2019

Data Standardization: Dates of Importance to Public Health Surveillance

Illness (Symptom) Onset Date, Report Dates, Laboratory-Related Dates, (Clinical) Diagnosis Date

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INTRODUCTION

This document was developed by the Data Standardization Work Group (DSWG) of the CSTE Surveillance Practice and Implementation Subcommittee and will be published and maintained in a repository on the CSTE website [Insert website].

DATA STANDARDIZATION WORK GROUP OVERVIEW

As work on the Centers for Disease Control and Prevention (CDC) NNDSS Modernization Initiative (NMI) (https://www.cdc.gov/nmi/) has progressed, the need has been identified to develop consensus on common definitions for core surveillance data elements to address variation in how jurisdictions or programs define and populate these data elements.

Consistent, shared definitions and guidelines are imperative to accurately using epidemiology to improve health at the jurisdictional and national levels. This information allows public health professionals to effectively allocate resources to identify and respond to disease threats.

The objective of the CSTE Data Standardization Work Group (DSWG) is to improve data quality through the development and application of consensus definitions for the core data elements used for communicable disease surveillance. The DSWG combines the expert knowledge of its members to achieve consensus across diseases and jurisdictions to facilitate and support standardization for data elements, whether they are referenced as part of notification to CDC, in communication between states, or in analysis.

This effort directly aligns with key portions of CSTE's mission, including promoting the effective use of epidemiologic data to guide public health practice and improve health, as well as develop standards for practice.

DATES OF IMPORTANCE TO PUBLIC HEALTH SURVEILLANCE

Within Generic v2.0 and Generic v2.0-based message mapping guides (MMGs), several dates are important both as individual core surveillance data elements as well as contributing to components of other, hierarchical data elements used for case counting and notification to CDC. Four dates/date concepts were selected as the first set of data elements for the DSWG to assess: illness onset date, report dates, laboratory-related dates, and diagnosis date. Standardizing the use of these dates across programs and jurisdictions has the additional benefit of establishing a common vocabulary when dealing with complex or hierarchical data elements in the future.

STRUCTURE OF THE DATA STANDARDIZATION BRIEF

Each data element included in this brief includes three areas:

- Background and Overview, including Current Data Element Description, Priority and Usage
- Recommended Definitions and Implementation
- Recommended Actions

It is hoped that this process will serve as a template for future data standardization efforts.

ILLNESS (SYMPTOM) ONSET DATE

BACKGROUND AND OVERVIEW

CURRENT DATA ELEMENT DESCRIPTION IN MMGS

The current data element description for the Date of Illness Onset in the Generic v2.0 MMG is shown below:

PHIN Variable	Data Element Name	Data Element Description	CDC Priority	HL7 Implementation Notes
INV137	Date of Illness Onset	Date of the beginning of the illness. Reported date of the onset of symptoms of the condition being reported to the public health system.	P	For unknown date, OBX-5 **MAY** be populated with '99999999'.

For more information on the content and information in MMG columns, please refer to the Generic v2.0 MMG workbook, and the tab titled "MMG Column Description".

For the Arboviral v1.3 MMG, the specifications are as follows:

PHIN Variable	Data Element Name	Data Element Description	CDC Priority	HL7 Implementation Notes	ArboNET Variable ID
INV137	Date of Illness Onset	Date of the beginning of the illness. Reported date of the onset of symptoms of the condition being reported to the public health system.	P		OnsetDate

DATA ELEMENT PRIORITY AND CURRENT USAGE

Date of Illness Onset is considered a key data element for infectious disease surveillance and reporting by many jurisdictions and may be collected as part of follow-up for many diseases. It is currently common practice to populate this data element with alternate values if symptom onset date is not available for case reporting. Some jurisdictions treat this data element as an 'Event Date,' using a hierarchical algorithm to populate the date with alternate dates – including diagnosis date, reporting dates, or laboratory dates – if symptom onset date is not available. In the Generic v2.0 MMG, the Date

of Illness Onset has a CDC Priority of *Preferred*, and therefore is not *Required* in the message. The HL7 Implementation Notes indicate, "For unknown date, OBX-5 MAY be populated with '99999999'".

RECOMMENDED DEFINITION AND IMPLEMENTATION

Recommended Definition: Rename to Symptom Onset Date

***Symptom Onset Date**: The data element should be interpreted as the **earliest date** of the **onset of signs or symptoms** relevant to the reported condition.*

Some diseases present with prodromal symptoms before onset of actual illness. It is the DSWG recommendation that changing this data element to **Symptom Onset Date** will more accurately capture the start of the illness period.

Recommended Implementation

Jurisdictions should populate the data element when information is available to meet the above description of the Symptom Onset Date; otherwise, the data element should remain NULL and the HL7 segment should not be sent. If jurisdictions are able to distinguish between unknown and missing values, jurisdictions can choose to send the numeric value "99999999" (described in the Generic v2.0 MMG) rather than omitting the OBX segment. Substitution of another date, or calculation from other dates, is not recommended.

Examples of specific scenarios resulting in a NULL Symptom Onset Date and exclusion from HL7 messages are described below:

1. Asymptomatic Patients
    a. If a patient is asymptomatic, the data element should remain NULL and the HL7 segment should not be sent.
2. Symptom Onset Date is Not Collected
    a. The data element may not be collected systematically for a particular condition, even after the adoption of the Generic v2.0 and disease-specific MMGs. As noted above, the data element is not *Required* for the case notification message. For these cases, the data element should remain NULL and the HL7 segment should not be sent.
    b. For some jurisdictions, individual cases for a condition may not be investigated and therefore the signs/symptoms may not be collected. For these cases, the data element should remain NULL and the HL7 segment should not be sent.

c. Upon investigation, some cases may have no sign/symptom onset information available. For these cases, the data element should remain NULL and the HL7 segment should not be sent.
d. Upon investigation, some cases may have signs or symptoms available, but no onset date. For these cases, the presence of signs and symptoms should be recorded in the investigation, but if the date of the earliest relevant sign or symptom cannot be obtained, the data element should remain NULL and the HL7 segment should not be sent.
    i. Jurisdictions may choose to specify the individual signs and symptoms; utilize an indicator that the patient was symptomatic; or have an indicator to note the Symptom Onset Date is unknown.
e. Some cases may be lost to follow-up, with no onset information available. For these cases, the data element should remain NULL and the HL7 segment should not be sent.

Please note that substitution of another date, or calculation from other dates, is not recommended. Symptom Onset Date should be a distinct data element in the surveillance system. Some jurisdictions have substituted other dates or generated a calculated date to populate an Event Date due to a surveillance system or program data analysis requirement. If an Event Date is *Required,* Symptom Onset Date should not be used to store the Event Date, even if Symptom Onset Date is used within a hierarchy to populate Event Date.

Recommended Data Sources

During the course of an investigation, investigators may utilize data from a variety of sources, including interviews with the patient or a proxy, interviews with a healthcare provider, and medical record/chart reviews. Unless there is reason to believe the patient/proxy interview information is unreliable, it is the recommendation of the DSWG that the patient/proxy information should be considered the gold standard for the purpose of the investigation.

A recommended hierarchy for the data sources is as follows:

1. Patient/proxy interview
2. Provider interview or medical record/chart review
    a. Documentation of the earliest date of the onset of signs or symptoms for the condition.
    b. Dates in the medical record/chart:
        i. Date of illness or symptom onset as noted in the chart.
        ii. Date of care, i.e., when a patient sought medical care (e.g., date of visit, admission date). If the relevant signs or symptoms for the condition are noted on that date, and no additional information from the patient/proxy or elsewhere in the medical record/chart is available, the date of care may be utilized as the Symptom Onset Date.
        iii. If the medical record/chart references the timing of sign/symptom onset, but does not specify the date, the investigator should identify the correct date for

populating Symptom Onset Date. For example, if the medical record/chart indicates onset three days prior to the visit, which occurred on 01/01/2018, then the onset should be identified as 12/29/2017.

The dates obtained from the provider or medical record/chart, if different from the date provided by the patient/proxy, may have value for the larger public health investigation. For example, these dates may establish the:

- Incubation period and relevant risk factors
- Period of infectiousness that will inform the necessary exclusions or infectious disease precautions
- Timeframe during which post-exposure prophylaxis should be given

As described above, investigators should follow the hierarchy when identifying the most appropriate date for Symptom Onset Date for the case but note these additional dates elsewhere in the record.

Laboratory dates (e.g., specimen collection date, result date) are not included in the hierarchy, and not recommended as a source of information to determine the Symptom Onset Date. In general, laboratory reports do not contain sign or symptom information with onset dates.

Identifying the Sign or Symptom for the Symptom Onset Date

Across conditions, the recommended signs and symptoms to consider for the Symptom Onset Date vary. Investigators should refer to the latest NNDSS case definition for the condition, as published on the CDC website at https://wwwn.cdc.gov/nndss/conditions/, that list the signs or symptoms that may be relevant for each condition. The case definitions are based on CSTE position statements, which are available in the CSTE position statement archive at: http://www.cste.org/default.asp?page=PositionStatements.

The disease-specific MMGs may require collecting onset dates for individual signs or symptoms. For these conditions, the date used for the Symptom Onset Date should be the date of the earliest relevant sign/symptom, which may be one of the signs/symptoms with its own discrete data element or a sign/symptom without a discrete data element.

RECOMMENDED ACTIONS

Data Element	DSWG Recommendations	Recommended Definition
Date of Illness Onset	• Change Data Element Name to **Symptom Onset Date**	The data element Symptom Onset Date should be defined as the earliest date of the onset of signs or symptoms relevant to the reported condition.

CSTE

1. Provide support for the vetting process and distribution of the final products to the CSTE community.
2. Publish the Data Standardization Brief and supporting documents on the CSTE website in a repository.
3. Data Standardization Work Group and Surveillance Practice and Implementation Subcommittee:
    a. Promote the Data Standardization Brief and supporting documents on the Surveillance/Informatics Steering Committee and SPIS Subcommittee conference calls.
    b. Review and update the brief upon changes to the Generic Messaging Mapping Guide.

CDC

1. Incorporate the following changes into any revisions of the Generic v2.0-based Message Mapping Guides, or into Generic v3:
    a. Revise the Date of Illness Onset data element
        i. Change the Data Element Name to **Symptom Onset Date**
        ii. The HL7 Implementation Notes indicate, "For unknown date, OBX-5 **MAY** be populated with '99999999'". Recommend allowing jurisdictions to not include the HL7 segment for the associated data element when the date is not available for notification.
        iii. Include in the Data Element Description a reference to this document for appropriate application.
2. Review how this data element is used and defined across CDC programs and harmonize its use.

STATE, TERRITORIAL AND LOCAL HEALTH DEPARTMENTS

1. Review the brief and conduct a gap analysis for each data element to identify differences in the surveillance system implementation and application of the data elements across disease programs.
2. Implement necessary revisions to the surveillance system(s) to address the following for Symptom Onset Date:

a. Data element should not be *Required*; NULL should be allowed.
b. Data element should not be populated from another field via substitution, calculation, or application of an algorithm.
c. Data element should be a discrete data element separate from the Event Date.
d. If jurisdictions are able to distinguish between unknown and missing values, jurisdictions can choose to send the numeric value “99999999” (described in the Generic v2.0 MMG) rather than omitting the OBX segment.

REPORT DATES

BACKGROUND AND OVERVIEW

CURRENT DATA ELEMENT DESCRIPTION IN MMGS

The four data elements related to reporting dates in the Generic v2.0 MMG:

PHIN Variable	Data Element Name	Data Element Description	CDC Priority	HL7 Implementation Notes
INV111	Date Reported	Date that a health department first suspected the subject might have the condition	P	
INV120	Earliest Date Reported to County	Earliest date reported to county public health system.	O	For unknown date, OBX-5 MAY be populated with '99999999'
INV121	Earliest Date Reported to State	Earliest date reported to state public health system.	P	For unknown date, OBX-5 MAY be populated with '99999999'
INV177	Date First Reported to PHD	Date the report was first sent to the public health department (local, county or state) by reporter (physician, lab, etc.).	P	

Please note, these data elements are not included in the Arboviral v1.3 MMG.

DATA ELEMENT PRIORITY AND CURRENT USAGE

These reporting date-related data elements are core Generic v2.0 non-repeating data elements. While multiple reports from multiple sources may be received for a given case, each of these data elements, if collected, is defined only once for the case and should represent the "first" or "earliest" of the applicable reports for each element. Except for Earliest Date Reported to County, which has a CDC Priority of *Optional*, the other three dates have a CDC Priority of *Preferred*.

Jurisdictions generally collect a date to represent when a case is reported to the public health agency/department/system, but might not collect all four dates shown above.

The date most consistently used across jurisdictions, although with varied names in the surveillance systems and definitions for application, is the **Date First Reported to Public Health Department**.

Some jurisdictions track components of the reporting process by capturing when a report is first made to the local or county level (**Earliest Date Reported to County**) separately from when the state public health agency first receives a report or is notified (**Earliest Date Reported to State**). Depending on multiple factors, including the reporting requirements for each jurisdiction, either date may occur first. Recording this level of specificity (date reported to county/local versus state) may help monitor the timeliness of implementing the public health response, especially in those states with decentralized local health agencies, but may not be relevant or applicable for all jurisdictions.

Most jurisdictions do not collect a separate date to represent when a public health agency "first suspected the subject might have the condition" as defined for **Date Reported**. This data element may be relevant for public health reporting completed via mail, when there is a lag between the suspicion of a case and receipt of the actual report to the public health agency, or when multiple, specific data elements are not available for recording the separate dates. As public health reporting electronically via electronic laboratory reporting (ELR) and electronic initial case reporting (EICR) increases, this data element may no longer be as relevant to tracking the report of a case. Some jurisdictions also use this data element instead of or interchangeably with Date First Reported to Public Health Department.

The DSWG recommendations for each data element will be discussed in turn below.

RECOMMENDED DEFINITIONS AND IMPLEMENTATION

DATE FIRST REPORTED TO PUBLIC HEALTH DEPARTMENT

Recommended Definition: Rename to Date First Received by Public Health Agency

*The data element **Date First Received by Public Health Agency** should be defined as the **earliest date** a report for the case was **received** by a public health agency in the jurisdiction, whether a state/territory or county/local agency.*

Recommended Implementation: Date First Received by Public Health Agency should be used by all jurisdictions.

The recommendation of the DSWG is to rename the Generic v2.0 data element Date First Reported to Public Health Department to **Date First Received by Public Health Agency**.

As currently defined in the Generic v2.0 MMG, jurisdictions may experience ambiguity in applying a date for this data element. The data element could represent a variety of dates including the date a report was printed from a laboratory or electronic health record system, the date a paper form was faxed or mailed, or various other dates in the transmission of an electronic report. The term "received" should be operationalized as the date a report of the case was received by the public health agency rather than when the report was sent, if different. This distinction is the rationale for renaming the data element. Additionally, the receiving public health agency might not know when a report was sent, but should be able to capture when it was received.

A "report" need not be a formal printed or electronic record, but may also include a telephone call or another method by which a health agency may identify or be notified about a case. See Data Sources for additional details.

The DSWG further recommends that all jurisdictions utilize this data element, whether it is the only one of this set of "reporting date" data elements used or in combination with one or more of the others. The CDC Priority for this date is *Preferred*. We recommend that this date be recorded for all cases (i.e., is never NULL in the surveillance system and is always sent in HL7 messages), though with no change to the CDC Priority.

Date First Received by Public Health Agency may be a calculated field taking the earliest of the data elements Date First Received by State Health Agency and Date First Received by Local Health Agency, if used, or it may be used alone. However, if Date First Received by Public Health Agency is a calculated

field, some jurisdictions may find it useful to be able to manually override the calculation in a particular case if a more appropriate "first received" date is identified.

As mentioned above, this data element will generally reflect receipt by the jurisdiction in which the case will be counted for CDC notification. In the event that a case report is triaged through multiple jurisdictions, or is first reported to a jurisdiction that is not the counting jurisdiction, the data element should reflect receipt by an agency within the jurisdiction of residence responsible for submitting the case notification to CDC. For the situation when the case was first received by a public health agency in a different state, the counting jurisdiction's data element need not capture the date of first report within that other state. However, out-of-jurisdiction reporting should be considered in situations such as determining the timeliness of reporting or the implementation of control actions, as cases first received by another jurisdiction may have large delays in the recorded Date First Received by Public Health Agency. To help identify this situation, jurisdictions may find it useful to have a mechanism to identify cases they first received from an out-of-jurisdiction health agency, for example, use of a reporting source field or a flag for interjurisdictional transfers.

Additionally, some jurisdictions may find it useful to have a separate field to record the earliest date that a report was sent by the reporter. As discussed above, the date that a report was sent may be different from the date the report was received; examples include a report submitted by mail or a report sent electronically that fails to be received or successfully processed by the receiving application or platform. This distinction may be important for identifying compliance with reporting regulations or for detecting problems with data transmissions. However, the date a report is *sent* should remain a separate concept from the data element Date First Received by Public Health Agency.

EARLIEST DATE REPORTED TO STATE AND EARLIEST DATE REPORTED TO COUNTY

Recommended Definition: Rename to Date First Received by State Health Agency and Date First Received by Local Health Agency

*The data element **Date First Received by State Health Agency** should be defined as the **earliest date** a report for the case was **received** by the state public health agency.*

*The data element **Date First Received by Local Health Agency** should be defined as the **earliest date** a report for the case was **received** by the local public health agency.*

The recommendation of the DSWG is that these data elements be renamed from "Earliest Date Reported to […]" to **"Date First Received by** […]", to reflect that the date a report was sent may not be the same as the date a report was received by the health agency. Furthermore, "County" should be replaced by "Local Health Agency" in the Generic v2.0 MMG since not all local health agencies are county health agencies. For the purposes of this brief, tribal health departments may be considered local health agencies.

Recommended Implementation

"Received", "report", and "Local Health Agency" should be operationalized as above.

The CDC Priority for Earliest Date Reported to State is *Preferred*. We recommend making Date First Received by State Health Agency *Optional*. The Earliest Date Reported to County is currently *Optional*; we recommend keeping that priority for Date First Received by Local Health Agency.

The Date First Received by State Health Agency may not be relevant for local health systems. The Date First Received by Local Health Agency may not be relevant for jurisdictions/states with a centralized health agency. Differentiating the state versus local report dates may also not be deemed important by all jurisdictions. Furthermore, while these data elements may be valuable at the state or local level, their primary value may be as components to the Date First Received by Public Health Agency or the counting jurisdiction for reporting to CDC rather than as independent values.

If a jurisdiction chooses to include one or both of these data elements in their system, they should be populated if the date is known; otherwise, the data elements should remain NULL and the HL7 segments should not be sent.

DATE REPORTED

Recommended Implementation: remove Date Reported from the Generic V2.0 MMG

*We recommend **removal** from the Generic v2.0 Message Mapping Guides of the data element **Date Reported**.*

Date Reported is defined in the Generic V2.0 MMG as "date that a health department first suspected the subject might have the condition." This data element, in practice, is redundant with the Date First Received by Public Health Department. Continued inclusion within the surveillance system and use of a data element to capture the date that public health first suspected a subject might have the condition should be at the discretion of the public health jurisdiction.

Recommended Data Sources

The data sources for the three date data elements recommended for use may vary across jurisdictions or programs, depending on the methods by which the jurisdiction receives information. Possible sources include:

- Reports from healthcare providers or healthcare institutions
- Reports from laboratories
- Information collected during case investigations (e.g., symptomatic contacts identified during the course of a public health investigation)
- Other health agencies
- Medical records, death certificates, or other sources that provide the first knowledge of the case

Submissions from any of these sources may be electronic (EICR, ELR or direct entry into the surveillance system), or by fax, mail, telephone call, or any other method that the public health agency accepts. Each agency should have a procedure for recording the dates related to initial report receipt from the accepted sources.

Because these data elements represent the "earliest" or the "first" for each concept, multiple report types or data sources may need to be considered concurrently when populating these data elements. For example, Date First Received by Public Health Agency for some cases may need to reflect the date a laboratory report was received, while for others it reflects a provider report, depending on which report came first.

Examples of specific scenarios (where the three "Date First Received by" data elements are included in the surveillance system):

- A laboratory report is received by the state health agency on 1/5/2019. It is shared with the local health agency on 1/6/2019.
    - Date First Received by Public Health Agency: 1/5/2019
    - Date First Received by State Health Agency: 1/5/2019
    - Date First Received by Local Health Agency: 1/6/2019

- A provider reports a suspected case to the local health agency by phone on 1/5/2019. Information about this case is shared with the state health agency on 1/6/2019.
    - Date First Received by Public Health Agency: 1/5/2019
    - Date First Received by State Health Agency: 1/6/2019
    - Date First Received by Local Health Agency: 1/5/2019

RECOMMENDED ACTIONS

Data Element	DSWG Recommendations	Recommended Definition
Date First Reported to Public Health Department	• Change Data Element Name to **Date First Received by Public Health Agency**	The data element Date First Received by Public Health Agency should be defined as the earliest date a report for the case was received by a public health agency in the jurisdiction, whether a state/territory or county/local agency.
Earliest Date Reported to State	• Change Data Element Name to **Date First Received by State Health Agency** • Change CDC Priority to **Optional**	The data element Date First Received by State Health Agency should be defined as the earliest date a report for the case was received by the state public health agency.
Earliest Date Reported to County	• Change the Data Element Name to **Date First Received by Local Health Agency**	The data element Date First Received by Local Health Agency should be defined as the earliest date a report for the case was received by the local public health agency.
Date Reported	• Remove Data Element **Date Reported**	

CSTE

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    a. Promote the Data Standardization Brief and supporting documents on the Surveillance/Informatics Steering Committee and SPIS Subcommittee conference calls.
    b. Review and update the brief upon changes to the Generic Messaging Mapping Guide.

CDC

1. Incorporate the following changes into any revisions of the Generic v2.0-based Message Mapping Guides, or into Generic v3:
    a. Revise the Date First Reported to Public Health Department
        i. Change the Data Element Name to **Date First Received by Public Health Agency**
        ii. Revise the definition, as shown above
    b. Revise the Earliest Date Reported to State
        i. Change the Data Element Name to **Date First Received by State Health Agency**
        ii. Revise the definition, as shown above

iii. Make this data element *Optional*
iv. The HL7 Implementation Notes indicate, "For unknown date, OBX-5 **MAY** be populated with '99999999'". Recommend allowing jurisdictions to not include the HL7 segment for the associated data element when the date is not available for reporting.

c. Revise the Earliest Date Reported to County
   i. Change the Data Element Name to **Date First Received by Local Health Agency** to reflect that not all local health agencies are county health agencies.
   ii. Revise the definition, as shown above
   iii. The HL7 Implementation Notes indicate, "For unknown date, OBX-5 **MAY** be populated with '99999999'". Recommend allowing jurisdictions to not include the HL7 segment for the associated data element when the date is not available for reporting.
d. Remove the Date Reported from message mapping guides, as in practice it is used redundantly with the current Date First Reported to Public Health Department.
e. Include in the Data Element Descriptions a reference to this document for appropriate application.

STATE, TERRITORIAL AND LOCAL HEALTH DEPARTMENTS

1. Review the brief and conduct a gap analysis for each data element to identify differences in the surveillance system implementation and application of the data elements across disease programs.
2. Implement necessary revisions to the surveillance system(s) to ensure that Date First Received by Public Health Agency is populated and is defined as above.

LABORATORY-RELATED DATES

BACKGROUND AND OVERVIEW

CURRENT DATA ELEMENT DESCRIPTION IN MMGS

This section focuses on 10 date data elements representing laboratory-related dates in the Generic v2.0 (GenV2)-based MMGs. The Generic v2.0 MMG itself does not include laboratory information; rather, these fields may be included in several MMGs used in conjunction with GenV2. The laboratory-related dates fall into two areas in the MMGs – the Laboratory Interpretative Repeating Group and the Laboratory Template.

Four of these dates are part of the ***Lab Interpretive Repeating Group***[1] within GenV2-based MMGs, while the additional six laboratory data elements are included in the ***Laboratory Template*** associated with these guides:

Lab Interpretive Repeating Group

- Specimen Collection Date/Time
- Specimen Received Date/Time
- Specimen Analyzed Date/ Time
- Date/Time of Lab Result

Laboratory Template

- Specimen Collection Date/Time (SPM-17)
- Specimen Received Date/Time (SPM-18)
- Specimen Analyzed Date (OBX-19)
- Specimen Collection Date (OBX-14)
- Results Rpt/Status Change Date/Time (OBR-22)
- Observation Date/Time (OBR-7)

GenV2-based MMGs that use the Repeating Group might not include all four of the dates listed above. Additionally, the dates in the Repeating Group and the Laboratory Template overlap as they reference the same date concepts but may vary across condition-specific MMGs. Dates from both sources are discussed together below when they reference the same date concept.

[1] The name of this repeating group varies slightly across MMGs.

Laboratory Interpretative Repeating Group Data Elements:

Data Element Name	Data Element Description
Specimen Collection Date/Time	Date and/or time of collection of laboratory specimen
Specimen Received Date/Time	The date/time the specimen is received
Specimen Analyzed Date/Time	Date/time associated with generation of the result
Date/Time of Lab Result	Date result sent from Reporting Laboratory

Laboratory Template Data Elements:

Data Element Name	Data Element Description
Specimen Collection Date/Time (SPM-17)	The date the specimen was collected
Specimen Received Date/Time (SPM-18)	The date/time the specimen is received
Specimen Analyzed Date (OBX-19)	Date/time associated with generation of the result
Specimen Collection Date (OBX-14)	Date/time of observation in OBX segment for ELR infers the specimen collection date
Results Rpt/Status Chng - Date/Time (OBR-22)	Indicates the date and time that the results were reported or that a status changed
Observation Date/Time (OBR-7)	The clinically relevant date/time of the observation

Please note, only specimen collection date is included in the Arboviral v1.3 MMG:

PHIN Variable	Data Element Name	Data Element Description	CDC Priority	ArboNET Variable ID
33882-2	Specimen Collection Date	Specimen collection date would be used to identify the first or second specimen and would be useful for Serum Paired Antibody result too.	P	SpecimenCollectionDate

DATA ELEMENT PRIORITY AND CURRENT USAGE

The CDC Priority for all four dates included in the Lab Interpretive Repeating Group is *Preferred*. The inclusion of individual laboratory-related dates within the repeating group varies not only by guide but, in the case of the Foodborne and Diarrheal Diseases (FDD) guide, by condition within the MMG.

Laboratory Template data elements are standard for all MMGs using the template; Observation Date/Time (OBR-7) is a *Required* element, Specimen Received Date/Time (SPM-17) is *Preferred*, and the rest are *Optional*.

Jurisdictions vary in their usage of the Lab Interpretive Repeating Group and/or the Laboratory Template. Depending on the guidance for each condition and how each jurisdiction chooses to implement the MMGs, one or both sets of data elements might be sent to CDC.

RECOMMENDED DEFINITIONS AND IMPLEMENTATION

Specimen Collection Dates are defined by the following data elements:

Lab Interpretive Repeating Group

- Specimen Collection Date/Time

Laboratory Template

- Observation Date/Time (OBR-7)
- Specimen Collection Date (OBX-14)
- Specimen Collection Date/Time (SPM-17)

Specimen Collection Date is widely available from both paper and electronic laboratory reports and is captured in most jurisdictions' surveillance systems. Specimen Collection Date is an important data element for public health surveillance and control. It frequently contributes to calculated/hierarchical aggregate reporting dates for case counting and public health reporting (MMWR Week, Event Date). It may also be used to determine timing/appropriateness of testing and whether testing was done pre- or post-treatment, calculate age, or differentiate between multiple specimens collected over the course of a disease event. It can also be useful in deduplication of lab results that are reported by multiple sources.

The Specimen Collection Date represents the date a clinical specimen was collected from the patient for testing for the condition of concern; this date does not typically represent the date a microorganism isolate was identified. The Lab Interpretive data element Specimen Collection Date/Time should be the same as the Specimen Collection Date/Time (SPM-17) and Specimen Collection Date (OBX-14) in the Laboratory Template, and by HL7 2.5.1 standards should also be synonymous with Observation Date/Time (OBR-7).

Specimen Collection Date should be populated directly from the corresponding date on the paper or electronic laboratory report or from a data element in the surveillance system that captures this information. For jurisdictions using the Laboratory Template, Observation Date/Time (OBR-7) is *Required* and must be populated; therefore, jurisdictions using the Laboratory Template must be able to capture the date of specimen collection within their surveillance system. For other data elements, if this information is not available, the associated HL7 segment should not be sent.

Recommended Implementation: Specimen Collection Date

Specimen Collection Date *(i.e.,* ***Specimen Collection Date/Time*** *(repeating group),* ***Specimen Collection Date/Time*** *(SPM-17),* ***Specimen Collection Date*** *(OBX-14) and* ***Observation Date/Time*** *(OBR-7)) should be interpreted as the date a clinical specimen was collected from the patient for the laboratory testing relevant to the disease or condition being reported to a public health agency.*

Specimen Received Dates are defined by the following data elements:

Lab Interpretive Repeating Group

- Specimen Received Date/Time

Laboratory Template

- Specimen Received Date/Time (SPM-18)

Specimen Received Date represents the date that a specimen is received at the laboratory performing the test for the condition of concern. This typically represents when a specimen package is opened by the lab rather than when it is first received at a facility, which may introduce a margin of error for use of this date. This date is directly comparable to Specimen Received Date/Time (SPM-18) in the laboratory template.

Specimen Received Date is not frequently captured in surveillance systems, though it is typically available for electronically reported labs results. It is usually available within a public health laboratory's information management system and some jurisdictions may use data from this source rather than importing it into the surveillance system. Some jurisdictions may use this date to track specimens within the public health laboratory, particularly processing of outbreak specimens for foodborne conditions. Jurisdictions may use the date for quality control metrics within the public health laboratory, including turnaround time. It could also be used with clinical or commercial labs to track timing of specimens that were tested in multiple facilities, although timing of receipt at a clinical/commercial lab was not widely considered relevant to public health surveillance or investigation by members of the DSWG.

When available, this data element should be populated directly from the corresponding date on the paper or electronic laboratory report or from a data element in the surveillance system that captures this information. If this information is not available, the data element should not be populated in the HL7 message.

Recommended Implementation: Specimen Received Date/Time

> ***Specimen Received Date/Time (repeating group)*** *and* ***Specimen Received Date/Time (SPM-18)*** *should be interpreted as the date the specimen was received by the performing laboratory for the condition being reported to a public health agency, be it county/local or state.*

Result Dates are defined by the following data elements:

Lab Interpretive Repeating Group**:**

- Date/Time of Lab Result
- Specimen Analyzed Date/Time

Laboratory Template**:**

- Results Rpt/Status Chng - Date/Time (OBR-22)
- Specimen Analyzed Date (OBX-19)

Existing MMGs include one or both of two laboratory result-related dates in the Lab Interpretive Repeating Group, while both are part of the Laboratory Template:

- **Specimen Analyzed Date/Time** (comparable to Specimen Analyzed Date (OBX-19)) is intended to represent the date testing occurred or was performed (described in MMGs as when the result was generated).
- **Date/Time of Lab Result** (comparable to Results Rpt/Status Chng - Date/Time, OBR-22) represents when a result was reported out by the laboratory. It should be noted that Date Result Reported (OBR-22) may change if updated results are released as newer results become available.

While these fields are distinct in most HL7 ELR messages, *Specimen Analyzed Date* and data elements representing the *date a result was reported (Date/Time of Lab Result, Results Rpt/Status Chng)* may not be stored separately in some surveillance systems. In general, a 'result date' data element may be captured that could represent either or both of the two dates. Paper laboratory reports frequently do not include both the *date a result was reported* and the *specimen analyzed dates* and may not clearly specify *which date* is reflected on the lab result form. For practical purposes, usually the date that a test is completed/result generated is unlikely to vary greatly from the date the result is reported out by the laboratory (especially in the case of electronic test reporting where results can be reported as soon as they are available). Any difference is unlikely to be meaningful in terms of public health surveillance and control. For this reason, it was the workgroup's view that when these dates could not be distinguished, *any 'result date' captured in the jurisdictional surveillance system would be an acceptable date for populating all of these data elements.*

In systems that do not differentiate between the types of 'result date,' the single 'result date' that is captured may be used to populate both Lab Interpretive data elements and both Laboratory Template data elements.

For systems that feed ELR data directly into the NNDSS HL7 messages, or for systems in which the two dates (OBR-22 and OBX-19) are captured as two distinct data elements, the two result dates can be populated accordingly. In systems with two distinct dates, values captured from OBR-22 should be used to populate Date/Time of Lab Result in the Interpretive Lab group and Results Rpt/Status Chng – Date/Time in the Laboratory Template. Values captured from OBX-19 should be used to populate Specimen Analyzed Date/Time in the Lab Interpretive group and Specimen Analyzed Date in the Laboratory template.

If no result date is available, the associated HL7 segment should not be included.

Recommended Implementation: Result Date

Result date *may reflect either the date the* ***specimen was analyzed*** *or the* ***date the latest result was released for reporting****. If the surveillance system captures and stores both Specimen Analyzed Date and the date a result was reported out, both data elements should be maintained and reported accordingly. If the surveillance system does not differentiate between these two concepts, jurisdictions may choose to use the available date to populate Specimen Analyzed Date/Time/Specimen Analyzed Date (OBX-19) and Date/Time of Lab Result/Results Rpt/Status Change, or populate only one set of dates, leaving the others blank.*

Recommended Data Sources

Laboratory-related dates may be obtained from ELR, paper laboratory reports, electronic medical record (EMR) review or via electronic initial case reporting (EICR) or sometimes from provider-submitted reports, other forms of medical records or a provider interview (uncommon). Data from ELR should be the gold standard, as each of these fields is captured distinctly and can be used to populate the HL7 case notification directly. Other sources may be missing some laboratory-related dates or dates may require some clarification as to what information is actually represented by available dates.

Examples of specific scenarios:

- A jurisdictional surveillance system captures specimen collection date and a single result date (which includes a mix of date result generated and date result reported). A lab result is received with a specimen collection date of 03/01/2019, and a result date of 03/02/2019. MMG elements should be captured as follows:

    - Specimen Collected Date/Time, Observation Date/Time (OBR-7), Specimen Collection Date (OBX-14), Specimen Collection Date/Time (SPM-17) : 03/01/2019
    - Specimen Received Date/Time, Specimen Received Date/Time (SPM-18): Do not send
    - Specimen Analyzed Date, Specimen Analyzed Date/Time (OBX-19): 03/02/2019
    - Date/Time of Lab Result, Results Rpt/Status Chng (OBR-22): 03/02/2019

- A jurisdictional surveillance system captures each of the above dates separately from ELR messages. A lab result is received with a specimen collection date of 3/5/2019, a specimen received date of 3/6/2019, and specimen analyzed date of 3/6/2019, and a results reported date of 3/7/2019. MMG elements should be captured as follows:

    - Specimen Collected Date/Time, Observation Date/Time (OBR-7), Specimen Collection Date (OBX-14), Specimen Collection Date/Time (SPM-17) : 03/05/2019
    - Specimen Received Date/Time, Specimen Received Date/Time (SPM-18): 03/06/2019
    - Specimen Analyzed Date, Specimen Analyzed Date/Time (OBX-19): 03/06/2019
    - Date/Time of Lab Result, Results Rpt/Status Chng (OBR-22): 03/07/2019

RECOMMENDED ACTIONS

Data Element	DSWG Recommendations
Specimen Received Date	• Remove Data Element **Specimen Received Date**

CSTE

1. Provide support for the vetting process and distribution of the final products to the CSTE community.
2. Publish the Data Standardization Brief and supporting documents on the CSTE website in a repository.
3. Data Standardization Work Group and Surveillance Practice and Implementation Subcommittee:
    a. Promote the Data Standardization Brief and supporting documents on the Surveillance/Informatics Steering Committee and SPIS Subcommittee conference calls.
    b. Review and update the brief upon changes to the Generic v2.0-based Messaging Mapping Guides.

CDC

1. Incorporate the following changes into any revisions of the Generic v2.0-based Message Mapping Guides, or comparable Generic v3-based guides:
    a. Remove the Specimen Received Date, as it is infrequently captured or used in surveillance systems.
    b. Include in the Data Element Descriptions a reference to this document for appropriate application.

STATE, TERRITORIAL AND LOCAL HEALTH DEPARTMENTS

1. Review the brief and conduct a gap analysis for each data element to identify differences in the surveillance system implementation and application of the data elements across disease programs.
2. Implement necessary revisions to the surveillance system to address the following:
    a. Ensure that surveillance system can capture Specimen Collection Date and at least one type of 'result date.'
    b. Consider collecting result date data elements separately as Specimen Analyzed Date (Date result was generated) and Date of Laboratory Report (Date result reported by laboratory).

(CLINICAL) DIAGNOSIS DATE

BACKGROUND AND OVERVIEW

CURRENT DATA ELEMENT DESCRIPTION IN MMGS

The data element description for the Diagnosis Date in the Generic v2.0 MMG is as follows, "Earliest date of diagnosis (clinical or laboratory) of condition being reported to public health system."

PHIN Variable	Data Element Name	Data Element Description	CDC Priority	HL7 Implementation Notes
INV136	Diagnosis Date	Earliest date of diagnosis (clinical or laboratory) of condition being reported to public health system.	P	For unknown date, OBX-5 **MAY** be populated with '99999999'.

Please note, this data element is not included in the Arboviral v1.3 MMG.

DATA ELEMENT PRIORITY AND CURRENT USAGE

Diagnosis Date can be interpreted to represent the earliest date an illness was identified as a particular notifiable condition. As the date of clinical diagnosis may not always be available to public health, many jurisdictions currently use other dates, typically laboratory-related, as a proxy for diagnosis, or populate diagnosis date using a hierarchy of available clinical and laboratory dates. Date of clinician diagnosis, Specimen Collection Date, and Test Result Date often contribute to the data in this field. While Diagnosis Date is a key data element for some jurisdictions, in other jurisdictions it is used primarily as a component of more complex data elements such as Event Date.

When Diagnosis Date is determined based on a hierarchy of other dates, there is a great deal of variability and complexity in which dates are considered relevant or contributory for the condition in question. For example:

- Clinical signs and symptoms and patient history may be sufficient for a presumptive diagnosis of some conditions, while for many others a laboratory test result may be required to differentiate a particular reportable condition from other conditions with a similar clinical presentation.
- Ordering of a laboratory test may not always indicate clinical suspicion or presumptive diagnosis of a specific reportable condition, since testing is often ordered simultaneously for multiple

conditions, so use of Specimen Collection Date as a proxy for Diagnosis Date may not approximate clinical diagnosis in many instances.

- In addition, while a test result date may indicate identification of a particular organism or other laboratory findings suggestive of a condition, a true diagnosis requires a clinician interpretation of available clinical and laboratory information.

Hierarchical determination of Diagnosis Date can be based on several different algorithms incorporating any of the data elements mentioned above as well as other dates.

The substantial variability in practice across both jurisdictions and program areas currently limits the utility of Diagnosis Date as a standardized data element and makes interpretation of this data element challenging. Standardization efforts are focused on developing common terminology with a consistent meaning across conditions and jurisdictions, with the goal of standardized data elements that are discrete – clean, simple, and well-defined. For this reason the workgroup agreed that the Diagnosis Date should represent clinical diagnosis only, while capturing laboratory dates in separate, discrete data elements.

RECOMMENDED DEFINITION AND IMPLEMENTATION

Recommended Definition: Rename Diagnosis Date to Clinical Diagnosis Date

***Diagnosis Date** should represent **clinical diagnosis** only. Other dates relevant to diagnosis, such as laboratory dates, should be captured in separate, discrete data elements.*

Recommended Implementation: Clinical Diagnosis Date

In order for Clinical Diagnosis Date to represent a discrete, well-defined element, it is recommended that this date be stored as a separate data element from other fields, such as laboratory-related dates, that are sometimes used to populate Diagnosis Date in current practice. Many of these other dates are already typically captured elsewhere in jurisdictional surveillance systems, and jurisdictions may choose to use any combination of date types for internal use as appropriate.

In the Generic v2.0 MMG, Clinical Diagnosis Date has a CDC Priority of *Preferred*, and therefore is not *Required* in the message. Jurisdictions should populate the data element when information is available to meet the above description of the Clinical Diagnosis Date; otherwise, the data element should not be sent. Jurisdictions may choose to discriminate between missing dates and unknown values if this level of specificity is available in the surveillance system. Substitution of another date, or calculation from other dates, is not recommended.

For most condition-specific MMGs, the laboratory-related dates of Specimen Collection Date and Result Date are collected in separate, discrete fields; both are collected in the laboratory template. Collecting clinical and laboratory dates as separate, discrete data elements may provide clarity in terms of which information is available, compared to a single date that could potentially represent a variety of time points. Because laboratory dates are not available for conditions that rely solely on core Generic v2.0 data elements, implementation of this definition of Diagnosis Date may require the addition of one or more laboratory-related data elements to future updates of GenV2 or to GenV3 in order for those dates to be captured within fields collected by CDC.

Recommended Data Sources

During the course of an investigation, investigators may utilize data from a variety of sources, including case reports from healthcare providers (electronic or not), interviews with a healthcare provider, and medical record/chart reviews. Patient self-reported date of diagnosis is not a recommended data source for this element.

Recommended data sources include:

1. Provider report, provider interview, or medical record/chart review
    a. Date of earliest clinical diagnosis; generally speaking, the earliest date at which a clinician identified the specific condition of interest as a suspected or final diagnosis.
    b. If multiple conditions are initially suspected, the date of diagnosis should reflect when the particular condition reported to public health was named as the diagnosis.
2. Electronic case reports
    a. Visit/encounter date associated with an EICR or other electronic case report for a particular condition.

Laboratory dates (e.g., Specimen Collection Date, Result Date) should not be used as a proxy for diagnosis and should instead be captured in separate data elements within the MMGs and the surveillance system.

RECOMMENDED ACTIONS

Data Element	DSWG Recommendations	Recommended Definition
Diagnosis Date	• Change the Data Element Name to **Clinical Diagnosis Date**	The data element Clinical Diagnosis Date should be defined earliest date that the condition being reported to public health system was diagnosed by a clinician.

CSTE

1. Provide support for the vetting process and distribution of the final products to the CSTE community.
2. Publish the Data Standardization Brief and supporting documents on the CSTE website in a repository.
3. Data Standardization Work Group and Surveillance Practice and Implementation Subcommittee:
    a. Promote the Data Standardization Brief and supporting documents on the Surveillance/Informatics Steering Committee and SPIS Subcommittee conference calls.
    b. Review and update the brief upon changes to the Generic Messaging Mapping Guide.

CDC

1. Incorporate the following changes into any revisions of the Generic v2.0-based Message Mapping Guides, or into Generic v3:
    a. Revise the Diagnosis Date data element
        i. Change the Data Element Name to **Clinical Diagnosis Date**
        ii. Revise the Data Element description to “Earliest date that the condition being reported to public health system was diagnosed by a clinician.”
        iii. The HL7 Implementation Notes indicate, “For unknown date, OBX-5 **MAY** be populated with ‘99999999’”. Recommend to allow jurisdictions to choose not to send the data element if clinical diagnosis date is unavailable.
        iv. Include in the Data Element Description a reference to this document for appropriate application.
    b. Consider adding laboratory dates that have commonly been used to populate Diagnosis Date, such as first Specimen Collection Date for the first positive test for the condition being reported or First Positive Result Date, to the Generic v2.0 MMG core set of data elements.

STATE, TERRITORIAL AND LOCAL HEALTH DEPARTMENTS

1. Review the brief and conduct a gap analysis for each data element to identify differences in the surveillance system implementation and application of the data elements across disease programs.
2. Implement necessary revisions to the surveillance system to address the following:
    a. Data element should not be *Required*; NULL values should be allowed.

REFERENCES & RESOURCES

- Centers for Disease Control and Prevention (CDC) NNDSS Modernization Initiative (NMI):
  - https://www.cdc.gov/nmi/
- Message Mapping Guides:
  - https://wwwn.cdc.gov/nndss/case-notification/message-mapping-guides.html
- MMG Related Documentation:
  - https://wwwn.cdc.gov/nndss/case-notification/related-documentation.html
- Lab Repeating Group Template:
  - https://wwwn.cdc.gov/nndss/document/Laboratory%20Template_R1_20180511.xlsx
- CSTE Position Statements:
  - https://www.cste.org/page/PSInfo
- Surveillance Case Definitions for Current and Historical Positions:
  - https://wwwn.cdc.gov/nndss/conditions/

APPENDIX: 2019 CSTE DATA STANDARDIZATION WORK GROUP MEMBERS

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