



HL7 Version 2.5.1 Implementation Guide:
Electronic Laboratory Reporting to Public Health,
Release 1 (US Realm)

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Public Health / Emergency Response Work Group

PHER Work Group Co-chair:	Rita Altamore Washington State Department of Health
PHER Work Group Co-chair:	Alean Kirnak American Immunization Registry Association (AIRA)
PHER Work Group Co-chair:	Joginder Madra Gordon Point Informatics Ltd.
PHER Work Group Co-chair:	Michelle Williamson National Center for Health Statistics/CDC
Principal Author:	Austin Kreisler SAIC - Science Applications International Corp

Questions or comments regarding this document should be directed to Rita Altamore at
<mailto:rita.altamore@doh.wa.gov>.

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1. Introduction

The *HL7 Version 2.5.1 Implementation Guide: Electronic Laboratory Reporting to Public Health (US Realm), Release 1* is the public health version of the *HL7 U.S. Realm - Interoperability Specification: Lab Result Message to EHR*. The use case describes the transmission of laboratory-reportable findings to appropriate local, state, territorial and federal health agencies using the HL7 2.5.1 ORU^R01 message. It includes a reference to batch processing. It does not cover querying patient demographics or querying of laboratory results.

1.1 PURPOSE

This guide contains the necessary specifications for laboratory results reporting to local, state, territorial and federal health agencies. In particular, this guide addresses messaging content and dynamics related to the transmission of Laboratory Reportable Result Messages/ELR. Each state and territory has requirements for laboratories to report certain findings to health officials. In the past, these reports were written by hand on forms provided by health departments and mailed to appropriate offices. With computerization of laboratories, it has become possible for laboratories to send reportable data to health departments electronically. The message described in this guide is not specific to any pathogen or reportable condition and is applicable for most biological and chemistry laboratory-reportable findings. It should be noted that this guide does not cover reporting of results from laboratory to laboratory.

This document is intended to meet the needs and requirements of implementation guidance in Public Health entities, replacing the previous documentation regarding Electronic Laboratory Reporting (ELR). It does not replace the need for documentation of the constraints of specific implementations.

1.2 AUDIENCE

This guide is designed for use by analysts and developers who require guidance on optional and ambiguous elements of the *HL7 Version 2.5.1 ORU Unsolicited Observation Message* relative to the *Public Health Lab Result/ELR Use Case*. Users of this guide must be familiar with the details of HL7 message construction and processing. This guide is not intended to be a tutorial on that subject.

1.3 SCOPE

This specification covers the exchange of laboratory results from the testing source to appropriate local, state, territorial and federal public health agencies. One of the primary features of this implementation guide is its focus on key points of broad interoperability. These key points include the following:

- **Use of strong identifiers for key information objects** – These information objects include patients, orders, providers and organizations. A strong identifier is one that uniquely identifies the object in question in a global fashion. This means the identifier includes enough information to remain unique when taken out of the context within which the identifier was created. This is accomplished through the use of assigning authorities for the identifier. In this guide, an assigning authority is normally handled either as an ISO Object Identifier (OID). The combination of the identifier and the assigning authority should always be unique. This uniqueness ensures that each identifier can be broadly shared among independent healthcare organizations and still point to its originally associated object.
HL7 is developing an implementation guide for the use of OIDs, “HL7 Implementation Guidance for Unique Object Identifiers (OIDs), Release 1¹”. Although this IG is still under development, it does provide guidance on how organizations can manage OIDs.

¹ The current version of the HL7 Implementation Guidance for Unique Object Identifiers (OIDs), Release 1 can be found at: http://www.hl7.org/documentcenter/ballots/2009may/downloads/V3_OIDS_R1_I2_2009MAY.zip.

Chapter 1: Introduction

- **Use of Vocabulary Standards** This guide calls for specific vocabulary standards for the exchange of laboratory information. Use of standard vocabularies is important for a number of reasons. Use of standard vocabularies allows broad distribution of healthcare information without the need for individual institutions to exchange master files for data such as test codes, result codes, etc. Each institution maps its own local vocabularies to the standard code, allowing information to be shared broadly, rather than remaining isolated as a single island of information. Standard vocabularies, particularly coded laboratory results, enable more automated decision support for patient healthcare, as well as more automated public health surveillance of populations.

1.3.1 Other Related Profiles

This specification documents a message profile for Electronic Laboratory Reporting to Public Health (ELR Receiver profile). Several other profiles are referenced and documented including:

- NHSN Receiver – This will be subject of a future HL7 Specification
- Lab to EHR Receiver - HL7 Version 2.5.1 Implementation Guide: Orders and Observations; Interoperable Laboratory Result Reporting to EHR, Release 1

This document should not be considered the source of truth for these other profiles. They are provided here as supplementary documentation.

This specification provides a strategy for harmonizing various lab result specifications, but that strategy has not been universally agreed upon. The ELR Receiver profile has been constructed according to the strategy outline in Appendix C. The Lab Result Sender profile has also been constructed according to the same strategy, but is not considered "Normative". Only the ELR Receiver profile in this document should be considered "Normative". Normative is being used here in the sense that any system claiming conformance to the ELR Receiver profile would have its conformance measured according to the profile in this document (which itself is an informative HL7 Standard).

Two profiles are found only in this document:

- ELR Receiver – a message profile for Electronic Laboratory Reporting to Public Health. This is the primary focus of this document.
- Lab Result Sender – This profile is provided for informational purposes only. A sender of Laboratory result messages conforming to the profile will satisfy the requirements of the ELR and NHSN profiles, and in the future may meet the requirements of the Lab to EHR profile.

Other profiles may be added to the group of harmonized specifications, but it is not the intent of the strategy provided in Appendix C to force any particular specification to harmonize with this group of specifications.

1.3.2 Condition Reporting

Authority to establish a list of reportable conditions and to specify the content of those reports resides with the individual public health jurisdiction. A joint Centers for Disease Control and Prevention (CDC) – Council of State and Territorial Epidemiologists (CSTE) project is underway, which has the goal of creating a national knowledgebase containing this information. For information on current status, email PHIN@cdc.gov.

Until the knowledgebase is completed, reporters can access further information about reportable conditions at the website for their own Public Health jurisdiction, or at the CSTE web site:

<http://www.cste.org/dnn/ProgramsandActivities/PublicHealthInformatics/tabid/346/Default.aspx>

1.4 CONVENTIONS

This guide adheres to the following conventions:

- The guide is constructed assuming the implementer has access to the 2.5.1 version of the HL7 Standard. Although some information from the standard is included in this implementation guide, much information from the standard has not been repeated here.

- The rules outlined in *HL7 2.5.1, Chapter 2, Section 2.12, Conformance Using Message Profiles*, were used to document the use case for, and constraints applied to, the messages described in this guide.
- Data types have been described separately from the fields that use the data types. For details regarding data type field lengths, please refer to *Section 2.1.3, Lengths*, in this document.
- No conformance information is provided for optional message elements. This includes length, usage, cardinality, value sets and descriptive information. Implementers who want to use optional message elements should refer to the HL7 Standard to determine how these optional message elements will be used.

1.4.1 Message Element Attributes

The following table describes the various attributes used by this guide to document data type attribute tables, message structure attribute tables and segment attribute tables. Not all attributes apply to all attribute tables.

TABLE 1–1. MESSAGE ELEMENT ATTRIBUTES	
Attribute	Definition
Seq	Sequence of the elements as numbered in the HL7 message element. The Seq attribute applies to the data type attribute table and the segment attribute table.
Segment	<p>Three-character code for the segment and the abstract syntax (<i>e.g.</i>, the square and curly braces).</p> <p>[XXX] Optional { XXX } Repeating XXX Required [{ XXX }] Optional and Repeating</p> <p>Note that for segment groups there is no segment code present, but the square and curly braces will still be present.</p> <p>The Segment attribute only applies to the Message attribute table.</p>
Length	<p>Maximum length of the element. Lengths are provided only for primitive data types. The length attribute applies to data type attribute tables and segment attribute tables. Lengths should be considered recommendations, not absolutes. The receiver can truncate fields, components and sub-components that are longer than the recommended length. The receiver should continue to process a message even when a field, component, or sub-component length exceeds the maximum recommended length identified in this specification. See section C.3.3 for documentation on how lengths are handled in this guide.</p> <p>The length attribute may contain a character indicating how the data may be truncated by a receiver. The truncation characters are defined as follows:</p> <ul style="list-style-type: none"> • = Truncation not allowed • # Truncation allowed • No character indicates the truncation behavior is not defined.
DT	<p>Data type used by this profile for HL7 element.</p> <p>The data type attribute applies to data type attribute tables and segment attribute tables.</p>
Usage	Usage of the message element for this profile. Indicates whether the message element (segment, segment group, field, component, or subcomponent) is required, optional, or conditional in the corresponding message element. Usage applies to the message attribute

TABLE 1–1. MESSAGE ELEMENT ATTRIBUTES

Attribute	Definition
	<p>table, data type attribute table and the segment attribute table. See section C.3.1 – Usage for documentation on how usage has been implemented in this guide.</p> <p>In this implementation guide, usage has been divided by actor. This guide documents four separate actors:</p> <ul style="list-style-type: none"> • Lab Result Sender • ELR Receiver • NHSN Receiver • Lab to EHR Receiver <p>Only the ELR Receiver actor is considered “Normative” in this guide. The other actors and the related profiles are provided as informational only. These non-normative usage columns have a grey background.</p> <p>See section 3.1 for additional information about the various actors documented in this guide. Legal usage values are:</p> <p>R – Required. HL7 Definition: A conforming sending application shall populate all “R” elements with a non-empty value. Conforming receiving application shall process (save/print/archive/etc.) or ignore the information conveyed by required elements. A conforming receiving application must not raise an error due to the presence of a required element, but may raise an error due to the absence of a required element. Any element designated as required in a standard HL7 message definition shall also be required in all HL7 message profiles of that standard message.</p> <p>RE – Required, but can be empty. HL7 Definition: The element may be missing from the message, but must be sent by the sending application if there is relevant data. A conforming sending application must be capable of providing all “RE” elements. If the conforming sending application knows the required values for the element, then it must send that element. If the conforming sending application does not know the required values, then that element will be omitted. Receiving applications will be expected to process (save/print/archive/etc.) or ignore data contained in the element, but must be able to successfully process the message if the element is omitted (no error message should be generated because the element is missing).</p> <p>O – Optional. HL7 Definition: This code indicates that the Usage for this element has not yet been defined. A usage of ‘Optional’ may not be used in ‘implementation’ profiles (no-optionality profiles). Conformance may not be tested on an Optional field. Narrower profiles may be defined based on this profile, and may assign any usage code to the element</p> <p>C – Conditional. HL7 Definition: This usage has an associated condition predicate (See section 2.B.7.6, “Condition predicate”). If the predicate is satisfied: A conformant sending application must always send the element. A conformant receiving application must process or ignore data in the element. It may raise an error if the element is not present.</p>

TABLE 1–1. MESSAGE ELEMENT ATTRIBUTES

Attribute	Definition
	<p>If the predicate is NOT satisfied: A conformant sending application must NOT send the element. A conformant receiving application must NOT raise an error if the condition predicate is false and the element is not present, though it may raise an error if the element IS present.</p> <p>CE – Conditional, but may be empty. HL7 Definition: This usage has an associated condition predicate (See section 2.B.7.6, "Condition predicate").</p> <p>If the predicate is satisfied: If the conforming sending application knows the required values for the element, then the application must send the element. If the conforming sending application does not know the values required for this element, then the element shall be omitted. The conforming sending application must be capable of knowing the element (when the predicate is true) for all 'CE' elements. If the element is present, the conformant receiving application shall process (display/print/archive/etc.) or ignore the values of that element. If the element is not present, the conformant receiving application shall not raise an error due to the presence or absence of the element.</p> <p>If the predicate is not satisfied: The conformant sending application shall not populate the element. The conformant receiving application may raise an application error if the element is present.</p> <p>X – Not used for this profile. HL7 Definition: For conformant sending applications, the element will not be sent. Conformant receiving applications may ignore the element if it is sent, or may raise an application error.</p> <p>- - The hyphen (-) Indicates the profile using the actor does not provide documentation of the structure containing the particular element or does not provide documentation of the particular element in the structure. For instance in a data type specification for CE, if a profile does not provide documentation of the CE data type, then each component of the data type would have a "-" for the usage for the actor associated with that profile.</p>
Cardinality	<p>Minimum and maximum number of times the element may appear.</p> <p>[0..0] Element never present.</p> <p>[0..1] Element may be omitted and can have, at most, one occurrence.</p> <p>[1..1] Element must have exactly one occurrence.</p> <p>[0..n] Element may be omitted or may repeat up to <i>n</i> times.</p> <p>[1..n] Element must appear at least once, and may repeat up to <i>n</i> times.</p> <p>[0..*] Element may be omitted or repeat an unlimited number of times.</p> <p>[1..*] Element must appear at least once, and may repeat unlimited number of times.</p> <p>[m..n] Element must appear at least <i>m</i>, and at most, <i>n</i> times.</p> <p>Cardinality applies only to message attribute tables and segment attribute tables.</p> <p>See section C.3.2 for additional information on how cardinality is handled in this guide.</p>

TABLE 1–1. MESSAGE ELEMENT ATTRIBUTES

Attribute	Definition
Value Set	<p>The set of coded values to be used with the field. The value set attribute applies only to the data type attribute tables and the segment attribute tables. The value set may equate with an entire code system part of a code system, or codes drawn from multiple code systems.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Note: Where a table constraint is indicated, or where HL7 Version 2.6 standards are pre-adopted, the constrained or specified HL7 table is included below the data type table.</p> </div>
Name	<p>HL7 descriptor of the message element. Name applies to the message attribute table, data type attribute table and the segment attribute table.</p>
Description/Comments	<p>Context and usage for the element. Description/Comments applies to the message attribute table, data type attribute table and the segment attribute table.</p>

Note: In the tables throughout this document, Yellow = This Interoperability Specification does not support the use of this item. This corresponds with the Usage code "X".

1.4.1.0 Usage Conformance Testing Recommendations

The following table provides some recommendations for testing the various usage codes described in the previous table.

TABLE 1–2. USAGE CONFORMANCE TESTING RECOMMENDATIONS

Usage	Recommendation
R – Required	<p>Required elements must be present in a message instance with the following caveats:</p> <p>A required segment, which is contained within a segment group, is required only when the segment group is present in the message. For instance if the segment group is RE, then when the segment group is present, the required segments in that group must be present.</p> <p>A required field in a segment is required only when the segment itself is present in the message. For instance if the segment is CE (conditional or empty) and the conditional predicate is satisfied, then the segment is present in the message and the required fields must be present in the segment.</p> <p>A required component of a data type is required only when the field the data type is associated with is present in the message.</p> <p>Testing of a required element generally involves generating both a fully populated message instance as well as a minimally populated message instance. It may be necessary to generate specific test cases to handle separate segment groups, segments, etc. depending on the usage associated with these higher level elements within a message.</p>
RE – Required, but can be empty	<p>Since conformant senders must be able to show they can send this data, the primary mechanism for testing the RE usage would involve requiring the sender to transmit a “fully” populated message instance from their application. In this case, the expectation is that the message will be generated by the application, not handcrafted. The message would contain all data the sending application can populate in the message. This generally means the sender would be populating in their application all data elements being tested, including those that are optional in the application.</p>
O – Optional	<p>Conformance testing for optional elements would not normally be performed. If a particular</p>

TABLE 1-2. USAGE CONFORMANCE TESTING RECOMMENDATIONS

Usage	Recommendation
	implementation decides to use an optional element, it should create an implementation specific profile which further constrains this profile, making the optional element either required, required but may be empty, condition or conditional but may be empty, and then test the element in question based upon the assigned usage in that profile.
C – Conditional	Testing conditional elements generally means a special test case must be developed based upon the specific conditional rule or conditional predicate documented for the element.
CE – Conditional, but may be empty	Testing conditional but may be empty elements generally means a special test case must be developed based upon the specific conditional rule or conditional predicate documented for the element.
X – Not used for this profile	Testing this usage code usually involves looking at both fully populated and minimally populated messages. Note that the sending application may collect the data element in question, but it should not communicate that data element in message instances.

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2. Messaging Infrastructure

2.1 MESSAGING FRAMEWORK

2.1.1 Delimiters

This profile supports the use of the normal HL7 delimiters. It is recommended, but not required, that implementers be able to send messages using the standard HL7 delimiters. Receivers must be capable of receiving any legal delimiters that are sent in a particular message instance.

This table is pre-adopted from the *HL7 Version 2.6*, which offers information regarding best practices. The intent has not changed from *Version 2.5.1*. Note that this implementation guide includes additional constraints and explanations for the entries.

TABLE 2-1. DELIMITERS			
Delimiter	Required Value	Encoding Character Position	Description
Segment Terminator	<cr>	-	Terminates a segment record. This value cannot be changed by implementers. Additional Constraints and Explanation: The <cr> denotes the ASCII-013 carriage return character. There is a common misunderstanding that a linefeed character, or carriage return followed by a linefeed character, is allowed also. Neither HL7 nor this profile allows either of these two as part of the segment terminator. Only the ASCII-013 carriage return is allowed.
Field Separator	|	-	Separates two adjacent data fields within a segment. It also separates the segment ID from the first data field in each segment. Additional Constraints and Explanation: It is recommended that senders use ASCII-124, the vertical bar (|) character, as the field separator.
Component Separator	^	1	Separates adjacent components of data fields where allowed. Additional Constraints and Explanation: It is recommended that senders use ASCII-094, the caret (^) character, as the component separator.

TABLE 2-1. DELIMITERS

Delimiter	Required Value	Encoding Character Position	Description
Repetition Separator	~	2	Separates multiple occurrences of a field where allowed. Additional Constraints and Explanation: It is recommended that senders use ASCII-126, the tilde character (~), as the repetition separator.
Escape Character	\	3	Use the escape character with any field represented by an ST, TX or FT data type, or for use with the data (fifth) component of the ED data type. If no escape characters are used in a message, this character may be omitted. However, it must be present if subcomponents are used in the message. Best practice is always to include this character. Additional Constraints and Explanation: It is recommended that senders use ASCII-091, the backslash (\) character, as the escape character.
Subcomponent Separator	&	4	Separates adjacent subcomponents of data fields where allowed. If there are no subcomponents, this character may be omitted. Best practice is always to include this character. Additional Constraints and Explanation: It is recommended that senders use ASCII-038, the ampersand (&) character, as the subcomponent separator.

2.1.2 Null Values In Fields Vs. Components

In HL7, a null value for a field is indicated by paired double quotes ("""). The null value applies to the field as a whole, not to the components/subcomponents of the field. A null field value indicates that the receiver of the message should delete the corresponding set of information from the data store. For this implementation guide, null values within components and subcomponents are meaningless. For example, |lastname^firstname^^^^L| would be interpreted exactly as |lastname^firstname^^^^L|. The components and subcomponents of a data type constitute a snapshot of the data. The set of data represented by the data type is handled as a complete set; therefore, using the null value to indicate a missing component or subcomponent is unnecessary.

2.1.3 Lengths

In *HL7 Version 2.5*, HL7 assigned lengths to the components of data types, but did not standardize the lengths of the fields that use those data types. This guide pre-adopts the length rules from *HL7 Version 2.7*: Starting with v2.7, HL7 allows documentation of both a minimum and maximum length for an element.

In *HL7 Version 2.7* length is specified for primitive data types (i.e., those without components). Length is not specified for composite elements. For composite data types, the actual minimum and maximum lengths can be very difficult to determine due to the interdependencies on the component content, and the specification of actual lengths is not useful either. In general, this guide will adopt lengths from *HL7 Version 2.7*.

The concept of truncation is being pre-adopted from HL7 Version 2.7 as well, but only in regards to length documentation. The transmission of the truncation character in message data is not being pre-adopted.

See section C.3.3 for additional documentation about how lengths are documented in this guide.

*Note: In HL7 Version 2.5.1, the length of 65536 has a special meaning: For HL7, "If the maximum length needs to convey the notion of a Very Large Number, the number 65536 should be displayed to alert the user."
In this implementation guide, fields or components with length 65536 should be understood as having no prescribed length. Receivers should be prepared to accept any size chunk of data carried in the field or component.*

2.1.4 Snapshot processing

HL7 distinguishes between two methods of update: the "snapshot" and the "action code/unique identifier" modes. Both modes apply to repeating segments and repeating segment groups. For repeating fields, only snapshot processing applies. For the purpose of this guide, only snapshot processing is supported for segments, segment groups and fields.

2.1.4.0 Repeating Segments

HL7 defines snapshot processing for segments as follows:

In the "snapshot" mode, the information contained in the set of repeating segments or segment groups from the incoming message replaces the corresponding information in the receiving application. This is equivalent to a deletion of the prior information followed by the addition of the newly supplied information. In this mode, everything (all repeating segments and segment groups) must be sent with every subsequent message in the series of messages. There is no other way to indicate which ones changed and which ones did not.

To specify "delete all of the segments in this repeating group" in the snapshot mode, send a single segment with "delete data" (indicated by a value of "") in all fields. This actively signals the receiver that there is information that needs to be deleted. If no segment were sent, this would equate to "no information." No information should not signal the receiver to take an action. There would be risk that the receiver might misinterpret the sender's intent.²

2.1.4.1 Repeating Fields

Snapshot processing for repeating fields requires sending a full list of repetitions for each transaction. If the intent is to delete an element, the element is left off the list. This is analogous to the snapshot mode for repeating segments and segment groups. To delete the whole list, transmit the field once with a "|" (null) in the first component.

Repetitions of fields shall not have empty repetitions followed by repetitions containing data, except where the HL7 standard clearly reserves certain repetitions for specific purposes. For instance, PID-5 Patient Name is a repeating field, the first repetition of which is reserved by HL7 for the legal name. In the case where a name is known for the patient, but is not the legal name, format the name field as follows: |~lastname^firstname^mi^^^A|.

2.1.4.2 Message Snapshots

Snapshot processing for messages simply means that the content of the current message is used to replace the contents from a prior message for the same information object. The primary problem associated with message snapshots is making sure the appropriate information object is updated. In this case, the information object is a laboratory result associated with a specific patient. To do the snapshot update properly, key identifiers must be shared across the messages, and must together uniquely identify the specific laboratory result that is to be updated. In HL7 version 2.7, the key identifiers to tie results together have been identified as the Placer Order Number (ORC-2/OBR-2) and Filler Order number (ORC-3/OBR-3). Unfortunately, some laboratories don't consider the placer or

² Taken from HL7 2.6, Chapter 2, section 2.10.4.1.

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filler number as a unique identifier of the order (and hence the result). Instead, these laboratories use the placer and filler order numbers to identify a group of orders. Typically, in this case, the implementer will need to also look at OBR-4, the universal Service ID in conjunction with the placer or filler order number. Other identifiers in the message that can be used to verify the correct results are being updated include the patient identifiers³ found in PID-3. If these identifiers don't match across messages, even when the placer and filler order numbers match, then it's very likely the two messages are for different patients.

Another factor complicating the association of results across messages is the fact that many laboratories do not generate unique filler order numbers. In many cases, these laboratories are actually using an "accession number" as the filler order number. Often these accession numbers are reused by the laboratory system. That means that a particular accession number may be used repeatedly for different orders over time. If this occurs, validating the patient identifiers in PID-3 becomes critical. This guide will call for the use of placer and filler order numbers that are not reused in this fashion.

Another issue with matching results from multiple messages is because not all laboratories properly identify the assigning authority associated with an identifier (such as a placer or filler order number). In HL7 terminology, an assigning authority is a component of an identifier that together with the actual ID makes the overall identifier unique. For instance, if Laboratory A creates a filler order number 123, Laboratory B also creates filler order number 123, and both these laboratories send results associated with these orders to a public health department, the public health department needs to know which laboratory each filler order number is associated with. The assigning authority is used to distinguish between these two laboratories. Not all laboratories provide that assigning authorities, so the receiver of the message have to figure out a mechanism for associating the order number with the appropriate laboratory. This guide will require use of some sort of assigning authority to prevent this problem, but it's worth noting that non-conformant Laboratories can cause tremendous problems by ignoring this requirement. This actually becomes a patient safety issue because results can end up being associated with incorrect patients because of this sort of problem.

Finally, for those public health departments that wish to create longitudinal records of laboratory results for patients, the use of patient identifiers to associate results becomes important. Many of the same sorts of issues identified above for placer and filler order numbers exist for patient identifiers. Often, no assigning authority information is provided for these patient identifiers. In this case, personally identifiable information such as name, date of birth, gender, address, etc. become important in trying to match results to the appropriate patient. Certainly, not all public health departments will be trying to do this sort of matching, many are not even allowed to by state law, while others may actually be required to by state law.

2.1.4.3 Creation of Message Snapshots

The snapshot of data used to construct the message is captured at the time the relevant event (see section 3.4 below) occurs. The event triggering creation of the message is distinct from the time of transmission that may occur at some later time, particularly when batch transmission is being used.

2.2 USE OF ESCAPE SEQUENCES IN TEXT FIELDS

Senders and receivers using this profile shall handle escape sequence processing as described in *HL7 Version 2.5.1, Chapter 2, Section 2.7.4 (Special Characters)*. This requirement applies to the ST, TX and FT data types. Implementers shall not support escape sequences described in *Sections 2.7.2 (Escape sequences supporting multiple character sets), 2.7.3 (Highlighting), 2.7.5 (Hexadecimal), 2.7.6 (Formatted Text) and 2.7.7 (Local)*. This restriction applies to the TX and FT data types.

³ To manage patient identifiers, HITSP has adopted the IHE Patient ID Cross-Referencing (PIX) transaction is described in IHE-ITI TF-2 §3.9.1 and IHE Patient Identity Feed transaction is described in IHE-ITI TF-2 §3.8.1. These two IHE transactions can be found in the IHE Technical Framework (Vol. 2: Transaction) at http://static.ihe.net/Technical_Framework/index.cfm#IT.

2.3 DATA TYPES

documents what data types are used within which profiles.

Data type	Data Type Name	Lab Result Sender	ELR Receiver	NHSN Receiver	Lab to EHR Receiver
CE	Coded element	U	X	X	U
CNN	Composite ID Number and Name Simplified	U	U	X	U
CQ	Composite Quantity with Units	U	U	U	U
CWE	Coded with Exceptions	U	U	U	U
CX	Extended Composite ID with Check Digit	U	U	U	U
DR	Date/Time Range	U	U	U	U
DT	Date	U	U	X	U
DTM	Date/Time	U	U	U	U
ED	Encapsulated Data	U	U	X	U
EI	Entity Identifier	U	U	U	U
EIP	Entity Identifier Pair	U	U	U	U
ERL	Error Location	U	U	X	X
FC	Financial Class	U	U	X	U
FN	Family Name	U	U	U	U
FT	Formatted Text Data	U	U	U	U
HD	Hierarchic Designator	U	U	U	U
ID	Coded Values for HL7 Tables	U	U	U	U
IS	Coded value for User-Defined Tables	U	U	U	U

TABLE 2-2. DATA TYPES					
Data type	Data Type Name	Lab Result Sender	ELR Receiver	NHSN Receiver	Lab to EHR Receiver
MSG	Message Type	U	U	U	U
NDL	Name with Date and Location	U	U	X	X
NM	Numeric	U	U	X	U
PL	Person Location	U	U	U	U
PRL	Parent Result Link	U	U	U	U
PT	Processing Type	U	U	U	U
RP	Reference Pointer	U	U	X	U
SAD	Street Address	U	U	U	U
SI	Sequence ID	U	U	U	U
SN	Structured Numeric	U	U	U	U
ST	String	U	U	U	U
TM	Time	U	U	X	U
TS	Time Stamp	U	U	U	U
TX	Text Data	U	U	U	U
VID	Version Identifier	U	U	U	U
XAD	Extended Address	U	U	U	U
XCN	Extended Composite ID Number and Name	U	U	U	U
XON	Extended Composite Name and ID Number for Organizations	U	U	U	U
XPN	Extended Person Name	U	U	U	U
XTN	Extended telecommunications number	U	U	X	U

Legend for Table 2-2. Data Types:

- U - Used in profile
- X - Not used in profile

2.3.1 CE – Coded Element

TABLE 2-3. CODED ELEMENT (CE)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	ST	RE	-	-	RE		Identifier	
2	1..199 #	ST	RE	-	-	RE		Text	It is strongly recommended that text be sent to accompany any identifier. When a coded value is not known, text can still be sent, in which case no coding system should be identified.
3	1..12	ID	CE	-	-	CE	HL70396	Name of Coding System	Lab to EHR Condition predicate: Required if an identifier is provided in component 1.
4	1..20=	ST	RE	-	-	RE		Alternate Identifier	The alternate identifier (from the alternate coding system) should be the closest match for the identifier found in component 1.
5	1..199 #	ST	RE	-	-	RE		Alternate Text	It is strongly recommended that alternate text be sent to accompany any alternate identifier.
6	1..12	ID	CE	-	-	CE	HL70396	Name of Alternate Coding System	Lab to EHR Condition predicate: Required if an alternate identifier is provided in component 4.

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Example: |625-4^Bacteria identified:Prid:Pt:Stool:Nom:Culture^LN^BAC^Bacteria Culture^99Lab|

2.3.2 CNN – Composite ID Number and Name Simplified

TABLE 2-4. COMPOSITE ID NUMBER AND NAME SIMPLIFIED (CNN)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..15=	ST	RE	RE	RE	O		ID Number	The ID Number component combined with the Assigning Authority – Universal ID component (component 10) must uniquely identify the associated person. Note - despite the component being named "ID Number" this component is an ST string data type, not numeric, so the component is not limited to just numbers.
2	1..50#	ST	RE	RE	RE	O		Family Name	
3	1..30#	ST	RE	RE	RE	O		Given Name	I.e., first name.
4	1..30#	ST	RE	RE	RE	O		Second and Further Given Names or Initials Thereof	
5	1..20#	ST	RE	RE	RE	O		Suffix (e.g., JR or III)	
6	1..20#	ST	RE	RE	RE	O		Prefix (e.g., DR)	
7	1..5=	IS	RE	RE	RE	O	HL70360	Degree (e.g., MD)	
8	1..4=	IS	X	X	X	X	HL70297	Source Table	Not supported.

TABLE 2-4. COMPOSITE ID NUMBER AND NAME SIMPLIFIED (CNN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
9	1..20=	IS	RE	RE	RE	O	Local	Assigning Authority – Namespace ID	The coding system for this component is locally managed.
10	1..199 =	ST	CE	CE	RE	O		Assigning Authority - Universal ID	Must be an OID. ELR Condition predicate: Required if component 1 (ID Number) is populated.
11	1..6	ID	CE	CE	RE	O	HL70301	Assigning Authority - Universal ID Type	ELR Condition predicate: This component is required if a value is present in component 10 (Assigning Authority – Universal ID.) Constrained to the value 'ISO'.

Example: |1234^Admit^Alan^A^III^Dr^MD^^DOC^2.16.840.1.113883.19.4.6^ISO|

2.3.3 CQ – Composite Quantity with Units

TABLE 2-5. COMPOSITE QUANTITY WITH UNITS (CQ)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		NM	R	R	RE	R		Quantity	

TABLE 2-5. COMPOSITE QUANTITY WITH UNITS (CQ)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
2		CWE	RE	RE	RE	RE	Unified Code for Units of Measure (UCUM)	Units	Units of measure must be drawn from the UCUM coding system.

Example: |150^m&meter&UCUM|

2.3.4 CWE – Coded with Exceptions – All Fields Except OBX-5

TABLE 2-6. CODED WITH EXCEPTIONS – ALL FIELDS EXCEPT OBX-5 (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	ST	RE	RE	RE	RE		Identifier	
2	1..199#	ST	CE	CE	RE	RE		Text	It is strongly recommended that text be sent to accompany any identifier. When a coded value is not known, the original text attribute is used to carry the text, not the text component. ELR Condition predicate: If the Identifier component is empty, then this component must be empty.

TABLE 2-6. CODED WITH EXCEPTIONS – ALL FIELDS EXCEPT OBX-5 (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
3	1..12	ID	CE	CE	C	CE	HL70396	Name of Coding System	Harmonized condition predicate: Required if an identifier is provided in component 1. See section 6 for description of the use of coding systems in this implementation guide.
4	1..20=	ST	RE	RE	RE	RE		Alternate Identifier	The alternate identifier (from the alternate coding system) should be the closest match for the identifier found in component 1.
5	1..199#	ST	CE	CE	RE	RE		Alternate Text	It is strongly recommended that alternate text be sent to accompany any alternate identifier. ELR Condition predicate: If the alternate Identifier component is empty, then this component must be empty.
6	1..12	ID	CE	CE	C	CE	HL70396	Name of Alternate Coding System	Harmonized condition predicate: Required if an alternate identifier is provided in component 4. See section 6 for description of the use of coding systems in this implementation guide.

TABLE 2-6. CODED WITH EXCEPTIONS – ALL FIELDS EXCEPT OBX-5 (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
7	1..10=	ST	CE	RE	C	RE		Coding System Version ID	NHSN Condition predicate: Required if a coding system is identified in component 3. The format for the version ID is determined by the coding system being used. The length has been increased to handle longer versioning strings.
8	1..10=	ST	CE	RE	C	RE		Alternate Coding System Version ID	NHSN Condition predicate: Required if an alternate coding system is identified in component 6. However, the particular coding system indicates versioning should be handled will be appropriate here. The length has been increased to handle longer versioning strings.
9	1..199#	ST	CE	CE	RE	RE		Original Text	Either original Text is used to convey the text that was the basis for coding, or when there is no code to be sent, only free text. ELR Condition predicate: If no identifier and alternate identifier are present, then this component is required.
10	1..20=	ST	RE	O	RE	-		Second Alternate Identifier	Additional local code.

TABLE 2-6. CODED WITH EXCEPTIONS – ALL FIELDS EXCEPT OBX-5 (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
11	1..199 #	ST	RE	O	RE	-		Second Alternate Text	Additional local text.
12	1..12	ID	CE	O	C	-	HL70396	Second Name of Alternate Coding System	NHSN Condition predicate: Required if a second alternate identifier is provided in component 10. NHSN Note-Coding system identifier for transmitter code instance. May be the value 'Transmitter' or may be a standard coding system identifier.
13	1..10=	ST	RE	O	RE	-		Second Alternate Coding System Version ID	Version for the coding system identified in components 12.
14	1..199 =	ST	RE	O	RE	-		Coding System OID	OID for the coding system named in CWE.3.
15	1..199 =	ST	X	X	X	-		Value Set OID	Not supported.
16	1..8=	DTM	X	X	X	-		Value Set Version ID	Not supported.
17	1..199 =	ST	X	X	X	-		Alternate Coding System OID	Not supported.
18	1..199 =	ST	X	X	X	-		Alternate Value Set OID	Not supported.
19	1..8=	DTM	X	X	X	-		Alternate Value Set Version ID	Not supported.

TABLE 2–6. CODED WITH EXCEPTIONS – ALL FIELDS EXCEPT OBX–5 (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
20	1..199 =	ST	X	X	X	-		Second Alternate Coding System OID	Not supported.
21	1..199 =	ST	X	X	X	-		Second Alternate Value Set OID	Not supported.
22	1..8=	DTM	X	X	X	-		Second Alternate Value Set Version ID	Not supported.

Usage: The CWE data type is used where it is necessary to communicate a code, text, coding system and the version of coding system the code was drawn from. It also allows the communication of an alternate code drawn from another coding system. Many coded fields in this specification identify coding systems or value sets that must be used for the field. **When populating the CWE data types with these values, this guide does not give preference to the triplet in which the standard code should appear.** The receiver is expected to examine the coding system names in components 3 and 6 to determine if it recognizes the coding system.

The CWE data type allows communication of an early form of what has come to be called "null flavors." HL7 2.5.1 refers to these as CWE Statuses, where the values are drawn from HL7 Table 0353. The CWE Statuses are not supported in this guide.

Note: This guide pre-adopts the structure of the CWE data type from *HL7 Version 2.7*. In general, public health surveillance data transmissions are from healthcare facilities, including laboratories, to local or State health departments, and then to CDC. NHSN is an exception in that healthcare facilities use a single application to report data directly to CDC. This enables the States to have access to those data, more specifically a selected subset of data entered into NHSN, as soon as they are stored in the NHSN database. In the future, data may be reported to NHSN by data transmissions that follow the more general model of healthcare to health department to CDC. In addition, surveillance data submitted to NHSN and other public health systems may be transmitted from a hospital system, Health Information Exchange (HIE), or some other information broker rather than a single facility. These hospital information system, HIE, or broker intermediaries may be responsible for mapping local hospital codes to CDC codes and may also have their own local coding system in which at least some codes lack a unique one-to-one relationship to CDC standard codes. As a result, three different codes may represent the same concept: the facility local code, the transmitter local code, and the CDC standard code. All analysis at CDC will be performed on the CDC standard code. However, coding validation will require use of the two local codes. The transmitter code is needed to identify mapping irregularities between facility local codes and CDC standard codes that are attributable to the process of an intermediary standardizing facility local code for their own use. The triplet code can help CDC meet this need or requirement for data validation. For this reason, a constrained version of the CWE data type from *HL7 Version 2.7* has been pre-adopted for all CE and CWE data types in this guide.

Example: |625-4^Bacteria identified:Prid:Pt:Stool:Nom:Culture^LN^BAC^Bacteria
Culture^99Lab^2.26^May 2006|

2.3.5 CWE – Coded with Exceptions – For OBX-5 Only

TABLE 2-7 CODED WITH EXCEPTIONS – FOR OBX-5 ONLY (CWE)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	ST	R	R	RE	RE		Identifier	ELR Note: The identifier component is always required.
2	1..199 #	ST	RE	RE	RE	RE		Text	It is strongly recommended that text be sent to accompany any identifier. When a coded value is not known, the original text attribute is used to carry the text, not the text component.
3	1..12	ID	R	R	C	CE	HL70396	Name of Coding System	See section 6 for description of the use of coding systems in this implementation guide. NHSN & Lab to EHR Condition predicate: Required if an identifier is provided in component 1.
4	1..20=	ST	RE	RE	RE	RE		Alternate Identifier	The alternate identifier (from the alternate coding system) should be the closest match for the identifier found in component 1.

TABLE 2-7 CODED WITH EXCEPTIONS - FOR OBX-5 ONLY (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
5	1..199 #	ST	RE	RE	RE	RE		Alternate Text	It is strongly recommended that alternate text be sent to accompany any alternate identifier.
6	1..12	ID	CE	CE	C	CE	HL70396	Name of Alternate Coding System	Harmonized condition predicate: Required if an alternate identifier is provided in component 4. See section 6 for description of the use of coding systems in this implementation guide.
7	1..10=	ST	CE	RE	C	RE		Coding System Version ID	NHSN Condition predicate: Required if a coding system is identified in component 3. However, the particular coding system indicates versioning should be handled will be appropriate here. The length has been increased to handle longer versioning strings.
8	1..10=	ST	RE	RE	RE	RE		Alternate Coding System Version ID	However, the particular coding system indicates versioning should be handled will be appropriate here. The length has been increased to handle longer versioning strings.
9	1..199 #	ST	RE	RE	RE	RE		Original Text	Original Text is used to convey the text that was the basis for coding.
10	1..20=	ST	RE	O	RE	-		Second Alternate Identifier	Additional local code.

TABLE 2-7 CODED WITH EXCEPTIONS - FOR OBX-5 ONLY (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
11	1..199 #	ST	RE	O	RE	-		Second Alternate Text	Additional local text.
12	1..12	ID	CE	O	C	-	HL70396	Second Name of Alternate Coding System	NHSN Condition predicate: Required if a second alternate identifier is provided in component 10. NHSN Note-Coding system identifier for transmitter code instance. May be the value 'Transmitter' or may be a standard coding system identifier.
13	1..10=	ST	RE	O	RE	-		Second Alternate Coding System Version ID	Version for the coding system identified in components 12.
14	1..199 =	ST	RE	O	RE	-		Coding System OID	OID for the coding system named in CWE.3.
15	1..199 =	ST	X	X	X	-		Value Set OID	Not supported.
16	1..8=	DTM	X	X	X	-		Value Set Version ID	Not supported.
17	1..199 =	ST	X	X	X	-		Alternate Coding System OID	Not supported.
18	1..199 =	ST	X	X	X	-		Alternate Value Set OID	Not supported.
19	1..8=	DTM	X	X	X	-		Alternate Value Set Version ID	Not supported.

TABLE 2-7 CODED WITH EXCEPTIONS – FOR OBX-5 ONLY (CWE)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
20	1..199 =	ST	X	X	X	-		Second Alternate Coding System OID	Not supported.
21	1..199 =	ST	X	X	X	-		Second Alternate Value Set OID	Not supported.
22	1..8=	DTM	X	X	X	-		Second Alternate Value Set Version ID	Not supported.

Usage: This version of the CWE is used only with OBX-5. The CWE data type is used where it is necessary to communicate a code, text, coding system and the version of coding system the code was drawn from. It also allows the communication of an alternate code drawn from another coding system. Many coded fields in this specification identify coding systems or value sets that must be used for the field. **When populating the CWE data types with these values, this guide does not give preference to the triplet in which the standard code should appear.** The receiver is expected to examine the coding system names in components 3 and 6 to determine if it recognizes the coding system.

The CWE data type allows communication of an early form of what has come to be called "null flavors." HL7 2.5.1 refers to these as CWE Statuses, where the values are drawn from HL7 Table 0353. The CWE Statuses are not supported in this guide.

Note: This guide pre-adopts the structure of the CWE data type from *HL7 Version 2.7*. In general, public health surveillance data transmissions are from healthcare facilities, including laboratories, to local or State health departments, and then to CDC. NHSN is an exception in that healthcare facilities use a single application to report data directly to CDC. This enables the States to have access to those data, more specifically a selected subset of data entered into NHSN, as soon as they are stored in the NHSN database. In the future, data may be reported to NHSN by data transmissions that follow the more general model of healthcare to health department to CDC. In addition, surveillance data submitted to NHSN and other public health systems may be transmitted from a hospital system, Health Information Exchange (HIE), or some other information broker rather than a single facility. These hospital information system, HIE, or broker intermediaries may be responsible for mapping local hospital codes to CDC codes and may also have their own local coding system in which at least some codes lack a unique one-to-one relationship to CDC standard codes. As a result, three different codes may represent the same concept: the facility local code, the transmitter local code, and the CDC standard code. All analysis at CDC will be performed on the CDC standard code. However, coding validation will require use of the two local codes. The transmitter code is needed to identify mapping irregularities between facility local codes and CDC standard codes that are attributable to the process of an intermediary standardizing facility local code for their own use. The triplet code can help CDC meet this need or requirement for data validation. For this reason, a constrained version of the CWE data type from *HL7 Version 2.7* has been pre-adopted for all CE and CWE data types in this guide.

Example: |302620005^Salmonella group B phase 1 a-e^SCT^Sal^ Salmonella group
B^99LabMicro^20080731|

2.3.6 CX – Extended Composite ID with Check Digit

TABLE 2–8. EXTENDED COMPOSITE ID WITH CHECK DIGIT (CX)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..15=	ST	R	R	R	R		ID Number	The ID Number component combined with the Assigning Authority component must uniquely identify the associated object, i.e., any object with which the field is associated. Note - despite the component being named "ID Number" this component is an ST string data type, not numeric, so the component is not limited to just numbers.
2	1..4=	ST	O	O	O	O		Check Digit	
3	3..3	ID	O	O	O	O	HL7 0061	Check Digit Scheme	
4		HD	R	R	R	R		Assigning Authority	The Assigning Authority component is used to identify the system, application, organization, etc. that assigned the ID Number in component 1.
5	2..5	ID	R	R	R	R	HL70203	Identifier Type Code	

TABLE 2–8. EXTENDED COMPOSITE ID WITH CHECK DIGIT (CX)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
6		HD	RE	RE	0	0		Assigning Facility	The Assigning Facility identifies the place or location that the ID Number was assigned for use.
7		DT	0	0	0	0		Effective Date	
8		DT	0	0	0	0		Expiration Date	
9		CWE	0	0	0	0	Local	Assigning Jurisdiction	
10	3..3	CWE	0	0	0	0	Local	Assigning Agency or Department	

Usage: The CX data type is used to carry identifiers. This guide requires that all identifiers be accompanied by assigning authorities, and that all identifiers carry an identifier type. This method allows the exchange of unique identifiers for the associated object across organizational and enterprise boundaries, enabling broad interoperability.

Although the Identifier Type Code component is required, it is not a part of the actual identifier. Rather, it is metadata about the identifier. The ID Number and Assigning Authority component, together, constitute the actual identifier. The reason for this requirement is to promote forward compatibility with *HL7 Version 3* identifiers, where there is no concept of identifier type codes. Although this guide does not deal directly with *Version 3* constructs, it is intended to work within the context of the HITSP Interoperability constructs, which work with both *Version 2.x* messaging and *Version 3* constructs.

Example: | 36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.840.1.113883.19.3.2.1&ISO |

2.3.7 DR – Date/Time Range

TABLE 2-9. DATE/TIME RANGE (DR)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		TS	R	RE	R	RE		Range Start Date/Time	
2		TS	RE	RE	O	RE		Range End Date/Time	

Example: |200806021328.0001-0005^200906021328.0001-0005|

2.3.8 DT – Date

TABLE 2-10. DATE (DT)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	4..8	-	R	R	R	R		Date	Format: YYYY[MM[DD]]

Example: |20080602|

2.3.9 DTM – Date/Time

TABLE 2-11. DATE/TIME (DTM)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	4..24	-	R	R	R	R		Date/Time	Format: YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]][+/-ZZZZ]

Usage: It is strongly recommended that the time zone offset always be included in the DTM particularly if the granularity includes hours, minutes, seconds, etc. Specific fields in this implementation guide may require Date/Time to a specific level of granularity, which may require the time zone offset.

Example: |200806021328.0001-0005|

2.3.10 ED – Encapsulated Data

TABLE 2-12. ENCAPSULATED DATA (ED)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		HD	RE	RE	-	RE		Source Application	Identifier of the application that is the source of the encapsulated data.

TABLE 2-12. ENCAPSULATED DATA (ED)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
2	4..11	ID	R	R	-	R	ELR - HL70834 (from HL7 2.7) Lab to EHR - HL70191	Type of Data	Identifier of the type of data found in component 5. See section 6.1.1.5 for details of HL70834.
3	1..32=	ID	RE	RE	-	RE	HL70291 (from HL7 2.7)	Data Subtype	Identifier of the subtype of data found in component 5. See section 6.1.1.2 for details of HL70291.
4	1..6	ID	R	R	-	R	HL70299	Encoding	Identifier of the type of encoding to be performed in the data component

TABLE 2-12. ENCAPSULATED DATA (ED)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
5		TX	R	R	-	R		Data	<p>The data in this component must be properly escaped after encoding. Receivers will need to un-escape the text prior to decoding.</p> <p>Note that the length 65536 has a special meaning in HL7, indicating the length is a "Very Large Number" Since in this case the Data component of the ED data type carries the actually encapsulated data, this component may be much larger than 65536. For instance, an image carried in this data type might be multi-megabyte in size.</p>

Specific MIME type/MIME subtypes to be supported will be worked out for specific implementations.

```
Example: |&2.16.840.1.113883.19.4.6&ISO^multipart^related^A^MIME-Version: 1.0
Content-Type: multipart/related; boundary="HL7-CDA-boundary";
type="text/xml"; start="10.12.45567.43"
Content-Transfer-Encoding: BASE64
--HL7-CDA-boundary
Content-Type: text/xml; charset="US-ASCII"
```

```
Content-ID: <10.12.45567.43>
... Base 64 of base CDA document, which contains
...
<observationMedia classCode="OBS" moodCode="EVN">
  <id root="10.23.4567.345"/>
  <value mediaType="image/jpeg">
    <reference value="left_hand_image.jpeg"/>
  </value>
</observationMedia>
--HL7-CDA-boundary
Content-ID: <10.23.4567.345>
Content-Location: canned_left_hand_image.jpeg
Content-Type: image/JPEG
... Base64 image ...
--HL7-CDA-boundary-
... |
```

2.3.11 EI – Entity Identifier

TABLE 2-13. ENTITY IDENTIFIER (EI)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..199 =	ST	R	R	R	R		Entity Identifier	
2	1..20=	IS	RE	RE	RE	O	Local	Namespace ID	The coding system for this component is locally managed.
3	1..199 =	ST	R	R	R	R		Universal ID	Must be an OID.
4	1..6	ID	R	R	R	R	HL70301	Universal ID Type	Constrained to the value "ISO".

Usage: The EI data type is used to carry identifiers. This guide requires that all entity identifiers be accompanied by assigning authorities. This allows the exchange of unique identifiers for the associated object across organizational and enterprise boundaries, enabling broad interoperability.

In the EI data type, the Namespace ID, Universal ID and Universal ID type correspond to the HD data type identified elsewhere. These types, together, are commonly considered the assigning authority for the identifier. The Entity Identifier and Assigning Authority components, together, constitute the actual identifier.

Example: |23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|

2.3.12 EIP – Entity Identifier Pair

TABLE 2-14. ENTITY IDENTIFIER PAIR (EIP)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		EI	RE	O	O	RE		Placer Assigned Identifier	
2		EI	R	R	R	CE		Filler Assigned Identifier	Lab to EHR Condition predicate: Component 2 will be required if the field is OBR-29; otherwise, the component is RE. This is necessary to accommodate the use of EIP in SPM-2

Example:

|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO|

2.3.13 ERL – Error Location

TABLE 2-15. ERROR LOCATION (ERL)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	3..3=	ST	R	R	-	-		Segment ID	The 3-character name for the segment (i.e., PID).

TABLE 2-15. ERROR LOCATION (ERL)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
2	1..2=	NM	R	R	-	-		Segment Sequence	
3	1..2=	NM	CE	CE	-	-		Field Position	The field number with the error. Should not be populated for errors involving the entire segment. ELR Condition predicate: This component is required if components 4, 5 and/or 6 are populated.
4	1..2=	NM	CE	CE	-	-		Field Repetition	The first field repetition is counted a 1. ELR Condition predicate: This component is required if the field identified in components 1, 2, and 3 is a repeating field.
5	1..2=	NM	CE	CE	-	-		Component Number	ELR Condition predicate: This component is required if component 6 is populated.
6	1..2=	NM	RE	RE	-	-		Sub-component Number	

Example: |MSH^1^21^1^2|

2.3.14 FC – Financial Class

TABLE 2-16. FINANCIAL CLASS (FC)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		IS	R	R	-	-	Local	Financial Class Code	The financial class code assigned to the patient locally.
2		TS	O	O	-	-		Effective Date	

Example: |x^20090602|

2.3.15 FN – Family Name

TABLE 2-17. FAMILY NAME (FN)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..50#	ST	R	R	R	R		Surname	
2	1..20#	ST	O	O	O	O		Own Surname Prefix	
3	1..50#	ST	O	O	O	O		Own Surname	
4	1..20#	ST	O	O	O	O		Surname Prefix From Partner/Spouse	

TABLE 2-17. FAMILY NAME (FN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
5	1..50#	ST	0	0	0	0		Surname From Partner/Spouse	

Example: |Admit|

2.3.16 FT – Formatted Text Data

TABLE 2-18. FORMATTED TEXT DATA (FT)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
	1..65536	-	R	R	R	R		Formatted Text Data	

Usage: The FT data type allows use of the formatting escape sequences documented in *HL7 Version 2.5.1, Chapter 2, Section 2.7 - Use of Escape Sequences in Text Fields*. In this ELR Profile, the only allowed escape sequences are those allowed in HL7 Version 2.5.1, Chapter 2, Section 2.7.4 - Special Characters. These are the escape sequences for the message delimiters (i.e., |^&~).

Example: |Culture \T\ Sensitivity Report ...|

2.3.17 HD – Hierarchic Designator

TABLE 2-19. HIERARCHIC DESIGNATOR (HD)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	IS	RE	RE	RE	O	Local	Namespace ID	The coding system for this component is locally managed.
2	1..199 =	ST	R	R	R	R		Universal ID	Must be an OID except for ELR Receiver for MSH-3 where a CLIA identifier is allowed.
3	1..6	ID	R	R	R	R	HL70301	Universal ID Type	Constrained to the value 'ISO' except for ELR Receiver for MSH-4 where the value 'CLIA' is allowed..

Usage: The HD data type is used directly to identify objects such as applications or facilities. It is used also as a component of other data types, where it is typically an assigning authority for an identifier. Where this capability is used in this specification, that usage is described separately. Note that the HD data type has been constrained to carry an OID identifying an application, a facility, or an assigning authority. The only exception to the use of OID's for the HD is for the ELR Receiver profile for MHS-4 (Sending Facility)

Example: |Lab^2.16.840.1.113883.19.3.1.1^ISO|

2.3.18 ID – Coded Value for HL7-Defined Tables

TABLE 2–20. CODED VALUE FOR HL7–DEFINED TABLES (ID)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..15=	-	R	R	R	R		Coded Value for HL7-Defined Tables	

Example: |ABC|

2.3.19 IS – Coded Value for User-Defined Tables

TABLE 2–21. CODED VALUE FOR USER–DEFINED TABLES (IS)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	-	R	R	R	R		Coded Value for User-Defined Tables	

Example: |XYZ|

2.3.20 MSG – Message Type

TABLE 2-22. MESSAGE TYPE (MSG)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	3..3	ID	R	R	R	R	HL70076	Message Code	
2	3..3	ID	R	R	R	R	HL70003	Trigger Event	
3	3,7	ID	R	R	R	R	HL70354	Message Structure	

Example: |ORU^R01^ORU_R01|

2.3.21 NDL - Name With Date And Location

TABLE 2-23. NAME WITH DATE AND LOCATION (NDL)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		CNN	R	R	-	-		Name	
2		TS	X	X	-	-		Start Date/time	Not supported.
3		TS	X	X	-	-		End Date/time	Not supported.
4	1..20=	IS	X	X	-	-	HL70302	Point of Care	Not supported.
5	1..20=	IS	X	X	-	-	HL70303	Room	Not supported.

TABLE 2-23. NAME WITH DATE AND LOCATION (NDL)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
6	1..20=	IS	X	X	-	-	HL70304	Bed	Not supported.
7		HD	X	X	-	-		Facility	Not supported.
8	1..20=	IS	X	X	-	-	HL7306	Location Status	Not supported.
9	1..20=	IS	X	X	-	-	HL70305	Person Location Type	Not supported.
10	1..20=	IS	X	X	-	-	HL7307	Building	Not supported.
11	1..20=	IS	X	X	-	-	HL7308	Floor	Not supported.

Example: |1234&Admit&Alan&A&III&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO|

2.3.22 NM – Numeric

TABLE 2–24. NUMERIC (NM)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..16	-	R	R	R	R		Numeric	HL7 allows only ASCII numeric characters as well as an optional leading plus or minus sign and an option decimal point. Note that use of scientific notation for numbers is not supported by this data type.

Example: |123.4|

2.3.23 PL – Person Location

TABLE 2–25. PERSON LOCATION (PL)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..20=	IS	RE	O	RE	O	HL70302	Point of Care	
2	1..20=	IS	RE	O	RE	O	HL70303	Room	
3	1..20=	IS	RE	O	RE	O	HL70304	Bed	

TABLE 2–25. PERSON LOCATION (PL)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
4		HD	0	0	0	0		Facility	
5	1..20=	IS	0	0	0	0	HL70306	Location Status	
6		CWE	RE	0	RE	RE	HL70305 NHSN – PH_HealthcareServiceLoc_HL7_V3	Person Location Type	CWE data type is pre-adopted from HL7 Version 2.7 to support NHSN requirements. This will require a change to Lab to EHR IG. NHSN uses the HL7 V3 Healthcare Service Location codes for this component.
7	1..20=	IS	0	0	0	0	HL70307	Building	
8	1..20=	IS	0	0	0	0	HL70308	Floor	
9	1..199#	ST	0	0	0	0		Location Description	
10		EI	0	0	0	0		Comprehensive Location Identifier	
11		HD	0	0	0	0		Assigning Authority for Location	

Use of the PL data type in this implementation guide is optional. All fields using the data type are either optional or not supported. Specifics on what components of the PL to use in an implementation would need to be determined by the implementers.

Example: |4E^234^A^Good Health Hospital&2.16.840.1.113883.19.3.2.3&ISO^N^N^Building
1^4^Nursing unit 4 East^1234&&2.16.840.1.113883.19.3.2.3&ISO^&2.16.840.1.113883.19.3.2.3&ISO|

2.3.24 PRL – Parent Result Link

TABLE 2–26. PARENT RESULT LINK (PRL)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		CWE	R	R	RE	R	Laboratory Observation Value Set	Parent Observation Identifier	Identifier of the OBX-3 Observation ID of the parent result. Typically, this is used in microbiology results where the sensitivities are linked to the specific culture OBX where the organism was identified.
2	1..20=	ST	RE	RE	RE	RE		Parent Observation Sub-Identifier	Identifier of the OBX-4 Observation Sub-ID associated with the OBX-3 Observation ID of the parent result. Typically, this is used in microbiology results where the sensitivities are linked to the specific culture OBX where the organism was identified. The combination of OBX-3 and OBX-4 must be unique within a particular OBR.
3		TX	RE	RE	RE	RE		Parent Observation Value Descriptor	Taken from the OBX-5 of the parent result. If OBX-5 contains coded data, this will be the value of the text component of the CE or CWE data type or the original text component of the CWE data type when there is no coded component.

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Usage: See *Appendix A*, of this document for details on how this data type and the EIP data type are used in parent/child result linking. Use of data type CWE for sequence 1 reflects a pre-adoption of *HL7 Version 2.6* standards.

Example: |625-4&Bacteria identified:Prid:Pt:Stool:Nom:Culture&LN^1^Campylobacter jejuni|

2.3.25 PT – Processing Type

TABLE 2–27. PROCESSING TYPE (PT)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..1	ID	R	R	R	R	HL70103	Processing ID	
2	1..1	ID	O	O	O	O	HL70207	Processing Mode	

Example: |P^T|

2.3.26 RP – Reference Pointer

TABLE 2–28. REFERENCE POINTER (RP)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..999#	ST	R	R	-	R		Pointer	Pointer to the object. For URIs, it contains the path and query parts. Example: /phin/library/documents/pdf/DRAFT_PHIN_ORU_ELR_v2.5.1_20061221.pdf
2		HD	R	R	-	R		Application ID	Unique identifier of the application that holds the object being pointed to. For URIs, it contains the scheme and authority parts. Note that the HD data type used for this component is specialized for use in the RP data type, and is different that what is defined in section 2.3.17 (HD).
2.1	1..20=	IS	O	O	-	O	Local	Namespace ID	
2.2	1..199=	ST	R	R	-	R		Universal ID	This component is restricted to a universal resource identifier (URI). For URIs, contains the scheme and authority parts. Example: http://www.cdc.gov

TABLE 2–28. REFERENCE POINTER (RP)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
2.3	1..6	ID	R	R	-	R	HL70301	Universal ID Type	This component is constrained to support only universal Resource Identifier. Literal value: 'URI'
3	4..11	ID	RE	RE	-	RE	HL70834 (2.7)	Type of Data	Identifier of the type of data pointed to. For the URI example referenced above, this is "application." See section 6.1.1.5 For details of HL70834.
4	1..32=	ID	RE	RE	-	RE	HL70291 (2.7)	Subtype	Identifier of the subtype of data pointed to. For the URI example above, this is "pdf," indicating portable document format. See section 6.1.1.2 for details of HL70291.

Usage: The field uses the RP data type to allow communication of pointers to images, sound clips, XML documents, HTML markup, etc. The RP data type is used when the object being pointed to is too large to transmit directly.

This specification defines the mechanism for exchanging pointers to objects, but does not address the details of applications actually accessing and retrieving the objects over a network.

This guide constrains this data type to support only Universal Resource Identifiers (URI). See <http://ietf.org/rfc/rfc2396.txt> for a detailed definition. The general format of a URI is in the form <scheme>://<authority><path>?<query>. The scheme and authority portions appear in the Application ID component, Universal ID subcomponent. The path and query portion of the URI appear in the Pointer component of the RP data type.

Example:

```
|?requestType=WADO\T\study=1.2.840.113848.5.22.9220847989\T\series=1.2.840.113848.5.22.9220847
```

98.4\T\object=1.2.840.113848.5.22.922084798.4.5^&https://www.pacs.poupon.edu/wado.jsp&URI^image^jpeg |

2.3.27 SAD – Street Address

TABLE 2–29. STREET ADDRESS (SAD)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..120#	ST	R	R	R	R		Street or Mailing Address	
2	1..50#	ST	O	O	O	O		Street Name	
3	1..12#	ST	O	O	O	O		Dwelling Number	

Usage: The SAD is used only as a component of the XAD data type.

Example: |2222 Home Street|

2.3.28 SI – Sequence ID

TABLE 2-30. SEQUENCE ID (SI)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..4=	-	R	R	R	R		Sequence ID	Non-negative integer up to 9999. May be further constrained to limit the number of times a segment may repeat.

Example: |1|

2.3.29 SN – Structured Numeric

TABLE 2-31. STRUCTURED NUMERIC (SN)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..2	ST	RE	RE	RE	RE		Comparator	Component that must be one of ">" or "<" or ">=" or "<=" or "=" or "<>". This component defaults to "=" if empty.
2		NM	RE	RE	RE	RE		Num1	

TABLE 2-31. STRUCTURED NUMERIC (SN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
3	1..1	ST	RE	RE	RE	RE		Separator/Suffix	Component that must be one of "-" or "+" or "/" or "." or ":".
4		NM	RE	RE	RE	RE		Num2	

Usage: The SN data type carries a structured numeric result value. Structured numeric values include intervals ($^0^-^1$), ratios ($^1/^2$ or $^1:^2$), inequalities ($<^10$), or categorical results (2^+).

Examples: $|^0^-^1|$
 $|^1/^2|$
 $|^1:^2|$
 $|<^10|$
 $|2^+|$

2.3.30 ST – String Data

TABLE 2–32. STRING DATA (ST)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		-	R	R	R	R		String Data	

Usage: The ST data type is normally used for short text strings. No leading blanks (space characters) are permitted. Trailing blanks are permitted. In this ELR Profile, the only allowed escape sequences are those allowed in HL7 Version 2.5.1, Chapter 2, Section 2.7.4 - Special Characters. These are the escape sequences for the message delimiters (i.e., |^&~).

Example: |almost any test data at all|

2.3.31 TM – Time

TABLE 2–33. TIME (TM)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	2..16	-	R	R	R	R		Time	Format: HH[MM[SS[S[S[S[S]]]]]] [+/- ZZZZ]

Usage: It is strongly recommended that the time zone offset always be included in the TM. Specific fields in this implementation guide may require time to a specific level of granularity, which may require the time zone offset.

Example: |235959+1100|

2.3.32 TS – Time Stamp

TABLE 2–34. TIME STAMP (TS)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		DTM	R	R	R	R		Time	
2		ID	X	X	X	X		Degree of Precision	Deprecated as of <i>HL7 Version 2.3</i> . See component 1 (DTM) for the current method of designating degree of precision.

Example: |200806021328.0001-0005|

2.3.33 TX – Text Data

TABLE 2–35. TEXT DATA (TX)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		-	R	R	R	R		Text Data	

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Usage: The TX data type is used to carry string data intended for display purposes. It can contain leading blanks (space characters). In this ELR Profile, the only allowed escape sequences are those allowed in HL7 Version 2.5.1, Chapter 2, Section 2.7.4 - Special Characters. These are the escape sequences for the message delimiters (i.e., |^&~).

Example: | leading spaces are allowed. |

2.3.34 VID – Version Identifier

TABLE 2-36. VERSION IDENTIFIER (VID)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	3.5	ID	R	R	R	R	HL70104	Version ID	Restricted to 2.5.1 in this guide. Literal value: '2.5.1'
2		CWE	O	O	O	O	Country Value Set	Internationalization Code	
3		CWE	O	O	O	O	Local	International Version ID	

Example: |2.5.1|

2.3.35 XAD – Extended Address

TABLE 2–37. EXTENDED ADDRESS (XAD)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		SAD	RE	RE	O	RE		Street Address	
2	1..120#	ST	RE	RE	O	RE		Other Designation	Example: Suite 555
3	1..50#	ST	RE	RE	O	RE		City	
4	1..50#	ST	RE	RE	RE	RE	State Value Set	State or Province	
5	1..12=	ST	RE	RE	RE	RE	Postal Code Value Set	Zip or Postal Code	In the US, the zip code takes the form 99999[-9999], while the Canadian postal code takes the form A9A9A9.
6	3.3	ID	RE	RE	RE	RE	Country Value Set	Country	
7	1.3	ID	RE	RE	O	RE	HL70190	Address Type	
8	1..50#	ST	O	O	O	O		Other Geographic Designation	
9	1..20=	IS	RE	RE	RE	RE	PHVS_County_FIPS_6-4	County/Parish Code	Lab to EHR: No standard value set is used. FIPS codes may be used.
10	1..20=	IS	O	O	O	O	HL70288	Census Tract	
11	1..1	ID	O	O	O	O	HL70465	Address Representation Code	

TABLE 2-37. EXTENDED ADDRESS (XAD)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
12		DR	X	X	X	X		Address Validity Range	Deprecated as of <i>HL7 Version 2.5</i> . See XAD-13 Effective Date and XAD-14 Expiration Date components.
13	1..8=	TS	0	0	0	0		Effective Date	
14	1..8=	TS	0	0	0	0		Expiration Date	

Example: |4444 Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B|

2.3.36 XCN – Extended Composite ID Number and Name for Persons

TABLE 2-38. EXTENDED COMPOSITE ID NUMBER AND NAME FOR PERSONS (XCN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..15=	ST	RE	RE	RE	RE		ID Number	The ID Number component combined with the Assigning Authority component (component 9) must uniquely identify the associated person. Note - despite the component being named "ID Number" this component is an ST string data type, not numeric, so the component is not limited to just numbers.
2		FN	RE	RE	RE	RE		Family Name	
3	1..30#	ST	RE	RE	RE	RE		Given Name	I.e., first name.
4	1..30#	ST	RE	RE	O	RE		Second and Further Given Names or Initials Thereof	
5	1..20#	ST	RE	RE	RE	RE		Suffix (e.g., JR or III)	
6	1..20#	ST	RE	RE	RE	RE		Prefix (e.g., DR)	
7	1..20=	IS	O	O	O	O	HL70360	Degree (e.g., MD)	
8	1..20=	IS	O	O	O	O	HL70297	Source Table	

TABLE 2–38. EXTENDED COMPOSITE ID NUMBER AND NAME FOR PERSONS (XCN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
9		HD	CE	CE	CE	CE		Assigning Authority	The Assigning Authority component is used to identify the system, application, organization, etc. that assigned the ID Number in component 1. Harmonized condition predicate: Required if component 1 (ID Number) is populated.
10	1..5	ID	RE	RE	RE	RE	HL70200	Name Type Code	Defaults to l (legal name) if empty.
11	1..4	ST	O	O	O	O		Identifier Check Digit	
12	3..3	ID	CE	O	O	CE	HL70061	Check Digit Scheme	Lab to EHR Condition predicate: Required if component 11 (Identifier Check Digit) is populated.
13	2..5	ID	CE	CE	RE	RE	HL70203	Identifier Type Code	ELR Condition predicate. Required if component 1 (ID Number) is populated.
14		HD	RE	RE	O	O		Assigning Facility	
15	1..1	ID	O	O	O	O	HL70465	Name Representation Code	
16		CE	O	O	O	O	HL70448	Name Context	
17		DR	X	X	X	X		Name Validity Range	Deprecated as of <i>HL7 Version 2.5</i> . See XCN-19 Effective Date and XCN-20 Expiration Date components.
18	1..1	ID	O	O	O	O	HL70444	Name Assembly Order	

TABLE 2-38. EXTENDED COMPOSITE ID NUMBER AND NAME FOR PERSONS (XCN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
19	1..8=	TS	0	0	0	0		Effective Date	
20	1..8=	TS	0	0	0	0		Expiration Date	
21	1..199 #	ST	RE	RE	RE	RE		Professional Suffix	Suggest using values from HL7 table 360.
22		CWE	0	0	0	0		Assigning Jurisdiction	
23		CWE	0	0	0	0		Assigning Agency or Department	

Example:

```
|1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO
^^^^^^^MD|
```

2.3.37 XON – Extended Composite Name and Identification Number for Organizations

TABLE 2-39. EXTENDED COMPOSITE NAME AND IDENTIFICATION NUMBER FOR ORGANIZATIONS (XON)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1	1..50#	ST	CE	CE	-	RE		Organization Name	ELR Condition predicate: Must be present if there is no Organization Identifier in component 10. Send it if you have it.
2	1..20=	IS	RE	RE	-	RE	HL70204	Organization Name Type Code	
3		NM	X	X	-	X		ID Number	(Deprecated as of <i>HL7 Version 2.5.</i>) Use XON-10 Organization Identifier.
4	1..4=	NM	O	O	-	O		Check Digit	
5	3..3	ID	O	O	-	O	HL70061	Check Digit Scheme	
6		HD	CE	CE	-	CE		Assigning Authority	The Assigning Authority component is used to identify the system, application, organization, etc. that assigned the ID in component 10. ELR & Lab to EHR Condition predicate: Required if component 10 (Organization Identifier) is populated.
7	2..5	ID	CE	CE	-	RE	HL70203	Identifier Type Code	ELR Condition predicate: Required if component 10 (Organization Identifier) is populated.
8		HD	O	O	-	O		Assigning Facility	

TABLE 2–39. EXTENDED COMPOSITE NAME AND IDENTIFICATION NUMBER FOR ORGANIZATIONS (XON)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
9	1..1	ID	O	O	-	O	HL70465	Name Representation Code	
10	1..20=	ST	RE	RE	-	RE		Organization Identifier	

Example: |Level Seven Healthcare, Inc.^L^&2.16.840.1.113883.19.4.6^ISO^XX^1234|

2.3.38 XPN – Extended Person Name

TABLE 2–40. EXTENDED PERSON NAME (XPN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		FN	CE	RE	CE	RE		Family Name	NHSN Condition predicate: Required if component 7, name type code, is anything but "S" (Pseudo name) or "U" (unknown name).
2	1..30#	ST	CE	RE	CE	RE		Given Name	I.e., first name. NHSN Condition predicate: Required if component 7, name type code, is anything but "S" (Pseudo name) or "U" (unknown name).

TABLE 2–40. EXTENDED PERSON NAME (XPN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
3	1..30#	ST	RE	RE	RE	RE		Second and Further Given Names or Initials Thereof	
4	1..20#	ST	RE	RE	RE	RE		Suffix (e.g., JR or III)	
5	1..20#	ST	RE	RE	RE	RE		Prefix (e.g., DR)	
6	1..20=	IS	O	O	RE	O	HL70360	Degree (e.g., MD)	
7	1..5	ID	RE	RE	RE	RE	HL70200	Name Type Code	Defaults to I (legal name) if empty.
8	1..1	ID	O	O	O	O	HL70465	Name Representation Code	
9		CWE	O	O	O	O	HL70448	Name Context	
10		DR	X	X	X	X		Name Validity Range	Deprecated as of <i>HL7 Version 2.5</i> . See XPN-12 Effective Date and XPN-13 Expiration Date components.
11	1..1	ID	O	O	O	O	HL70444	Name Assembly Order	
12		TS	O	O	O	O		Effective Date	
13		TS	O	O	O	O		Expiration Date	
14	1..199#	ST	RE	RE	RE	RE		Professional Suffix	Suggest using values from HL7 table 360.

Example: |Admit^Alan^A^III^Dr^^L^^^^^^MD|

2.3.39 XTN – Extended Telecommunication Number

TABLE 2-41. EXTENDED TELECOMMUNICATION NUMBER (XTN)									
SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
1		ST	X	X	-	-		Telephone Number	Deprecated as of <i>HL7 Version 2.3</i> .
2	3..3	ID	RE	RE	-	-	HL70201	Telecommunication Use Code	Should use 'NET' if component 4 (Email Address) is present.
3	2..8	ID	RE	RE	-	-	HL70202	Telecommunication Equipment Type	Should use 'Internet' if component 4 (Email Address) is present.
4	1..199 =	ST	CE	CE	-	-		Email Address	ELR Condition predicate: Required if component 7 (local number) is not present. Component 4 (Email Address) must be empty if component 7 (Local Number) is present.
5	1..3=	NM	CE	CE	-	-		Country Code	ELR Condition predicate: This component is required or empty (RE) if component 7 (Local Number) is present otherwise it must be empty.
6	1..3=	NM	CE	CE	-	-		Area/City Code	ELR Condition predicate: This component is required or empty (RE) if component 7 (Local Number) is present otherwise it must be empty.

TABLE 2-41. EXTENDED TELECOMMUNICATION NUMBER (XTN)

SEQ	LEN	DT	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	Component Name	Comments
7	1..9=	NM	CE	CE	-	-		Local Number	ELR Condition predicate: Required if component 4 (Email Address) is not present. Component 7 (Local Number) must be empty if component 4 (Email Address) is present.
8	1..5=	NM	CE	CE	-	-		Extension	ELR Condition predicate: This component is required or empty (RE) if component 7 (Local Number) is present otherwise it must be empty.
9	1..199 #	ST	RE	RE	-	-		Any Text	For example: "Regular hours 8 am to 5 pm."
10	1..4=	ST	X	X	-	-		Extension Prefix	Not supported.
11	1..6=	ST	X	X	-	-		Speed Dial Code	Not supported.
12	1..199 #	ST	X	X	-	-		Unformatted Telephone number	Not supported.

Usage: Note that component 4 (Email Address) and component 7 (Local Number) are mutually exclusive. You must populate one or the other, but not both in a single repeat of this data type.

Example: | ^PRN^PH^^1^555^5552003 |
 | ^NET^Internet^eve.everywoman@hl7.org |

3. Message Profile – Public Health Laboratory Messaging

3.1 USE CASE MODEL

TABLE 3–1. USE CASE: LABORATORY TO PUBLIC HEALTH

Item	Detail
Description	<p>The <i>Public Health Laboratory Messaging Use Case</i> focuses on the use case describing the transmission of laboratory-reportable findings to appropriate local, state, territorial, and federal health agencies using the <i>HL7 2.5.1 ORU</i> message. It includes optional acknowledgments of receipt of transactions. The use case does allow the optional use of batch processing to transmit results. It does not cover querying patient demographics or querying laboratory results. The use case does cover reporting of healthcare associated infection (HAI) related microbiology results to the National Healthcare Safety Network (NHSN).</p> <p>The goal of the use case is to provide safe, reliable delivery of reportable laboratory results to public health. If PHIN MS is used for transport, then use of the HL7 Acknowledgments may be un-necessary, although PHIN MS does not ensure that the payload conforms to HL7 formatting rules, it does provide safe and reliable transport. The use case does not cover reporting of laboratory results from one public health jurisdictional entity to another.</p> <p>This use case excludes the situation where public health is the originator of the order for testing. The use case for public health laboratory test orders and reporting of related results is sufficiently different to warrant a distinct use case. The APHL/CDC PHLIP project is directly addressing this use case.</p> <p>This use case is not intended to cover reporting of results to Cancer Registries. This use case is restricted individual living subjects (persons and animals).</p>
Actors	<p>Laboratory Result Sender – The laboratory result sender actor is an application capable of transmitting the results of laboratory testing on specimens. This may be the laboratory itself or some aggregator of laboratory result data. The laboratory result sender application is capable of transmitting the results of laboratory testing to a receiver, optionally capable of batching result messages and optionally capable of receiving HL7 acknowledgments. If the Laboratory Result Sender is an actual laboratory system, it is often referred to as “Filler.”</p> <p>The Laboratory Result Sender application is an HL7 Application as defined by HL7 Version 3 Standard: Abstract Transport Specification, Normative Edition 2009. One point of confusion is what role data aggregators play in this use case. In typical circumstances, a data aggregator is considered an HL7 Application, and as such directly takes on the role of Laboratory Result Sender for this use case. The HL7 Version 3 Standard: Abstract Transport Specification, Normative Edition 2009 also describes several roles typically played by interface engines, include gateway, bridge and intermediary roles. The abstract transport specification considers the gateway role to be an HL7 Application, so for this use case an interface engine playing the gateway role and originating the transaction in this IG would be a</p>

TABLE 3–1. USE CASE: LABORATORY TO PUBLIC HEALTH

Item	Detail
	<p>Laboratory Result Sender actor.</p> <p>Laboratory Result Receiver – The laboratory result receiver is an application capable of receiving results of laboratory testing, optionally transmitting an acknowledgment and optionally capable of receiving a batch of laboratory results and transmitting a batch acknowledgment. The laboratory result receiver may be associated with the local, state, territorial and federal health agencies that require access to the results. In the use case, the laboratory result receiver is identified as the "public health jurisdictional entity." Note that the Laboratory Result Receiver should not be confused with the "Placer" of the laboratory order that the laboratory results are associated. The placer of the order is typically a provider who is responsible for treating the patient. In this case, the Laboratory Result Receiver is an interested party who receives a copy of the results. There are three specializations for the Laboratory Result Receiver including:</p> <ul style="list-style-type: none"> ◦ Electronic Laboratory Result (ELR) Receiver – A Laboratory Result Receiver conforming to the ELR receiver message profile ◦ National Healthcare Safety Network (NHSN) Receiver⁴ – A Laboratory Result Receiver conforming to the NHSN receiver message profile ◦ Lab to EHR Receiver - A Laboratory Result Receiver conforming to the Lab to EHR⁵ receiver message profile <p>It should be noted that the latter two actors, NHSN Receiver and the Lab to EHR Receiver are included in this guide for comparison purposes only. Other guides are the source of truth for these profiles.</p>
Assumptions	<p>The following assumptions are preconditions for the use of this profile:</p> <ul style="list-style-type: none"> Each public health jurisdictional entity has previously defined the reportable conditions appropriate to its jurisdiction. Laboratory result senders are responsible for the setup of their system with the reportable conditions appropriate to its jurisdiction.
Business Rules	<p>The following Business Rule applies to the use of this profile:</p> <ul style="list-style-type: none"> Batch processing may optionally be used as described in the <i>Transmit Batch Message Use Case, 2008</i> (see <i>References</i>).

The Send Laboratory Use Case Model has two primary participating actors, the Laboratory Result Sender and the Laboratory Result Receiver. The use case has three “child” use case, Preliminary Result, Final Result and Corrected Result.

⁴ The NHSN Receiver profile has been fully documented in a separate guide and was balloted in the January 2010 ballot cycle.

⁵ See HL7 Version 2.5.1 Implementation Guide: Orders and Observations; Interoperable Laboratory Result Reporting to EHR, Release 1. Available from the HL7 Members download at: http://www.hl7.org/memonly/downloads/home_download.cfm

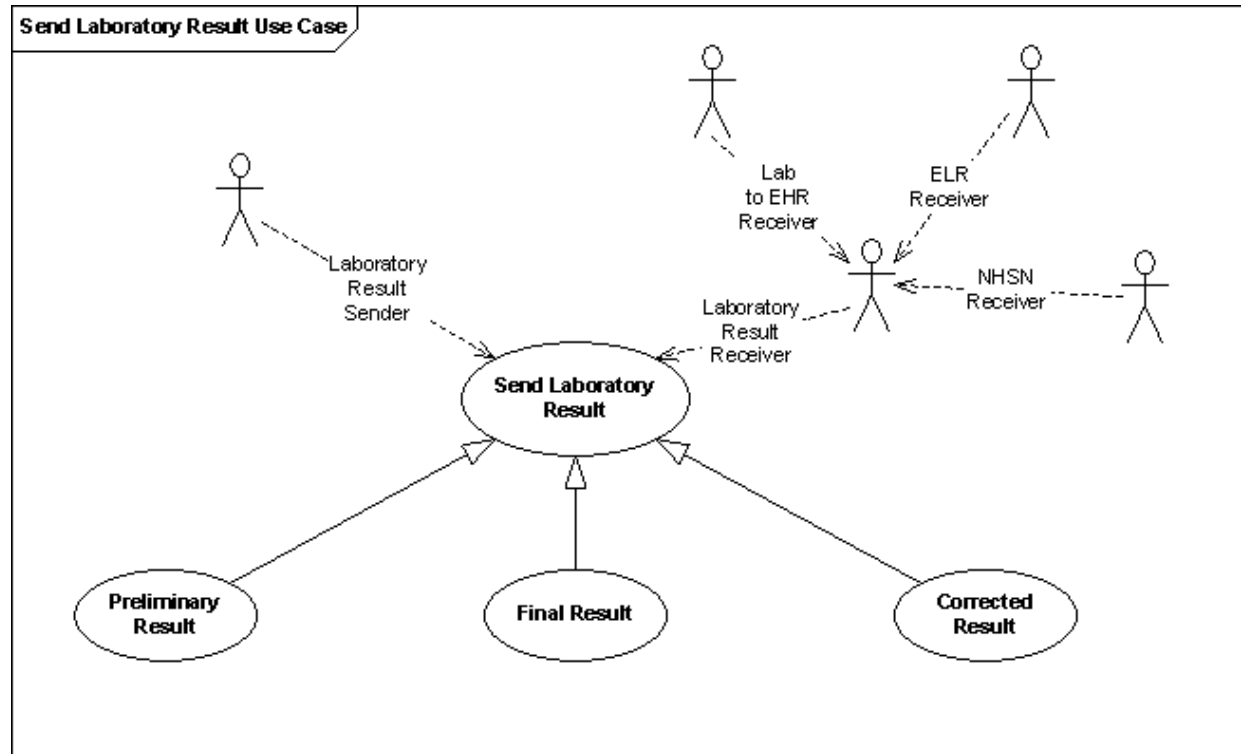


Figure 3-1. Send Laboratory Result Use Case Model

3.2 DYNAMIC INTERACTION MODEL

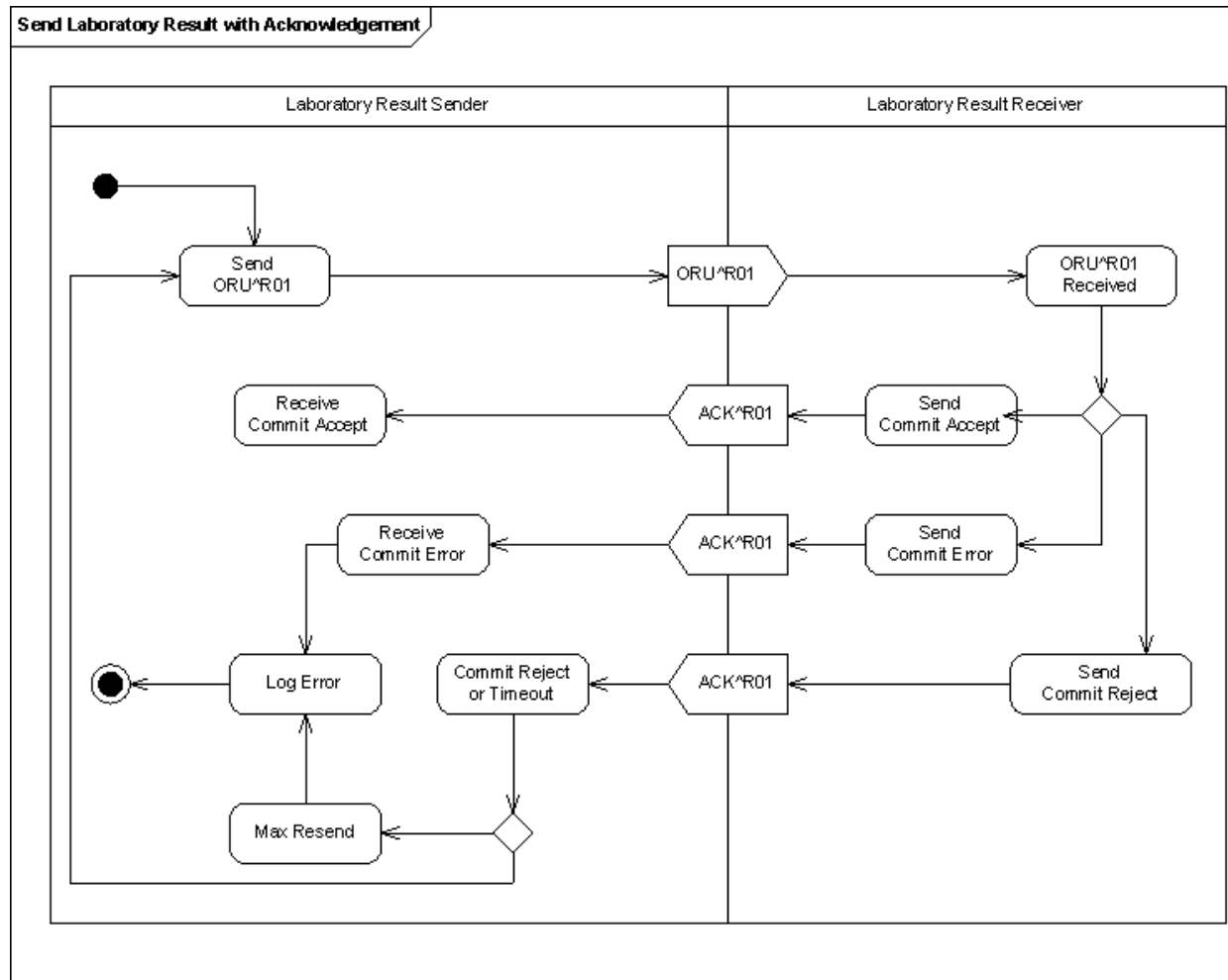


Figure 3-2. Activity Diagram for Send Laboratory Result Use Case – Acknowledgment Required

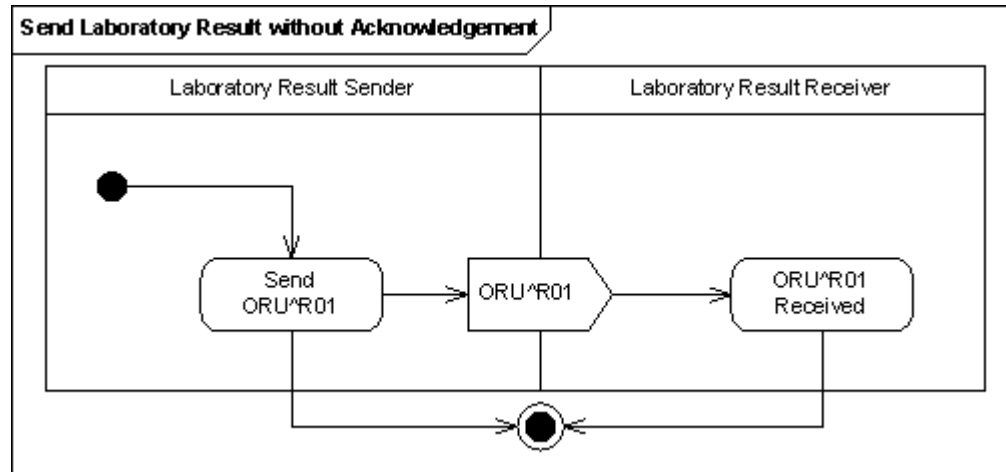


Figure 3-3. Activity Diagram for Send Laboratory Result Use Case - Without Acknowledgment

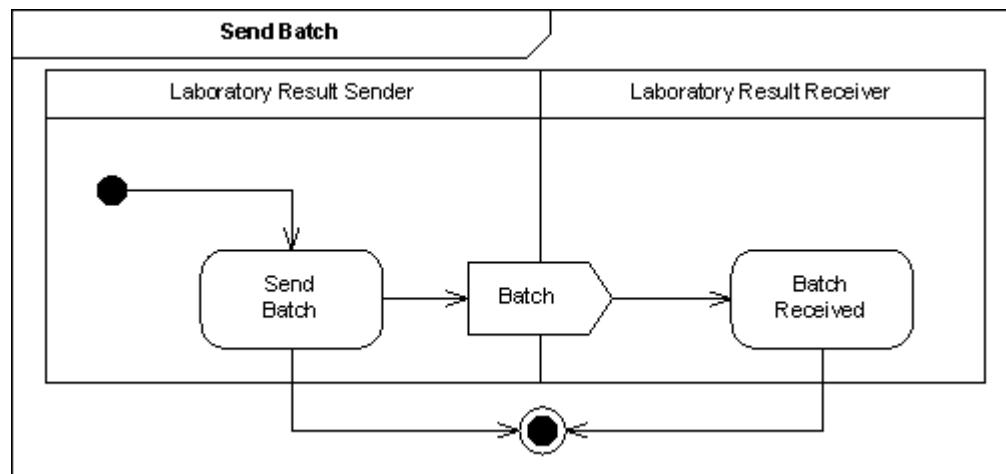


Figure 3-4. Activity Diagram for Send Laboratory Result Use Case - Batch

3.3 DYNAMIC DEFINITIONS

Three dynamic definitions are provided to support cases where acknowledgments are required, not used, and batch messaging.

TABLE 3–2. DYNAMIC DEFINITION – INDIVIDUAL TRANSACTIONS WITH ACKNOWLEDGMENTS

Item	Value
Profile ID	PHLabReport-Ack
HL7 Version	2.5.1
Accept Acknowledgement	AL – Always
Application Acknowledgement	Refer to HL7 Table 0155 – Accept/Application Acknowledgment conditions in section 6.1.1.2 for valid values.
Acknowledgement Mode	Immediate
Profile Type	Constrainable Profile
Message Types	ORU^R01^ORU_R01, ACK^R01^ACK
Encoding	ER7 (required) 2.5.1 XML (optional)

TABLE 3–3. DYNAMIC DEFINITION – INDIVIDUAL TRANSACTIONS WITHOUT ACKNOWLEDGMENTS

Item	Value
Profile ID	PHLabReport-NoAck
HL7 Version	2.5.1
Accept Acknowledgement	NE – Always
Application Acknowledgement	NE – Always
Acknowledgement Mode	Immediate

TABLE 3–3. DYNAMIC DEFINITION – INDIVIDUAL TRANSACTIONS WITHOUT ACKNOWLEDGMENTS

Item	Value
Profile Type	Constrainable Profile
Message Types	ORU^R01^ORU_R01
Encoding	ER7 (required) 2.5.1 XML (optional)

TABLE 3–4. DYNAMIC DEFINITION – BATCH TRANSACTIONS

Item	Value
Profile ID	PHLabReport-Batch
HL7 Version	2.5.1
Accept Acknowledgement	NE – Never
Application Acknowledgement	NE – Never
Acknowledgement Mode	NA
Profile Type	Constrainable Profile
Message Types	ORU^R01^ORU_R01, Batch Wrapper.
Encoding	ER7 (required) 2.5.1 XML (optional)

3.4 INTERACTIONS

TABLE 3-5. INTERACTIONS – INDIVIDUAL TRANSACTION WITH ACKNOWLEDGMENTS									
Event	Description	Lab Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Usage	Message Type	Receiver Action	Sender	Data Values
Preliminary Result	Preliminary: A verified early result is available; final results not yet obtained	R	C6	O	R	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=P
Final Result	Final results; results stored and verified. Can be changed only with a corrected result.	R	R	R	R	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=F
Correction	Correction to results	R	R	R	R	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=C
Order Received	Order received; specimen not yet received	O	O	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=O
Specimen Received	No results available; specimen received, procedure incomplete	O	O	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=I
Procedure Scheduled	No results available; procedure scheduled, but not done	O	O	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=S

⁶ Conditional on certain reportable conditions and also dependent upon individual state laws/regulations.

TABLE 3-5. INTERACTIONS – INDIVIDUAL TRANSACTION WITH ACKNOWLEDGMENTS

Event	Description	Lab Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Usage	Message Type	Receiver Action	Sender	Data Values
Partial Results Available	Some, but not all, results available	O	O	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=A
Unverified Results Stored	Results stored; not yet verified	O	O	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=R
No Results Available	No results available; Order canceled, Testing Not Done	RE	RE	O	O	ORU^R01^ORU_R01	Commit Accept, Commit Reject or Commit Error	Laboratory Result Sender	ORC-1=RE OBR-25=X
No Order	No order on record for this test. (Used only on queries)	X	X	X	X	ORU^R01^ORU_R01	NA	Laboratory Result Sender	ORC-1=RE OBR-25=Y
No Patient Record	No record of this patient. (Used only on queries)	X	X	X	X	ORU^R01^ORU_R01	NA	Laboratory Result Sender	ORC-1=RE OBR-25=Z
Commit Accept	Enhanced mode: Accept acknowledgment: Commit Accept	R	O	-	R	ACK^R01^ACK	None	Laboratory Result Receiver	MSA-1=CA
Commit Error	Enhanced mode: Accept acknowledgment: Commit Error	R	O	-	R	ACK^R01^ACK	None	Laboratory Result Receiver	MSA-1=CE
Commit Reject	Enhanced mode: Accept acknowledgment: Commit Reject	R	O	-	R	ACK^R01^ACK	None	Laboratory Result Receiver	MSA-1=CR

TABLE 3-6. INTERACTIONS – INDIVIDUAL TRANSACTION WITHOUT ACKNOWLEDGMENTS/BATCH

Event	Description	Lab Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Usage	Message Type	Receiver Action	Sender	Data Values
Preliminary Result	Preliminary: A verified early result is available; final results not yet obtained	R	C7	O	R	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=P
Final Result	Final results; results stored and verified. Can be changed only with a corrected result.	R	R	R	R	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=F
Correction	Correction to results	R	R	R	R	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=C
Order Received	Order received; specimen not yet received	O	O	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=O
Specimen Received	No results available; specimen received, procedure incomplete	O	O	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=I
Procedure Scheduled	No results available; procedure scheduled, but not done	O	O	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=S
Partial Results Available	Some, but not all, results available	O	O	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=A

⁷ Conditional on certain reportable conditions and also dependent upon individual state laws/regulations.

TABLE 3–6. INTERACTIONS – INDIVIDUAL TRANSACTION WITHOUT ACKNOWLEDGMENTS/BATCH

Event	Description	Lab Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Usage	Message Type	Receiver Action	Sender	Data Values
Unverified Results Stored	Results stored; not yet verified	O	O	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=R
No Results Available	No results available; Order canceled, Testing Not Done	RE	RE	O	O	ORU^R01^ORU_R01	None	Laboratory Result Sender	ORC-1=RE OBR-25=X
No Order	No order on record for this test. (Used only on queries)	X	X	X	X	ORU^R01^ORU_R01	NA	Laboratory Result Sender	ORC-1=RE OBR-25=Y
No Patient Record	No record of this patient. (Used only on queries)	X	X	X	X	ORU^R01^ORU_R01	NA	Laboratory Result Sender	ORC-1=RE OBR-25=Z

3.5 REFERENCES

1. *HL7 U.S. Realm – Interoperability Specification: Lab Result Message to EHR, Version 1.0*, November 2007
2. *Harmonized Use Case for Electronic Health Records (Laboratory Result Reporting)*
3. *Implementation Guide for Transmission of Laboratory-Based Reporting of Public Health Information using version 2.3.1 of Health Level Seven (HL7) Standard Protocol*, March 2005.
4. *HL7 Version 3 Standard: Abstract Transport Specification, Normative Edition 2009*

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4. Messages

The following sections detail the structure of each message, including segment name, usage, cardinality and description. See section 1.4.1 (Message Element Attributes) for a description of the columns in the Abstract Message Syntax Tables.

4.1 ORU^R01^ORU_R01

The ORU^R01 message is constrained for transmitting laboratory results from the testing source to Public Health.

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
MSH	Message Header	[1..1]	R	R	R	R	The message header (MSH) segment contains information describing how to parse and process the message. This includes identification of message delimiters, sender, receiver, message type, timestamp, etc.
[[SFT]]	Software Segment	[1..*]	R	R	O	O	Each HL7 aware application that touches the message on the way to the destination application must add a SFT segment for its application. For instance, PHIN MS is not HL7 aware and would not be expected to add an SFT. On the other hand, an integration engine is HL7 aware and would be expected to add an SFT. The first repeat (i.e., the Laboratory Result Sender actor) is required. Any other application that transforms the message must add an SFT segment for that application. Other applications that route or act as a conduit may add an SFT but are not required to do so.
{	<i>PATIENT_RESULT Begin</i>	[1..*]	R	R	R	R	The NHSN Receiver profile can receive only 1 Patient_Result group.
[	<i>PATIENT Begin</i>	[1..1]	R	R	R	RE	For public health reporting, the patient group is required.
PID	Patient Identification	[1..1]	R	R	R	R	The patient identification (PID) segment is used to provide basic demographics regarding the subject of the testing. The subject may be a person or animal.
[PD1]	Additional Demographics	[0..1]	O	O	O	O	

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
[[NTE]]	Notes and Comments for PID	[0..*]	RE	RE	O	RE	This notes and comments (NTE) segment should contain notes or comments pertaining to the patient identified in the PID segment. It should not contain order or result related comments. The Lab to EHR profile allows only a single NTE currently.
[[NK1]]	Next of Kin/Associated Parties	[0..*]	RE	RE	O	O	The next of kin (NK1) segment can be used to document the patient's next of kin, employer, guardian, etc. Particular jurisdictions may require the NK1 segment to contain parent/guardian information when reporting lead testing results for children. When reporting results of animal testing (for example testing animals for rabies) the NK1 segment can be used to identify the owner of the animal.
[	<i>VISIT Begin</i>	[0..1]	RE	RE	O	RE	
PV1	Patient Visit	[1..1]	R	R	R	R	HL7 requires that the patient visit (PV1) segment be present if the VISIT group is present.
[PV2]	Patient Visit – Additional Information	[0..1]	RE	O	O	RE	
]	<i>VISIT End</i>						
]	<i>PATIENT End</i>						

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
{	<i>ORDER_OBSERVATION Begin</i>	[1..*]	R	R	R	R	The order group is required and can repeat. This means that multiple ordered tests may be performed on a specimen. Snapshot processing of the result message involves processing as a snapshot all the repeats of the ORDER_OBSERVATION group together as a group. This is especially important when dealing with parent/child results (such as cultures and sensitivities) which will span multiple ORDER_OBSERVATION groups. All these must be processed from both a message sender and message receiver perspective as a single snapshot.
[ORC]	Order Common	[0..1]	CE	CE	O	RE	The common order (ORC) segment identifies basic information about the order for testing of the specimen. This segment includes identifiers of the order, who placed the order, when it was placed, what action to take regarding the order, etc. ELR Condition predicate: The first ORDER_OBSERVATION group must contain an ORC segment (containing ordering facility information) if no ordering provider information is present in OBR-16 or OBR-17.
OBR	Observations Request	[1..1]	R	R	R	R	The observation request (OBR) segment is used to capture information about one test being performed on the specimen. Most importantly, the OBR identifies the type of testing to be performed on the specimen, and ties that information to the order for the testing.
[{NTE}]	Notes and Comments for OBR	[0..*]	RE	RE	O	RE	
{	<i>TIMING_QTY Begin</i>	[0..*]	RE	O	O	RE	Although Timing/Quantity may be necessary for orders, it's not necessary for result reporting, particularly ELR.
TQ1	Timing/Quantity	[1..1]	R	O	O	R	

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
{[TQ2]}	Timing/Quantity Order Sequence	[0..1]	O	O	O	O	
}	<i>TIMING_QTY End</i>						
[CTD]	Contact Data	[0..1]	O	O	O	O	
{	OBSERVATION Begin	[0..*]	CE	CE	CE	CE	<p>Multiple results may be associated with an order. There will always be a single OBX in the results group.</p> <p>Snapshot processing: Since the OBX segment in 2.5.1 does not contain a unique instance identifier, it is assumed that the repeating observation group will contain a complete set of observations (OBXs) associated with the OBR. Where a single OBX is being updated, all the OBXs related to the OBR must accompany the updated OBX, i.e., a full snapshot is sent.</p> <p>Harmonized condition predicate: May be empty for OBR-25 Result statuses of "O," "I," "S" and "X"; otherwise, it is required.</p>
OBX	Observation related to OBR	[1..1]	R	R	R	R	<p>The observation/result (OBX) segment contains information regarding a single observation (analyte) result. This includes identification of the specific type of observation, the result for the observation, when the observation was made, etc.</p> <p>For laboratory testing, the OBX is normally reporting the results of a test performed on a specimen, Because the ORU^R01^ORU_R01 message structure allows multiple specimens to be associated with a single OBR, there is no direct way to tell which specimen a particular OBX is associated with. There are other HL7 messages for laboratory results where this ambiguity does not exist, but were not chosen for this implementation guide.</p>

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
[[NTE]]	Notes and Comments	[0..*]	RE	RE	RE	RE	The notes and comment (NTE) segment may carry comments related to the result being reported in the OBX segment.
}}	OBSERVATION End						
[[FTI]]	Financial Transaction	[0..*]	O	O	O	O	
[[CTI]]	Clinical Trial Identification	[0..*]	O	O	O	O	
- {{	SPECIMEN Begin	[0..*]	CE	CE	C	RE	<p>The specimen group is conditionally required in the ORU and is used to carry specimen information that is no longer contained in the OBR segment. It also provides a place for the specimen number. Each specimen group documents a single sample. Note that for ELR, the message has been constrained to support a single SPECIMEN group per OBR, meaning only a single specimen can be associated with the OBR.</p> <p>ELR & NHSN Condition predicate: The specimen group is required for the parent Order_Observation Group in the message.</p> <p>ELR & NHSN Cardinality: These profiles currently support a single SPM segment. Per the harmonization strategy the receiver must pick from a message instance which repeat they will use for the profile.</p>
SPM	Specimen Information related to OBR	[1..1]	R	R	R	R	The specimen information (SPM) segment describes the characteristics of a single sample. The SPM segment carries information regarding the type of specimen, where and how it was collected, who collected it, and some basic characteristics of the specimen.

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
{{OBX}}	Observation related to Specimen	[0..*]	RE	RE	O	O	<p>The Observation related to Specimen is generally used to report additional characteristics related to the specimen. It is not used to report the results of the requested testing identified in OBR-4 (Universal Service ID). The observations associated with the specimen are typically information that the ordering providing sends with the order. The laboratory forwards that information as part of the result message.</p> <p>One recommended value to report in the OBX related to Specimen is the age of patient at time of specimen collection. The appropriate LOINC code for this is 35659-2 (Age at specimen collection:TimeDif:Pt:^Patient:Qn).</p> <p>Other possible types of observations include:</p> <ul style="list-style-type: none"> Was specimen sent out? Was it a specimen or isolate? Id of the specimen/isolate sent for testing Where was the specimen sent? Reason for send out? <p>Implementers will need to provide a list of expected observations associated with specimen.</p>
}}	<i>SPECIMEN End</i>						
}	<i>ORDER_OBSERVATION End</i>						
}	<i>PATIENT_RESULT End</i>						

TABLE 4-1. ORU^R01^ORU_R01 ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
[DSC]	Continuation Pointer	[0..0]	X	X	X	X	Not supported.

4.1.1 Diagram of ORU^R01^ORU_R01

The following diagram shows a simple view of the ORU^R01^ORU_R01 message structure. The green boxes represent the key segments in the HL7 result message and include the MSH, PID, OBR and OBX segments. The data found in these segments are key to the laboratory report. Data found in the other segments may be important but are not key to interpreting the message. Note that this diagram does not show repeating elements of the message (repeating groups or segments). It represents the way in which information in the message is related. Neither does this diagram capture the conditions on when some of the segments must be present in the message. For instance, there must be an ORC segment present in the message in the first repeat of the ORDER_OBSERVATION group.

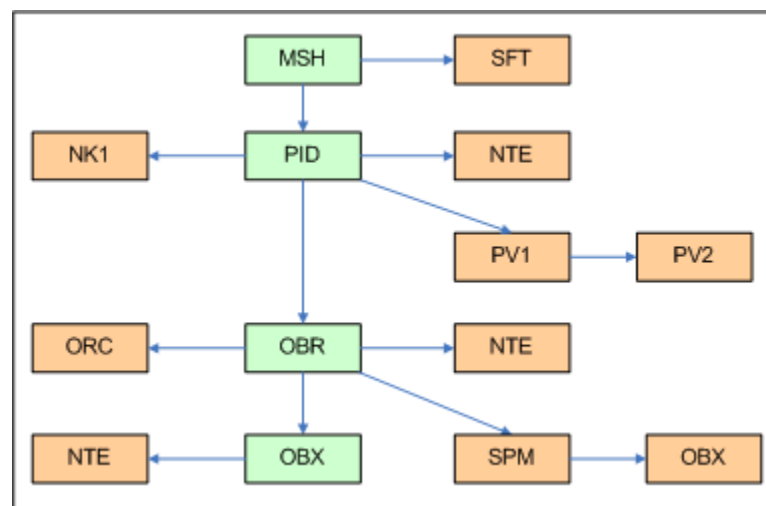


Figure 4-1. 2.5.1 ELR Message

4.1.2 Comparison with the 2.3.1 ORU^R01

The following diagram shows the structure of the 2.3.1 ELR message.

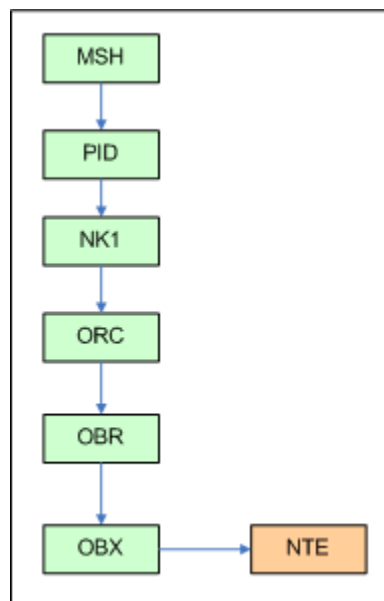


Figure 4-2. 2.3.1 ELR Message

The message structure for the 2.3.1 ELR message is simpler than the 2.5.1 ELR message described above. There are several reasons for this including the following:

- The 2.5.1 ELR message adheres strictly to the ORU^R01 message structure described by HL7 in 2.5.1. The 2.3.1 ELR message rearranged some of the groups in the message to suite ELR purposes. Unfortunately, this approach breaks XML implementations of the HL7 standard.
- The 2.5.1 ELR message includes new segments introduced by HL7. This includes the SFT and SPM segments. The SFT segment is used to document new information that was not contained in the original 2.3.1 ELR message. The SPM segment was added by HL7 to replace some fields found in the OBR segment. The SPM segment provides additional information about the specimen not found in the 2.3.1 message.
- Support for the PV1 and PV2 segments have been added to the 2.5.1 ELR message. Both segments were part of the underlying HL7 standard for the ORU^R01 in 2.3.1 and 2.5.1. The difference here is that the 2.5.1 ELR has included support for some of this information in the 2.5.1 ELR message based upon states identifying a need for this information.
- Additional support for the NTE segment has been added to the 2.5.1 ELR message. NTE's associated with the PID and OBR were part of the underlying HL7 standard for the ORU^R01 in 2.3.1 and 2.5.1. The difference here is that the 2.5.1 ELR has included support for additional comments in this message based upon states identifying a need for this information.

4.2 ACK^R01^ACK

TABLE 4–2. ACK^R01^ACK ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
MSH	Message Header	[1..1]	R	R	-	R	The message header (MSH) segment contains information describing how to parse and process the message. This includes identification of message delimiters, sender, receiver, message type, timestamp, etc.
[[SFT]]	Software Segment	[1..*]	R	R	-	O	Each HL7 aware application that touches the message on the way to the destination application must add a SFT segment for its application. For instance, PHIN MS is not HL7 aware and would not be expected to add an SFT. On the other hand, an integration engine is HL7 aware and would be expected to add an SFT. The first repeat (i.e., the originator) is required. Any other application that transforms the message must add an SFT segment for that application. Other applications that route or act as a conduit may add an SFT but are not required to do so.
MSA	Message Acknowledgment	[1..1]	R	R	-	R	
[[ERR]]	Error	[0..*]	CE	CE	-	C	ELR & Lab to EHR Condition predicate: Required when MSA-1 is not "AA" or "CA."

4.3 HL7 BATCH PROTOCOL

Messages for this profile may be sent as part of a batch, using the HL7 Batch Protocol. The frequencies of batch transmissions are left to specific implementations. Batches may be sent more often if the message size or resource requirements dictate. It should be noted that the Lab to EHR profile makes no mention of batch protocol, so no usage has been defined here for the Lab to EHR Receiver.

TABLE 4-3. BATCH ABSTRACT MESSAGE SYNTAX

Segment in Standard	Name	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Description
[FHS]	File Header Segment	[1..1]	R	R	R	-	File header required.
{	--- BATCH begin	[1..1]	R	R	R	-	One batch per file supported.
[BHS]	Batch Header Segment	[1..1]	R	R	R	-	One batch per file supported.
{[	--- MESSAGE begin	[1..*]	R	R	R	-	One or more messages per batch supported.
MSH	(one or more HL7 messages)	[1..1]	R	R	R	-	
....						-	
....						-	
....						-	
]}]	--- MESSAGE end					-	
[BTS]	Batch Trailer Segment	[1..1]	R	R	R	-	
}	--- Batch end					-	
[FTS]	File Trailer Segment	[1..1]	R	R	R	-	

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5. Segment and Field Descriptions

This messaging guide provides notes for supported fields. The following format is used in this document for listing and defining message segments and fields. First, the message segment use is defined and then a segment attribute table listing all fields defined in the segment is shown. See section 1.4.1 (Message Element Attributes) for a description of the columns in the Segment Attribute Tables.

5.1 MSH – MESSAGE HEADER SEGMENT

The Message Header Segment (MSH) contains information describing how to parse and process the message. This includes identification of message delimiters, sender, receiver, message type, timestamp, etc.

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..1	ST	[1..1]	R	R	R	R		Field Separator	Character to be used as the field separator for the rest of the message. Literal value: '|' [ASCII (124)].
2	4..5	ST	[1..1]	R	R	R	R		Encoding Characters	Four characters, always appearing in the same order: '^~\&#'. Literal value: '^~\&#'.
3		HD	[1..1]	R	R	R	RE		Sending Application	Field that may be used to identify the sending application uniquely for messaging purposes. For this field only, if all three components of the HD are valued, the first component defines a member in the set defined by the second and third components.

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
4		HD	[1..1]	R	R	R	R		Sending Facility	<p>Field that uniquely identifies the facility associated with the application that plays the Laboratory Result Sender Actor (see section 3.1 Use Case Model) that sends the message. If acknowledgments are in use, this facility will receive any related acknowledgment message.</p> <p>Lab Result Sender Profile: For harmonization across all receiver profiles, use of an OID for this field is recommended.</p> <p>ELR Receiver Profile: For laboratories originating messages, the CLIA identifier is allowed for the Universal ID component of the HD data type. Non-laboratory facilities taking on the Laboratory Result Sender actor role will use an OID for this field.</p>
5		HD	[1..1]	R	R	O	RE		Receiving Application	Field that may be used to identify the receiving application uniquely for messaging purposes. For this field only, if all three components of the HD are valued, the first component defines a member in the set defined by the second and third components.

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
6		HD	[1..1]	R	R	R	RE		Receiving Facility	Field that uniquely identifies the facility for the application that plays the Laboratory Result Receiver Actor (see section 3.1 Use Case Model) and receives the message. If acknowledgments are in use, this facility originates any related acknowledgment message.
7		TS	[1..1]	R	R	R	R		Date/Time Of Message	Field containing the date/time the message was created by the sending system. Format: YYYYMMDDHHMMSS[S[S[S[S]]]]+/-ZZZZ. Note that the time zone offset is required, and the minimum granularity is to the second, although more precise time stamps are allowed.
8	1..40=	ST	[0..1]	O	O	O	O		Security	Not supported.
9		MSG	[1..1]	R	R	R	R		Message Type	For the result message Literal Value: 'ORU^R01^ORU_R01'. For the acknowledgement message Literal Value: 'ACK^R01^ACK'.

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
10	1..199=	ST	[1..1]	R	R	R	R		Message Control ID	String that uniquely identifies the message instance from the sending application. Example formats for message control IDs include GUID, timestamp plus sequence number, OID plus sequence number or sequence number. The important point is that care must be taken to insure that the message control id is unique. The sending application (MSH-3) plus MSH-10 (message control id) needs to be globally unique.
11		PT	[1..1]	R	R	R	R		Processing ID	Field that may be used to indicate the intent for processing the message, such as "T" (training,) "D" (debug,) or "P" (production.)
12		VID	[1..1]	R	R	R	R		Version ID	HL7 version number used to interpret format and content of the message. For this message, the version ID will always be Literal Value: 2.5.1. Note that receivers must examine MHS-21 (Message Profile Identifier) to understand which message profile the message instance conforms with.
13		NM	[0..1]	O	O	O	O		Sequence Number	
14	1..180=	ST	[0..1]	O	O	O	O		Continuation Pointer	

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
15	2..2	ID	[0..1]	CE	CE	CE	CE	HL70155	Accept Acknowledgment Type	Harmonized condition predicate: Required when MSH-21 profile id is PHLabReport-Ack or USLabReport, otherwise it may be empty or "NE".
16	2..2	ID	[0..1]	CE	CE	CE	CE	HL70155	Application Acknowledgment Type	Harmonized condition predicate: Required when MSH-21 profile id is PHLabReport-Ack or USLabReport, otherwise it may be empty or "NE". Refer to 6.1.1.2- HL7 Table 0155 - Accept/Application Acknowledgment Conditions for valid values.
17	3..3	ID	[0..1]	R	O	R	O	Country Value Set	Country Code	ELR Receiver - If empty the default is 'USA'
18	5..15	ID	[0..*]	O	O	O	O	HL70211	Character Set	
19		CWE	[0..1]	O	O	O	O		Principal Language Of Message	
20	3..13	ID	[0..1]	O	O	O	O	HL70356	Alternate Character Set Handling Scheme	

TABLE 5-1. MESSAGE HEADER SEGMENT (MSH)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
21		EI	[1..*]	R	R	R	R		Message Profile Identifier	Field used to reference or assert adherence to a message profile. Message profiles contain detailed explanations of grammar, syntax, and usage for a particular message or set of messages. This field is allowed to repeat. If multiple profiles are listed in this field, it is assumed the profiles aren't contradictory. If they were contradictory, this would be the basis for an error. The rules described by HL7 Chapter 2.1 about constraining profiles apply. The profile ID for the profile defined in this guide should appear as a Repeat. Other profile IDs may appear in the field, as well, in cases where more constrained profiles are created from this profile. An OID for this profile is available once it is assigned. Value is based on profile id from dynamic definition in section 3.3. NHSN Cardinality: The NHSN Profile currently supports a single repeat of this field.

Note: When there is no performing lab specified in the OBX, use the combination of MSH-3 and MSH-4 to define a local coding system. It is assumed that:

- Different applications within an organization with a single CLIA number may have different local coding systems (e.g., a clinical pathology application vs. an anatomic pathology application).

Chapter 5: Segment and Field Descriptions

- A single application within an organization with a single CLIA number has a single local coding system. That coding system may contain multiple value sets, for example, it may contain local value sets for observation identifier, observation value, abnormal flag, race, ethnicity, reason for study, and others.

Example:

```
MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20070701132554-0400||ORU^R01^ORU_R01|20070701132554000008|P^T|2.5.1|||NE|NE|USA|||PHLabReport-Ack^^2.16.840.1.114222.4.10.3^ISO
```

5.2 SFT – SOFTWARE SEGMENT

The software segment provides information about the sending application or other applications that manipulate the message before the receiving application processes the message. In this guide, the Laboratory Result Sender actor is required to populate the first SFT segment. Any other application that transforms the message must add an SFT segment for that application. Other applications that route or act as a conduit may add an SFT but are not required to do so. See Table 3-1. Use Case: Laboratory To Public Health, Actor, Laboratory Result Sender for further discussion the types of roles applications may play in these data exchanges. Based on that discussion, and HL7 Application (including gateways) is required to populate an SFT segment, while bridges and intermediaries may add an SFT but are not required to do so.

TABLE 5–2. SOFTWARE SEGMENT (SFT)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1		XON	[1..1]	R	R	-	-		Software Vendor Organization	
2	1..15#	ST	[1..1]	R	R	-	-		Software Certified Version or Release Number	
3	1..20#	ST	[1..1]	R	R	-	-		Software Product Name	
4	1..20#	ST	[1..1]	R	R	-	-		Software Binary ID	

TABLE 5-2. SOFTWARE SEGMENT (SFT)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
5		TX	[0..1]	O	O	-	-		Software Product Information	
6		TS	[0..1]	RE	RE	-	-		Software Install Date	

Example:

```
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^1234|1.2|An Lab System|56734||20080817
```

5.3 MSA – ACKNOWLEDGEMENT SEGMENT

The Message Response Segment (MSA) contains the information sent as acknowledgment to the order message received by a Laboratory Information System.

TABLE 5-3. ACKNOWLEDGEMENT SEGMENT (MSA)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	2..2	ID	[1..1]		R	-	R	HL70008	Acknowledgment Code	Acknowledgment code indicating receipt of message. (Refer to <i>HL7 Table 0008 - Acknowledgment Code</i> for valid values.)

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TABLE 5-3. ACKNOWLEDGEMENT SEGMENT (MSA)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
2	1..199=	ST	[1..1]		R	-	R		Message Control ID	Identifier that enables the sending system to associate this response with the message for which it is intended. This value will be the MSH.10 message control ID from the message being acknowledged.
3		ST	[0..0]		X	-	X		Text Message	Deprecated as of <i>HL7 Version 2.4</i> . See ERR segment.
4		NM	[0..1]		O	-	O		Expected Sequence Number	
5		ID	[0..0]		X	-	X		Delayed Acknowledgment Type	Deprecated as of <i>HL7 Version 2.2</i> and the detail was withdrawn and removed from the standard as of <i>HL7 Version 2.5</i> .
6		CWE	[0..0]		X	-	X		Error Condition	Deprecated as of <i>HL7 Version 2.4</i> . See ERR segment.

Example:

MSA|CA|20070701132554000008

5.4 ERR – ERROR SEGMENT

The ERR segment is used to add error comments to acknowledgment messages.

TABLE 5–4. ERROR SEGMENT (ERR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1		ELD	[0..0]	X	X	-	-		Error Code and Location	Deprecated as of <i>HL7 Version 2.5</i> . See ERR-2 Error Location and ERR-3 HL7 Error Code fields.
2		ERL	[0..*]	O	O	-	-		Error Location	
3		CWE	[1..1]	R	R	-	-	HL70357	HL7 Error Code	Identifies the HL7 (communications) error code.
4	1..1	ID	[1..*]	R	R	-	-	HL70516	Severity	Identifies the severity of an application error. Knowing if something is Error, Warning, or Information is intrinsic to how an application handles the content.
5		CWE	[0..1]	O	O	-	-	HL70533	Application Error Code	Note that HL7 table 0533 has no suggested values. It is always a user defined table, and will generally contain locally defined codes.
6	1..80#	ST	[0..10]	O	O	-	-		Application Error Parameter	
7	1..2048#	TX	[0..1]	RE	RE	-	-		Diagnostic Information	Information that may be used by help desk or other support personnel to diagnose a problem.
8	1..250#	TX	[0..1]	RE	RE	-	-		User Message	
9	1..20=	IS	[0..0]	X	X	-	-		Inform Person Indicator	Not supported.

TABLE 5–4. ERROR SEGMENT (ERR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
10		CWE	[0..0]	X	X	-	-		Override Type	Not supported.
11		CWE	[0..0]	X	X	-	-		Override Reason Code	Not supported.
12		XTN	[0..*]	RE	RE	-	-		Help Desk Contact Point	

Example:

```
ERR||OBR^1|100^Segment sequence error^HL70357|E||Missing required OBR segment|Email help desk for further information on this error|||^NET^Internet^helpdesk@hl7.org
```

5.5 PID – PATIENT IDENTIFICATION SEGMENT

The Patient Identification Segment (PID) is used to provide basic demographics regarding the subject of the testing. The subject may be a person or animal.

TABLE 5–5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	O	R		Set ID – PID	Literal Value: '1'.
2		CX	[0..0]	X	X	X	X		Patient ID	Deprecated as of <i>HL7 Version 2.3.1</i> . See PID-3 Patient Identifier List.

TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
3		CX	[1..*]	R	R	R	R		Patient Identifier List	Field used to convey all types of patient/person identifiers. This includes social security numbers, driver's license numbers, medical record numbers, etc. NHSN Cardinality: NHSN currently supports up to 4 patient identifiers.
4		CX	[0..0]	X	X	X	X		Alternate Patient ID – PID	Deprecated as of <i>HL7 Version 2.3.1</i> . See PID-3.
5		XPN	[1..*]	R	R	R	R		Patient Name	Patient name or aliases. When the name of the patient is not known, a value must still be placed in this field since the field is required. In that case, HL7 recommends the following: |~^^^^^U|. The "U" for the name type code in the second name indicates that it is unspecified. Since there may be no name components populated, this means there is no legal name, nor is there an alias. This guide will interpret this sequence to mean there is no patient name. NHSN Cardinality: NHSN currently supports up to 2 patient names.
6		XPN	[0..1]	RE	RE	O	RE		Mother's Maiden Name	May be included for identification purposes. Name type code is constrained to the value "M."

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TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
7		TS	[0..1]	RE	RE	RE	RE		Date/Time of Birth	<p>Patient's date of birth. The time zone component is optional. Note that the granularity of the birth date may be important. For a newborn, birth date may be known down to the minute, while for adults it may be known only to the date. Birth date may be used by the lab to calculate an age for the patient, which may affect what normal ranges apply to particular test results. Format: YYYY[MM[DD[HH[MM[SS[S[S[S[S]]]]]]]]] +/-ZZZZ</p> <p>Note: If a birth date is not provided in the PID, then the patient age at specimen collection must be reported as an observation associated with the specimen.</p>
8	1..20=	IS	[0..1]	RE	RE	RE	RE	HL70001	Administrative Sex	Patient's gender.
9		XPN	[0..0]	X	X	X	X		Patient Alias	Deprecated as of <i>HL7 Version 2.4</i> . See PID-5 Patient Name.
10		CWE	[0..*]	RE	RE	RE	RE	HL70005	Race	One or more codes that broadly refer to the patient's race(s).
11		XAD	[0..*]	RE	RE	O	O		Patient Address	NHSN Cardinality: NHSN currently supports a single patient address.
12	1..20=	IS	[0..0]	X	X	X	X		County Code	Deprecated as of <i>HL7 Version 2.3</i> . See PID-11 - Patient Address, component 9 County/Parish Code.

TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
13		XTN	[0..*]	RE	RE	O	O		Phone Number – Home	
14		XTN	[0..*]	RE	RE	O	O		Phone Number – Business	
15		CWE	[0..*]	O	O	O	O	PHVS_Language_ISO_639-2_Alpha3	Primary Language	Need language for communication with the patient (i.e., phone, email, letter, etc.)
16		CWE	[0..1]	O	O	O	O	HL70002	Marital Status	
17		CWE	[0..1]	O	O	O	O	HL70006	Religion	
18		CX	[0..1]	C	O	C	O		Patient Account Number	ELR: Use PID-3, with identifier type of 'AN'. NHSN Condition predicate: If PID-3 does not have an identifier with the AN type code, then this field is required and must contain an anonymous (type code = ANON) account number.
19		ST	[0..0]	X	X	X	X		SSN Number – Patient	Deprecated as of <i>HL7 Version 2.3.1</i> . See PID-3 Patient Identifier List.
20		DLN	[0..0]	X	X	X	X		Driver's License Number – Patient	Deprecated as of <i>HL7 Version 2.5</i> . See PID-3 Patient Identifier List.
21		CX	[0..*]	O	O	O	O		Mother's Identifier	
22		CWE	[0..*]	RE	RE	RE	RE	HL70189	Ethnic Group	NHSN Cardinality: NHSN currently supports a single patient ethnic group.
23	1..250#	ST	[0..1]	O	O	O	O		Birth Place	

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TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
24	1..1	ID	[0..1]	O	O	O	O	HL70136	Multiple Birth Indicator	
25	1..2=	NM	[0..1]	O	O	O	O		Birth Order	
26		CWE	[0..*]	O	O	O	O	HL70171	Citizenship	
27		CWE	[0..1]	O	O	O	O	HL70172	Veterans Military Status	
28		CWE	[0..0]	X	X	X	X		Nationality	Deprecated as of <i>HL7 Version 2.4</i> . See PID-10 Race, PID-22 Ethnic Group, and PID-26 Citizenship.
29		TS	[0..1]	RE	RE	RE	O		Patient Death Date and Time	Format: YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]]] +/-ZZZZ]
30	1..1	ID	[0..1]	RE	RE	RE	O	HL70136	Patient Death Indicator	If PID-29 is valued, then this field should be populated with "Y" since the patient is known to be dead.
31	1..1	ID	[0..1]	RE	O	O	RE	HL70136	Identity Unknown Indicator	
32	1..20=	IS	[0..*]	O	O	O	O	HL70445	Identity Reliability Code	
33		TS	[0..1]	RE	RE	O	O		Last Update Date/Time	Note: Used to indicate when demographics were last updated. Format: YYYY[MM[DD[HH[MM[SS[.S[S[S[S]]]]]]]] +/-ZZZZ]

TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
34		HD	[0..1]	CE	CE	O	O		Last Update Facility	This is the facility that originated the demographic update. ELR: Condition predicate: If PID-33 is present this is required.
35		CWE	[0..1]	RE	RE	O	X	PHVS_Animal_CDC	Species Code	Population of this field supports animal rabies testing as it relates to human rabies testing. This is a variant to HITSP where the field is not supported. If a constrained version of this guide includes support for Breed (PID-36) or Strain (PID-37), then this field would be required if Breed and or Strain is present.
36		CWE	[0..1]	O	O	O	X	Local	Breed Code	If a constrained version of this guide includes support for Strain (PID-37), then this field would be required if Strain is present. ELR Note: The value set for PID-35, PHVS_Animal_CDC, is drawn from SNOMED CT and includes breed codes as well as codes for the species. SNOMED CT is now structured such that the selection of the specific breed also implies a specific species.
37	1..80=	ST	[0..1]	O	O	O	X		Strain	
38		CWE	[0..2]	O	O	O	X	HL70429	Production Class Code	

TABLE 5-5. PATIENT IDENTIFICATION SEGMENT (PID)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
39		CWE	[0..*]	0	0	0	X	Tribal Citizenship Value Set	Tribal Citizenship	HL7 recommends using Bureau of Indian Affairs (BIA) Tribal Identity List. The following is a link to the current live list: http://www.usa.gov/Government/Tribal_Sites/index.shtml This is a link to the most recent official static list: http://edocket.access.gpo.gov/2008/E8-6968.htm

Example :

```
PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.840.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.113883.4.1^ISO^SS||Everyman^Adam^A^^^^L^^^^^^^BS|Mum^Martha^M^^^^M|20050602|M||2106-3^White^CDCREC^^^^04/24/2007|2222 Home Street^^Ann Arbor^MI^99999^USA^H||^PRN^PH^^1^555^5552004|^WPN^PH^^1^955^5551009|eng^English^ISO6392^^^^3/29/2007|M^Married^HL70002^^^^2.5.1|||||N^Not Hispanic or Latino^HL70189^^^^2.5.1|||||||N|||200808151000-0700|Reliable^2.16.840.1.113883.19.3.1^ISO
```

5.6 NK1 – NEXT OF KIN SEGMENT

If the subject of the testing is something other than a person, the NK1 will document the person or organization responsible for or owning the subject. For patients who are persons, the NK1 documents the next of kin of the patient. This is particularly important for lead testing of minors, since the NK1 is used to document information about the parent or guardian. For animal patients, the NK1 documents the person or organization that owns or is responsible for the animal. This is where the employment information for the patient is documented.

TABLE 5-6. NEXT OF KIN SEGMENT (NK1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	-	-		Set ID – NK1	For the first repeat of the NK1 segment, the sequence number shall be one (1), for the second repeat, the sequence number shall be two (2), etc.
2		XPN	[0..*]	CE	CE	-	-		Name	Name of the next of kin or associated party. Multiple names for the same entity are allowed, but the legal name must be sent in the first sequence. If the legal name is not sent, the repeat delimiter must be sent in the first sequence. ELR Condition predicate: If next of kin or associated party is a person use this field, otherwise, use field NK1-13
3		CWE	[0..1]	RE	RE	-	-	HL70063	Relationship	Description of the relationship between the next of kin/related party and the patient. It is of particular importance when documenting the parent or guardian of a child patient or the owner of an animal patient.
4		XAD	[0..*]	RE	RE	-	-		Address	Component that may contain the address of the next of kin/associated party.
5		XTN	[0..*]	RE	RE	-	-		Phone Number	Field that may contain the telephone number of the next of kin/associated party. Multiple phone numbers are allowed

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TABLE 5-6. NEXT OF KIN SEGMENT (NK1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
6		XTN	[0..0]	X	X	-	-		Business Phone Number	Not supported. Use NK1-5.
7		CWE	[0..0]	X	X	-	-		Contact Role	Not supported.
8		DT	[0..0]	X	X	-	-		Start Date	Not supported.
9		DT	[0..0]	X	X	-	-		End Date	Not supported.
10	1..60#	ST	[0..0]	X	X	-	-		Next of Kin / Associated Parties Job Title	Not supported.
11		JCC	[0..0]	X	X	-	-		Next of Kin / Associated Parties Job Code/Class	Not supported.
12		CX	[0..0]	X	X	-	-		Next of Kin / Associated Parties Employee Number	Not supported.
13		XON	[0..1]	CE	CE	-	-		Organization Name – NK1	ELR Condition predicate: If next of kin or associated party is an organization use this field, otherwise, use field NK1-2.
14		CWE	[0..0]	X	X	-	-		Marital Status	Not supported.
15	1..20=	IS	[0..0]	X	X	-	-		Administrative Sex	Not supported.
16		TS	[0..0]	X	X	-	-		Date/Time of Birth	Not supported.
17	1..20=	IS	[0..0]	X	X	-	-		Living Dependency	Not supported.
18	1..20=	IS	[0..0]	X	X	-	-		Ambulatory Status	Not supported.
19		CWE	[0..0]	X	X	-	-		Citizenship	Not supported.

TABLE 5-6. NEXT OF KIN SEGMENT (NK1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
20		CWE	[0..1]	O	O	-	-	PHVS_Language_ISO_639-2_Alpha3	Primary Language	Need language for communication with the patient (i.e., phone, email, letter, etc.)
21	1..20=	IS	[0..0]	X	X	-	-		Living Arrangement	Not supported.
22		CWE	[0..0]	X	X	-	-		Publicity Code	Not supported.
23	1..1	ID	[0..0]	X	X	-	-		Protection Indicator	Not supported.
24	1..20=	IS	[0..0]	X	X	-	-		Student Indicator	Not supported.
25		CWE	[0..0]	X	X	-	-		Religion	Not supported.
26		XPN	[0..0]	X	X	-	-		Mother's Maiden Name	Not supported.
27		CWE	[0..0]	X	X	-	-		Nationality	Not supported.
28		CWE	[0..0]	X	X	-	-		Ethnic Group	Not supported.
29		CWE	[0..0]	X	X	-	-		Contact Reason	Not supported.
30		XPN	[0..*]	CE	CE	-	-		Contact Person's Name	ELR Condition predicate: Required if NK1-13 is populated.
31		XTN	[0..*]	RE	RE	-	-		Contact Person's Telephone Number	
32		XAD	[0..*]	RE	RE	-	-		Contact Person's Address	
33		CX	[0..0]	X	X	-	-		Next of Kin/Associated Party's Identifiers	Not supported.

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TABLE 5-6. NEXT OF KIN SEGMENT (NK1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
34	1..20=	IS	[0..0]	X	X	-	-		Job Status	Not supported.
35		CWE	[0..0]	X	X	-	-		Race	Not supported.
36	1..20=	IS	[0..0]	X	X	-	-		Handicap	Not supported.
37	1..16#	ST	[0..0]	X	X	-	-		Contact Person Social Security Number	Not supported.
38	1..250#	ST	[0..0]	X	X	-	-		Next of Kin Birth Place	Not supported.
39	1..20=	IS	[0..0]	X	X	-	-		VIP Indicator	Not supported.

Example :

NK1 | 1 | Mum^Martha^M^^^L | MTH^Mother^HL70063^^^2.5.1 | 444 Home Street^Apt B^Ann Arbor^MI^99999^USA^H | ^PRN^PH^^1^555^5552006

5.7 PV1 – PATIENT VISIT INFORMATION

This segment contains basic inpatient or outpatient encounter information.

TABLE 5-7. PATIENT VISIT INFORMATION (PV1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	O	R		Set ID - PV1	Literal Value: '1'.
2	1..20=	IS	[1..1]	R	R	R	R	HL70004	Patient Class	A gross identification of the classification of patient's visit
3		PL	[0..1]	C	O	RE	C		Assigned Patient Location	Lab to EHR Condition predicate: Required if PV1-2 is "inpatient."
4	1..20=	IS	[0..1]	CE	RE	O	CE	Admission Type Value Set	Admission Type	Lab to EHR Condition predicate: Required if PV1-2 is "inpatient."
5		CX	[0..1]	O	O	O	O		Preadmit Number	
6		PL	[0..1]	O	O	O	O		Prior Patient Location	
7		XCN	[0..*]	O	O	O	O		Attending Doctor	
8		XCN	[0..*]	O	O	O	O		Referring Doctor	
9		XCN	[0..*]	O	O	O	O		Consulting Doctor	
10	1..20=	IS	[0..1]	RE	O	RE	RE	Local	Hospital Service	
11		PL	[0..1]	O	O	O	X		Temporary Location	
12	1..20=	IS	[0..1]	O	O	O	O	HL70087	Preadmit Test Indicator	

Chapter 5: Segment and Field Descriptions

TABLE 5-7. PATIENT VISIT INFORMATION (PV1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
13	1..20=	IS	[0..0]	X	X	X	X		Re-admission Indicator	Not supported.
14	1..20=	IS	[0..1]	O	O	O	X	HL70023	Admit Source	
15	1..20=	IS	[0..0]	X	X	X	X		Ambulatory Status	Not supported.
16	1..20=	IS	[0..0]	X	X	X	X		VIP Indicator	Not supported.
17		XCN	[0..*]	O	O	O	O		Admitting Doctor	
18	1..20=	IS	[0..1]	O	O	O	O	HL70018	Patient Type	
19		CX	[0..1]	RE	O	RE	O		Visit Number	
20		FC	[0..*]	O	O	O	O		Financial Class	
21	1..20=	IS	[0..0]	X	X	X	X		Charge Price Indicator	Not supported.
22	1..20=	IS	[0..0]	X	X	X	X		Courtesy Code	Not supported.
23	1..20=	IS	[0..0]	X	X	X	X		Credit Rating	Not supported.
24	1..20=	IS	[0..0]	X	X	X	X		Contract Code	Not supported.
25		DT	[0..0]	X	X	X	X		Contract Effective Date	Not supported.
26	1..12=	NM	[0..0]	X	X	X	X		Contract Amount	Not supported.
27	1..3=	NM	[0..0]	X	X	X	X		Contract Period	Not supported.
28	1..20=	IS	[0..0]	X	X	X	X		Interest Code	Not supported.
29	1..20=	IS	[0..0]	X	X	X	X		Transfer to Bad Debt Code	Not supported.

TABLE 5-7. PATIENT VISIT INFORMATION (PV1)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
30		DT	[0..1]	O	O	O	O		Transfer to Bad Debt Date	
31	1..20=	IS	[0..1]	O	O	O	O	HL70021	Bad Debt Agency Code	
32	1..12=	NM	[0..1]	O	O	O	O		Bad Debt Transfer Amount	
33	1..12=	NM	[0..1]	O	O	O	O		Bad Debt Recovery Amount	
34	1..20=	IS	[0..1]	O	O	O	O	HL70111	Delete Account Indicator	
35		DT	[0..1]	O	O	O	O		Delete Account Date	
36	1..20=	IS	[0..1]	RE	O	O	RE	HL70112	Discharge Disposition	Disposition of the patient at discharge or once the visit is completed, for example, "Discharged to Home/Self-Care", "Expired", "Left Against Medical Advice". Uses Uniform Billing codes.
37		DLD	[0..1]	O	O	RE	O		Discharged to Location	
38		CWE	[0..1]	O	O	O	O	HL70114	Diet Type	
39	1..20=	IS	[0..1]	O	O	O	O	HL70115	Servicing Facility	
40	1..20=	IS	[0..0]	X	X	X	X		Bed Status	Not supported
41	1..20=	IS	[0..1]	O	O	O	O	HL70117	Account Status	
42		PL	[0..1]	O	O	O	O		Pending Location	

5.8 PV2 – PATIENT VISIT – ADDITIONAL INFORMATION SEGMENT

The PV2 segment is a continuation of information contained on the PV1 segment.

TABLE 5–8. PATIENT VISIT – ADDITIONAL INFORMATION (PV2)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1		PL	[0..0]	X	X	-	X		Prior Pending Location	Not supported
2		CWE	[0..0]	X	X	-	X		Accommodation Code	Not supported.
3		CWE	[0..1]	RE	O	-	RE	Local	Admit Reason	A generalized explanation of why the patient needed services. Frequently used for chief complaint. Has no universally accepted value set.
4		CWE	[0..0]	X	X	-	X		Transfer Reason	Not supported.
5	1..25=	ST	[0..0]	X	X	-	X		Patient Valuables	Not supported.
6	1..25=	ST	[0..0]	X	X	-	X		Patient Valuables Location	Not supported.
7	1..20=	IS	[0..0]	X	X	-	X		Visit User Code	Not supported.
8		TS	[0..0]	X	X	-	X		Expected Admit Date/Time	Not supported.
9		TS	[0..0]	X	X	-	X		Expected Discharge Date/Time	Not supported.
10	1..3=	NM	[0..0]	X	X	-	X		Estimated Length of Inpatient Stay	Not supported.

TABLE 5-8. PATIENT VISIT - ADDITIONAL INFORMATION (PV2)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
11	1..3=	NM	[0..0]	X	X	-	X		Actual Length of Inpatient Stay	Not supported.
12	1..50#	ST	[0..0]	X	X	-	X		Visit Description	Not supported.
13		XCN	[0..0]	X	X	-	X		Referral Source Code	Not supported.
14		DT	[0..0]	X	X	-	X		Previous Service Date	Not supported.
15	1..1	ID	[0..1]	RE	O	-	RE	HL70136	Employment Illness Related Indicator	Coded value indicating whether services are provided as a consequence of employment
16	1..20=	IS	[0..0]	X	X	-	X		Purge Status Code	Not supported.
17		DT	[0..0]	X	X	-	X		Purge Status Date	Not supported.
18	1..20=	IS	[0..0]	X	X	-	X		Special Program Code	Not supported.
19	1..1	ID	[0..0]	X	X	-	X		Retention Indicator	Not supported.
20	1..1=	NM	[0..0]	X	X	-	X		Expected Number of Insurance Plans	Not supported.
21	1..20=	IS	[0..0]	X	X	-	X		Visit Publicity Code	Not supported.
22	1..1	ID	[0..0]	X	X	-	X		Visit Protection Indicator	Not supported.

TABLE 5-8. PATIENT VISIT - ADDITIONAL INFORMATION (PV2)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
23		XON	[0..*]	RE	O	-	RE		Clinic Organization Name	Name of the organization within a facility that provides patient care. Name shall be unique within any given facility.
24	1..20=	IS	[0..0]	X	X	-	X		Patient Status Code	Not supported.
25	1..20=	IS	[0..0]	X	X	-	X		Visit Priority Code	Not supported.
26		DT	[0..1]	O	O	-	X		Previous Treatment Date	
27	1..20=	IS	[0..0]	X	X	-	X		Expected Discharge Disposition	Not supported.
28		DT	[0..0]	X	X	-	X		Signature on File Date	Not supported.
29		DT	[0..1]	O	O	-	X		First Similar Illness Date	
30		CWE	[0..0]	X	X	-	X		Patient Charge Adjustment Code	Not supported.
31	1..20=	IS	[0..0]	X	X	-	X		Recurring Service Code	Not supported.
32	1..1	ID	[0..0]	X	X	-	X		Billing Media Code	Not supported.
33		TS	[0..0]	X	X	-	X		Expected Surgery Date and Time	Not supported.
34	1..1	ID	[0..0]	X	X	-	X		Military Partnership Code	Not supported.

TABLE 5-8. PATIENT VISIT - ADDITIONAL INFORMATION (PV2)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
35	1..1	ID	[0..0]	X	X	-	X		Military Non-Availability Code	Not supported.
36	1..1	ID	[0..0]	X	X	-	X		Newborn Baby Indicator	Not supported.
37	1..1	ID	[0..0]	X	X	-	X		Baby Detained Indicator	Not supported.
38		CWE	[0..0]	X	X	-	X		Mode of Arrival Code	Not supported.
39		CWE	[0..0]	X	X	-	X		Recreational Drug Use Code	Not supported.
40		CWE	[0..1]	RE	O	-	RE	HL70432	Admission Level of Care Code	A generalized identification of patient's acuity for the services received during the visit covered by this message
41		CWE	[0..0]	X	X	-	X		Precaution Code	Not supported.
42		CWE	[0..0]	X	X	-	X		Patient Condition Code	Not supported.
43	1..20=	IS	[0..0]	X	X	-	X		Living Will Code	Not supported.
44	1..20=	IS	[0..0]	X	X	-	X		Organ Donor Code	Not supported.
45		CWE	[0..0]	X	X	-	X		Advance Directive Code	Not supported.
46		DT	[0..0]	X	X	-	X		Patient Status Effective Date	Not supported.

TABLE 5-8. PATIENT VISIT - ADDITIONAL INFORMATION (PV2)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
47		TS	[0..0]	X	X	-	X		Expected LOA Return Date/Time	Not supported.
48		TS	[0..0]	X	X	-	X		Expected Pre-admission Testing Date/Time	Not supported.
49		IS	[0..0]	X	X	-	X		Notify Clergy Code	Not supported.

Example:

```
PV2|||1^Sick^99AdmitReason|||||||||N|||||Level Seven Healthcare,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^1234|||20010603|||19990603
```

5.9 ORC – COMMON ORDER SEGMENT

The Common Order Segment (ORC) identifies basic information about the order for testing of the specimen. This segment includes identifiers for the order, who placed the order, when it was placed, what action to take regarding the order, etc.

TABLE 5-9. COMMON ORDER SEGMENT (ORC)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	2..2	ID	[1..1]	R	R	-	R	HL70119	Order Control	Determiner of the function of the order segment. In the ORU^R01 this should be the literal value: "RE."
2		EI	[0..1]	CE	CE	-	CE		Placer Order Number	ELR & Lab to EHR Condition predicate: If OBR-2 Placer Order Number is populated; this field must contain the same value as OBR-2.
3		EI	[1..1]	R	R	-	R		Filler Order Number	This field must contain the same value as OBR-3 Filler Order Number. Note: In the circumstance where some of the lab results are generated by the lab, but others are performed by a reference lab, the sending lab can choose what filler order number to use, but what ever is used, the sending lab is expected to be able to trace all the observations in the lab result back to the appropriate source lab based on the filler order number provided in ORC-3.
4		EI	[0..1]	RE	RE	-	RE		Placer Group Number	The placer group number is used to identify a group of orders. In the laboratory setting this is commonly referred to as a "requisition number."
5	2..2	ID	[0..1]	O	O	-	O	HL70038	Order Status	
6	1..1	ID	[0..1]	O	O	-	O	HL70121	Response Flag	

TABLE 5–9. COMMON ORDER SEGMENT (ORC)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
7		TQ	[0..0]	X	X	-	X		Quantity/Timing	Deprecated as of <i>HL7 Version 2.5</i> . See TQ1 and TQ2 segments.
8		EIP	[0..1]	O	O	-	O		Parent	
9		TS	[0..1]	O	O	-	O		Date/Time of Transaction	
10		XCN	[0..*]	O	O	-	O		Entered By	
11		XCN	[0..*]	O	O	-	O		Verified By	
12		XCN	[0..*]	CE	CE	-	O		Ordering Provider	ELR Condition predicate: If OBR.16 Ordering Provider is populated, this field will contain the same value.
13		PL	[0..1]]	O	O	-	O		Enterer's Location	
14		XTN	[0..*]	CE	CE	-	O		Call Back Phone Number	ELR Condition predicate: If OBR-17 Callback Phone Number is populated, this field will contain the same value. This should be a phone number associated with the original order placer. ELR Cardinality: ELR currently supports up to call back phone numbers.
15		TS	[0..1]	O	O	-	O		Order Effective Date/Time	
16		CWE	[0..1]	O	O	-	O	Local	Order Control Code Reason	
17		CWE	[0..1]	O	O	-	O	Local	Entering Organization	
18		CWE	[0..1]	O	O	-	O	Local	Entering Device	

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TABLE 5–9. COMMON ORDER SEGMENT (ORC)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
19		XCN	[0..*]	O	O	-	O		Action By	
20		CWE	[0..0]	X	X	-	X		Advanced Beneficiary Notice Code	Not supported.
21		XON	[1..*]	R	R	-	O		Ordering Facility Name	ELR Cardinality: ELR supports a single ordering facility name.
22		XAD	[1..*]	R	R	-	O		Ordering Facility Address	The address of the facility where the order was placed. ELR Cardinality: ELR supports a single ordering facility address
23		XTN	[1..*]	R	R	-	O		Ordering Facility Phone Number	
24		XAD	[0..*]	RE	RE	-	O		Ordering Provider Address	The address of the ordering provider.
25		CWE	[0..1]	O	O	-	O	Local	Order Status Modifier	
26		CWE	[0..0]	X	X	-	X		Advanced Beneficiary Notice Override Reason	Not supported.
27		TS	[0..1]	O	O	-	O		Filler's Expected Availability Date/Time	
28		CWE	[0..1]	O	O	-	O	HL70177	Confidentiality Code	
29		CWE	[0..1]	O	O	-	O	HL70482	Order Type	

TABLE 5–9. COMMON ORDER SEGMENT (ORC)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
30		CNE	[0..1]	0	0	-	0	HL70483	Enterer Authorization Mode	
31		CWE	[0..1]	0	0	-	0	Strongly recommend using Laboratory Order Value Set from HITSP	Parent Universal Service Identifier	

Example:

```
ORC|RE||CHEM9700122^MediLabCo-
Seattle^45D0470381^CLIA|||||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^E
I^&2.16.840.1.113883.19.4.6^ISO^^^^^^MD|^WPN^PH^1^555^5551005|||||Level Seven
Healthcare, Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005 Healthcare Drive^^Ann
Arbor^MI^99999^USA^B|^WPN^PH^1^555^5553001|4444 Healthcare Drive^Suite 123^Ann
Arbor^MI^99999^USA^B
```

5.10 OBR – OBSERVATION REQUEST SEGMENT

The Observation Request Segment (OBR) is used to capture information about one test being performed on the specimen. Most importantly, the OBR identifies the type of testing to be performed on the specimen and ties that information to the order for the testing.

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	O	R		Set ID - OBR	For the first repeat of the OBR segment, the sequence number shall be one (1), for the second repeat, the sequence number shall be two (2), etc.
2		EI	[1..1]	RE	RE	RE	RE		Placer Order Number	<p>This identifier is assigned by the placer of the order being fulfilled by this result message. This identifier distinguishes the placer's order from all other orders created by the placer where an order is interpreted to be the testing identified in a single OBR segment. Normally, it is a type of system identifier assigned by the placer software application.</p> <p>The Placer Order Number and the Filler Order Number are essentially foreign keys exchanged between applications for uniquely identifying orders and the associated results across applications.</p>

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
3		EI	[1..1]		R	R	R		Filler Order Number	<p>Order number associated with the Filling Application. This number is assigned to the test by the organization performing the test. This field should not contain the accession number or specimen identifier for a specimen unless these identifiers meet the criteria for a filler order number. The specimen or accession identifier should be placed in SPM-2. The Filler Order Number identifies this order as distinct from all other orders being processed by this filler where an order is interpreted to be the testing identified in a single OBR segment. Normally, this is a type of system identifier assigned by the filler software application.</p> <p>The Filler Order Number, along with the Placer Order Number, is essentially foreign keys exchanged between applications for uniquely identifying orders and the associated results across applications.</p> <p>In messages containing multiple OBRs, each OBR must be identified by a unique Filler Order Number. This is critical for making parent/child results relationships work properly. Microbiology cultures and sensitivities are linked in this fashion in this profile. See <i>Appendix A, Section A.4. Linking Parent and Child Results</i>, of this document for more information on linking parent/child results.</p>

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
4		CWE	[1..1]	R	R	R	R	Strongly recommend using Laboratory Order Value Set from HITSP.	Universal Service Identifier	Identifier code for the requested observation/test/ battery. Strongly recommend Laboratory Order Value Set, which is based on LOINC.
5		ID	[0..0]	X	X	X	X		Priority – OBR	Deprecated as of <i>HL7 Version 2.3</i> . See TQ1-9 Priority Field.
6		TS	[0..0]	X	X	X	X		Requested Date/Time	Deprecated as of <i>HL7 Version 2.3</i> . See TQ1-8 Start Date/Time.

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
7		TS	[1..1]	R	R	R	R		Observation Date/Time	For specimen-based observations, the date/time the specimen was collected. A minimum of year, month and day must be provided when the actual date/time is known. For unknown collection date/time use "0000". If the SPM is sent, this field must contain the same value as the first component of SPM-17 Specimen Collection Date/Time. HL7 requires this field in an OBR in a result message. For OBXs related to this OBR and related to the testing of a specimen, OBX-14 (Date/Time of the Observation) shall contain the same value as this field. Format: YYYYMMDD[HH[MM[SS[.S[S[S[S]]]]]]]+/-ZZZZ] except when reporting an unknown date of '0000"
8		TS	[0..1]	CE	CE	O	RE		Observation End Date/Time	For specimen-based observations where the specimen was collected over a period of time, this represents the end point in time when the specimen was collected. ELR Condition predicate: This field must contain the same value as the second component of SPM-17 Specimen Collection Date/Time.

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TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
9		CQ	[0..0]	X	X	X	X		Collection Volume	Deprecated as of <i>HL7 Version 2.5</i> . See SPM-12 Specimen Collection Amount.
10		XCN	[0..*]	O	O	O	O		Collector Identifier	
11	1..1	ID	[0..1]	O	O	O	O	HL70065	Specimen Action Code	
12		CWE	[0..1]	O	O	O	O	Local	Danger Code	
13		ST	[0..1]	RE	RE	O	O		Relevant Clinical Information	
14		TS	[0..0]	X	X	X	X		Specimen Received Date/Time	Deprecated as of <i>HL7 Version 2.5</i> . See SPM-18 Specimen Received Date/Time.
15		SPS	[0..0]	X	X	X	X		Specimen Source	Deprecated as of <i>HL7 Version 2.5</i> . See SPM-4 Specimen Type.
16		XCN	[0..*]	RE	RE	O	RE		Ordering Provider	Identifier of the provider who ordered the testing being performed. The National Provider Identifier (NPI) may be used as the identifier. Note that ORC.12 Ordering Provider is constrained to contain the same value as this field.

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
17		XTN	[0..2]	RE	RE	O	O		Order Callback Phone Number	This is the number the laboratory can call with questions regarding the order. This should be a phone number associated with the original order placer. Note that ORC.17 Call Back Phone Number is constrained to contain the same value as this field.
18	1..199=	ST	[0..1]	O	O	O	O		Placer Field 1	
19	1..199=	ST	[0..1]	O	O	O	O		Placer Field 2	
20	1..199=	ST	[0..1]	O	O	O	O		Filler Field 1	
21	1..199=	ST	[0..1]	O	O	O	O		Filler Field 2	
22		TS	[1..1]	R	R	R	R		Results Rpt/Status Chng - Date/Time	Required field in this message. Applies to the entire report. Receipt of a subsequent message with the same Filler Number and a different status in this field implies that processing may need to occur at the receiving application level to update a previous report. Format: YYYYMMDDHHMMSS.SS[...]+/-ZZZZ
23		MOC	[0..1]	O	O	O	O		Charge to Practice	
24	2..3	ID	[0..1]	RE	O	RE	RE	HL70074	Diagnostic Serv Sect ID	
25	1..1	ID	[1..1]	R	R	R	R	V2 Result Status Value Set	Result Status	

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
26		PRL	[0..1]	CE	CE	C	CE		Parent Result	Field that, together with OBR-29 Parent, allows this result to be linked to a specific OBX segment associated with another OBR segment. See <i>Appendix A, Section A.4. Linking Parent and Child Results</i> , of this document for more information on linking parent/child results. Harmonized condition predicate: This field is required when linking child sensitivities to the parent culture.
27		TQ	[0..0]	X	X	X	X		Quantity/Timing	Deprecated as of <i>HL7 Version 2.5</i> . See TQ1 and TQ2 segments.
28		XCN	[0..*]	RE	O	O	RE		Result Copies To	

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
29		EIP	[0..1]	CE	CE	C	C		Parent	Used to link this OBR with a parent OBR. Commonly used with microbiology messages to link a susceptibility result with the parent culture that identified the organism. For this linkage to work properly, the Placer Order Number and the Filler Order Number must uniquely identify the specific parent OBR. This means that the same Filler Number cannot be used to identify multiple OBRs. See <i>Appendix A, Section A.4. Linking Parent and Child Results</i> , of this document for more information on linking parent/child results. Harmonized condition predicate: This field is required if OBR-24 carries the value "MB" and OBR-4 indicates the ordered test is a culture and sensitivity. Parent/child linking should be used when the specimen type changes between the parent and child result (specimen and isolate/component specimen) or for reflex tests.
30	4..4	ID	[0..0]	X	X	X	X		Transportation Mode	Not supported.
31		CWE	[0..*]	RE	RE	RE	O	Reason For Study Value Set	Reason for Study	We know ICD9 is used today, but we will allow ICD10 when the US starts using it.
32		NDL	[0..1]	RE	RE	O	O		Principal Result Interpreter	Used for pathology results.

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TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
33		NDL	[0..*]	O	O	O	O		Assistant Result Interpreter	
34		NDL	[0..*]	O	O	O	O		Technician	
35		NDL	[0..*]	O	O	O	O		Transcriptionist	
36		TS	[0..1]	O	O	O	O		Scheduled Date/Time	
37	1..16=	NM	[0..0]	X	X	X	X		Number of Sample Containers	Not supported. See SPM-26
38		CWE	[0..0]	X	X	X	X		Transport Logistics of Collected Sample	Not supported.
39		CWE	[0..*]	O	O	O	O	Local	Collector's Comment	
40		CWE	[0..0]	X	X	X	X		Transport Arrangement Responsibility	Not supported.
41	1..1	ID	[0..0]	X	X	X	X		Transport Arranged	Not supported.
42	1..1	ID	[0..0]	X	X	X	X		Escort Required	Not supported.
43		CWE	[0..0]	X	X	X	X		Planned Patient Transport Comment	Not supported.
44		CWE	[0..1]	O	O	O	O	HL70088	Procedure Code	

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
45		CWE	[0..*]	0	0	0	0	HL70340	Procedure Code Modifier	
46		CWE	[0..*]	0	0	0	0	HL70411	Placer Supplemental Service Information	
47		CWE	[0..*]	0	0	0	0	HL70411	Filler Supplemental Service Information	
48		CWE	[0..1]	0	0	0	0	HL70476	Medically Necessary Duplicate Procedure Reason	
49		IS	[0..1]	0	0	0	0	HL70507	Result Handling	

Chapter 5: Segment and Field Descriptions

TABLE 5-10. OBSERVATION REQUEST SEGMENT (OBR)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
50		CWE	[0..1]	0	0	0	0	Strongly recommend using Laboratory Order Value Set from HITSP	Parent Universal Service Identifier	This field has been retained as optional to allow ELR implementations with Labs that do not support unique placer or filler order numbers. In some cases the lab's filler order number equates with a requisition number that in conjunction with the Universal Service ID will constitute a unique identifier for the order. For parent/child result linking to work in these situations, the sending lab will need to populate not only OBR-29, but this field also. The receiving application will need to use both OBR-29 and this field to properly link these results. We note that such implementations will not be conformant with this guide, but optional support for this field has been retained so that states may still communicate with these labs in a non-conformant manner.

Note: In the circumstance where some of the lab results are generated by the lab, but others are performed by a reference lab, the sending lab can choose what filler order number to use. Which ever filler order number is used, the sending lab is expected to be able to trace all the observations in the lab result back to the appropriate source lab based on the filler order number provided in OBR-3.

Example :

```
OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|5054
5-3^Bacterial susceptibility panel:-:Pt:Isolate:OrdQn:MIC^LN^^^^2.26|||200808151030-
0700|||anemia|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI&2.16.840.1
.113883.19.4.6^ISO^^^^^^MD|^WPN^PH^1^555^5551005|||2008081830-0700|||F|625-4&Bacteria
```

```
identified:Prid:Pt:Stool:Nom:Culture&LN^1^Campylobacter
jejuni|||23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO||
787.91^DIARRHEA^I9CDX^^^07/09/2008|1235&Slide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO
```

5.11 TQ1 – TIMING/QUANTITY SEGMENT

The TQ1 segment is used to specify the timing of events and actions such as those that occur in order management and scheduling systems.

TABLE 5-11. TIME/QUANTITY SEGMENT FOR ORDER GROUP

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	-	-	R		Set ID - TQ1	Sequence number of the timing specification, the first of which shall be 1; the second of which shall be 2; and so on.
2		CQ	[0..1]	O	-	-	O	Unified Code for Units of Measure (UCUM)	Quantity	
3		RPT	[0..*]	O	-	-	O		Repeat Pattern	
4		TM	[0..*]	O	-	-	O		Explicit Time	
5		CQ	[0..*]	O	-	-	O	Unified Code for Units of Measure (UCUM)	Relative Time and Units	
6		CQ	[0..1]	O	-	-	O	Unified Code for Units of Measure (UCUM)	Service Duration	

TABLE 5-11. TIME/QUANTITY SEGMENT FOR ORDER GROUP

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
7		TS	[0..1]	RE	-	-	RE		Start date/time	Field that may be specified by the requester, in which case it indicates the earliest date/time at which the services should be started. In many cases, however, the start date/time will be implied or will be defined by other fields in the service request record (e.g., urgency - STAT). The filling service may record a value in this field after receipt of the service request.
8		TS	[0..1]	O	-	-	O		End date/time	
9		CWE	[0..*]	RE	-	-	RE	HL70485	Priority	Urgency of the request. If this field is blank, the default is R (routine). Multiple priorities may be assigned to one order.
10	1..250=	TX	[0..1]	O	-	-	O		Condition text	
11	1..250=	TX	[0..1]	O	-	-	O		Text instruction	
12	1..1	ID	[0..1]	O	-	-	O	HL70472	Conjunction	
13		CQ	[0..1]	O	-	-	O	Unified Code for Units of Measure (UCUM)	Occurrence duration	
14	1..10=	NM	[0..1]	O	-	-	O		Total occurrence's	

Example:

TQ1|1|||200907291200+0400||R^Routine^HL70485

5.12 OBX – OBSERVATION/RESULT SEGMENT

The Observation/Result Segment (OBX) contains information regarding a single observation related to a single test (OBR) or specimen (SPM). This includes identification of the specific type of observation, the result for the observation, when the observation was made, etc.

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	R	R		Set ID – OBX	For the first repeat of the OBX segment, the sequence number shall be one (1), for the second repeat, the sequence number shall be two (2), etc.
2	2..3	ID	[0..1]	CE	CE	CE	CE	HL70125	Value Type	This field identifies the data type used for OBX-5. Conditional statement: If OBX-5 is populated, OBX-2 is required. See <i>Section 5.8.1, HL7 Table 0125</i> for the data types that will be supported for this field and OBX-5.

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
3		CWE	[1..1]	R	R	R	R	Laboratory Observation Identifier Value Set	Observation Identifier	<p>Unique identifier for the type of observation. This field provides a code for the type of observation. OBX-3 in conjunction with OBX-4 Observation Sub-ID should uniquely identify this OBX from all other OBXs associated with this OBR.</p> <p>LOINC is used as the coding system for this field except where the test being reported has no equivalent LOINC code. In this case, use of local codes is allowed. This should only occur for new tests that have yet been coded by LOINC.</p> <p>When populating this field with values, this guide does not give preference to the triplet in which the standard (LOINC) code should appear.</p> <p>Lab to EHR - LOINC® is an HL7 approved code system and shall be used for the Observation Identifier as described in the appropriate HITSP Interoperability Specification. Use of LOINC codes for additional tests is strongly encouraged.</p>
4	1..20=	ST	[0..1]	CE	CE	C	C		Observation Sub-ID	<p>Harmonized condition predicate: Required if there is more than one OBX with the same OBX-3 Observation Identifier associated with the same OBR. Normally, this field is populated with a number, but text values may be used also.</p>

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
5		Var	[0..1]	CE	CE	RE	C	For coded observation values, use Coded Laboratory Observation Value Set.	Observation Value	Field that documents each specific, allowed data type. See Section 6.1.1.1, <i>HL7 Table 0125</i> for the data types that will be supported for this field. Harmonized Condition predicate: Either OBX-5 or OBX-8 (Abnormal flags) must be present in the message except if OBX-11 is 'X', result can not be obtained.
6		CWE	[0..1]	CE	CE	O	CE	Unified Code for Units of Measure (UCUM)	Units	UCUM® is an HL7-approved code system and shall be used for units as described in the appropriate HITSP Interoperability Specification. The UCUM unit of measure for values without a unit of measure is "1". Harmonized Conditional statement: If the data type in OBX 2 is "NM" or "SN" and the OBX-11 observation result status is not 'X' then this field is required.
7	1..60=	ST	[0..1]	RE	RE	RE	RE		References Range	Interpretation range that applies to the value reported in OBX-5. It should provide enough information to understand the abnormal flags reported in OBX-8. ELR Note-It is not appropriate to send the reference range for a result in an associated NTE segment. It would be appropriate to send information amplifying the reference range provided in this field in an NTE associated with this OBX.

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
8	1..20=	CWE	[0..*]	CE	CE	RE	RE	Lab to EHR, NHSN- HL70078 (2.5.1) ELR- HL70078 (2.7)	Abnormal Flags	Indicator of the normalcy of the result found in OBX-5. Cardinality indicates the possible need for multiple abnormal flags, as in the following example: <i>Example: Hemoglobin has a normal range of 12-16</i> <i>Initial result (reported in a separate ORU message based on testing an earlier specimen): HGB = 15.9 (results normal)</i> <i>Current result (in this OBX based on current specimen): HGB = 11.9 abnormality: (L) below low normal and a (D) significant change down (delta > 3).</i> In this example, OBX-8 would be set to |L-D|. Microbiology example: Ceftazidime susceptibility (LOINC 133-9) value = |<=^1|, units = ug/ml, Abnormal flag = S ELR-Note that this IG is adopting HL70078 form 2.7. NHSN has pre-adopted the CWE data type for this field from 2.7. ELR Condition predicate: Required if OBX-5 is empty the OBX-11 observation result status is not 'X', result cannot be obtained. NHSN Cardinality: NHSN supports a single Abnormal Flag.

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
9	1..5#	NM	[0..1]	O	O	O	O		Probability	
10	1..2	ID	[0..1]	O	O	O	O	HL70080	Nature of Abnormal Test	
11	1..1	ID	[1..1]	R	R	R	R	HL70085	Observation Result Status	Status of the observation result.
12		TS	[0..1]	O	O	O	O		Effective Date of Reference Range	
13	20=	ST	[0..1]	O	O	O	O		User-Defined Access Checks	

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
14		TS	[0..1]	CE	CE	RE	RE		Date/Time of the Observation	<p>The date/time of observation is intended to carry the clinically relevant time of the observation. For specimen-based laboratory reporting, the specimen collection date and time. For observations carried out directly on a patient for instance, such as a blood pressure, the time the observation was performed also happens to be the clinically relevant time of the observation.</p> <p>The date/time the testing was performed should be reported in OBX-19</p> <p>ELR Condition predicate: For observations related to the testing of a specimen, OBX-14 (Date/Time of the Observation) shall contain specimen collection time and will be the same value as OBR-7 and SPM-17.1.</p> <p>Format: YYYYMMDD[HH[MM[SS[S[S[S[S]]]]]]]]+/-ZZZZ] except when reporting an unknown date of '0000'.</p> <p>Note that in the past; OBX-14 was often used to carry the time of testing a specimen, even though HL7 clearly stated it should be the specimen collection date/time in that case. In this IG, the time the testing was performed will be carried in OBX-19, and OBX-14 will be used for its HL7 intended purpose. Previous version of HL7 did not contain OBX-19.</p>

TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
15		CWE	[0..1]	O	O	O	O	Local	Producer's Reference	If populated the field must identify the same performing organization as that identified in OBX-23 (Performing Organization Name).
16		XCN	[0..*]	O	O	O	O		Responsible Observer	
17		CWE	[0..*]	RE	RE	RE	O	HL7 V3 Observation Method	Observation Method	Method of testing by the laboratory. If the LOINC code in OBX-3 is methodless, this field shall be populated. Sometimes the method may be extrapolated from the local test codes. NHSN Cardinality: NHSN supports a single Observation Method.
18		EI	[0..*]	O	O	O	O		Equipment Instance Identifier	
19		TS	[0..1]	RE	RE	RE	RE		Date/Time of the Analysis	Time at which the testing was performed. Note that in the past; OBX-14 was often used to carry the time of testing a specimen, even though HL7 clearly stated it should be the specimen collection date/time in that case. In this IG, the time the testing was performed will be carried in OBX-19, and OBX-14 will be used for its HL7 intended purpose.
20		(TBD)	[0..0]	X	X	X	X		Reserved for harmonization with <i>Version 2.6</i> .	Not supported.

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TABLE 5-12. OBSERVATION/RESULT SEGMENT (OBX)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
21		(TBD)	[0..0]	X	X	X	X		Reserved for harmonization with <i>Version 2.6</i> .	Not supported.
22		(TBD)	[0..0]		X	X	X		Reserved for harmonization with <i>Version 2.6</i> .	Not supported.
23		XON	[1..1]	R	R	O	R		Performing Organization Name	The information for producer ID is recorded as an XON data type. For laboratories, this field specifies the laboratory that produced the test result described in this OBX segment. This information supports CLIA regulations in the US. For producing laboratories that are CLIA-certified, the CLIA identifier should be used for the organization identifier (component 10).
24		XAD	[1..1]	R	R	O	R		Performing Organization Address	Address of the laboratory that actually performed the test when used as a reference laboratory.
25		XCN	[0..1]	RE	RE	O	RE		Performing Organization Medical Director	Name of the Medical Director of the reference laboratory. Required when OBX-24 indicates the performing lab is in a jurisdiction that requires this information.

Example:

```
OBX|1|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^^2.26|1|66543000^Campylobacter jejuni^SCT^^^^January
```

```

2007|||||P|||200906041458|||0086^Bacterial identification^OBSMETHOD^^^^501-
20080815||200906051700|||GHH Lab^L^^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^NPI

```

5.12.1 Observation Identifiers, Observation Values, Interpretations and Comments

Laboratory results fall into several broad categories or types of results. The first type of result is a quantitative measure of some property of a specimen and is typically numerical in nature. Often these numeric results are also associated with some sort of interpretation, typically in terms of the normality or abnormality of the measured quantity in relationship to a reference range or normal range. Another type of result is a qualitative result related to the testing of a specimen. This is typically coded or textual in nature. Qualitative results may actually be interpretations of more detailed quantitative measurement. Finally, both quantitative and qualitative results may have comments associated with them. These comments may provide additional clarification, information regarding how the result was obtained, etc.

How a particular result should be reported using the OBX segment above depends upon what is being used as an observation identifier for OBX-3. This guide assumes that LOINC is normally being used for the identification of observations. LOINC identifiers can easily be classified as quantitative or qualitative. The LOINC scale property QN (quantitative) indicates that the LOINC identifier is quantitative. All other LOINC identifiers can be treated as qualitative for the purpose of this discussion. Those OBX's associated with quantitative LOINC identifiers should be using OBX-5 with either the NM (numeric), SN (structured numeric), TS (timestamp), DT (date) or TM (time) data types. These quantitative results can be accompanied by an interpretation. Coded interpretations should be reported using OBX-8 (abnormal flags) when the values have been drawn from HL7 table 0078. When a coded interpretation is sent, or when a textual interpretation is sent, a second OBX using a non-quantitative LOINC identifier should be used.

So far, we have been talking about actual clinical findings, whether they are quantitative or qualitative. Often, additional clarifying documentation is sent along with the clinical findings. These should be handled as comments, conveyed in an NTE segment(s) following the OBX in question. Comments typically fall into the following categories:

- Comments about how a clinical finding was reached
- Clarification regarding the meaning of a clinical finding
- Additional information not directly related to the clinical finding such as contact information for the lab, disclaimers, etc.
- Most canned, or boiler plate text associated with a result falls into the comment category,

TABLE 5-13. OBSERVATION IDENTIFIERS

Testing situation Discussion	OBX.2 Observation Type	OBX.3 Observation Identifier: LOINC part = scale	OBX.5 Observation value	OBX.6 Units	OBX.8 Abnormal Flags	OBX.7 Reference Range	NTE Segment
Numeric result along with interpretation	NM	QN	number	UCUM Units required	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Numerical intervals, ratios, inequalities	SN	QN	structured numeric	UCUM Units required	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Time like quantitative result with interpretation	TS, TM, DT,	QN	timestamp, time or date	[empty]	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Conveys ordinal value and interpretation	CWE	ORD	Ordinal as a code. SNOMED CT shall be used when code exists; otherwise it's a local code. Sending ordinals as codes is the preferred ELR approach.	[empty]	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Conveys ordinal value and interpretation	SN	ORD	Ordinal as structured numeric	[empty]	May be populated with codes from HL7 table 0078	Required	May be populated with comments, not clinical findings.

TABLE 5-13. OBSERVATION IDENTIFIERS

Testing situation Discussion	OBX.2 Observation Type	OBX.3 Observation Identifier: LOINC part = scale	OBX.5 Observation value	OBX.6 Units	OBX.8 Abnormal Flags	OBX.7 Reference Range	NTE Segment
Conveys observation and interpretation	CWE	NOM	Coded observation. SNOMED CT shall be used when code exists; otherwise it's a local code.	[empty]	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Conveys observation and interpretation	FT, TX or ST	NAR	text	[empty]	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Conveys observation and interpretation	FT, TX or ST	MULTI	text	[empty]	May be populated with codes from HL7 table 0078	May be populated	May be populated with comments, not clinical findings.
Conveys imbedded object (ED) or pointer to object (RP)	ED, RP	Varies	Object pointer or imbedded object	[empty]	[empty]	[empty]	May be populated with comments, not clinical findings.

5.13 SPM – SPECIMEN SEGMENT

The Specimen Information Segment (SPM) describes the characteristics of a single sample. The SPM segment carries information regarding the type of specimen, where and how it was collected, who collected it and some basic characteristics of the specimen.

TABLE 5-14. SPECIMEN SEGMENT (SPM)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..4	SI	[1..1]	R	R	O	R		Set ID – SPM	For the first repeat of the SPM segment, the sequence number shall be one (1), for the second repeat, the sequence number shall be two (2), etc.
2		EIP	[1..1]	R	R	R	RE		Specimen ID	Unique identifier for the specimen as referenced by the Placer application, the Filler application, or both. Note that the specimen id is not the same thing as the placer/filler order number. Order numbers identify the specific test to be performed on a specimen. A particular specimen may be associated with multiple orders (and multiple placer/filler order numbers). The specimen id may be the same as an accession number, depending on how the particular lab assigns accession numbers.
3		EIP	[0..*]	O	O	O	O		Specimen Parent IDs	
4		CWE	[1..1]	R	R	R	R	Specimen Type Value Set	Specimen Type	Description of the precise nature of the entity that is the source material for the observation.
5		CWE	[0..*]	RE	RE	O	O	PHVS_ModifierOrQualifier_CDC	Specimen Type Modifier	Allows sending qualifiers for a SNOMED CT term from a single axis. Only used if SPM-4 is a SNOMED code.
6		CWE	[0..*]	RE	RE	O	O	HL70371	Specimen Additives	

TABLE 5-14. SPECIMEN SEGMENT (SPM)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
7		CWE	[0..1]	RE	RE	O	RE	Specimen Collection Method Value Set	Specimen Collection Method	Method used to collect the specimen.
8		CWE	[0..1]	RE	RE	RE	RE	Body Site Value Set	Specimen Source Site	Source from which the specimen was obtained. For environmental samples, this may describe the location of the source of the specimen. For biological samples, it may represent the anatomical site from which the specimen was collected.
9		CWE	[0..*]	RE	RE	O	RE	PHVS_ModifierOrQualifier_CDC	Specimen Source Site Modifier	Modifier or qualifier for the specimen source site (SPM-8). Allows sending qualifiers for a SNOMED CT term from a single axis. Only used if SPM-8 is a SNOMED code. This allows use of post-coordinated terminologies for specimen source.
10		CWE	[0..1]	O	O	O	O	HL70543	Specimen Collection Site	
11		CWE	[0..*]	RE	RE	O	O	HL70369	Specimen Role	
12		CQ	[0..1]	RE	RE	O	RE	Unified Code for Units of Measure (UCUM)	Specimen Collection Amount	Amount of sample collected. This can be reported as a volume or a weight/mass.
13	1..6=	NM	[0..1]	O	O	O	O		Grouped Specimen Count	
14		ST	[0..*]	O	O	O	O		Specimen Description	NHSN Cardinality: NHSN supports a single specimen description.

TABLE 5-14. SPECIMEN SEGMENT (SPM)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
15		CWE	[0..*]	O	O	O	O	HL70376	Specimen Handling Code	
16		CWE	[0..*]	O	O	O	O	HL70489	Specimen Risk Code	
17		DR	[1..1]	R	R	RE	RE		Specimen Collection Date/Time	<p>Time range over which the sample was collected, as opposed to the time the sample collection device was recovered. The first component of the date range must match OBR-7 Observation Date/Time. The second component must match OBR-8 Observation End Date/Time. For OBXs reporting observations based on this specimen, OBX-14 should contain the same value as component 1 of this field.</p> <p>A minimum of year, month and day must be provided when the actual date/time is known. For unknown collection date/time use "0000".</p> <p>Format: [YYYYMMDD[HH[MM[SS[.S[S[S(S)]]]]]]][+/-ZZZZ]^YYYYMMDD[HH[MM[SS[.S[S[S(S)]]]]]]][+/-ZZZZ]</p>
18		TS	[1..1]	R	R	RE	RE		Specimen Received Date/Time	<p>Time the specimen was received at the diagnostic service. The actual time that is recorded is based on how specimen receipt is managed, and may correspond to the time the sample is logged in.</p> <p>Format: YYYYMMDD[HH[MM[SS[.S[S[S(S)]]]]]]][+/-ZZZZ]</p>

TABLE 5-14. SPECIMEN SEGMENT (SPM)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
19		TS	[0..1]	0	0	0	0		Specimen Expiration Date/Time	
20	1..1	ID	[0..1]	0	0	0	0	HL70136	Specimen Availability	
21		CWE	[0..*]	RE	RE	0	0	HL70490	Specimen Reject Reason	
22		CWE	[0..1]	0	0	0	0	HL70491	Specimen Quality	
23		CWE	[0..1]	0	0	0	0	HL70492	Specimen Appropriateness	
24		CWE	[0..*]	0	0	0	0	HL70493	Specimen Condition	
25		CQ	[0..1]	0	0	0	0	Unified Code for Units of Measure (UCUM)	Specimen Current Quantity	
26	1..4=	NM	[0..1]	0	0	0	0		Number of Specimen Containers	
27		CWE	[0..1]	0	0	0	0	Local	Container Type	
28		CWE	[0..1]	0	0	0	0	HL70544	Container Condition	
29		CWE	[0..1]	0	0	0	0	HL70494	Specimen Child Role	

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Example:

```
SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO||WB^
Whole Blood^HL70487^^^^2.5.1|THYO^Thyoglycollate broth^HL70371^^^^2.5.1|BCAE^Blood Culture,
Aerobic Bottle^HL70488^^^^2.5.1|49852007^Structure of median cubital vein (body
structure)^SCT^^^^20080731||P^Patient^HL60369^^^^2.5.1|2.0^mL&MilliLiter [SI Volume
Units]&UCUM&&&1.6|||200808151030-0700|200808151100-0700
```

5.14 NTE – NOTES AND COMMENTS SEGMENT

The Notes and Comments Segment (NTE) is used to convey additional comments regarding the associated segment. The NTE segment is not intended for automatic processing. The contents of the NTE segment are primarily intended for human use. Automated process should not be based upon the contents of NTE-3 (Comment); rather the content of that field should be displayed to humans.

TABLE 5-15. NOTES AND COMMENTS SEGMENT (NTE)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1		SI	[1..1]	R	R	RE	-		Set ID – NTE	For the first repeat of the NTE segment, the sequence number shall be one (1), for the second repeat, the sequence number shall be two (2), etc.
2	1..1	ID	[0..1]	RE	RE	RE	-	HL70105	Source of Comment	
3		FT	[1..*]	R	R	RE	-		Comment	Comment contained in the segment. NHSN Cardinality: NHSN supports a single comment.
4		CWE	[0..1]	RE	RE	O	-	HL70364	Comment Type	

Example:

NTE|1|L|Comment goes here. It can be a very long comment.|RE^Remark^HL70364^^^^2.5.1

5.15 FHS – FILE HEADER SEGMENT

This segment is used as the lead-in to a file (group of batches).

TABLE 5-16. FILE HEADER SEGMENT (FHS)										
Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..1	ST	[1..1]	R	R	R	-		File Field Separator	Character to be used as the field separator for the rest of the message. The supported value is |, ASCII (124).
2	4..5	ST	[1..1]	R	R	R	-		File Encoding Characters	Four characters that always appear in the same order in this field: |^~\&|.
3		HD	[0..1]	O	O	O	-		File Sending Application	
4		HD	[1..1]	R	O	R	-		File Sending Facility	NHSN - Party ID – same one as used in PHIN MS wrapper.
5		HD	[0..1]	O	O	O	-		File Receiving Application	
6		HD	[1..1]	R	O	R	-		File Receiving Facility	Unique identifier of the facility that is to receive the message. This field has the same definition as the corresponding field in the MSH segment.
7		TS	[1..1]	R	O	R	-		File Creation Date/Time	Date/time the file was created by the sending system.
8	1..40=	ST	[0..0]	X	X	X	-		File Security	Not Supported.

TABLE 5-16. FILE HEADER SEGMENT (FHS)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
9	1..40=	ST	[0..1]	O	O	O	-		File Name/ID	
10	1..80=	ST	[0..0]	X	X	X	-		File Header Comment	Not Supported.
11	1..20=	ST	[0..0]	X	X	X	-		File Control ID	Not Supported.
12	1..20=	ST	[0..0]	X	X	X	-		Reference File Control D	Not Supported.

Example :

FHS|^~\&| |Lab1^2.16.840.1.113883.19.3.1^ISO| |SPH^2.16.840.1.113883.19.3.2^ISO| 20080723123558-0400

5.16 FTS – FILE TRAILER SEGMENT

The FTS segment defines the end of a file (group of batches).

TABLE 5–17. FILE TRAILER SEGMENT (FTS)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..10=	NM	[1..1]	R	O	R	-		File Batch Count	The number of batches contained in this file. Since this interface is constrained to one batch per file, this number should always be '1'.
2	1..80#	ST	[0..0]	X	X	X	-		File Trailer Comment	Not supported.

Example:
FTS | 1

5.17 BHS – BATCH HEADER SEGMENT

This segment is used as the lead-in to a file (group of batches).

TABLE 5–18. BATCH HEADER SEGMENT (BHS)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	1..1	ST	[1..1]	R	R	R	-		Batch Field Separator	Character used as the field separator for the rest of the message. The supported value is , ASCII (124).

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TABLE 5-18. BATCH HEADER SEGMENT (BHS)

Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
2	4..5	ST	[1..1]	R	R	R	-		Batch Encoding Characters	Four characters that always appear in the same order in this field: |^~\&|.
3		HD	[0..1]	O	O	O	-		Batch Sending Application	
4		HD	[1..1]	R	O	R	-		Batch Sending Facility	NHSN-Party ID – same one as used in PHIN MS wrapper.
5		HD	[0..1]	O	O	O	-		Batch Receiving Application	
6		HD	[1..1]	R	O	R	-		Batch Receiving Facility	Unique identifier of the facility that is to receive the message. This field has the same definition as the corresponding field in the MSH segment.
7		TS	[1..1]	R	O	R	-		Batch Creation Date/Time	Date/time the batch was created by the sending system.
8	1..40=	ST	[0..0]	X	X	X	-		Batch Security	Not supported.
9	1..40=	ST	[0..1]	O	O	O	-		Batch Name/ID/Type	
10	1..80=	ST	[0..0]	X	X	X	-		Batch Comment	Not supported.
11	1..20=	ST	[0..0]	X	X	X	-		Batch Control ID	Not supported.
12	1..20=	ST	[0..0]	X	X	X	-		Reference Batch Control D	Not supported.

Example:

BHS|^~\&|| Lab1^2.16.840.1.113883.19.3.1^ISO| |SPH^2.16.840.1.113883.19.3.2^ISO| 20080723123558-0400

5.18 BTS – BATCH TRAILER SEGMENT

The BTS segment defines the end of a batch of messages.

TABLE 5-19. BATCH TRAILER SEGMENT (BTS)										
Seq	Len	DT	Cardinality	Lab Result Sender Usage	ELR Receiver Usage	NHSN Receiver Usage	Lab to EHR Receiver Usage	Value Set	HL7 Element Name	Description/Comments
1	10	NM	[1..1]	R	R	R	-		Batch Message Count	This is the total number of messages contained in the batch.
2	80	ST	[0..0]	X	X	X	-		Batch Comment	Not supported.
3	100	NM	[0..0]	X	X	X	-		Batch Totals	Not supported.

Example:

BTS|100

6. Code Systems and Value Sets

Successful message implementation requires that transmitted messages (message instances) contain valid values for coded fields. It is important to note that code sets are relatively dynamic and subject to change between publications of these implementation guides.

Every code value passed in a message instance is drawn from a code system that has a globally unique identifier, such as an OID. In general, the coded values allowed in a field (a) may be drawn from more than one code system, and (b) may be a subset of the codes from a given coding system. Combining (a) and (b) makes it possible for the allowed code value to be a combination of multiple subsets drawn from multiple coding systems. In most cases, only a subset of the codes defined in a code system are legal for use in a particular message.

The subsets of the codes that are legal for a particular field is identified by an HL7 construct known as a "value set." A value set is a collection of coded values drawn from code systems. Value sets serve to identify the specific set of coded values for the message from the universe of coded values across all coding systems.

The segment tables in previous sections identify the value set or coding system used for each supported field containing a coded value. Fields that use the data type CWE require that messages include the code, drawn from *HL7 0396*, that uniquely defines the coding system, as well as the coded value itself. Some of these pre-coordinated value sets must be updated, or new ones created, as new needs are identified.

Value sets are identified by a unique identifier also, but this identifier is not transmitted in the message. The identifier or code for the coding system from which the value is derived is sent in the message. However, the value set identifier is useful and important when vocabulary items are modified or replaced.

6.1 VOCABULARY CONSTRAINTS

Table 6-1. Value Set/Code System Summary shows the various value sets/code systems used in this IG. It also provides information about the source of the vocabulary and an identifier for the vocabulary. The name found in the Value Set/Code System Name column corresponds with the value set identified in the Value Set column of the data type and segment attribute tables found above.

TABLE 6-1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
Admission Type Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.33	A code indicating the priority of the admission (e.g., Emergency, Urgent, Elective, et cetera). See (UB-04/NUBC CURRENT UB DATA SPECIFICATIONS MANUAL) UB-04 FL14
Body Site Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.3221.8.9	Specimen Source Site. Identify the body site for injury, specimen, injection and finding. Shall contain a value descending from the SNOMED CT® Anatomical Structure (91723000) hierarchy. This indicates the anatomical site
Country Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.63	This identifies the codes for the representation of names of countries, territories and areas of geographical interest. The complete set of 3166-1 codes. http://www.iso.org/iso/iso-3166-1_decoding_table Also available from PHIN VADS as: PHVS_Country_ISO_3166-1 Also known as HL7 Table 0399.
ELR Reportable Laboratory Observation Identifier Value Set	TBD	TBD	This value set is determined by specific ELR implementations. The specific reportable laboratory observation identifiers are often state or jurisdiction specific.
HL7 V3 Observation Method	HL7 Version 3.0	2.16.840.1.113883.5.84 (code system)	Observation Method Also available from PHIN VADS as: PHVS_LabTestMethods_CDC
HL70001	HL7 Version 2.5.1	2.16.840.1.113883.12.1 (code system)	Administrative Sex. Also available from PHIN VADS as: PHVS_AdministrativeSex_HL7_2x

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70002	HL7 Version 2.5.1	2.16.840.1.113883.12.2 (code system)	Marital Status. Note, HITSP has identified a different value set in HITSP C80: Name: Marital Status Value Set Source: Health Level Seven (HL7) Version 3.0 The HL7 Lab to EHR IG adopted by HITSP uses the HL70002
HL70003	HL7 Version 2.5.1	2.16.840.1.113883.12.3 (code system)	Event type
HL70004	HL7 Version 2.5.1	2.16.840.1.113883.12.4 (code system)	Patient Class Also available from PHIN VADS as: PHVS_PatientClass_HL7 Note, HITSP has identified a different value set in HITSP C80: Name: Patient Class Value Set Source: Health Level Seven (HL7) Version 3.0 Act Encounter Code The HL7 Lab to EHR IG adopted by HITSP uses the HL70004
HL70005	HL7 Version 2.5.1	2.16.840.1.113883.6.238 (code system)	Race Category Also available from PHIN VADS as: PHVS_RaceCategory_CDC
HL70006	HL7 Version 2.5.1	2.16.840.1.113883.12.6 (code system)	Religion
HL70008	HL7 Version 2.5.1	2.16.840.1.113883.12.8 (code system)	Acknowledgment code Also available from PHIN VADS as: PHVS_AcknowledgmentCode_HL7_2x
HL70018	HL7 Version 2.5.1	2.16.840.1.113883.12.18 (code system)	Patient Type
HL70021	HL7 Version 2.5.1	2.16.840.1.113883.12.21 (code system)	Bad Debt Agency Code

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70023	HL7 Version 2.5.1	2.16.840.1.113883.12.23 (code system)	Admit Source Also available from PHIN VADS as: PHVS_AdmitSource_HL7_2x Note, HITSP has identified a different value set in HITSP C80: Name: Admission Source Value Set Source: National Uniform Billing Committee (NUBC). See UB-04/NUBC CURRENT UB DATA SPECIFICATIONS MANUAL) UB-04 FL15 The HL7 Lab to EHR IG adopted by HITSP does not support this element.
HL70038	HL7 Version 2.5.1	2.16.840.1.113883.12.38 (code system)	Order status Also available from PHIN VADS as: PHVS_OrderStatus_HL7_2x
HL70061	HL7 Version 2.5.1	2.16.840.1.113883.12.61 (code system)	Check digit scheme
HL70063	HL7 Version 2.5.1	2.16.840.1.113883.12.63 (code system)	Relationship Also available from PHIN VADS as: PHVS_Relationship_HL7_2x
HL70065	HL7 Version 2.5.1	2.16.840.1.113883.12.65 (code system)	Specimen Action Code
HL70074	HL7 Version 2.5.1	2.16.840.1.113883.12.74 (code system)	Diagnostic Service Sector ID Also available from PHIN VADS as: PHVS_DiagnosticServiceSectionID_HL7_2x
HL70076	HL7 Version 2.5.1	2.16.840.1.113883.12.76 (code system)	Message type
HL70078 (2.5.1)	HL7 Version 2.5.1	2.16.840.1.113883.12.78 (code system)	Abnormal Flags Also available from PHIN VADS as: PHVS_AbnormalFlag_HL7_2x Note, HITSP has identified a different value set in HITSP C80: Name: Result Normalcy Status Value Set Source: Health Level Seven (HL7) Version 3.0 Observation Interpretation. The HL7 Lab to EHR IG adopted by HITSP uses the HL70078 from 2.5.1.

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70078 (2.7)	HL7 Version 2.7	2.16.840.1.113883.12.78 (code system)	Observation Interpretation.
HL70080	HL7 Version 2.5.1	2.16.840.1.113883.12.80 (code system)	Nature of Abnormal Test
HL70085	HL7 Version 2.5.1	2.16.840.1.113883.12.85 (code system)	Observation Result Status Also available from PHIN VADS as: PHVS_ObservationResultStatus_HL7_2x
HL70087	HL7 Version 2.5.1	2.16.840.1.113883.12.87 (code system)	Pre-Admit Test Indicator
HL70088	HL7 Version 2.5.1	2.16.840.1.113883.12.88 (code system)	Procedure Code
HL70103	HL7 Version 2.5.1	2.16.840.1.113883.12.103 (code system)	Processing ID. Also available from PHIN VADS as: PHVS_ProcessingID_HL7_2x
HL70104	HL7 Version 2.5.1	2.16.840.1.113883.12.104 (code system)	Version ID
HL70105	HL7 Version 2.5.1	2.16.840.1.113883.12.105 (code system)	Source of Comment Also available from PHIN VADS as: PHVS_SourceOfComment_HL7_2x
HL70111	HL7 Version 2.5.1	2.16.840.1.113883.12.111 (code system)	Delete Account Code
HL70112	HL7 Version 2.5.1	2.16.840.1.113883.12.112 (code system)	Discharge Disposition Also available from PHIN VADS as: PHVS_DischargeDisposition_HL7_2x Note, HITSP has identified a different value set in HITSP C80: Name: Discharge Disposition Value Set Source: National Uniform Billing Committee (NUBC). UB-04/NUBC CURRENT UB DATA SPECIFICATIONS MANUAL- UB-04 FL17 – Patient Status. The HL7 Lab to EHR IG adopted by HITSP uses the HL70112.

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70114	HL7 Version 2.5.1	2.16.840.1.113883.12.114 (code system)	Diet type
HL70115	HL7 Version 2.5.1	2.16.840.1.113883.12.115 (code system)	Servicing Facility
HL70117	HL7 Version 2.5.1	2.16.840.1.113883.12.117 (code system)	Account status
HL70119	HL7 Version 2.5.1	2.16.840.1.113883.12.119 (code system)	Order Control. Also available from PHIN VADS as: PHVS_OrderControlCodes_HL7_2x
HL70121	HL7 Version 2.5.1	2.16.840.1.113883.12.121 (code system)	Response flag Also available from PHIN VADS as: PHVS_ResponseFlag_HL7_2x
HL70125	HL7 Version 2.5.1	2.16.840.1.113883.12.125 (code system)	Value Type
HL70136	HL7 Version 2.5.1	2.16.840.1.113883.12.136 (code system)	Yes/No Also available from PHIN VADS as: PHVS_YesNo_HL7_2x
HL70155	HL7 Version 2.5.1	2.16.840.1.113883.12.155 (code system)	Accept/application acknowledgment condition
HL70171	HL7 Version 2.5.1	2.16.840.1.113883.12.171 (code system)	Citizenship
HL70172	HL7 Version 2.5.1	2.16.840.1.113883.12.172 (code system)	Veterans Military Status
HL70177	HL7 Version 2.5.1	2.16.840.1.113883.12.177 (code system)	Confidentiality code Also available from PHIN VADS as: PHVS_ConfidentialityCode_HL7_2x
HL70189	HL7 Version 2.5.1	2.16.840.1.113883.6.238 (code system)	Ethnic Group A constrained version of the value set without the UNK value is available from PHIN VADS as: PHVS_EthnicityGroup_CDC

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70190	HL7 Version 2.5.1	2.16.840.1.113883.12.190 (code system)	Address type. Also available from PHIN VADS as: PHVS_AddressType_HL7_2x
HL70191	HL7 Version 2.5.1	2.16.840.1.113883.12.191 (code system)	Type of referenced data
HL70200	HL7 Version 2.5.1	2.16.840.1.113883.12.200 (code system)	Name type Also available from PHIN VADS as: PHVS_NameType_HL7_2x
HL70201	HL7 Version 2.5.1	2.16.840.1.113883.12.201 (code system)	Telecommunication use code Also available from PHIN VADS as: PHVS_TelecommunicationUseCode_HL7_2x
HL70202	HL7 Version 2.5.1	2.16.840.1.113883.12.202 (code system)	Telecommunication equipment type Also available from PHIN VADS as: PHVS_TelecommunicationEquipmentType_HL7_2x
HL70203	HL7 Version 2.5.1	2.16.840.1.113883.12.203 (code system)	Identifier type. Also available from PHIN VADS as: PH_IdentifierType_HL7_2x
HL70204	HL7 Version 2.5.1	2.16.840.1.113883.12.204 (code system)	Organization name type
HL70207	HL7 Version 2.5.1	2.16.840.1.113883.12.207 (code system)	Processing mode. Also available from PHIN VADS as: PHVS_ProcessingMode_HL7_2x
HL70211	HL7 Version 2.5.1	2.16.840.1.113883.12.211 (code system)	Alternate character sets
HL70288	HL7 Version 2.5.1	2.16.840.1.113883.12.288 (code system)	Census tract

TABLE 6-1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70291 (2.7)	HL7 Version 2.7	2.16.840.1.113883.12.291 (code system)	Subtype of referenced data. Also available from PHIN VADS as: PHVS_MIME_MediaSubType_IANA See Table 6-5. HL7 Table 0291 - Subtype Of Referenced Data below.
HL70297	HL7 Version 2.5.1	2.16.840.1.113883.12.297 (code system)	CN ID This is an empty HL7 user defined table, so the codes will all be locally defined.
HL70299	HL7 Version 2.5.1	2.16.840.1.113883.12.299 (code system)	Encoding, Also available from PHIN VADS as: PHVS_Encoding_HL7_2x
HL70301	HL7 Version 2.7	2.16.840.1.113883.12.301 (code system)	Universal ID type See Table 6-6. HL7 Table 0301 - Universal ID Type below for details.
HL70302	HL7 Version 2.5.1	2.16.840.1.113883.12.302 (code system)	Point of care
HL70303	HL7 Version 2.5.1	2.16.840.1.113883.12.303 (code system)	Room
HL70304	HL7 Version 2.5.1	2.16.840.1.113883.12.304 (code system)	Bed
HL70305	HL7 Version 2.5.1	2.16.840.1.113883.12.305 (code system)	Person location type Note that NHSN has adopted the HL7 Version 3 Healthcare Service Location coding system for this field.
HL70306	HL7 Version 2.5.1	2.16.840.1.113883.12.306 (code system)	Location status
HL70307	HL7 Version 2.5.1	2.16.840.1.113883.12.307 (code system)	Building
HL70308	HL7 Version 2.5.1	2.16.840.1.113883.12.308 (code system)	Floor

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70326	HL7 Version 2.5.1	2.16.840.1.113883.12.326 (code system)	Visit Indicator
HL70340	HL7 Version 2.5.1	2.16.840.1.113883.12.340 (code system)	Procedure Code Modifier
HL70354	HL7 Version 2.5.1	2.16.840.1.113883.12.354 (code system)	Message structure
HL70356	HL7 Version 2.5.1	2.16.840.1.113883.12.356 (code system)	Alternate character set handling scheme
HL70357	HL7 Version 2.5.1	2.16.840.1.113883.12.357 (code system)	Message Error Condition Codes Also available from PHIN VADS as: PHVS_MessageErrorConditionCodes_HL7_2x
HL70360	HL7 Version 2.5.1	2.16.840.1.113883.12.360 (code system)	Degree/license/certificate Also available from PHIN VADS as: PHVS_DegreeLicenseCertificate_HL7_2x
HL70364	HL7 Version 2.5.1	2.16.840.1.113883.12.364 (code system)	Comment Type Also available from PHIN VADS as: PHVS_CommentType_CDC
HL70369	HL7 Version 2.5.1	2.16.840.1.113883.12.369 (code system)	Specimen Role Also available from PHIN VADS as: PHVS_SpecimenRole_CDC
HL70371	HL7 Version 2.5.1	2.16.840.1.113883.12.371 (code system)	Specimen Additives Also available from PHIN VADS as: PHVS_AdditiveOrPreservative_HL7_2x
HL70376	HL7 Version 2.5.1	2.16.840.1.113883.12.376 (code system)	Special Handling Code

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70396	HL7 http://www.hl7.org/special/committees/vocab/table_0396/index.cfm	2.16.840.1.113883.12.396 (code system)	<p>HL7 Table 0396 defines the standard coding systems recognized by HL7. The table defines a mechanism by which locally defined codes can be transmitted. Any code/coding system not defined in HL7 Table 0396 is considered a “local” coding system from the HL7 perspective. Coding systems that are identified in this implementation guide will be identified according to the recommended HL7 nomenclature from table 0396 as “99ELR-zzz” where “zzz” represents a string identifying the specific non-standard coding system. To maintain backwards compatibility with the 2.3.1 ELR implementation Guide, coding systems defined locally (i.e., not identified in this guide) and not defined in HL7 Table 0396 can continue to identify the coding system as “L”. It is strongly suggested that implementers instead adopt the use of “99zzz” approach to identifying local coding systems since HL7 has indicated that use of the “L” for local coding systems is retained only for backwards compatibility, and its use may be withdrawn in a subsequent 2.x version. Note that the local use of “99zzz” should not collide with any of the “locally” defined coding systems identified in this implementation guide.</p> <p>HL7 now maintains HL7 table 0396 “real time”. This means that values may be added to the table at any time so that implementers can have an up-to-date source of truth for the codes to be used to identify coding systems in any 2.x message. Users of this IG should acquire the latest version of HL7 table 0396. The latest version of HL7 table 0396 (independent of HL7 version) is available for download from HL7 at: http://www.hl7.org/special/committees/vocab/table_0396/index.cfm.</p>
HL70411	HL7 Version 2.5.1	2.16.840.1.113883.12.411 (code system)	Supplemental Service Information Values
HL70429	HL7 Version 2.5.1	2.16.840.1.113883.12.429 (code system)	Production Class Code Also available from PHIN VADS as: PHVS_ProductionClass_HL7_2x
HL70432	HL7 Version 2.5.1	2.16.840.1.113883.12.432 (code system)	Admission Level of Care Code Also available from PHIN VADS as: PHVS_AdmissionLevelOfCareCode_HL7_2x

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70444	HL7 Version 2.5.1	2.16.840.1.113883.12.444 (code system)	Name assembly order
HL70445	HL7 Version 2.5.1	2.16.840.1.113883.12.445 (code system)	Identity Reliability Code Also available from PHIN VADS as: PHVS_IdentityReliabilityCode_HL7_2x
HL70448	HL7 Version 2.5.1	2.16.840.1.113883.12.448 (code system)	Name context
HL70465	HL7 Version 2.5.1	2.16.840.1.113883.12.465 (code system)	Name/address representation
HL70472	HL7 Version 2.5.1	2.16.840.1.113883.12.472 (code system)	TQ Conjunction ID
HL70476	HL7 Version 2.5.1	2.16.840.1.113883.12.476 (code system)	Medically Necessary Duplicate Procedure Reason
HL70482	HL7 Version 2.5.1	2.16.840.1.113883.12.482 (code system)	Order Type
HL70483	HL7 Version 2.5.1	2.16.840.1.113883.12.483 (code system)	Authorization Mode
HL70485	HL7 Version 2.5.1	2.16.840.1.113883.12.485 (code system)	Priority Also available from PHIN VADS as: PHVS_ExtendedPriorityCodes_HL7_2x
HL70487	HL7 Version 2.5.1	2.16.840.1.113883.12.487 (code system)	Specimen Type
HL70488	HL7 Version 2.5.1	2.16.840.1.113883.12.488 (code system)	Specimen collection method. Also available from PHIN VADS as: PHVS_SpecimenCollectionMethod_HL7_2x
HL70489	HL7 Version 2.5.1	2.16.840.1.113883.12.489 (code system)	Risk Codes

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70490	HL7 Version 2.5.1	2.16.840.1.113883.12.490 (code system)	Specimen Reject Reason Also available from PHIN VADS as: PHVS_SpecimenRejectReason_HL7_2x
HL70491	HL7 Version 2.5.1	2.16.840.1.113883.12.491 (code system)	Specimen Quality Also available from PHIN VADS as: PHVS_SpecimenQuality_HL7_2x
HL70492	HL7 Version 2.5.1	2.16.840.1.113883.12.492 (code system)	Specimen Appropriateness Also available from PHIN VADS as: PHVS_SpecimenAppropriateness_HL7_2x
HL70493	HL7 Version 2.5.1	2.16.840.1.113883.12.493 (code system)	Specimen Condition Also available from PHIN VADS as: PHVS_SpecimenCondition_CDC
HL70494	HL7 Version 2.5.1	2.16.840.1.113883.12.494 (code system)	Specimen Child Role Also available from PHIN VADS as: PHVS_SpecimenChildRole_HL7_2x
HL70507	HL7 Version 2.5.1	2.16.840.1.113883.12.507 (code system)	Observation Result Handling
HL70516	HL7 Version 2.5.1	2.16.840.1.113883.12.516 (code system)	Error severity Also available from PHIN VADS as: PHVS_ErrorSeverity_HL7_2x
HL70533	HL7 Version 2.5.1	2.16.840.1.113883.12.533 (code system)	Application error code Note that HI7 table 0533 has no suggested values. It is always a user defined table, and will generally contain locally defined codes.
HL70543	HL7 Version 2.5.1	2.16.840.1.113883.12.543 (code system)	Specimen Collection Site
HL70544	HL7 Version 2.5.1	2.16.840.1.113883.12.544 (code system)	This is an empty HL7 user defined table, so it is effectively locally defined.

TABLE 6-1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
HL70834 (2.7)	HL7 Version 2.7	2.16.840.1.113883.12.834 (code system)	Imported Table 0834 – MIME Types. Note that the HITSP Lab to EHR IG uses HL70191, which can be directly mapped to the 2.7 values imported from IANA. Also available from PHIN VADS as: PHVS_MIME_MediaType_IANA See Table 6-7. HL7 Table 0834 – MIME Type below.
ICD-10	TBD	TBD	TBD
Laboratory Observation Identifier Value Set	TBD	TBD	Unique identifiers for the type of observations. Values must be drawn from LOINC. This value set is the union of the following value sets: <ul style="list-style-type: none"> • Laboratory Test Result Value Set • ELR Reportable Laboratory Observation Identifier Value Set • NHSN Lab test id value set (TBD)
Laboratory Coded Observation Value Set	TBD	TBD	Drawn from SNOMED CT. At a minimum, it will contain the SNOMED CT® Laboratory Test Finding (118246004) hierarchy and the SNOMED CT® Microorganism (264395009) sub-tree. It may also need to contain various modifiers and qualifiers as identified in PHVS_ModifierOrQualifier_CDC value set. The HITSP C80 Laboratory Observation Value Set covers only the Laboratory Test Findings portion of this value set, and really needs to be expanded to cover at least microorganisms and commonly use qualifiers and modifiers.
Laboratory Order Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.25	This identifies the laboratory order. From the LOINC® database, Laboratory order concepts can be extracted by using the following filter: CLASSTYPE=1 and ORDER_OBS= order

TABLE 6-1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
Laboratory Test Result Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.40	The value set is defined as being the set of LOINC® values which: are used in HEDIS measures: category A/B/C bioterrorism agents/diseases (need help here) Public Health jurisdiction and Federal reportable disease conditions ⁸
NHSN Lab test id value set	TBD	TBD	This value set is still under development by NHSN. At this time, the name is just a placeholder for the eventual value set.
PH_HealthcareServiceLoc_HL7_V3	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.113883.6.259 (code system)	Healthcare Service Locations (HL7) - A comprehensive classification of locations and settings where healthcare services are provided. This is based on the National Healthcare Safety Network (NHSN) location code system that has been developed over a number of years through CDC's interaction with a variety of healthcare facilities and is intended to serve a variety of reporting needs where coding of healthcare service locations is required. Keywords: HSLOC, Healthcare Service Delivery Location
PHVS_AdministrativeDiagnosis_CD_ICD-9CM	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.856	ICD-9 CM Administrative Diagnosis Codes used for billing purposes, Reason for Study, DG1 Diagnosis segments Keyword: ICD-9 Vol 1 & 2.
PHVS_Animal_CDC	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.1074	Animal
PHVS_County_FIPS_6-4	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.829	Codes representing county of origin, address county, reporting county

⁸ It is the authors understanding that the current HITSP value set for Laboratory Test Results does not include the LOINC codes necessary for ELR reportable conditions. It is expected that HITSP will add these ELR test codes to the value set as they are identified (per the value set definition).

TABLE 6–1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
PHVS_Language_ISO_639-2_Alpha3	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.831	Primary spoken language Note that HITSP identifies a language value set as follows: “The value set is defined by Internet RFC 4646 (replacing RFC 3066). Please see ISO 639 language code set maintained by Library of Congress for enumeration of language codes and Frequently Asked Questions.” RFC4646 seems to point to ISO 639 as the source of the actual language codes, so this value set is consistent with the HITSP value set.
PHVS_Microorganism_CDC	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.1009	Microorganisms/infectious agents
Postal Code Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.2	This identifies the postal (ZIP) Code of an address in the United States http://zip4.usps.com/zip4/welcome.jsp
Reason For Study Value Set	TBD	TBD	Reason for Study. Union of concepts from PHVS_AdministrativeDiagnosis_CDC_ICD-9CM and ICD-10. Note: HITSP apparently has stopped using ICD-9 for diagnosis and focused on using value sets from SNOMED CT.
SNOMED CT Specimen Collection (17636008) sub-tree.	SNOMED CT	2.16.840.1.113883.6.96 (code system)	SNOMED CT Specimen Collection (17636008) sub-tree.
SNOMED CT Specimen sub-tree (12303009)	SNOMED CT	2.16.840.1.113883.6.96 (code system)	SNOMED CT Specimen sub-tree (12303009) Also available from PHIN VADS as: PHVS_Specimen_CDC
PHVS_ModifierOrQualifier_CDC	CDC PHIN VADS (see section 6.2 below)	2.16.840.1.114222.4.11.1014	Used for Specimen Type Modifier and Specimen Source Site Modifier. Based on a subset of SNOMED CT.
Specimen Collection Method Value Set	TBD	TBD	Specimen Collection Method. Union of HL7 Table 0488 and SNOMED CT Specimen Collection (17636008) sub-tree.

TABLE 6-1. VALUE SET/CODE SYSTEM SUMMARY

Value Set/Code System Name	Value Set/Code System Source	Value Set/Code System Identifier	Description
Specimen Type Value Set	TBD	TBD	Specimen Type Union of HL70487 and SNOMED CT Specimen sub-tree (12303009)
State Value Set	HITSP C-80,20090708 V1.1	2.16.840.1.113883.3.88.12.80.1	Identifies addresses within the United States are recorded using the FIPS 5-2 two-letter alphabetic codes for the State, District of Columbia, or an outlying area of the United States or associated area. http://www.itl.nist.gov/fipspubs/fip5-2.htm Also available from PHIN VADS as: PHVS_State_FIPS_5-2
Tribal Citizenship Value Set	TBD	TBD	Tribal Citizenship HL7 recommends using Bureau of Indian Affairs (BIA) Tribal Identity List. The following is a link to the current live list: http://www.usa.gov/Government/Tribal_Sites/index.shtml This is a link to the most recent official static list: http://edocket.access.gpo.gov/2008/E8-6968.htm
Unified Code for Units of Measure (UCUM)	Regenstrief Institute, Inc. http://www.regenstrief.org/medinformatics/ucum	2.16.840.1.113883.3.88.12.80.29	Units of measure concepts that includes atomic UCUM units as well as UCUM expression. Commonly used UCUM units of measure concepts can be obtained from UCUM Web Site http://aurora.regenstrief.org/~ucum/ucum.html#datyp2apdxatblxmp A tool for converting non-UCUM units of measure to the equivalent UCUM units is available at: http://www.regenstrief.org/medinformatics/ucum/unit-conversion-tool A pre-coordinated value set of common units is also available from PHIN VADS as: PHVS_UnitsOfMeasure_UCUM

6.1.1 HL7 Tables

This section provides values for HL7 tables that have had constraints applied to them in this IG.

Chapter 6: Code Systems and Value Sets

6.1.1.0 HL7 Table 0078 from 2.7

TABLE 6–2. HL7 TABLE 0078 FROM 2.7

Value	Description	Comment
L	Below low normal	
H	Above high normal	
LL	Below lower panic limits	
HH	Above upper panic limits	
<	Below absolute low-off instrument scale	
>	Above absolute high-off instrument scale	
N	Normal (applies to non-numeric results)	
A	Abnormal (applies to non-numeric results)	
AA	Very abnormal (applies to non-numeric units, analogous to panic limits for numeric units)	
null	No range defined, or normal ranges don't apply	
U	Significant change up	
D	Significant change down	
B	Better—use when direction not relevant	
W	Worse—use when direction not relevant	
S	Susceptible. Indicates for microbiology susceptibilities only.	
R	Resistant. Indicates for microbiology susceptibilities only.	
I	Intermediate. Indicates for microbiology susceptibilities only.	

TABLE 6–2. HL7 TABLE 0078 FROM 2.7

Value	Description	Comment
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.	
VS	Very susceptible. Indicates for microbiology susceptibilities only.	
POS	Positive	Added in HL7 Version 2.7
NEG	Negative	Added in HL7 Version 2.7
IND	Indeterminate	Added in HL7 Version 2.7
DET	Detected	Added in HL7 Version 2.7
ND	Not Detected	Added in HL7 Version 2.7
AC	Anti-complementary substances present	Added in HL7 Version 2.7
TOX	Cytotoxic substance present	Added in HL7 Version 2.7
QCF	Quality Control Failure	Added in HL7 Version 2.7
RR	Reactive	Added in HL7 Version 2.7
WR	Weakly reactive	Added in HL7 Version 2.7
NR	Non-reactive	Added in HL7 Version 2.7

Chapter 6: Code Systems and Value Sets

6.1.1.1 HL7 Table 0125 – Value Type (Constrained from the Full HL7 Table)

TABLE 6–3. HL7 TABLE 0125 – VALUE TYPE

Value	Description	Lab Sender Usage	ELR Usage	NHSN Usage	Lab to EHR Usage	Comment
AD	Address	X	X	X	X	Not supported.
CE	Coded Entry	R	O	-	R	
CF	Coded Element With Formatted Values	X	X	X	X	Not supported.
CK	Composite ID With Check Digit	X	X	X	X	Withdrawn as of <i>Version 2.5</i> .
CN	Composite ID And Name	X	X	X	X	Withdrawn as of <i>Version 2.5</i> .
CP	Composite Price	X	X	X	X	Not supported.
CWE	Coded with Exceptions	R	R	R	R	<p>This Implementation Guide has a specially constrained version of the CWE data type in section 2.3.5 above which is used for OBX-5. The version of the CWE documented in section 2.3.4 above shall not be used for OBX-5. The version of the CWE constrained for use with OBX-5 requires sending coded data. If the lab is trying to send only string data, the ST, TX or FT data types should be used.</p> <p>Data type to be used where it is important to communicate the coding system and coding system version with the coded result being reported. Pre-adopted from <i>Version 2.6</i>.</p>
CX	Extended Composite ID With Check Digit	O	O	-	O	

TABLE 6-3. HL7 TABLE 0125 - VALUE TYPE

Value	Description	Lab Sender Usage	ELR Usage	NHSN Usage	Lab to EHR Usage	Comment
DT	Date	R	R	-	O	
ED	Encapsulated Data	R	R	-	R	Field using the ED data type to allow communication of images, sound clips, XML documents, html markup, etc.
FT	Formatted Text (Display)	R	R	-	R	Field using the FT data type to carry a text result value. This is intended for display. The text may contain formatting escape sequences as described in the data types section. Numeric results and numeric results with units of measure should not be reported as text. These should be reported as NM or SN numeric results, with the units of measure in OBX-6.
MO	Money	X	X	X	X	Not supported.
NM	Numeric	R	R	-	R	Field using the NM data type to carry a numeric result value. The only non-numeric characters allowed in this field are a leading plus (+) or minus (-) sign. The structured numeric (SN) data type should be used for conveying inequalities, ranges, ratios, etc. The units for the numeric value should be reported in OBX-6.
PN	Person Name	X	X	X	X	Withdrawn as of <i>Version 2.5</i> .

TABLE 6-3. HL7 TABLE 0125 - VALUE TYPE

Value	Description	Lab Sender Usage	ELR Usage	NHSN Usage	Lab to EHR Usage	Comment
RP	Reference Pointer	R	R	-	R	<p>Field using the RP data type to allow communication of pointers to images, sound clips, XML documents, html markup, etc. The RP data type is used when the object being pointed to is too large to transmit directly.</p> <p>This specification defines the mechanism for exchanging pointers to objects, but it does not address the details of applications actually accessing and retrieving the objects over a network.</p> <p>The most common scheme for passing a pointer is to use a Universal Resource Identifier (URI). See http://ietf.org/rfc/rfc2396.txt for detailed definition. The general format of a URI is in the form: <code><scheme>://<authority><path>?<query></code>. The scheme and authority portions appear in the Application ID component, Universal ID subcomponent. The path and query portion of the URI appear in the Pointer component of the RP data type.</p>
SN	Structured Numeric	R	R	R	R	<p>Field using the SN data type to carry a structured numeric result value. Structured numeric include intervals ($^0^1$), ratios ($^1^1/2$ or $^1^1:^2$), inequalities ($<^10$), or categorical results (2^+). The units for the structured numeric value should be reported in OBX-6.</p>

TABLE 6-3. HL7 TABLE 0125 - VALUE TYPE

Value	Description	Lab Sender Usage	ELR Usage	NHSN Usage	Lab to EHR Usage	Comment
ST	String Data	R	R	R	R	Field using the ST data type to carry a short text result value. Numeric results and numeric results with units of measure should not be reported as text. These shall be reported as NM or SN numeric results, with the units of measure in OBX-6.
TM	Time	R	R	-	O	
TN	Telephone Number	X	X	X	X	Withdrawn as of <i>Version 2.5</i> .
TS	Time Stamp (Date & Time)	R	R	-	O	
TX	Text Data (Display)	R	R	-	R	Field using the TX data type to carry a text result value this is intended for display. Numeric results and numeric results with units of measure should not be reported as text. These should be reported as NM or SN numeric results, with the units of measure in OBX-6.
XAD	Extended Address	X	X	X	X	Not supported.
XCN	Extended Composite Name And Number For Persons	X	X	X	X	Not supported.
XON	Extended Composite Name And Number For Organizations	X	X	X	X	Not supported.
XPN	Extended Person Name	X	X	X	X	Not supported.
XTN	Extended Telecommunications Number	X	X	X	X	Not supported.

Chapter 6: Code Systems and Value Sets

6.1.1.2 5.2.1 HL7 Table 0155 – Accept/Application Acknowledgment Conditions (Constrained from the Full HL7 Table)

TABLE 6-4. HL7 TABLE 0155 – ACCEPT/APPLICATION ACKNOWLEDGMENT CONDITIONS						
Value	Description	Lab Sender Usage	ELR Usage	NHSN Usage	Lab to EHR Usage	Comment
AL	Always	R	O	O	R	
NE	Never	R	R	O	O	
ER	Error/reject conditions only	O	O	O	O	
SU	Successful completion only	O	O	O	O	

6.1.1.3 HL7 Table 0291 – Subtype Of Referenced Data

TABLE 6-5. HL7 TABLE 0291 – SUBTYPE OF REFERENCED DATA		
Value	Description	Comment
	Source RFC 2046	MIME media subtypes established in accordance with RFC 2046 (http://ietf.org/rfc/rfc2046.txt) and registered with the Internet Assigned Numbers Authority (http://www.iana.org/numbers.html). Note that the MIME media subtype values are case-insensitive, in accordance with RFC 2045.
x-hl7-cda-level-one	HL7 Clinical Document Architecture Level One document	Not supported.

6.1.1.4 HL7 Table 0301 - Universal ID Type

TABLE 6–6. HL7 TABLE 0301 – UNIVERSAL ID TYPE

Value	Description	Usage	Comments
DNS	An Internet dotted name. Either in ASCII or as integers	X	Not supported.
GUID	Same as UUID.	X	Not supported.
CEN	The CEN Healthcare Coding Scheme Designator. (Identifiers used in DICOM follow this assignment scheme.)	X	Not supported.
HL7	Reserved for future HL7 registration schemes	X	Not supported.
ISO	An International Standards Organization Object Identifier	R	Used as the Universal ID Type in the CNN, EI and HD data types.
L,M,N	These are reserved for locally defined coding schemes.	X	Not supported.
Random	Usually a base64 encoded string of random bits. The uniqueness depends on the length of the bits. Mail systems often generate ASCII string "_unique names," from a combination of random bits and system names. Obviously, such identifiers will not be constrained to the base64 character set.	X	Not supported.
URI	Uniform Resource Identifier	R	Used as the Universal ID Type in the RP data type
UUID	The DCE Universal Unique Identifier	X	Not supported.
x400	An X.400 MHS format identifier	X	Not supported.
x500	An X.500 directory name	X	Not supported.

Chapter 6: Code Systems and Value Sets

6.1.1.5 HL7 Table 0834 – MIME Type

TABLE 6-7. HL7 TABLE 0834 – MIME TYPE

Value	Description	Lab Sender Usage	ELR Receiver	NHSN Receiver	Lab to EHR Receiver	Comments
application	Application data	O	O	-	O	
audio	Audio data	R	R	-	R	
image	Image data	R	R	-	R	
model	Model data	O	O	-	O	
text	Text data	R	R	-	R	
video	Video data	R	R	-	R	
multipart	MIME multipart package	O	O	-	O	

6.2 VOCABULARY DISTRIBUTION

Vocabularies recommended in this guide are primarily standard vocabularies recommended by the HITSP for use in the particular domains. In many cases, these vocabularies are further constrained into value sets for use within this guide or were previously constrained into value sets by the CDC and maintained in PHIN VADS for use in the Public Health domain.

PHIN VADS is based upon Whitehouse E-Gov Consolidated Health Informatics (CHI) domain recommendations and its main purpose is to distribute the vocabulary subsets that are needed for public health. PHIN VADS allow implementers to browse, search, and download the value sets associated with an implementation guide. PHIN VADS has the capability to host multiple versions of value sets and implementation guide vocabulary. PHIN VADS provides vocabulary metadata that are needed for HL7 messaging or CDA implementation. The latest version of any value set referenced in this implementation guide can be obtained from the CDC PHIN VADS [<http://phinvads.cdc.gov>].

7. Example Laboratory Result Messages

The examples provided in this section are handcrafted and as such are subject to human error. **Examples should not be used as the basis for implementing the messages in the implementation guide.** Examples are provided to illustrate the use of the messages.

7.1 LEAD LABORATORY RESULT MESSAGE

```
MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^
  ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.1-
  0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1|||NE|NE|USA|||USEL
  R1.0^2.16.840.1.114222.4.10.3^ISO
```

```
SFT|1|Level Seven Healthcare Software,
  Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An Lab
  System|56734||20080817
```

```
PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.8
  40.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.113883.4.1^IS
  O^SS|Everyman^Adam^A^^^^L^^^^^^BS|Mum^Martha^M^^^^M|20050602
  |M|2106-3^White^CDCREC^^^^04/24/2007|2222 Home Street^^Ann
  Arbor^MI^99999^USA^H||^PRN^PH^^1^555^5552004|^WPN^PH^^1^955^55
  51009|eng^English^ISO6392^^^^3/29/2007|M^Married^HL70002^^^^2.
  5.1|||N^Not Hispanic or
  Latino^HL70189^^^^2.5.1|||N|||200808151000-
  0700|Reliable^2.16.840.1.113883.19.3.1^ISO
```

```
NK1|1|Mum^Martha^M^^^^L|MTH^Mother^HL70063^^^^2.5.1|444 Home
  Street^Apt B^Ann Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552006
```

```
PV1|1|O|4E^234^A^Good Health
  Hospital&2.16.840.1.113883.19.3.2.3&ISO^N^N^Building
  1^4^Nursing unit 4
  East^1234&&2.16.840.1.113883.19.3.2.3&ISO^&2.16.840.1.113883.1
  9.3.2.3&ISO|R|||||||||||||||||||||||||||||||||200808151
  000-0700|200808151200-0700
```

```
PV2|||1^Sick^99AdmitReason|||||||||N|||||Level Seven
  Healthcare,
  Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|||20010603||
  |19990603ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|97001
  23^Lab^2.16.840.1.113883.19.3.1.6^ISO|||||||1234^Admit^Alan^
  A^III^Dr^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI&&2.16.840.1.11
  3883.19.4.6^ISO^^^^^^^MD|^WPN^PH^^1^555^5551005|||||Level
  Seven Healthcare,
  Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005
```

Chapter 7: Example Laboratory Result Messages

Healthcare Drive^^Ann
Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444 Healthcare
Drive^Suite 123^Ann Arbor^MI^99999^USA^B

OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.
840.1.113883.19.3.1.6^ISO|10368-9^Lead BldC-
mCnc^LN^3456543^Blood lead test^99USI^2.24|||200808151030-
0700|||diarrhea|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.11
3883.19.4.6^ISO^L^^EI^&2.16.840.1.113883.19.4.6^ISO^^^^^^MD
|^WPN^PH^^1^555^5551005|||2008081830-0700|||F|||787.91^
DIARRHEA^I9CDX^^^07/09/2008|1235&Slide&Stan&S&&Dr&MD&&DOC&2.1
6.840.1.113883.19.4.6&ISO

OBX|1|NM|10368-9^Lead BldC-mCnc^LN^^^2.24|1|50|ug/dL^micro-gram
per deci-liter^UCUM^^^1.6|<10 ug/dL|H|||F|||200808151030-
0700|||200808181800-
0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3
434 Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1
.113883.19.4.6&ISO^L^^NPI

SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.
840.1.113883.19.3.1.6&ISO||122554006^Capillary blood
specimen^SCT^BLDC^Blood
capillary^HL70070^20080131^2.5.1||HEPA^Ammonium
heparin^HL70371^^^2.5.1|CAP^Capillary
Specimen^HL70488^^^2.5.1|181395001^Venous structure of
digit^SCT^^^20080731||P^Patient^HL60369^^^2.5.1|50^uL&Micro
Liter&UCUM&&&1.6|||200808151030-0700|200808151100-0700

OBX|2|NM|35659-2^Age at specimen
collection^LN^^^2.24||3|a^year^UCUM^^^1.6|||F|||2008081510
30-0700|||200808151030-
0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3
434 Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1
.113883.19.4.6&ISO^L^^NPI

7.2 CAMPYLOBACTER JEJUNI

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^
ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.1-
0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1||NE|NE|USA|||USEL
R1.0^2.16.840.1.114222.4.10.3^ISO

SFT|1|Level Seven Healthcare Software,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An Lab
System|56734||20080817

PID|1||36363636^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.8
40.1.113883.19.3.2.1&ISO~444333333^^&2.16.840.1.113883.4.1^IS

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SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO||119339001^Stool specimen^SCT^^^20080131|||||P^Patient^HL60369^^^2.5.1|10^gram&UCUM&&&1.6|||||200808151030-0700|200808151100-0700

7.3 ANIMAL RABIES

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.1-0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1||NE|NE|USA|||USELR1.0^^2.16.840.1.114222.4.10.3^ISO

SFT|1|Level Seven Healthcare Software, Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An Lab System|56734||20080817

PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.840.1.113883.19.3.2.1&ISO|^L~Everyman^Fluffy^^^N||20070602|M|||||||||||||20080817|Y|||200808151000-0700|Reliable^2.16.840.1.113883.19.3.1^ISO|44696006^Beagle^SCT^^^20080731

NK1|1|Everyman^Adam^A^^^L|OWN^Owner^HL70063^^^2.5.1|444 Home Street^Apt B^Ann Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552006

ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|||||||1234^Seven^Henry^L^^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI&2.16.840.1.113883.19.4.6^ISO^^^DVM|^WPN^PH^^1^555^5551005|||||Level Seven Healthcare, Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005 Healthcare Drive^^Ann Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444 Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B

OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|6528-4^Rabies virus Ag^LN^^^2.26|||200808141030-0700|||||1234^Seven^Henry^L^^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI&2.16.840.1.113883.19.4.6^ISO^^^DVM|^WPN^PH^^1^555^5551005|||||2008081830-0700|||F|||||1235&Slide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO

OBX|1|CWE|6528-4^Rabies virus Ag^LN^^^2.26|1|260373001^Detected^SCT^^^20080731|||||F|||200808141030-0700|||||200808151030-0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO||256865009^Brain tissue^SCT^^^^20080131|||||P^Patient^HL60369^^^^2.5.1|72^g&gram&UCUM&&&1.6|||||200808141030-0700|200808151100-0700

7.4 HEPATITIS C VIRUS

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.1-0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1|||NE|NE|USA|||USELR1.0^^2.16.840.1.114222.4.10.3^ISO

SFT|1|Level Seven Healthcare Software, Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An Lab System|56734||20080817

PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.840.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.113883.4.1^ISO^SS|Everyman^Adam^A^^^^L^^^^^^BS|Mum^Martha^M^^^^M|19800602|M|2106-3^White^CDCREC^^^^04/24/2007|2222 Home Street^^Ann Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552004|^WPN^PH^^1^955^5551009|eng^English^ISO6392^^^^3/29/2007|M^Married^HL70002^^^^2.5.1|||||N^Not Hispanic or Latino^HL70189^^^^2.5.1|||||||N|||200808151000-0700|Reliable^2.16.840.1.113883.19.3.1^ISO

PV1|1|O|4E^234^A^Good Health Hospital&2.16.840.1.113883.19.3.2.3&ISO^N^N^Building 1^4^Nursing unit 4 East^1234&&2.16.840.1.113883.19.3.2.3&ISO^&2.16.840.1.113883.19.3.2.3&ISO|R|||||||||||||||||||||||||||||||||200808151000-0700|200808151200-0700

PV2|||1^Sick^99AdmitReason|||||||||||||N|||||||Level Seven Healthcare, Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|||20010603|||19990603

ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|||||||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^^^^^MD|^WPN^PH^^1^555^5551005|||||||Level Seven Healthcare, Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005 Healthcare Drive^^Ann Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444 Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B

OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|5198-7^HCV Ab Ser EIA-aCnc^LN^140666^Hep C Virus Ab^99LabTest^2.26|||200808151030-

Chapter 7: Example Laboratory Result Messages

```
0700|||jaundice||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.11
3883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^MD
|^WPN^PH^1^555^5551005|||2008081830-
0700||F|||782.4^Jaundice unspecified not of
newborn^I9CDX^^^07/09/2008|1235&Slide&Stan&S&&Dr&MD&&DOC&2.16
.840.1.113883.19.4.6&ISO
```

```
OBX|1|SN|5198-7^HCV Ab Ser EIA-aCnc^LN^140666^Hep C Virus
Ab^99LabTest^2.24|1|>^11.0|1^^UCUM^^^1.6^^s/co ratio|0.0-
0.9|H~POS||F|||200808151030-0700|||200808181800-0700|||GHH
Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1
.113883.19.4.6&ISO^L^^NPI
```

```
SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.
840.1.113883.19.3.1.6&ISO||122555007^Venous blood
specimen^SCT^WB^Blood,
whole^HL70487^20080731^2.5.1||HEPA^Ammonium
heparin^HL70371^^^2.5.1|VENIP^Venipuncture^HL70488^^^2.5.1|
29092000^Venous
structure^SCT^^^20080731||P^Patient^HL60369^^^2.5.1|2^ml&mi
lliliter&UCUM&&&1.6|||200808151030-0700|200808151100-0700
```

```
OBX|2|NM|35659-2^Age at specimen
collection^LN^^^2.24|1|29|a^year^UCUM^^^1.6|||F|||20080815
1030-0700|||200808151030-0700|||GHH
Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1
.113883.19.4.6&ISO^L^^NPI
```

```
OBX|3|TX|11294-6^Current employment^LN^^^2.24|1|food
handler|||F|||200808151030-0700|||200808151030-
0700|||GHH
Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1
.113883.19.4.6&ISO^L^^NPI
```

7.5 MINIMAL MESSAGE WITH ACKNOWLEDGEMENT

Acknowledgments are an optional part of this implementation guide. The National ELR group felt that this guide should show some examples of the optional acknowledgments.

The first example is a minimal message, including only those fields that are required. The subsequent examples include acknowledgements for a successful receipt, an error upon receipt and a rejection acknowledgement in response to the minimal message.

7.5.1 Example: Minimal Message

Transaction sent:

Chapter 7: Example Laboratory Result Messages

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.1-0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1|||NE|NE|USA|||USELR1.0^^2.16.840.1.114222.4.10.3^ISO

SFT|1|Level Seven Healthcare Software, Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An Lab System|56734||20080817

PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.16.840.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.113883.4.1^ISO^SS||Everyman^Adam^A^^^L^^^BS|Mum^Martha^M^^^M|20050602|M||2106-3^White^CDCREC^^^04/24/2007|2222 Home Street^^Ann Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552004|^WPN^PH^^1^955^5551009|eng^English^ISO6392^^^3/29/2007|M^Married^HL70002^^^2.5.1|||N^Not Hispanic or Latino^HL70189^^^2.5.1|||N|||200808151000-0700|Reliable^2.16.840.1.113883.19.3.1^ISO

ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^MD|^WPN^PH^^1^555^5551005|||Level Seven Healthcare, Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005 Healthcare Drive^^Ann Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444 Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B

OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.16.840.1.113883.19.3.1.6^ISO|10368-9^Lead BldC-mCnc^LN^3456543^Blood lead test^99USI^2.24|||200808151030-0700|||diarrhea|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^MD|^WPN^PH^^1^555^5551005|||2008081830-0700|||F|||787.91^DIARRHEA^I9CDX^^^07/09/2008|1235&Slide&Stan&S&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO

OBX|1|NM|10368-9^Lead BldC-mCnc^LN^^^2.24||50|ug/dL^microgram per deci-liter^UCUM^^^1.6|<10 ug/dL|H||F|||200808151030-0700|||200808181800-0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.16.840.1.113883.19.3.1.6&ISO||122554006^Capillary blood specimen^SCT^BLDC^Blood capillary^HL70070^20080131^2.5.1||HEPA^Ammonium

Chapter 7: Example Laboratory Result Messages

```
heparin^HL70371^^^^2.5.1|CAP^Capillary
Specimen^HL70488^^^^2.5.1|181395001^Venous structure of
digit^SCT^^^^20080731||P^Patient^HL60369^^^^2.5.1|50^uL
&MicroLiter&UCUM&&&&1.6|||200808151030-
0700|200808151100-0700
```

7.5.2 Example: Successful Receipt Message

Acknowledgment:

```
MSH|^~\&|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113
883.19.3.2^ISO|Lab^2.16.840.1.113883.19.4.6^ISO|GHH^2.16
.840.1.113883.19.3.1^ISO|20080818183002.9-
0700||ACK^R01^ACK|1234567891|P^T|2.5.1||NE|NE|USA|||US
ELR1.0^2.16.840.1.114222.4.10.3^ISO
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
ELR System|56739||20080817
MSA|CA|1234567890
```

7.5.3 Example: Error on Receipt Message

Transaction sent:

```
MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.
3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.
1-
0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1||NE|NE|USA||
||USELR1.0^2.16.840.1.114222.4.10.3^ISO
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
Lab System|56734||20080817
PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.
16.840.1.113883.19.3.2.1&ISO~444333333^^^&2.16.840.1.113
883.4.1^ISO^SS||Everyman^Adam^A^^^^L^^^^^^^BS|Mum^Martha
^M^^^^M|20050602|M||2106-
3^White^CDCREC^^^^04/24/2007|2222 Home Street^^Ann
Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552004|^WPN^PH^^1^
955^5551009|eng^English^ISO6392^^^^3/29/2007|M^Married^H
L70002^^^^2.5.1|||N^Not Hispanic or
Latino^HL70189^^^^2.5.1|||N||200808151000-0700|
Reliable^2.16.840.1.113883.19.3.1^ISO
ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^
2.16.840.1.113883.19.3.1.6^ISO|||1234^Admit^Alan^A
^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI&2.16.840
.1.113883.19.4.6^ISO^^^^^^^MD|^WPN^PH^^1^555^5551005||
|||Level Seven Healthcare,
Inc.^L^^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005
Healthcare Drive^^Ann
```

```

Arbor^MI^99999^USA^B|^WPN^PH^1^555^5553001|4444
Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B
OBX|1|NM|10368-9^Lead BldC-mCnc^LN^^^2.24||50|ug/dL^micro-
gram per deci-liter^UCUM^^^1.6|<10
ug/dL|H|||F|||200808151030-0700|||200808181800-
0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^
1236|3434 Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16
.840.1.113883.19.4.6&ISO^L^^NPI
SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2
.16.840.1.113883.19.3.1.6&ISO||122554006^Capillary blood
specimen^SCT^BLDC^Blood
capillary^HL70070^20080131^2.5.1||HEPA^Ammonium
heparin^HL70371^^^2.5.1|CAP^Capillary
Specimen^HL70488^^^2.5.1|181395001^Venous structure of
digit^SCT^^^20080731||P^Patient^HL60369^^^2.5.1|50^uL
&MicroLiter&UCUM&&&1.6|||200808151030-
0700|200808151100-0700

```

Acknowledgment:

```

MSH|^~\&|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113
883.19.3.2^ISO|Lab^2.16.840.1.113883.19.4.6^ISO|GHH^2.16
.840.1.113883.19.3.1^ISO|20080818183002.9-
0700||ACK^R01^ACK|1234567891|P^T|2.5.1||NE|NE|USA|||US
ELR1.0^^2.16.840.1.114222.4.10.3^ISO
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^1234|1.2|An
ELR System|56739||20080817
MSA|CE|1234567890
ERR||OBR^1|100^Segment sequence error^HL70357|E||Missing
required OBR segment|Email help desk for further
information on this
error|||^NET^Internet^helpdesk@hl7.org

```

7.5.4 Example: Error on Receipt - Warning

Transaction sent:

```

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.
3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.
1-
0700||ORU^R01^ORU_R01|1234567890|P^T|2.5.1||NE|NE|USA||
||USELR1.0^^2.16.840.1.114222.4.10.3^ISO
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^1234|1.2|An
Lab System|56734||20080817
PID|1||36363636^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.
16.840.1.113883.19.3.2.1&ISO~44433333^^&2.16.840.1.113
883.4.1^ISO^SS||Everyman^Adam^A^^^L^^^BS|Mum^Martha

```

Chapter 7: Example Laboratory Result Messages

```
^M^^^M|20050602|M||2106-
3^White^CDCREC^^^^04/24/2007|2222 Home Street^^Ann
Arbor^MI^99999^USA^H|^PRN^PH^^1^555^5552004|^WPN^PH^^1^
955^5551009|eng^English^ISO6392^^^^3/29/2007|M^Married^H
L70002^^^^2.5.1|||||N^Not Hispanic or
Latino^HL70189^^^^2.5.1|||||N|||200808151000-0700|
Reliable^2.16.840.1.113883.19.3.1^ISO
ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^
2.16.840.1.113883.19.3.1.6^ISO|||||1234^Admit^Alan^A
^III^Dr^^&2.16.840.1.113883.19.4.6^ISO^L^^EI&2.16.840
.1.113883.19.4.6^ISO^^^^^^MD|^WPN^PH^^1^555^5551005||
||||Level Seven Healthcare,
Inc.^L^^&2.16.840.1.113883.19.4.6^ISO^XX^^1234|1005
Healthcare Drive^^Ann
Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444
Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B
OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2
.16.840.1.113883.19.3.1.6^ISO|10368-9999^Lead BldC-
mCnc^LN^3456543^Blood lead
test^99USI^2.24|||200808151030-
0700|||||diarrhea|||1234^Admit^Alan^A^III^Dr^^&2.16.84
0.1.113883.19.4.6^ISO^L^^EI&2.16.840.1.113883.19.4.6^I
SO^^^^^^MD|^WPN^PH^^1^555^5551005|||||2008081830-
0700|||F|||||787.91^DIARRHEA^I9CDX^^^^07/09/2008|1235&S
lide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO
OBX|1|NM|10368-9^Lead BldC-mCnc^LN^^^^2.24||50|ug/dL^micro-
gram per deci-liter^UCUM^^^^1.6|<10
ug/dL|H|||F|||200808151030-0700|||200808181800-
0700|||Lab^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^
1236|3434 Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^NPPES&2.16
.840.1.113883.19.4.6&ISO^L^^NPI
SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2
.16.840.1.113883.19.3.1.6&ISO||122554006^Capillary blood
specimen^SCT^BLDC^Blood
capillary^HL70070^20080131^2.5.1||HEPA^Ammonium
heparin^HL70371^^^^2.5.1|CAP^Capillary
Specimen^HL70488^^^^2.5.1|181395001^Venous structure of
digit^SCT^^^^20080731|||P^Patient^HL60369^^^^2.5.1|50^uL
&MicroLiter&UCUM&&&1.6|||200808151030-
0700|200808151100-0700
```

Acknowledgement:

```
MSH|^~\&|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113
883.19.3.2^ISO|Lab^2.16.840.1.113883.19.4.6^ISO|GHH^2.16
.840.1.113883.19.3.1^ISO|20080818183002.9-
0700||ACK^R01^ACK|1234567891|P^T|2.5.1|||NE|NE|USA|||US
ELR1.0^2.16.840.1.114222.4.10.3^ISO
```

```

SFT|1|Level Seven Healthcare Software,
    Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
    ELR System|56739||20080817
MSA|CE|1234567890
ERR||OBR^1^4|207^Application internal
    error^HL70357|W|||Invalid LOINC Code|Email help desk for
    further information on this
    error|||^NET^Internet^helpdesk@hl7.org

```

7.5.5 Example: Reject Receipt Message

Transaction sent:

```

MSH|^~\&|Lab1^1234^CLIA|^1234^CLIA|ELR^2.16.840.1.113883.19.
    3.2^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|20080818183002.
    1-
    0700||ORU^R01^ORU_R01|1234567890|T^T|2.5.1|||NE|NE|USA||
    ||USELR1.0^^2.16.840.1.114222.4.10.3^ISO

```

(The remainder of the message is the same as that in *Section 7.3.1* above.)

Acknowledgment:

```

MSH|^~\&|ELR^2.16.840.1.113883.19.3.2^ISO|SPH^2.16.840.1.113
    883.19.3.2^ISO|Lab^2.16.840.1.113883.19.4.6^ISO|GHH^2.16
    .840.1.113883.19.3.1^ISO|20080818183002.9-
    0700||ACK^R01^ACK|1234567891|P^T|2.5.1|||NE|NE|USA|||US
    ELR1.0^^2.16.840.1.114222.4.10.3^ISO
SFT|1|Level Seven Healthcare Software,
    Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
    ELR System|56739||20080817
MSA|CR|1234567890
ERR||MSH^1^10|202^Unsupported processing id^HL70357|E|||Test
    message sent in production environment|Email help desk
    for further information on this
    error|||^NET^Internet^helpdesk@hl7.org

```

Appendix A. HL7 Reporting of Culture and Susceptibilities

A.1 INTRODUCTION

Parent-child relationships, such as culture and sensitivities, can be reported using the HL7 electronic messaging standard. However, this is an area where many vendors and large laboratories have augmented the standard to account for variations in the systems with which they work. This usually does not present a problem until these messages must be shared between systems (for instance, between laboratories and sub-contracted laboratories, or between laboratories and public health agencies).

Parent-child information such as culture and susceptibilities (*e.g.*, reporting of multi-resistant tuberculosis or drug-resistant gonococcus or pneumococcus) is a critical component of electronic, laboratory-based public health reporting.

The approach described here is required for use in reporting microbiology results for this message profile.

A.2 TEMPLATE FOR CULTURE RESULTS

A template report for the initial identification of three organisms from a single stool culture is presented below. For each field (*i.e.*, the space between the pipes, "|"), a description of what should appear in that particular field is given, along with the segment-field number in parentheses (*e.g.*, OBR-3) for some of the fields. Note that these examples use the ORU^R01 message type.

```
MSH|...
PID|...
OBR|1| Placer number | Filler number | Identifier code for
    the requested test or panel of tests(OBR-4) |...
OBX|1|CE| Specific organism identifier (OBX-3) | Sub-id for
    the first organism (OBX-4) | Description of organism
    (OBX-5) |...
OBX|2|SN| Other identifier (OBX-3) | Sub-id for the first
    organism (OBX-4) | Observation on the organism (OBX-5) |...
OBX|3|CE| Specific organism identifier (OBX-3) | Sub-id for
    the second organism (OBX-4) | Description of organism
    (OBX-5) |...
OBX|4|SN| Other identifier (OBX-3) | Sub-id for the second
    organism (OBX-4) | Observation on the Organism (OBX-5) |...
OBX|5|CE| Specific organism identifier (OBX-3) | Sub-id for
    the third organism (OBX-4) | Description of organism
    (OBX-5) |...
OBX|6|SN| Other identifier (OBX-3) | Sub-id for the third
    organism (OBX-4) | Observation on the organism (OBX-5) |...
SPM|1| Specimen identifier for the specimen being tested|_
```

This report has the MSH (Message Header), the PID (Patient Identification Segment), a single OBR (Observation Request Segment), and six OBX (Observation/Results) segments, and a single SPM (Specimen Segment). Note that the Set ID in the first field of each OBX is sequential, while the Sub-ID in the fourth field of each OBX is not sequential, but acts as a link for all of the OBX segments that are reporting information for a related observation.

The Sub-ID field in the template above has the words "first," "second" and "third" in **bold** and highlighted in green. This is done to show that the identification of the first organism is the relating observation for the first two OBX segments (e.g., Set-ID numbers 1 and 2). The identification of the second organism is the relating observation for the second two segments (e.g., Set-ID numbers 3 and 4), and so on. An example using the template above is presented below.

A.2.1 Examples of Culture Results

In this example, Reliable Labs, Inc. is sending preliminary results of a stool culture to state public health authorities. Three pathogens have been identified: Campylobacter jejuni, Salmonella and Shigella.

This example shows the use of the Sub-ID in OBX-4 to connect related observations. The Sub-ID is shown in bolded letters and highlighted in green, as presented in the previous template. In this example, numbers are used for the Sub-ID. However, a text identifier such as "isolate1" could be used. The HL7 standard has defined the Sub-ID (e.g., OBX-4) as a "string" data type. Thus, it can be either a number or text.

In this example, the information about colony counts in OBX segments with Set IDs 2, 4, and 6 is provided to show how the Sub-ID is used to relate the associated OBX segments to each other (e.g., 1 and 2, 3 and 4, 5 and 6). Some laboratories may not have this additional information and would therefore transmit only the identification of the organisms (e.g., OBX segments 1, 3 and 5).

Identified organisms must be reported as coded data instead of text data. Coded data enables machine processing of results. String data can normally be interpreted only by humans.

```
MSH|^~\&|Lab1^1234^CLIA|Reliable^1234^CLIA|ELR^2.16.840.1.113
883.19.3.2.3^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|2007070
1132554-
0400||ORU^R01^ORU_R01|20070701132554000008|P^T|2.5.1|||NE
|NE|USA|||USELR1.0^^2.16.840.1.113883.19.9.7^ISO
SFT|1|Level Seven Healthcare Software,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
Lab System|56734||20080817
PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.1
6.840.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.11388
3.4.1^ISO^SS||Everyman^Adam^A^^^L^^^BS|Mum^Martha^M^
^^^M|19750602|M|2106-3^White^CDCREC^^^04/24/2007|2222
Home Street^^Ann
Arbor^MI^99999^USA^H||^PRN^PH^^1^555^5552004|^WPN^PH^^1^9
55^5551009|eng^English^ISO6392^^^3/29/2007|M^Married^HL7
0002^^^2.5.1|||N^Not Hispanic or
Latino^HL70189^^^2.5.1|||N|||200808151000-
0700|Reliable^2.16.840.1.113883.19.3.1^ISO
ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2
.16.840.1.113883.19.3.1.6^ISO|||1234^Admit^Alan^A^I
II^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^EI^&2.16.840.1.
113883.19.4.6^ISO^^^MD||^WPN^PH^^1^555^5551005|||
|Level Seven Healthcare,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005
Healthcare Drive^^Ann
Arbor^MI^99999^USA^B|^WPN^PH^^1^555^5553001|4444
Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B
OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.
16.840.1.113883.19.3.1.6^ISO|625-4^Bacteria
```

Appendix A: HL7 Reporting of Culture and Susceptibilities

identified^LN^3456543^ CULTURE,
STOOL^99USI^2.26|||200808151030-
0700|||||diarrhea|||1234^Admit^Alan^A^III^Dr^^^&2.16.840
.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO
^^^^^^MD|^WPN^PH^^1^555^5551005|||2008081830-
0700|||P|||||787.91^DIARRHEA^I9CDX^^^07/09/2008|1235&Sl
ide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO

OBX|1|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^2.26|1|6654300
0^Campylobacter jejuni^SCT^^^January
2007|||||P|||200808151030-0700|||0086^Bacterial
identification^OBSMETHOD^^^501-20080815||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI

OBX|2|SN|564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^2.26|1|^10000^-
^90000|1^^UCUM^^^1.6|||||P|||200808151030-
0700|||||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI

OBX|3|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^2.26|2|3026200
05^Salmonella group B phase 1 a-e^SCT^^^January
2007|||||P|||200808151030-0700|||0086^Bacterial
identification^OBSMETHOD^^^501-20080815||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI

OBX|4|SN|564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^2.26|2|>^100000|1^^UCUM^^^1
.6|||||P|||200808151030-0700|||||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI

OBX|5|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^2.26|3|7735200
2^Shigella^SCT^^^January 2007|||||P|||200808151030-
0700|||0086^Bacterial identification^OBSMETHOD^^^501-


```

20080815||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI
OBX|6|SN|564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^2.26|3|<^1000|1^^UCUM^^^1.6
||||P|||200808151030-0700|||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^NPI
SPM|1|23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.
16.840.1.113883.19.3.1.6&ISO||119339001^Stool
specimen^SCT^^^20080131|||||P^Patient^HL60369^^^2.5.1
|10^g&gram&UCUM&&&&1.6||||200808151030-
0700|200808151100-0700

```

A.3 TEMPLATE FOR CULTURE AND SUSCEPTIBILITY RESULTS

The template and example in the *Template for Culture Results* section of this appendix describe a report for a culture. The following template shows how antimicrobial susceptibility results are reported for the culture described in that section. The connection of the culture to the susceptibilities is a "parent-child" relationship, where the culture is the parent result and the susceptibilities are the child results. This means that there can be many child results for a single parent result. In other words, there can be multiple OBR child segments for the single OBR parent segment presented in the *Template for Culture Results* section of this appendix. The template for the report containing the culture and susceptibilities appears below. The titles in *Italics* are given to highlight the individual parent and child segments and are not found in an actual HL7 message transmission. It is important to note that in each of the OBR child segments there is a pointer back to the parent result. This pointer is found in OBR-26 (Parent Result) and in OBR-29 (Parent Number).

Message Header and Patient Identification Segment for the Parent-Child Message

```

MSH|...
PID|...

```

Parent OBR Segment

```

OBR|1|Placer number (OBR-2) | Filler order number (OBR-3) |
Identifier code for the requested test or panel of tests
(OBR-4) |...

```

Parent OBX Segments for First Organism Identified

```

OBX|1|CE| Specific organism identifier (OBX-3) | Sub-id for
the first organism (OBX-4) | Description of organism
(OBX-5) |...

```

```

OBX|2|SN| Other identifier (OBX-3) | Sub-id for the first
organism (OBX-4) | Observation on the organism (OBX-5) |...

```

Parent OBX Segments for Second Organism Identified

```

OBX|3|CE| Specific organism identifier (OBX-3) | Sub-id for
the second organism (OBX-4) | Description of organism
(OBX-5) |...

```

Appendix A: HL7 Reporting of Culture and Susceptibilities

OBX|4|SN| Other identifier (OBX-3) | Sub-id for the **second organism (OBX-4)** | Observation on the Organism (OBX-5) |...
Parent OBX Segments for Third Organism Identified

OBX|5|CE| Specific organism identifier (OBX-3) | Sub-id for the **third organism (OBX-4)** | Description of organism (OBX-5) |...

OBX|6|SN| Other identifier (OBX-3) | Sub-id for the **third organism (OBX-4)** | Observation on the organism (OBX-5) |...
Child OBR for First Organism identified

OBR|2| Placer number (OBR-2)| Filler order number (OBR-3) | Identifier code for the requested test or panel of tests (OBR-4) ||| A **pointer back to the parent OBX segment that contained the identification of the first organism, see below for description of "Pointers" (OBR-26)** ||| Parent Filler order number (OBR-29) |...
Child OBX Segments for Susceptibilities of First Organism Identified

OBX|1|CE|Specific susceptibility identifier for first antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|2|CE|Specific susceptibility identifier for second antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|3|CE|Specific susceptibility identifier for third antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...
Child OBR Segment for Susceptibilities of Second Organism Identified

OBR|3| Placer number (OBR-2)| Filler order number (OBR-3) | Identifier code for the requested test or panel of tests (OBR-4) ||| A **pointer back to the parent OBX segment that contained the identification of the second organism, see below for description of "Pointers" (OBR-26)** ||| Parent Filler order number (OBR-29) |...
Child OBX Segments for Susceptibilities of Second Organism Identified

OBX|1|CE|Specific susceptibility identifier for first antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|2|CE|Specific susceptibility identifier for second antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|3|CE|Specific susceptibility identifier for third antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

Child OBR Segment for Susceptibilities of Third Organism Identified

OBR|3| Placer number (OBR-2)| Filler order number (OBR-3) | Identifier code for the requested test or panel of tests (OBR-4) ||| A pointer back to the parent OBX segment that contained the identification of the third organism, see below for description of "Pointers" (OBR-26) ||| Parent Filler order number (OBR-29) |...

Child OBX Segments for Susceptibilities of Third Organism Identified

OBX|1|CE|Specific susceptibility identifier for first antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|2|CE|Specific susceptibility identifier for second antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

OBX|3|CE|Specific susceptibility identifier for third antimicrobial (OBX-3) || Susceptibility finding (OBX-5) ||| Susceptibility interpretation (OBX-8) |...

SPM Segment

SPM|1| Specimen identifier for the specimen being tested|...

A.3.1 Examples of Culture and Susceptibility Results

Using the template above, this example shows a report of three pathogens identified from a stool specimen with their respective antimicrobial susceptibility tests.

```
MSH|^~\&|
  Lab1^1234^CLIA|Reliable^1234^CLIA|ELR^2.16.840.1.113883.1
  9.3.2.3^ISO|SPH^2.16.840.1.113883.19.3.2^ISO|200707011325
  54-
  0400||ORU^R01^ORU_R01|20070701132554000008|P^T|2.5.1|||NE
  |NE|USA|||USELR1.0^2.16.840.1.113883.19.9.7^ISO
SFT|1|Level Seven Healthcare Software,
  Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1.2|An
  Lab System|56734||20080817
PID|1||36363636^^^MPI&2.16.840.1.113883.19.3.2.1&ISO^MR^A&2.1
  6.840.1.113883.19.3.2.1&ISO~44433333^^^&2.16.840.1.11388
  3.4.1^ISO^SS||Everyman^Adam^A^^^L^^^BS|Mum^Martha^M^
  ^^M|19750602|M||2106-3^White^CDCREC^^^04/24/2007|2222
  Home Street^^Ann
  Arbor^MI^99999^USA^H||^PRN^PH^^1^555^5552004|^WPN^PH^^1^9
  55^5551009|eng^English^ISO6392^^^3/29/2007|M^Married^HL7
  0002^^^2.5.1|||N^Not Hispanic or
```

Appendix A: HL7 Reporting of Culture and Susceptibilities

Latino^HL70189^^^^2.5.1|||||N|||200808151000-
0700|Reliable^2.16.840.1.113883.19.3.1^ISO
ORC|RE|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2
.16.840.1.113883.19.3.1.6^ISO|||||1234^Admit^Alan^A^I
II^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.
113883.19.4.6^ISO^^^^^^MD|^WPN^PH^1^555^5551005|||||
|Level Seven Healthcare,
Inc.^L^^^&2.16.840.1.113883.19.4.6^ISO^XX^^^1234|1005
Healthcare Drive^^Ann
Arbor^MI^99999^USA^B|^WPN^PH^1^555^5553001|4444
Healthcare Drive^Suite 123^Ann Arbor^MI^99999^USA^B
OBR|1|23456^EHR^2.16.840.1.113883.19.3.2.3^ISO|9700123^Lab^2.
16.840.1.113883.19.3.1.6^ISO|625-4^Bacteria
identified^LN^3456543^ CULTURE,
STOOL^99USI^2.26|||200808151030-
0700|||||diarrhea|||1234^Admit^Alan^A^III^Dr^^^&2.16.840
.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO
^^^^^^MD|^WPN^PH^1^555^5551005|||||2008081830-
0700|||F|||||787.91^DIARRHEA^I9CDX^^^^07/09/2008|1235&Sl
ide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO
OBX|1|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^2.26|1|6654300
0^Campylobacter jejuni^SCT^^^^January
2007|||||F|||200808151030-0700|||0086^Bacterial
identification^OBSMETHOD^^^^501-20080815||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI
OBX|2|SN|564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^2.26|1|^10000^-
^90000|1^^UCUM^^^^1.6|||||F|||200808151030-
0700|||||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI
OBX|3|CWE|625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^2.26|2|3026200
05^Salmonella group B phase 1 a-e^SCT^^^^January
2007|||||F|||200808151030-0700|||0086^Bacterial
identification^OBSMETHOD^^^^501-20080815||200808161030-
0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI

Appendix A: HL7 Reporting of Culture and Susceptibilities

OBX | 4 | SN | 564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^^2.26 | 2 | >^100000 | 1^^UCUM^^^^1
.6 | | | | F | | | 200808151030-0700 | | | | 200808161030-
0700 | | | | Reliable Labs,
Inc^L^^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236 | 3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B | 9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI

OBX | 5 | CWE | 625-4^Bacteria
identified:Prid:Pt:Stool:Nom:Culture^LN^^^^2.26 | 3 | 7735200
2^Shigella^SCT^^^^January 2007 | | | | F | | | 200808151030-
0700 | | | 0086^Bacterial identification^OBSMETHOD^^^^501-
20080815 | | 200808161030-0700 | | | | Reliable Labs,
Inc^L^^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236 | 3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B | 9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI

OBX | 6 | SN | 564-5^COLONY
COUNT:NUM:PT:XXX:QN:VC^LN^^^^2.26 | 3 | <^1000 | 1^^UCUM^^^^1.6
| | | | F | | | 200808151030-0700 | | | | 200808161030-
0700 | | | | Reliable Labs,
Inc^L^^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236 | 3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B | 9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI

SPM | 1 | 23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700122&Lab&2.
16.840.1.113883.19.3.1.6&ISO | | 119339001^Stool
specimen^SCT^^^^20080131 | | | | | P^Patient^HL60369^^^^2.5.1
| 10^g&gram^UCUM&&&&1.6 | | | | 200808151030-
0700 | 200808151100-0700

OBR | 2 | | 9700124^Lab^2.16.840.1.113883.19.3.1.6^ISO | 50545-
3^Bacterial susceptibility panel:-
:Pt:Isolate:OrdQn:MIC^LN^^^^2.26 | | | 200808151030-
0700 | | | | | | 1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.11388
3.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^^^^
MD | ^WPN^PH^^1^555^5551005 | | | | 2008081830-0700 | | F | 625-
4&Bacteria
identified:Prid:Pt:Stool:Nom:Culture&LN^1^Campylobacter
jejuni | | 23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700123
&Lab&2.16.840.1.113883.19.3.1.6&ISO | | 787.91^DIARRHEA^I9CD
X^^^^07/09/2008 | 1235&Slide&Stan&S&&Dr&MD&&DOC&2.16.840.1.
113883.19.4.6&ISO

OBX | 1 | SN | 6979-9^AMPICILLIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26 | 1 | <^0.06 | ug/mL^^UCUM^^^^1.6 | | S | | F | | 200
808151030-0700 | | | | 200808161030-0700 | | | | Reliable Labs,
Inc^L^^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236 | 3434
Industrial Loop^^Ann

Appendix A: HL7 Reporting of Culture and Susceptibilities

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

OBX|2|SN|7016-9^GENTAMICIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^^UCUM^^^^1.6||S|||F|||200808151030-0700|||200808161030-0700|||Reliable Labs, Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

OBX|3|SN|7002-9^CIPROFLOXACIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^^UCUM^^^^1.6||S|||F|||200808151030-0700|||200808161030-0700|||Reliable Labs, Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

OBR|3||9700125^Lab^2.16.840.1.113883.19.3.1.6^ISO|50545-3^Bacterial susceptibility panel:-
:Pt:Isolate:OrdQn:MIC^LN^^^^2.26|||200808151030-0700|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.113883.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^^^^MD|^WPN^PH^^1^555^5551005|||2008081830-0700|||F|625-4&Bacteria identified:Prid:Pt:Stool:Nom:Culture&LN^2^Salmonella group B phase 1 a-e|||23456&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700123&Lab&2.16.840.1.113883.19.3.1.6&ISO||787.91^DIARRHEA^I9CDX^^^^07/09/2008|1235&Slide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6&ISO

OBX|1|SN|6979-9^AMPICILLIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|<^0.06|ug/mL^^UCUM^^^^1.6||S|||F|||200808151030-0700|||200808161030-0700|||Reliable Labs, Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

OBX|2|SN|7016-9^GENTAMICIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^^UCUM^^^^1.6||S|||F|||200808151030-0700|||200808161030-0700|||Reliable Labs, Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.840.1.113883.19.4.6&ISO^L^^^NPI

OBX|3|SN|7002-9^CIPROFLOXACIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^^UCUM^^^^1.6||S|||F|||200808151030-0700|||200808161030-0700|||Reliable Labs, Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434 Industrial Loop^^Ann


```

Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI
OBR|4||9700126^Lab^2.16.840.1.113883.19.3.1.6^ISO|50545-
3^Bacterial susceptibility panel:-
:Pt:Isolate:OrdQn:MIC^LN^^^^2.26|||200808151030-
0700|||1234^Admit^Alan^A^III^Dr^^^&2.16.840.1.11388
3.19.4.6^ISO^L^^^EI^&2.16.840.1.113883.19.4.6^ISO^^^^^^
MD|^WPN^PH^1^555^5551005|||2008081830-0700|||F|625-
4&Bacteria
identified:Prid:Pt:Stool:Nom:Culture&LN^2^Shigella|||2345
6&EHR&2.16.840.1.113883.19.3.2.3&ISO^9700123&Lab&2.16.840
.1.113883.19.3.1.6&ISO||787.91^DIARRHEA^I9CDX^^^^07/09/20
08|1235&Slide&Stan&S&&Dr&MD&&DOC&2.16.840.1.113883.19.4.6
&ISO
OBX|1|SN|6979-9^AMPICILLIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^<^0.06|ug/mL^UCUM^^^^1.6||S|||F|||200
808151030-0700|||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI
OBX|2|SN|7016-9^GENTAMICIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^UCUM^^^^1.6||S|||F|||2008
08151030-0700|||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI
OBX|3|SN|7002-9^CIPROFLOXACIN:SUSC:PT:ISLT:ORDQN:GRADIENT
STRIP^LN^^^^2.26|1|^0.05|ug/mL^UCUM^^^^1.6||S|||F|||2008
08151030-0700|||200808161030-0700|||Reliable Labs,
Inc^L^^^CLIA&2.16.840.1.113883.19.4.6&ISO^XX^^^1236|3434
Industrial Loop^^Ann
Arbor^MI^99999^USA^B|9876543^Slide^Stan^S^^^^^NPPES&2.16.
840.1.113883.19.4.6&ISO^L^^^NPI

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A.4 LINKING PARENT AND CHILD RESULTS

The previous example uses the information in OBR-26 as a pointer to the parent OBX where the culture result is reported. OBR-26 has three components. The three components of OBR-26 are the OBX-3, OBX-4 and part of the OBX-5 from the parent OBX segment. The pointer to the parent requires only the first two components. The third component is intended to provide additional information that may be useful, but not necessary. This allows a lengthy result in the parent OBX-5 (e.g., a paragraph describing pathology results) to be truncated or not sent at all.

Appendix B. Clinical Laboratory Improvements Amendment Considerations, US Realm Only

In the United States, Clinical Laboratory testing of human specimens is regulated by the Clinical Laboratory Improvements Amendments of 1988 (CLIA). Several sections of the regulations implementing CLIA impact how electronic laboratory is formatted for the US Realm and these changes are outlined in this appendix. Impacted areas include mandatory reporting requirements, report retention and display, and those authorized to receive a report. Specifics on the CLIA Regulation are found at <http://www.cdc.gov/clia/regs/toc.aspx>.

B.1 MANDATORY REPORTING REQUIREMENTS

Section 493.1291 of the CLIA Regulations defines items that must appear on a clinical laboratory report in the US (http://www.cdc.gov/clia/regs/subpart_k.aspx#493.1291). Interpretative Guidelines on the elements required in a report may be found at <http://www.cms.hhs.gov/CLIA/downloads/apcsubk2.pdf>. Specific report fields impacted include the following:

TABLE B-1 – MANDATORY REPORTING REQUIREMENTS		
Segment	Field	CLIA Impact
PID-3	Patient Identifier List	A unique patient identification number is required
PID-5	Patient Name	Positive patient identification required. If the patient's name is known, this must be that name. If it is not known, a unique patient identifier must be assigned.
OBX-3	Observation Identifier ⁹	<p>Unique identification of the test performed is required. LOINC® is an HL7-approved code system and shall be used for the Observation Identifier as described in the appropriate HITSP Interoperability Specification. Use of LOINC codes for additional tests is strongly encouraged. See <i>Section 6</i> for more details. Addition of a local laboratory code is allowed.</p> <p>For certain tests CLIA requires additional information:</p> <p>Laboratories using manufacturer's instruments, kits or test systems labeled for "investigational use only" or "research use only" must clearly state that the test results are not to be used for treatment or diagnostic purposes. If results of such tests are being reported</p>

⁹ While CLIA requires a laboratory to maintain positive identification of a specimen reporting, that information as part of the result is not required.

TABLE B-1 – MANDATORY REPORTING REQUIREMENTS

Segment	Field	CLIA Impact
		without a disclaimer statement, or are being used by the provider for patient care, they are in the same category as in-house developed tests and the laboratory must establish performance specifications in accordance with §493.1253. The disclaimer for Analyte Specific Reagents (ASR) should state, "This test was developed and its performance characteristics determined by (Laboratory Name). It has not been cleared or approved by the U.S. Food and Drug Administration." The ASR disclaimer on the test report is required by the FDA under <i>21 CFR, Part 809.30</i> , "Restrictions on the sale, distribution and use of analyte -specific reagents."
OBX-5	Observation Value	The laboratory result is required. No regulatory requirements are specified, outside of readability, regarding result appearance.
OBX-6	Units	Units, if required, or an interpretation must be given. For tests such as genetic screens the interpretation may actually be the test result.
OBX-7	Reference Range	Required.
OBX-8	Abnormal flag.	Use is not required, but a laboratory may use this field as part of its interpretation guidance. If reported, it should be displayed by an EHR.
OBX-11	Observation Result Status	Used to reflect CLIA required conditions such as specimen acceptability, result corrections, cancellations as well as report status (§493.1291 (c)(7) and (k)(1,2)). See SPM-21 and -22 below.
OBX-19	Date/Time of Analysis	Use this field to meet the requirement for test report time.
OBX-23, 24, 25	Laboratory Identification Fields	The identification of the performing laboratory is required. Populating with the CLIA ID Number in OBX-23 meets the requirement if this receiving EHR has access to a look-up table that will convert the CLIA ID number to full demographics comprising OBX-23, Performing Organization Name; OBX-24, Performing Organization Address; and OBX-25, Performing Organization Medical Director. If the CLIA ID number is not used, all demographic fields (OBX-23, OBX-24 and OBX-25) must be populated with appropriate information.
SPM-4	Specimen Type	Reporting requirements call for the specimen source, which equates to the Specimen Type in the SPM segment.
SPM-21	Specimen Reject Reason	Use this field in connection with OBX-11 if a test is cancelled for specimen related reason. SNOMED-CT is the recommended terminology.
SPM-22	Specimen Quality	Use this field to provide a coded version for Specimen Description. For Electronic Health Records, it is preferred that this field be used in place of, or in connection with, SPM-14. SNOMED-CT is the recommended terminology.

B.2 REPORT RETENTION

While this section is not to be construed as legal advice, the electronic message from a performing laboratory is presumed to be the legal report of the tests performed. Hence, the receiver must save the content of the message for the same time period as required for any other legal document.

B.3 AUTHORIZED PARTIES

Local laws, generally at the State level, govern who is authorized to receive laboratory reports. CLIA restricts the availability of those authorized to receive laboratory reports to just those approved at the local level and sets no national standards. Testing laboratories may not report results to unauthorized parties under CLIA.

Testing laboratories either have a trusted relationship with the ordering party or presume that the ordering party is authorized to receive results. However, testing laboratories need not have knowledge of the appropriateness of others requested to receive results, such as "Copy to" recipients. To maintain CLIA compliance, a US testing laboratory may choose to restrict its reports to only those recipients known to be authorized. Hence, copies of a result need not be sent by a testing laboratory. Note that CLIA places no restrictions on the receiver of a laboratory report regarding its retransmission of the report to others.

Appendix C. Strategy For Harmonizing Multiple HL7 Implementation Guides

C.1 BACKGROUND

Multiple HL7 laboratory result implementation guides are being put forward to support various use cases. The guides constrain the standard HL7 lab result message in various ways according to the needs of specific use cases. These use cases include the HITSP Lab to EHR (Electronic Health Records), ELR (Electronic Laboratory Reporting) to public health, NHSN (National Healthcare Safety Network) and others.

The sending laboratories for the above three Implementation Guides (IG) certainly overlap. All three are intended to be used by US laboratories sending results to EHR's, state/national public health agencies, or the National Healthcare Safety Network. This creates tremendous burden for laboratories and other senders of lab data, who are forced to generate three different sets of result message content for the same class of data.

The goal of this document is outline an approach for creating a harmonized set of specifications that allows senders of lab data to use a single format to meet the needs of multiple receivers. It is not the goal of this document to force all Laboratory Result IG's into one specification. The goal of the strategy is to enable harmonization amongst guides that are mutually compatible, and whose authors/stakeholders agree should be harmonized.

Each of the above IG's documents a message profile in which the conformance rules (e.g., for usage and cardinality) are the same for the sender and receiver. These constrained profiles are tailored to suit the needs of the particular receiver of data. The least constrained of the three is the Lab to EHR IG, followed by the ELR IG. The most tightly constrained IG is the NHSN IG. In each case, the IG is focused on the data in which the receiver is interested. The ELR and NHSN IG's mark a considerable number of elements as not supported, meaning the sender should never send this data to the particular receiver. The Lab to EHR IG does have some elements that are not supported, but considerably fewer than the other IG's.

This practice of marking data as not supported is a major reason why senders currently have to develop separate interfaces to support each of these use cases. The goal here is to develop an approach to documenting these IG's such that the sender needs only one interface to meet the requirements of all three receivers.

The first step is to separate the requirements of the sender from the receiver. As indicated above, the three source IG's combine the requirements for both sender and receiver. By separating the two, we simplify the task of creating a single sender specification that can be used to send lab data to all three receivers. The second step is to put in place some rules governing how usage is related between the sender profile and the receiver profiles. These rules are intended to prevent collisions between various requirements from receivers. These rules help identify places in the IG's where the three sets of receivers need to harmonize their specifications, allowing senders to support all 3 without requiring specialized interfaces for each receiver.

The harmonization strategy provided here was designed for an environment where the same type of message has been used in multiple profiles. In this guide that message is HL7 ORU^R01. It is certainly possible to adapt this harmonization strategy to work in the situation where different messages are used across multiple profiles, assuming that those messages share common segments. In that circumstance, the strategy would only harmonize those elements that are in common across the various profiles such as data types, segments, vocabulary etc., but not harmonizing on message structure. For example, it should be possible to adapt this strategy to harmonize across a profile using the ORU^R01 and the OUL^R22 that are both capable of conveying laboratory results, and share many common segments.

C.2 CONFORMANCE TO THE HL7 STANDARD

HL7 has defined a set of rules governing conformance with the 2.x series of standards. These rules are provided in Chapter 2 of the HL7 standard. In version 2.7, these rules are provided in Chapter 2B, Conformance Using Message Profiles. Understanding the rules for creating message profiles is essential to building a strategy for creating a consistent set of implementation guides. Message profiles are composed of multiple elements, including:

- use case definition
- dynamic definitions
- static definitions
- vocabulary (table) definitions

The strategy being proposed in this document is intended to allow variations in the use case and dynamic definitions while providing consistent static and vocabulary definitions. To accomplish this goal, this document will address various aspects of a message profiles static and vocabulary definitions. This includes the following areas:

- Usage
- Cardinality
- Length
- Vocabulary
- Identifiers
- Pre-adoption of features

C.2.1 Usage

Usage is perhaps the most important, and probably the least understood aspect of developing a message profile. The set of rules to be discussed focus on the HL7 concept of “usage”. In an HL7 v2.x message profile the term “usage” is defined as follows:

Usage refers to the circumstances under which an element appears in a message. Some elements must always be present, others may never be present, and others may only be present in certain circumstances. A set of codes has been defined to clearly identify the rules governing the presence of a particular element.

The rules govern the expected behavior of the sending application and limited restrictions on the receiving application with respect to the element. These usage codes expand/clarify the optionality codes defined in the HL7 standard.

The HL7 standard also defines the following set of Usage codes (related to the 2.x Optionality codes).

TABLE C-1. USAGE DEFINITIONS BY SENDER AND RECEIVER			
Usage	Description	Sender Meaning	Receiver Meaning
R	Required	A conforming sending application shall populate all “R” elements with a non-empty value.	Conforming receiving application shall process (save/print/archive/etc.) or ignore the information conveyed by required elements.

TABLE C-1. USAGE DEFINITIONS BY SENDER AND RECEIVER

Usage	Description	Sender Meaning	Receiver Meaning
RE	Required but may be empty	The element may be missing from the message, but must be sent by the sending application if there is relevant data. A conforming sending application must be capable of providing all "RE" elements. If the conforming sending application knows the required values for the element, then it must send that element. If the conforming sending application does not know the required values, then that element will be omitted.	Receiving applications will be expected to process (save/print/archive/etc.) or ignore data contained in the element, but must be able to successfully process the message if the element is omitted (no error message should be generated because the element is missing).
O	Optional	This code indicates that the Usage for this element has not yet been defined. A usage of Optional may not be used in implementation profiles (no-optionality profiles). Conformance may not be tested on an Optional field. Narrower profiles may be defined based on this profile, and may assign any usage code to the element	This code indicates that the Usage for this element has not yet been defined. A usage of Optional may not be used in implementation profiles (no-optionality profiles). Conformance may not be tested on an Optional field. Narrower profiles may be defined based on this profile, and may assign any usage code to the element
C	Conditional	<p>This usage has an associated condition predicate (See section 2.12.6.6, "Condition predicate").</p> <p>If the predicate is satisfied: A conformant sending application must always send the element.</p> <p>If the predicate is NOT satisfied: A conformant sending application must NOT send the element.</p>	<p>This usage has an associated condition predicate (See section 2.12.6.6, "Condition predicate").</p> <p>If the predicate is satisfied: A conformant receiving application must process or ignore data in the element. It may raise an error if the element is not present.</p> <p>If the predicate is NOT satisfied: A conformant receiving application must NOT raise an error if the condition predicate is false and the element is not present, though it may raise an error if the element IS present.</p>

TABLE C-1. USAGE DEFINITIONS BY SENDER AND RECEIVER

Usage	Description	Sender Meaning	Receiver Meaning
CE	Conditional but it may be empty	<p>This usage has an associated condition predicate (See section 2.12.6.6, "Condition predicate").</p> <p>If the predicate is satisfied:</p> <p>If the conforming sending application knows the required values for the element, then the application must send the element. If the conforming sending application does not know the values required for this element, then the element shall be omitted. The conforming sending application must be capable of knowing the element (when the predicate is true) for all CE elements.</p> <p>If the predicate is not satisfied:</p> <p>The conformant sending application shall not populate the element.</p>	<p>This usage has an associated condition predicate (See section 2.12.6.6, "Condition predicate").</p> <p>If the predicate is satisfied:</p> <p>If the element is present, the conformant receiving application shall process (display/print/archive/etc.) or ignore the values of that element. If the element is not present, the conformant receiving application shall not raise an error due to the presence or absence of the element.</p> <p>If the predicate is not satisfied:</p> <p>The conformant receiving application may raise an application error if the element is present.</p>
X	Not supported	For conformant sending applications, the element will not be sent.	Conformant receiving applications may ignore the element if it is sent, or may raise an application error.

In this table, the usage as it applies to the sender is shown in a separate column from the usage as it applies to the receiver.

C.3 STRATEGY

This section provides details on various aspects of the proposed strategy for harmonizing multiple implementation guides. Details will be provided for usage, cardinality, length, vocabulary and identifiers. Rules for pre-adoption of features from subsequent HL7 versions are addressed. Finally, an overall “Golden Rule” is proposed to make the strategy work.

C.3.1 Usage Rules

- Sender Usage should be marked as X (Not Supported) only when no receivers support the element.
- Receiver Usage should be marked X (Not Supported) only when all receivers do not support the element. If one receiver supports the element, each receiver should at least mark the element as O (Optional). Receivers should ignore optional elements in their receiver profile.
- Sender usage should reflect the tightest constraint among the receivers. If any receiver has the element as R (Required) then the element should be required for the sender.
- Receiver conditional usage should not be contradictory. For instance if two receivers have an element marked as conditional (C, CE), the conditions certainly need to be harmonized so the sender has only one set of Condition predicates to deal with.
- Receiver usage of R, RE, C, CE and O allow the receiver to ignore a data element. Receivers should separately document what elements they actually support. When an element is being ignored by the receiver, the elements presence or absence in a message should be ignored and no error should be raised, unless the element is malformed according to the underlying HL7 standard.

Note that once sender usage has been established, there are restrictions on what cardinalities are allowed for the element in question.

TABLE C-2. USAGE RULES			
Tightest Receiver Usage	Allowed Receiver Usage for other receiver profiles	Sender usage	Allowed Sender Cardinality
R	R, RE, CE, C, O	R	[1..1], [1..n], [1..*], [m..n], [m..*]
CE	CE, C, RE, O	CE	[0..1], [0..n], [0..*]
C	C, RE, O	C	[0..1], [0..n], [0..*]
RE	RE, O	RE	[0..1], [0..n], [0..*], [m..n], [m..*]
O	O	O	[0..1], [0..n], [0..*]
X	X	X	[0..0]

C.3.2 Cardinality

Like usage, cardinality will need to be harmonized. The HL7 Conformance documentation (HL7 2.5.1, Chapter 2, section 2.12.6.4) links cardinality to usage. For instance, a required element must have a minimum cardinality of 1 or greater, cardinality of 0 is not allowed. Table 2 - Usage Rules above outlines the cardinalities allowed for various usage constraints. The rules for cardinality are as follows:

- The lower bound of cardinality for the element will be determined from the lower bound from all the profiles sharing the tightest usage for the element. The lower bound cardinality will be the greatest lower bound value from this set. If there is a single profile with the tightest usage, then the lower bound cardinality will equal that profiles lower bound cardinality
- The upper bound of cardinality for the element will be the loosest upper bound for all the profiles being considered.
- Where the receiver is expecting fewer repetitions of an element than the bound set by the above two rules, the burden is on the receiver to determine which repetitions it is interested in receiving. This means the receiver may need to scan repetitions beyond the number indicated in documented upper bound to identify repeats they are interested in.

Example: A segment in a message is Optional and Repeating in the HL7 standard, for instance [NTE] (usage – Optional, cardinality – 0..*). In one profile, the element has been constrained to Required with cardinality 1..1. In a second profile, it has been constrained to Required with cardinality 2..3. In a third profile, it has been constrained to RE with cardinality 0..5. The Sender profile would have the element as Required, with cardinality 2..5. The lower cardinality limit of 2 came from the first profile that made the element required. The upper cardinality limit of 5 came from the second profile that had the loosest cardinality. A receiver conforming to the first profile (R, 1..1) would be expected to look at all 5 repeats of the element to determine which one it is interested in receiving.

TABLE C- 3. CARDINALITY EXAMPLE		
Profile	Usage	Cardinality
HL7 Standard – [NTE]	Optional	0..*

TABLE C- 3. CARDINALITY EXAMPLE

Profile	Usage	Cardinality
Profile 1	Required	1..1
Profile 2	Required	2..3
Profile 3	Required or empty	0..5
Sender profile	Required	2..5

C.3.3 Length

The recommendation here is to adopt the length documentation conventions from the latest HL7 version, in this case 2.7. Starting with v2.7, HL7 allows documentation of both a minimum and maximum length for an element.

In v2.7, length should not be specified for composite elements. In these cases, the actual minimum and maximum lengths can be very difficult to determine due to the interdependencies on the component content, and the specification of actual lengths is not useful either. This strategy also recommends adopting the standard length ranges defined in v2.7 as opposed to trying to sort out differences between the various IG's.

C3.3.1 Conformance Length

The concept of a conformance length was also introduced in v2.7. The conformance length indicates the minimum length an application must support. For the purposes of this strategy, the upper limit of allowed length range will be considered the conformance length.

C3.3.2 Truncation of data

One useful feature of length management in v2.7 is a set of new rules for handling truncation of data. This document proposes supporting those rules. Truncation behavior will be documented for data type components and segment definitions. We will use the same mechanism for documenting truncation behavior as the 2.7 standard:

- = Truncation not allowed
- # Truncation allowed
- No character indicates the truncation behavior is not defined.

C.3.4 Vocabulary/Value Sets

Binding vocabulary to specific coded elements in messages will probably be one of the most troublesome aspects of harmonizing the various specifications. Vocabulary is often selected to meet requirements specific to the use case the specification designed to support. Identifying harmonized vocabulary spanning multiple use cases may be difficult if not impossible. The following principles will be used as a guide:

- Use HL7 standard vocabularies where they are dictated by the standard
- Use nationally harmonized standards where appropriate. This includes vocabularies selected by HITSP.
- Where HL7 and HITSP have not identified specific vocabularies, attempt to harmonize the different value sets for an element across the various specifications
- Create new value sets that incorporate vocabularies that cannot be otherwise harmonized.

C.3.5 Identifiers

Uniformity is also needed in the treatment of identifiers, and the assigning authorities associated with those identifiers. One example of issues in this area is one IG requiring use of an OID to identify a sending laboratory,

while a second IG requires the use of the laboratory's CLIA number. The sending system cannot support both requirements with a single message.

Since HITSP is the current US authority for implementations, it makes sense to use the HITSP strategy for handling identifiers. This means the Lab to EHR IG should be used as the basis for handling particular identifiers. Other IG's following this strategy must support the HITSP identifier. They may allow other than those specified by HITSP, but they cannot require the use of an identifier different from what HITSP has specified.

For example, in the Lab to EHR IG, MSH-4, Sending Application is required to be an OID. The ELR specification must support an OID for MSH-4, but may allow a CLIA number instead. What the ELR IG cannot do is require the use of the CLIA number.

C.3.6 Pre-adoption of Features

In many cases, implementation guides will pre-adopt features from newer versions of the HL7 standard. Where features are being pre-adopted, all the harmonized specifications must agree on the version to be pre-adopted. The following guidelines will be used when pre-adopting features:

- Use the latest version of the HL7 2.x standard, which will soon be v2.7.
- When new segments, data types, fields, components, sub-components, et al. are being pre-adopted, they should be as loosely constrained as possible, unless all the harmonized specifications agree to tighter constraints.

C.3.7 Golden Rule

The golden rule for this strategy is taken from HL7 2.7 Chapter 2, section 2.6.2, Rules for the Recipient:

- ignore segments, fields, components, subcomponents, and extra repetitions of a field that are present but were not expected
- treat optional segments that were expected but are not present as consisting entirely of fields that are not present
- treat fields and components that are expected but were not included in a segment as not present.

Appendix D. Recommended Changes to Existing Implementation Guides

Based on the harmonization strategy provided in Appendix C, this guide is recommending the following changes to HL7 Version 2.5.1 Implementation Guide: Orders and Observations; Interoperable Laboratory Result Reporting to EHR, Release 1. Note that this IG is not making the actual changes; it is simply recommending certain changes be made to harmonize the profiles.

TABLE D-1. RECOMMENDED CHANGES

Item	Recommendation
Harmonization Strategy	Adopt the harmonization strategy documented in Appendix C of this guide.
Data type Lengths	Pre-adopt the HL7 version 2.7 data type lengths as identified in this guide.
CWE Data type	Pre-adopt the HL7 2.7 structure for the CWE data type.
Batch processing	Add support for batch transaction processing for Lab results
Message Acknowledgements	Add a profile for result transmission without acknowledgement. Some transport mechanisms exist that guarantee deliver of the payload, rendering the current commit accept protocol unnecessary.
ORU^R01 Message Structure	Allow NTE following PID segment to repeat.
NK1 Segment	Add documentation for NK1 segment. There are two circumstances where NK1 should be used. <ul style="list-style-type: none"> • Identification of guardian for lab testing of minors. This is particularly important for child lead testing. • Identification of owner information for animal lab testing. This is relevant for animal rabies testing as it relates to a human case of rabies exposure.
SFT Segment	Add documentation for this segment.
ERR Segment	Add documentation of ERR segment
PID-35 (Species)	Add this as an optional field. This is needed for animal rabies testing.
PID36 (Breed)	Add this as an optional field. This is needed for animal rabies testing.
PID-37 (Strain)	Add this as an optional field. This is needed for animal rabies testing.
PID-38 (Production Class Code)	Add this as an optional field. This is needed for animal testing.
PID-39 (Tribal Citizenship)	Add this as an optional field. Some states collect this information as part of a reportable lab result.
PV1-11 (Temporary Location)	Add this as an optional field. Some states collect this information as part of a reportable lab result.

Appendix D: Recommended Changes to Existing Implementation Guides

TABLE D-1. RECOMMENDED CHANGES	
Item	Recommendation
PV1-14 (Admit Source)	Add this as an optional field. Some states collect this information as part of a reportable lab result.
PV1-52 (Other Healthcare Provider)	Add this as an optional field. Some states collect this information as part of a reportable lab result.
PV2-26 (Previous Treatment Date)	Add this as an optional field. Some states collect this information as part of a reportable lab result.
PV2-29 (First Similar Illness Date)	Add this as an optional field. Some states collect this information as part of a reportable lab result.
OBX-8 (Abnormal Flags)	Pre-adopt the CWE data type for this field from HL7 version 2.7. This was done to allow communication of local abnormal flags along with the standard HL7 codes.
Align Observation Identifiers with data types for OBX-5	The ELR IG developed a strategy for relating the LOINC scale property with the data type being used for OBX-5. This strategy also identifies when units of measure are required, when abnormal flags are appropriate, reference ranges and comments. This strategy is detailed in section 5.12.1 of this guide.
FHS Segment	Add documentation of this segment
FTS Segment	Add documentation of this segment
BHS Segment	Add documentation of this segment
BTS Segment	Add documentation of this segment
HL70002 (Marital Status)	This needs to be harmonized with HITSP: Note, HITSP has identified a different value set in HITSP C80: <ul style="list-style-type: none"> Name: Marital Status Value Set Source: Health Level Seven (HL7) Version 3.0 The HL7 Lab to EHR IG adopted by HITSP uses the HL70002
HL70004 (Patient Class)	This needs to be harmonized with HITSP: Note, HITSP has identified a different value set in HITSP C80: <ul style="list-style-type: none"> Name: Patient Class Value Set Source: Health Level Seven (HL7) Version 3.0 Act Encounter Code The HL7 Lab to EHR IG adopted by HITSP uses the HL70004
HL70023 (Admit Source)	This needs to be harmonized with HITSP: Note, HITSP has identified a different value set in HITSP C80: <ul style="list-style-type: none"> Name: Admission Source Value Set Source: National Uniform Billing Committee (NUBC). See UB-04/NUBC CURRENT UB DATA SPECIFICATIONS MANUAL) UB-04 FL15 The HL7 Lab to EHR IG adopted by HITSP does not support this element.

Appendix D: Recommended Changes to Existing Implementation Guides

TABLE D-1. RECOMMENDED CHANGES	
Item	Recommendation
HL70078 (Abnormal Flags-2.5.1, Observation Interpretation 2.8))	<p>This needs to be harmonized with HITSP and within HL7.</p> <p>Note, HITSP has identified a different value set in HITSP C80:</p> <ul style="list-style-type: none"> • Name: Result Normalcy Status Value Set • Source: Health Level Seven (HL7) Version 3.0 Observation Interpretation. The HL7 Lab to EHR IG adopted by HITSP uses the HL70078 from 2.5.1. <p>The ELR IG has pre-adopted the HL7 version 2.7 Observation Interpretation code system, which adds new values not in 2.5.1 or in the HL7 V3 vocabulary (what a mess).</p>
HL70112 (Discharge Disposition)	<p>This needs to be harmonized with HITSP.</p> <p>Note, HITSP has identified a different value set in HITSP C80:</p> <ul style="list-style-type: none"> • Name: Discharge Disposition Value Set • Source: National Uniform Billing Committee (NUBC). UB-04/NUBC CURRENT UB DATA SPECIFICATIONS MANUAL- UB-04 FL17 – Patient Status. <p>The HL7 Lab to EHR IG adopted by HITSP uses the HL70112.</p>
HL70305 (Person location type)	<p>This needs to be harmonized with HITSP.</p> <p>Note that NHSN has adopted the HL7 Version 3 Healthcare Service Location coding system for this field.</p>
HL70834 (Imported Table 0834 – MIME Types)	<p>This needs to be harmonized with HITSP.</p> <p>Note that the HITSP Lab to EHR IG uses HL70191, which can be directly mapped to the 2.7 values imported from IANA.</p>
Laboratory Observation Identifier Value Set	<p>The Laboratory Test Result Value Set from HITSP C80 as it is defined today is inadequate for both ELR to Public Health and NHSN reporting. This IG defined an expanded value set called Laboratory Observation Identifier Value Set which is the union of the following value sets:</p> <ul style="list-style-type: none"> • Laboratory Test Result Value Set • ELR Reportable Laboratory Observation Identifier Value Set • NHSN Lab test id value set (TBD)
Laboratory Coded Observation Value Set	<p>This needs to be harmonized with HITSP C80. The Laboratory Coded Observation Value Set is drawn from SNOMED CT. At a minimum, it will contain the SNOMED CT® Laboratory Test Finding (118246004) hierarchy and the SNOMED CT® Microorganism (264395009) sub-tree. It may also need to contain various modifiers and qualifiers as identified in PHVS_ModifierOrQualifier_CDC value set.</p> <p>The HITSP C80 Laboratory Observation Value Set covers only the Laboratory Test Findings portion of this value set, and really needs to be expanded to cover at least microorganisms and commonly use qualifiers and modifiers.</p>

Appendix D: Recommended Changes to Existing Implementation Guides

TABLE D-1. RECOMMENDED CHANGES

Item	Recommendation
Primary Spoken Language	<p>It's not clear if the HITSP C80 value set for Primary Spoken Language is the same as that identified in this IG (ISO-639). Note that HITSP identifies a language value set as follows:</p> <p>"The value set is defined by Internet RFC 4646 (replacing RFC 3066). Please see ISO 639 language code set maintained by Library of Congress for enumeration of language codes and Frequently Asked Questions."</p> <p>RFC4646 seems to point to ISO 639 as the source of the actual language codes, so this value set is consistent with the HITSP value set.</p>
Reason For Study Value Set	<p>This needs to be harmonized with HITSP.</p> <p>Reason for Study. Union of concepts from PHVS_AdministrativeDiagnosis_CDC_ICD-9CM and ICD-10.</p> <p>Note: HITSP apparently has stopped using ICD-9 for diagnosis and focused on using value sets from SNOMED CT.</p>
SPM-4 (Specimen Type)	Adopt the Specimen Type Value Set, which uses the HL7 table 0487 and the SNOMED CT Specimen sub-tree (12303009).
SPM-5 (Specimen Type Modifier)	Adopt the PHVS_ModifierOrQualifier_CDC (a subset of SNOMED CT) as the value set for this field.
SPM-7 (Specimen Collection Method)	Adopt the Specimen Collection Method Value Set, which includes the HL7 table 0488, and SNOMED CT Specimen Collection (17636008) sub-tree.
SPM-9 (Specimen Source Site Modifier)	Adopt the PHVS_ModifierOrQualifier_CDC (a subset of SNOMED CT) as the value set for this field.
OBSERVATION Begin	Adopt harmonized condition predicate for OBSERVATION Begin group in ORU^R01 message structure.
MSH-15 Accept Acknowledgment Type	Adopt harmonized condition predicate for MSH-15.
MSH-16 Application Acknowledgment Type	Adopt harmonized condition predicate for MSH-16.
OBR-26 Parent Result	Adopt harmonized condition predicate for OBR-26
OBR-29 Parent	Adopt harmonized condition predicate for OBR-29
OBX-4 Observation Sub-ID	Adopt harmonized condition predicate for OBX-4.
OBX-5 Observation Value	Adopt harmonized condition predicate for OBX-5
OBX-6 Units	Adopt harmonized condition predicate for OBX-6

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