso:3166>)

Observation - Mass gathering [C3841750] (<http://terminology.hl7.org/CodeSystem/umls>) - Text: Mass gathering (football game)
Period: from 2020-01-11 Time: 18:00:00Z to 2020-01-11 Time: 21:30:00Z
Value: Sports stadium (environment) [264379009] (<http://snomed.info/sct>) - Text: City Football Stadium

Observation - Travel [420008001] (<http://snomed.info/sct>) - Text: Travel History
Period: from 2018-01-15 to 2018-01-30

Example – Hierarchical Viewer 4 - <https://vhewer.com>

Observation - Travel [420008001] (http://snomed.info/sct) - Text: Travel History
Period: from 2018-01-15 to 2018-01-30

- Component - Location [LOC] (http://terminology.hl7.org/CodeSystem/v3-ParticipationType)
Value: Fiji [FJI] (urn:iso:std:iso:3166)
- Component - Location [LOC] (http://terminology.hl7.org/CodeSystem/v3-ParticipationType)
Value: Vanuatu [VUT] (urn:oid:1.0.3166.1)
- Component - Type of activity (attribute) [280147009] (http://snomed.info/sct)
Value: Active duty military (occupation) [702348006] (http://snomed.info/sct)

Observation - Are you deaf, or do you have serious difficulty hearing [69856-3] (http://loinc.org)
Date: 2020-11-10T22:33:22Z
Value: true

Section
Title: Pregnancy Section

Observation - Pregnancy status [82810-3] (http://loinc.org)
Date Determined: 2017-10-01
Date Recorded: 2017-10-01
Period: from 2017-08-26
Value: Pregnancy (finding) [77386006] (http://snomed.info/sct)

- Component
Date Determined: 2017-10-01
- Gestational age Estimated from patient reported estimated date of conception [53691-2] (http://loinc.org)
Value: 143 d
- Component
Date Determined: 2017-10-01
- Delivery date Estimated from date fundal height reaches umb [57064-8] (http://loinc.org)
Value Date Time: 2018-05-01

Section
Title: Emergency Outbreak Information Section

Observation - Employee desk distance from mail sorter
Date: 2020-11-18T22:33:22Z
Value: 2 m

Section
Title: Past Medical History Section

Section
Title: Review of Systems Section

Triggers (1)

- Set of actions in an electronic health record (EHR) that initiates the creation of an electronic initial case report (eiCR) and leads to its transmission (directly or indirectly) to AIMS
- When certain data in the EHR are recorded or updated, they are checked against a series of codes that have been distributed to the EHR.
- If there are matches, there is one (or more) reportable condition that need to be processed for confirmation.
- This should all be done automatically, behind the scenes, and without disrupting healthcare providers' workflows.
- **However, eiCR can also be manually initiated or scheduled (in both cases, this needs to be explicitly explained/declared – codes PHC1464 / PHC2235)**

Triggers (2)

- Based on reporting parameters and trigger code value sets in XML or JSON format that are distributed through the Electronic Reporting and Surveillance Distribution (eRSD) system.
- The eRSD contains these value sets: Reportable Conditions Trigger Codes (RCTC)
- The trigger codes in the eRSD are developed by the Council of State and Territorial Epidemiologists (CSTE), Centers for Disease Control and Prevention (CDC), and APHL.

Triggers (3) – Subscription to eRSD

- EHR implementers can register and “subscribe” to the eRSD service at no cost to receive notification of routine and emergent updates.
- Each update will include an effective start date, which is the date the set of codes should be implemented and in use by reporters.
- For routine scheduled releases, this will typically be four to six months from the release date (see schedule below). Emergent eRSD releases should be implemented as soon as possible to meet pressing public health emergency needs.

Triggers (4) -> This is eRSD (example fragment)

- ValueSet Expansion: list of condition codes (SCT, ICD10)

```
"version": "3.0.0",
"name": "Diagnosis_ProblemTriggersforPublicHealthReporting",
"title": "Diagnosis_Problem Triggers for Public Health Reporting",
"status": "draft",
"experimental": false,
"date": "2024-07-01T16:17:21-04:00",
"publisher": "CSTE Steward",
"description": "Purpose: Clinical Focus - This set of values contains diagnoses or problems that represent clinical focus for reporting purposes. It includes triggers for public health reporting based on the context of the problem or diagnosis.", "useContext": [ {
  "code": {
    "system": "http://hl7.org/fhir/us/ecr/CodeSystem/us-ph-usage-context-type",
    "code": "reporting"
  },
  "valueCodeableConcept": {
    "coding": [ {
      "system": "http://hl7.org/fhir/us/ecr/CodeSystem/us-ph-usage-context",
      "code": "triggering"
    } ]
  }
}, {
  "code": {
    "system": "http://hl7.org/fhir/us/ecr/CodeSystem/us-ph-usage-context-type",
    "code": "priority"
  },
  "valueCodeableConcept": {
    "coding": [ {
      "system": "http://hl7.org/fhir/us/ecr/CodeSystem/us-ph-usage-context",
      "code": "routine"
    } ]
  }
}, {
  "purpose": "Diagnoses or problems documented in a clinical record.",
  "compose": {
    "include": [
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.0X1A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.0X2A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.0X3A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.0X4A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.1X1A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.1X2A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.1X3A"
      },
      {
        "system": "http://hl7.org/fhir/sid/icd-10-cm",
        "version": "2024",
        "code": "T40.1X4A"
      }
    ]
  }
} ]
```

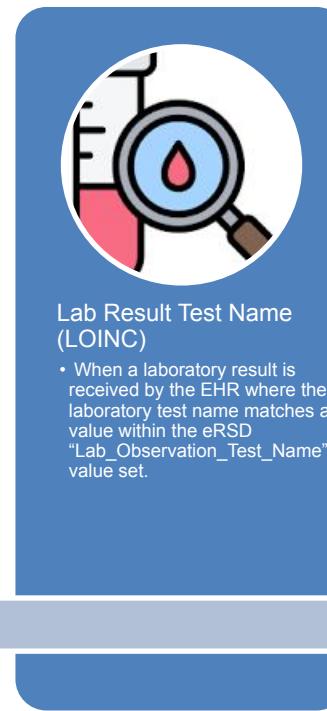
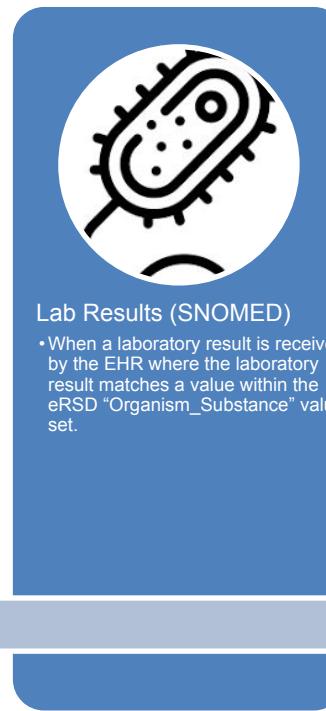
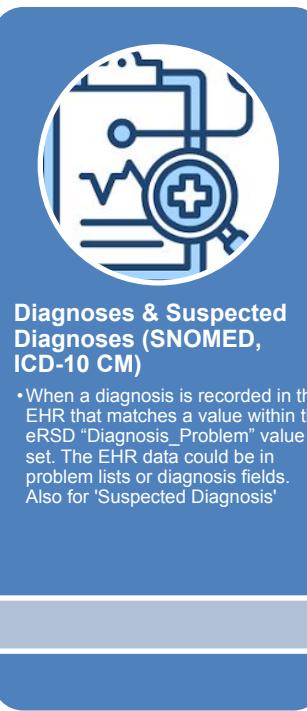
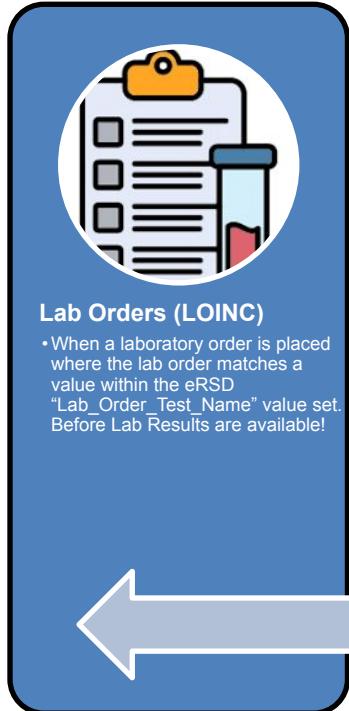
```
"expansion": {
  "timestamp": "2024-07-01T16:17:46-04:00",
  "contains": [ {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.0X1A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.0X2A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.0X3A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.0X4A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.1X1A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.1X2A"
  }, {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.1X3A"
  },
  {
    "system": "http://hl7.org/fhir/sid/icd-10-cm",
    "version": "2024",
    "code": "T40.1X4A"
  }
]
```

Triggers

An eICR is “triggered” or generated and sent to the AIMS platform for confirmation of reportability when one of the specific trigger code sets in the eRSD is matched



Six Primary Trigger Scenarios



Trigger Timing

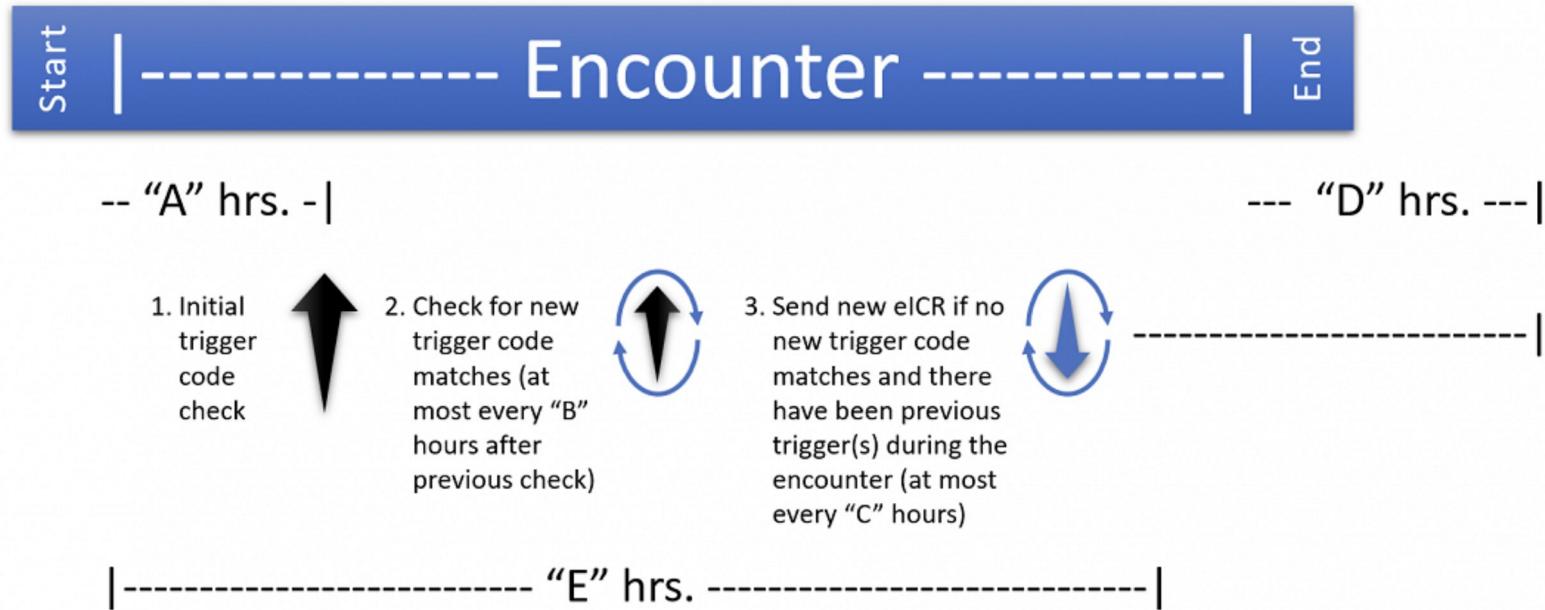
- Because of variability in accumulation of data at the start of a patient encounter, the EHR implementer should implement a **time-based delay in generating and sending the first encounter eICR** to allow time for required data to be captured within the patient chart.
- This will ensure the eICR is **better populated before sending** and will reduce the number of case reports that are sent for a single patient encounter.



Timing Parameters

- [A] From start of patient encounter to first EICR (waiting for completion...) – **Example: 1 hour**
- [B] From a previous trigger code to subsequent ones in a longer encounter (duplicate check) – **Example: 12-24 hs**
- [C] From a previous eiCR to an updated one (update data) – **Example: 72 hours**
- [D] Time period after encounter ends where we still check for updates – **Example: 72 hours**
- [E] Reporting duration for the encounter – **Example: 1 week**

Timing Parameters Diagram



Transaction for eiCR

- Two options for transport:
 - FHIR Message: ('focus': the document bundle)

Message Header

Event Coding: Indicates a message containing electronic case report healthcare data sent from clinical care.

Sender (failed to find Practitioner reference (or PractitionerRole) (or Device) (or Organization) organization-ecr-salem-medical-center in the Bundle)

Destination

Name: YMCA Acme Message Gateway

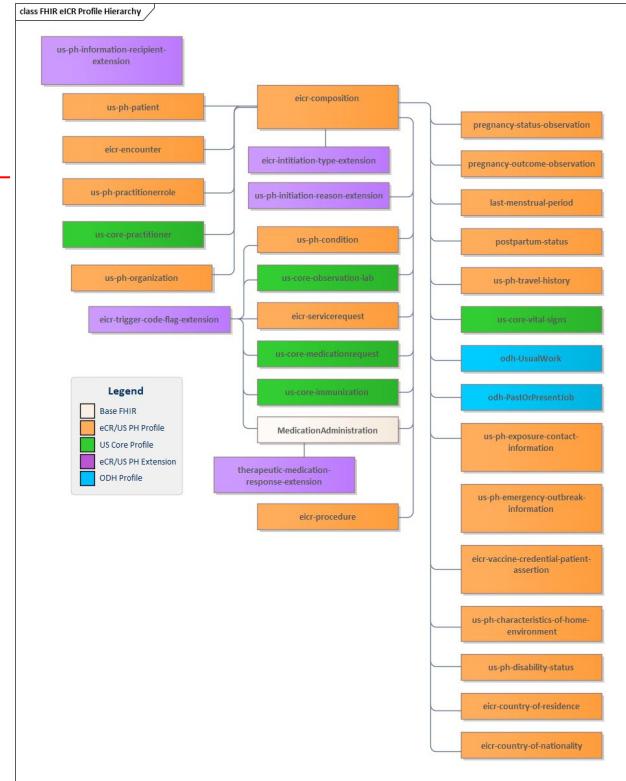
Endpoint: <http://example.org/ymca/fhir>

[skipping item destination.target]

- RESTful POST of Document
 - POST with the Bundle as request body

eiCR Data Elements

- We can see the details at
 - <https://hl7.org/fhir/us/ecr/artifacts.html>
- eiCR MessageHeader
- Document Bundle -> Composition
- Encounter, Procedure, ServiceRequest
- Other PH Profiles (used elsewhere):
 - Conditions, SDOH, Pregnancy, ...
 - **Based on US CORE. (BRAVO!!)**



Composition Section Contents

- Work information
- Travel history
- Exposure/contact information
- Laboratory orders, tests, and results
- Signs, symptoms, and diagnoses
- Medication and immunization information
- Flags for the existence of reportable condition trigger codes in diagnoses, ordered/resulted laboratory tests, medications, immunizations, and procedures:
 - flags contain RCTC OID and RCTC version
 - codes indicating whether the eICR was manually or alternately initiated
- Pregnancy status

Take your time to review the example with this information in mind...

eiCR Terminology

- Only CodeSystems and ValueSets defined by this IG
- Also SNOMED CT, LOINC referenced from the clinical artifacts definition.

11.0.16 Terminology: US Public Health Code Systems	
US Public Health Message Types CodeSystem	The US Public Health Message Types CodeSystem is a 'starter set' of codes supported for identifying types of messages being exchanged.
US Public Health PlanDefinition Action Codes	The US Public Health PlanDefinition Actions CodeSystem is a 'starter set' of codes supported for identifying actions in PlanDefinition.
US Public Health TriggerDefinition NamedEvents	The US Public Health TriggerDefinition NamedEvents CodeSystem is a 'starter set' of codes supported for identifying named events to subscribe to in clinical workflows.
US Public Health Usage Context	This code system contains codes that identify the use context of a valueset.
US Public Health Usage Context Type	This code system contains codes that identify the use context type of a valueset.

11.0.17 Terminology: US Public Health Value Sets	
US Public Health Message Significance Category	The impact of the content of a message.
US Public Health Message Types ValueSet	The US Public Health Message Types Value Set is a 'starter set' of codes for uniquely identifying messages in MessageHeader instances contained within a reporting bundle.
US Public Health PlanDefinition Action	The US Public Health PlanDefinition Action Value Set is a 'starter set' of codes for uniquely identifying actions in PlanDefinition instances.
US Public Health ValueSet Priority	This value set contains codes representing release priority for ValueSets.
US Public Health Pregnancy Status	This value set contains codes representing pregnancy statuses.
US Public Health TriggerDefinition NamedEvent	The US Public Health TriggerDefinition NamedEvent Value Set is a 'starter set' of codes for identifying named events uniquely in TriggerDefinition instances contained within a PlanDefinition.

11.0.18 Terminology: Code Systems	
eRSD Endpoint Connection Type	This code system contains codes that identify the HL7 FHIR File type.
eRSD JurisdictionTypes	This code system describes the possible types of jurisdictions that require public health reporting.
MessageHeader Event Code System	This code system contains codes that identify the event a message represents.

11.0.19 Terminology: Value Sets	
eCR MessageHeader Event	This value set contains codes that identify the event an eCR message represents.
Chlamydia Example	This example set of values contains laboratory observations test names that represent that the patient may have a potentially reportable condition - chlamydia.
eRSD Endpoint Connection Type Codes	Set of endpoint connection types specified as being supported by APHL.

Three Questions for this block!

- 1- What do we use to represent an eiCR report as a group of resources in FHIR?
- 2- Which resource represents the document and its sections when reporting eiCR using FHIR?
- 3- Which FHIR resource is used in eiCR to represent 'disability status' (Hint: Look at the artifact index: <https://hl7.org/fhir/us/ecr/artifacts.html>)

Assignment #6

We will proceed to work in groups now, and solve Assignment #6

[Assignment #6 - P H Implementation Guides.pdf](#)



eiCR Workflow -Receiving Actors: RR-FHIR

- Goals for Reportability Response (RR)
- FHIR Specification
- FHIR Example
- FHIR Data Elements
 - RR Composition
 - RR Subject Section
 - EICR Section
 - RR Summary Section

ECR workflow for receiving actors: RR-FHIR

- Specification (IG): <https://hl7.org/fhir/us/ecr/> (2.1.2)
- Build: <https://build.fhir.org/ig/HL7/case-reporting/>
- The RR answer includes references and data from the eiCR

Goals of the Reportability Response

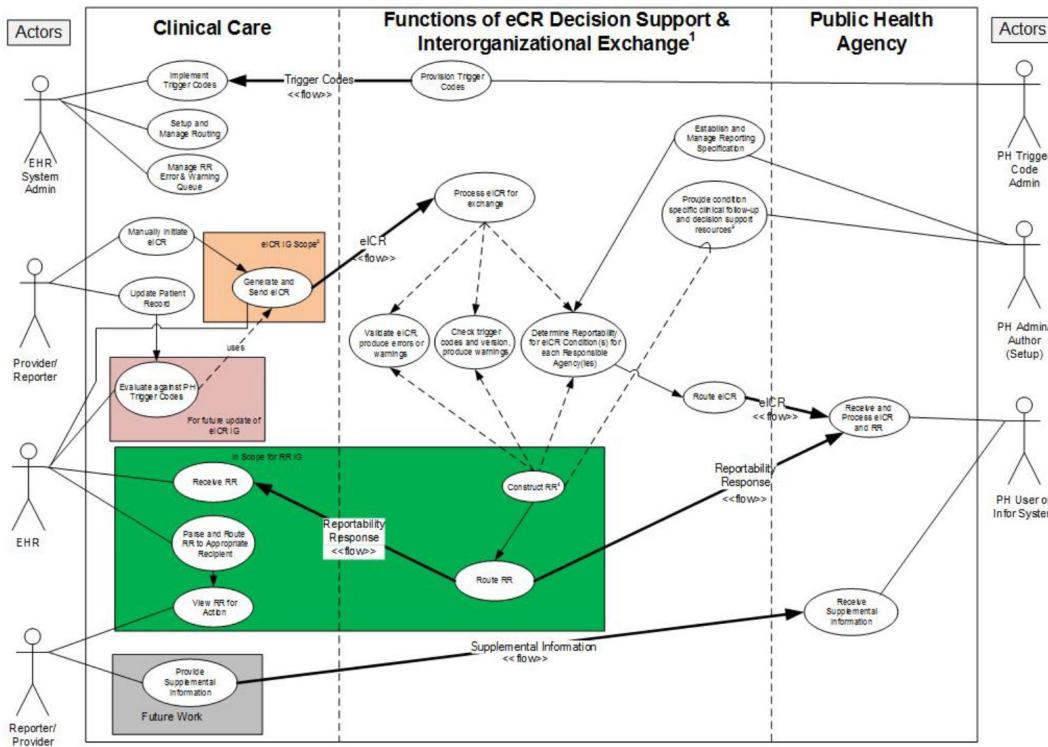
- **Status:** Communicate the reportability status, for the responsible PHA(s), of each condition included in the eICR
- **Author:** Identify who (a PHA or an intermediary) prepared the Reportability Response
- **Routing:** Indicate whether the eICR has been sent to one or more PHA(s) Identify which PHA(s) has/have been sent the eICR
- **Contact Info:** Provide contact information for the responsible PHA(s)
- **Links:** Provide access to clinical support resources suggested by the responsible PHA(s) for identified reportable conditions

Goals of the Reportability Response

- **Acknowledgement:** Confirm eICR receipt and processing
- **Follow Up:** Provide suggested or required clinical follow-up activities from the responsible PHA(s), including any additional reporting needs or infection control activities
- **Reflection:** A Reportability Response will also, when requested, be shared with the responsible PHAs (when they have not constructed it) for their internal use
- **Multiple PHAs:** When a condition is considered reportable to more than one PHA, the Reportability Response can be helpful in communicating reporting that has been done to other PHAs as well.

Overall Workflow (from the CDA IG)

Figure 1: Electronic Case Reporting Context Flow Diagram Reporting to a Public Health Agency



RR – Reportability Response in FHIR

- Example:

- <https://hl7.org/fhir/us/ecr/Bundle-bundle-rr-document-one-cond-on-e-pha.html>
- **Do not get lost:**
- It is a FHIR Bundle ("document").
- Inside of the bundle ("document"): Composition with Sections
- Composition: Link to Entities: Patient, Encounter, Custodian Author
- Sections in Composition: Text and link to entries (processable information)

Example FHIR Reportability Response

- 4 parts
 - Metadata for the RR (Composition)
 - Patient, Encounter, PHA Author
 - Sections
 - RR Subject
 - Electronic Initial Case Report
 - RR Summary Section
- Raw example (JSON) available here:
<https://hl7.org/fhir/us/ecr/Bundle-bundle-rr-document-one-cond-one-pha.json>

Example – Part 1: Metadata

- Metadata: patient, encounter, author, date

(From the
Composition
resource inside of the
Bundle)

Subject

Eve L EVERYWOMAN
Identifier 1032702 Address 5101 Peachtree St NE
Atlanta GA US Date of birth 24 November 1974

Document metadata

Generated Narrative: Composition composition-rr-one-cond-one-pha

version: 6; Last updated: 2021-08-17 03:37:27+0000;

Information Source: #0LoQfHsenVG69d13

Profile: RR Composition

Composition Version Number: 1

US Public Health Information Recipient Extension: PractitionerRole Primary Care Clinic/Center

identifier: <http://acme.org/identifiers> /RR12347

status: Final

type: Reportability response report Document Public health

encounter: Ambulatory Office Visit

date: 2018-07-19 04:09:06+0000

author: Health Authority West, 7777 Health Authority Drive, Ann Arbor MI, 99999

title: Reportability Response - One Condition/One PHA example

custodian: Health Authority West, 7777 Health Authority Drive, Ann Arbor MI, 99999

Example – Part 2: RR Subject Section

This is NOT the patient: it's the result of processing the report

Reportability Response Subject Section

Public Health Reporting Communication: one or more conditions are reportable, or may be reportable to public health

Example – Part 3: Electronic Initial Case Report Section

Pointer to the original case report!

Section

Title: Electronic Initial Case Report Section

Code: Initial case report processing information Document

Document

Identifier: urn:uuid:db734647-fc99-424c-a864-7e3cda82e703

Identifier: sTT988#1

Type: Public health Case report

Category: Clinical Note - Text: Clinical Note

Content

Content Type: text/plain

url: urn:hl7ii:2.16.840.1.113883.19.5.99999.19:1

Subject: Eve Everywoman ([Patient](#))

Display: eICR_Document.xml, Identifier: urn:uuid:db734647-fc99-424c-a864-7e3cda82e703

Example – Part 4: Response Summary

Summary of the processing, additional information about the disease

Reportability Response Summary Section

Summary:

Your organization electronically submitted an initial case report to determine if reporting to public health is needed for a patient. "Zika virus disease (disorder)" is reportable to "State Department of Health". An initial case report was sent to "State Department of Health". Additional information may be required for this report.

"Zika virus disease (disorder)" for "State Department of Health"

Reporting is required within "24 hours". Reporting to this Public Health Agency is based on "both patient home address and provider facility address".

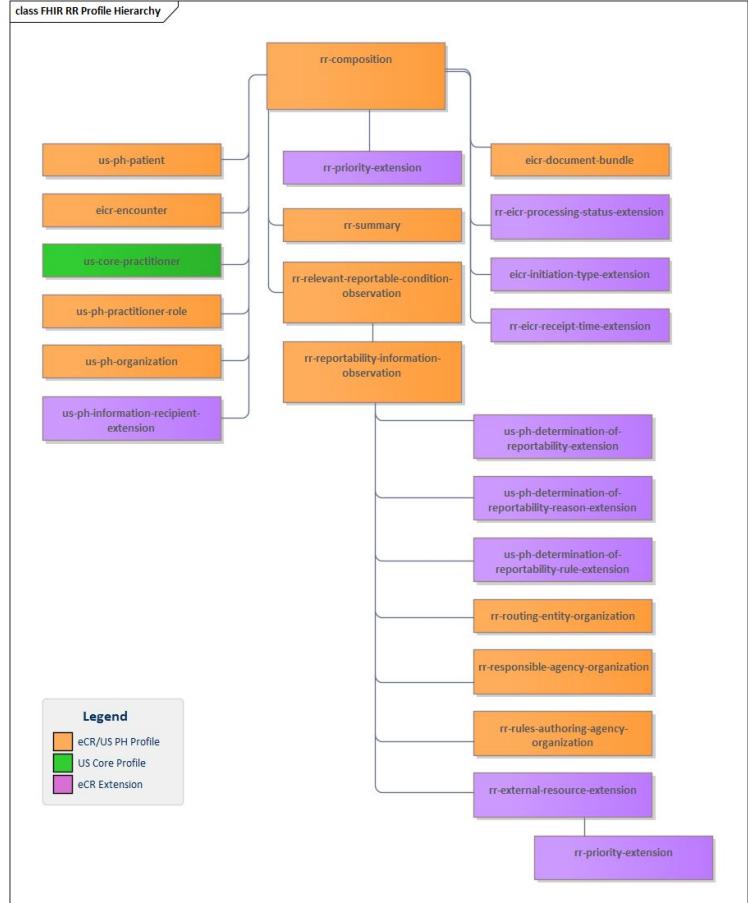
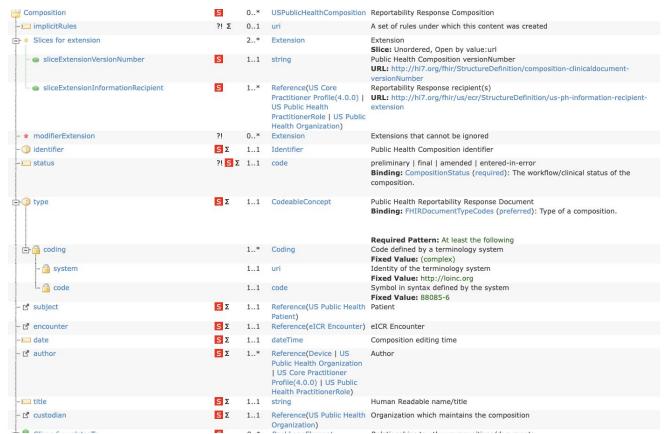
- Local mosquito-borne Zika virus transmission was reported in your area. Increased watchfulness for symptoms of Zika virus in your patients is warranted. ([Immediate action requested](#))
- Additional information for the required reporting of Zika must be submitted to State Department of Health immediately. This additional information can be submitted here. ([Link - Immediate action required](#))
- Zika has particular risks for pregnant women. Follow-up guidance for pregnant women and couples who are planning pregnancy. ([Link - Immediate action requested](#))
- Further Laboratory testing for Zika may be needed. Guidance for additional testing and specimen collection ([Link - Action requested](#))
- Forms for submitting further Zika laboratory testing ([Link - Information only](#))
- Treatment guidance ([Link - Information only](#))
- If you have additional questions regarding Zika or reporting, contact information for the State Department of Health is available here. ([Link - Information Only](#))

Additional Resources (Information only):

- Control and prevention information for providers ([Link](#))
- Detailed condition references ([Link](#))
- Prevalence in State ([Link](#))
- CDC webpage ([Link](#))
- Patient information factsheet ([Link](#))
- State Resident information ([Link](#))

Data Elements

- Starts here:
- https://hl7.org/fhir/us/ecr/reportability_response_rr_transaction_and_profiles.html



Data Elements: Composition

- Type RR LOINC
- Author Organization
(Public Agency)
- Subject Patient,
same as in the EICR
- Custodian
Organization (Public
Agency)

[summary](#) [on show codes](#) [show debug](#) [≡ X](#)

Composition
Type: Reportability response report Document Public health
Identifier: RR12347
Date: 2018-07-19 Time: 04:09:06Z
Status: final
Title: Reportability Response - One Condition/One PHA example
Version: 1

Author

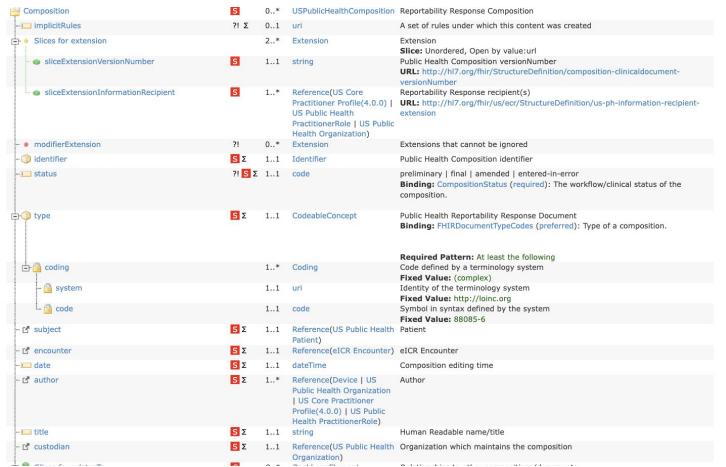
Organization
Identifier: 1144221847
Name: Health Authority West
Phone: +1-555-555-3555
email: mail@healthauthoritywest.gov
Address: 7777 Health Authority Drive, Ann Arbor, MI, 99999
Display: Health Authority West, 7777 Health Authority Drive, Ann Arbor MI, 99999

Subject

Patient
Name: **Eve L Everywoman**
Gender: female
Birth Sex: F
Gender Identity
Value: asked but unknown - Text: asked but unknown
Tribal Affiliation
Value: Fort Mojave Indian Tribe of Arizona, California & Nevada
Enrolled Tribe Member: true
Date of Birth: 1974-11-24
Identifier: 1032702
Deceased: false
Race
Category: White
Text: White
Ethnicity
Category: Not Hispanic or Latino
Text: Not Hispanic or Latino
Active: true
Communication
Language: English
Phone: 1-(404)555-1212 (Use: home)
email: eve.everywoman@example.com
Address: 5101 Peachtree St NE, Atlanta, GA, 30302, US
Display: Eve Everywoman

Data Elements: Composition

- RR Composition
 - Encounter □ Same as in the EICR



summary **on show codes** **show debug** **x**

Encounter
Identifier: 9937012
Date: from 2018-04-01 Time: 15:00:00+00:00 to 2018-04-02 Time: 15:15:00+00:00
Status: finished
Class: ambulatory
Type: 99202 - Text: Office Visit
Location
Identifier: 1144221995
Name: Clinic Bldg A, Salem Medical Center
Type: Hospital
Phone: (+1) (555)555-3001
Fax: (+1) (555)555-3002
email: mail@smc.org
Address: Clinic Bldg A, 4444 Healthcare Drive, Ann Arbor, MI, 99999
Display: Clinic Bldg A, Salem Medical Center, 4646 Brown Rd, Salem, MA 02368

Role – Primary Care Clinic/Center
Identifier: 9941339108
Specialty: Family practice
email: henry.seven@example.com

Practitioner
Identifier: 9941339108
Name: Seven Henry M.D.
Address: BMass Doctors, 2100 North Ave, Burlington, MA, 02368, US
email: henry.seven@example.com
Display: Henry Seven, MD

Location
Identifier: 1144221995
Name: Clinic Bldg A, Salem Medical Center
Type: Hospital
Phone: (+1) (555)555-3001
Fax: (+1) (555)555-3002
email: mail@smc.org
Address: Clinic Bldg A, 4444 Healthcare Drive, Ann Arbor, MI, 99999
Display: Salem Medical Center

Organization
Identifier: 55555555
Name: Salem Medical Center
Phone: +1-555-555-1111
email: mail@salemmedicalcenter.com
Address: 22222 Health Authority Drive, Ann Arbor, MI, 99999
Display: Salem Medical Center

Type: attender

Service Provider
Organization
Identifier: 55555555
Name: Salem Medical Center

Data Elements: RR Subject Section

- Options for "Public Health Reporting Communication"
 - One or more conditions are reportable, or may be reportable, to public health.
 - Submitted report had no identifiable reporting needs
 - Manually initiated report was submitted to public health
- **NOTE: THIS IS *TEXT*. The coded information is included in RR Summary Section / entry: RRReportableCondition**

Data Elements: EICR Section

section:sliceEICRSection	S	1..1	BackboneElement	Electronic Initial Case Report Section
Slices for extension		1..*	Extension	Extension Slice: Unordered, Open by value:url eICR Processing Status URL: http://hl7.org/fhir/us/ecr/StructureDefinition/rr-eicr-processing-status-extension
extensionEICRProcessingStatus	S	1..1	(Complex)	
extensionAlternatelyManuallyInitiatedEICR	S	0..1	CodeableConcept	Alternately or Manually Initiated eICR URL: http://hl7.org/fhir/us/ecr/StructureDefinition/eicr-initiation-type-extension Binding: eICR Initiation (extensible): Initiation Types
extensionEICRReceiptTime	S	0..1	dateTime	Date and time of eICR receipt URL: http://hl7.org/fhir/us/ecr/StructureDefinition/rr-eicr-receipt-time-extension
code		1..1	CodeableConcept	Initial case report processing information Document Required Pattern: At least the following
coding		1..*	Coding	Code defined by a terminology system Fixed Value: (complex)
system		1..1	uri	Identity of the terminology system Fixed Value: http://loinc.org
code		1..1	code	Symbol in syntax defined by the system Fixed Value: 88082-3
Slices for entry	S	0..*	Reference(Resource)	A reference to data that supports this section Slice: Unordered, Open by profile:resolve()
entry:sliceEICRDocument	S	0..*	Reference(eICR Document Bundle US Core DocumentReference Profile(4.0.0))	Reference to eICR Document Bundle or eICR CDA document
identifier		0..1	Identifier	eICR Document Bundle identifier
display	S	0..1	string	Filename of eICR

Extensions (EICR Section)

- **EICRProcessingStatus:**

- **EICRProcessingStatus (code)**

- May include further reasons/details

- **EICRValidationOutput:**

- Markdown, html, string or attachment: output from the EICR validator

- { "url": "**eICRValidationOutput**", "valueAttachment": {"contentType": "text/html",
- "data": "PGhobWwgeG1sbnM9ImhodHA6Ly93d3cudzMub3JnLz...="}}

	Concept Code	Sequence	Concept Name	Preferred Concept Name	Code System	Value Set
<input type="checkbox"/>	RRVS19	1	eICR processed	eICR processed	PHIN VS (CDC Local Coding System)	eICR Processing Status (eCR) Details
<input type="checkbox"/>	RRVS20	2	eICR was processed - with a warning	eICR was processed - with a warning	PHIN VS (CDC Local Coding System)	eICR Processing Status (eCR) Details
<input type="checkbox"/>	RRVS21	3	eICR was processed - with a severe warning	eICR was processed - with a severe warning	PHIN VS (CDC Local Coding System)	eICR Processing Status (eCR) Details
<input type="checkbox"/>	RRVS22	4	eICR was not processed - error	eICR was not processed - error	PHIN VS (CDC Local Coding System)	eICR Processing Status (eCR) Details

Extensions (EICR Section)

- **AlternatelyManuallyInitiatedEICR:** Code for Manually or Alternately Initiated
- **EICRReceiptTime:** date and time of the eiCR receipt

Data Elements: RR Summary Section

section:sliceRRSummarySection	S	0..1	BackboneElement	Reportability Response Summary Section
Slices for extension		1..*	Extension	Extension
extensionRRPriority	S	1..1	CodeableConcept	Slice: Unordered, Open by value:url RR Priority URL: http://hl7.org/fhir/us/ecr/StructureDefinition/rr-priority-extension Binding: Reportability Priority (eCR) (extensible): Reportability Priority
code	S	1..1	CodeableConcept	Document summary Required Pattern: At least the following
coding		1..*	Coding	Code defined by a terminology system
system		1..1	uri	Fixed Value: (complex) Identity of the terminology system
code		1..1	code	Fixed Value: http://loinc.org Symbol in syntax defined by the system Fixed Value: 55112-7
text	S	1..1	Narrative	RR Summary Section narrative
Slices for entry	S	2..*	Reference(Resource)	A reference to data that supports this section Slice: Unordered, Open by profile:resolve()
entry:sliceRRSummary	S	1..1	Reference(RR Summary)	RR Summary
entry:sliceRCondition	S	1..*	Reference(RR Relevant Reportable Condition Observation)	Relevant Reportable Condition

Data Elements: RR Summary Section

- Extension: RRPriority: Reportability Priority

Downloaded Selected					
Concept Code	Sequence	Concept Name	Preferred Concept Name	Code System	Value Set
<input type="checkbox"/> RRVS17	1	Immediate action required	Immediate action required	PHIN VS (CDC Local Coding System)	Reportability Priority (eCR) Details
<input type="checkbox"/> RRVS18	2	Immediate action requested	Immediate action requested	PHIN VS (CDC Local Coding System)	Reportability Priority (eCR) Details
<input type="checkbox"/> RRVS14	3	Action required	Action required	PHIN VS (CDC Local Coding System)	Reportability Priority (eCR) Details
<input type="checkbox"/> RRVS16	4	Action requested	Action requested	PHIN VS (CDC Local Coding System)	Reportability Priority (eCR) Details
<input type="checkbox"/> RRVS15	5	Information only	Information only	PHIN VS (CDC Local Coding System)	Reportability Priority (eCR) Details

- text: RR Summary Section Narrative.

Not just any text, see the (complex) rules here:

https://hl7.org/fhir/us/ecr/reportability_response_narrative_guidance.html

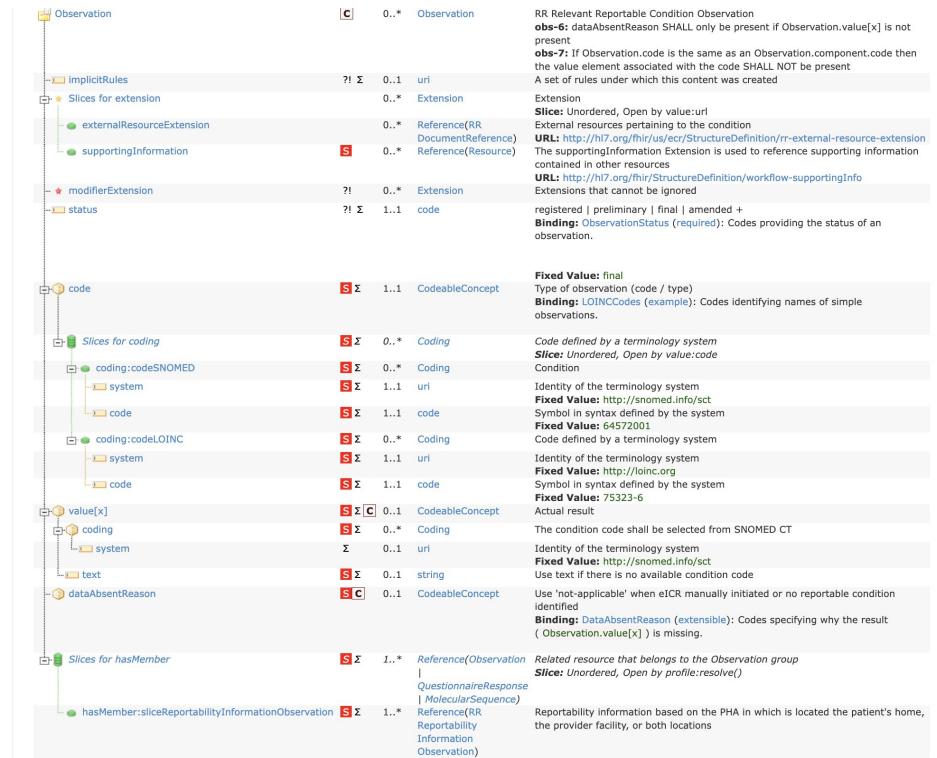
Data Elements: RR Summary Section

- Entry: **RRSummary**: Same as text. Example

valueString : "your organization electronically submitted an initial case report to determine if reporting to public health is needed for a patient. 'Zika virus disease (disorder)' is reportable to 'State Department of Health'. An initial case report was sent to 'State Department of Health'. Additional information may be required for this report." }

Data Elements: RR Summary Section

- Entry: **RRReportableCondition** [1..n]
- **valueCodeableConcept:**
 - The Condition (SNOMED CT)
- **dataAbsentReason:**
 - When manually initiated or no reportable condition found
- **externalResourceExtension:** link with more info (example: pdf)
- **hasMember:**
 - one per PHA (see next slide)

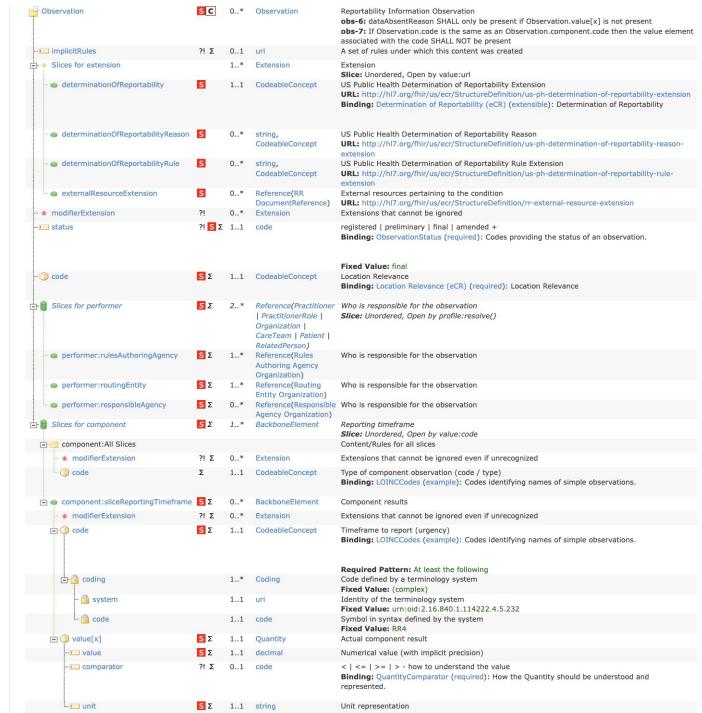


Data Elements: RR Summary Section

- **RRReportableCondition.hasMember:**
- Reportability information based on the PHA in which is located the patient's home, the provider facility, or both locations

Yes, this is too small!. Too much stuff inside
Full View Here:

<https://hl7.org/fhir/us/ecr/StructureDefinition-rr-reportability-information-observation.html>



Data Elements: RR Summary Section

- **RRReportableCondition.hasMember:**
- **code:** home or facility
- **determinationOfReportability**
 - Reportable, May be reportable, Not reportable, Not applicable
- **determinationOfReportabilityReason (text)**
- **determinationOfReportabilityRule (text)**
- **externalResourceExtension (+Info)**
- (Performer)
 - **routingEntity**
 - **rulesAuthoringAgency**
 - **responsibleAgency**
- **ReportingTimeFrame (time frame to report)**

Member
Observation
Status: final
Code: Patient home address
Component
Code: Timeframe to report (urgency)
Value: 24 H
Performer
Organization
Identifier: 43214321
Name: Health Authority West Routing Entity
Type: Routing Entity
Phone: +1-555-555-3555
email: mail@healthauthoritywest.gov
Address: 7777 Health Authority Drive, Ann Arbor, MI, 99999
Organization
Identifier: 12341234
Name: Health Authority West Rules Authoring Agency
Type: Rules Authoring Agency
Phone: +1-555-555-3555
email: mail@healthauthoritywest.gov
Address: 7777 Health Authority Drive, Ann Arbor, MI, 99999
Organization
Identifier: 99996666
Name: Health Authority West Responsible Agency
Type: Responsible Agency
Phone: +1-555-555-3555
email: mail@healthauthoritywest.gov
Address: 7777 Health Authority Drive, Ann Arbor, MI, 99999
Display: Health Authority West Rules Authoring Agency
Display: Health Authority West Routing Entity
Display: Health Authority West Routing Entity

eRSD – Electronic Reporting and Surveillance Distribution

- Spec: Lives in the same eCR Implementation Guide
- Under a specific section:
- https://hl7.org/fhir/us/ecr/electronic_reporting_and_surveillance_distribution_ersd_transaction_and_profiles.html
- Technologies:
 - Subscription
 - CQL Libraries

eRSD: Subscriptions

- General Mechanism:



- Topics:

Diagnosis_Problem

Condition?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-dxtc-example

Organism_Substance

Condition?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-ostc-example

Lab Order Test

ServiceRequest?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-lotc-example

Lab Obs Test Name

Observation?code:in=http://hl7.org/fhir/us/ecr/ValueSet/lrtc

Medications

MedicationAdministration?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

MedicationDispense?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

MedicationRequest?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

MedicationStatement?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

Immunization

Immunization?vaccineCode:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

Suspected_Disorder

Condition?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-sdtc-example

MedicationRequest?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-mrtc-example

Observation?code:in=http://hl7.org/fhir/us/ecr/ValueSet/valueset-lotc-example

What are we
(we=EHR or eCR
Now app) subscribing
to...?

eRSD: Plan Definitions+CQL Libraries+ValueSets

- eRSD CQL Libraries / Plan Definition
 - The PlanDefinition libraries are a mechanism for representing the process for creation and submission of reportable events

- start-workflow
 - trigger: encounter-start
 - action: check-suspected-disorder in "A" hours
- check-suspected-disorder
 - if is-encounter-suspected-disorder, create-eicr
 - if continue-check-reportable, check-reportable in "B" hours
- check-reportable
 - if is-encounter-reportable, create-eicr
 - if check-update-eicr, create-eicr
 - if is-encounter-in-progress, check-reportable in "B" hours
- create-eicr
 - action: validate-eicr
- validate-eicr
 - route-and-send-eicr
- encounter-modified
 - trigger: encounter-modified
 - create-eicr

11.194.1 Example ValueSet: Example ValueSet: Diagnosis Problem Triggers for Public Health Reporting

Draft as of 2018-08-01

Generated Narrative: ValueSet valueset-dxtc-example

This value set includes codes based on the following rules:

- Include these codes as defined in <http://hl7.org/fhir/sid/icd-10-cm>

Code	Display
A01	Typhoid and paratyphoid fevers
A01.0	Typhoid fever
- Include these codes as defined in <http://snomed.info/sct>

Code	Display
10750051000119105	Chlamydia trachomatis infection in mother complicating childbirth (disorder)
10754031000119105	Gonorrhea in mother complicating childbirth (disorder)
1084791000119106	Cardiac disorder due to typhoid fever (disorder)
1086991000119103	Gonococcal abscess of brain (disorder)
1087051000119109	Gonococcal osteomyelitis (disorder)
1087061000119106	Gonococcal pneumonia (disorder)
1092371000119103	Salmonella pyelonephritis (disorder)

eRSD: Plan Definitions+CQL Libraries+ValueSets

- Example CQL Criteria

```
define "Chlamydial conjunctivitis (as a diagnosis or active problem)":  
exists (  
    [Encounter: reasonCode in "VS: Chlamydia trachomatis Infection [Conjunctivitis] (Disorders) (SNOMED)"]  
    [Encounter: reasonCode in "VS: Chlamydia trachomatis Infection [Conjunctivitis] (Disorders) (ICD10CM)"]  
)  
or exists (  
    [Diagnosis: "VS: Chlamydia trachomatis Infection [Conjunctivitis] (Disorders) (SNOMED)"]  
    union [Diagnosis: "VS: Chlamydia trachomatis Infection [Conjunctivitis] (Disorders) (ICD10CM)"]  
) Dx  
    where Dx.clinicalStatus ~ "Active"  
        and Dx.verificationStatus ~ "Confirmed"
```

And for the Patient age < 1 year criteria:

```
define "Patient age < 1 year":  
AgeInYears() < 1
```

And then combining them according to the combination method rules:

```
define "Chlamydial conjunctivitis (as a diagnosis or active problem) AND patient age < 1 year":  
    "Chlamydial conjunctivitis (as a diagnosis or active problem)"  
    and "Patient age < 1 year"
```

eRSD: Plan Definitions+CQL Libraries+ValueSets

- Adding Jurisdictions

(a,b,c: jurisdictions configured to report with this rule)

```
define "Chlamydial conjunctivitis (as a diagnosis or active problem) AND patient age < 1 year (with Jurisdictions)":  
    "Chlamydial conjunctivitis (as a diagnosis or active problem) AND patient age < 1 year"  
    and exists ((  
        GetJurisdictionCodes(Patient.address)  
        union GetJurisdictionCodes(GetLocation(Encounter.location.location))  
    ) JC  
    where JC in { 'A', 'B', 'C' }
```

We need to

- identify the location for the Encounter and
- have some state/zip configuration for the Jurisdictions
- See:

Six Questions for this block!

- 1 – Where can I find the coded answer to whether the case is reportable or not?
- 2 – Which information from the eiCR is copied to the RR?
- 3 – Where is the complete eiCR report referenced in the RR?
- 4 – Where can I find links of interest regarding the reported disease?
- 5 – Where in the response can I find the reporting priority with specific requested actions?
- 6 – Where can I find the routing entity for the response?