EHR-Laboratory Interoperability and Connectivity Specification

(ELINCS)

Version 2.0

DRAFT 5

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Contents

1. Introduction

The EHR-Laboratory Interoperability and Connectivity Specification (ELINCS) is a messaging specification intended to standardize the electronic reporting of test results from clinical laboratories to electronic health record (EHR) systems. ELINCS focuses on the specific structure and contents of electronic messages used to communicate laboratory results and the shared semantic assumptions between laboratory and EHR systems that exchange such messages. The goal of ELINCS is to provide a precise and generally applicable lab-reporting specification that can be adopted as an industry standard, thereby obviating the need for clinical laboratories and EHR systems to define anew the specifications of each laboratory-to-EHR interface that is implemented. For more information about the ELINCS project, see www.elincs.org.

The ELINCS specification is based on the HL7 version 2.4 messaging standard and the LOINC coding standard. Specifically, it defines *message profiles* for relevant HL7 message types and it mandates LOINC codes for identifying certain tests. A message profile is an unambiguous specification of a HL7 message type intended for a particular use case. A message profile defines both the *dynamic* aspects of information interchange (i.e., the systems that participate in such interchanges and the real-world events that trigger messaging) and the *static* aspects of messaging (i.e., the structure and contents of the electronic messages that are exchanged).

The initial version of ELINCS is an *application-level* specification and does not address lower-level aspects of the electronic data-interchange process. Specifically, ELINCS currently *does not address*:

- Choice of transport technologies
- Encryption and authentication mechanisms
- Infrastructure for addressing and routing messages

Also, the initial version of ELINCS focuses exclusively on the electronic *reporting* of lab results. Messaging specifications for the electronic *ordering* of laboratory tests are outside the scope of the ELINCS work products at this time.

The remainder of this document specifies the dynamic and static aspects of the ELINCS Laboratory Data Specification in detail. Although this document describes the elements of HL7 messages and messaging interactions as they relate to the ELINCS specification, it does not constitute an introduction to HL7. Readers unfamiliar with HL7 may wish to first review the HL7 2.x standard (especially Chapter 7), available at www.hl7.org.

2. ELINCS Use Case

The ELINCS specification addresses the following use case or "story board" for the reporting of laboratory results to EHR applications:

- A laboratory order is entered into an ambulatory EHR system by a clinician (see Section 2.2 for definition of *EHR system*).
- The EHR system generates a lab requisition (paper or electronic) that is communicated to the clinical laboratory. The laboratory may be a commercial lab, hospital lab, or clinic/office lab.
- The information from the order requisition is manually entered or electronically imported into the laboratory information system (L.I.S.) of the laboratory.
- The specimen(s) required for the order are made available to the laboratory, either by collection at the laboratory or delivery following collection at another location (for example, the physician office or a satellite "draw station").
- The laboratory performs or attempts to perform the ordered tests.
- Information regarding the status and results of the ordered tests is electronically transmitted directly to the EHR system that generated the lab requisition.

Figure 1 depicts graphically the participants and information exchange of the ELINCS use case.

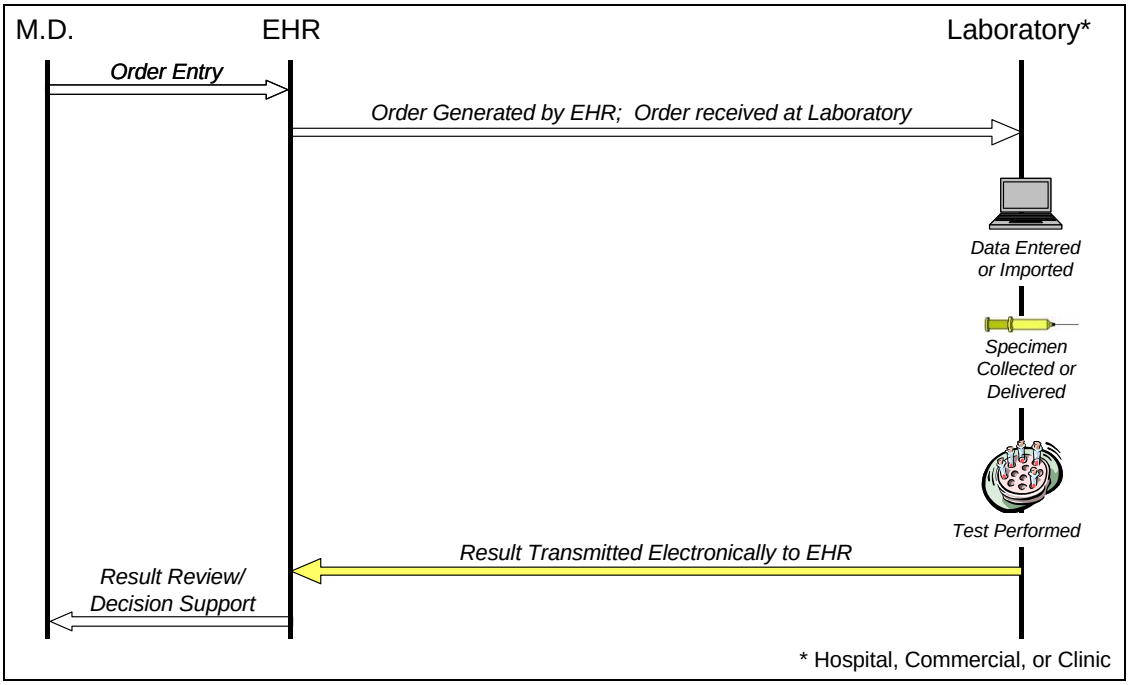


Figure 1. The general use case supported by the ELINCS specification. Note that the form of the order (paper or electronic) and the mechanism by which the order is received by the laboratory are not specified. The shaded arrow depicts the transaction(s) that the ELINCS specification primarily addresses.

2.1. Use Case Details

It is important to note the following points about the ELINCS use case:

- The ELINCS use case *does not* assume that a lab order (requisition) is transmitted electronically from the EHR system to the laboratory. The specific representation of orders (paper or electronic) and the means by which orders are communicated to a laboratory are outside the scope of the ELINCS specification, which primarily addresses the *reporting* of lab test results. The ELINCS specification only requires that certain data elements be included in lab orders (see Section 5), regardless of the representation or communication of those orders.
- The ELINCS use case *does* assume that a lab order is generated by an EHR system. This requirement ensures that the relevant identifiers known to the EHR system (such as the patient identifier, test identifier, etc.) appear on the lab requisition and are available to the laboratory. The laboratory must subsequently include these identifiers in any reported results, which allows the EHR system to correctly associate the results with the test, patient, and provider objects in its database.
- The ELINCS use case is general and encompasses a number of typical scenarios:
  - A paper lab requisition is given to a patient in the physician's office. The patient travels to a lab facility, where she presents the order for processing and where a specimen is collected.
  - The specimen is collected from the patient in the physician's office. A lab requisition is also prepared in the physician's office, and the specimen plus the requisition are delivered to a lab facility for processing.
  - An electronic lab requisition is transmitted from the EHR system to the laboratory. A paper copy of the requisition is given to the patient. The patient travels to a lab facility, where she presents the order for processing and where a specimen is collected.
  - Other combinations of the elements in the above scenarios, as consistent with the assumptions of the ELINCS use case.
- The ELINCS use case explicitly *does not* encompass the following scenarios:
  - A lab result is electronically communicated from one EHR system to another EHR system, for example, in the course of referring a patient or transferring the care of a patient.
  - Lab results are shared among entities participating in a regional data-sharing network, for example between a lab system and a regional data-sharing repository.

Organizations may use the ELINCS interaction model and messaging specifications for use cases outside of the one described in this document. However, the design of the ELINCS messaging specification does not consider the requirements of other use cases and may not address them.

Furthermore, any conformance testing of applications that implement the ELINCS specification will assume and take place in the context of the ELINCS use case only.

2.2. Relevant Definition of *EHR System*

For purposes of the ELINCS use case, interaction model, and messaging specifications, an *EHR System* is defined as:

> A clinical information system used in the ambulatory setting with the following minimal characteristics:
>
> - A data model that includes discrete representations of patients, clinician end-users, laboratory test requisitions, laboratory tests (including panels), and laboratory test results (at the level of individual analytes)
> - The capability to capture and internally store laboratory test orders entered by specific clinicians for specific patients
> - The capability to generate laboratory test requisitions in a format and medium that may be communicated to a clinical laboratory
> - The capability to receive electronic messages that report the status and results of laboratory tests that have been ordered
> - The capability to display to clinicians the status and results of laboratory tests, as reported in electronic messages.

Note that this definition is very minimal and omits many features and capabilities that are typically associated with electronic health record systems. This minimal characterization is intentional, so as to include the broadest possible set of EHR systems in the ELINCS use case. The minimal nature of the definition by no means excludes EHR systems with significantly greater capabilities.

3. ELINCS Interaction Model

Based on the use case described in Section 2, an *interaction model* may be defined for the ELINCS specification. Although messaging in the ELINCS specification is based on HL7 version 2.4, the interaction modeling is based on the HL7 v3.0 methodology. According to this methodology, an interaction model specifies a set of distinct artifacts that, collectively, describe the dynamic (behavioral) and static (structural) aspects of ELINCS-compliant data exchanges. The artifacts consist of a set of *interactions*, each of which describes a single, one-way electronic communication. The interactions are, themselves, defined by the following set of components:

- Trigger event: The real-world event that causes the interaction to occur. For example, "Order Entered" or "Result Available".
- Application roles: The communicating systems or sub-systems at the sending and receiving end of the interaction. For example, "Order Placer" or "Order Fulfiller".
- Message Type: A precise specification of the rules that govern the construction of the HL7 message that is transmitted in the course of the interaction, including the specification of required/optional fields and the contents of populated fields (with respect to structure,

terminology and coding rules). In the ELINCS specification, these message types are based on existing HL7 v2.4 messages (such as the ORU message). An example ELINCS message type is "MT-ORU-1".

- Receiver Responsibilities: The specification of subsequent actions that must be taken by the system in the receiving role of an interaction. For example, the initiation of additional messaging or the specific storing/processing of the data received.

Figure 2 graphically depicts the interaction model for the ELINCS use case. The modeling specifies the following interactions, which are described in the sections that follow:

Order Fulfillment Request (IN-1)
Result Status (IN-2)
Result Available (IN-3)
Result Correction (IN-4)
Result Confirm Response (IN-5)

Note that the interaction model does not imply that all of these interactions must take place in the course of ordering and reporting a single laboratory test. For example, if corrections to the results of a test are not required, then no Result Correction interaction will take place.

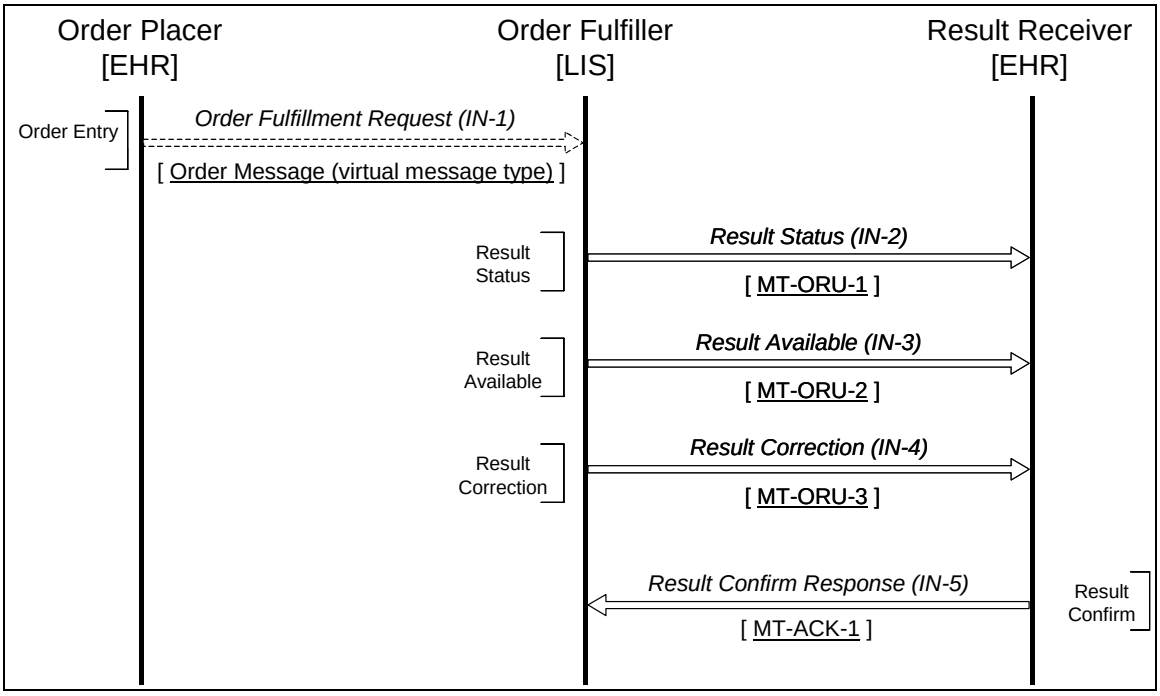


Figure 5. Interaction diagram for ELINCS specification. Note that the EHR application fulfills two application roles.

3.1. Order Fulfillment Request

Interaction: ***Order Fulfillment Request (IN-1)***		
Component	**Description**	**Comment**
Trigger Event	Order Entry (i.e., user enters order into EHR)	The ELINCS use case assumes that lab requisitions are created when clinician users enter orders into an EHR.
Application Roles	Sender: Order Placer Receiver: Order Fulfiller	The Order Placer is the EHR system. When a clinician user enters an order, the EHR system *generates* a communication artifact (paper, electronic, or otherwise) that contains the clinical and application-specific information representing the order. The artifact need not be an electronic message, a message formatted per HL7, or any other specific representation. The Order Fulfiller is the laboratory information system (L.I.S.). It is assumed that the Order Fulfiller subsequently receives the communication artifact (whatever its form) and *electronically captures and stores* the clinical and application-specific information representing the order. The method of capture is not specified and may be manual data entry, a messaging interface, bar-code scanning, or any other data-capture mechanism.
Message Type	Order Message (virtual)	An actual HL7 message type is not specified for this interaction. A "virtual" message type is defined, which specifies a minimum set of *Required Data Elements* that must be included on a lab requisition, regardless of the format or medium used for the requisition. See Section 4.3 for details.
Receiver Responsibilities	Order Fulfiller: Store the *Required Data Elements* and reference the *Required Data Elements* in all messages transmitted in result interactions.	The Order Fulfiller must perform the following operations: 1. Capture the *Required Data Elements* and associate them with the communicated order throughout the lifetime of the order. 2. For any subsequent interactions in which the Order Fulfiller communicates information to the Result Receiver regarding this order, the *Required Data Elements* must be included among the transmitted data (the specific means of including the *Required Data Elements* will be defined in the Message Types corresponding to each interaction.)

3.2. Result Status

Interaction: ***Result Status (IN-2)***		
Component	**Description**	**Comment**
Trigger Event	Result Status	Relevant information is available regarding the state of processing the order in the laboratory. No actual result information is available. The real-world event(s) that the Order Fulfiller *may* report via this interaction are: • The specimen has been received in the lab The real-world event(s) that the Order Fulfiller *must* report via this interaction are: • An ordered test has been cancelled in its entirety (for example, because the specimen was not suitable for performing the test or the ordering clinician cancelled the test)
Application Roles	Sender: Order Fulfiller Receiver: Result Receiver	The Order Fulfiller is the laboratory information system (L.I.S.) The Result Receiver is the EHR system.
Message Type	MT-ORU-1	The message type is defined in Section 6
Receiver Responsibilities	Result Receiver: 1. *Accept Acknowledgement* of the MT-ORU-1 message. 2. Display cancelled test(s) to user 3. Report to users all information that (a) is required to be reported by the CLIA regulations and (b) was received from the laboratory.	1. Upon receipt and safe storage of an MT-ORU-1 message, the Result Receiver must acknowledge receipt of the message. Hence, a *Result Confirm* trigger event is created for the Result Receiver (see Section 3.5). 2. Upon receipt of a message indicating that one or more entire tests have been cancelled, the Result Receiver must clearly indicate to the user which test(s) were cancelled (as indicated in the relevant OBR segment(s) of the message) and display any explanatory comments or notes in the corresponding NTE segment(s). 3. Upon receipt of an MT-ORU-1 message, the Result Receiver will report to appropriate end users all of the data elements received in the message that are required to be reported per the CLIA laboratory regulations. See Section 4.3for details.

3.3. Result Available

Interaction: ***Result Available (IN-3)***		
Component	**Description**	**Comment**
Trigger Event	Result Available	One or more results are available for an ordered test. The real-world event(s) that the Order Fulfiller *may* report via this interaction are: • Preliminary results for a test are available The real-world event(s) that the Order Fulfiller *must* report via this interaction are: • Final results for a test are available (and no further results will be provided for the reported analyte(s), except to provide corrections) • A test has been *partially* cancelled. One or more analytes will not be reported. For example, the specimen does not support testing of all analytes in an ordered panel.
Application Roles	Sender: Order Fulfiller Receiver: Result Receiver	The Order Fulfiller is the laboratory information system (L.I.S.) The Result Receiver is the EHR system.
Message Type	MT-ORU-2	The message type is defined in Section 6.
Receiver Responsibilities	Result Receiver: 1. *Accept Acknowledgement* of the MT-ORU-1 message. 2. Display of cancelled analyte(s) to user 3. Report to users all information that (a) is required to be reported by the CLIA regulations and (b) was received from the laboratory.	1. Upon receipt and safe storage of an MT-ORU-2 message, the Result Receiver must acknowledge receipt of the message. Hence, a *Result Confirm* trigger event is created for the Result Receiver (see Section 3.5). 2. Upon receipt of a message indicating that one or more analytes have been cancelled (i.e., a partial cancellation of a test), the Result Receiver must clearly indicate to the user which analytes have been cancelled (as indicated in the relevant OBX segments of the message) and display to the user any explanatory comments or notes in the corresponding NTE segment(s). 3. Upon receipt of an MT-ORU-2 message, the Result Receiver will report to appropriate end users all of the data elements received in the message that are required to be reported per the CLIA laboratory regulations. See Section 4.3 for details.

3.4. Result Correction

Interaction: ***Result Correction (IN-4)***		
Component	**Description**	**Comment**
Trigger Event	Result Correction	One or more results previously reported were reported in error and must be corrected or should be amended. Result values may or may not be included in this interaction. The real-world events that *must* be reported via this interaction are: • A result previously reported as Final has been corrected, and the patient record should be amended with the reported result • A result previously reported (as preliminary or final) was reported in error and the patient record should be amended to indicate that the previously reported result was incorrect (for example, the result was reported for the wrong patient).
Application Roles	Sender: Order Fulfiller Receiver: Result Receiver	The Order Fulfiller is the laboratory information system (L.I.S.) The Result Receiver is the EHR system.
Message Type	MT-ORU-3	The message type is defined in Section 6.
Receiver Responsibilities	Result Receiver: 1. *Accept Acknowledgement* of the MT-ORU-1 message. 2. Report to users all information that (a) is required to be reported by the CLIA regulations and (b) was received from the laboratory.	1. Upon receipt and safe storage of an MT-ORU-3 message, the Result Receiver must acknowledge receipt of the message. Hence, a *Result Confirm* trigger event is created for the Result Receiver (see Section 3.5). 2. Upon receipt of an MT-ORU-2 message, the Result Receiver will report to appropriate end users all of the data elements received in the message that are required to be reported per the CLIA laboratory regulations. See Section 4.3 for details.

3.5. Result Confirm Response

Interaction: ***Result Confirm Response (IN-5)***		
Component	**Description**	**Comment**
Trigger Event	Result Confirm Response	Upon receipt of an HL7 message as part of a Result Status, Result Available, or Result Correction interaction, the Result Receiver must acknowledge receipt of the message per the specifications of this interaction. The real-world event that triggers this interaction is recognition by the Result Receiver that it has received a relevant HL7 message and it has safely stored the message such that the Order Fulfiller is relieved from re-transmitting the same message. In the absence of a Result Confirm Response, the Order Fulfiller may need to re-transmit the result message. Note that the Result Receiver's ability to correctly parse the message, associate it with a known order or previous result, or otherwise successfully process the message contents is not implied by this trigger event.
Application Roles	Sender: Result Receiver Receiver: Order Fulfiller	The Result Receiver is the EHR system. The Order Fulfiller is the laboratory information system (L.I.S.)
Message Type	MT-ACK-1	The message type is defined in Section 7.
Receiver Responsibilities	None	

4. Notation for Message Type Specifications

The ELINCS message types used in the interactions of Section 3 are based on standard HL7 v2.4 messages. ELINCS further constrains the standard messages beyond the specifications provided by HL7, so that less optionality and flexibility are allowed. These constraints allow the exchange of lab test result information with significantly less analysis and negotiation between individual labs and EHR systems.

The notation for specifying constraints in ELINCS message types is based on the model for defining HL7 *message profiles*, as described in HL7 version 2.5[1]. This model is designed to document highly constrained versions of HL7 messages and to support conformance testing of implementations. The specifics of the notation are described in the following sections.

4.1. Notation for Message Structure

Message structure defines the sequence, nesting, and optionality of segments that may appear in an ELINCS message type. The table below provides an example of an ELINCS message-structure specification, with each component described in the sections that follow:

Example Message Structure (NOT PART OF THE ELINCS SPECIFICATION)

Segment ID	Usage	Cardinality	Segment Name
MSH	R	[1..1]	Message Header
{	R	[1..*]	Message Content Block
PID	R	[1..1]	Patient Identification
[PD1]	X	[0..0]	Additional Demographics
{	R	[1..*]	Test Order Block
OBR	RE	[0..1]	Observations Report
OBX	**	**	Observation/Result
{[FT1]}	X	[0..0]	Financial Transaction
}			
}			

The following notation is used in ELINCS message-structure specifications:

Segment Identification and Naming

The *Segment ID* and *Segment Name* identify each HL7 segment that may appear in the message. The Segment IDs corresponds to the IDs used in the standard HL7 documentation. Note that segments that are grayed out will not appear in instances of the specified ELINCS message type (the *Usage* of all such messages is "X" – see below).

Segment Sequence and Nesting

The allowed sequence of segments in a message instance is indicated by the sequence of segments in the message-structure specification. Braces, { . . . } surrounding a group of segments indicate one or more repetitions of the enclosed group may occur. Brackets, [. . .] surrounding a group of segments indicates

[1] See Chapter 2, Section 12 of the HL7 v2.5 documentation (available at www.hl7.org). Note that the model described may be applied to message types defined in version of HL7 prior to 2.5.

that the enclosed group is optional. If a group of segments is optional and may repeat it is enclosed in brackets and braces, { [. . .] }. In the example above, the following sequence of segments is allowed, given the nesting, repetition, and optionality indicated:

MSH
PID
OBR
OBR
PID
OBR

Usage

Usage refers to the optionality of individual segments and groups of segments. The following designations and their meanings are used in ELINCS message structures:

Usage Table for Segments in ELINCS Result Messages

Value	Description	Comment
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. 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 based on that standard message.
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 to report. 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).
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.
**	Specific to message type	Used only in a *shared* message-structure specification, i.e., a specification that is shared by multiple message types. A shared message-structure is defined when the message structures of multiple message types are very similar. The usage of segments that differ across the message types are designated with a value of "**". The specific usage of these segments is specified in Appendix D.

Cardinality

Cardinality defines the number of instances of a segment allowed in the message type. A range is provided, with the first value designating the minimum number and the second value designating the maximum number.

Note: The concept of a "repeating" element is expressed by a Cardinality range with a second value > 1. For example, a cardinality range of "[1..5]" indicates that the element may repeat up to 5 times. A cardinality range of "[1..*]" indicates that there is no limit to number of repeating elements.

4.2. Notation for Message Segments

For each segment that may appear in an ELINCS message type, there is a specification of the allowed fields within that segment and the allowed values of those fields. The allowed fields are specified in an "HL7 Attribute Table" that corresponds to each segment. The allowed values are specified in a narrative section that corresponds to each allowed field. For fields with *complex data types* (i.e., data types whose values consist of multiple sub-parts), the narrative sections include a Component Table that indicates the usage of each sub-part. The following tables show examples of an HL7 Attribute table and Component Table:

EXAMPLE HL7 Attribute Table (NOT PART OF THE ELINCS SPECIFICATION)

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Set ID - OBR**	**4**	**SI**	**O**	**[0..1]**	**6.4.2**
2	**Placer Order Number**	**50**	**EI**	**R**	**[1..1]**	**6.4.3**
3	**Universal Service Identifier [CLIA]**	**250**	**CE**	**R**	**[1..1]**	**6.4.5**
4	Priority – OBR	2	ID	X	[0..0]	
5	**Observation Date/Time**	**26**	**TS**	**R**	**[1..1]**	**6.4.6**
6	**Observation End Date/Time**	**26**	**TS**	**RE**	**[0..1]**	**6.4.7**
7	Collection Volume	20	CQ	X	[0..0]	
8	Collector Identifier	250	XCN	X	[0..0]	
9	**Result Status**	**1**	**ID**	**R**	**[1..1]**	**6.4.14**
10	**Parent Result**	**400**	**CM**	**O**	**[0..1]**	**6.4.15**
11	**Parent**	**200**	**CM**	**C**	**[0..1]**	**6.4.16**

EXAMPLE Component Table (NOT PART OF THE ELINCS SPECIFICATION)

Component/Sub-Component	Usage
identifier (ST) **[CLIA]**	R
text (ST) **[CLIA]**	RE
name of coding system (IS)	RE
alternate identifier (ST)	O
alternate text (ST)	O
name of alternate coding system (IS)	X

The following columns appear in HL7 Attribute Tables:

Field Sequence (SEQ)

Ordinal position of the field in the segment.

Element Name (ELEMENT NAME)

The name of the field, as specified by HL7 Version 2.4. This name is for reference purposes and does not appear in the message data.

CLIA: If the field name includes the annotation "**[CLIA]**", the field is subject to the requirements of the federal Clinical Laboratory Improvement Amendments (CLIA). Specifically, if the field is populated, its value must be included by the receiving EHR system on all lab reports. For such fields, the component table further specifies which components of the field value the EHR system must include on lab reports. For example, the tables above indicate that the *identifier* and *text* components of the *Universal Service ID* field must be included on all lab reports by the EHR system. See Section 4.3 for more information about CLIA requirements.

Field Length (LEN)

The maximum field length. For repeating fields, it specifies the maximum length of each value, so a field with multiple repeating values may exceed the specified length. For each value, however, the maximum length is calculated to include the component and subcomponent separators. Note: In certain cases, the maximum field length in ELINCS segments is greater than indicated in the HL7 standard. Specifically, this is the case for the following fields:

Segment/Field	ELINCS Length	HL7 Length
MSH-21 Conformance Statement ID	30	10
OBR-2 Placer Order Number	50	22
OBR-3 Filler Order Number	50	22

Please see the descriptions of these fields in Section 6.2 (MSH Segment) and Section 6.4 (OBR Segment) for more information about the reasons for extending the HL7-prescribed field lengths.

Data Type (DATA TYPE)

The HL7 data type that must be used for the value of the field. Information about the data type is usually provided in the detailed description of each field. Additional details about any HL7 data type may be found in Chapter 2 of the HL7 v2.4 standard specification, available at www.hl7.org.

Usage

Usage refers to the optionality of fields within the segment. The following designations and their meanings are used in ELINCS segments. Note that these designations may appear in the Usage column of both HL7 Attribute Tables and Component Tables:

Usage Table for Fields in ELINCS Segments

Value	Description	Comment
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. 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.
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	Sending applications may populate this field, but they are not required to do so per the ELINCS specification. If the sending application populates the field, the value must conform to all specifications for the field in the HL7 v2.4 standard. Sending applications should not expect conformant receiving applications to process data sent in this field. Receiving applications may process data received in this field, but they are not required to do so per the ELINCS specification. Receiving applications should not expect the field to be populated by conformant sending applications. Sending and receiving systems may agree to use the optional elements, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

Value	Description	Comment
C	Conditional	This usage has an associated condition predicate, which can be evaluated based on the values of other data elements in the same message. **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. **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.
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.
**	Specific to message type	Used only in a *shared* message-structure specification, i.e., a specification that is shared by multiple message types. A shared message-structure is defined when the message structures of multiple message types are very similar. The usage of fields that differ across the message types are designated with a value of "**". The specific usage of these segments is specified in Appendix D.

Cardinality

Cardinality defines the number of instances of a segment allowed in the message type. See discussion in Section 4.1: Cardinality.

Comment/Description

Identifies the Section in this document where further information about populating the field may be found. Note that these section numbers are hyperlinked in the electronic version of this document. The sections referenced by these section numbers directly follow the HL7 Attribute Table. These descriptions include the HL7 definition of the field, as well as rules for populating the field in conformance with the ELINCS specification. One or more sample values may be provided in these descriptions.

4.3. Requirements of the Clinical Laboratory Improvement Amendments (CLIA)

The Clinical Laboratory Improvement Amendments (CLIA) is a federal statute that regulates the operations of clinical laboratories that contract with the Centers For Medicare and Medicaid Services. Among its provisions, CLIA requires that certain information is always included on lab reports provided to clinicians (see http://www.phppo.cdc.gov/clia/regs/toc.aspx §493.1291). For example, CLIA requires that lab reports always include certain patient demographic information.

In order for laboratories to comply with the CLIA regulations, the EHR systems that receive ELINCS messages must include the CLIA-mandated information on the lab reports that they provide to clinician

end users. The ELINCS specification, therefore, stipulates as a *receiver responsibility* of EHR systems that they must include this information on lab reports. The specific fields to which this receiver responsibility applies are indicated by the annotation "**[CLIA]**" in each HL7 Attribute Table (for example, see Section 6.3.1). In certain cases, CLIA does not require that all of the components of such fields be included on the lab reports; in these cases, the required components are indicated by the annotation "**[CLIA]**" in the corresponding Component Table (for example, see Section 6.3.4). For additional information regarding this notation, see Section 4.2.

Note: The "**[CLIA]**" annotations specify requirements that pertain to the receiving EHR systems only. CLIA requirements regarding fields that laboratories must populate in ELINCS messages are expressed via the "Usage" value for each field and each component defined in the specification (such as "R", "RE", and "O").

5. Order Message Type (Virtual)

An actual HL7 message type is not specified for the Order Fulfillment Request interaction. The ELINCS use case does not assume that an electronic order-entry process is available, so the specification of an HL7 order message is not relevant. Instead, a "virtual" message type is defined, which specifies a minimum set of required data elements that a conformant EHR system must include on each lab requisition that it generates. The required data elements may be printed on a paper lab requisition generated by the EHR system or included in an electronic order message transmitted by the EHR system.

A format similar to that of used for HL7 message segments (see Section 4.2) is used to specify the required data elements in the following sections. However, several exceptions to this format apply, since the sections define a virtual rather than actual message type:

- The sequence of the data elements is not specified. The data elements may appear in any sequence on a lab requisition, provided that the meaning of each data element is clear (for example, the name of the patient must be clearly distinguished from the name of the provider).
- The characters that separate multi-part values are not specified (such as the delimiter between the first and last name of the patient). Any delimiters may be chosen or no delimiters used (for example, the first and last name of a patient may be placed in different fields or locations on a lab requisition, as long as the meanings of the data elements is clear).
- The HL7 data type for each field need not be strictly followed. For example, the parts of a complex HL7 data type (such as the XPN data type for Patient Name) may be placed in different fields or locations on a lab requisition, as long as the association between the parts is clear. HL7 data types are used in the specification of required data elements for two reasons: (1) so that the association between the values as they appear on lab requisitions and as they will later be reported in HL7 result messages is more apparent, and (2) to provide a migration path to standardized electronic ordering that is consistent with implementations of standardized result reporting as specified in this document.

5.1. Required Data Elements in ELINCS-Conformant Orders

The following "virtual" message segment lists the data elements that an EHR system must place on all lab requisitions. Note that this list is a minimum set, and additional data elements may also be placed on lab requisitions.

Attribute Table – Virtual Order

ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
Lab Requisition Identifier	**50**	**EI**	**R**	**[1..1]**	**5.1.1**
Test Identifier	**250**	**CE**	**R**	**[1..*]**	**5.1.2**
Ordering Provider	**250**	**XCN**	**R**	**[1..1]**	**5.1.3**
Result Copies To	**250**	**XCN**	**O**	**[0..5]**	**5.1.4**
Result Copies Address	**250**	**ST**	**C**	**[0..5]**	**5.1.5**
Patient Identifier	**180**	**CX**	**R**	**[1..*]**	**5.1.6**
Patient Name	**250**	**XPN**	**C**	**[1..1]**	**5.1.7**
Patient Date of Birth	**20**	**ST**	**R**	**[1..1]**	**5.1.8**
Patient Gender	**20**	**ST**	**R**	**[1..1]**	**5.1.9**

Each required data element is described in the sections that follow.

Note: Conformant laboratory systems are required to capture only the required (R) and required-but-may-be-empty (RE) components of the complex data elements (such as "XPN"). Optional components may appear on lab orders, but laboratory systems need not capture them per the receiver responsibilities specified in the Order Fulfillment Request interaction (see Section 3.1). For example, an EHR system may include both the ID and the assigning authority for a patient identifier on a lab requisition (see Section 5.1.4). The receiving laboratory must capture the ID, but is free to ignore the assigning authority. In general, sending and receiving systems may agree to exchange and use optional components of complex data elements, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems (see the definition of "Optional" elements in the table of Section 4.2).

5.1.1. Lab Requisition Identifier (EI)

ELINCS Specification: The identifier assigned by the EHR to the lab requisition. This identifier will appear as the *Placer order number* (within the OBR segment) in all communications from the laboratory to the EHR system that relate to the status or the results of any of the test(s) ordered on this requisition. Note that multiple tests may be ordered on a single lab requisition.

The nature of the requisition identifier is at the discretion of the EHR system that generates the requisition. Specifically, it is NOT assumed or required that the identifier is unique beyond the namespace of the EHR system. Hence, no value is required for the <namespace ID>, <universal ID> or <universal ID type> components of this field. It is incumbent on the EHR system that generates lab requisitions and receives lab results to manage the requisition identifiers that appear in these communications appropriately. Laboratories are responsible only for correctly recording those components that have been specified on an order and including them in any status messages or reported results (see Sections 3.1 and 6.4.3).

Note: The value of the <entity identifier> component is not necessarily numeric (the data type ST allows alphanumeric characters).

Field: Lab Requisition Identifier (EI)

Component/Sub-Component	Usage
entity identifier (ST)	R
namespace ID (ST)	O
universal ID (ST)	O
universal ID type (ST)	O

ELINCS Sample Value(s):

```
Order #: ORD885-04A3X   [A lab requisition identifier with no
                         namespace information; paper
                         requisition]

Order#:  48577689599
Namespace ID:  MedRecSystems-252
                        [A lab requisition identifier with an
                         accompanying namespace ID, as assigned
                         by the EHR; paper requisition]

ORD885-04A3X^MedRecSystems-252
                        [A lab requisition identifier with an
                         accompanying namespace ID, as assigned
                         by the EHR; electronic HL7 requisition]
```

5.1.2. Test Identifier (CE)

ELINCS Specification: The identifier(s) of the test(s) ordered on the lab requisition, as assigned by the EHR system. These identifiers will subsequently appear in the *Universal service identifier* in all communications from the laboratory to the EHR system related to the status or the results of the ordered test(s). Multiple test identifiers may appear on a single lab requisition, if multiple tests are ordered.

Note: The nature of the test identifier is not addressed by the ELINCS specification. Specifically, there is no requirement at this time that EHRs use a standard coding system (such as LOINC or CPT-4) to identify ordered tests. EHRs may use proprietary test codes, EHRs and Laboratories may mutually agree upon a set of test codes, or Laboratories may require that their proprietary test codes be used to order tests.

Field: Test Identifier

Component/Sub-Component	Usage
identifier (ST)	R
text (ST)	R
name of coding system (ST)	O
alternate identifier (ST)	X
alternate text (ST)	X
name of alternate coding system (ST)	X

ELINCS Sample Value(s):

`5863 - CBC w/Diff` [A lab-specific code and description for an ordered CBC]

`CPT 85025 - CBC w/Diff` [CPT code and description for an ordered CBC]

`24359-2^HEMOGRAM & DIFFERENTIAL PANEL^LN`

[LOINC code and description for an ordered CBC; electronic HL7 requisition]

5.1.3. Ordering Provider (XCN)

ELINCS Specification: The name and identifier of the ordering provider as maintained by the EHR system. Although it is preferred that lab requisitions contain the Medicare UPIN number or National Provider Identifier (NPI) of the ordering provider, the type of provider identifier specified is at the discretion of the EHR system. However, the order generated by the EHR system must *indicate the type of provider identifier used*, and this type must clearly correspond to one of the types enumerated in Table 0203a of Appendix C.

It is incumbent on the EHR system that generates lab requisitions and receives lab results to manage the provider identifiers that appear on test requisitions and results appropriately. It is expected that the value of this identifier can be used within the EHR system to uniquely identify the ordering provider (although it is not assumed that the identifier is unique outside the namespace of the EHR system). Laboratories are responsible only for correctly recording the provider name, identifier and identifier type and for including these data elements in any status messages or reported results.

Sending and receiving systems may agree to populate and use the optional components of this field, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

Field: Ordering Provider (XCN)

Component/Sub-Component	Usage
ID number (ST)	R
family name (FN)	R
family name (ST)	R
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X
family name from partner/spouse (ST)	X
given name (ST)	R
middle name or initials thereof (ST)	RE
suffix (e.g., JR or III) (ST)	RE
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (ST)	O
source table (IS)	X
assigning authority (HD)	O
name type code (ID)	X
identifier check digit (ST)	X
code identifying the check digit scheme employed (ID)	X
identifier type code (ST)	R
assigning facility (HD)	O

Component/Sub-Component	Usage
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

ELINCS Sample Value(s):

```
 Ordered by:  James Randolph, Jr.
Provider UPIN:  7588493898
```

[EHR-specified name and UPIN identifier]

```
 Ordered by:  James Randolph, Jr.
EHR User ID:  88AF-D87B-C48E
```

[EHR-specified name and EHR user identifier]

```
 Ordered by:  James Randolph, Jr.
Provider ID (type unspecified):  MD-38857548-5
```

[EHR-specified name and unspecified identifier]

5.1.4. Result Copies To (XCN)

ELINCS Specification: The identities of any providers to whom the ordering provider would like to send copies of the test result ("copy-to providers"). These identities must consist of the name and either the Medicare UPIN number or National Provider Identifier (NPI) of the copy-to provider (see Table 0203c of Appendix C). Up to 5 copy-to providers may be included on an order.

Note that the request to send copies of results to other providers is entirely optional in any lab order. Furthermore, if such a request is made, the ELINCS specification does not obligate the receiving laboratory to send copies to the indicated providers. Ordering providers and laboratories must separately agree upon the required handling of such requests, and such agreements fall outside the purview of the ELINCS specification. ELINCS only specifies the minimum data elements that must be provided on an order if the ordering provider requests that copies of results be sent by the laboratory. In general, it is preferable for providers to share laboratory results among themselves, rather than rely on laboratories to correctly route and distribute copies.

Field: Ordering Provider (XCN)

Component/Sub-Component	Usage
ID number (ST)	R
family name (FN)	R
family name (ST)	R
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X

Component/Sub-Component	Usage
family name from partner/spouse (ST)	X
given name (ST)	R
middle name or initials thereof (ST)	RE
suffix (e.g., JR or III) (ST)	RE
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (ST)	O
source table (IS)	X
assigning authority (HD)	X
name type code (ID)	X
identifier check digit (ST)	X
code identifying the check digit scheme employed (ID)	X
identifier type code (ST)	R
assigning facility (HD)	X
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

ELINCS Sample Value(s):

```
Copies to:  Bill Copyme, MD (UPIN 7588493898) and Jane
             Metoo, MD (NPI 56783200939)
```

5.1.5. Result Copies Address (ST)

ELINCS Specification: The address and fax number for each provider designated to receive a copy of the test results. This information must be provided on the lab requisition if any copied providers are designated (i.e., of values appear for the "Result Copies To" field), and the information must be provided for every copied provider.

ELINCS Sample Value(s):

```
Copies to:  Bill Copyme, MD (UPIN 7588493898)
             75 Professional Circle  Suite 200
             Alameda, CA 94883
             Fax:  510-583-8821

            Jane Metoo, MD (NPI 56783200939)
             300 Grant Blvd  Suite 5
             Oakland, CA 94831
             Fax:  510-669-2004
```

5.1.6. Patient Identifier (CX)

ELINCS Specification: The patient identifier(s) as assigned by the EHR system that generates the order. All orders must contain exactly one patient identifier that uniquely identifies the patient within the EHR

system. This identifier must be clearly designated as the *ELINCS primary patient identifier*. The ELINCS primary patient identifier is guaranteed to be included in status or result messages sent by the laboratory for this order (see Section 6.3.3). An order may also contain additional patient identifiers, although these are not guaranteed to be reported in status or result messages.

The nature of the ELINCS primary patient identifier is at the discretion of the EHR system that generates the requisition. It may be a medical record number, a globally unique identifier generated by the EHR, a payer-assigned identifier, or anything else. Specifically, it is NOT assumed or required that this identifier is unique beyond the namespace of the EHR system. It is incumbent on the EHR system that generates lab requisitions and receives lab results to manage the patient identifiers that appear in these communications appropriately. Laboratories are responsible only for correctly recording the ELINCS primary patient identifier and including it in any reported results or status messages.

Sending and receiving systems may agree to populate and use the optional components of this field and/or to exchange multiple patient identifiers, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

If the type of patient identifier is specified, it must correspond to one of the values in Table 0203b of Appendix C.

Field: PID-3 Patient Identifier (CX)

Component/Sub-Component	Usage
ID (ST)	R
check digit (ST)	X
code identifying the check digit scheme employed (ID)	X
assigning authority (ST)	O
identifier type code (ST)	O
assigning facility (ST)	O
effective date (DT)	O
expiration date (DT)	O

ELINCS Sample Value(s):

`Patient ID` (ELINCS Primary ID)`:  JX48859487`

[The primary ELINCS patient ID]

`MRN (ELINCS Primary Patient ID):  IM-44857-02`

[The patient's medical record number, which is also the primary ELINCS patient ID]

```
ELINCS Pt. ID:  SMI-44857-02
Patient Health Plan ID: JX48859487
```

[The patient's medical record number and health plan ID; note that only the ELINCS Pt. ID is guaranteed to be provided in electronic results reported by the laboratory]

5.1.7. Patient Name (XPN)

ELINCS Specification: The first name and last name of the patient. The patient name must be provided on the lab requisition, except for certain tests that allow or require that a patient's name be withheld for confidentiality reasons (e.g., HIV testing).

Sending and receiving systems may agree to populate and use the optional components of this field, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

Field: Patient Name (XPN)

Component/Sub-Component	Usage
family name (FN)	R
family name (ST)	R
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X
family name from partner/spouse (ST)	X
given name (ST)	R
middle name or initials thereof (ST)	O
suffix (e.g., JR or III) (ST)	O
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (IS)	X
name type code (ID)	X
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

ELINCS Sample Value(s):

```
Pt Last:  Connor
Pt First:  James

Pt. Name:  Connor, James

Patient Name:  James E. Connor, Jr.
```

5.1.8. Patient Date of Birth (ST)

ELINCS Specification: Patient's date of birth, as stored in the EHR system. Note that the exact format is not specified, but the birth year must be provided as a 4-digit year.

ELINCS Sample Value(s):

12/06/1957

Dec. 6, 1957

1957-12-06

~~6/12/05~~ [Not allowed]

5.1.9. Patient Gender (ST)

ELINCS Specification: Patient's gender, as stored in the EHR system. Note that the format and coding system are not specified.

ELINCS Sample Value(s):

Sex: M

Gender: Male

Male ☑

Female ☐

6. Result Message Types (MT-ORU-1, MT-ORU-2, MT-ORU-3)

ELINCS specifies three interactions for the reporting of laboratory results: Result Status, Result Available, and Result Correction (see Section 3). The message types that correspond to these interactions are similar in structure and content, so it is convenient to specify the message structures and message segments of the three message types together. The following sections document these shared specifications, calling out distinctions among the message types where necessary (for example, see Section 6.2.14). Appendix D provides a summary specification for each message type separately, to serve as a reference for implementation and conformance testing.

6.1. Message Structure

The three message types used for result reporting in ELINCS are all based on the HL7 v2.4 ORU message. This message represents laboratory results as a three-level hierarchy, with the Patient Identification segment (PID) at the upper level, an observation report segment (OBR) at the next level and one or more observation segments (OBX) at the lowest level.

Table 1 displays the hierarchical structure of the shared message type, which is a subset of the standard HL7 ORU message structure. The boldfaced entries indicate those segments that may appear in result-reporting messages. The grayed-out segments indicate those segments that are not used in any of the message types.

Segment ID	Usage	Cardinality	Segment Name
MSH	**R**	**[1..1]**	**Message Header**
{	**R**	**[1..*]**	**Message Content Block**
PID	**R**	**[1..1]**	**Patient Identification**
[PD1]	X	[0..0]	Additional Demographics
[{NK1}]	X	[0..0]	Next of Kin/Associated Parties
[{NTE}]	X	[0..0]	Notes and Comments
[	X	[0..0]	
PV1	X	[0..0]	Patient Visit
[PV2]	X	[0..0]	Patient Visit - Additional Info
]			
{	**R**	**[1..*]**	**Test Order Block**
ORC	X	[0..0]	Order Common
OBR	**R**	**[1..1]**	**Observations Report ID**
{[NTE]}	**RE**	**[0..*]**	**Notes and comments**
[CTD]	X	[0..0]	Contact Data
{	******	******	**Test Result Block**
OBX	**R**	**[1..1]**	**Observation/Result**
{[NTE]}	**RE**	**[0..*]**	**Notes and comments**
}			
{[FT1]}	X	[0..0]	Financial Transaction
{[CTI]}	X	[0..0]	Clinical Trial Identification
}			
}			
[DSC]	X	[0..0]	Continuation Pointer

Table 1. Message structure of ELINCS' MT-ORU-1, MT-ORU-2, and MT-ORU-3 message types. Note that the Usage and Cardinality of the Test Result Block varies among the three message types.

Note that multiple Test Order Blocks may be sent beneath each PID segment, with multiple Test Result Blocks beneath each OBR segment. One or more note segments (NTEs) may be inserted after an OBR or

OBX segment, if there exists relevant comment or note information to communicate (hence, the "RE" usage for NTE segments). Each set of NTE segments correspond to the OBR or OBX segment that immediately precedes it.

6.2. MSH - Message Header Segment

The MSH segment defines the intent, source, destination, and some specifics of the syntax of a message.

6.2.1. MSH Segment Structure

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Field Separator**	**1**	**ST**	**R**	**[1..1]**	**6.2.2**
2	**Encoding Characters**	**4**	**ST**	**R**	**[1..1]**	**6.2.3**
3	**Sending Application**	**180**	**HD**	**O**	**[0..1]**	**6.2.4**
4	**Sending Facility**	**180**	**HD**	**R**	**[1..1]**	**6.2.5**
5	**Receiving Application**	**180**	**HD**	**O**	**[0..1]**	**6.2.6**
6	**Receiving Facility**	**180**	**HD**	**O**	**[0..1]**	**6.2.7**
7	**Date/Time Of Message**	**26**	**TS**	**R**	**[1..1]**	**6.2.8**
8	Security	40	ST	X	[0..0]	
9	**Message Type**	**13**	**CM**	**R**	**[1..1]**	**6.2.9**
10	**Message Control ID**	**20**	**ST**	**R**	**[1..1]**	**6.2.10**
11	**Processing ID**	**3**	**PT**	**R**	**[1..1]**	**6.2.11**
12	**Version ID**	**60**	**VID**	**R**	**[1..1]**	**6.2.12**
13	Sequence Number	15	NM	X	[0..0]	
14	Continuation Pointer	180	ST	X	[0..0]	
15	**Accept Acknowledgment Type**	**2**	**ID**	**R**	**[1..1]**	**6.2.13**
16	Application Acknowledgment Type	2	ID	X	[0..0]	
17	Country Code	3	ID	X	[0..0]	
18	Character Set	16	ID	X	[0..0]	
19	Principal Language Of Message	250	CE	X	[0..0]	
20	Alternate Character Set Handling Scheme	20	ID	X	[0..0]	
21	**Conformance Statement ID**	**30**	**ID**	**R**	**[1..1]**	**6.2.14**

6.2.2. MSH-1 Field separator (ST)

HL7 Definition: This field contains the separator between the segment ID and the first real field, *MSH-2-encoding characters*. As such it serves as the separator and defines the character to be used as a separator for the rest of the message. Recommended value is |, (ASCII 124).

6.2.3. MSH-2 Encoding characters (ST)

HL7 Definition: This field contains the four characters in the following order: the component separator, repetition separator, escape character, and subcomponent separator. Recommended values are ^~\& (ASCII 94, 126, 92, and 38, respectively).

6.2.4. MSH-3 Sending application (HD)

HL7 Definition: This field uniquely identifies the sending application among all other applications within the network enterprise. Entirely site-defined.

ELINCS Specification: This field is optional in the MSH segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. Certain trading partners may mutually agree to use this field to facilitate processing of ELINCS messages, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

In general, receiving systems should not assume or require that a sending system will populate this field unless separately negotiated. Sending systems should not assume or require that a receiving system will use or store the value of this field unless separately negotiated.

If populated, the contents of this field should conform to the HD data type.

6.2.5. MSH-4 Sending facility (HD)

HL7 Definition: Identifies the facility at which the sending application resides.

The HD data type is designed to be used either as a local identifier (with only the <namespace ID> valued) or a globally-unique identifier (<universal ID> and <universal ID type> both valued). HDs that have defined third components (defined universal ID types) must have a second component that is unique within the series of IDs defined by that component. See HL7 specification for more information.

```
HD Components:  <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID
                type (ID)>
```

ELINCS Specification: This field is used to uniquely identify the laboratory that generated the test result. The combination of < universal ID (ST)> and <universal ID type (ID)> must uniquely identify the laboratory, and both of these components must be populated.

The value of <universal ID type> represents the high-level *naming authority* that controls the assignment of laboratory identifiers that appear in the <universal ID> component. The preferred naming authority is CLIA. Hence, laboratories that are CLIA-certified and have a CLIA identifier must send their CLIA identifier in the <universal ID> component, along with the value “L-CL” in the <universal ID type> component.

Laboratories without a CLIA identifier may send another allowed value (see Table - 0362 in Appendix C). If a lab does not have an identifier of an allowed type, then the lab cannot send ELINCS-compliant messages at this time. Specifically, reporting from labs outside the United States may not be accommodated by the ELINCS specification.

Note: the <namespace ID> component is not populated for this field.

Field: MSH-4 Sending Facility (HD)

Component/Sub-Component	Usage
namespace ID (IS)	X
universal ID (ST)	R
universal ID type (ID)	R

ELINCS Sample Value(s):

```
^57768-2^L-CL
^387564^L-CP
```

6.2.6. MSH-5 Receiving application (HD)

HL7 Definition: This field uniquely identifies the receiving application among all other applications within the network enterprise. Entirely site-defined

ELINCS Specification: This field is optional in the MSH segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the HD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems. In general, receiving systems should not assume or require that a sending system will populate this field unless separately negotiated. Sending systems should not assume or require that a receiving system will use or store the value of this field unless separately negotiated.

6.2.7. MSH-6 Receiving facility (HD)

HL7 Definition: Identifies the facility at which the receiving application resides.

ELINCS Specification: This field is optional in the MSH segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the HD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems. In general, receiving systems should not assume or require that a sending system will populate this field unless separately negotiated. Sending systems should not assume or require that a receiving system will use or store the value of this field unless separately negotiated.

6.2.8. MSH-7 Date/time of message (TS)

HL7 Definition: This field contains the date/time that the sending system created the message.

Note: This field was made required in version 2.4.

```
TS Format:  YYYY[MM[DD[HHMM[SS[.S[S[S[S]]]]]]]][+/-ZZZZ]^<degree of
            precision>
```

The TS data type contains the exact time of an event, including the date and time. The date portion of a time stamp follows the rules of a date field and the time portion follows the rules of a time field. The time zone (+/-ZZZZ) is represented as +/-HHMM offset from UTC (formerly Greenwich Mean Time (GMT)), where +0000 or -0000 both represent UTC (without offset). The specific data representations used in the HL7 encoding rules are compatible with ISO 8824-1987(E).

ELINCS Specification: This field must be reported to a precision of seconds. Indication of the time zone is required. The Degree of precision component is not supported.

Field: MSH-7 Date/time of message (TS)

Component/Sub-Component	Usage
YYYYMMDDHHMMSS +/-ZZZZ	R
Degree of precision	X

ELINCS Sample Value(s):

20040822143045-0800 [indicates date/time of Aug. 22, 2004 2:30 PM and 45 seconds PST]

6.2.9. MSH-9 Message type (CM)

HL7 Definition: This field contains the message type, trigger event, and the message structure ID for the message.

```
CM Components:  <message type (ID)> ^ <trigger event (ID)> ^ <message
                structure (ID)>
```

The allowed components of this field are listed in several tables maintained by HL7 (*HL7 Table 0076 - Message type*, *HL7 Table 0003 - Event type*, and *HL7 Table 0354 - Message structure*). Note: These tables are not listed in Appendix C. See the HL7 v2.4 standard specification for details.

The receiving system uses this field to recognize the data segments, and possibly, the application to which to route this message.

ELINCS Specification: In the MT-ORU-1, MT-ORU-2, and MT-ORU-3 message types, this field must be hard coded to the following value:

```
ORU^R01^ORU_R01
```

6.2.10. MSH-10 Message control ID (ST)

HL7 Definition: This field contains a number or other identifier that uniquely identifies the message. The receiving system may echo this ID back to the sending system in a Message Acknowledgment Segment (MSA).

ELINCS Specification: The sending system must assign an identifier for the message that is unique within the namespace of the sending facility (see Section 6.2.4). This will guarantee that the combination of the Message control ID and the Sending Facility constitutes a globally unique message identifier.

The receiving system must echo this ID back to the sending system in any Message Acknowledgement Segments (see Section 7.3.2)

6.2.11. MSH-11 Processing ID (PT)

HL7 Definition: This field is used to decide whether to process the message as defined in HL7 Application (level 7) Processing rules. The first component defines whether the message is part of a production, training, or debugging system (refer to HL7 Table 0103 - Processing ID below for valid values). The second component defines whether the message is part of an archival process or an initial load (refer to HL7 Table 0207 - Processing mode below for valid values). This allows different priorities to be given to different processing modes.

```
PT Components:  <processing ID (ID)> ^ <processing mode (ID)>
```

HL7 Table 0103 - Processing ID

Value	Description
D	Debugging
P	Production

Value	Description
T	Training

HL7 Table 0207 - Processing mode

Value	Description
A	Archive
R	Restore from archive
I	Initial load
T	Current processing, transmitted at intervals (scheduled or on demand)
Not present	Not present (the default, meaning *current* processing)

ELINCS Specification: The components must be assigned as appropriate, per the HL7 specification.

Field: MSH-11 Processing ID (PT)

Component/Sub-Component	Usage
processing ID (ID)	R
processing mode (ID)	O

6.2.12. MSH-12 Version ID (VID)

HL7 Definition: This field is matched by the receiving system to its own version of HL7 to be sure the message will be interpreted correctly.

```
VID Components:  <version ID (ID)> ^ <internationalization code (CE)> ^
                 <internal version ID (CE)>
```

Note: This field contains the version of HL7 only. The identity and version of the ELINCS message type should appear in the field MSH-21 Conformance statement ID.

ELINCS Specification: The second and third components should not be sent. The first component of the field should be hard-coded to the following value:

2.4

Field: MSH-12 Version ID (VID)

Component/Sub-Component	Usage
version ID (ID)	R
internationalization code (CE)	X
internal version ID (CE)	X

6.2.13. MSH-15 Accept Acknowledgement Type (ID)

HL7 Definition: This field identifies the conditions under which a receiving application is required to return an accept acknowledgment in response to this message. A positive accept acknowledgement signifies that the receiving system has committed the message to safe storage; it releases the sending system from the need to resend the message. Refer to Table 0155 in Appendix C for valid values for this field.

ELINCS Specification: For the Result Status, Result Available, and Result Correction interactions, an Accept Acknowledgement message must be sent by the receiving application upon committing the message to safe storage (see Sections 3.2 - 3.4). Hence, the sender must hard-code the value of this field to:

SU

("Successful completion only") in the MT-ORU-1, MT-ORU-2, and MT-ORU-3 message types. The specifications of the acknowledgement message appear in Section 7.

6.2.14. MSH-21 Conformance statement ID (ID)

HL7 Definition: Sites may use this field to assert adherence to a Conformance Statement published by HL7 or by a site. Conformance Statements contain detailed explanations of grammar, syntax, and usage for a particular message or set of messages.

ELINCS Specification: The value of this field indicates which ELINCS message type and version applies to the sent message. The appropriate values to be sent depend on the relevant ELINCS message type, as specified in the following sub-sections.

Note on Field Length: The field length for MSH-21 has been extended to 30 characters from the HL7-prescribed length of 10 characters. This extension is to allow descriptive conformance statement IDs that include message type names (such as "ELINCS_MT-ORU-1_1.0").

6.2.14.1. MSH-21 in Message Type MT-ORU-1 (Result Status interaction)

The value should be hard-coded to

`ELINCS_MT-ORU-1_2.0`

6.2.14.2. MSH-21 in Message Type MT-ORU-2 (Result Available interaction)

The value should be hard-coded to

`ELINCS_MT-ORU-2_2.0`

6.2.14.3. MSH-21 in Message Type MT-ORU-3 (Result Correction interaction)

The value should be hard-coded to

`ELINCS_MT-ORU-3_2.0`

6.3. PID - Patient Identification Segment

The PID segment is used to communicate patient identification information for lab results transmitted per the ELINCS laboratory specification. This segment contains permanent patient identifying and demographic information that, for the most part, is not likely to change frequently.

Note that in version 2.4 of the HL7 standard, the fields "Patient ID," "Alternate Patient ID," and "SSN Number – Patient" have been deprecated in favor of the Patient Identifier List field. Hence, any and all patient identifiers transmitted in the PID segment must be placed in the Patient Identifier List field (this is a repeating field that can contain multiple identifiers for a single patient).

6.3.1. PID Segment Structure

Note that only four fields in the PID segment are relevant to the ELINCS use case. Although other patient-identifying fields may be useful for the matching of laboratory result data in circumstances where a patient identifier is not available, the ELINCS use case requires that a patient identifier be included in laboratory orders, so "secondary" identifying information such as address and phone number are not required.

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Set ID - PID**	**4**	**SI**	**O**	**[0..1]**	**6.3.2**
2	Patient ID	20	CX	X	[0..0]	
3	**Patient Identifier List [CLIA]**	**250**	**CX**	**R**	**[1..*]**	**6.3.3**
4	Alternate Patient ID - PID	20	CX	X	[0..0]	
5	**Patient Name [CLIA]**	**250**	**XPN**	**RE**	**[0..2]**	**6.3.4**
6	**Mother's Maiden Name**	**250**	**XPN**	**O**	**[0..*]**	**6.3.5**
7	**Date/Time of Birth**	**26**	**TS**	**RE**	**[0..1]**	**6.3.6**
8	**Administrative Sex**	**1**	**IS**	**RE**	**[0..1]**	**6.3.7**
9	Patient Alias	250	XPN	X	[0..0]	
10	**Race**	**250**	**CE**	**O**	**[0..*]**	**6.3.8**
11	**Patient Address**	**250**	**XAD**	**O**	**[0..*]**	**6.3.9**
12	County Code	4	IS	X	[0..0]	
13	Phone Number - Home	250	XTN	X	[0..0]	
14	Phone Number - Business	250	XTN	X	[0..0]	
15	Primary Language	250	CE	X	[0..0]	
16	Marital Status	250	CE	X	[0..0]	
17	Religion	250	CE	X	[0..0]	
18	Patient Account Number	250	CX	X	[0..0]	
19	SSN Number - Patient	16	ST	X	[0..0]	
20	Driver's License Number - Patient	25	DLN	X	[0..0]	
21	Mother's Identifier	250	CX	X	[0..0]	
22	Ethnic Group	250	CE	X	[0..0]	
23	Birth Place	250	ST	X	[0..0]	
24	Multiple Birth Indicator	1	ID	X	[0..0]	
25	Birth Order	2	NM	X	[0..0]	
26	Citizenship	250	CE	X	[0..0]	
27	Veterans Military Status	250	CE	X	[0..0]	
28	Nationality	250	CE	X	[0..0]	
29	Patient Death Date and Time	26	TS	X	[0..0]	
30	Patient Death Indicator	1	ID	X	[0..0]	
31	Identity Unknown Indicator	1	ID	X	[0..0]	

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
32	Identity Reliability Code	20	IS	X	[0..0]	
33	Last Update Date/Time	26	TS	X	[0..0]	
34	Last Update Facility	40	HD	X	[0..0]	
35	Species Code	250	CE	X	[0..0]	
36	Breed Code	250	CE	X	[0..0]	
37	Strain	80	ST	X	[0..0]	
38	Production Class Code	250	CE	X	[0..0]	

6.3.2. PID-1 Set ID – PID (SI)

HL7 Definition: This field may be used where multiple PID segments are included in a message.

ELINCS Specification: This field is optional in the PID segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the SI data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.3.3. PID-3 Patient Identifier List (CX)

HL7 Definition: This field contains the list of identifiers (one or more) used by the healthcare facility to uniquely identify a patient (e.g., medical record number, billing number, birth registry, national unique individual identifier, etc.).

```
CX Components:   <ID (ST)> ^ <check digit (ST)> ^ <code identifying the
                 check digit scheme employed (ID)> ^ < assigning
                 authority (HD)> ^ < identifier type code (ID)> ^ <
                 assigning facility (HD) ^ <effective date (DT)> ^
                 <expiration date (DT)>
```

ELINCS Specification: The Patient Identifier List must contain at least one value, and this value must be the *ELINCS primary patient identifier* that was communicated in the lab order (see Section 5.1.4). Per the specification for ELINCS-conformant lab orders, all orders must contain an ELINCS primary patient identifier (see Section 5.1.4) and this identifier must be recorded by the laboratory upon receipt of an order and maintained throughout processing of the ordered test(s) (see Section 3.1). The ELINCS primary patient identifier must subsequently appear in PID-3 in all communications from the laboratory to the EHR system related to the status or the results of the ordered tests. The <identifier type code> corresponding to this identifier must correctly indicate that it is the ELINCS primary patient identifier (i.e., its value must be "EL" – see Table 0203 of Appendix C).

Additional patient identifiers may also be sent in PID-3 by the lab. These identifiers may correspond to secondary patient identifiers that were included in the lab order or assigned by the lab. Sending and receiving systems may agree to exchange multiple patient identifiers, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

The <identifier type code> component must be populated for all patient identifiers, and its value must be drawn from Table 0203b of Appendix C.

The nature of the patient identifier that is designated as the ELINCS primary patient identifier is at the discretion of the EHR system that generates the requisition. Specifically, it is NOT assumed or required that the patient identifier is unique beyond the namespace of the EHR system. Hence, no value is

required for the <assigning authority> or <assigning facility> components of this field. It is incumbent on the EHR system that generates lab requisitions and receives lab results to manage the patient identifiers that appear in these communications appropriately. Laboratories are responsible only for correctly recording the ELINCS primary patient identifier and including it in any status messages or reported results.

CLIA: The EHR system must include at least one patient identifier on the lab report CLIA reference: §493.1291 (c)(1) and corresponding entry in section D5805 of the CLIA interpretive guidelines.

The optionality of all components is shown in the following table.

Field: PID-3 Patient Identifier List

Component/Sub-Component		Usage
ID (ST)	**[CLIA]**	R
check digit (ST)		X
code identifying the check digit scheme employed (ID)		X
assigning authority (HD)		O
identifier type code (ID)		R
assigning facility (HD)		O
effective date (DT)		O
expiration date (DT)		O

ELINCS Sample Value(s):

Example 1:

Patient Identifier(s) on Lab Order:

Patient ID (ELINCS Primary ID): JX48859487

Patient Identifier(s) in PID-3 of Lab Result:

JX48859487^^^^EL [The ELINCS primary patient identifier, as designated on the lab order]

Example 2:

Patient Identifier(s) on Lab Order:

MRN (Primary ELINCS Patient ID): IM-44857-02

Patient Identifier(s) in PID-3 of Lab Result:

IM-44857-02^^^^EL~IM-44857-02^^^^MR

[The medical record number was designated as the ELINCS primary patient identifier on the order, so the lab reported it as both the ELINCS primary patient identifier and the MRN. Per ELINCS, reporting it as the ELINCS primary patient identifier was required; also reporting it as the MRN was optional.]

Example 3:

Patient Identifier(s) on Lab Order:

```
ELINCS Pt. ID:  IM-44857-02
Patient Health Plan ID: JX48859487
```

Patient Identifier(s) in PID-3 of Lab Result:

`IM-44857-02^^^^EL` [Two patient identifiers were included on the order, but the lab is only required to report the ELINCS primary patient identifier]

Example 4:

Patient Identifier(s) on Lab Order:

```
ELINCS Pt. ID:  IM-44857-02
```

Patient Identifier(s) in PID-3 of Lab Result:

`IM-44857-02^^^^EL~JX48859487^^^^HC`

[The ELINCS primary patient identifier was included on the lab order, but the lab chose to also report the patient's health card number (which it collected from the patient). Reporting the health card number was optional, and the EHR may choose to ignore it.]

6.3.4. PID-5 Patient name (XPN)

HL7 Definition: This field contains the names of the patient. The primary or legal name of the patient is reported first. Multiple given names and/or initials are separated by spaces.

```
XPN Components:      <family name (FN)> ^ <given name (ST)> ^ <second and
                     further given names or initials thereof (ST)> ^ <suffix
                     (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^
                     <degree (e.g., MD) (IS)> ^ <name type code (ID) > ^
                     <name representation code (ID)> ^ <name context (CE)> ^
                     <name validity range (DR)> ^ <name assembly order (ID)>

Subcomponents of family name: <family name (ST)> & <own family name prefix
                              (ST)> & <own family name (ST)> & <family name
                              prefix from partner/spouse (ST)> & <family
                              name from partner/spouse (ST)>
```

ELINCS Specification: Only the <family name> sub-component and <given name> component are required for this field, if they have been provided on the test order. One additional name (i.e., an alias) optionally may also be provided in this field, but it must appear as the second repeating value. Valid values for the optional <name type code (ID) > component appear in Table 0200 in Appendix C. The use of "L" (Legal name) or "A" (Alias name) for the <name type code> component is recommended if this component is populated.

Sending and receiving systems may agree to populate and use the optional components of this field, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

Note: The patient name *must* be reported in PID-5 if it is provided on the lab order. Per the ELINCS interaction model (see Section 3.1), the fulfiller of lab orders is required to capture the patient name when

it is communicated on an order and to include the patient name in any subsequent reporting of results or status for that order.

CLIA: The EHR system must include the patient's name (if reported by the lab) on the report of a lab result. The patient name may be omitted by the lab in certain cases, to protect patient confidentiality. In these cases, the EHR system must include the Filler Order Number on the report (see Section 6.4.4). CLIA reference: §493.1291 (c)(1) and corresponding entry in section D5805 of the CLIA interpretive guidelines.

Field: PID-5 Patient Name (XPN)

Component/Sub-Component	Usage
family name (FN)	RE
family name (ST) **[CLIA]**	RE
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X
family name from partner/spouse (ST)	X
given name (ST) **[CLIA]**	RE
second and further given names or initials thereof (ST) **[CLIA]**	O
suffix (e.g., JR or III) (ST) **[CLIA]**	O
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (IS)	X
name type code (ID)	O
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

ELINCS Sample Value(s):

`Connor^James` [James Connor]

`Connor^James^E^^^^L` [Legal name of James E. Connor]

6.3.5. PID-6 Mother's Maiden Name (XPN)

HL7 Definition: This field contains the family name under which the mother was born (i.e., before marriage). It is used to distinguish between patients with the same last name.

ELINCS Specification: This field is optional in the PID segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the XPN data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.3.6. PID-7 Date/time of birth (TS)

HL7 Definition: This field contains the patient's date and time of birth. See Section 6.2.8 for more information about the Timestamp (TS) data type.

ELINCS Specification: Only the birth *date* should be placed in this field. No time zone indicator should be used.

Note: The patient's date of birth *must* be reported in PID-7 if it is provided on the lab order. Per the ELINCS interaction model (see Section 3.1), the fulfiller of lab orders is required to capture the patient's date of birth when it is communicated on an order and to include the date of birth in any subsequent reporting of results or status for that order.

Field: PID-7 Date/time of birth (TS)

Component/Sub-Component	Usage
YYYYMMDD	R
Degree of precision	X

ELINCS Sample Value(s):

```
19571206
```

6.3.7. PID-8 Administrative sex (IS)

HL7 Definition: This field contains the patient's sex.

ELINCS Specification: Refer to Table 0001 in Appendix C for allowed values.

Note: The patient's gender *must* be reported in PID-8 if it is provided on the lab order. Per the ELINCS interaction model (see Section 3.1), the fulfiller of lab orders is required to capture the patient's gender when it is communicated on an order and to include the patient name in any subsequent reporting of results or status for that order.

6.3.8. PID-8 Race (CE)

HL7 Definition: This field refers to the patient's race. The second triplet of the CE data type for race (alternate identifier, alternate text, and name of alternate coding system) is reserved for governmentally assigned codes

ELINCS Specification: This field is optional in the PID segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the CE data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.3.9. PID-9 Patient Address (XAD)

HL7 Definition: This field contains the mailing address of the patient. Multiple addresses for the same person may be sent in the following sequence: The primary mailing address must be sent first in the sequence (for backward compatibility); if the mailing address is not sent, then a repeat delimiter must be sent in the first sequence.

ELINCS Specification: This field is optional in the PID segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the XAD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.4. OBR – Observation Request Segment

The OBR segment serves as the report header for the set of observations (analytes) related to a laboratory test. The details of each individual observation appear in corresponding OBX segments (see Section 6.5.4).

6.4.1. OBR Segment Structure

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Set ID - OBR**		**4**	**SI**	**O**	**[0..1]**	**6.4.2**
2	**Placer Order Number**		**50**	**EI**	**R**	**[1..1]**	**6.4.3**
3	**Filler Order Number**	**[CLIA]**	**50**	**EI**	**R**	**[1..1]**	**6.4.4**
4	**Universal Service Identifier**	**[CLIA]**	**250**	**CE**	**R**	**[1..1]**	**6.4.5**
5	Priority - OBR		2	ID	X	[0..0]	
6	Requested Date/Time		26	TS	X	[0..0]	
7	**Observation Date/Time**		**26**	**TS**	**R**	**[1..1]**	**6.4.6**
8	**Observation End Date/Time**		**26**	**TS**	**RE**	**[0..1]**	**6.4.7**
9	Collection Volume		20	CQ	X	[0..0]	
10	Collector Identifier		250	XCN	X	[0..0]	
11	**Specimen Action Code**		**1**	**ID**	**R**	**[1..1]**	**6.4.8**
12	Danger Code		250	CE	X	[0..0]	
13	Relevant Clinical Info.		300	ST	X	[0..0]	
14	**Specimen Received Date/Time**		**26**	**TS**	******	******	**6.4.9**
15	**Specimen Source**	**[CLIA]**	**300**	**CM**	**RE**	**[0..1]**	**6.4.10**
16	**Ordering Provider**	**[CLIA]**	**250**	**XCN**	**R**	**[1..1]**	**6.4.11**
17	Order Callback Phone Number		250	XTN	X	[0..0]	
18	Placer Field 1		60	ST	X	[0..0]	
19	Placer Field 2		60	ST	X	[0..0]	
20	Filler Field 1		60	ST	X	[0..0]	
21	**Filler Field 2**		**60**	**ST**	******	******	**6.4.12**
22	**Results Rpt/Status Chng - Date/Time**	**[CLIA]**	**26**	**TS**	**RE**	**[0..1]**	**6.4.13**
23	Charge to Practice +		40	CM	X	[0..0]	
24	Diagnostic Serv Sect ID		10	ID	X	[0..0]	
25	**Result Status**	**[CLIA]**	**1**	**ID**	**R**	**[1..1]**	**6.4.14**
26	**Parent Result**		**400**	**CM**	**C**	**[0..1]**	**6.4.15**
27	Quantity/Timing		200	TQ	X	[0..0]	
28	**Result Copies To**		**250**	**XCN**	**C**	**[0..5]**	**6.4.16**
29	**Parent**		**200**	**CM**	**C**	**[0..1]**	**6.4.17**
30	Transportation Mode		20	ID	X	[0..0]	
31	Reason for Study		250	CE	X	[0..0]	
32	Principal Result Interpreter +		200	CM	X	[0..0]	
33	Assistant Result Interpreter +		200	CM	X	[0..0]	
34	Technician +		200	CM	X	[0..0]	
35	Transcriptionist +		200	CM	X	[0..0]	
36	Scheduled Date/Time +		26	TS	X	[0..0]	
37	Number of Sample Containers *		4	NM	X	[0..0]	
38	Transport Logistics of Collected Sample *		250	CE	X	[0..0]	
39	Collector's Comment *		250	CE	X	[0..0]	
40	Transport Arrangement Responsibility		250	CE	X	[0..0]	
41	Transport Arranged		30	ID	X	[0..0]	

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
42	Escort Required	1	ID	X	[0..0]	
43	Planned Patient Transport Comment	250	CE	X	[0..0]	
44	Procedure Code	250	CE	X	[0..0]	
45	Procedure Code Modifier	250	CE	X	[0..0]	
46	Placer Supplemental Service Information	250	CE	X	[0..0]	
47	Filler Supplemental Service Information	250	CE	X	[0..0]	

6.4.2. OBR-1 Set ID – OBR (SI)

HL7 Definition: This field may be used where multiple OBR segments are included in a message.

ELINCS Specification: This field is optional in the OBR segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the SI data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.4.3. OBR-2 Placer order number (EI)

HL7 Definition: This field contains the order number as assigned by the placer (EHR application). The first component is a string that identifies the individual order. It identifies an order uniquely among all orders from a particular ordering application.

```
EI Components:    <entity identifier (ST)> ^ <namespace ID (IS)> ^
                  <universal ID (ST)> ^ <universal ID type (ID)>
```

ELINCS Specification: The value of *placer order number* must contain the requisition identifier specified on the lab requisition (order) received by the laboratory. Per the ELINCS specification, lab requisitions must contain a requisition identifier as assigned by the EHR system, and this requisition identifier must be recorded by the laboratory upon receipt and maintained throughout processing of the test(s) ordered on that requisition (see Section 5.1.1). The requisition identifier must subsequently appear as the placer order number (OBR-2) in all communications from the laboratory to the EHR system that relate to the status or results of any of the tests ordered on the requisition.

Note: If multiple tests are ordered on a single lab requisition, the same requisition identifier must be reported as the placer order number (OBR-2) for all of these tests. The individual tests will be distinguished by the value of OBR-4 (Universal Service ID) – see Section 6.4.5.

Special Case: In reporting the status or results of a reflex test or add-on test (see Section 6.4.8), the placer order number associated with the *original* lab requisition should be placed in the placer order number field of the OBR segment. The original lab requisition is (1) the requisition to which the add-on test was added or (2) the requisition that contained the test whose results caused the reflex test to occur.

Note: The value of the <entity identifier> component is not necessarily numeric (the data type ST allows alphanumeric characters).

Note on Field Length: The field length for OBR-2 has been extended to 50 characters from the HL7-prescribed length of 22 characters. This extension allows EHR systems to use longer unique identifiers (such as GUIDs) for order numbers and namespace IDs.

Field: OBR-2 Placer Order Number (EI)

Component/Sub-Component	Usage
entity identifier (ST)	R
namespace ID (IS)	O
universal ID (ST)	O
universal ID type (ID)	O

ELINCS Sample Value(s):

```
ORD885-04A3X            [The order identifier as provided on the
                         lab requisition]

48577689599^MedRecSystems-252
                       [The order identifier as provided on the
                        lab requisition, including optional
                        EHR namespace information that was also
                        provided]
```

6.4.4. OBR-3 Filler order number (EI)

HL7 Definition: This field is the order number associated with the laboratory. It is a case of the Entity Identifier data type:

```
EI Components:    <entity identifier (ST)> ^ <namespace ID (IS)> ^
                  <universal ID (ST)> ^ <universal ID type (ID)>
```

Its first component is a string that identifies test being performed. This value is assigned by the laboratory and must uniquely identify the order among orders processed in a particular laboratory. This uniqueness must persist over time. For example, a specimen number or accession number may be used.

The second through fourth components contain the ID of the laboratory that has assigned the entity identifier, in the form of the HD data type (see Section 6.2.4 for more information about the HD data type). These components denote the "name space" of the <entity identifier (ST)> component, such that the entire value of the Filler Order Number is globally unique.

When results are transmitted in an ORU message, the identifying filler order number must be present in all OBR segments.

ELINCS Specification: The value of the <entity identifier (ST)> component is assigned by the specific laboratory that generated the test result, and this component must be populated. It is assumed that this identifier will be unique for any test processed by that laboratory. This identifier is typically the "accession number" assigned by the laboratory.

The combination of < universal ID (ST)> and <universal ID Type (ID)> is used to uniquely identify this laboratory, and both of these components must be populated. The value of <universal ID Type > represents the high-level *naming authority* that controls the identifiers for its laboratories. The preferred naming authority is CLIA, and laboratories that are CLIA-certified and have a CLIA identifier must send that identifier in the <universal ID> component, along with the value "L-CL" in the <Universal ID Type> component. Laboratories without a CLIA identifier may send another allowed value in the <Universal ID Type> component (see Table - 0362 in Appendix C). If a lab does not have an identifier of an allowed

type, then the lab cannot send ELINCS-compliant messages at this time. Specifically, reporting from labs outside the United States may not be accommodated by the ELINCS specification.

CLIA: The EHR system must include the filler order number (i.e., "accession number") on the report of a lab result *if* the patient name is not included on the report (for example, for confidentiality reasons). CLIA reference: §493.1291 (c)(1) and corresponding entry in section D5805 of the CLIA interpretive guidelines.

Note on Field Length: The field length for OBR-3 has been extended to 50 characters from the HL7-prescribed length of 22 characters. This extension allows lab systems to use longer unique identifiers (such as GUIDs) for accession numbers and namespace IDs.

Note: In most cases, the values of the <universal ID> and <universal ID type> components in this field will be the same as in the field MSH-4 Sending facility.

The combination of <entity identifier (ST)>, <universal ID (ST)>, and <universal ID type (ID)> must provide a globally unique identifier for any test reported in a ELINCS-conformant result message.

Note: the <namespace ID> component is not populated for this field.

Field: OBR-3 Filler Order Number (EI)

Component/Sub-Component	Usage
entity identifier (ST) **[CLIA]**	R
namespace ID (IS)	X
universal ID (ST)	R
universal ID type (ID)	R

ELINCS Sample Value(s):

```
5788475-04333^^57768-2^L-CL  [An accession number from a CLIA-
                              certified lab]

48577689599^^387564^L-CP  [An accession number from a DoD lab]
```

6.4.5. OBR-4 Universal service identifier (CE)

HL7 Definition: This field is the identifier code for the requested observation/test/battery. This can be based on local and/or "universal" codes. The structure of this CE data type is as follows:

```
CE Components:   <identifier (ST)> ^ <text (ST)> ^ <name of coding system
                 (IS)> ^ <alternate identifier (ST)> ^ <alternate text
                 (ST)> ^ <name of alternate coding system (IS)>
```

ELINCS Specification: The first three components of this field must contain the identifier, text description, and name of coding system for the performed test *as assigned by the laboratory*. These codes are typically the proprietary test codes that appear in clinical laboratory data dictionaries ("test masters").

The 4th, 5th, and 6th components of this field must contain the identifier of the ordered test *as specified on the lab requisition generated by the EHR system*. Per the ELINCS specification, lab requisitions must contain a test identifier as assigned by the EHR system, and the test identifier must be recorded by the laboratory upon receipt and maintained throughout processing of the ordered test(s) (see Section 5.1.2). The test identifier must subsequently appear in the 4th, 5th, and 6th components of *Universal service*

identifier in all communications from the laboratory to the EHR system related to the status or the results of the ordered test (see the Receiver Responsibilities in Section 3.1).

The test identifier and test description as specified on the lab requisition must appear in the 4th and 5th components of the field, and the name of the coding system must appear in the 6th component *if the coding system was specified on the lab requisition.*

Exception: In the special case of an add-on test or reflex test, there will be no separate lab requisition generated by the EHR system (see Section 6.4.8 for information about add-on tests and reflex tests). Hence, the lab system may not be aware of the test identifier used by the EHR system for the add-on or reflex test. In these cases, the lab should send only the lab-assigned identifier, text description, and name of coding system in the 1st, 2nd, and 3rd components of OBR-4. The last three components may be left empty in this specific case (hence, the "RE" usage for those components).

For a list of all coding systems that may be used in this field, see Table 0396 in Appendix C.

CLIA: The EHR system must include the identifier and name of the reported test on the report of a lab result. CLIA reference: §493.1291 (c)(4).

Field: OBR-4 Universal Service Identifier

Component/Sub-Component		Usage
identifier (ST)	**[CLIA]**	R
text (ST)	**[CLIA]**	R
name of coding system (IS)		R
alternate identifier (ST)		RE
alternate text (ST)		RE
name of alternate coding system (IS)		RE

ELINCS Sample Value(s):

Example 1:

Test Identifier on Lab Order:

`5863 - CBC w/Diff` [A lab-specific code and description for an ordered CBC (i.e., the EHR uses the lab's codes to specify ordered tests)]

Universal Service Identifier(s) in OBR-4 of Lab Result:

`5863^CBC w/Diff^99lab^5863^CBC w/Diff^99lab`

[The lab-specific code reported twice, once as the lab-assigned code for the performed test (in the first three components, and once as the EHR-assigned code for the ordered test (in the last three components)]

Example 2:

Test Identifier on Lab Order:

`CPT 85025 - CBC w/Diff` [CPT code and description for an ordered CBC]

Universal Service Identifier(s) in OBR-4 of Lab Result:

5863^CBC w/Diff^99lab^85025^CBC w/Diff^C4

[The lab-assigned code in the first three components, and the EHR-assigned code in the last three components]

Example 3:

Test Identifier on Lab Order:

Hem445 – CBC+Differential [An EHR-specific code and description for an ordered CBC; no coding system is specified]

Universal Service Identifier(s) in OBR-4 of Lab Result:

5863^CBC w/Diff^99lab^Hem44^CBC+Differential

[The lab-assigned code in the first three components, and the EHR-assigned code in the last two components]

Example 4:

Test Identifier on Lab Order:

<none> [The test was not ordered via the EHR – it was a reflex test ordered by the lab]

Universal Service Identifier(s) in OBR-4 of Lab Result:

8344^Antibiotic sensitivity^99lab

[Only the lab-assigned code appears in the first three components]

6.4.6. OBR-7 Observation date/time (TS)

HL7 Definition: This field is the clinically relevant date/time of the observation. In the case of a specimen-associated study, this field shall represent the date and time the specimen was collected or obtained. When the OBR is transmitted as part of a report message, the field **must** be filled in.

ELINCS Specification: It is recommended that this field be reported to a precision of seconds, although just a date may be reported if the time that the specimen was obtained is not available (for example, if the "date of service" for a lab test is used). The time zone must be specified if the time (to any precision) is reported. The Degree of precision component is not supported.

Field: OBR-7 Observation date/time (TS)

Component/Sub-Component	Usage
YYYYMMDD[HH[MM[SS]] +/-ZZZZ]	R
Degree of precision	X

ELINCS Sample Value(s):

`20040822143045-0800`	[indicates date/time of Aug. 22, 2004 2:30 PM and 45 seconds PST]
`20040822`	[indicates date/time of Aug. 22, 2004]
`19000101`	[indicates that no observation date/time is available]

6.4.7. OBR-8 Observation end date/time (TS)

HL7 Definition: This field is the end date and time of a study or timed specimen collection. If an observation takes place over a substantial period of time, it will indicate when the observation period ended. For observations made at a point in time, it will be null.

ELINCS Specification: This field is required if a value is applicable (e.g., if the specimen collection takes place over a substantial period of time) and the value is known to the laboratory. If populated, it is recommended that this field be reported to a precision of seconds. However, just a date may be reported if the time of day that the specimen collection was concluded is not available. The time zone must be specified if the time (to any precision) is reported. The Degree of precision component is not supported.

OBR-8 Observation end date/time (TS)

Component/Sub-Component	Usage
YYYYMMDD[HH[MM[SS]]] +/-ZZZZ]	RE
Degree of precision	X

ELINCS Sample Value(s):

`20040822143045-0800`	[indicates date/time of Aug. 22, 2004 2:30 PM and 45 seconds PST]
`20040822`	[indicates date/time of Aug. 22, 2004]

6.4.8. OBR-11 Specimen action code (ID)

HL7 Definition: This field is the action to be taken with respect to the specimens that accompany or precede this order. The purpose of this field is to further qualify (when appropriate) the general action indicated by the order control code contained in the accompanying ORC segment.

ELINCS Specification: In ELINCS messages, the *specimen action code* is used to indicate the relationship of the test reported in this OBR segment to the test(s) ordered on the lab requisition. Specifically, the field is intended to flag *add-on tests* and *reflex tests* (see below). The allowed values for this field are listed in Table 0065 of Appendix C.

Add-on tests are tests that that a healthcare provider requests to be performed on a patient specimen that has already been collected for another test. Add-on tests may be requested by telephone, electronically, or otherwise. Typically, there will be no separate lab requisition for the add-on test, so the test must be associated with an existing lab requisition.

> When reporting the status, results, or corrections for an add-on test, the value of *specimen action code* must be **A** ("Add ordered test to the existing specimen")

Reflex tests are tests that the lab initiates based on the results of a previously performed test (i.e., without an explicit order). For example, a lab may initiate antibiotic sensitivity tests on the organisms identified

in a positive culture result. In the ELINCS use case, a reflex test must be associated with an existing lab requisition, because no new requisition is submitted.

> When reporting the status, results, or corrections for a reflex test, the value of *specimen action code* must be **G** ("Generated order; reflex order").

Originally ordered tests are tests that explicitly appear on lab requisitions generated by EHR systems, per the specifications of the Order Fulfillment Request interaction (see Section 3.1). In other words, these are tests that are not add-on tests or reflex tests.

> When reporting the status, results, or corrections for an originally ordered test, the value of *specimen action code* must be **L** ("Lab obtained specimen from patient") or **O** ("Specimen obtained by service other than Lab").

Note: Reflex tests and add-on tests also require special handling with respect to the values in OBR-2 Placer Order Number (see Section 6.4.3), and OBR-29 Parent (see Section 6.4.16).

6.4.9. OBR-14 Specimen received date/time (TS)

HL7 Definition: For observations requiring a specimen, the specimen received date/time is the actual login time at the diagnostic service. This field must contain a value when the order is accompanied by a specimen, or when the observation required a specimen **and** the message is a report.

ELINCS Specification: This field contains the date/time at which the specimen was received by the lab. The usage (optionality) of the field varies depending on the message type in which it appears (see below). If populated, the field must be reported to a minimum precision of minutes, and may be reported to a precision of seconds. The time zone must be specified. The Degree of precision component is not supported.

OBR-15 Specimen received date/time (TS)

Component/Sub-Component	Usage
YYYYMMDDHHMM[SS] +/-ZZZZ	RE
Degree of precision	X

6.4.9.1. OBR-14 in Message Type MT-ORU-1 (Result Status interaction)

The field must be populated if a specimen has been received for the test in question (i.e., its usage is "RE" - Required-but-may-be-empty). For example, if a test is cancelled because a specimen has been received and found to be unsuitable, OBR-15 must be populated. If a test is cancelled because no specimen was received, OBR-15 need not be populated.

If populated, the value should be formatted as specified in the general ELINCS specification for OBR-14 Specimen received date/time (see above).

6.4.9.2. OBR-14 in Message Type MT-ORU-2 (Result Available interaction)

The field must be populated (i.e., its usage is "R" – Required). The value should be formatted as specified in the general ELINCS specification for OBR-14 Specimen received date/time (see above).

6.4.9.3. OBR-14 in Message Type MT-ORU-3 (Result Correction interaction)

The field must be populated (i.e., its usage is "R" – Required). The value should be formatted as specified in the general ELINCS specification for OBR-14 Specimen received date/time (see above).

6.4.10. OBR-15 Specimen Source (CM)

HL7 Definition: This field identifies the source and (optionally) the site and/or method of collecting the specimen. Values are represented using the Composite (CM) data type, which consists of the following components in this case:

```
Components:  <specimen source name or code (CE)> ^ <additives (TX)> ^
             <freetext (TX)> ^ <body site (CE)> ^ <site modifier (CE)> ^
             <collection method modifier code (CE)>


Sub-components of Specimen source name or code:
             <identifier (ST)> ^ <text (ST)> ^ <name of coding system
             (IS)> ^ <alternate identifier (ST)> ^ <alternate text (ST)>
             ^ <name of alternate coding system (IS)>
```

ELINCS Specification: This field should be populated if the information is available to the laboratory application. When populated, the specimen source codes must be drawn from table 0070 in Appendix C, and the name of the coding system should be "HL70070".

CLIA: The EHR system must include the Specimen Source on the report of a lab result *if* this information is provided by the laboratory and it is relevant to the clinical interpretation of the test result. CLIA reference: §493.1291 (c)(5) and corresponding entry in section D5805 of the CLIA interpretive guidelines.

Field: OBR-15 Specimen Source (CM)

Component/Sub-Component	Usage
specimen source name or code (CE)	RE
identifier (ST)	RE
text (ST)	O
name of coding system (IS)	RE
alternate identifier (ST)	X
alternate text (ST)	X
name of alternate coding system (IS)	X
additives (TX)	X
freetext (TX)	X
body site (CE)	X
site modifier (CE)	X
collection method modifier code (CE)	X

ELINCS Sample Value(s):

```
BLDA&Blood arterial&HL70070
SPT&&HL70070
```

6.4.11. OBR-16 Ordering provider (XCN)

HL7 Definition: This field identifies the provider who ordered the test. The value is coded using the XCN data type:

```
Components: <ID number (ST)> ^ <family name (FN)> ^ <given name (ST)> ^
            <second or further given names or initials thereof (ST)> ^
            <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^
            <degree (e.g., MD) (IS)> ^ <source table (IS)> ^ <assigning
            authority (HD)> ^ <name type code (ID)>  ^ <identifier check
            digit (ST)> ^ <code identifying the check digit scheme
            employed (ID)> ^ <identifier type code (IS)> ^ <assigning
            facility (HD)> ^ <name representation code (ID)> ^ <name
            context (CE)> ^ <name validity range (DR)> ^ < name assembly
            order (ID)>
```

ELINCS Specification: The value of *ordering provider* must contain the provider identifier specified on the lab requisition (order) received by the laboratory. Per the ELINCS specification, lab requisitions must contain a provider name and identifier as assigned by the EHR system, and these data elements must be recorded by the laboratory upon receipt and maintained throughout processing of the ordered test(s) (see Section 5.1.3). The name and identifier must subsequently appear with the *Ordering provider* field of the OBR segment in all communications from the laboratory to the EHR system related to the status or the results of the ordered test(s).

The type of provider identifier that is specified is at the discretion of the EHR system that generates the requisition. It is preferred that lab requisitions contain the Medicare UPIN number of the ordering provider, but not required per the ELINCS standard (see Section 5.1.3). It is incumbent on the EHR system that generates lab requisitions and receives lab results to manage the provider identifiers that appear on test requisitions and results appropriately. Laboratories are responsible only for correctly recording the provider name and identifier and including these data elements in any status messages or reported results.

Note: The allowed values for the <identifier type code> component are listed in Table 0203a of Appendix C. If the type of identifier for the ordering provider is not specified on the lab requisition, the laboratory system should specify the identifier type **U** ("Unspecified").

Sending and receiving systems may agree to populate and use the optional components of this field, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

CLIA: The EHR system must use the value of the ordering provider to ensure that test results are released only to authorized persons and the individual responsible for using the test results . CLIA reference §493.1291 (f).

Field: OBR-16 Ordering Provider (XCN)

Component/Sub-Component		Usage
ID number (ST)		R
family name (FN)	**[CLIA]**	R
family name (ST)		R
own family name prefix (ST)		X
own family name (ST)		X
family name prefix from partner/spouse (ST)		X
family name from partner/spouse (ST)		X
given name (ST)	**[CLIA]**	R
second and further given names or initials thereof (ST)	**[CLIA]**	O
suffix (e.g., JR or III) (ST)	**[CLIA]**	O
prefix (e.g., DR) (ST)		O

Component/Sub-Component		Usage
degree (e.g., MD) (IS)	**[CLIA]**	O
source table (IS)		X
assigning authority (HD)		O
name type code (ID)		X
identifier check digit (ST)		X
code identifying the check digit scheme employed (ID)		X
identifier type code (IS)		R
assigning facility (HD)		O
name representation code (ID)		X
name context (CE)		X
name validity range (DR)		X
name assembly order (ID)		X

ELINCS Sample Value(s):

`7588493898^Randolph^James^^Jr^^^UPIN`

[EHR-specified name and UPIN identifier]

`88AF-D87B-C48E^Simms^Sandra^^^^MD^EH`

[EHR-specified name and EHR user identifier]

`MD-38857548-5^Collins^Gregory^^III^^DO^U`

[EHR-specified name and unspecified user identifier]

6.4.12. OBR-21 Filler Field 2 (ST)

ELINCS Specifications: This field is used only when a *copy* of a test result has been sent by the lab to one or more providers other than the ordering provider. Ordering providers occasionally request this service to inform cross-covering physicians, primary care providers, or other caregivers of test results. In these situations, the value of OBR-21 depends on the intended recipient of the result – the provider who ordered the test or the "other" providers who are to receive copies of the result. The possible values of the field are text strings, assigned per the following rules:

Intended Recipient of Result	Field Value
Ordering Provider	"ResultCopiesRequested"
Other Provider(s)	"ResultCopyEnclosed"

The primary purpose of this field is to inform an EHR system that it is receiving the results of a test ordered by a different provider than the intended recipient, so that the EHR is aware that the order, the ordering physician, and the patient associated with the result may not necessarily be known to the EHR. In these cases, the value "ResultCopyEnclosed" in Filler Field 2 indicates this situation.

A secondary purpose of this field is to confirm to the ordering provider that the laboratory is aware of the request to send copies of the result to other providers. The value "ResultCopiesRequested" in Filler Field 2 provides this confirmation. **Note**: The value "ResultCopiesRequested" in Filler Field 2 of an ELINCS messages does not necessarily imply that the copied results also will be sent in ELINCS messages, will be sent electronically, or will be sent at all. It only confirms that the laboratory is aware of the request. Any

additional agreements regarding the fulfillment of request to send copies of lab results must be negotiated separately between the users of EHR systems and the clinical laboratory.

The rules for populating the field depend on the message type and the intended recipient, as described below.

6.4.12.1. OBR-21 in Message Type MT-ORU-1 (Result Status interaction)

The field is not supported (i.e., should not populated) for this interaction because status messages are sent only to the ordering provider.

6.4.12.2. OBR-21 in Message Type MT-ORU-2 (Result Available interaction)

The field is optional and should be populated only when copies of a test result are to be sent to a different recipient than the ordering provider. In this case, the field should be populated per the following rule:

1. IF the result in this OBR segment is intended for the ordering provider AND IF the ordering provider requested that copies be sent to one or more other providers, then the value of this field should be

ResultCopiesRequested

2. IF the result in this OBR segment is a copy that is intended for a provider other than the ordering provider, then the value of this field should be

ResultCopyEnclosed

3. In all other cases, this field should not be populated.

6.4.12.3. OBR-21 in Message Type MT-ORU-3 (Result Correction interaction)

The field is optional and should be populated only when copies of a test result are to be sent to a different recipient than the ordering provider. In this case, the field should be populated per the following rule:

1. IF the result in this OBR segment is intended for the ordering provider AND IF the ordering provider requested that copies be sent to one or more other providers, then the value of this field should be

ResultCopiesRequested

2. IF the result in this OBR segment is a copy that is intended for a provider other than the ordering provider, then the value of this field should be

ResultCopyEnclosed

3. In all other cases, this field should not be populated.

ELINCS Sample Value(s):

See sample values in Section 6.4.16.

6.4.13. OBR-22 Results rpt/status chng - date/time (TS)

The usage of this field depends on the specific interaction and message type in which it appears. See the sub-sections below for details.

HL7 Definition: This field specifies the date/time results reported or status changed. This field is used to indicate the date and time that the results are composed into a report and released, or that a status was entered or changed at the laboratory.

ELINCS Specifications: This first component is required if known, and must be reported to a precision of seconds. Values with greater precision are allowed. Indication of the time zone is required. The Degree of precision component is not supported.

CLIA: If provided in the ELINCS message, the EHR system must include on the report of each lab result the date and time that the result was reported or the status of the result changed. CLIA reference: §493.1291 (c)(3).

Field: OBR-22 Results rpt/status chng (TS)

Component/Sub-Component	Usage
YYYYMMDDHHMMSS +/-ZZZZ **[CLIA]**	R
Degree of precision	X

ELINCS Sample Value(s):

`200408221430-0800` [indicates date/time of Aug. 22, 2004 2:30 PM PST]

6.4.13.1. OBR-22 in Message Type MT-ORU-1 (Result Status interaction)

The value should be formatted as specified in the general ELINCS specification for OBR-22 Results rpt/status chng - date/time (see above).

The value should represent the date/time at which the change in status took place. For example, the date/time at which the specimen was received in the laboratory or the test was cancelled.

6.4.13.2. OBR-22 in Message Type MT-ORU-2 (Result Available interaction)

The value should be formatted as specified in the general ELINCS specification for OBR-22 Results rpt/status chng - date/time (see above).

The value should represent the date/time at which the laboratory released the clinical results for the test reported in this OBR segment. For example, if the results of multiple tests from a lab requisition are reported together but were created at different times, the value of this field will represent the date/time at which the results of each test were created by the laboratory (which may precede the date/time at which the results were packaged into an HL7 message and transmitted to the receiving system; the latter date/time appears in MSH-7 Date/time of message).

6.4.13.3. OBR-22 in Message Type MT-ORU-3 (Result Correction interaction)

The value should be formatted as specified in the general ELINCS specification for OBR-22 Results rpt/status chng - date/time (see above).

The value should represent the date/time at which the laboratory released corrections to the previously reported test results. For example, if corrections to the results of multiple tests from one lab requisition are reported at the same time but were made at different times, the value of this field will represent the date/time at which the corrections of each test were made by the laboratory (which may precede the date/time at which the corrections were packaged into an HL7 message and transmitted to the receiving system; the latter date/time appears in MSH-7 Date/time of message).

6.4.14. OBR-25 Result status (ID)

The usage of this field depends on the specific interaction and message type in which it appears. See the sub-sections below for details.

HL7 Definition: This field is the status of results for this order. This field is required whenever the OBR is contained in a report message.

ELINCS Specification: the complete set of allowed values for this field appear in Table 0123 in Appendix C. The allowed values for specific interactions and message types appear in the sub-sections below. Note that only the values listed in each sub-section may appear in instances of the indicated message types. For example, only the values "I" and "X" may appear in message instances formatted per the MT-ORU-1 message type (the applicable message type is indicated by the value of MSH-21 Conformance statement ID in each ELINCS message instance).

CLIA: The EHR system must include a suitable representation of the Result Status on the report of a lab result if an entire test was cancelled (status = "X") or previously reported results were corrected or deleted (status = "C"). CLIA reference §493.1291 (c)(7) and §493.1291 (k)(1, 2)).

6.4.14.1. OBR-25 in Message Type MT-ORU-1 (Result Status interaction)

The indicated values should be assigned by the sending system for the following trigger events:

Trigger Event	Correct Value of Result Status
Specimen received in laboratory	**I**
Entire order cancelled	**X**

6.4.14.2. OBR-25 in Message Type MT-ORU-2 (Result Available interaction)

The indicated values should be assigned by the sending system for the following trigger events:

Trigger Event	Correct Value of Result Status
Preliminary results available	**P**
Final results available	**F**
Partial Cancellation	**P or F ***

* Depending on the status of the results for other analytes associated with the same test (OBR). If preliminary results are reported for the other analytes, the Result Status value should be **P**. If final results are reported for the other analytes, the Result Status value should be **F**. If no results are reported for any other analytes (i.e., only cancelled analytes are reported), then the Result Status value should be **F**. **Note**: The distinction between cancelled and reported analytes will indicated at the OBX level (see OBX-11 Observation result status).

6.4.14.3. OBR-25 in Message Type MT-ORU-3 (Result Correction interaction)

The indicated values should be assigned by the sending system for the following trigger events:

Trigger Event	Correct Value of Result Status
Corrections to previously reported results	**C**
Deletions of previously reported results	**C**

Note: The distinction between corrections and deletions will indicated at the OBX level (see OBX-11 Observation result status).

6.4.15. OBR-26 Parent Result (CM)

HL7 Definition: This field uniquely identifies the parent result's OBX segment related to this order. The value of this OBX segment in the parent result is the organism or chemical species about which this battery reports. For example, if the current battery is an antimicrobial susceptibility, the parent results identified OBX contains a result which identifies the organism on which the susceptibility was run.

ELINCS Specification: This field is conditional in the OBR segment of ELINCS messages, and must be populated only for the results of *reflex tests*.

Condition: OBR-26 Parent Result must be populated if the value of OBR-11 Specimen Action Code is **G** ("Generated order; reflex order"). In these cases, the value of OBR-11 allows the receiving system to correctly associate the results of a reflex test (for example, the antibiotic susceptibilities of an organism) to the previous culture result (i.e., the identify of the organism). When the value of OBR-11 Specimen Action Code is NOT **G**, the usage of OBR-26 is optional (i.e., the field may be populated, but need not be).

When populated, the value of OBR-26 must reference the OBX segment of the test result that prompted the reflex test. For further explanation and an example, see Appendix B, Section B.2.5.

For tests other than reflex tests, OBR-26 is optional. Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems. In general, receiving systems should not expect this field to be populated by conformant sending systems (except for reflex tests), and sending systems should not expect this field to be processed by conformant receiving systems.

6.4.16. OBR-28 Result Copies To (XCN)

HL7 Definition: This field is the people who are to receive copies of the results.

ELINCS Specification: The usage of this field is conditional, and it is populated depending on the value of field OBR 21 Filler Field 2. Specifically, the field should be populated per rules below.

Condition:

1. If OBR-21 contains the value **ResultCopiesRequested** (i.e., the result in this OBR segment is intended for the ordering provider and that provider has requested that copies of the result also be sent to one or more other providers), then this field should contain the identity(ies) of the other provider(s) to whom the result was requested to be sent. For each identity, the components of the field should be populated as indicated by the table below.

Note: OBR-28 is a repeating field and may contain the identities of up to 5 providers.

2. If OBR-21 contains the value **ResultCopyEnclosed** (i.e., if the result in this OBR segment is a copy that is intended for a provider other than the ordering provider), then this field should be the identity of the provider for whom the result is intended. This information allows the correct routing of the result (automatically or manually) after upon its receipt. The components of the field should be populated as indicated in the table below.

   CLIA: The EHR system must include use the value of this field to ensure that test results are released only to authorized persons and the individual responsible for using the test results . CLIA reference §493.1291 (f).

3. If OBR-21 contains any other value or is not present (NULL), then OBR-28 should not be populated.

Field: OBR-28 Result Copies To (XCN)

Component/Sub-Component	Usage
ID number (ST)	R
family name (FN)	R
family name (ST)	R
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X
family name from partner/spouse (ST)	X
given name (ST)	R
second and further given names or initials thereof (ST)	O
suffix (e.g., JR or III) (ST)	O
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (IS)	O
source table (IS)	X
assigning authority (HD)	X
name type code (ID)	X
identifier check digit (ST)	X
code identifying the check digit scheme employed (ID)	X
identifier type code (IS)	R
assigning facility (HD)	X
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

Note: The allowed values of the Identifier Type Code appear in HL7 Table 0203c.

ELINCS Sample Value(s):

A test was ordered by Dr. John Smith, with copies requested for Dr. Bill Copyme and Dr. Jane Metoo. In response, the lab sent the test results to Dr. Smith, Dr. Copyme, and Dr. Metoo.

Example 1:

OBR-21 Value:

```
ResultCopiesRequested
```

OBR-28 Value:

```
1234567890^Copyme^Bill^^^^^^^^^^NPI~
9876543210^Metoo^Jane^^^^^^^^^^NPI
```

[This OBR contains the result sent to the ordering provider, Dr. John Smith]

Example 2:

OBR-21 Value:

```
ResultCopyEnclosed
```

OBR-28 Value:

```
1234567890^Copyme^Bill^^^^^^^^^^NPI
```

[This OBR contains the copy of the result sent to Dr. Bill Copyme]

Example 3:

OBR-21 Value:

```
ResultCopyEnclosed
```

OBR-28 Value:

```
9876543210^Metoo^Jane^^^^^^^^^^NPI
```

[This OBR contains the copy of the result sent to Dr. Jane Metoo]

6.4.17. OBR-29 Parent (CM)

HL7 Definition: This field relates a child OBR segment to its parent OBR segment when a parent/child relationship exists. For example, observations that are spawned by previous observations, e.g., antimicrobial susceptibilities spawned by blood cultures, need to record the parent (blood culture) filler order number here.

```
Components:  <parent's placer order number (EI)> ^ <parent's filler order
             number (EI)>
```

ELINCS Specification: This field is used only when the OBR segment refers to a *Reflex Test*. Reflex tests are tests that a lab has initiated based on the results of a previously performed test (see Section 6.4.8). In these cases, the value of the *Parent* field provides a reference to the previously performed test whose results generated the reflex test.

Condition: This *OBR-29 Parent* is populated if and only if the value of OBR-11 Specimen Action Code is "**G"**, indicating that the OBR segment describes a reflex test.

Although the HL7 definition indicates that the *Parent* field should reference the parent OBR's *Placer Order Number* (OBR-2), practical constraints and customary practice dictate that the *Parent* field, instead, reference the parent OBR's *Universal Service Identifier* (OBR-4). Hence, the ELINCS specification redefines the composite data type for this field as follows:

```
Component:      <parent's universal service identifier (ST)>
```

Note: The value of *Parent* must reference the 1st component of OBR-4 Universal Service Identifier for the parent OBR segment . Although OBR-4 may optionally contain a second test identifier in the fourth component (see Section 6.4.5), only the value of the first component should be referenced in the *Parent* field.

Note: The parent OBR segment may or may not be reported in the same HL7 message as this OBR segment. Hence, the receiving system must maintain a record of the Universal Service Identifiers appearing in previously reported OBR segments, as these identifiers may be referenced in OBR segments of subsequent HL7 messages. For example, a lab may report the preliminary results for a throat culture, then later report the results of antibiotic sensitivity testing that was automatically performed based on the results of the throat culture. In this case, the OBR segment that reports the antibiotic sensitivity results will reference the OBR segment (sent earlier) that reported the throat culture results.

ELINCS Sample Value(s):

5863	[A reference to the lab-assigned test code appearing in the OBR-4 field of another OBR segment, indicating that the results of the test reported in that OBR segment generated the reflex test that is reported in this OBR Segment]

6.5. NTE - Notes and Comments Segment

The NTE segment is commonly used for sending notes and comments that accompany test-result data. Note that, depending on its position in the ORU message, this segment may be associated with an OBR segment or with an OBX segment.

6.5.1. NTE Segment Structure

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Set ID - NTE**	**4**	**SI**	**O**	**[0..1]**	**6.5.2**
2	Source of Comment	8	ID	X		
3	**Comment**	**65536**	**FT**	**RE**	**[0..*]**	**6.5.3**
4	**Comment Type**	**250**	**CE**	**O**	**[0..1]**	**6.5.4**

6.5.2. NTE-1 Set ID – NTE (SI)

HL7 Definition: This field may be used where multiple NTE segments are included in a message.

ELINCS Specification: This field is optional in the NTE segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the SI data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.5.3. NTE-3 Comment (FT)

HL7 Definition: This field contains the comment contained in the segment.

ELINCS Specification: This field should be populated if a relevant message needs to be communicated to users of the receiving system.

> **Note**: Although the NTE field is a flexible way to attach any text-based message to a lab result report, it is important that the NTE segment not be used to report the test result itself. For example, the NTE segment has sometimes been used to report "text-based" test results, such as the results of Pap smears or microbiology cultures. This use of the NTE segment is not in conformance with the ELINCS standard. Furthermore, it is not necessary to report text-based test results in this way. Note that the OBX segment (see Section 6.5.4) can accommodate any text-based reporting, since the Observation Value field (see Section6.6.6) can contain text strings up to 65,000 characters long. The Comment field in the NTE segment should be reserved for *meta results* only, such as the reason that a test could not be completed or information regarding the methodology of a test or the limitations of its interpretation.

6.5.4. NTE-4 Comment Type (CE)

HL7 Definition: This field contains a coded value to identify the type of comment text being sent in the specific comment record.

ELINCS Specification: This field is optional in the NTE segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the CE data type, but the coding system and allowed values are not specified by HL7.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.6. OBX - Observation/Result Segment

The OBX segment is used to transmit a single lab-result value. It represents the smallest indivisible unit of a laboratory report. When the results of laboratory panels are reported, the ordered panel is typically reported in the OBR segment, and the results of each test performed in the panel are reported as individual OBX segments "nested" beneath the OBR segment. When the results of individually ordered tests are reported, there is a single OBX segment for each OBR segment.

Note that no single data type is assigned to the Observation Value field in an OBX segment (see Section6.6.6), because different data types may be used to report the results of different tests. For example, a serum sodium result may be reported using a numeric data type (NM), whereas a Pap smear result may be reported using a free text data type (TX). The data type that actually appears in the Observation Value field is indicated on a case-by-case basis in the Value Type field (see Section 0).

Also note that the LOINC coding system must be used as the coding system in the Observation Identifier field *for certain lab tests*. The list of tests that require LOINC coding is listed in Appendix A.

6.6.1. OBX Segment Structure

HL7 Attribute Table – OBX – Observation/Result

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Set ID - OBX**		**4**	**SI**	**O**	**[0..1]**	**6.6.2**
2	**Value Type**		**2**	**ID**	**C**	**[0..1]**	**6.6.3**
3	**Observation Identifier**	**[CLIA]**	**250**	**CE**	**R**	**[1..1]**	**6.6.4**
4	**Observation Sub-ID**		**20**	**ST**	**C**	**[0..1]**	**6.6.5**
5	**Observation Value**	**[CLIA]**	**65536**[2]	*****	**C**	**[0..*]**	**6.6.6**
6	**Units**	**[CLIA]**	**250**	**CE**	**RE**	**[0..1]**	**6.6.7**
7	**References Range**	**[CLIA]**	**60**	**ST**	**RE**	**[0..1]**	**6.6.8**
8	**Abnormal Flags**	**[CLIA]**	**5**	**IS**	**RE**	**[0..5]**	**6.6.9**
9	Probability		5	NM	X	[0..0]	
10	Nature of Abnormal Test		2	ID	X	[0..0]	
11	**Observation Result Status**	**[CLIA]**	**1**	**ID**	**R**	**[1..1]]**	**6.6.10**
12	Date Last Observation Normal Value		26	TS	X	[0..0]	
13	User Defined Access Checks		20	ST	X	[0..0]	

[2] The length of the observation field is variable, depending upon value type. See *OBX-2 value type*.

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
14	Date/Time of the Observation		26	TS	X	[0..0]	
15	**Producer's ID**	**[CLIA]**	**250**	**CE**	**R**	**[1..1]**	**6.6.11**
16	**Responsible Observer**		**250**	**XCN**	**RE**	**[0..*]**	**6.6.12**
17	Observation Method		250	CE	X	[0..0]	
18	Equipment Instance Identifier		22	EI	X	[0..0]	
19	**Date/Time of the Analysis**		**26**	**TS**	**RE**	**[0..1]**	**6.6.13**

6.6.2. OBX-1 Set ID – OBX (SI)

HL7 Definition: This field may be used where multiple OBX segments are included in a message.

ELINCS Specification: This field is optional in the OBX segment of MT-ORU-1, MT-ORU-2 and MT-ORU-3 messages. If populated, its content should conform to the SI data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

6.6.3. OBX-2 Value type (ID)

HL7 Definition: This field contains the format of the observation value in OBX. It must be valued if OBX-11 Observation Result Status is not valued with an 'X". If the value type is CE then the result must be a coded entry. When the value type is TX or FT then the results are bulk text. The valid values for the value type of an observation are listed in Table 0125 in Appendix C.

The observation value must be represented according to the format for the specified data type, as defined in the HL7 standard.

Although NM is a valid type, observations which are usually reported as numbers will sometimes have the SN (structured numeric) data type because non-numeric characters are often reported as part of the result, e.g., >300 to indicate the result was off-scale for the instrument.

TX should **not** be used except to send large amounts of text. In the TX data type, the repeat delimiter can only be used to identify paragraph breaks. Use ST to send short, and possibly encodable, text strings.

ELINCS Specification: Although HL7 allows the use of most data types in OBX segments (see Table 0125 in Appendix C), ELINCS allows only a subset of HL7 data types are relevant for reporting laboratory results. This subset includes:

CE	Coded Element
NM	Numeric
SN	Structured Numeric
ST	String Data
TX	Text Data
FT	Formatted text

These entries are boldfaced in Table 0125 . See the HL7 documentation for details about the structure of each data type.

Condition: This *OBX-2 Value type* must be valued if OBX-11 Observation Result Status is not valued with an "X" (i.e., if the OBX segment is not communicating a cancelled test component).

6.6.4. OBX-3 Observation identifier (CE)

HL7 Definition: This field contains a unique identifier for the observation (i.e., the individual test for which the result is reported in this OBX segment). The format is that of the Coded Element (CE). Example: 8625-6^P-R interval^LN.

```
CE Components: <identifier (ST)> ^ <text (ST)> ^ <name of coding system
               (IS)> ^ <alternate identifier (ST)> ^ <alternate text
               (ST)> ^ <name of alternate coding system (IS)>
```

ELINCS Specification: For the tests listed in Appendix A, the LOINC coding system *must* be used to represent the observation (analyte) reported. In these cases, the LOINC code for the reported analyte must appear in the 1st, 2nd, and 3rd components of OBX-3. For tests that are not listed in Appendix A, LOINC codes need not be reported in OBX-3 and the first three components of the field may be left blank. However, LOINC codes *may* be reported for any tests and their use is encouraged. In any case, *the first three components of OBX-3 are reserved for LOINC codes only*.

Note: The complete set of LOINC codes and associated documentation may be obtained from www.loinc.org.

For all tests, the 4th, 5th, and 6th components of OBX-3 must be populated with the laboratory's internal codes for the reported analytes. In most cases, the lab's internal codes will be its proprietary codes for analytes, but this is not necessarily the case, and the nature of these codes is outside the purview of the ELINCS specification.

Note: The labs' internal codes are required even when LOINC codes are reported. This is to provide backward compatibility with result data that was received prior to the adoption of the ELINCS specification.

CLIA: The EHR system must include the identifier and name of the analyte reported on the report of each lab result. CLIA reference: 493.1291(c)(4).

Field: OBX-3 Observation Identifier

Component/Sub-Component		Usage
identifier (ST)		RE
text (ST)		RE
name of coding system (IS)		RE
alternate identifier (ST)	**[CLIA]**	R
alternate text (ST)	**[CLIA]**	R
name of alternate coding system (IS)		R

ELINCS Sample Values:

`2089-1^LDL Cholesterol^LN^576X^LDL Chol^99Lab`

[LOINC code for LDL Cholesterol, plus the lab's internal code; note that LDL Cholesterol appears among the tests listed in Appendix A.]

`^^^7564ZZ^Hep B SAg^99Lab`

[Lab's internal code for Hep B surface antigen, coded per lab's proprietary coding system; note that Hep. B surface antigen does not appear among the tests listed in Appendix A.]

6.6.5. OBX-4 Observation Sub-ID (ST)

HL7 Definition: This field is used to distinguish between multiple OBX segments with the same observation ID organized under one OBR.

ELINCS Specification: This field is optional in the OBX segment of ELINCS messages, *except* in the reporting of microbiology culture results, in which case the field is required (see Appendix B, Section B.1.4). If populated, the contents of this field should conform to the ST data type.

Condition: If the test (OBR) reports the results of a microbiology culture, then the Observation Sub-ID of each related OBX segment must be populated (unless OBX-11. In all other cases, the usage of OBR-4 is optional (i.e., the field may be populated, but need not be). When populated, the value of OBX-4 must be assigned per the explanation and example in Appendix B Section B.1.4.

Note: Within any OBR segment, each OBX segment must have a unique combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values. See Section B.1.4 for more information. Note that, if OBX-4 is not populated (i.e., no value exists), the value of OBX-3 must be unique in each OBX segment.

For tests other than microbiology cultures, OBX-4 is optional. Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems. In general, receiving systems should not expect this field to be populated by conformant sending systems (except for cultures), and sending systems should not expect this field to be processed by conformant receiving systems.

6.6.6. OBX-5 Observation value (*)

HL7 Definition: This field contains the value (test result) observed by the sender (laboratory). An observation value is always represented as the data type specified in OBX-2 Value Type of the same OBX segment.

Each logically independent observation should be reported in a separate OBX segment, i.e. one OBX segment should not contain the **result** of more than one logically independent observation. This requirement is included to assure that the contents of OBX Units and OBX-8 Abnormal Flags can be reported correctly. An electrolytes battery consisting of sodium, potassium, chloride, and bicarbonate, for example, would be reported as four separate OBX segments. Similarly, two bacterial organisms isolated in a single bacterial culture would be reported as two separate OBX segments.

ELINCS Specification: The Observation Value must be reported using one the allowed value types for the observation, as specified in OBX-2 Value Type. For example, an LDL cholesterol may reported as a numeric (NM) value type if a precise result is known (such as “90”), or it may be reported as a structured numeric (SN) value type if the result is beyond the limits of the measuring instrument (such as “> 500”). Also, for a Hemoccult test, the result may be reported as a string (ST) data type, implying that any alphanumeric characters and free text may appear in the value. In any case, the format of the value reported in OBX-5 Observation value must be consistent with the value type specified in OBX-2 Value Type.

CLIA: If the Observation Value field is populated in the OBX segment, the EHR system must include the value of this field on the reports of lab results. CLIA reference: §493.1291 (c)(6).

Condition: *OBX-5 Observation value* must be valued if OBX-2 Value type is valued.

ELINCS Sample Value(s):

`7.3`	[Numeric (NM) value type]

```
>^100              [Structured Numeric (SN) value type]
^3^+               [Structured Numeric (SN) value type]
Straw colored      [String data (ST) value type]
```

6.6.7. OBX-6 Units (CE)

HL7 Definition: When an observation's value is measured on a continuous scale, one must report the measurement units within the Units field of the OBX segment. Since HL7 Version 2.2 of the specification, all fields that contain units are of data type CE.

```
CE Components: <identifier (ST)> ^ <text (ST)> ^ <name of coding system
               (IS)> ^ <alternate identifier (ST)> ^ <alternate text
               (ST)> ^ <name of alternate coding system (IS)>
```

ELINCS Specification: This field should be populated when the result is numeric, when units apply, and when the sending application is aware of the units that apply.

When this field is populated, the 1st component (identifier) must represent the units of measure using the *Unified Code for Units of Measure* (UCUM) coding system (see aurora.regenstrief.org/UCUM and sample UCUM codes below). UCUM provides a set of primitives (such as "g" for gram, "L" for liter, and "m" for milli) and a formal language for constructing any unit-of-measure code in a unique way (such as "mg/dL"). A table of UCUM codes for units of measure commonly used in clinical laboratory reporting may be found at <a TBD url>. The codes for units of measure that do not appear in this table must be constructed per the formal UCUM expression language. **Note:** UCUM codes are case sensitive.

The 2nd component (text) must contain a human-readable representation of the units of measure. Laboratories must populate the second component based on the assumption that receiving systems may display only this representation of units to end users (for example, the value should be consistent with JCAHO guidelines for "do not use" abbreviations – see www.jcaho.org/).

The 3rd component (name of coding system) must be hard-coded to the value "UCUM" to designate that the identifier is a UCUM code.

The 4th through 6th components may be optionally populated with an alternative representation for the units of measure (such as the lab's proprietary code or abbreviation).

Note: When units apply to a test results, the units must be placed in *OBX-6 Units* field, and not included with the numeric result in *OBX-5 Observation Value* field. The inclusion of units in OBX-5 is not consistent with the ELINCS specification.

CLIA: If the Units field is populated in the OBX segment, the EHR system must include the value of the field on the report for this result. CLIA reference: §493.1291 (c)(6).

Field: OBX-6 Units (CE)

Component/Sub-Component	Usage
identifier (ST)	R
text (ST) **[CLIA]**	R
name of coding system (IS)	R
alternate identifier (ST)	O
alternate text (ST)	O
name of alternate coding system (IS)	O

ELINCS Sample Value(s):

```
ug/dL^mcg/dL^UCM
           [UCUM designation for a mass concentration,
            with a JCAHO-compliant description in the 2nd
            component of the field]

%^%^UCM^PCT^%^99qst

           [UCUM designation for "percent" in the first 3
           fields, and the lab-specific representation in
           the last 3 fields]
```

Sample UCUM codes for common units of measure:

UCUM Code	Unit of Measure
%	Percent
%{OfLymphocytes}	PercentOfLymphocytes
ug/g	MicroGramsPerGram
mL/dL	MilliLitersPerDeciLiter
[iU]	InternationalUnit
/mg	PerMilliGram
umol/mg	MicroMolesPerMilliGram
meq/g	MilliEquivalentsPerGram
mg/dL	MilliGramsPerDeciLiter
mmol/dL	MilliMolesPerDeciLiter
[pH]	pH
mL/(24.h)	MilliLitersPer24Hour
[ppm]	PartsPerMillion

6.6.8. OBX-7 References range (ST)

HL7 Definition:

For numeric values, the suggested format of reference ranges are:

a) lower limit-upper limit (when both lower and upper limits are defined; e.g., for potassium: 3.5 - 4.5)
b) > lower limit (if no upper limit, e.g., >10)
c) < upper limit (if no lower limit, e.g., <15)

Text (alphabetical) values: the normal value may be reported in this location; for example, "Negative".

ELINCS Specification: This field should be populated when the lab system is aware of the reference range for the reported tests. Reference Range is technically a String-valued field. As such, the formats specified in the HL7 definition above are suggestions only. Therefore, values may be reported in this field in any format that is consistent with the String data type. No assumptions are made about the structure of values in this field, or whether units are included or not.

Note: If the test result is numeric and units are not included in the Reference Range field, then the units that apply to the reference range must be the same as those reported in the Units field.

CLIA: If the Reference Range field is populated in the OBX segment, the EHR system must include the value of the field on the report for this result. CLIA reference: §493.1291 (d).

ELINCS Sample Value(s):

```
< 6.0
< 6.0 mg/dl
3.5 – 4.5
< 1:100
```

6.6.9. OBX-8 Abnormal flags (IS)

HL7 Definition: This field contains a table lookup indicating the normalcy status of the result. We strongly recommend sending this value when applicable.

ELINCS Specification: This field should be populated when the lab system is aware of the relevant data for a test. When this field is populated, the values must be coded per the allowable values in Table 0078 in Appendix C.

Note: Information regarding the normalcy of numeric test results must appear only in *OBX-8 Abnormal flags* and should not be placed in *OBX-5 Observation Value*.

CLIA: If the Abnormal Flags field is populated in the OBX segment, the EHR system must include the value of the field on the report for this result. CLIA reference: §493.1291 (c)(6).

6.6.10. OBX-11 Observation result status (ID)

The usage of this field depends on the specific interaction and message type in which it appears. See the sub-sections below for details.

HL7 Definition: This field reflects the current completion status of the results for one Observation Identifier (i.e., the data in one OBX segment).

ELINCS Specification: The complete set of allowed values for this field appears in Table 0085 in Appendix C. The allowed values for specific interactions and message types appear in the sub-sections below. Note that only the values listed in each sub-section may appear in instances of the indicated message types. For example, only the values P, F, or X may appear in this field in messages formatted per the MT-ORU-2 message type (the applicable message type is indicated by the value of MSH-21 Conformance statement ID in each ELINCS message instance).

CLIA: The EHR system must include a suitable representation of the Observation Result Status on the report for this result if an analyte was cancelled (status = “X”) or previously reported results were corrected or deleted (status = “C” or “D”). CLIA reference §493.1291 (c)(7) and §493.1291 (k)(1, 2).

6.6.10.1. OBX-11 in Message Type MT-ORU-1 (Result Status interaction)

No OBX segments appear in this message type. The value of OBX-11 Observation result status does not apply.

6.6.10.2. OBX-11 in Message Type MT-ORU-2 (Result Available interaction)

The following values should be assigned by the sending system for the following trigger events:

Trigger Event	Correct Value of Observation Result Status
Preliminary results available	**P**
Final results available	**F**
Partial Cancellation*	**X**

* In messages in which reported results appear along with cancelled analytes, the OBX segments for the cancelled analytes should have an Observation Result Value of **X**, and the OBX segments for the reported analytes should have the appropriate Observation Result Values (i.e., either **P** or **F)**.

6.6.10.3. OBX-11 in Message Type MT-ORU-3 (Result Correction interaction)

The following values should be assigned by the sending system for the following trigger events:

Trigger Event	Correct Value of Result Status
Corrections to previously reported results	**C**
Deletions of previously reported results*	**D**

* The semantics of the **D** flag is: The previously reported result was incorrect (for example, because the wrong value was sent or because the result sent was for the wrong patient). No corrected result is currently available, although a corrected result may be sent in the future.

Note: Normal progression of results through intermediate (e.g., 'gram positive cocci') to final (e.g., 'staphylococcus aureus') should NOT be transmitted as **C** (correction); they should be transmitted as **P** (preliminary) until they are final.

6.6.11. OBX-15 Producer ID (CE)

HL7 Definition: This field contains a unique identifier of the responsible producing service. It should be reported explicitly when the test results are produced at outside laboratories, for example. This information supports CLIA regulations in the US.

ELINCS Specification: This field specifies the laboratory that produced the test result described in the OBX segment. The disclosure of this information is a regulatory requirement of the Clinical Laboratory Improvement Amendments (CLIA reference §493.1291(c)(2) and §493.1291(i)(3)).

The first component of OBX-15 must contain a publicly registered identifier for the laboratory. For labs certified by CLIA, the CLIA identifier should be used. The third component specifies the coding system for this identifier, and its values must be drawn from Table - 0362 in Appendix C. When the CLIA identifier is reported, the value "L-CL" should be used in the third component.

The second component must contain the name, address, and medical director of the laboratory that produced the test result. This information must be structured into the following discrete elements:

Laboratory Name

Laboratory Address – Street
Laboratory Address – City
Laboratory Address – State
Laboratory Address – Zip Code
First and Last Name of Medical Director

The second component has the ST (string) data type, which may not contain any reserved characters, including the sub-component separator specified in MSH-2. Therefore, the discrete elements of the second component must be delimited with the escape sequence "\T\" (see sample values below).

CLIA: The EHR system must include the name, address, and medical director of the lab that produced the test result on the report of each result. CLIA reference §493.1291 (c)(2) and §493.1291 (i)(3).

Field: OBX-15 Producer ID (CE)

Component/Sub-Component	Usage
identifier (ST)	R
text (ST)	R
name of coding system (IS)	R
alternate identifier (ST)	X
alternate text (ST)	X
name of alternate coding system (IS)	X

ELINCS Sample Values:

```
10D0987432^AccuLabs\T\11636 Administration Ave.\T\St. Louis\T\MO
\T\63146\T\John Smith, MD^L-CL
```

[The CLIA identifier for the reporting laboratory, plus the name, address and medical director of that lab]

```
DOD1234567^Womack Med Ctr\T\456 Star Dr.\T\Ft. Bragg\T\NC
\T\28310\T\Ben Jones, MD^L-CP
```

[The CLIP identifier for the reporting laboratory, plus the name, address and medical director of that lab]

6.6.12. OBX-16 Responsible Observer (XCN)

HL7 Definition: When required, this field contains the identifier of the individual directly responsible for the observation (i.e., the person who either performed or verified it). In a laboratory, the observer is the technician who performed or verified the analysis.

```
Components: <ID number (ST)> ^ <family name (FN)> ^ <given name (ST)> ^
            <second or further given names or initials thereof (ST)> ^
            <suffix (e.g., JR or III) (ST)> ^ <prefix (e.g., DR) (ST)> ^
            <degree (e.g., MD) (IS)> ^ <source table (IS)> ^ <assigning
            authority (HD)> ^ <name type code (ID)>  ^ <identifier check
            digit (ST)> ^ <code identifying the check digit scheme
            employed (ID)> ^ <identifier type code (IS)> ^ <assigning
            facility (HD)> ^ <name representation code (ID)> ^ <name
            context (CE)> ^ <name validity range (DR)> ^ < name assembly
            order (ID)>
```

ELINCS Specification: Laboratories will populate this field when required to report the responsible observer. This is typically the case when human judgment is required to determine a result, such as for cytology or certain medical microbiology tests. The field is optional. If the field is populated, only the first and last name are required.

Receiver Responsibility: If the field is populated, the value(s) must be stored in the database and displayed with the result in the EHR application.

Field: OBX-16 Responsible Observer(XCN)

Component/Sub-Component	Usage
ID number (ST)	X
family name (FN)	R
family name (ST)	R
own family name prefix (ST)	X
own family name (ST)	X
family name prefix from partner/spouse (ST)	X
family name from partner/spouse (ST)	X
given name (ST)	R
second and further given names or initials thereof (ST)	O
suffix (e.g., JR or III) (ST)	O
prefix (e.g., DR) (ST)	O
degree (e.g., MD) (IS)	O
source table (IS)	X
assigning authority (HD)	X
name type code (ID)	X
identifier check digit (ST)	X
code identifying the check digit scheme employed (ID)	X
identifier type code (IS)	X
assigning facility (HD)	X
name representation code (ID)	X
name context (CE)	X
name validity range (DR)	X
name assembly order (ID)	X

6.6.13. OBX-19 Date/Time of Analysis (TS)

HL7 Definition: This field is used to transfer the time stamp associated with generation of the analytical result.

ELINCS Specification: This field contains the date/time at which the lab produced the result or correction that is reported in this OBX segment. If the date/time at which the lab produced the result or correction for an individual analyte (OBX) differs from the date/time at which the lab produced the results or corrections for an entire panel (i.e., OBR), the date/time for the individual analyte should be reported in this field. The date/time at which the lab produced the results or corrections for the entire panel should be reported in OBR-22 Results rpt/status chng - date/time.

If the lab produced the results for all of the analytes in a panel at the same time or if the test consists of only one analyte (i.e., the test is not a panel), then OBX-19 Date/Time of Analysis should not be populated. The relevant date/time should be reported in OBR-22 Results rpt/status chng - date/time only

If populated, this field must be reported to a precision of seconds and the time zone must be specified. The Degree of precision component is not supported.

Field: OBX-19 Date/time of Analysis (TS)

Component/Sub-Component	Usage
YYYYMMDDHHMMSS +/-ZZZZ	R
Degree of precision	X

7. Confirm Response Message Type (MT-ACK-1)

The confirm response message type (MT-ACK-1) used in the ELINCS Confirm Response Interaction (IN-5) is based on the HL7 v2.4 ACK message. The structure of the message and the contents of its segments as relevant to the IN-5 interaction are described below.

7.1. Message Structure

MT-ACK-1 Message Structure

Segment ID	Usage	Cardinality	Segment Name
MSH	R	[1..1]	Message Header
MSA	R	[1..1]	Message Acknowledgement
ERR	X	[0..0]	Error Segment

The ERR segment is not used, because the MT-ACK-1 message is intended to acknowledge *successful* receipt and storage of a result message only. The detailed error information that the ERR segment may contain, therefore, is not relevant. If the result receiver is capable of detecting and reporting detailed error information in the result messages that it receives, this information must be sent in a different message type whose structure and contents are outside the purview of the ELINCS specification.

7.2. MSH – Message Header Segment

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Field Separator	1	ST	R	[1..1]	7.2.1
2	Encoding Characters	4	ST	R	[1..1]	7.2.2
3	Sending Application	180	HD	O	[0..1]	7.2.3
4	Sending Facility	180	HD	O	[0..1]	7.2.4
5	Receiving Application	180	HD	O	[0..1]	7.2.5
6	Receiving Facility	180	HD	R	[1..1]	7.2.6
7	Date/Time Of Message	26	TS	R	[1..1]	7.2.7
8	Security	40	ST	X	[0..0]	
9	Message Type	13	CM	R	[1..1]	7.2.8
10	Message Control ID	20	ST	R	[1..1]	7.2.9
11	Processing ID	3	PT	R	[1..1]	7.2.10
12	Version ID	60	VID	R	[1..1]	7.2.11
13	Sequence Number	15	NM	X	[0..0]	
14	Continuation Pointer	180	ST	X	[0..0]	
15	Accept Acknowledgment Type	2	ID	X	[0..0]	
16	Application Acknowledgment Type	2	ID	X	[0..0]	
17	Country Code	3	ID	X	[0..0]	
18	Character Set	16	ID	X	[0..0]	
19	Principal Language Of Message	250	CE	X	[0..0]	
20	Alternate Character Set Handling Scheme	20	ID	X	[0..0]	
21	Conformance Statement ID	10	ID	R	[1..1]	7.2.12

7.2.1. MSH-1 Field separator (ST)

This field has the same definition as in the MSH segment of result messages. See Section 6.2.2.

7.2.2. MSH-2 Encoding characters (ST)

This field has the same definition as in the MSH segment of result messages. See Section 6.2.3.

7.2.3. MSH-4 Sending application (HD)

This field is optional in the MSH segment of MT-ACK-1 messages. If populated, its content should conform to the HD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

7.2.4. MSH-4 Sending facility (HD)

This field is optional in the MSH segment of MT-ACK-1 messages. If populated, its content should conform to the HD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

7.2.5. MSH-4 Receiving application (HD)

This field is optional in the MSH segment of MT-ACK-1 messages. If populated, its content should conform to the HD data type.

Sending and receiving systems may agree to populate and use this field in specific ways, but such agreements are outside the purview of the ELINCS specification and have no bearing on the conformance of sending or receiving systems.

7.2.6. MSH-4 Receiving facility (HD)

The content of this field should match the content of the *MSH-4 Sending Facility* field in the result message that is being acknowledged. See Section 6.2.4.

7.2.7. MSH-7 Date/time of message (TS)

This field has the same definition as in the MSH segment of result messages. See Section6.2.8.

7.2.8. MSH-9 Message type (CM)

HL7 Definition: This field contains the message type, trigger event, and the message structure ID for the message.

```
CM Components:  <message type (ID)> ^ <trigger event (ID)> ^ <message
                structure (ID)>
```

The allowed components of this field are listed in several tables maintained by HL7 (*HL7 Table 0076 - Message type*, *HL7 Table 0003 - Event type*, and *HL7 Table 0354 - Message structure*). Note: These tables are not listed in Appendix C. See the HL7 v2.4 standard specification for details.

ELINCS Specification: In the MT-ACK-1 message type, this field must be hard coded to the following value:

```
ACK^R01^ACK_R01
```

7.2.9. MSH-10 Message control ID (ST)

HL7 Definition: This field contains a number or other identifier that uniquely identifies the message.

ELINCS Specification: The sending system must assign an identifier for the message that is unique within the namespace of the sending facility and/or application.

Note that the value of this field is *not* a reference to the message that is being acknowledged. The Message control ID of the acknowledged message appears in MSA-2 Message Control ID.

7.2.10. MSH-11 Processing ID (PT)

This field has the same definition as in the MSH segment of result messages. See Section 6.2.11.

7.2.11. MSH-12 Version ID (VID)

This field has the same definition as in the MSH segment of result messages. See Section 6.2.12.

7.2.12. MSH-21 Conformance statement ID (ID)

HL7 Definition: Sites may use this field to assert adherence to a Conformance Statement published by HL7 or by a site. Conformance Statements contain detailed explanations of grammar, syntax, and usage for a particular message or set of messages.

ELINCS Specification: In the MT-ACK-1 message type, MSH-21 Conformance statement ID should be hard-coded to the following value:

ELINCS_MT-ACK-1_2.0

7.3. MSA – Message Acknowledgement Segment

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	**Acknowledgment Code**	**2**	**ID**	**R**	**[1..1]**	**7.3.1**
2	**Message Control ID**	**20**	**ST**	**R**	**[1..1]**	**7.3.2**
3	Text Message	80	ST	X	[0..0]	
4	Expected Sequence Number	15	NM	X	[0..0]]	
5	Delayed Acknowledgment Type	1	ID	X	[0..0]	
6	Error Condition	250	CE	X	[0..0]	

7.3.1. MSA-1 Acknowledgment code (ID)

HL7 Definition: This field contains the acknowledgment code, per the HL7 message processing rules. Refer to *HL7 Table 0008 - Acknowledgment code* for valid values (Note: Table 0008 does not appear in Appendix C).

In this table, the value "CA" corresponds to "Enhanced mode: Accept acknowledgment: Commit Accept." This value means that the receiving system has committed the message to safe storage in a manner that releases the sending system from the need to resend the message.

ELINCS Specification: In the Result Confirm Response interaction (IN-5), acknowledgement messages are intended to confirm specifically that a message has been received and committed to safe storage. Hence, the value of MSA-1 Acknowledgement Code in the MT-ACK-1 message type should be hard coded to:

CA

7.3.2. MSA-2 Message control ID (ST)

HL7 Definition: This field contains the message control ID of the message sent by the sending system. It allows the sending system to associate this response with the message for which it is intended.

ELINCS Specification: Note that the combination of the values in *MSA-2 Message Control ID* and *MSH-6 Receiving Facility* should be unique to the recipient of the acknowledgement message (i.e., the Order Fulfiller).

Appendix A: Tests Requiring LOINC Coding in OBX Segment

The following table lists the test analytes that must be identified using LOINC® codes[3] in the ELINCS version 1.0 specification (i.e., in the OBX-3 Observation Identifier field). The tests comprise common laboratory tests and lab tests required to calculate HEDIS measures. These tests were selected because they (1) represent the top 95% of laboratory tests performed by frequency (based on sample files provided by three sources in California) or (2) represent the tests that are most useful for quality-improvement programs related to HEDIS. A small but important subset of all tests was selected for ELINCS version 2.0 so that laboratories can perform the LOINC coding required for ELINCS compliance in a reasonable time frame.

Note: The set of test analytes in this table is the official set that requires LOINC coding for ELINCS version 2.0. Each test is defined with respect to the allowed values for its defining properties in the LOINC database. Note that the wildcard character ("*") indicates that any value is allowed for the indicated property. Please refer to www.elincs.org for the current set of LOINC codes that correspond to the test analytes as defined below.

The following defines each column in the table of this appendix.

Test Category: A high-level grouping of tests. This is not intended to represent the constituents of common "panels" (such as Cob's, basic metabolic or urinalysis panels), but simply to group test analytes for editing and browsing purposes. Tests associated with HEDIS measures are explicitly identified.

Test: This is the common test name for specific test analytes.

Test Desc: This gives more descriptive information regarding the test analytes.

Component: Allowed values for the LOINC *Component* part

System: Allowed values for the LOINC *System (Sample) Type* part

Time Aspect: Allowed values for the LOINC *Time Aspect* part

Property: Allowed values for the LOINC *Kind of Property* part

Scale Type: Allowed values for the LOINC *Type of Scale* part

Method: Allowed values for the LOINC *Type of Method* part

Sample LOINC Code(s): A subset of the LOINC codes that correspond to the named test analytes in column 2.

---

[3] Logical Observation Identifiers Names and Codes (LOINC) is a standard, non-proprietary coding system for laboratory tests and other clinical observations. LOINC codes uniquely identify tests based on a combination of their features, including the analyte being measured, the specimen being tested, and the test methodology being used. Over 25,000 LOINC codes exist for laboratory tests. See www.loinc.org for additional information.

Sample Values: This column simply shows some example values and units for the results of the indicated tests

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
Common blood cell count and differential WBC count analytes										
	BANDS	**Neutrophil bands, patient blood, quantitative**	NEUTROPHILS.BAND FORM	BLD	PT	NCNC	QN	*	26507-4. 30229-9, 763-3	1.14 K/uL
	BANDS %	**Neutrophil bands as percent of total leukocytes**	NEUTROPHILS.BAND FORM/100 LEUKOCYTES	BLD	PT	NFR	QN	*	26508-2, 35332-6, 764-1	7%
	BASOPHILS	**Basophils, patient blood quantitative**	BASOPHILS	BLD	PT	NCNC	QN	*	26444-0, 704-7, 705-4	0.1 K/uL
	BASOPHILS %	**Basophils as percent of total leukocytes**	BASOPHILS/100 LEUKOCYTES	BLD	PT	NFR	QN	*	30180-4, 706-2, 707-0	1%
	BLAST	**Lymphoblasts, patient blood, quantitative**	LYMPHOBLASTS	BLD	PT	NCNC	QN	*	33830-1, 35050-4	0.46 K/uL
	BLASTS %	**Lymphoblasts as percent of total leukocytes**	LYMPHOBLASTS/100 LEUKOCYTES	BLD	PT	NFR	QN	*	33831-9, 34922-5	4%
	EOSINOPHILS	**Eosinophils, patient blood quantitative**	EOSINOPHILS	BLD	PT	NCNC	QN	*	26449-9, 711-2, 712-0	0.1 K/uL
	EOSINOPHILS %	**Eosinphils as percent of total leukocytes**	EOSINOPHILS/100 LEUKOCYTES	BLD	PT	NFR	QN	*	26450-7, 713-8, 714-6	4%
	LYMPHOCYTES	**Lymphocytes, patient blood quantitative**	LYMPHOCYTES	BLD	PT	NCNC	QN	*	26474-7, 731-0, 30364-4, 732-8	3.1 K/uL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	LYMPHOCYTES %	**Lymphocytes as percent of total leukocytes**	LYMPHOCYTES/100 LEUKOCYTES	BLD	PT	NFR	QN	*	26478-8, 736-9, 30365-1, 737-7	19%
	MCH	**Erythrocyte Mean Corpuscular Hemoglobin, patient RBC, quantitative**	ERYTHROCYTE MEAN CORPUSCULAR HEMOGLOBIN	RBC	PT	ENTMASS	QN	*	785-6, 28539-5	32.6 pg
	MCHC	**Erythrocyte Mean Corpuscular Hemoglobin Concentration, patient RBC, quantitative**	ERYTHROCYTE MEAN CORPUSCULAR HEMOGLOBIN CONCENTRATION	RBC	PT	MCNC	QN	*	28540-3, 786-4	31.4 g/dL
	MCV	**Mean Corpuscular Volume, patient RBC, quantitative**	MEAN CORPUSCULAR VOLUME	RBC	PT	ENTVOL	QN	*	30428-7, 787-2	91 fL
	METAMYELOCYTE	**Metamyelocytes, patient blood quantitative**	METAMYELOCYTE	BLD	PT	NCNC	QN	*	30433-7, 739-3	4%
	MONOCYTES	**Monocytes, patient blood quantitative**	MONOCYTES	BLD	PT	NCNC	QN	*	743-5, 742-7, 26484-6	2.4 K/uL
	MONOCYTES %	**Monocytes as percent of total leukocytes**	MONOCYTES/100 LEUKOCYTES	BLD	PT	NFR	QN	*	744-3, 5905-5, 26485-3	3%
	MPV	**Mean Platelet Volume, patient blood quantitative**	PLATELET MEAN VOLUME	BLD	PT	ENTVOL	QN	*	28542-9, 32623-1, 776-5	9.23 fL
	MYELOCYTE	**Myelocytes, patient blood quantitative**	MYELOCYTES	BLD	PT	NCNC	QN	*	30446-9, 748-4	1%

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	NEUTROPHILS	**Neutrophils, patient blood quantitative**	NEUTROPHILS	BLD	PT	NCNC	QN	*	753-4, 751-8, 26499-4	1.5 K/uL
	NEUTROPHILS %	**Neutrophils as percent of total leukocytes**	NEUTROPHILS/100 LEUKOCYTES	BLD	PT	NFR	QN	*	23761-0, 770-8, 26511-6	53%
	NUCLEATED RBC'S	**Nucleated Erythrocytes, patient blood quantitative**	ERYTHROCYTES.NUCLEATED	BLD	PT	NCNC	QN	*	30392-5, 771-6, 772-4	/100 WBC
	PLATELETS	**Platelets, patient blood quantitative**	PLATELETS	BLD	PT	NCNC	QN	*	778-1, 777-3, 26515-7	400 K/uL
	PROMYELOCYTE	**Promyelocytes, patient blood quantitative**	PROMYELOCYTES	BLD	PT	NCNC	QN	*	26523-1, 780-7, 781-5	1%
	RBC	**Red Blood Cells (Erythrocytes), patient blood**	ERYTHROCYTES	BLD	PT	NCNC	QN	*	790-6, 789-8, 26453-1	4.41 M/uL
	RBC MORPHOLOGY	**Red Blood Cell (Erythrocytes) Morphology, patient blood**	ERYTHROCYTES, ERYTHROCYTE SHAPE, ERYTHROCYTE SIZE	BLD	PT	MORPH	NOM	*	18225-3,	1+, NORMAL
	RDW	**Erythrocyte Distribution Width, patient RBC quantitative**	ERYTHROCYTE DISTRIBUTION WIDTH	RBC	PT	RATIO, ENTVOL	QA	*	21000-5, 30384-2	11.2%
	SEGS	**Neutrophil Segments, patient blood quantitative**	NEUTROPHILS.SEGMENTED, NEUTROPHILS.HYPERSEGMENTED	BLD	PT	NCNC	QN	*	30451-9, 768-2	60.8
	WBC	**White Blood Cells (Leukocytes), patient blood quantitative**	LEUKOCYTES	BLD, BPU	PT	NCNC	QN	*	6690-2, 26464-8, 804-5	7.3 K/uL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
Common metabolic analytes								*		
	A/G RATIO	**Albumin/Globulin ratio**	ALBUMIN/GLOBULIN	SER, SER/PLAS	PT	MCRTO	QN	*	1759-0	1.5
	BUN/CREAT RATIO	**Urea Nitrogen/Creatinine ratio, patient serum/plasma, quantitative**	UREA NITROGEN/CREATININE	SER/PLAS	PT	MCRTO	QN	*	3097-3	13
	GLOBULIN (CALC)	**Globulin (calculated), patient urine quantitative**	GLOBULIN	UR	PT	MCNC	QN	*	14431-1	3.6
Common urinalysis analytes								*		
	BACTERIA	**Bacteria, urine**	BACTERIA	URNS	PT	ACNC, NARIC	ORD, QN	*	25145-4	4+, 30/HPF
	CASTS	**Casts, patient urine**	CASTS	URNS	PT	ACNC, NARIC	ORD, QN	*	24124-0	HYALINE CAST, 0-5
	EPITHELIAL	**Epithelial cells, patient urine quantitative**	EPITHELIAL CELLS, SQUAMOUS CELLS	URNS, UR	PT	NARIC, NCNC	QN	*	25157-9	11, <1, FEW
	LEUKOCYTE ESTERASE	**Leukocyte Esterase, patient urine quantitative**	LEUKOCYTE ESTERASE	UR	PT	ACNC	QN	*	5799-2	NEGATIVE
	URINE APPEARANCE	**Urine appearance, nominal**	APPEARANCE, CHARACTER, CLARITY, COLOR, ODOR	UR	PT	APER, TYPE	NOM	*	32167-9	CLOUDY
	URINE BILIRUBIN	**Bilirubin, patient urine quantitative**	BILIRUBIN	UR	PT	SCNC, MCNC, ACNC	QN, ORD	*	5770-3	NEGATIVE
	URINE BLOOD	**Blood, patient urine quantitative**	ERYTHROCYTES	UR, URNS	PT	ACNC, NCNC, NARIC	ORD, QN	*	20409-9	MEDERATE, 1+

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	URINE COMMENTS	**Comments, patient urine sediment narrative**	URINE SEDIMENT COMMENTS	URNS	PT	FIND	NAR	*	11279-7	URINE CULTURE NOT INDICATED
	URINE CRYSTALS	**Crystals, patient urine sediment, nominal**	CRYSTALS	URNS	PT	PRID	NOM	*	5782-8	NONE SEEN
	URINE HEMOGLOBIN	**Hemoglobin, patient urine, quantitative and ordinal**	HEMOGLOBIN	UR	PT	ACNC, MCNC	ORD, QN	*		NEGATIVE
	URINE KETONE	**Ketones, patient urine quantitative**	KETONES	UR	PT	ACNC, SCNC	ORD, QN	*	5797-6, 22702-5	NEGATIVE, 40 mg/dL
	URINE MUCOUS	**Mucous, patient urine sediment, quantitative and nominal**	MUCUS	URNS	PT	ACNC, NARIC	ORD, QN	*	8247-9, 28545-2	FEW
	URINE NITRITE	**Nitrite, patient urine quantitative**	NITRITE	UR	PT	ACNC, MCNC	ORD, QN	*	20407-3	NEGATIVE
	URINE PH	**PH, patient urine quantitative**	PH	UR	PT	SCNC	QN	*	5803-2	5.0
	URINE SPECIFIC GRAVITY	**Specific Gravity, patient urine quantitative**	SPECIFIC GRAVITY	UR	PT	RDEN	QN	*	5811-5	1.004, >1.03
	URINE UROBILINOGEN	**Urobilinogen, patient urine quantitative**	UROBILINOGEN	UR	PT	ACNC, MSCNC, MCNC	ORD, QN	*	5818-0, 19161-9, 20405-7, 34928-2	0.2 EU/dL, NORMAL
	URINE, WBC	**WBC, patient urine quantitative**	LEUKOCYTES	UR, URNS	PT	ACNC, NCNC, NARIC	ORD, QN	*	24122-4, 30405-5,	5-10, 100+
	URINE, YEAST	**Yeast, patient urine sediment, ordinal**	YEAST	URNS	PT	ACNC, NARIC	ORD, QN	*		NONE SEEN
Other common tests/assays								*		

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	AFP	**Alpha-Fetoprotein, patient serum quantitative**	ALPHA-1-FETOPROTEIN	SER	PT	SCNC, ACNC, MCNC	QN	*		
	ALBUMIN	**Albumin, patient serum/ plasma, quantitative**	ALBUMIN	SER/PLAS	PT	MCNC	QN	*	2862-1, 1751-7	4.6 g/dL
	ALKALINE PHOSPHATASE	**Alkaline Phosphatase, patient serum/ plasma, quantitative**	ALKALINE PHOSPHATASE	SER/PLAS, BLD	PT	CCNC	QN	*	6768-6	43 U/L
	ALT	**Transferase; alanine amino, patient serum/ plasma, quantitative**	ALANINE AMINOTRANSFERASE	SER/PLAS	PT	CCNC	QN	*	1742-6	24 U/L
	ALT/SGPT	**Alanine Amino Transferase: Aspartate Amino Transferase ratio, serum/plasma, quantitative**	ALANINE AMINOTRANSFERASE/ASPARTATE AMINOTRANSFERASE	SER/PLAS	PT	CCRTO	QN	*	16325-3	21
	AMOXICILLIN LEVEL	**Amoxicillin Level, patient serum/plasma quantitative**	AMOXICILLIN	SER/PLAS	PT	MCNC	QN	*		
	ANA	**Antinuclear Antibodies (ANA), patient body fluid, ordinal**	NUCLEAR AB	FLU	PT	ACNC	ORD, QN	*		BORDERLINE

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	ANA PATTERN	**Antinuclear Antibodies (ANA) Pattern, patient body fluid, nominal**	NUCLEAR AB PATTERN	FLU	PT	IMP	NOM	*		Homogeneous
	ANION GAP	**Anion gap, patient serum/plasma, quantitative**	ANION GAP	SER/PLAS	PT	SCNC	QN	*		7
	ANTIBODY SCREEN	**Indirect Antiglobulin/ Coombs' Test, patient serum/plasma ordinal**	INDIRECT ANTIGLOBULIN TEST	SER/PLAS	PT	ACNC	ORD	*		NEGATIVE
	AST	**Transferase; aspertate amino, patient serum/ plasma, quantitative**	ASPARTATE AMINOTRANSFERASE	SER/PLAS	PT	CCNC, ACNC	QN, ORD	*	27344-1	38 U/L
	AST/SGOT	**Aspartate Amino Transferase: Alanine Amino Transferase ratio, serum/plasma, quantitative**	ASPARTATE AMINOTRANSFERASE/ALANINE AMINOTRANSFERASE	SER/PLAS	PT	CCRTO	QN	*	1916-6	17
	BILIRUBIN, DIRECT	**Bilirubin direct, patient serum/plasma, quantitative**	BILIRUBIN.GLUCURONIDATED	SER/PLAS	PT	MCNC, SCNC	QN	*	1968-7, 14629-0	0.1 mg/dL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	BILIRUBIN, TOTAL	**Bilirubin total, patient serum/plasma, quantitative**	BILIRUBIN	SER/PLAS	PT	MCNC, SCNC	QN	*	1975-2, 14631-6	0.8 mg/dL
	BLOOD TYPE AND SCREEN, ANTIBODY	**Antibody Screen, patient serum/plasma ordinal**	ANTIBODY SCREEN	SER/PLAS	PT	ACNC	ORD	*		NEGATIVE
	BLOOD TYPE AND SCREEN, BLOOD TYPE	**ABO Group, patient**	ABO GROUP	BLD, BLD^BPU	PT	TYPE	NOM	*		GROUP B
	BLOOD TYPE AND SCREEN, ABO/RH	**RH Type, patient serum/plasma ordinal**	ABO+RH GROUP	BLD, SER/PLAS^BPU	PT	TYPE	NOM	*		Rh Im Glob
	BUN	**Urea Nitrogen patient serum/plasma, quantitative**	UREA NITROGEN	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*	14937-7, 3094-0	15 mg/dL
	CALCIUM	**Calcium, total patient blood quantitative**	**CALCIUM**	BLD, SER/PLAS	PT	ACNC, MCNC, SCNC	ORD, QN	*	17861-6, 2000-8	9.1 mg/dL
	CARBON DIOXIDE, TOTAL	**Carbon Dioxide (bicarbonate), patient blood quantitative**	CARBON DIOXIDE	BLD, SER/PLAS	PT	SCNC	QN	*	2028-9	27 mmol/L
	CD3 T CELLS	**CD3 T Cells, patient blood quantitative**	CD3	BLD, WBC	PT	ACNC, NCNC	QN	*		1700 x10E6/L
	CD3 T CELLS %	**CD3 T Cells – Percent of Cells, patient blood quantitative**	CELLS.CD3/100 CELLS	BLD	PT	NFR	QN	*		87%

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	CD4 T CELLS	**Helper T-Lymphocyte Marker CD4, patient blood quantitative**	CELLS.CD4	BLD, WBC	PT	ACNC, NCNC	QN	*		244 cmm
	CD4 T CELLS %	**Helper T-Lymphocyte Marker CD4 percent of cells, patient blood quantitative**	CELLS.CD4/100 CELLS	BLD	PT	NFR	QN	*		15%
	CD4/CD8 RATIO	**CD4/CD8 ratio, patient blood quantitative**	CELLS.CD4/CELLS.CD8	BLD	PT	NRTO	QN	*		0.95 RATIO
	CD8 T CELLS	**Helper T-Lymphocyte Marker CD8, patient blood quantitative**	CELLS.CD8	BLD, WBC	PT	ACNC, NCNC	QN	*		737 x10E6/L
	CD8 T CELLS %	**Helper T-Lymphocyte Marker CD8 percent of cells, patient blood quantitative**	CELLS.CD8/100 CELLS	BLD	PT	NFR	QN	*		68%
	CHLORIDE	**Chloride, patient blood quantitative**	CHLORIDE	BLD, SER/PLAS, XXX	PT	SCNC	QN	*	2075-0	99 mmol/L
	CHOL/HDL RATIO	**Total Cholesterol/HDL Cholesterol ratio, patient serum/plasma quantitative**	CHOLESTEROL.TOTAL/CHOLESTEROL.IN HDL	SER/PLAS	PT	MCRTO, PRCTL, SCRTO	QN	*	32309-7, 9830-1	3.2
	CREATINE KINASE	**Creatine Kinase, patient serum/plasma quantitative**	CREATINE KINASE	SER/PLAS	PT	CCNC	QN	*	2157-6	222 U/L

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	CREATININE	**Creatinine, patient blood quantitative**	CREATININE	BLD, SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*	38483-4	1.0 mg/dL
	CREATININE, URINE	**Creatinine, patient urine, quantitative**	CREATININE	UR	24H	MCNC, MSCNC, MRAT, MSRAT, SCNC, SRAT,	QN	*		1384 mg/period
	C-Reactive Protein	**C-Reactive Protein, patient serum/plasma/fluid, quantitative**	C REACTIVE PROTEIN	SER/PLAS	PT	MCNC	QN	*		8.2 mg/L
	ESR	**Erythrocyte Sedimentation Rate, patient blood quantitative**	ERYTHROCYTE SEDIMENTATION RATE	BLD	PT	VEL	QN	*		36 mm/hr
	ESR, WESTERGREN	**Erythrocyte Sedimentation Rate – Westergren nethod, patient blood quantitative**	ERYTHROCYTE SEDIMENTATION RATE	BLD	PT	VEL	QN	WESTERGREN	4537-7	15 mm/hr
	FERRITIN	**Ferritin, patient serum quantitative**	FERRITIN	SER	PT	MSCNC	QN	*	35209-6	3 ug/L
	FOLLICLE STIMULATING HORMONE	**Follitropin, patient serum/plasma quantitative**	FOLLITROPIN	SER/PLAS	PT	ACNC, MCNC, SCNC	QN	*	20433-9	43.0 mIU/mL
	GLUCOSE	**Glucose, patient blood quantitative**	GLUCOSE	BLD, BLDA, BLDC, BLDV	PT	ACNC, MCNC, SCNC	ORD, QN	*	2341-6, 5914-7, 2340-8, 14743-9, 32016-8, 2339-0, 15074-8	91 mg/dL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	GLUCOSE, FASTING	**Glucose, post fasting, patient plasma/serum, quantitative**	GLUCOSE^POST CFST	BLDC, BLDV	PT	MCNC, SCNC	QN	*		77 mg/dL
	N. GONORRHEA (Antigen?)	**Neisseria Gonorrhoeae, DNA Probe with Confirmation, endocervical or male urethral specimens, ordinal**	NEISSERIA GONORRHOEAE DNA	CVM, CVX, URTH	PT	ACNC	ORD	*		NEGATIVE
	H. PYLORI	**H Pylori Antigen, IGG, IGM, IGA**	HELICOBACTER PYLORI	STL, SER, SAL	PT	ACNC, TITR	ORD, QN	*	17780-8, 31843-6	
	HCG, TOTAL BETA	**Human Chorionic Gonadotropin (hCG), Beta Subunit, patient serum/CSF/Amniotic Fluid/ Urine qualitative**	CHORIOGONADOTROPIN.BETA SUBUNIT	AMN, CSF, FLU, SER, UR	PT	ACNC, MCNC, SCNC	ORD, QN	*		
	HEMOGLOBIN Does this belong in the CBC section?	**Blood count, hemoglobin**	HEMOGLOBIN	BLD, BLDA, BLDC, BLDMV	PT	ACNC, MCNC	ORD, QN	*	30350-3, 718-7	12.2 g/dL
	HEPATITIS A ANTIBODY, IgM	**Antibody to Hepatitis A Virus, IgM, patient serum quantitative**	HEPATITIS A VIRUS AB.IGM	SER	PT	ACNC	ORD, QN	*		Negative

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	HEPATITIS A ANTIBODY, Total	**Antibody to Hepatitis A Virus, Total, patient serum quantitative**	HEPATITIS A VIRUS AB	SER	PT	ACNC	ORD, QN	*		Negative
	HEPATITIS B SURFACE ANTIBODY	**Antibody to Hepatitis B Surface Antigen, patient serum quantitative**	HEPATITIS B VIRUS SURFACE AB	SER, SER^DONOR	PT	ACNC	ORD, QN	*		LESS THAN 2.0
	HEPATITIS B SURFACE ANTIGEN	**Hepatitis B Surface Antigen, patient serum quantitative**	HEPATITIS B VIRUS SURFACE AG	SER	PT	ACNC	ORD	*		Pos
	HEPATITIS B CORE Antibody, TOTAL	**Hepatitis B Virus Core Total, Patient Serum Quantitative**	HEPATITIS B VIRUS CORE AB	SER, SER^DONOR	PT	ACNC	ORD, QN	*		Neg
	HEPATITIS B CORE Antibody, IgM	**Hepatitis B Virus Core IgM, Patient Serum Quantitative**	HEPATITIS B VIRUS CORE AB.IGM	SER	PT	ACNC	ORD, QN	*		
	HEPATITIS B CORE Antibody, IgG	**Hepatitis B Virus Core IgG, Patient Serum Quantitative**	HEPATITIS B VIRUS CORE AB.IGG	SER	PT	ACNC	ORD, QN	*		
	HEPATITIS C ANTIBODY	**Antibody to Hepatitis C Virus, patient serum quantitative**	HEPATITIS C VIRUS AB	SER	PT	ACNC	ORD, QN	*		Neg

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	HIV-1 ANTIBODY SCREEN Is there a common method? See below "HIV-1 Antibody screen EIA"	**HIV-1 Antibodies Test With Confirmation, patient serum ordinal**	HIV 1 AB	SER	PT	ACNC	ORD, QN	*		NEGATIVE
	HIV-1 ANTIBODY SCREEN, EIA	**HIV-1 Antibodies Test With Confirmation by Elisa, patient serum/plasma ordinal**	HIV 1 AB	BLDC, SER	PT	ACNC	ORD, QN	EIA		
	HIV-1 RNA	**HIV-1 RNA (bDNA), patient plasma quantitative**	HIV 1 RNA	BLD, SER, SER/PLAS, PLAS	PT	ACNC, MCNC, NCNC	ORD, QN	*		< 75
	HIV-1 RNA BDNA, LOG	**HIV-1 Log Viral Load, patient plasma quantitative**	HIV 1 RNA	PLAS	PT	LNCNC	QN	*	29541-0, 29539-4	14,098
	HIV-2 ANTIBODY SCREEN	**HIV-2 Antibodies Test With Confirmation, patient serum ordinal**	HIV 2 AB	SER	PT	ACNC	ORD, QN	*	5225-8, 7919-4, 22358-6	Reactive
	HIV-2 ANTIBODY SCREEN, EIA	**HIV-2 Antibodies Test With Confirmation by Elisa, patient serum/plasma ordinal**	HIV 2 AB	SER	PT	ACNC	ORD	EIA	5224-1, 30361-0	
	IRON	**Iron, patient serum quantitative**	IRON	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*		135 ug/dL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	IRON, Saturation	**Iron Saturation, patient serum/plasma quantitative**	IRON SATURATION	SER/PLAS	PT	MCRTO, SCRTO	QN	*		43 PERCENT
	IRON, TIBC	**Total Iron Binding Capacity, patient serum quantitative**	IRON BINDING CAPACITY	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*		286 ug/dL
	LDH	**Lactic Acid Dehydrogenase, patient fluid quantitative**	LACTATE DEHYDROGENASE	FLU	PT	CCNC	QN	*		147 U/L
	LDL/HDL RISK RATIO	**LDL Cholesterol/HDL Cholesterol ratio, patient serum/plasma quantitative**	CHOLESTEROL.IN LDL/CHOLESTEROL.IN HDL	SER/PLAS	PT	MCRTO	QN	*	11054-4	3
	MAGNESIUM	**Magnesium, patient serum/plasma quantitative**	MAGNESIUM	BLD, SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	QN	*		2.0 mg/dL
	PARTIAL THROMBOPLASTIN							*	3173-2	
	PHOSPHORUS	**Inorganic Phosphate, patient blood quantitative**	PHOSPHATE	BLD, SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*		2.9 mg/dL
	POTASSIUM	**Potassium, patient serum quantitative**	POTASSIUM	BLD, BLDA, BLDC, BLDV, SER/PLAS	PT	SCNC	QN	*	22760-3, 2823-3	4.5 mmol/L
	PROGESTERONE	**Progesterone, patient serum/plasma quantitative**	PROGESTERONE	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*		30.2 ng/mL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	PROTEIN, TOTAL	**Total Protein, patient serum quantitative**	PROTEIN	SER/PLAS, PLAS	PT	MCNC, SCNC	QN	*	20577-3, 2885-2, 27258-3	7.4 g/dL
	PROTHROMBIN TIME/INTERNATIONAL NORMALIZED RATIO		COAGULATION TISSUE FACTOR INDUCED.INR	BLD	PT	RLTM	QN	*	34714-6,	
	PSA, FREE	**Prostate Specific Antigen - Free, patient serum/plasma quantitative**	PROSTATE SPECIFIC AG.FREE	SER/PLAS	PT	ACNC, MCNC, SCNC	QN	*		1.4 ng/mL
	PSA, TOTAL	**Prostate Specific Antigen - Total, patient serum/plasma quantitative**	PROSTATE SPECIFIC AG	SER/PLAS	PT	ACNC, MCNC, SCNC	QN	*		7.0 ng/mL
	RHEUMATOID FACTOR	**Rheumatoid factor, patient serum quantitative**	RHEUMATOID FACTOR	SER, SER/PLAS	PT	ACNC	ORD, QN	*	11572-5	< 14
	RUBELLA IgG SCREEN	**Rubella Antibodies IgG, patient serum quantitative and ordinal**	RUBELLA VIRUS AB.IGG	SER	PT	ACNC	ORD, QN	*		179.8 IU/mL
	SODIUM	**Sodium, patient serum/plasma quantitative**	SODIUM	BLD, BLDA, BLDC, BLDV, SER	PT	SCNC	QN	*	2951-2	140 mmol/L
	SODIUM, Volume	**Sodium 24 Hour Total Volume, patient urine quantitative**	SODIUM	UR	24H	SCNC, SRAT,	QN	*		138 mmol/L

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	SYPHILIS	**RPR, VDRL, Syphilis serology**	REAGIN AB	SER, SER^DONOR	PT	ACNC, TITR	ORD, QN	*	20507-0, 20508-8, 31147-2, 22464-2, 11084-1, 22462-6, 22461-8	NON-REACTIVE
	STREP GROUP B SCREEN	**Beta Strep Group B Antigen, patient urine/serum/ csf, ordinal (?? Ag test from throat specimen only??)**	STREPTOCOCCUS.BETA-HEMOLYTIC	GEN, THRT	PT	ACNC	ORD	*		beta Streptococcus not group A or B
	T3 UPTAKE	**Triiodothyronine/ Triiodothyronine Uptake Index patient serum/plasma quantitative**	THYROXINE/TRIIODOTHYRONINE UPTAKE INDEX	SER/PLAS	PT	MCRTO	QN	*	3028-8	29.7 %
	TSH, SERUM	**Thyroid Stimulating Hormone, patient serum/plasma quantitative**	THYROTROPIN	BLD, SER/PLAS	PT	ACNC, SCNC	QN	*	11580-8, 11579-0, 3016-3, 27975-2, 14297-6	1.51 mIU/L
	THYROXINE, FREE	**Thyroxine Free, patient serum/plasma quantitative**	THYROXINE.FREE	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*		0.65 ng/dL
	THYROXINE, TOTAL (T4)	**Thyroxine, patient serum/plasma quantitative**	THYROXINE	BLD, SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	QN	*		9.7 ug/dL

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	URIC Acid	**URATE, patient urine quantitative**	URATE	UR	24H	MCNC, MRAT, MSCNC, SUB, SCNC	QN	*		7.7 mg/dL
	URINE GLUCOSE	**Glucose, patient urine quantitative**	GLUCOSE	UR	PT	ACNC, MCNC, MFR, MRAT, SCNC	ORD, QN	*	22705-8	NEGATIVE, 3+
	VLDL	**VLDL Cholesterol, patient serum/plasma quantitative**	CHOLESTEROL.IN VLDL	SER/PLAS	PT	MCNC, MSCNC, SCNC	QN	*	25371-6, 2091-7, 13458-5	30 mg/dL
HEDIS: Comprehensive Diabetes Care								*		
	HgbA1c %	**Measures of blood hemoglobin A1c**	HEMOGLOBIN A1C/HEMOGLOBIN.TOTAL	BLD	PT	MFR	QN	*	4548-4, 4549-2, 17855-8, 17856-6	6%
	Urine Albumin	**Albumin, patient urine quantitative**	ALBUMIN	UR	PT, 24H	ACNC, MCNC, MRAT	ORD, QN	*	1753-3, 1754-1, 1755-8, 21059-1	25 g/dl
	Urine Albumin/Creatinine ratio	**Albumin/Creatinine ratio, patient urine quantitative**	ALBUMIN/CREATININE	UR	PT, 24H	ACNC, MCRTO, RATIO, SCRTO	ORD, QN	*	9318-7, 13705-9, 14585-4, 20621-9, 32294-1	25.6 ug/mg
	Urine Protein	**Protein, patient urine quantitative**	PROTEIN	UR	PT, 6H, 12H, 24H	ACNC, MCNC, MRAT, MASS	ORD, QN	*	2887-8, 2888-6, 2889-4, 12842-1, 18373-1, 21482-5, 26801-1, 27298-9, 32209-9, 32551-4, 35663-4	9 mg/dl
	Urine Protein/Creatinine ratio	**Protein/Creatinine ratio, patient urine quantitative**	PROTEIN/CREATININE	UR	PT, 24H	MCRTO, RATIO	QN	*	2890-2, 13801-6, 34366-5	not available

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	Urine Microalbumin	**Urine Microalbumin, patient urine, quantitative**	ALBUMIN	UR	PT, 24H	MCNC, MRAT	QN	*	11218-5, 14956-7, 14957-5, 30003-8	25 ug/ml
	Urine Microalbumin/ Creatinine ratio	**Urine Microalbumin / Creatinine ratio, patient urine, quantitative**	ALBUMIN/CREATININE	UR	PT, 24H	MCRTO, RATIO	QN	*	14958-3, 14959-1, 30000-4, 30001-2	25.6 ug/mg
HEDIS: Comprehensive Diabetes Care, Cholesterol Management after CV event								*		
	LDL-Cholesterol	**LDL Cholesterol, patient serum/plasma quantitative**	**CHOLESTEROL.IN LDL**	SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	QN	*	2089-1, 12773-8, 13457-7, 18261-8, 18262-6, 22748-8	90 mg/dl
	HDL-Cholesterol	**HDL Cholesterol, patient serum/plasma quantitative**	CHOLESTEROL.IN HDL	SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	QN	*	12772-0, 14646-4, 18263-4, 2085-9, 26015-8, 26016-6, 9832-7, 26017-4, 9833-5	60 mg/dl
	Total Cholesterol	**Total Cholesterol, patient serum/plasma quantitative**	CHOLESTEROL	BLD, SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	ORD, QN	*	14647-2, 2093-3, 32308-9	150 mg/dl
	Triglycerides	**Triglycerides, patient serum/plasma quantitative**	TRIGLYCERIDE, TRIGLYCERIDE^POST CFST	BLD, SER, SER/PLAS	PT	ACNC, MCNC, MSCNC, SCNC	ORD, QN	*	22731-4, 14927-8, 30524-3, 12951-0, 1644-4, 2571-8, 3048-6, 3043-7	100 mg/dl

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
HEDIS: Cervical cancer screening								*		
	Pap Smear	**Pap Smear (cytology)**	MICROSCOPIC OBSERVATION	CVX, CVX/VAG	PT	PRID	NOM, NAR	CYTO STAIN, CYTO STAIN.THIN PREP	10524-7, 18500-9, 19765-7,* 19766-5,*	TEXT MESSAGES
HEDIS: Colorectal Cancer Screening										
	Hemoccult (FOBT)	**Hemoglobin, patient stool nominal**	HEMOGLOBIN.GASTROINTESTINAL^4TH SPECIMEN	STL	PT	ACNC	ORD, QN	*	2335-8, 12503-9, 12504-7, 14563-1, 14564-9, 14565-6, 27396-1, 27401-9, 27925-7, 27926-5, 29771-3	Negative
HEDIS: Chlamydia Screening Measure										
	Chlamydia Trachomatis Culture	specimens include cervical swab, vaginal swab, and urine sediment	CHLAMYDIA TRACHOMATIS	CVX, GENV, URNS	PT	ACNC	ORD	*	6349-5, 14463-4, 14464-2, 14467-5	Text Result

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	Chlamydia Trachomatis Antigen Detection	specimens include cervical swab, vaginal swab, and urine sediment	CHLAMYDIA TRACHOMATIS AG	CVX, GENV, URNS	PT	ACNC	ORD	*	6354-5, 6355-2, 14470-9, 14471-7, 14474-1, 14509-4, 14510-2, 14513-6, 31771-9, 31772-7, 31775-0, 31777-6	< 1:16, ALARM
	Chlamydia Trachomatis DNA Probe	specimens include genital swab, genital fluid, cervical swab, cervical mucus, vaginal swab, and urethral swab	CHLAMYDIA TRACHOMATIS DNA	GEN, GENF, CVM, CVX, UR, URTH	PT	ACNC	ORD	*	6356-0, 6357-8, 16600-9, 16601-7, 20993-2, 21189-6, 21190-4, 21191-2, 21192-0, 21613-5, 23838-6,	NEGATIVE
	Chlamydia Trachomatis rRNA Probe	specimens include urine	CHLAMYDIA TRACHOMATIS RRNA	UR	PT	ACNC	ORD	*	4993-2, 16602-5	not available
	Chlamydia Species Culture		CHLAMYDIA SP IDENTIFIED	GEN	PT	PRID	NOM	*	557-9, 560-3	Text Result
	Chlamydia Species Antigen Detection	specimens include urine, genital swab, vaginal swab, peritoneal fluid, and conjunctiva	CHLAMYDIA SP AG	CNJT, GEN, GENV, PRT, UR	PT	ACNC	ORD	*	561-1, 6343-8, 6345-3, 6346-1, 6347-9, 16593-6, 31765-1, 32001-0, 32003-6, 32004-4, 32671-0	< 1:16, ALARM

Test Category	Test	Test Desc	Component	System	Time Aspect	Property	Scale Type	Method	Sample LOINC Code(s)	Sample Values
	Chlamydia Species DNA Probe	specimens include urine, genital swab, vaginal swab, cervical swab, and urethra swab	CHLAMYDIA SP DNA	CVX, GEN, GENV, SER, UR, URTH	PT	ACNC	ORD	*	32774-2, 34708-8, 35713-7, 35714-5, 35715-2, 35716-0, 35717-8, 35722-8, 35726-9, 35727-7, 35728-5, 35729-3, 35730-1	NEGATIVE

Legend:

System	
AMN	Amniotic fluid
BLD	Whole Blood
BLD^BPU	Blood – Blood Product Unit
BLDA	Blood Arterial
BLDC	Blood Capillary
BLDCO	Blood – Cord
BLDCO^FETUS	Blood – Cord Fetus
BLDCOA	Blood – Cord Arterial
BLDCOV	Blood – Cord Capillary
BLDMV	Blood Mixed Venous
BLDV	Blood Venous
CNJT	Conjunctiva
CSF	Cerberal Spinal Fluid
CVM	Cervical Mucus
CVX	Cervix
CVX/VAG	Cervix / Vaginal
FLU	Body Fluid, Unspecified
GEN	Genital
GENF	Genital Fluid
GENV	Genital Vaginal
PLAS	Plasma
PRT	Peritoneal Fluid / Ascites
RBC	Erythrocytes
SAL	Saliva
SER	Serum
SER/PLAS	Serum / Plasma
SER/PLAS.ULTRACENTRIFUGE	Serum / Plasma Ultracentrifuge
SER/PLAS^BPU	Serum / Plasma – Blood Prod. Unit
SER/PLAS^DONOR	Serum / Plasma – Donor
SER^DONOR	Serum – Donor
STL	STOOL
THRT	THROAT
UR	URINE
URNS	URINE SEDIMENT
URTH	URETHRA
WBC	

Scale Type	
DOC	Document
NAR	Narrative
NOM	Nominal
ORD	Ordinal
QN	Quantitative

Time Aspect	
6H	6 Hours Post Challenge
12H	12 Hours Post Challenge
24H	24 Hours Post Challenge
PT	Point
XXX	<Variable>

Property	
ACNC	Arbitrary Concentration
APER	Appearance
CCNC	Catalytic Concentration
CCRTO	Catalytic Concentration Ratio
ENTMASS	Entitic Mass
ENTVOL	Entitic Volume
FIND	Finding
IMP	Impression / Interpretation of study
LNCNC	Log Number Concentration
MASS	Mass
MCNC	Mass Concentration
MCNT	Mass Content
MCRTO	Mass Concentration Ratio
MFR	Mass Fraction
MORPH	Morphology
MRAT	Mass Rate
MSCNC	Substance Concentration
MSRAT	Substance Rate
NARIC	Number Areic (Number per Area)
NCNC	Number Concentration (count / vol)
NFR	Number Fraction
NRTO	Number Ratio
PRCTL	Percentile
PRID	Presence or Identity
RATIO	Ratios
RDEN	Relative Density
RLTM	Relative Time
SCNC	Substance Concentration
SCRTO	Substance Concentration Ratio
SUB	Susbstance Amount
TITR	Dilution Factor (Titer)
TYPE	Type
VEL	Velocity

Appendix B. Reporting of Culture Results and Antimicrobial Sensitivities

The effective reporting of culture results and antimicrobial sensitivities in the ELINCS specification requires that data across different OBR segments and OBX segments be appropriately associated (for example, to associate the correct antimicrobial sensitivity with the correct cultured organism when multiple organisms have grown). HL7 v2.4 provides specific mechanisms for such associations that do not apply in the reporting of most laboratory tests. Effective reporting of culture results and antimicrobial sensitivities also entails the specific use of LOINC and SNOMED codes, to uniformly identify results and support important decision-support functions related to the treatment of infectious diseases. The use of these codes also does not apply in the general case. This appendix, therefore, describes the requirements of ELINCS in the specific cases of reporting culture results and antimicrobial sensitivities. These requirements constitute more specific *extensions* to the requirements in the body of this document, although they do not otherwise supercede those requirements.

B.1 Culture Results

Culture results typically report the identify of cultured organisms and (sometimes) quantify the degree to which such organisms appear in the cultured specimen. ELINCS prescribes that such results be reported as described below.

B.1.1 Defining Culture Results

For purposes of the ELINCS specification, a “culture” is any microbiological test in which infectious organisms are identified and characterized by allowing the organisms present in a specimen to reproduce in predetermined media in laboratory. The cultured organisms may be bacteria, viruses, or parasites. The results of any such test must be reported according to the specification below.

B.1.2 An Example

The following example shows the preliminary results of a sputum culture that identified Staphylococcus aureus and Beta hemolytic Streptococcus A. The segments and fields are all encoded as specified in the body of this document, except those fields that are described in the sections below.

```
MSH|...
PID|...
OBR|1|ORD885-04A3X|5788475-04333^^57768-2^L-CL|5863^Spt Routine
    Cult^99Lab^5863^Spt Routine Cult^99Lab|||20050714|||||||
    20050715|SPT&Sputum&HL70070|1234567890^Good^Robert^^^^^^^^^^NPI
    ||||||200507181430-0800|||P<cr>
 OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN[1]|1[2]|
     3092008^Staphylococcus aureus^SCT[3]||A||P|…<cr>
 OBX|2|SN|564-5^Colony count^LN|1[2]|10,000-90,000||A||P|…<cr>
 OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN[1]|2[2]|413643004^Beta
     hemolytic Streptococcus A^SCT[3]||A||P|…<cr>
 OBX|4|SN|564-5^Colony count^LN|2[2]|<1,000||A||P|…<cr>
```

Superscript 1: OBX-3 Observation Identifier
Superscript 2: OBX-4 Observation Sub-ID
Superscript 3: OBX-5 Observation Value

B.1.3 OBX-3 Observation Identifier

For OBX segments in which a cultured organism is identified, an appropriate LOINC code must be used, i.e., a code with the component value of "MICROORGANISM IDENTIFIED". There are approximately 175 such LOINC codes in version 2.15 of the LOINC terminology, varying with respect to the method of culture and the specimen type.

ELINCS Sample Values:

```
600-7^MICROORGANISM IDENTIFIED:BLD:BLOOD CULTURE^LN
```

[LOINC code for organism identified in blood culture]

```
6460-0^MICROORGANISM IDENTIFIED:SPT:ROUTINE BACTERIAL CULTURE^LN
```

[LOINC code for organism identified in blood culture]

```
628-8^MICROORGANISM IDENTIFIED:TISS:ANAEROBIC CULTURE^LN
```

[LOINC code for organism identified in anaerobic tissue culture]

For OBX segments in which the colony count of a cultured organism is reported, an appropriate LOINC code must be used, i.e., a code with the component value of "COLONY COUNT". There are approximately 10 such LOINC codes in version 2.15 of the LOINC terminology.

ELINCS Sample Values:

```
564-5^COLONY COUNT:NUM:QN^LN
20774-6^COLONY COUNT:ACNC:QN^LN
```

For OBX segments that report any other aspect of a culture result, the coding of the Observation Identifier field is not specified by ELINCS. The laboratory may report such observations using its proprietary codes, LOINC codes, or any other coding system.

B.1.4 OBX-4 Observation Sub-ID

Each OBX segment that reports a culture result must have the Observation Sub-ID field populated. OBX segments that contain information pertaining to the same identified microorganism must be "grouped" via the same value in the Observation Sub-ID field. For example, the first two OBX segments in the example above contain information pertaining to the Staphylococcus Aureus organism identified in the sputum sample (in this case, the identity of that organism and its colony count). These OBX segments, therefore, both have the Observation Sub-ID value of "1". The second two OBX segments contain information pertaining to the Beta-hemolytic Streptococcus A organism, and both have the Observation Sub-ID value of "2".

Note: Even if only one OBX segment appears for each identified organism, the Observation Sub-ID field must be populated in these OBX segments, because the value of the Observation Sub-ID field is used to reference the appropriate OBX segment in subsequent reporting of antimicrobial sensitivities (See section B.2.5). Even in the case that only a single OBX segment is used to report a culture result, the Observation Sub-ID field must be populated, for the same reason. For example, if only one organism had been identified in the example above and no colony counts had been reported, the Observation Sub-ID field would still need to contain the value "1".

Note: Within any OBR segment, the OBX segments must be sequenced such that they are grouped by their Observation Sub-ID values. For example, in the culture result shown above, the OBX segments with the Observation Sub-ID value "1" all appear before the OBX segments with the Observation Sub-ID value "2". This sequencing ensures that culture results will be displayed to users correctly by EHR systems that display result details in the same sequence as they are received.

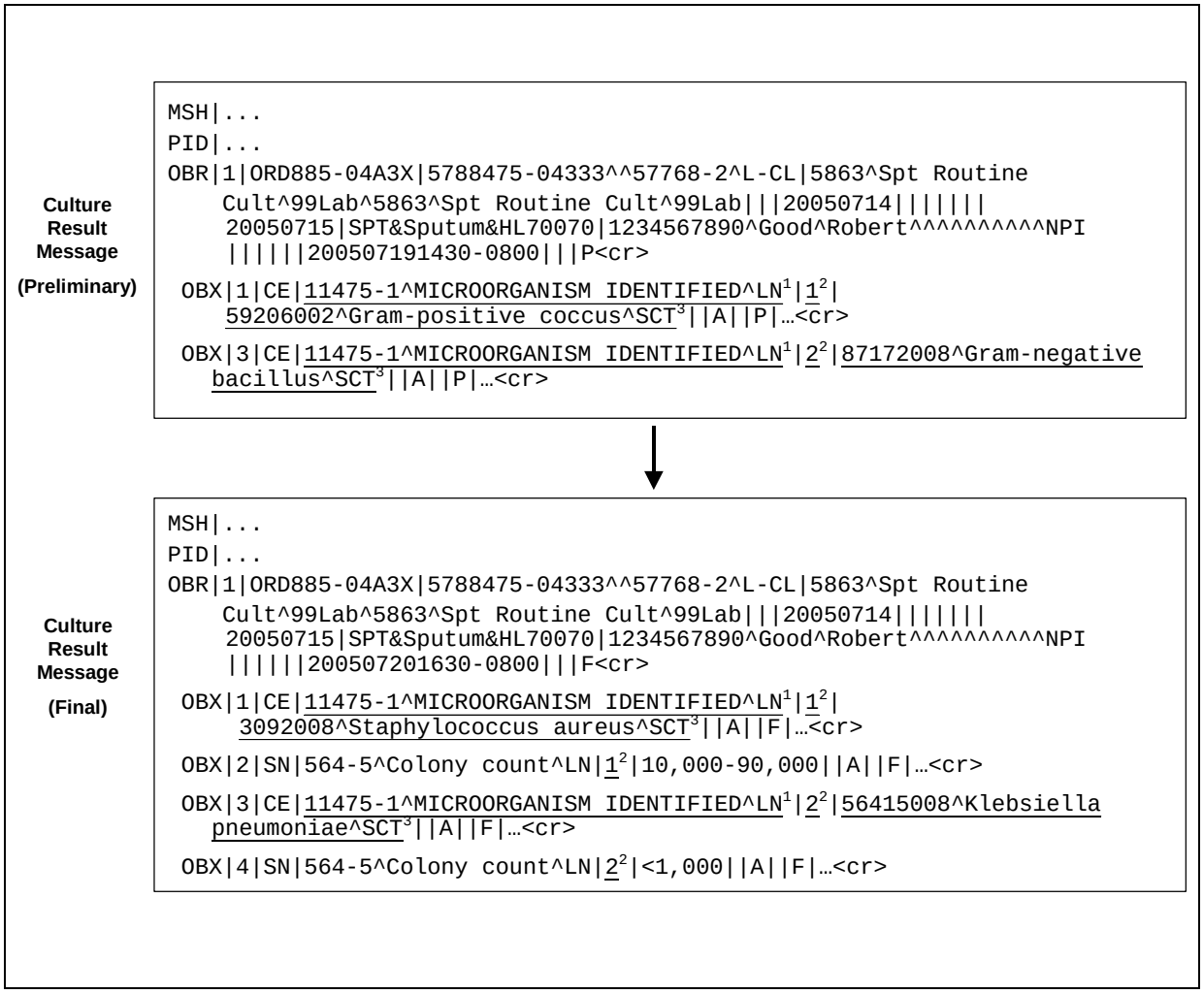
Note: Within any OBR segment, each OBX segment must have a unique combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values. Note that in the first and third OBX segments of the example above, the values of OBX-3 are the same ("11475-1^MICROORGANISM IDENTIFIED^LN"), necessitating that the values of OBX-4 are different ("1" and "2", respectively). The following would not be a valid ELINCS message, because OBX segments appear with duplicate combinations of OBX-3 and OBX-4 values:

INVALID:

```
MSH|...
PID|...
OBR|1|ORD885-04A3X|5788475-04333^^57768-2^L-CL|5863^Spt Routine
    Cult^99Lab^5863^Spt Routine Cult^99Lab|||20050714|||||||
    20050715|SPT&Sputum&HL70070|1234567890^Good^Robert^^^^^^^^^^NPI
    |||||200507181430-0800|||P<cr>
 OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN[1]|1[2]|
     3092008^Staphylococcus aureus^SCT||A||P|…<cr>
 OBX|2|SN|564-5^Colony count^LN[1]|1[2]|10,000-90,000||A||P|…<cr>
 OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN[1]|1[2]|413643004^Beta
     hemolytic Streptococcus A^SCT||A||P|…<cr>
 OBX|4|SN|564-5^Colony count^LN[1]|1[2]|<1,000||A||P|…<cr>
```

Superscript 1: OBX-3 Observation Identifier
Superscript 2: OBX-4 Observation Sub-ID

Note: When the results of a specific culture are sent more than once (for example, as a preliminary result and later as a final result), the combination of OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values for the identified organisms *must be the same in each result message that is sent*. This consistency allows the receiving EHR systems to correctly update the identified organisms as they are revised by the lab. The example below shows the preliminary and the (subsequently sent) final values of a sputum culture, with the OBX-3 (Observation Identifier) and OBX-4 (Observation Sub-ID) values maintained correctly.



Superscript 1: OBX-3 Observation Identifier
Superscript 2: OBX-4 Observation Sub-ID
Superscript 3: OBX-5 Observation Value

B.1.5 OBX-5 Observation Value

The value of each organism identified by a culture must be represented by a *coded entity* (CE data type) and the SNOMED CT terminology must be used to encode the organism. Specifically, the SNOMED CT concept ID must appear in the first component of OBX-5 and the coding system designator "SCT" must appear in the third component. The second component must be populated with an accurate text description of the organism identified, typically the preferred display term as assigned by the SNOMED CT terminology.

Note: The SNOMED CT terminology is available free of charge within the Unified Medical Language System (UMLS) Thesaurus of the National Library of Medicine. See www.nlm.nih.gov/research/umls.

Note: Only the Observation Value in the OBX that identifies an organism must be coded using the SNOMED CT terminology. The Observation Value for colony counts or other observations related to the culture may be represented in any reasonable way chosen by the laboratory.

ELINCS Sample Values:

```
3092008^Staphylococcus aureus^SCT
413643004^Beta hemolytic Streptococcus A^SCT
```

B.2 Antimicrobial Sensitivities

Antimicrobial *sensitivity* (or *susceptibility*) results report the sensitivity of cultured microorganisms to specific antibiotics, a standard part of medical microbiology and critical to the treatment of infectious diseases. The reporting of such tests in a uniformly structured and coded manner allows EHR systems to assist in the selection or assessment of antibiotic therapies, thereby promoting effective care and patient safety. The ELINCS specification, therefore, prescribes that such tests be reported as described below.

B.2.1 Defining Antimicrobial Sensitivities

For purposes of the ELINCS specification, an antimicrobial sensitivity test is any test that assesses the susceptibility of a microorganism previously identified via culture to one or more specific antibiotic medications. The results of such a test may indicate, for example, that the microorganism is "susceptible," "moderately susceptible," or "resistant" to a specific antibiotic. For any antimicrobial sensitivity tests, ELINCS requires that the results be reported according to the specification below.

B.2.2 An Example

The following example shows the final results of a sputum culture that identified Staphylococcus aureus and Beta hemolytic Streptococcus A, and the results of subsequent sensitivity testing on these organisms with respect to the antimicrobials Ampicillin and Amoxicillin/Clavulanate. Note that the sensitivity tests were performed as "reflex tests," i.e., they were initiated by the laboratory in response to the positive culture results. The segments and fields are all encoded as specified in the body of this document, except those fields that are described in the sections below and in Section B.1.

```
MSH|...
PID|...
```

Culture Result

```
OBR|1|ORD885-04A3X[1]|5788475-04333^^57768-2^L-CL[2]|5863^Spt Routine
    Cult^99Lab^5863^Spt Routine Cult^99Lab|||20050714|||||||
    20050715|SPT&Sputum&HL70070|1234567890^Good^Robert^^^^^^^^^^NPI
    ||||||200507191430-0800|||F<cr>
OBX|1|CE|11475-1^MICROORGANISM IDENTIFIED^LN|1|
     3092008^Staphylococcus aureus^SCT||A||F|…<cr>
OBX|2|SN|564-5^Colony count^LN|1[2]|10,000-90,000||A||F|…<cr>
OBX|3|CE|11475-1^MICROORGANISM IDENTIFIED^LN|2|413643004^Beta
     hemolytic Streptococcus A^SCT||A||F|…<cr>
OBX|4|SN|564-5^Colony count^LN|2[2]|<1,000||A||F|…<cr>
```

Sensitivity Result 1

```
OBR|2|ORD885-04A3X[1]|5788475-05772^^57768-2^L-CL[2]|6402^Bacterial Susc Panel
    Islt^99Lab|||20050714|||||||20050715|SPT&Sputum&HL70070|||||||
    200507191430-0800|||F|
    11475-1&MICROORGANISM IDENTIFIED&LN^1^Staphylococcus aureus[3]|||
    5863^Spt Routine Cult^99Lab[4]<cr>
OBX|1|NM|28-1^Ampicillin^LN[5]|1|32|µg/mL||R[6]<cr>
OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN[5]|1|2|µg/mL||S[6]<cr>
```

Sensitivity Result 2

```
OBR|3|ORD885-04A3X[1]|5788475-05773^^57768-2^L-CL[2]|6402^Bacterial Susc Panel
    Islt^99Lab|||20050714|||||||20050715|SPT&Sputum&HL70070|||||||
    200507191430-0800|||F|
    11475-1&MICROORGANISM IDENTIFIED&LN^2^Beta
    hemolytic Streptococcus A[3]|||5863^Spt Routine Cult^99Lab[4]<cr>
OBX|1|NM|28-1^Ampicillin^LN[5]|1|2|µg/mL||S[6]<cr>
OBX|2|NM|20-8^Amoxicillin+Clavulanate^LN[5]|1|2|µg/mL||S[6]<cr>
```

Superscript 1: OBR-2 Placer Order Number
Superscript 2: OBR-3 Filler Order Number
Superscript 3: OBR-26 Parent Result
Superscript 4: OBR-29 Parent
Superscript 5: OBX-4 Observation ID
Superscript 6: OBX-8 Abnormal Flags

B.2.3 OBR-2 Placer Order Number

The Placer Order Number in the sensitivity results must be the same as in the OBR of the culture result that spawned the sensitivity testing. Note that the Placer Order Number is the same for all of the OBR segments in the example, although the sensitivity results are "reflex tests" that were not explicitly ordered by the ordering provider.

B.2.4 OBR-3 Filler Order Number

The Filler Order Number is the unique lab-assigned identifier for the test. Note that the Filler order numbers for the susceptibility panels (sensitivity tests) may be different than the Filler Order Number of the culture that spawned the sensitivity testing, because many labs consider reflex tests as separate "internal" orders. For this reason, the Filler Order Number is not used to relate the OBR segment of sensitivity-testing result to the OBR segment of the culture result.

B.2.5 OBR-26 Parent Result

In the OBR segment of a sensitivity result, the value of the Parent Result field references the OBX segment for the identified organism that prompted the sensitivity testing. For example, the value in the Parent Result field of the first sensitivity result above is

11475-1&MICROORGANISM IDENTIFIED&LN^1^Staphylococcus aureus

which references the Observation ID (OBX-3), Observation Sub-ID (OBX-4), and the text component of the Observation Value (OBX-5.2) of the first OBX segment in the culture result. Note the following correspondence between the components and sub-components of OBR-26 Parent Result field in the sensitivity result and the fields and components of the corresponding OBX segment in the culture result:

Field: OBR-26 Parent Result (Sensitivity Result)

Component/Sub-Component in OBR-26	Usage	Referenced Field/Component in Parent OBX Segment
OBR-26.1 (1st component)	R	
OBR-26.1.1 (1st sub-component)	R	OBX-3.1 Observation Identifier.Identifier
OBR-26.1.2 (2nd sub-component)	R	OBX-3.2 Observation Identifier.Text
OBR-26.1.3 (3rd sub-component)	R	OBX-3.3 Observation Identifier.Name of Coding System
OBR-26.2 (2nd component)	R	OBX-4 Observation Sub-ID
OBR-26.3 (3rd component)	R	OBX-5.2 Observation Value.Text

Note: Because organisms identified in culture results must be reported as coded entities (see Section B.1.3), one can safely assume that OBX-5.2 of the parent result will be the text representation of a coded entity.

B.2.6 OBR-29 Parent

In the OBR segment of a sensitivity result, the Parent Result field references the OBR segment corresponding to the culture result that spawned the sensitivity testing. The relevant OBR segment is referenced via its Universal Service Identifier (OBR-4). For example, the values in the Parent field of the first and second sensitivity result above are

5863^Spt Routine Cult^99Lab4

which references the Universal Service ID in the OBR of the culture result. Note that the combination of the Placer Order Number and Universal Service ID uniquely identify the OBR of the culture result, and both of these values must appear in the OBR of the sensitivity result.

Note: This relationship between a susceptibility panel and the specific organism to which it applies is denoted via the combination of OBR-2 (Filler Order Number), OBR-26 (Parent), and OBR-29 (Parent Result), as described above. Note that the combination of values for these fields is different for Sensitivity Result 1 and Sensitivity Result 2 in the example of Section B.2.2.

CLIA: In the reporting of antimicrobial sensitivities, the EHR system must indicate to users the correct relationship between each tested antibiotic and the identified organism for which it was tested.

B.2.7 OBX-3 Observation Identifier

For sensitivity results, the Observation Identifier must be encoded using the LOINC terminology. Specifically, the value of the observation identifier must be one of the LOINC codes designated to identify antimicrobials tested within susceptibility panels, i.e. codes with a PROPERTY attribute of "SUSC". The LOINC coding system includes approximately 1100 such codes, which cover all antimicrobials that are typically assessed in microbiology sensitivity testing.

ELINCS Sample Values:

1-8^ ACYCLOVIR^LN
12-5^AMIKACIN:MIC^LN
193-3^CLINAMYCIN:MIC^LN
395-4^ PENICILLIN V:MLC^LN

B.2.8 OBX-5 Observation Value

For sensitivity results, the Observation Value field may be represented in whatever manner suits the laboratory and is consistent with conventional practice. The uniform coding of the Abnormal Flags field (see below) is more important for the automated processing of sensitivity results.

B.2.9 OBX-6 Units

When applicable, the Units field should be represented as in any other OBX segment.

B.2.10 OBX-8 Abnormal Flags

For sensitivity results, the value of the Abnormal Flags field must be one of the following values from Table 0078 in Appendix C:

Value	Description
S	Susceptible. Indicates for microbiology susceptibilities only.
R	Resistant. Indicates for microbiology susceptibilities only.
I	Intermediate. Indicates for microbiology susceptibilities only.
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.
VS	Very susceptible. Indicates for microbiology susceptibilities only.

Appendix C: Enumerated Value Tables

HL7 Table 0001 - Administrative sex

Value	Description
F	Female
M	Male
O	Other

HL7 Table 0038 - Order status

Value	Description
A	Some, but not all, results available
CA	Order was canceled
CM	Order is completed
DC	Order was discontinued
ER	Error, order not found
HD	Order is on hold
IP	In process, unspecified
RP	Order has been replaced
SC	In process, scheduled

HL7 Table 0065 - Specimen action code

Value	Description
A	Add ordered tests to the existing specimen
G	Generated order; reflex order
L	Lab obtained specimen from patient
O	Specimen obtained by service other than Lab

HL7 Table 0070 - Specimen source codes

Value	Description
ABS	Abscess
AMN	Amniotic fluid
ASP	Aspirate
BPH	Basophils
BIFL	Bile fluid
BLDA	Blood arterial
BBL	Blood bag
BLDC	Blood capillary
BPU	Blood product unit
BLDV	Blood venous
BON	Bone
BRTH	Breath (use EXHLD)
BRO	Bronchial
BRN	Burn
CALC	Calculus (=Stone)
CDM	Cardiac muscle
CNL	Cannula
CTP	Catheter tip
CSF	Cerebral spinal fluid
CVM	Cervical mucus
CVX	Cervix
COL	Colostrum
BLDCO	Cord blood
CNJT	Conjunctiva
CUR	Curettage
CYST	Cyst
DIAF	Dialysis fluid
DOSE	Dose med or substance
DRN	Drain
DUFL	Duodenal fluid
EAR	Ear

Value	Description
EARW	Ear wax (cerumen)
ELT	Electrode
ENDC	Endocardium
ENDM	Endometrium
EOS	Eosinophils
RBC	Erythrocytes
EYE	Eye
EXG	Exhaled gas (=breath)
FIB	Fibroblasts
FLT	Filter
FIST	Fistula
FLU	Body fluid, unsp
GAS	Gas
GAST	Gastric fluid/contents
GEN	Genital
GENC	Genital cervix
GENL	Genital lochia
GENV	Genital vaginal
HAR	Hair
IHG	Inhaled Gas
IT	Intubation tube
ISLT	Isolate
LAM	Lamella
WBC	Leukocytes
LN	Line
LNA	Line arterial
LNV	Line venous
LIQ	Liquid NOS
LYM	Lymphocytes
MAC	Macrophages
MAR	Marrow
MEC	Meconium

Value	Description
MBLD	Menstrual blood
MLK	Milk
MILK	Breast milk
NAIL	Nail
NOS	Nose (nasal passage)
ORH	Other
PAFL	Pancreatic fluid
PAT	Patient
PRT	Peritoneal fluid /ascites
PLC	Placenta
PLAS	Plasma
PLB	Plasma bag
PLR	Pleural fluid (thoracentesis fld)
PMN	Polymorphonuclear neutrophils
PPP	Platelet poor plasma
PRP	Platelet rich plasma
PUS	Pus
RT	Route of medicine
SAL	Saliva
SMN	Seminal fluid
SER	Serum
SKN	Skin
SKM	Skeletal muscle
SPRM	Spermatozoa
SPT	Sputum
SPTC	Sputum - coughed
SPTT	Sputum - tracheal aspirate
STON	Stone (use CALC)
STL	Stool = Fecal
SWT	Sweat
SNV	Synovial fluid (Joint fluid)
TEAR	Tears

Value	Description
THRT	Throat
THRB	Thrombocyte (platelet)
TISS	Tissue
TISG	Tissue gall bladder
TLGI	Tissue large intestine
TLNG	Tissue lung
TISPL	Tissue placenta
TSMI	Tissue small intestine
TISU	Tissue ulcer
TUB	Tube NOS
ULC	Ulcer
UMB	Umbilical blood
UMED	Unknown medicine
URTH	Urethra
UR	Urine
URC	Urine clean catch
URT	Urine catheter
URNS	Urine sediment
USUB	Unknown substance
VITF	Vitreous Fluid
VOM	Vomitus
BLD	Whole blood
BDY	Whole body
WAT	Water
WICK	Wick
WND	Wound
WNDA	Wound abscess
WNDE	Wound exudate
WNDD	Wound drainage
XXX	To be specified in another part of the message

User-defined Table 0078 - Abnormal flags

Value	Description
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)
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.
MS	Moderately susceptible. Indicates for microbiology susceptibilities only.
VS	Very susceptible. Indicates for microbiology susceptibilities only.

HL7 Table 0085 - Observation result status codes interpretation

Value	Description
C	**Record coming over is a correction and thus replaces a final result**
D	Deletes the OBX record
F	**Final results; Can only be changed with a corrected result.**
P	**Preliminary results**
X	**Results cannot be obtained for this observation**
U	Results status change to final without retransmitting results already sent as 'preliminary.' E.g., radiology changes status from preliminary to final
W	Post original as wrong, e.g., transmitted for wrong patient

HL7 Table 0123 - Result status for OBR segment

Value	Description
O	Order received; specimen not yet received
I	No results available; specimen received, procedure incomplete
S	No results available; procedure scheduled, but not done
A	Some, but not all, results available
P	Preliminary: A verified early result is available, final results not yet obtained
C	Correction to results
R	Results stored; not yet verified
F	Final results; results stored and verified. Can only be changed with a corrected result.
X	No results available; Order canceled.
Y	No order on record for this test. (Used only on queries)
Z	No record of this patient. (Used only on queries)

HL7 Table 0125 - Value type

Value	Description
AD	Address
CE	**Coded Entry**
CF	Coded Element With Formatted Values
CK	Composite ID With Check Digit
CN	Composite ID And Name

Value	Description
CP	Composite Price
CX	Extended Composite ID With Check Digit
DT	Date
ED	Encapsulated Data
FT	**Formatted Text (Display)**
MO	Money
NM	**Numeric**
PN	Person Name
RP	Reference Pointer
SN	**Structured Numeric**
ST	**String Data.**
TM	Time
TN	Telephone Number
TS	Time Stamp (Date & Time)
TX	**Text Data (Display)**
XAD	Extended Address
XCN	Extended Composite Name And Number For Persons
XON	Extended Composite Name And Number For Organizations
XPN	Extended Person Name
XTN	Extended Telecommunications Number

HL7 Table 0155 - Accept/application acknowledgment conditions

Value	Description
AL	Always
NE	Never
ER	Error/reject conditions only
SU	Successful completion only

HL7 Table 0190 – Address Type

Value	Description
B	Firm/Business
BA	Bad address
BDL	Birth delivery location (address where birth occurred)
BR	Residence at birth (home address at time of birth)
C	Current Or Temporary
F	Country Of Origin
H	**Home**
L	Legal Address
M	Mailing
N	Birth (nee) (birth address, not otherwise specified)
O	Office
P	Permanent
RH	Registry home. Refers to the information system, typically managed by a public health agency, that stores patient information such as immunization histories or cancer data, regardless of where the patient obtains services.

HL7 Table 0200 - Name type

Value	Description
A	Alias Name
B	Name at Birth
C	Adopted Name
D	Display Name
I	Licensing Name
L	Legal Name
M	Maiden Name
N	Nickname /"Call me" Name/Street Name
P	Name of Partner/Spouse (retained for backward compatibility only)
R	Registered Name (animals only)
S	Coded Pseudo-Name to ensure anonymity
T	Indigenous/Tribal/Community Name
U	Unspecified

HL7 Table 0203a - Identifier type (Provider)

Value	Description
EH	Electronic Health Record/Electronic Medical Record User ID
EI	Employee number
NPI	National provider identifier (as mandated by HIPAA)
SL	State license number
SS	Social Security number
U	Unspecified
UPIN	Medicare/HCFA's Universal Physician Identification numbers

HL7 Table 0203b - Identifier type (Patient)

Value	Description
AN	Account number
BR	Birth registry number
DL	Driver's license number
DR	Donor Registration Number
EI	Employee number
EL	**ELINCS Primary Patient Identifier**
EN	Employer number
FI	Facility ID
GI	Guarantor internal identifier
GN	Guarantor external identifier
HC	Health Card Number
LR	Local Registry ID
MA	Medicaid number
MC	Medicare number
MCN	Microchip Number
MR	Medical record number
NE	National employer identifier
NH	National Health Plan Identifier
NI	National unique individual identifier
NNxxx	National Person Identifier where the xxx is the ISO table 3166 3-character (alphabetic) country code
PEN	Pension Number

Value	Description
PI	Patient internal identifier
PN	Person number
PT	Patient external identifier
RR	Railroad Retirement number
RRI	Regional registry ID
SR	State registry ID
SS	Social Security number
U	Unspecified
VN	Visit number
WC	WIC identifier
WCN	Workers' Comp Number
XX	Organization identifier

HL7 Table 0203c - Identifier type (Copy-To Provider)

Value	Description
NPI	National provider identifier (as mandated by HIPAA)
UPIN	Medicare/HCFA's Universal Physician Identification numbers

User Defined Table 0396 – Coding Systems

Value	Description
99zzz	Local general code, where zzz is an alphanumeric character
C4	CPT-4
HPC	HCFA Procedure Codes (HCPCS)
I10P	ICD-10 Procedure Codes
I9C	ICD-9CM
LN	Logical Observation Identifier Names and Codes (LOINC(r))
SNM	Systematized Nomenclature of Medicine (SNOMED)
SNM2	SNOMED 2
SNM3	Snomed International (SNOMED 3)
SCT	Snomed CT

User Defined Table 0362 – Sending/Receiving Facility

Value	Description
L-CL	CLIA ID assigned per the Clinical Laboratory Improvement Amendments
L-CP	CLIP ID issued for DoD laboratories by Armed Forces Institute of Pathology

Appendix D. Summary View of Result Message Types

The following tables summarize the message structure and message segments for the three types of result message: Result Status (MT-ORU-1), Result Available (MT-ORU-2), and Result Correction (MT-ORU-3). Although Section 6 includes more detail about each field in the included segments, the representation below is more specific to each message type and more informative when implementing and conformance testing each message type. Note that the "Comment/Description" column in the Attribute Tables references the description of each field as it applies to the indicated message type (for example, see MSH-21 Conformance Statement ID).

C.1 Result Status (MT-ORU-1)

Message Structure for MT-ORU-1 Message Type

Segment ID	Usage	Cardinality	Segment Name
MSH	R	[1..1]	Message Header
{	R	[1..*]	Message Content Block
PID	R	[1..1]	Patient Identification
{	R	[1..*]	Test Order Block
OBR	R	[1..1]	Observations Report ID
{[NTE]}	RE	[0..*]	Notes and comments
}			
}			

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Field Separator	1	ST	R	[1..1]	6.2.2
2	Encoding Characters	4	ST	R	[1..1]	6.2.3
3	Sending Application	180	HD	O	[0..1]	6.2.4
4	Sending Facility	180	HD	R	[1..1]	6.2.5
5	Receiving Application	180	HD	O	[0..1]	6.2.6
6	Receiving Facility	180	HD	O	[0..1]	6.2.7
7	Date/Time Of Message	26	TS	R	[1..1]	6.2.6
9	Message Type	13	CM	R	[1..1]	6.2.9
10	Message Control ID	20	ST	R	[1..1]	6.2.10
11	Processing ID	3	PT	R	[1..1]	6.2.11
12	Version ID	60	VID	R	[1..1]	6.2.12
15	Accept Acknowledgment Type	2	ID	R	[1..1]	6.2.13
21	Conformance Statement ID	30	ID	R	[1..1]	6.2.14.2

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - PID		4	SI	O	[0..1]	6.3.2
3	Patient Identifier List	[CLIA]	250	CX	R	[1..*]	6.3.3
5	Patient Name	[CLIA]	250	XPN	RE	[0..1]	6.3.4
6	Mother's Maiden Name		250	XPN	O	[0..*]	6.3.5
7	Date/Time of Birth		26	TS	RE	[0..1]	6.3.6
8	Administrative Sex		1	IS	RE	[0..1]	6.3.7
10	Race		250	CE	O	[0..*]	6.3.8
11	Patient Address		250	XAD	O	[0..*]	6.3.9

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - OBR		4	SI	O	[0..1]	6.4.2
2	Placer Order Number		50	EI	R	[1..1]	6.4.3
3	Filler Order Number	[CLIA]	50	EI	R	[1..1]	6.4.4
4	Universal Service Identifier	[CLIA]	250	CE	R	[1..1]	6.4.5
7	Observation Date/Time		26	TS	R	[1..1]	6.4.6
8	Observation End Date/Time		26	TS	RE	[0..1]	6.4.7
11	Specimen Action Code		1	ID	R	[1..1]	6.4.8
14	Specimen Received Date/Time		26	TS	RE	[0..1]	6.4.9.1
15	Specimen Source	[CLIA]	300	CM	RE	[0..1]	6.4.10
16	Ordering Provider	[CLIA]	250	XCN	R	[1..1]	6.4.11
22	Results Rpt/Status Chng - Date/Time	[CLIA]	26	TS	RE	[0..1]	6.4.13.1
25	Result Status	[CLIA]	1	ID	R	[1..1]	6.4.14.1
26	Parent Result		400	CM	C	[0..1]	6.4.15
28	Result Copies To		250	XCN	C	[0..5]	6.4.16
29	Parent		200	CM	C	[0..1]	6.4.17

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - NTE	4	SI	O	[0..1]	6.5.2
3	Comment	65536	FT	RE	[0..*]	6.5.3
4	Comment Type	250	CE	O	[0..1]	6.5.4

C.2 Result Available (MT-ORU-2)

Message Structure for MT-ORU-2 Message Type

Segment ID	Usage	Cardinality	Segment Name
MSH	R	[1..1]	Message Header
{	R	[1..*]	Message Content Block
PID	R	[1..1]	Patient Identification
{	R	[1..*]	Test Order Block
OBR	R	[1..1]	Observations Report ID
{[NTE]}	RE	[0..*]	Notes and comments
{	R	[1..*]	Test Result Block
OBX	R	[1..1]	Observation/Result
{[NTE]}	RE	[0..*]	Notes and comments
}			
}			
}			

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Field Separator	1	ST	R	[1..1]	6.2.2
2	Encoding Characters	4	ST	R	[1..1]	6.2.3
3	Sending Application	180	HD	O	[0..1]	6.2.4
4	Sending Facility	180	HD	R	[1..1]	6.2.5
5	Receiving Application	180	HD	O	[0..1]	6.2.6
6	Receiving Facility	180	HD	O	[0..1]	6.2.7
7	Date/Time Of Message	26	TS	R	[1..1]	6.2.6
9	Message Type	13	CM	R	[1..1]	6.2.9
10	Message Control ID	20	ST	R	[1..1]	6.2.10
11	Processing ID	3	PT	R	[1..1]	6.2.11
12	Version ID	60	VID	R	[1..1]	6.2.12
15	Accept Acknowledgment Type	2	ID	R	[1..1]	6.2.13
21	Conformance Statement ID	30	ID	R	[1..1]	6.2.14.2

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - PID		4	SI	O	[0..1]	6.3.2
3	Patient Identifier List	[CLIA]	250	CX	R	[1..*]	6.3.3
5	Patient Name	[CLIA]	250	XPN	RE	[0..1]	6.3.4
6	Mother's Maiden Name		250	XPN	O	[0..*]	6.3.5
7	Date/Time of Birth		26	TS	RE	[0..1]	6.3.6
8	Administrative Sex		1	IS	RE	[0..1]	6.3.7
10	Race		250	CE	O	[0..*]	6.3.8
11	Patient Address		250	XAD	O	[0..*]	6.3.9

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - OBR		4	SI	O	[0..1]	6.4.2
2	Placer Order Number		50	EI	R	[1..1]	6.4.3
3	Filler Order Number	[CLIA]	50	EI	R	[1..1]	6.4.4
4	Universal Service Identifier	[CLIA]	250	CE	R	[1..1]	6.4.5
7	Observation Date/Time		26	TS	R	[1..1]	6.4.6
8	Observation End Date/Time		26	TS	RE	[0..1]	6.4.7
11	Specimen Action Code		1	ID	R	[1..1]	6.4.8
14	Specimen Received Date/Time		26	TS	R	[1..1]	6.4.9.2
15	Specimen Source	[CLIA]	300	CM	RE	[0..1]	6.4.10
16	Ordering Provider	[CLIA]	250	XCN	R	[1..1]	6.4.11
21	Filler Field 2		60	ST	O	[0..1]	6.4.12.2
22	Results Rpt/Status Chng - Date/Time	[CLIA]	26	TS	RE	[0..1]	6.4.13.2
25	Result Status	[CLIA]	1	ID	R	[1..1]	6.4.14.2
26	Parent Result		400	CM	O	[0..1]	6.4.15
28	Result Copies To		250	XCN	C	[0..5]	6.4.16
29	Parent		200	CM	C	[0..1]	6.4.17

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - NTE	4	SI	O	[0..1]	6.5.2
3	Comment	65536	FT	RE	[0..*]	6.5.3
4	Comment Type	250	CE	O	[0..1]	6.5.4

HL7 Attribute Table – OBX – Observation/Result

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - OBX		4	SI	O	[0..1]	6.6.2
2	Value Type	[CLIA]	2	ID	C	[0..1]	6.6.3
3	Observation Identifier		250	CE	R	[1..1]	6.6.4
4	Observation Sub-ID		20	ST	C	[0..1]	6.6.5
5	Observation Value	[CLIA]	65536[4]	*	C	[0..*]	6.6.6
6	Units	[CLIA]	250	CE	RE	[0..1]	6.6.7
7	References Range	[CLIA]	60	ST	RE	[0..1]	6.6.8
8	Abnormal Flags	[CLIA]	5	IS	RE	[0..5]	6.6.9
11	Observation Result Status	[CLIA]	1	ID	R	[1..1]]	6.6.10.2
15	Producer's ID	[CLIA]	250	CE	R	[1..1]	6.6.11
16	Responsible Observer		250	XCN	RE	[0..*]	6.6.12
19	Date/Time of the Analysis		26	TS	RE	[0..1]	6.6.13

[4] The length of the observation field is variable, depending upon value type. See *OBX-2 value type*.

C.3 Result Correction (MT-ORU-3)

Message Structure for MT-ORU-3 Message Type

Segment ID	Usage	Cardinality	Segment Name
MSH	R	[1..1]	Message Header
{	R	[1..*]	Message Content Block
PID	R	[1..1]	Patient Identification
{	R	[1..*]	Test Order Block
OBR	R	[1..1]	Observations Report ID
{[NTE]}	RE	[0..*]	Notes and comments
{	R	[1..*]	Test Result Block
OBX	R	[1..1]	Observation/Result
{[NTE]}	RE	[0..*]	Notes and comments
}			
}			
}			

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Field Separator	1	ST	R	[1..1]	6.2.2
2	Encoding Characters	4	ST	R	[1..1]	6.2.3
3	Sending Application	180	HD	O	[0..1]	6.2.4
4	Sending Facility	180	HD	R	[1..1]	6.2.5
5	Receiving Application	180	HD	O	[0..1]	6.2.6
6	Receiving Facility	180	HD	O	[0..1]	6.2.7
7	Date/Time Of Message	26	TS	R	[1..1]	6.2.6
9	Message Type	13	CM	R	[1..1]	6.2.9
10	Message Control ID	20	ST	R	[1..1]	6.2.10
11	Processing ID	3	PT	R	[1..1]	6.2.11
12	Version ID	60	VID	R	[1..1]	6.2.12
15	Accept Acknowledgment Type	2	ID	R	[1..1]	6.2.13
21	Conformance Statement ID	30	ID	R	[1..1]	6.2.14.2

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - PID		4	SI	O	[0..1]	6.3.2
3	Patient Identifier List	[CLIA]	250	CX	R	[1..*]	6.3.3
5	Patient Name	[CLIA]	250	XPN	RE	[0..1]	6.3.4
6	Mother's Maiden Name		250	XPN	O	[0..*]	6.3.5
7	Date/Time of Birth		26	TS	RE	[0..1]	6.3.6
8	Administrative Sex		1	IS	RE	[0..1]	6.3.7
10	Race		250	CE	O	[0..*]	6.3.8
11	Patient Address		250	XAD	O	[0..*]	6.3.9

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - OBR		4	SI	O	[0..1]	6.4.2
2	Placer Order Number		50	EI	R	[1..1]	6.4.3
3	Filler Order Number	[CLIA]	50	EI	R	[1..1]	6.4.4
4	Universal Service Identifier	[CLIA]	250	CE	R	[1..1]	6.4.5
7	Observation Date/Time		26	TS	R	[1..1]	6.4.6
8	Observation End Date/Time		26	TS	RE	[0..1]	6.4.7
11	Specimen Action Code		1	ID	R	[1..1]	6.4.8
14	Specimen Received Date/Time		26	TS	R	[1..1]	6.4.9.3
15	Specimen Source	[CLIA]	300	CM	RE	[0..1]	6.4.10
16	Ordering Provider	[CLIA]	250	XCN	R	[1..1]	6.4.11
21	Filler Field 2		60	ST	O	O	6.4.12.3
22	Results Rpt/Status Chng - Date/Time	[CLIA]	26	TS	RE	[0..1]	6.4.13.3
25	Result Status	[CLIA]	1	ID	R	[1..1]	6.4.14.3
26	Parent Result		400	CM	O	[0..1]	6.4.15
28	Result Copies To		250	XCN	C	[0..5]	6.4.16
29	Parent		200	CM	C	[0..1]	6.4.17

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - NTE	4	SI	O	[0..1]	6.5.2
3	Comment	65536	FT	RE	[0..*]	6.5.3
4	Comment Type	250	CE	O	[0..1]	6.5.4

HL7 Attribute Table – OBX – Observation/Result

SEQ	ELEMENT NAME		LEN	DATA TYPE	Usage	Cardinality	Comment/ Description
1	Set ID - OBX		4	SI	O	[0..1]	6.6.2
2	Value Type	[CLIA]	2	ID	C	[0..1]	6.6.3
3	Observation Identifier		250	CE	R	[1..1]	6.6.4
4	Observation Sub-ID		20	ST	C	[0..1]	6.6.5
5	Observation Value	[CLIA]	65536[5]	*	C	[0..*]	6.6.6
6	Units	[CLIA]	250	CE	RE	[0..1]	6.6.7
7	References Range	[CLIA]	60	ST	RE	[0..1]	6.6.8
8	Abnormal Flags	[CLIA]	5	IS	RE	[0..5]	6.6.9
11	Observation Result Status	[CLIA]	1	ID	R	[1..1]]	6.6.10.3
15	Producer's ID	[CLIA]	250	CE	R	[1..1]	6.6.11
16	Responsible Observer		250	XCN	RE	[0..*]	6.6.12
19	Date/Time of the Analysis		26	TS	RE	[0..1]	6.6.13

[5] The length of the observation field is variable, depending upon value type. See *OBX-2 value type*.