



Background Information: Signs, Symptoms, Clinical Manifestations



Today we're going to go over some background information on how information on signs, symptoms, and clinical manifestations are transmitted according to various standards and CDC Message Mapping Guides (MMGs). This information will prepare you to participate in the Data Standardization Workgroup team meeting for this data class on February 16th.

Data elements



- Signs and Symptoms Repeating Group
- Clinical Manifestation Repeating Group
- Clinical Findings Repeating Group
- Problem Associated Signs and Symptoms
- Clinical Signs of Congenital Syphilis
- Symptoms Resolved After Treatment
- Late Clinical Manifestations
- Bacterial Infection Syndrome
- Did the subject have a diagnosis of HUS?
- Did the subject have a diagnosis of Thrombotic Thrombocytopenia (TTP)?
- Type of Complications

Council of State and Territorial Epidemiologists

Within CDC's National Notifiable Disease Surveillance System, or NNDSS, nearly all MMGs ask about signs, symptoms, findings, or manifestations that a patient experiences as a result of the condition being reported. This typically includes one of the repeating groups listed on the left side of the slide that ask about signs and symptoms, clinical manifestations, clinical findings, or Problem Associated Signs and Symptoms. A few additional questions are included across MMGs that ask about symptom resolution or a yes/no question asking about specific disease manifestations. Some MMGs ask about condition complications or the type of infection.

U.S. Core Data for Interoperability (USCDI) 

Problems (USCDI V4)
Description: Condition, diagnosis, or reason for seeking medical attention.
Value sets: SNOMED CT® U.S. Edition; ICD-10-CM

Symptoms (list) (USCDI+)
List of patient symptoms (structured) for the reportable event.

Council of State and Territorial Epidemiologists

Within the US Core Data for Interoperability (USCDI), all four released versions have included a data element of “Problems”, which would be the most likely place to find signs, symptoms, or clinical manifestations. This data element has a description of “Condition, diagnosis, or reason for seeking medical attention.” and lists SNOMED CT and ICD10CM as applicable vocabulary standards.

In addition to maintaining USCDI, the Office of National Coordinator for Health Information Technology (ONC) maintains USCDI+ to support domain- or program-specific data element lists that extend the existing USCDI. Within the USCDI+ public health domain, the Case Reporting Use case contains a data element of “Symptoms” with a description of “List of patient symptoms (structured) for the reportable event.” To populate the symptom list, USCDI+ refers to the FHIR US Core Condition Problems and Health Concerns Profile which also uses ICD-10 and SNOMED vocabulary standards.

Electronic Reporting



Electronic Lab Reporting (ELR)

- There is not a data element specifically defined for signs and symptoms

Electronic Case Reporting (eCR)

- Symptom (List)
 - List of patient symptoms (structured) for the reportable event

Council of State and Territorial Epidemiologists

Within the electronic lab reporting message, there is not a specific data element to capture the patient's signs and symptoms. While the OBX segment can be used to report clinical observations and results, it is not specifically designed to capture signs and symptoms data and we wouldn't expect to receive information on signs and symptoms in an ELR.

Within electronic case reporting, the eICR contains a data element of "Symptoms" with a description of "List of patient symptoms for the reportable event". This data element is included within the problem section that lists and describes all relevant clinical problems at the time the document is generated.

Case Notifications to CDC

Message Mapping Guides (MMGs)



☐ Symptoms

[Collapse Subsections](#)

☐ Symptoms

Did the patient experience any symptoms related to pertussis?:

Did the patient have any cough?:

Did the patient have paroxysmal cough?:

Did the patient have whoop?:

Did the patient have post-tussive vomiting?:

Did the patient have apnea?:

Did the patient have cyanosis?:

Other symptom(s)?:

Symptom Notes:

Council of State and Territorial Epidemiologists

Within a case investigation, questions on a patient's symptoms will often be structured similar to this block from the pertussis page in NBS. That is, there is a symptom section and each symptom of interest will be asked about individually, with drop down answer lists of yes, no, and unknown. However, the structure of these data elements looks different within MMGs that describe how the information should be transmitted to CDC. When we talk about defining core data elements for surveillance, our focus will be on how the information is transmitted to CDC.

Case Notifications to CDC

Message Mapping Guides (MMGs)



- Signs and Symptoms Repeating Group

- Carbon Monoxide Poisoning, Rubella, Measles, RIBD, Congenital Syphilis, Foodborne and Diarrheal Disease, Listeriosis, Mumps, Pertussis, COVID-19

Data Element (DE) Name	DE Identifier Sent in HL7 Message	Data Element Description	Value Set Name (VADS Hyperlink)
START: Signs and Symptoms Repeating Group			
Signs and Symptoms	56831-1	Signs and symptoms associated with the illness being reported	Signs and Symptoms (COVID-19)
Signs and Symptoms Indicator	INV919	Indicator for associated sign and symptom	Yes No Unknown (YNU)
END: Signs and Symptoms Repeating Group			

Council of State and Territorial Epidemiologists

Within MMGs, a signs and symptoms repeating group is the most commonly used structure for this information. This is included in the ten MMGs listed above. Most MMGs will have a unique value set for the signs and symptoms that are relevant to the particular condition. The number of signs and symptoms varies by condition, with 5-30 signs and symptoms in the current MMGs. The intent is for the repeating group to have as many instances as there are values in the value set, with a Yes/No/Unknown indicator included for each symptom. Value sets are largely comprised of SNOMED codes, with a few codes from PHIN vocabulary standards, the CDC Local Coding System. Examples include fatigue, fever, muscle pain, shock, vomiting, and myalgia.

Case Notifications to CDC

Message Mapping Guides (MMGs)



- Clinical Manifestations Repeating Group

- Babesiosis, Brucellosis, Leptospirosis, Lyme Disease, TBRD

Data Element (DE) Name	DE Identifier Sent in HL7 Message	Data Element Description	Value Set Name (VADS Hyperlink)
START: Clinical Manifestations Repeating Group			
Clinical Manifestation	INV929	Clinical manifestation of babesiosis	Clinical Manifestations (Babesiosis)
Clinical Manifestation Indicator	INV930	For each clinical manifestation reported, indicate (YNU) whether the subject developed the specified manifestation as a result of the illness	Yes No Unknown (YNU)
END: Clinical Manifestations Repeating Group			

Council of State and Territorial Epidemiologists

The second most common method of capturing this information is in a clinical manifestations repeating group, used in five MMGs. The structure is a repeating group similar to what was just described for signs and symptoms. There are no MMGs that utilize both the Signs and Symptoms repeating group and the Clinical Manifestations repeating group.

Case Notifications to CDC

Message Mapping Guides (MMGs)



- Clinical Section - Individual questions

- Arboviral

Data Element (DE) Name	DE Identifier Sent in HL7 message	Data Element Description	Value Set Name (VADS Hyperlink)
Fever	386661006	Fever	Yes No Unknown (YNU)
Chills or Rigors	43724002	Chills/ Rigors	Yes No Unknown (YNU)
Fatigue or Malaise	271795006	Fatigue and Malaise	Yes No Unknown (YNU)
Rash	271807003	Rash	Yes No Unknown (YNU)
Myalgia	68962001	Myalgia	Yes No Unknown (YNU)

Council of State and Territorial Epidemiologists

As an alternative structure, the arboviral MMG has a "clinical section" that includes approximately 30 discrete data elements, each asking about a single sign, symptom, or clinical manifestation, rather than a repeating group where the concepts of interest are specified within a value set.

Value Sets



Signs and Symptoms:

- 19 value sets for different conditions
- 111 unique codes (100 SNOMED, 9 local, OTH, UNK)
- 76/111 codes (68%) are only in one of the 19 value sets

Clinical Manifestations:

- 6 value sets for different conditions
- 91 unique codes (86 SNOMED, 3 local, OTH, UNK)
- 72/91 codes (79%) are only in one of the 6 value sets

No current condition contains both of these repeating groups.

Council of State and Territorial Epidemiologists

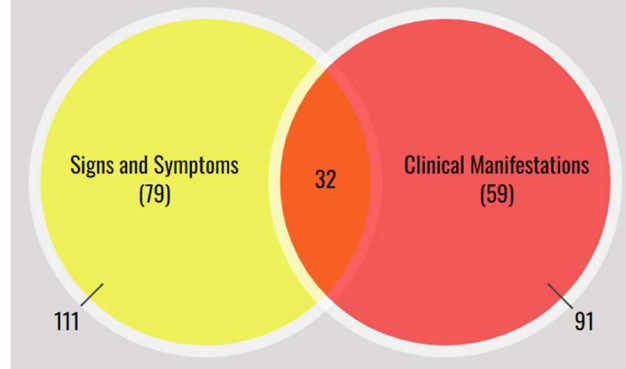
The work of this group will not be to define what codes make up value sets for these concepts. However, one thing we do want to talk about is if the data represented by these two repeating groups across MMGs can be represented by one standard data class. There is no MMG that contains both a signs and symptoms repeating group and a clinical manifestations repeating group. On the next slide we're going to look at the overlap in codes between these two repeating groups, but first we're going to discuss what that overlap looks like across value sets in a single repeating group for context.

The signs and symptoms repeating group is implemented with 19 different value sets across conditions. Within those 19 value sets there are 111 unique codes, and 68% of those codes are only present in one of the 19 value sets. Similarly for clinical manifestations, there are 6 different value sets used across conditions, with 91 unique codes. 79% of those codes are only present in one of the six value sets. This comparison shows that in general these value sets are highly condition specific and do not have much overlap across conditions, even within the same repeating group.

Value Set Overlap



Overlap Between Signs/Symptoms and Clinical Manifestations



Council of State and Territorial Epidemiologists

Now looking at how these codes overlap across the repeating groups, there were 32 codes, or about 1/3 of the codes from either repeating group, that are present in value sets from both groups. The concepts represented in the value sets for these two repeating groups are just as similar between the groups as within the groups.

Signs and Symptoms Examples



Carbon Monoxide	Mumps	Arbovirus	FDD	Flu
Chest pain (finding)	Fever (finding)	Fever	Bullae	Absent (qualifier value)
Clouded consciousness (finding)	Headache (finding)	Chills or Rigors	Cellulitis	Acute onset (qualifier value)
Dizziness (finding)	Jaw pain (finding)	Fatigue or Malaise	Diarrhea	Chill (finding)
Dyspnea (finding)	Loss of appetite (finding)	Rash	Dysuria (finding)	Conjunctivitis (disorder)
Headache (finding)	Muscle pain (finding)	Myalgia	Fatigue	Cough (finding)
Nausea (finding)	other	Arthralgia	Fever	Diarrhea (finding)
other	Parotitis (disorder)	Arthritis	Headache	Dyspnea (finding)
	Sublingual salivary gland swelling (finding)	Headache	Hematochezia	Extreme exhaustion (finding)
Syncope (disorder)	Submandibular salivary gland swelling (finding)	Paralysis or Paresis	Loss of appetite	Feeling feverish (finding)
Vomiting (disorder)				

Council of State and Territorial Epidemiologists

This slide contains a subset of values present within some of the signs and symptoms value sets for Carbon Monoxide, Mumps, Arbovirus, Foodborne and Diarrheal Disease, and Influenza. Concepts range from more general terms like fever and headache to more specific signs like submandibular salivary gland swelling.

Clinical Manifestations Examples



TBRD	Anthrax	Babesia	Brucellosis	Leptospirosis
Anemia (disorder)	Abdominal discomfort (finding)	Anemia (disorder)	Arthritis (disorder)	Abdominal pain (finding)
Decreased blood leukocyte number (finding)	Altered mental status (finding)	Chill (finding)	Endocarditis (disorder)	Acute hepatic failure (disorder)
Eruption of skin (disorder)	Ascites (disorder)	Fever (finding)	Epididymitis (disorder)	Acute renal impairment (disorder)
Eschar (morphologic abnormality)	Chest pain (finding)	Headache (finding)	Fatigue (finding)	Altered mental status (finding)
Fever (finding)	Chill (finding)	Joint pain (finding)	Fever (finding)	Aseptic meningitis (disorder)
Headache (finding)	Coma (disorder)	Muscle pain (finding)	Headache (finding)	Bleeding from nose (finding)
Hepatic transaminase elevation	Contusion (disorder)	other	Joint pain (finding)	Blood in urine (finding)
Muscle pain (finding)	Cough (finding)	Sweating (finding)	Large liver (disorder)	Blood in vomit - symptom (finding)
other	Diarrhea (finding)	Thrombocytopenic disorder (disorder)	Loss of appetite (finding)	Cardiac arrhythmia (disorder)
Thrombocytopenic disorder (disorder)	Dysphagia (disorder)		Meningitis (disorder)	Chest pain (finding)

Council of State and Territorial Epidemiologists

This slide contains a subset of values present within the clinical manifestations value sets for Tickborne and Rickettsial Disease, Anthrax, Babesiosis, Brucellosis, and Leptospirosis. Concepts again range from more general terms like fever and headache to more specific signs like thrombocytopenic disorder.

Case Notifications to CDC

Message Mapping Guides (MMGs)



- FDD Y/N/U Discrete Elements:

Data Element (DE) Name	DE Identifier Sent in HL7 Message	Data Element Description	May Repeat	Value Set Name (VADS Hyperlink)
HUS	INV936	Did the subject have a diagnosis of HUS?	N	Yes No Unknown (YNU)
Thrombotic Thrombocytopenia (TTP)	INV937	Did the subject have a diagnosis of Thrombotic Thrombocytopenia (TTP)?	N	Yes No Unknown (YNU)

- Malaria “Select All that Apply” Element:

Data Element (DE) Name	DE Identifier Sent in HL7 Message	Data Element Description	May Repeat	Value Set Name (VADS Hyperlink)
Type of Complications	67187-5	Complication(s) related to this malaria illness	Y	Complications (Malaria)

Council of State and Territorial Epidemiologists

Information that is similar to but separate from what is seen in the previous repeating groups are present in data elements that collect information on specific presentations, complications, or sequelae of infection. These elements are sometimes present within MMGs in addition to one of the previously discussed repeating groups, and their structure varies across the MMGs. Some examples shown here are from the Foodborne and Diarrheal disease MMG, where individual non-repeating Y/N/U elements ask if the case was diagnosed with HUS or TTP, and the malaria MMG, where the single data element uses a value set consisting of complications like cerebral malaria or renal failure. This format is kind of a "select all that apply" format where multiple entries from the value set can be transmitted, but there is no distinction able to be made on whether a non-transmitted value is not present or unknown. A similar format is also seen in the Respiratory and Invasive Bacterial Diseases MMG, with a data element that describes the types of infection caused by the organism, such as cellulitis, encephalitis, or septic shock.

Case Notifications to CDC

Message Mapping Guides (MMGs)



- COVID-19 Clinical Findings Repeating Group

Data Element (DE) Name	DE Identifier Sent in HL7 Message	Data Element Description	May Repeat	Value Set Name (VADS Hyperlink)	Value Set Code
START: Clinical Findings Repeating Group					
Clinical Finding	75321-0	Clinical findings associated with the illness being reported	N	Clinical Finding (COVID-19)	PHVS_ClinicalFinding_COVID-19
Clinical Finding Indicator	INV1314	Indicator for associated clinical findings. Please map Probable findings to Yes.	N	Yes No Unknown NA (NND)	PHVS_YesNoUnkNA_NND
END: Clinical Findings Repeating Group					

Value Set: Acute Respiratory Distress Syndrome, Electrocardiogram Abnormal, Pneumonia, Standard Chest X-Ray Abnormal, Other, Unknown

Council of State and Territorial Epidemiologists

In the COVID-19 MMG there is a "Clinical Findings" repeating group that is separate from the signs and symptoms repeating group. Rather than symptoms, this value set captures more severe findings or presentations like acute respiratory distress syndrome or an abnormal chest x-ray.

For Consideration



- In practice, the signs and symptoms repeating group is being utilized in the same manner as the clinical manifestations repeating group. Is there a need to keep these two repeating groups separate? If not, how should we name and define a single group of questions on this topic?
- Should there be an overall “was the patient symptomatic” data element?
- Condition complications/sequelae/infection types are data elements separate from the repeating groups and formatted differently across conditions. Should this type of data element be defined and standardized in structure or left for condition specific implementation?
- For either of these concepts, is a repeating group the preferred structure?

Council of State and Territorial Epidemiologists

Before the meeting on the 16th, here are some topics to consider that we will discuss further on that call.

Next Steps



- February 16th, 2024: 1-2pm
 - Should Signs and Symptoms and Clinical Manifestations remain two separate repeating groups? Can we define and name one data class for capturing these clinical findings? Is this data class core?
 - Should further data elements about complications/sequelae/infection type be standardized in structure across all conditions? Is this a core concept? If it should be standardized, how do we define it?
- March 8th & maybe March 15th, 2024: 1-2pm
 - Combination meeting(s) with the group discussing Exposures/Risk/Underlying Conditions. What is the best structure for sending these data classes?
 - The intended audience for this meeting are informaticians who work on the back-end databases for surveillance systems and structure messages for case notifications to CDC.

Council of State and Territorial Epidemiologists

Our call to discuss definitions of these data classes and what should be core is on February 16th from 1-2pm.

On March 8th the teams for this data class and Exposures/Risk/Underlying Conditions will meet together to discuss the preferred structure for transmitting this information to CDC. The intended audience for this meeting are informaticians who work on the back-end databases for surveillance systems and structure messages for case notifications to CDC. If this conversation is not wrapped up on March 8th we will also utilize our meeting time on March 15th to continue that conversation.