California Clinical Data Project:
Setting Standards

CALINX Lab 1.4 Data Standard

November 2014

Contents

1. Introduction

The California Clinical Data Project (CCDP) has specified a data standard for transmitting laboratory test results for quality improvement purposes. The data standard is based on previous work of the California Information Exchange (CALINX) project, and is, therefore, called the CALINX Laboratory Data Standard. The goal of the standard is to provide a format for reporting test results that is useful for population-based data aggregation and patient-level data analysis. Although clinical laboratories are providing test result files for data analysis today, no standard format exists for this process. The creation and statewide adoption of a single format for this purpose will improve the quality, efficiency, and timeliness with which this data is reported.

The CALINX laboratory data standard is based on the HL7 version 2.4 messaging standard and the LOINC laboratory coding standard. Specifically, it is a *message profile* for the HL7 ORU message type and it mandates LOINC codes for identifying certain tests. A message profile is an unambiguous specification of a HL7 message intended for a particular use case. Although the initial use case of the standard will primarily entail batch reporting of messages, use cases involving near-real time transactional reporting are not precluded by the structure of the standard and, in fact, will be well supported by its HL7 foundation.

The remainder of this document specifies the CALINX Laboratory Data Standard in detail, including the structure of CALINX messages and the contents of individual data fields. Although this document describes the elements of HL7 messages as they relate to the CALINX standard, it does not constitute an introduction to HL7. Readers unfamiliar with HL7 may wish to first review Appendix A (Introduction to HL7 Message Encoding) and/or the extensive materials describing the HL7 2.x standard, available at www.hl7.org.

Note that a summary view of the CALINX Laboratory Data Standard appears in Appendix D. This summary view shows only those segments and fields of the HL7 ORU message that are relevant to the CALINX Laboratory Data Standard. Appendix D may be used as an introduction to the CALINX standard or as a quick reference guide.

2. CALINX Message Structure

The CALINX laboratory data standard is a message profile based on the ORU (Unsolicited Observation) message from version 2.4 of the HL7 standard.[1] In HL7, the ORU message is a general-purpose message that may be used to report any clinical observations, include laboratory results, radiology reports, and physical exam findings. The ORU may also be used in various clinical contexts, including inpatient admissions, outpatient visits, and clinical trials.

The CALINX laboratory data standard, however, is focused on a specific use case: the retrospective reporting of laboratory results in the context of outpatient services. Hence, not all of the parts (segments) of the standard HL7 ORU message are relevant. Specifically, certain optional segments of the ORU message are not needed by the CALINX standard. Also, certain segments that are relevant to the CALINX standard have restrictions on their optionality or ability to repeat that vary from the HL7 standard. These variations simplify the message structure and ensure that CALINX messages contain required information. The variations from the HL7 structure for the ORU message are described in Section 2.2 and 2.3. Note that in all cases, however, the variations will result in a message structure that remains fully compliant with the HL7 ORU message. In other words, CALINX messages are valid instances of HL7 Version 2.4 ORU messages and can be processed by standard HL7 interface engines.

2.1. Notation

The structure of HL7 messages is defined in special notation that lists the segment IDs in the order they would appear in the message (for example, see Section 2.2). Braces, { . . . }, indicate one or more repetitions of the enclosed group of segments. Brackets, [. . .], show that the enclosed group of segments is optional. If a group of segments is optional and may repeat it should be enclosed in brackets and braces, { [. . .] }.

Note: [{...}] and {[...]} are equivalent.

2.2. Hierarchical CALINX Message Structure

The typical ORU message represents laboratory results as a three-level hierarchy, with the Patient Identification segment (PID) at the upper level, an order 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 CALINX message, which is a subset of the standard HL7 ORU message structure. The boldfaced entries indicate those segments that contain "core" data important to the communication of outpatient laboratory results for quality-improvement activities. These core segments have a CALINX optionality designation of "R" (Required) or "RE" (Required but might be empty) in Table 1. Non-boldfaced segments have the CALINX optionality designation of "O" (Optional). These designations are defined as follows:

[1] Any subsequent reference in this document to the HL7 standard or HL7 specifications implicitly refers to version 2.4, unless otherwise noted.

R - Required: The segment must be present in the message and the segment must be populated per its specifications in this document. Otherwise, the message is considered *invalid*. **Invalid** messages are not consistent with the HL7 standard and represent an error that may prevent processing.

RE - Required but might be empty: The segment must be present in the message *if the sending system has the information to populate it*. For example, **if** there is comment text that accompanies an OBR segment, then the comment must appear in an NTE segment that directly follows the OBR segment. If no such comment text is available, then no NTE segment is required following the OBR segment. If a "RE" segment appears in a message, the segment must be populated per its specifications in this document.

O – Optional: The segment may be included, but this is entirely at the discretion of the sending system. If the segment is included, it must conform to the specifications of that segment in HL7 version 2.4, but no additional formatting or coding constraints exist for the segment. Any specification of content or formatting for these segments must be negotiated separately between trading partners.

Note that any entry with a "**" in the "**CALINX opt"** column of Table 1 indicates a variation for that segment from the standard HL7 specification. The nature of the variation is described in Section 2.3.

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

Table 1. Message structure of CALINX Laboratory Data Standard

Note that multiple report headers (OBRs) may be sent beneath each patient identification segment, with multiple separate observation segments (OBXs) beneath each OBR. One note segment (NTE) may be optionally inserted after an OBR or OBX segment. The note segment applies to the entity that immediately precedes it, i.e., the test order if it follows the OBR segment and the individual test result if it follows the OBX segment.

2.3. CALINX Batch File Structure

When CALINX messages are sent in a batch file containing multiple messages, the HL7 Batch Protocol should be used to "bundle" the messages and provide appropriate header information. The HL7 Batch Protocol specifies that the set of transmitted messages be preceded by a special header segment, which provides useful information regarding the date of creation, sending entity, receiving entity, etc.

The table below displays the structure of a CALINX batch file. Note that the notation used is the same as for the table describing the hierarchical CALINX message structure in Section 2.2. Specifically, the boldfaced entries indicate those segments from the HL7 Batch Protocol that are relevant to the CALINX standard, whereas entries that are not boldfaced represent segments that are not relevant and entirely optional. Also, note that any entry with a "**" in the **Var** column indicates a variation for that segment from the standard HL7 specification. The nature of the variation is described in Section 2.4.

Segment ID	CALINX Opt	Segment Name
FHS	**R****	**file header segment**
{ [BHS]	O	batch header segment
{ [MSH	**RE**	**zero or more HL7 messages**
....		
....		
....		
] }		
[BTS]	O	batch trailer segment
}		
[FTS]	O	file trailer segment

Note that a batch containing zero HL7 messages may be sent to meet a requirement for periodic submission of batches when there are no messages to send.

2.4. Variations from the Standard HL7 ORU Message Structure

The optionality and repeatability constraints on certain segments in the CALINX message structure vary from those of the ORU message structure in the HL7 specifications.

PID Segment: A PID segment is required in a CALINX message (it is optional in the HL7 specification). Due to the need for patient identifying information to match laboratory result records with other data in disease registries and data warehouses, a PID segment must be sent in each CALINX message.

NTE Segments: Only one instance of an NTE segment may appear for each instance of an OBR and OBX segment in a CALINX message (multiple NTE segments may appear for each OBR and OBX segment in the HL7 specification). This restriction exists to simplify the CALINX message structure and to facilitate the processing of CALINX messages. Multiple comments may still be sent for each OBR and OBX segment because the comment field in the NTE segment is a repeating field (see Section 3.5).

OBX Segment: At least one OBX segment is required for each OBR segment (it is optional in the HL7).

FT1 Segment: Only one instance of a FT1 segment may appear for each instance of an OBR segment in a CALINX message (multiple FT1 segments may appear for each OBR segment in the HL7 specification). This restriction exists to simplify the CALINX message structure and to facilitate the processing of CALINX messages. Note that multiple diagnoses may still be sent in the FT1 segment because the Diagnosis Code field in the FT1 segment is a repeating field (see Section 3.7).

FHS Segment: Exactly one instance of an FHS segment must start the batch file (the FHS segment is optional in the HL7 Batch Protocol specification).

3. CALINX Message Segments

The formatting of each relevant segment of the CALINX message is described in detail in the following sections.

3.1. Guide to Understanding the CALINX Message Segments

Each section describing a message segment contains an "HL7 Attribute Table" that lists the allowed fields in the segment, per the HL7 Version 2.4 specification.

Certain of the fields in the HL7 Attribute Tables are boldfaced, whereas others are grayed out. The boldfaced entries represent those fields that are *relevant to the CALINX Laboratory Data Standard*, i.e. fields that contain "core" data important to the communication of outpatient laboratory results for quality-improvement activities. The ways in which these fields must be populated are specified in sub-sections that follow each HL7 Attribute table.

The grayed out entries represent fields that are not relevant to the CALINX Laboratory Data Standard. However, these fields may be populated in CALINX messages, provided that their values conform to the HL7 specifications. No further constraints regarding the population of these fields are specified; any such constraints must be negotiated separately between trading partners.

The following sections describe the information in each column of the HL7 Attribute Tables (for example, refer to the HL7 Attribute Table in Section 3.2.1).

Field Sequence (SEQ)

Order 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.

Field Length (LEN)

The maximum field length. While the fields in HL7 are variable length, a maximum field length has been developed. The maximum length is calculated to include the component and subcomponent separators. If a field value exceeds its field length, the field is considered *invalid* (see below).

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 standard specification, available at www.hl7.org.

Many data types are "structured," in that they consist of components. Components may, in turn, consist of sub-components. However, sub-components must be atomic (non-structured). In the case of structured data types, the optionality of each component and sub-component in the value of a field is specified in a table that accompanies the detailed description of the field. For example, the following table shows the

optionality of components and subcomponents for value of the Patient Name field in the PID segment (which has the structured data type "XPN"):

Field: PID-5 Patient Name (XPN)

Component/Sub-Component	OPT
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)	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

Note the possible optionality ("OPT") values in these tables:

R: Required. The component/sub-component must be populated with an allowed value. Otherwise, the entire field in which the component/sub-component appears is considered *invalid* (see below for more information about invalid fields). Allowed values are values consistent with the data type of the component/sub-component and consistent with any other field-specific constraints (such as membership in a table of allowed values for ID or IS typed data – see for example MSH-11 Processing ID).

RE: Required but might be empty. The component/sub-component must be populated with an allowed value *if the sending application knows the value*. If the sending application does not know the value, then the component/sub-component will be NULL. If the component/sub-component is NULL, the entire field in which the component/sub-component appears is considered *non-conformant* (See Section below for more information about non-conformant fields).

O: Optional. The component/sub-component may be populated, but this is entirely at the discretion of the sending system. If the component/sub-component is populated (non-NULL), it must conform to the specifications of that component/sub-component in HL7 version 2.4. Otherwise, the receiving application may indicate an error. Any specification of content or formatting for these components/ sub-components beyond what is specified in HL7 version 2.4 must be negotiated separately between trading partners.

X: Not Supported. The component/sub-component should not be populated by the sending application. If the component/sub-component is populated, the receiving systems may ignore its value or may signal an error.

Optionality per the HL7 Standard (HL7 OPT)

The optionality of the field per the standard HL7 specification. This is provided for reference only and may differ from the optionality of the field in the CALINX Laboratory Data Standard (see the following section).

Optionality per the CALINX Standard (CALINX OPT)

The optionality of the field in the CALINX Laboratory Data Standard. The possible optionality values for fields relevant to the CALINX data standard are:

R: Required. The field must be populated (i.e., a value for the field must be present). If the field is a structured field, then a value for every component/sub-component that is designated as "R" (Required) must be present for the field to be considered populated. Otherwise, the field is considered *invalid*.

> NOTE: **Invalid** fields are not consistent with the HL7 standard and represent an error that may prevent processing of the associated segment or entire message.

Note: Certain required fields have an "explicit null" value defined for them in the CALINX standard. For example, the explicit null value for the Patient Name field is "`STDNULL99^STDNULL99`". This value is used when the sending system knows of no valid value to populate a field – the explicit null value prevents the field from being invalid and allows processing of the field to proceed. When the explicit null value appears in a required field, however, the field is considered ***non-conformant***.

> NOTE: **Non-conformant** fields allow the processing of the associated segment and message to continue, but they may result in the logging of a data-quality error.

RE: Required but might be empty. The field must be populated (i.e., a value for the field must be present) if the sending application knows the value. If the field is a structured field, then a value for every component/sub-component that is designated as "R" (Required) or "RE" (Required but might be empty) must be present for the field to be considered populated. If the sending application does not populate the field, the field is considered *valid* but ***non-conformant*** (see above). The receiving application should process messages with non-conformant fields, although it may signal a non-conformance error.

Field Repetition (RP#)

Some fields are designated as repeatable and can either be repeated indefinitely or a specified number of times, noted as follows:

Y = repeatable indefinitely

Y/x (where x is the number of times) = repeatable "x" times

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 these requirements.

Following the HL7 Attribute Table, there appears a detailed description of each relevant (Required or RE) field that appears in the segment. These descriptions include the HL7 definition of the field, as well as a more specific CALINX specification (which describes the rules for populating the field so that it is compliant with the CALINX standard). Additionally, there may be one or more sample values provided for each field, to illustrate how the field should be appropriately populated.

3.2. MSH - Message Header Segment

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

3.2.1. MSH Segment Structure

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	**Field Separator**	**1**	**ST**	**R**	**R**		**3.2.2**
2	**Encoding Characters**	**4**	**ST**	**R**	**R**		**3.2.3**
3	Sending Application	180	HD	O	O		
4	**Sending Facility**	**180**	**HD**	**O**	**RE**		**3.2.4**
5	Receiving Application	180	HD	O	O		
6	Receiving Facility	180	HD	O	O		
7	**Date/Time Of Message**	**26**	**TS**	**R**	**R**		**3.2.5**
8	Security	40	ST	O	O		
9	**Message Type**	**13**	**CM**	**R**	**R**		**3.2.6**
10	**Message Control ID**	**20**	**ST**	**R**	**R**		**3.2.7**
11	**Processing ID**	**3**	**PT**	**R**	**R**		**3.2.8**
12	**Version ID**	**60**	**VID**	**R**	**R**		**3.2.9**
13	Sequence Number	15	NM	O	O		
14	Continuation Pointer	180	ST	O	O		
15	**Accept Acknowledgment Type**	**2**	**ID**	**O**	**RE**		**3.2.10**
16	**Application Acknowledgment Type**	**2**	**ID**	**O**	**RE**		**3.2.11**
17	Country Code	3	ID	O	O		
18	Character Set	16	ID	O	O	Y	
19	Principal Language Of Message	250	CE	O	O		
20	Alternate Character Set Handling Scheme	20	ID	O	O		
21	**Conformance Statement ID**	**10**	**ID**	**O**	**RE**	**Y**	**3.2.12**

3.2.2. 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).

3.2.3. 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).

3.2.4. MSH-4 Sending facility (HD)

HL7 Definition: Identifies the facility at which the sending application resides. Entirely site-defined.

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)>
```

CALINX Specification: This field is used to identify the specific laboratory that generated the test result, using a globally-unique identifier. The combination of <namespace ID (IS)> and <universal ID (ST)> is used to identify this laboratory, and both of these components must be populated if available. The value of <namespace ID> represents the high-level *naming authority* that controls the identifiers for its laboratories. These naming authorities may be large commercial laboratory chains or they may be government bodies that assign identifiers to individual labs. The allowed values for this component are listed in a user-defined table that is maintained by the CALINX governing body (see Table - 0362 in Appendix C). The value of <universal ID> represents the identifier of the laboratory itself, as specified by the naming authority. The combination of <namespace ID (IS)> and <universal ID (ST)> must be globally unique. Note: the <universal ID type> component is not populated for this field.

Field: MSH-4 Sending Facility (HD)

Component/Sub-Component	OPT
namespace ID (IS)	RE
universal ID (ST)	RE
universal ID type (ID)	X

CALINX Sample Value(s):

```
QD^387564
CL^57768-2
```

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

HL7 Definition: This field contains the date/time that the sending system created the message. If the time zone is specified, it will be used throughout the message as the default time zone.

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).

CALINX Specification: This field should be reported to at least a precision of seconds. Values with lesser precisions will be considered *non-conformant*. Values with greater precision (including the time zone) are allowed. The Degree of precision component, however, is not supported.

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

Component/Sub-Component	OPT
YYYYMMDDHHMMSS[.S[S[S[S]]]] [+/-ZZZZ]	R
Degree of precision	X

CALINX Sample Value(s):

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

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

3.2.6. 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.

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

CALINX Specification: This field must be hard coded to the following value:

```
ORU^R01^ ORU_R01
```

3.2.7. 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).

CALINX Specification: The sending system must assign an identifier for the message that is unique within the namespace of the sending facility (see Section 3.2.4). This will guarantee that the combination of the Message control ID and the Sending Facility constitute a globally unique message identifier.

3.2.8. 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
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)

CALINX Specification: The first component should be assigned as appropriate ("P" when in production mode), and the second component should not be sent

Field: MSH-11 Processing ID (PT)

Component/Sub-Component	OPT
processing ID (ID)	R
processing mode (ID)	X

3.2.9. 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 version of the CALINX data standard should appear in the field MSH-21 Conformance statement ID.

CALINX 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	OPT
version ID (ID)	R
internationalization code (CE)	X
internal version ID (CE)	X

3.2.10. 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.

CALINX Specification: For batch transmission of messages, the receiving system is not required to send an accept acknowledgement. As such, the sending application should set the value of this field to "NE" (Never) in every message sent within a batch file. For real-time transmissions of messages, the accept acknowledgement type will be specified by the sending application, using this field. In the absence of a value for this field, the receiving application should assume the default value "NE" (Never).

3.2.11. MSH-16 Application Acknowledgement Type (ID)

HL7 Definition: This field identifies the conditions under which a receiving application is required to return an application acknowledgment in response to this message. A positive application acknowledgement signifies that the receiving application has processed the message without encountering syntactic or semantic errors. Refer to Table 0155 in Appendix C for valid values for this field.

CALINX Specification: For batch transmission of messages, the receiving system is not required to send an application acknowledgement. As such, the value of this field should be set to "NE" (Never) in every message sent within a batch file. For real-time transmissions of messages, the application acknowledgement type will be determined by the sending application, using this field. In the absence of a value for this field, the receiving application should assume the default value "NE" (Never).

3.2.12. 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.

CALINX Specification: The value of this field indicates that the message conforms to the CALINX laboratory data standard. The value should be hard-coded to

```
CALINX_1.3
```

3.3. PID - Patient Identification Segment

The PID segment is used to communicate patient identification information for lab results transmitted in the CALINX laboratory standard. 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).

3.3.1. PID Segment Structure

Note that only six fields in the PID segment are relevant to the CALINX data standard. Although other patient-identifying fields may be useful for the matching of laboratory result data, these fields are usually not available to clinical laboratories.

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP /#	Comment/ Description
1	Set ID - PID	4	SI	O	O		
2	Patient ID	20	CX	B	O		
3	**Patient Identifier List**	**250**	**CX**	**R**	**R**	**Y**	**3.3.2**
4	Alternate Patient ID - PID	20	CX	B	O	Y	
5	**Patient Name**	**250**	**XPN**	**R**	**R**	**Y**	**3.3.3**
6	Mother's Maiden Name	250	XPN	O	O	Y	
7	**Date/Time of Birth**	**26**	**TS**	**O**	**RE**		**3.3.4**
8	**Administrative Sex**	**1**	**IS**	**O**	**RE**		**3.3.5**
9	Patient Alias	250	XPN	B	O	Y	
10	Race	250	CE	O	O	Y	
11	**Patient Address**	**250**	**XAD**	**O**	**RE**	**Y**	**3.3.6**
12	County Code	4	IS	B	O		
13	**Phone Number - Home**	**250**	**XTN**	**O**	**RE**	**Y**	**3.3.7**
14	Phone Number - Business	250	XTN	O	O	Y	
15	Primary Language	250	CE	O	O		
16	Marital Status	250	CE	O	O		
17	Religion	250	CE	O	O		
18	Patient Account Number	250	CX	O	O		
19	SSN Number - Patient	16	ST	B	O		
20	Driver's License Number - Patient	25	DLN	O	O		
21	Mother's Identifier	250	CX	O	O	Y	
22	Ethnic Group	250	CE	O	O	Y	
23	Birth Place	250	ST	O	O		
24	Multiple Birth Indicator	1	ID	O	O		
25	Birth Order	2	NM	O	O		
26	Citizenship	250	CE	O	O	Y	
27	Veterans Military Status	250	CE	O	O		
28	Nationality	250	CE	B	O		
29	Patient Death Date and Time	26	TS	O	O		
30	Patient Death Indicator	1	ID	O	O		
31	Identity Unknown Indicator	1	ID	O	O		
32	Identity Reliability Code	20	IS	O	O	Y	
33	Last Update Date/Time	26	TS	O	O		
34	Last Update Facility	40	HD	O	O		
35	Species Code	250	CE	C	O		
36	Breed Code	250	CE	C	O		
37	Strain	80	ST	O	O		
38	Production Class Code	250	CE	O	O	2	

3.3.2. 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.).

Note: The check digit and code identifying check digit scheme are null if ID is alphanumeric.

```
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)>
```

CALINX Specification: This field may contain any of several types of identifiers, including health plan assigned identifiers and medical record numbers. Also, multiple types of identifiers may be sent for a single patient in this repeating field.

The type of identifier for each identifier sent should be indicated in the <identifier type code (ID)> component. The valid values for this component are listed in Table 0203 of Appendix C (note that the most common types of identifiers are boldfaced in this table). The patient identifier itself should be placed in the <ID (ST)> component.

> Note: Although many types of identifiers are allowed in this field, per Table 0203, at least one instance of one of the following types of identifiers must appear for the field to be *conformant*:
>
> | | |
> |---|---|
> | HC | Health Card Number |
> | MR | Medical record number |
> | SS | Social Security number |

Because the identifiers will typically be alphanumeric, the <check digit> and <code identifying check digit scheme> components may be left blank. The optionality of all components is shown in the following table.

Field: PID-3 Sending Facility (HD)

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

In the case that no identifiers are available for a patient, a "dummy" value must be placed in the Patient Identifier List field, because this field is required per the HL7 standard. The following standard dummy value should be used in this case:

ID = `0000000000` [ten zeros]
Identifier Type Code = `B`

CALINX Sample Value(s):

`JX48859487^^^^HC` [A health card number assigned by the health plan]

`SMI-44857-02^^^^MR` [A medical record number assigned by the medical group]

`JX48859487^^^^HC~P149497732-02^^^^HC`

[Two different health card numbers for the same patient, reflecting a recent change in the way these numbers are assigned]

`0000000000^^^^B` [An explicit null value indicating that no patient ID is available]

3.3.3. 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)>
```

CALINX Definition: Only the components denoted as Required or Optional in the following table should be populated. Valid values for the <name type code (ID) > component appear in Table 0200 in Appendix C. The use of "L" (Legal name) for the <name type code> component is recommended, if the component is populated.

Field: PID-5 Patient Name (XPN)

Component/Sub-Component	OPT
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)	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

In the case that one or both required components of the name are not available for a patient, an "explicit null" value must be placed in the required Patient Name component(s) that are missing, because this field is Required per the HL7 standard. The following standard explicit null values should be used in this case:

Family Name (ST) = STDNULL99
Given Name (ST) = STDNULL99

CALINX Sample Value(s):

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

`Ray^^Jr.` [Billy Ray Yates, Jr.; name type unknown]

`STDNULL99^STDNULL99` [Explicit null values indicating that no patient names are available]

`Gordon^STDNULL99` [Explicit null value indicating that no given name is available]

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

HL7 Definition: This field contains the patient's date and time of birth. See Section 3.2.5 for more information about the Timestamp (TS) data type.

CALINX Specification: Only the birth *date* should be placed in this field. Note that this field is RE and should be populated if the data is available.

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

Component/Sub-Component	OPT
YYYYMMDD	RE
Degree of precision	X

CALINX Sample Value(s):

`19571206`

3.3.5. PID-8 Administrative sex (IS)

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

CALINX Specification: Refer to Table 0001 in Appendix C for allowed values. Note that this field is RE and should be populated if the data is available.

3.3.6. PID-11 Patient address (XAD)

HL7 Definition: This field contains the mailing address of the patient. Address type codes are defined by *HL7 Table 0190 - Address type*. 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.

```
XAD Components: <street address (SAD)> ^ <other designation (ST)> ^ <city
                (ST)> ^ <state or province (ST)> ^ <zip or postal code
                (ST)> ^ <country (ID)> ^ < address type (ID)> ^ <other
```

```
                    geographic designation (ST)> ^ <county/parish code (IS)>
                    ^ <census tract (IS)> ^ <address representation code
                    (ID)> ^ <address validity range (DR)>

Subcomponents of street address: <street address (ST)> & <street name
                                 (ST)> & <dwelling number (ST)>
```

CALINX Specification: If possible, the home address should be sent in this field. See Table 0190 in Appendix C for the allowable values of <address type (ID)> and the appropriate code for the home address ("H"). Typically, only one address will be sent, although multiple addresses may be sent in this repeating field.

Field: PID-11 Patient Address (XAD)

Component/Sub-Component	OPT
street address (SAD)	RE
street address (ST)	RE
street name (ST)	O
dwelling number (ST)	O
other designation (ST)	O
city (ST)	RE
state or province (ST)	RE
zip or postal code (ST)	RE
country (ID)	X
address type (ID)	RE
other geographic designation (ST)	X
county/parish code (IS)	X
census tract (IS)	X
address representation code (ID)	X
address validity range (DR)	X

CALINX Sample Value(s):

```
123 Main Street^#5^Oakland^CA^94607^^H
```

3.3.7. PID-13 Phone number - home (XTN)

HL7 Definition: This field contains the patient's personal phone numbers. All personal phone numbers for the patient are sent in the following sequence. The first sequence is considered the primary number (for backward compatibility). If the primary number is not sent, then a repeat delimiter is sent in the first sequence. Refer to HL7 Table 0201 - Telecommunication use code and HL7 Table 0202 - Telecommunication equipment type for valid values.

```
Components: [NNN] [(999)]999-9999 [X99999] [B99999] [C any text] ^
            <telecommunication use code (ID)> ^ <telecommunication
            equipment type (ID)> ^ <e-mail address (ST)> ^ <country code
            (NM)> ^ <area/city code (NM)> ^ <phone number (NM)> ^
            <extension (NM)> ^ <any text (ST)>
```

CALINX Specification: Only the first component should be populated in this field, and this component should contain the phone number in the following format:

[(999)] 999-9999 [X99999]

Certain other components may be populated, but the phone number should appear at least in the first component. Typically, only one phone number will be sent, although multiple numbers may be sent in this repeating field.

Field: PID-13 Phone number = home (XTN)

Component/Sub-Component	OPT
[(999)] 999-9999 [X99999]	RE
telecommunication use code (ID)	X
telecommunication equipment type (ID)	X
e-mail address (ST)	X
country code (NM)	X
area/city code (NM)	O
phone number (NM)	O
extension (NM)	O
any text (ST)	X
address representation code (ID)	X
address validity range (DR)	X

CALINX Sample Value(s):

```
(415) 388-5488
(510) 477-8033 X200
(510) 477-8033 X200^^^^^510^4778033^200
```

3.4. OBR – observation request segment

In the reporting of clinical observations, the OBR segment serves as the report header. It describes an entire set of observations. The details of each individual observation appear in corresponding OBX segments (see Section 3.6). In the case of laboratory results, the OBR segment describes the relevant lab-order information, including the date/time that the specimen was collected.

3.4.1. OBR Segment Structure

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	Set ID - OBR	4	SI	O	O		
2	Placer Order Number	22	EI	C	C		
3	**Filler Order Number**	**50**	**EI**	**C**	**R**		**3.4.3**
4	**Universal Service Identifier**	**250**	**CE**	**R**	**R**		**3.4.4**
5	Priority - OBR	2	ID	X	X		
6	Requested Date/Time	26	TS	X	X		
7	**Observation Date/Time #**	**26**	**TS**	**C**	**R**		**3.4.5**
8	**Observation End Date/Time #**	**26**	**TS**	**O**	**O**		**3.4.6**
9	Collection Volume *	20	CQ	O	O		
10	Collector Identifier *	250	XCN	O	O	Y	
11	Specimen Action Code *	1	ID	O	O		
12	Danger Code	250	CE	O	O		
13	Relevant Clinical Info.	300	ST	O	O		
14	Specimen Received Date/Time *	26	TS	C	C		
15	**Specimen Source ***	**300**	**CM**	**O**	**O**		**3.4.7**
16	**Ordering Provider**	**250**	**XCN**	**O**	**RE**	**Y**	**3.4.8**
17	Order Callback Phone Number	250	XTN	O	O	Y/2	
18	Placer Field 1	60	ST	O	O		
19	Placer Field 2	60	ST	O	O		
20	**Filler Field 1 +**	**120**	**ST**	**O**	**RE**		**3.4.9**
21	**Filler Field 2 +**	**120**	**ST**	**O**	**RE**		**3.4.10**
22	**Results Rpt/Status Chng - Date/Time +**	**26**	**TS**	**C**	**RE**		**3.4.11**
23	Charge to Practice +	40	CM	O	O		
24	Diagnostic Serv Sect ID	10	ID	O	O		
25	**Result Status +**	**1**	**ID**	**C**	**R**		**3.4.12**
26	Parent Result +	400	CM	O	O		
27	Quantity/Timing	200	TQ	O	O	Y	
28	Result Copies To	250	XCN	O	O	Y/5	
29	Parent	200	CM	O	O		
30	Transportation Mode	20	ID	O	O		
31	Reason for Study	250	CE	O	O	Y	
32	Principal Result Interpreter +	200	CM	O	O		
33	Assistant Result Interpreter +	200	CM	O	O	Y	
34	Technician +	200	CM	O	O	Y	
35	Transcriptionist +	200	CM	O	O	Y	
36	Scheduled Date/Time +	26	TS	O	O		
37	Number of Sample Containers *	4	NM	O	O		
38	Transport Logistics of Collected Sample *	250	CE	O	O	Y	
39	Collector's Comment *	250	CE	O	O	Y	
40	Transport Arrangement Responsibility	250	CE	O	O		
41	Transport Arranged	30	ID	O	O		
42	Escort Required	1	ID	O	O		
43	Planned Patient Transport Comment	250	CE	O	O	Y	
44	Procedure Code	250	CE	O	O		
45	Procedure Code Modifier	250	CE	O	O	Y	
46	Placer Supplemental Service Information	250	CE	O	O	Y	
47	Filler Supplemental Service Information	250	CE	O	O	Y	

3.4.2. OBR field definitions

The daggered (+) items in this segment are created by the laboratory and valued as needed when the OBR segment is returned as part of a report.

The starred (*) fields are only relevant when an observation is associated with a specimen. These are completed by the provider when the provider obtains the specimen. They are completed by the laboratory when the laboratory obtains the specimen.

OBR-7-observation date/time and *OBR-8-observation end date/time* (flagged with #) are the physiologically relevant times. In the case of an observation on a specimen, they represent the start and end of the specimen collection. In the case of an observation obtained directly from a subject (e.g., BP, Chest X-ray), they represent the start and end time of the observation.

3.4.3. 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 a lab test order (e.g., OBR). A limit of fifteen (15) characters is suggested but not required. This value is assigned by the laboratory and must uniquely identify the order (as specified in the order detail segment) from other 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 3.2.4 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 the OBR segments.

CALINX Specification: This field should contain an identifier for the lab test order that is unique across all laboratories and all tests. 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.

The combination of <namespace ID (IS)> and <universal ID (ST)> is used to identify this laboratory, and both of these components must be populated. The value of <namespace ID> represents the high-level *naming authority* that controls the identifiers for its laboratories. These naming authorities may be large commercial laboratory chains or they may be government bodies that assign identifiers to individual labs. The allowed values for this component are listed in a table that is maintained by the CALINX governing body (see Table 0362 in Appendix C). The value of <universal ID> represents the identifier of the laboratory itself, as specified by the naming authority. The combination of <namespace ID (IS)> and <universal ID (ST)> must be globally unique for any laboratory. Note: the <universal ID type> component is not populated for this field.

If the <entity identifier (ST)> assigned by every such laboratory is unique for any test processed there, then the combination of <entity identifier (ST)>, <namespace ID (IS)>, and <universal ID (ST)> should provide a globally unique identifier for any test order. Note: the <universal ID type> component is not populated for this field.

Field: OBR-3 Filler Order Number (EI)

Component/Sub-Component	OPT
entity identifier (ST)	R
namespace ID (IS)	R
universal ID (ST)	R
universal ID type (ID)	X

CALINX Sample Value(s):

```
5788475-04333^QD^387564
48577689599^CL^57768-2
```

3.4.4. 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)>
```

CALINX Specification: A lab's internal, proprietary code may be used in this field. Alternatively, a standard code (such as CPT-4) may be used instead or in addition to the proprietary code, if available.

If a proprietary code is used, the <name of coding system (IS)> component should be set to "L" (Local Code). For a list of all coding systems that may be used in this field, see Table 0396 in Appendix C.

Field: OBR-4 Universal Service Identifier

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

CALINX Sample Value(s):

```
75-887^CBC^L                          [proprietary code for a CBC]
85027^Complete blood count^C4         [CPT-4 code for a CBC]
75-887^CBC^L^85027^Complete blood count^C4    [both]
```

3.4.5. 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.

CALINX Specification: This field should 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). Values with greater precision than seconds are also allowed, including the time zone. The Degree of precision component is not supported.

Note that this is a required field. If the field is not available (for example, if a specimen is obtained outside of the lab and no record is available of its collection date), then the following "standard null" value should be used:

19000101

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

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

CALINX 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]

3.4.6. 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.

CALINX Specification: This field is Optional and will be populated at the discretion of the sending laboratory, although laboratories are encouraged to populate it if applicable. If populated, this field should 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. Values with greater precision than seconds are also allowed, although the Degree of precision component is not supported. This first component, date/time may be populated to a precision of seconds for certain tests (such as 24-hour urine albumin measures). The second component, degree of precision, is not supported.

Field: OBR-8 Observation end date/time (TS)

Component/Sub-Component	OPT
YYYYMMDD[HH[MM[SS[.S[S[S[S]]]]]]][+/-ZZZZ]	O
Degree of precision	X

CALINX Sample Value(s):

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

3.4.7. 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)>
```

CALINX Specification: This field is optional and will be populated at the discretion of the sending laboratory. However, it may be relevant to the clinical interpretation of certain laboratory tests, and sending laboratories are encouraged to populate it if applicable. When populated, the specimen source codes should be drawn from table 0070 in Appendix C, and the name of the coding system should be "HL70070".

Field: OBR-15 Specimen Source (CM)

Component/Sub-Component	OPT
specimen source name or code (CE)	O
identifier (ST)	O
text (ST)	O
name of coding system (IS)	O
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

CALINX Sample Value(s):

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

3.4.8. OBR-16 Ordering provider (XCN)

HL7 Definition: This field identifies the provider who ordered the test. Either the ID code or the name, or both, may be present. 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)>
```

CALINX Specification: Both the identifier and the name of the ordering provider are RE and should be populated, if available. It is recognized that the identifier of the ordering provider may represent an account number shared by multiple providers in a healthcare facility, in certain cases.

Most of the components of this field need not be populated. Only those components listed as RE or Optional in the following table are relevant to the CALINX:

Field: OBR-16 Ordering Provider (XCN)

Component/Sub-Component	OPT
ID number (ST)	RE
family name (FN)	RE
family name (ST)	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)	RE
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

3.4.9. OBR-20 Filler field 1 (ST)

HL7 Definition: This field is definable for any use by the filler (laboratory).

CALINX Specification: This field contains the identifier/code assigned by the laboratory and/or health plan to the medical group associated with the patient and the name of the medical group. This information must be structured into the following discrete elements:

Identifier/Code of Medical Group – Defined by the laboratory
Name of Medical Group – Used by the laboratory
Identifier/Code of Medical Group – Defined by the health plan
Name of Medical Group – Used by the health plan

The discrete elements of this field must be delimited with the caret character, "^". However, the OBR-20 field has the ST (string) data type, which must not contain any reserved characters, including the

component separator specified in MSH-2. In most messages, the caret is specified as the HL7 component separator, so use of this character as a delimiter within the OBR-20 field requires that it be represented by the escape sequence "\S\"[2] (see sample values below). Many HL7 interface engines will automatically escape the caret character to "\S\" when it appears in an ST data type. If the caret character is not used as the component delimiter (or any other delimiter) then the "^" character may be used explicitly in the message.

The identifier/code assigned by the laboratory to the medical group and the medical group name (the first and second sub-strings) should be populated if the laboratory has the information available (i.e., a usage of "RE" – Required but may be empty). The identifier/code assigned by the health plan to the medical group and the medical group name (the third and fourth sub-strings) are optional. Laboratories are not obligated to send the health plan's medical group identifier or name, but may do so if an agreement has been made between the laboratory and the health plan. When populated, the coding system of the identifier is determined by the health plan.

CALINX Sample Value(s):

```
12345\S\San Carlos Medical Partners
                              [The laboratory's identifier and name
                              of the medical group only]
PMGSCC\S\Physician's Medical Group of Santa Cruz County\S\10113-
SC\S\Santa Cruz County Medical Group
                              [The laboratory and health plan
                               identifier and name of the medical
                               group.]
```

3.4.10. OBR-21 Filler field 2 (ST)

HL7 Definition: This field is definable for any use by the filler (laboratory).

CALINX Specification: Contains the identifier/code assigned by the laboratory and/or health plan to the Independent Practice Association (IPA) associated with the patient and the name of the IPA. The formatting and usage for this information is the same as described for Filler field 1.

CALINX Sample Value(s):

```
88476X\S\Sequoia IPA  [The laboratory's identifier and name of
                      the IPA only]
11003\S\Preferred IPA of California\S\PIPACA\S\Pref IPA of CA
                      [The laboratory and health plan identifier
                      and name of the IPA]
```

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

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 is entered or changed. (This is a results field only.)

[2] This escape sequence assumes that the backslash character ("\") is the escape character specified in MSH-2. See Section3.2.3. If a different escape character is specified, the escape sequence must begin and end with that character.

CALINX Specifications: This field should contain the date/time that the results were originally reported to the ordering provider. The first component is RE and should be reported to a precision of minutes, if available. Precision greater than minutes is also allowed, although the second component, Degree of precision, is not supported. See Section 3.2.5 for more information about the Timestamp (TS) data type.

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

Component/Sub-Component	OPT
YYYYMMDDHHMM[SS[.S[S[S[S]]]]][+/-ZZZZ]	RE
Degree of precision	X

CALINX Sample Value(s):

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

3.4.12. OBR-25 Result status (ID)

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.

CALINX Specification: Allowed values for this field appear in Table 0123 in Appendix C. Note that only the following values are allowed:

F: Final results
C: Correction to results
M: Amended results
X: No results available; Order canceled

Note that an additional value has been added to the list of HL7-defined values: "M: Amended." This value (distinct from "Correction to results") is to denote the situation in which additional tests are *added* to a specimen after the results of the initial order are reported. The reporting of these additional tests is accompanied by a result status of "M" in the OBR segment (to alert the receiving entity that the Filler Order Number may not be unique, since the same specimen was used as reported previously).

Note: The result status of "P: Preliminary" is explicitly prohibited by CALINX. CALINX is used for the periodic batch reporting of results to support quality-improvement, rather than for the real-time reporting of results to support clinical care. Hence, preliminary results are not required in CALINX reports, and certain labs may not be able to provide them when generating batch reports. In order to ensure the consistency of CALINX data originating from different labs, test results should not be included in CALINX reports until the results are finalized. If a result is still "Preliminary" at the time a CALINX report is produced, the lab should withhold that result until the first reporting cycle when its status is "Final".

Note: If a test result is reported as "Final" during one reporting period and later corrected during a subsequent reporting period, the corrected result must be encoded with a Result Status value of "C" (Corrected) in OBR-25. This designation allows the receiving system to recognize the more recent result as a corrected version of a previously received result and to make the appropriate update(s) in its database. However, if a test is finalized and subsequently corrected *within the same reporting period*, the laboratory may report only the last corrected result within the reported period (using a Result Status value of "Final") and not report the earlier result(s).

3.5. 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.

3.5.1. NTE Segment Structure

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	Set ID – NTE	4	SI	O	O		
2	Source of Comment	8	ID	O	O		
3	**Comment**	**65536**	**FT**	**O**	**RE**	**Y**	**3.5.2**
4	Comment Type	250	CE	O	O		

3.5.2. NTE-3 Comment (FT)

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

CALINX Specification: Note that Comment is a repeating field, so that multiple comments may be included in a single NTE segment. This flexibility allows the CALINX standard to specify a single NTE segment per OBR and OBX segment, a simplification that facilitates processing.

> 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 is not the appropriate use of the NTE segment in the CALINX standard, and it is not necessary to report text-based test results in this way. Note that the OBX segment (see Section 3.6) can accommodate any text-based reporting, since the Observation Value field (see Section 3.6.4) 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.

3.6. 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 Section 3.6.4), 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 3.6.2).

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 maintained in a set of external documents. There is a separate document for each calendar year that NCQA releases updates to the

LOINC codes used in the HEDIS laboratory measures. The documents are titled "CALINX Lab LOINC Codes (<HEDIS Calendar Year>)" where "<HEDIS Calendar Year>" is replaced with the reporting calendar year to which the LOINC codes in the document apply.. In addition to LOINC codes, these external documents specify which tests must include a valid value in the Units field, Reference Range field, and Abnormal Flags field of the OBX segment. Other tests may have values in these fields, but they are not RE. Lastly, the documents indicate what Value Types are valid for each of the listed tests, so that receiving systems can know what data types to expect when results for these tests are reported. The latest "CALINX Lab LOINC Codes" document may be downloaded from the IHA.org CALINX Lab website (http://www.iha.org/calinx/calinxrxlab.htm).

3.6.1. OBX Segment Structure

HL7 Attribute Table – OBX – Observation/Result

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	Set ID – OBX	4	SI	O	O		
2	**Value Type**	**2**	**ID**	**C**	**RE***		**3.6.2**
3	**Observation Identifier**	**250**	**CE**	**R**	**R**		**3.6.3**
4	Observation Sub-ID	20	ST	C	O		
5	**Observation Value**	**65536**[3]	*****	**C**	**RE**	**Y**[4]	**3.6.4**
6	**Units**	**250**	**CE**	**O**	**RE***		**3.6.5**
7	**References Range**	**60**	**ST**	**O**	**RE***		**3.6.6**
8	**Abnormal Flags**	**5**	**IS**	**O**	**RE***	**Y/5**	**3.6.7**
9	Probability	5	NM	O	O		
10	Nature of Abnormal Test	2	ID	O	O	Y	
11	**Observation Result Status**	**1**	**ID**	**R**	**R**		**3.6.8**
12	Date Last Observation Normal Value	26	TS	O	O		
13	User Defined Access Checks	20	ST	O	O		
14	Date/Time of the Observation	26	TS	O	O		
15	Producer's ID	250	CE	O	O		
16	Responsible Observer	250	XCN	O	O	Y	
17	Observation Method	250	CE	O	O	Y	
18	Equipment Instance Identifier	22	EI	O	O	Y	
19	Date/Time of the Analysis	26	TS	O	O		

* Values for this field may be Optional, depending on the identity of the test or the observational result status. See the description for each field below in Appendix B for details.

3.6.2. 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.

---

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

4 May repeat for multipart, single answer results with appropriate data types, e.g., CE, TX, and FT data types.

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.

Any HL7 data type may be used, except CM, CQ, SI, and ID. See Table 0125 in Appendix C for a list of allowed values.

We allow the FT data type in the OBX segment but its use is discouraged. Formatted text usually implies a meaningful structure; for example, a list of three independent diagnoses reported on different lines. But ideally, the structure in three independent diagnostic statements would be reported as three separate OBX segments.

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.

CALINX Specification: Although HL7 allows the use of most data types in OBX segments (see Table 0125 in Appendix C), 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. For those tests listed in Appendix B, the allowed values of OBX-2 are restricted to the values listed in the Value Types column. For example, the only value types that may be used when reporting a Hemoglobin A1c % result (LOINC codes 4548-4, 4549-2, and 17856-6) are “NM” and “SN”.

In certain cases, an OBX segment may contain no test result value (i.e., no value for OBX-5 Observation Value). This case occurs if one component of a panel was cancelled or could not be completed (i.e., if OBX-11 Observation Result Status = “X”). In these cases, OBX-2 Value Type may also be unpopulated (not present).

3.6.3. 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)>
```

CALINX Specification: For the subset of tests listed in Appendix B, the LOINC coding system *must* be used to represent the observation (test) identifier for results reported in the CALINX standard. Note that local proprietary codes may *also* be transmitted with the LOINC code for these tests (using the <alternate identifier (ST)> and <name of alternate coding system (IS)> components), but a LOINC code is required at least. The complete set of codes and associated documentation may be obtained from www.loinc.org.

For tests that do not appear in the list of Appendix B, there are no restrictions on the coding system that may be used to identify the reported test, including labs’ local codes. See Table 0396 in Appendix C for a list of coding systems that are allowed in these cases.

Field: OBX-3 Observation Identifier

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

CALINX Sample Values:

`2089-1^LDL Cholesterol^LN` [LOINC code for LDL Cholesterol, test per Appendix B]

`2089-1^LDL Cholesterol^LN^576X^LDL Chol^L`

[LOINC code for LDL Cholesterol, plus a local code]

3.6.4. 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.

CALINX Specification: For tests listed in Appendix B, the Observation Value must be reported using one of the Value Types specified for the test. 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 will be reported as a string data (ST) value type, implying that any alphanumeric characters and free text may appear in the result.

In certain circumstances, an OBX segment may contain no test result value. This situation occurs if one component of a panel was cancelled or could not be completed (i.e., if OBX-11 Observation Result Status = "X"). In these circumstances, the Observation Value may be omitted from the OBX segment. For example, if the result of an LDL Cholesterol value cannot be accurately calculated due to an off-scale high triglyceride value, the Observational Result Status for the LDL analyte would be 'X' and no value would be provided in OBX-5.

CALINX 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]

3.6.5. 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. The default coding system for the units codes consists of the ISO abbreviation for a single case unit (ISO 2955-83) plus extensions that do not collide with ISO abbreviations. We designate this coding system as "ISO+". The ISO+ abbreviations *are* the codes for the default coding system. Consequently, when ISO+ units are being used, only ISO+ abbreviations need be sent, and the contents of the Units field will be backward compatible to HL7 Version 2.1.

For more information about the valid construction of ISO+ codes, see Chapter 7 of the HL7 Version 2.4 standard specification, available from www.hl7.org.

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

CALINX Specification: Table ISO+ in Appendix C lists common units designations (codes) that may appear in the <identifier (ST)> component of the Units field. The corresponding name in Table ISO+ may appear in the <text (ST)> component (although other equivalent names could appear or no name), and the <name of coding system (IS)> component should be hard-coded to "ISO+".

Note that Table ISO+ is not exhaustive. For example, it does not contain units for reporting certain mass ratios, such as "ug/mg." See Chapter 7 of the HL7 Version 2.4 standard specification for units construction rules.

Note that the Units field is an RE field only for those tests in Appendix B that have the flag "RE" in the Units column. For any other tests, it is highly desirable that the Units field be populated if the observation value is measured on a continuous scale and the value type is numeric (NM) or structured numeric (SN), although this is not required per the CALINX standard. If the units field is populated, however, it must be done based on Table ISO+ and the HL7 Version 2.4 standard specification for units construction rules.

Note: If OBX-11 Observation Result Status = "X" (Cancelled/Not Obtainable), then OBX-6 Units may be unpopulated (not present), regardless of the requirements in Appendix B.

Field: OBX-6 Units (CE)

Component/Sub-Component	OPT
identifier (ST)	RE
text (ST)	O
name of coding system (IS)	RE
alternate identifier (ST)	O
alternate text (ST)	O
name of alternate coding system (IS)	O

CALINX Sample Value(s):

```
mg/dL^Milligram/Deciliter^ISO+
%^Percent^ISO+
```

3.6.6. OBX-7 References range (ST)

HL7 Definition: When the observation quantifies the amount of a toxic substance, then the upper limit of the range identifies the toxic limit. If the observation quantifies a drug, the lower limits identify the lower

therapeutic bounds and the upper limits represent the upper therapeutic bounds above which toxic side effects are common.

Components: for numeric values in the format:

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".

CALINX Specification: Reference Range is technically a String-valued field. As such, the components 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. However, some value for the reference range should be included for those tests listed in Appendix B.

Note: If OBX-11 Observation Result Status = "X" (Cancelled/Not Obtainable), then OBX-7 Reference Range may be unpopulated (not present), regardless of the requirements in Appendix B.

CALINX Sample Value(s):

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

3.6.7. 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.

CALINX Specification: For those tests listed in Appendix B, an Abnormal Flag value must appear for all tests with an "RE" in the "Normal/Abnormal Flag" column. For any other tests, an Abnormal Flag value is desirable, but not RE. When this field is populated, the values must be coded per the allowable values in Table 0078 in Appendix C.

Note: If OBX-11 Observation Result Status = "X" (Cancelled/Not Obtainable), then OBX-8 Abnormal Flags may be unpopulated (not present), regardless of the requirements in Appendix B.

3.6.8. OBX-11 Observation result status (ID)

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

It is a required field. The values of this field are to be interpreted as follows:

> Code **F** indicates that the result has been verified to be correct and final.
>
> Code **W** indicates that the result has been verified to be wrong (incorrect); a replacement (corrected) result may be transmitted later.
>
> Code **C** indicates that data contained in the *OBX-5-observation value* field are to replace previously transmitted (verified and) final result data with the same observation ID, usually because the previous results were wrong.

Code **D** indicates that data previously transmitted in a result segment with the same observation ID should be deleted. When changing or deleting a result, multiple OBX segments with the same observation ID are replaced or deleted as a unit.

CALINX Specification: Refer to Table 0085 in Appendix C for a list of valid values for this field. Because this field is required per the HL7 standard, CALINX senders of data should always populate this field. If the observation result status is unknown, the sender should send the default code "**F**" (Final).

Allowed values: The following table shows the allowed values for OBX-11 Observation Result Status for each of the allowed values of OBR-25 Result Status (see Section 3.4.12).

OBR-25 and OBX-11 Allowed Status Combinations

OBR-25 Result Status	OBX-11 Observation Result Status
F – Final	**F** – Final **X** – Result Not Obtained
C – Corrected	**C** – Corrected **D** – Deleted **F** – Final **W** – Verified as Wrong
X – Cancelled	**X** – Result Not Obtained
M – Amended	**F** – Final

If multiple results are reported for a single ordered test (i.e., if multiple OBX segments appear under a single OBR segment), the values of OBX-11 may be any combination of the allowed values corresponding to the value of OBR-25. For example, if an OBR segment has a value of "**C**" (Corrected) in field OBR-25, the child OBX segments may have any combination of the values "**C**" (Corrected), "**D**" (Deleted), "**F**" (Final) or "**W**" (Verified as Wrong) in OBX-11.

Note: Cancelled Analytes. If the lab could not obtain a result for one or more analytes within a panel, the Observation Result Status for those analytes' OBX segments must be recorded as "**X**" (Result Not Obtained). This may occur when the value for a calculated result could not be obtained, when the quantity of a specimen was insufficient, or when the quality of a specimen was inadequate. In these cases, any text comments indicating that the analyte was not obtained or explaining why it was not obtained should be placed in the corresponding NTE segment, **NOT** in OBX-5 Observation Value. Specifically, a cancelled analyte should **NOT** be reported with an Observation Result Status value of "**F**" (Final) and an Observation Value of "TNP – Test Not Performed" (or similar text).

Note: Preliminary Results. The Observation Result Status "**P**" (Preliminary) is **prohibited** by CALINX. See table above.

Note: Result Corrections: When reporting an analyte as "**C**" (Corrected), "**D**" (Deleted), or "**W**" (Verified as Wrong) the value of the Result Status field (OBR-25) in the parent OBR segment must be "**C**" (Corrected). See table above.

3.7. FT1 – financial transaction segment

The FT1 segment typically contains the detail data necessary to post charges, payments, adjustments, etc. to patient accounting records. However, in the CALINX standard, the FT1 segment is used primarily to transmit information about the diagnosis code(s) associated with a test result. The FT1 segment may also be used to transmit information about the patient's insurance plan, if available.

3.7.1. FT1 Segment Structure

HL7 Attribute Table - FT1 – Financial Transaction

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	Set ID - FT1	4	SI	O	O		
2	Transaction ID Transaction	12	ST	O	O		
3	Batch ID **Transaction Date**	10	ST	O	O		
4	Transaction Posting Date	**26**	**TS**	**R**	**R**		**3.7.2**
5	**Transaction Type**	26	TS	O	O		
6	**Transaction Code**	**8**	**IS**	**R**	**R**		**3.7.3**
7	Transaction Description	**250**	**CE**	**R**	**R**		**3.7.4**
8	Transaction Description - Alt	40	ST	B	O		
9	Transaction Quantity	40	ST	B	O		
10	Transaction Amount - Extended	6	NM	O	O		
11	Transaction Amount - Unit	12	CP	O	O		
12	Department Code	12	CP	O	O		
13	**Insurance Plan ID**	250	CE	O	O		
14	Insurance Amount	**250**	**CE**	**O**	**RE**		**3.7.5**
15	Assigned Patient Location	12	CP	O	O		
16	Fee Schedule	80	PL	O	O		
17	Patient Type	1	IS	O	O		
18	**Diagnosis Code**	2	IS	O	O		
19	Performed By Code	**250**	**CE**	**O**	**RE**	**Y**	**3.7.6**
20	Ordered By Code	250	XCN	O	O	Y	
21	Unit Cost	250	XCN	O	O	Y	
22	Filler Order Number	12	CP	O	O		
23	Entered By Code	22	EI	O	O		
24	Procedure Code	250	XCN	O	O	Y	
25	Procedure Code Modifier	250	CE	O			
26		250	CE	O		Y	

3.7.2. FT1-4 Transaction date (TS)

HL7 Definition: This field contains the date of the transaction. For example, this field would be used to identify the date a procedure, item, or test was conducted or used. It may be defaulted to today's date.

CALINX Specification: This field should be defaulted to the current date, i.e., the date on which the message was created. Note that this field is not needed for the purposes of the CALINX lab reporting standard, but it is a required field in the FT1 segment per the HL7 standard.

The value of the first component may contain the date only (i.e., the components of the timestamp (TS) data type that contain the time, time zone, etc. down to the maximum precision of the data type need not be included, although they may be included if doing so is more convenient for the sending system). The second component, degree is precision, is not supported.

Field: FT1-4 Transaction Date (TS)

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

CALINX Sample Value(s):

```
20040723
20040723143045-0800
```

3.7.3. FT1-6 Transaction type (IS)

HL7 Definition: This field contains the code that identifies the type of transaction.

CALINX Specification: This field is not required for the purposes of the CALINX lab reporting standard, but it is a required field in the FT1 segment per the HL7 standard. The receiving application will ignore it. The field value should be hard-coded to "NA" (Not Applicable). See Table 0017 in Appendix C for the allowed values of this table in the CALINX standard.

3.7.4. FT1-7 Transaction code (CE)

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

HL7 Definition: This field contains the code assigned by the institution for the purpose of uniquely identifying the transaction. For example, this field would be used to uniquely identify a test for charging purposes.

CALINX Definition: This field is not required for the purposes of the CALINX lab reporting standard, but it is a required field in the FT1 segment per the HL7 standard. Hence, the sending system may populate this field as it wishes – the receiving system will ignore it. For convenience, this field could be populated with the same value as used in OBR-4 Universal Service Identifier (also a required field).

Field: FT1-7 Transaction Code (CE)

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

CALINX Sample Value(s):

```
75-887^CBC^L                        [proprietary code for a CBC]
85027^Complete blood count^C4       [CPT-4 code for a CBC]
```

3.7.5. FT1-14 Insurance plan ID (CE)

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

HL7 Definition: This field contains the identifier of the primary insurance plan with which this transaction should be associated.

CALINX Specification: This field is RE, but it is recognized that the patient's insurance information may not be available in many cases, particularly when the sending laboratory contracts directly with a provider organization and does not rely on insurance information for payment. In cases where the information is not available, this field may be left empty (null).

When insurance information is available, the California Department of Managed Health Care (DMHC) *Plan ID* should be used as the coding system for insurance carriers operating in California (see the list of licensed health plans at www.dmhc.ca.gov for the current list of values).

The <name of coding system (IS)> component should be hard-coded to "DMHC" for this field.

Field: FT1-14 Insurance Plan ID

Component/Sub-Component	OPT
identifier (ST)	RE
text (ST)	RE
name of coding system (IS)	RE
alternate identifier (ST)	O
alternate text (ST)	O
name of alternate coding system (IS)	O

CALINX Sample Value(s):

```
0176^Aetna^DMHC
0043^Blue Shield^DMHC
```

3.7.6. FT1-19 Diagnosis code - FT1 (CE)

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

HL7 Definition: This field contains the primary diagnosis code for billing purposes. ICD9-CM is assumed for all diagnosis codes. This is the most current diagnosis code that has been assigned to the patient.

CALINX Specification: This field should be reported if the information has been received by the laboratory. ICD10-CM codes must be used in this field, if it is populated. The <name of coding system (IS)> component should be hard-coded to "I10". Note that Diagnosis Code is a repeating field, so that multiple diagnosis codes may be contained in one FT1 segment (this eliminates the need to have repeating FT1 segments, which is not allowed in the CALINX message structure).

Field: FT1-19 Diagnosis Code (CE)

Component/Sub-Component	OPT
identifier (ST)	RE
text (ST)	RE
name of coding system (IS)	RE
alternate identifier (ST)	O
alternate text (ST)	O

Component/Sub-Component	OPT
name of alternate coding system (IS)	O

CALINX Sample Value(s):

```
250^Diabetes Mellitus^I10
428.0^Congestive Heart Failure^I10
```

3.8. FHS – File Header Segment

The FHS segment is used to commence a file containing multiple CALINX laboratory messages, per the CALINX batch file structure, as described in Section 2.3. This segment and the batch file structure only apply when data is sent in a batch file.

FHS Segment Structure

HL7 Attribute Table - FHS - File Header

SEQ	Comment/Description	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	**File Field Separator**	**1**	**ST**	**R**	**R**		**3.8.1**
2	**File Encoding Characters**	**4**	**ST**	**R**	**R**		**3.8.2**
3	File Sending Application	15	ST	O	O		
4	**File Sending Facility**	**50**	**ST**	**O**	**RE**		**3.8.3**
5	File Receiving Application	15	ST	O	O		
6	**File Receiving Facility**	**50**	**ST**	**O**	**RE**		**3.8.4**
7	**File Creation Date/Time**	**26**	**TS**	**O**	**RE**		**3.8.5**
8	File Security	40	ST	O	O		
9	File Name/ID	20	ST	O	O		
10	**File Header Comment**	**80**	**ST**	**O**	**O**		**3.8.6**
11	File Control ID	20	ST	O	O		
12	Reference File Control ID	20	ST	O	O		

3.8.1. FHS-1 File field separator (ST)

HL7 Definition: This field has the same definition as the corresponding field in the MSH segment.

3.8.2. FHS-2 File encoding characters (ST)

HL7 Definition: This field has the same definition as the corresponding field in the MSH segment.

3.8.3. FHS-4 File sending facility (ST)

HL7 Definition: This field has the same definition as the corresponding field in the MSH segment.

CALINX Specification: The lab results within a batch file may, in fact, originate from multiple lab facilities (for example, when a commercial lab with multiple facilities reports lab results to a payer). Hence, the value of this field cannot, in general, be the name of a single laboratory facility. It should be a text description of the sending organization. In certain cases, the sending organization may be a laboratory facility (for example, when a hospital lab sends a batch file).

CALINX Sample Value(s):

```
Laboratory Corporation of America
St. Joseph Hospital
```

Note: The data type of the File Sending Facility field described here (ST) is different than the data type of the Sending Facility field in the MSH segment (HD).

3.8.4. FHS-6 File receiving facility (ST)

HL7 Definition: This field has the same definition as the corresponding field in the MSH segment.

CALINX Definition: This field should simply contain the name of the organization for which the data is intended.

CALINX Sample Value(s):

```
Orange County IPA
Blue Shield of CA
```

3.8.5. FHS-7 File creation date/time (TS)

HL7 Definition: This field has the same definition as the corresponding field in the MSH segment.

CALINX Specification: This first component should contain the date and time (to the second) at which the batch file was created. Precision greater than seconds is allowed, although the Degree of precision component is not supported. The timestamp (TS) data type is described in more detail in Section 3.2.5.

CALINX Sample Value(s):

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

Note: the combination of the file sending facility, file receiving facility, and file creation data/time should uniquely identify any batch file of laboratory results.

3.8.6. FHS-10 File Header Comment (ST)

HL7 Definition: This field contains the free text field, the use of which is not further specified.

CALINX Definition: Although this field is optional, it is recommended that it contain a brief narrative description of the file contents. This is a convenience for organizations that receive these files.

CALINX Sample Value(s):

```
Feb. 2005 Results from LabCorp
Feb. 2005 Results from Highland Hosp. - Corrections
```

Appendix A: HL7 Message Encoding

The general structure of HL7 messages and the rules for their encoding are described below. This information may be useful in understanding and interpreting the specifications of the CALINX Laboratory Data Standard. For detailed information about HL7 Version 2.4, which is the basis for the CALINX Laboratory Data Standard, refer to the official HL7 specification available from www.hl7.org.

HL7 Message Structure

An HL7 message consists of data fields that are of variable length and separated by a field separator character. Rules describe how the various data types are encoded within a field and when an individual field may be repeated. Data fields are combined into logical groupings called segments. Segments are separated by segment separator characters. Each segment begins with a three-character literal value that identifies it within a message. Segments may be defined as required or optional and may be permitted to repeat. Individual data fields are found in the message by their position within their associated segments. The hierarchy of the structure is as follows:

- Message
  - Segment (Some are Repeatable)
    - Fields (Some are Repeatable)
      - Components
        - Subcomponents

The segments that are relevant to the CALINX Laboratory Standard are listed in Section 2.2 of this document.

HL7 Message Construction Process

Step 1 -- Construct the segments in the order defined for the message. Each segment is constructed as follows:

A. The first three characters are the segment ID code

B. Each data field in sequence is inserted in the segment in the following manner:

1. A field separator is placed in the segment
2. If the value is not present, no further characters are required
3. If the value is present, but null, the characters "" (two consecutive double quotation marks) are placed in the field
4. Otherwise, place the characters of the value in the segment. As many characters can be included as the maximum defined for the data field. It is not necessary, and is undesirable, to pad fields to fixed lengths. Padding to fixed lengths is permitted.
5. If the field definition calls for a field to be broken into components, the following rules are used:
   i. If more than one component is included they are separated by the component separator
   ii. Components that are present but null are represented by the characters ""

iii. Components that are not present are treated by including no characters in the component

iv. Components that are not present at the end of a field need not be represented by Component separators. For example, the two data fields are equivalent:

|ABC^DEF^^| and |ABC^DEF|.

6. If the component definition calls for a component to be broken into subcomponents, the following rules are used:
   i. If more than one subcomponent is included they are separated by the subcomponent separator
   ii. Subcomponents that are present but null are represented by the characters ""
   iii. Subcomponents that are not present are treated by including no characters in the subcomponent
   iv. Subcomponents that are not present at the end of a component need not be represented by subcomponent separators. For example, the two data components are equivalent:

^XXX&YYY&&^ and ^XXX&YYY^.

7. If the field definition permits repetition of a field, the following rules are used, the repetition separator is used only if more than one occurrence is transmitted and is placed between occurrences. (If three occurrences are transmitted, two repetition separators are used.) In the example below, two occurrences of telephone number are being sent:

|234-7120~599-1288B1234|

c. Repeat Step 1b while there are any fields present to be sent. If all the data fields remaining in the segment definition are not present there is no requirement to include any more delimiters.

d. End each segment with an ASCII carriage return character

Step 2 -- Repeat Step 1 until all segments have been generated.

Appendix B: Tests Requiring Special Coding in OBX Segment

The contents of this appendix have been removed from the CALINX Lab specification and are now maintained in a set of external documents. The documents are titled "CALINX Lab LOINC Codes (<HEDIS Calendar Year>)" where "<HEDIS Calendar Year" is replaced with the reporting calendar year to which the LOINC codes in the document are applicable (e.g., "CALINX Lab LOINC Codes (2009)". The document set will be updated annually as new HEDIS measures are released by NCQA. You can obtain a copy of the latest "CALINX Lab LOINC Codes" document from the IHA.org CALINX Lab website (http://www.iha.org/calinx/calinxrxlab.htm).

Appendix C: Enumerated Value Tables

HL7 Table 0001 - Administrative sex

Value	Description
F	Female
M	Male
O	Other

User-defined Table 0017 - Transaction type

Values	Description
NA	**Not Applicable**

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
MBLD	Menstrual blood

Value	Description
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
THRT	Throat
THRB	Thrombocyte (platelet)

Value	Description
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.**
I	Specimen in lab; results pending
N	Not asked; used to affirmatively document that the observation identified in the OBX was not sought when the universal service ID in OBR-4 implies that it would be sought.
O	Order detail description only (no result)
P	Preliminary results
R	Results entered -- not verified
S	Partial 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
C	**Correction to results**
M	**Amended results; tests were added to specimen after results were reported**
F	**Final results; results stored and verified. Can only be changed with a corrected result.**
X	**No results available; Order canceled.**

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
CP	Composite Price

Value	Description
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, which 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 0203 - Identifier type

Value	Description
AM	American Express
AN	Account number
B	**Blank (no identifier is available)**
BA	Bank Account Number
BR	Birth registry number
BRN	Breed Registry Number
DI	Diner's Club card
DL	Driver's license number
DN	Doctor number
DR	Donor Registration Number
DS	Discover Card
EI	Employee number
EN	Employer number
FI	Facility ID
GI	Guarantor internal identifier
GN	Guarantor external identifier
HC	**Health Card Number**
JHN	Jurisdictional health number (Canada)
LN	License number
LR	Local Registry ID
MA	Medicaid number
MC	Medicare number
MCN	Microchip Number
MR	**Medical record number**
MS	MasterCard
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
NPI	National provider identifier
PEN	Pension Number

Value	Description
PI	Patient internal identifier
PN	Person number
PRN	Provider number
PT	Patient external identifier
RR	Railroad Retirement number
RRI	Regional registry ID
SL	State license
SR	State registry ID
SS	**Social Security number**
U	Unspecified
UPIN	Medicare/HCFA's Universal Physician Identification numbers
VN	Visit number
VS	VISA
WC	WIC identifier
WCN	Workers' Comp Number
XX	Organization identifier

User Defined Table 0396 – Coding Systems

Value	Description
L	**Local general code**
C4	**CPT-4**
E	EUCLIDES
HPC	**HCFA Procedure Codes (HCPCS)**
I10	ICD-10
I10P	ICD-10 Procedure Codes
I9	ICD9
I9C	ICD-9CM
LN	**Logical Observation Identifier Names and Codes (LOINC(r))**
SNM	Systemized Nomenclature of Medicine (SNOMED)
SCT	Snomed CT

User Defined Table 0362 – Sending/Receiving Facility

Value	Description
LC	Laboratory Corporation of America (LabCorp)
QD	Quest Diagnostics
CL	CLIA (Clinical Laboratory Improvement Act)

Table ISO+: Common ISO derived units and ISO+ extensions

Code/Abbr.	Name
/(arb_u)	*1 / arbitrary unit
/iu	*1 / international unit
/kg	*1 / kilogram
/L	1 / liter
1/mL	*1 / milliliter
10.L/min	*10 x liter / minute
10.L /(min.m2)	*10 x (liter / minute) / meter^2 = liter / (minute D meter^2)
10*3/mm3	*10^3 / cubic millimeter (e.g., white blood cell count)
10*3/L	*10^3 / Liter
10*3/mL	*10^3 / milliliter
10*6/mm3	*10^6 / millimeter^3
10*6/L	*10^6 / Liter
10*6/mL	*10^6 / milliliter
10*9/mm3	*10^9 / millimeter^3
10*9/L	*10^9 / Liter
10*9/mL	*10^9 / milliliter
10*12/L	*10^{12} / Liter
10*3(rbc)	*1000 red blood cells†
a/m	Ampere per meter
(arb_u)	*Arbitrary unit
bar	Bar (pressure; 1 bar = 100 kilopascals)
/min	Beats or Other Events Per Minute
bq	Becquerel
(bdsk_u)	*Bodansky Units
(bsa)	*Body surface area
(cal)	*Calorie

Code/Abbr.	Name
1	*Catalytic Fraction
/L	Cells / Liter
cm	Centimeter
cm_h20	* Centimeters of water =H_20 (pressure)
cm_h20.s/L	Centimeters H_20 / (liter / second) = (centimeters H_20 D second) / liter (e.g., mean pulmonary resistance)
cm_h20/(s.m)	(Centimeters H_20 / second) / meter = centimeters H_20 / (second D meter) (e.g., pulmonary pressure time product)
(cfu)	*Colony Forming Units
m3/s	Cubic meter per second
d	Day
db	Decibels
dba	*Decibels a Scale
cel	Degrees Celsius
deg	Degrees of Angle
(drop)	Drop
10.un.s/cm5	Dyne D Second / centimeter^5 (1 dyne = 10 micronewton = 10 un) (e.g., systemic vascular resistance)
10.un.s/(cm5.m2)	((Dyne D second) / centimeter^5) / meter^2 = (Dyne D second) / (centimeter^5 D meter^2) (1 dyne = 10 micronewton = 10 un) (e.g., systemic vascular resistance/body surface area)
ev	Electron volts (1 electron volt = 160.217 zeptojoules)
eq	Equivalent
f	Farad (capacitance)
fg	Femtogram
fL	Femtoliter
fmol	Femtomole
/mL	*Fibers / milliliter
g	Gram
g/d	*Gram / Day
g/dL	Gram / Deciliter
g/hr	Gram / Hour
g/(8.hr)	*Gram / 8 Hour Shift
g/kg	Gram / Kilogram (e.g., mass dose of medication per body weight)
g/(kg.d)	(Gram / Kilogram) / Day = gram / (kilogram D day) (e.g., mass dose of medication per body weight per day)

Code/Abbr.	Name
g/(kg.hr)	(Gram / Kilogram) / Hour = gram / (kilogram D hour) (e.g., mass dose of medication per body weight per hour)
g/(8.kg.hr)	(Gram / Kilogram) /8 Hour Shift = gram / (kilogram D 8 hour shift) (e.g., mass dose of medication per body weight per 8 hour shift)
g/(kg.min)	(Gram / Kilogram) / Minute = gram / (kilogram D minute) (e.g., mass dose of medication per body weight per minute)
g/L	Gram / Liter
g/m2	Gram / Meter^2 (e.g., mass does of medication per body surface area)
g/min	Gram / Minute
g.m/(hb)	Gram D meter / heart beat (e.g., ventricular stroke work)
g.m/((hb).m2)	(Gram D meter/ heartbeat) / meter^2 = (gram D meter) / (heartbeat D meter^2) (e.g., ventricular stroke work/body surface area, ventricular stroke work index)
g(creat)	*Gram creatinine
g(hgb)	*Gram hemoglobin
g.m	Gram meter
g(tot_nit)	*Gram total nitrogen
g(tot_prot)	*Gram total protein
g(wet_tis)	*Gram wet weight tissue
gy	Grey (absorbed radiation dose)
hL	Hectaliter = 10^2 liter
h	Henry
in	Inches
in_hg	Inches of Mercury (=Hg)
iu	*International Unit
iu/d	*International Unit / Day
iu/hr	*International Unit / Hour
iu/kg	International Unit / Kilogram
iu/L	*International Unit / Liter
iu/mL	*International Unit / Milliliter
iu/min	*International Unit / Minute
j/L	Joule/liter (e.g., work of breathing)
kat	*Katal
kat/kg	*Katal / Kilogram
kat/L	*Katal / Liter

Code/Abbr.	Name
k/watt	Kelvin per watt
(kcal)	Kilocalorie (1 kcal = 6.693 kilojoule)
(kcal)/d	*Kilocalorie / Day
(kcal)/hr	*Kilocalorie / Hour
(kcal)/(8.hr)	*Kilocalorie / 8 Hours Shift
kg	Kilogram
kg(body_wt)	* kilogram body weight
kg/m3	Kilogram per cubic meter
kh/h	Kilogram per hour
kg/L	Kilogram / liter
kg/min	Kilogram per minute
kg/mol	Kilogram / mole
kg/s	Kilogram / second
kg/(s.m2)	(Kilogram / second)/ meter^2 = kilogram / (second D meter^2)
kg/ms	Kilogram per square meter
kg.m/s	Kilogram meter per second
kpa	Kilopascal (1 mmHg = 0.1333 kilopascals)
ks	Kilosecond
(ka_u)	King-Armstrong Unit
(knk_u)	*Kunkel Units
L	Liter
L/d	*Liter / Day
L/hr	Liter / hour
L/(8.hr)	*Liter / 8 hour shift
L/kg	Liter / kilogram
L/min	Liter / minute
L/(min.m2)	(Liter / minute) / meter^2 = liter / (minute D meter^2) (e.g., cardiac output/body surface area = cardiac index)
L/s	Liter / second (e.g., peak expiratory flow)
L.s	Liter / second / second^2 = liter D second
lm	Lumen
lm/m2	Lumen / Meter^2
(mclg_u)	*MacLagan Units
mas	Megasecond

Code/Abbr.	Name
m	Meter
m2	Meter^2 (e.g., body surface area)
m/s	Meter / Second
m/s2	Meter / Second^2
ueq	*Microequivalents
ug	Microgram
ug/d	Microgram / Day
ug/dL	Microgram / Deciliter
ug/g	Microgram / Gram
ug/hr	*Microgram / Hour
ug(8hr)	Microgram / 8 Hour Shift
ug/kg	Microgram / Kilogram
ug/(kg.d)	(Microgram / Kilogram) /Day = microgram / (kilogram D day) (e.g., mass dose of medication per patient body weight per day)
ug/(kg.hr)	(Microgram / Kilogram) / Hour = microgram / (kilogram D hours) (e.g., mass dose of medication per patient body weight per hour)
ug/(8.hr.kg)	(Microgram / Kilogram) / 8 hour shift = microgram / (kilogram D 8 hour shift) (e.g., mass dose of medication per patient body weight per 8 hour shift)
ug/(kg.min)	(Microgram / Kilogram) / Minute = microgram / (kilogram D minute) (e.g., mass dose of medication per patient body weight per minute)
ug/L	Microgram / Liter
ug/m2	Microgram / Meter^2 (e.g., mass dose of medication per patient body surface area)
ug/min	Microgram / Minute
uiu	*Micro international unit
ukat	*Microkatel
um	Micrometer (Micron)
umol	Micromole
umol/d	Micromole / Day
umol/L	Micromole / Liter
umol/min	Micromole / Minute
us	Microsecond
uv	Microvolt
mbar	Millibar (1 millibar = 100 pascals)

Code/Abbr.	Name
mbar.s/L	Millibar / (liter / second) =(millibar D second) / liter (e.g., expiratory resistance)
meq	*Milliequivalent
meq/d	*Milliequivalent / Day
meq/hr	*Milliequivalent / Hour
meq/(8.hr)	Milliequivalent / 8 Hour Shift
meq/kg	Milliequivalent / Kilogram (e.g., dose of medication in milliequivalents per patient body weight)
meq/(kg.d)	(Milliequivalents / Kilogram) / Day = milliequivalents / (kilogram D day) (e.g., dose of medication in milliequivalents per patient body weight per day)
meq/(kg.hr)	(Milliequivalents / Kilogram) / Hour = milliequivalents / (kilogram D hour) (e.g., dose of medication in milliequivalents per patient body weight per hour)
meq/(8.hr.kg)	(Milliequivalents / Kilogram) / 8 Hour Shift = milliequivalents / (kilogram D 8 hour shift) (e.g., dose of medication in milliequivalents per patient body weight per 8 hour shift)
meq/(kg.min)	(Milliequivalents / Kilogram) / Minute = milliequivalents / (kilogram D minute) (e.g., dose of medication in milliequivalents per patient body weight per minute)
meq/L	Milliequivalent / Liter
	Milliequivalent / Meter^2 (e.g., dose of medication in milliequivalents per patient body surface area)
meq/min	Milliequivalent / Minute
mg	Milligram
mg/m3	Milligram / Meter^3
mg/d	Milligram / Day
mg/dL	Milligram / Deciliter
mg/hr	Milligram / Hour
mg/(8.hr)	Milligram / 8 Hour shift
mg/kg	Milligram / Kilogram
mg/(kg.d)	(Milligram / Kilogram) / Day = milligram / (kilogram D day) (e.g., mass dose of medication per patient body weight per day)
mg/(kg.hr)	(Milligram / Kilogram) / Hour = milligram/ (kilogram D hour) (e.g., mass dose of medication per patient body weight per hour)
mg/(8.hr.kg)	(Milligram / Kilogram) /8 Hour Shift = milligram / (kilogram D 8 hour shift) (e.g., mass dose of medication per patient body weight per 8 hour shift)
mg/(kg.min)	(Milligram / Kilogram) / Minute = milligram / (kilogram D minute) (e.g., mass dose of medication per patient body weight per hour)
mg/L	Milligram / Liter

Code/Abbr.	Name
mg/m2	Milligram / Meter^2 (e.g., mass dose of medication per patient body surface area)
mg/min	Milligram / Minute
mL	Milliliter
mL/cm_h20	Milliliter / Centimeters of Water (H_20) (e.g., dynamic lung compliance)
mL/d	*Milliliter / Day
mL/(hb)	Milliliter / Heart Beat (e.g., stroke volume)
mL/((hb).m2)	(Milliliter / Heart Beat) / Meter^2 = Milliliter / (Heart Beat D Meter^2) (e.g., ventricular stroke volume index)
mL/hr	*Milliliter / Hour
mL/(8.hr)	*Milliliter / 8 Hour Shift
mL/kg	Milliliter / Kilogram (e.g., volume dose of medication or treatment per patient body weight)
mL/(kg.d)	(Milliliter / Kilogram) / Day = milliliter / (kilogram D day) (e.g., volume dose of medication or treatment per patient body weight per day)
mL/(kg.hr)	(Milliliter / Kilogram) / Hour = milliliter / (kilogram D hour) (e.g., volume dose of medication or treatment per patient body weight per hour)
mL/(8.hr.kg)	(Milliliter / Kilogram) / 8 Hour Shift = milliliter / (kilogram D 8 hour shift) (e.g., volume dose of medication or treatment per body weight per 8 hour shift)
mL/(kg.min)	(Milliliter / Kilogram) / Minute = milliliter / (kilogram D minute) (e.g., volume dose of medication or treatment per patient body weight per minute)
mL/m2	Milliliter / Meter^2 (e.g., volume of medication or other treatment per patient body surface area)
mL/mbar	Milliliter / Millibar (e.g., dynamic lung compliance)
mL/min	Milliliter / Minute
mL/(min.m2)	(Milliliter / Minute) / Meter^2 = milliliter / (minute D meter^2) (e.g., milliliters of prescribed infusion per body surface area; oxygen consumption index)
mL/s	Milliliter / Second
mm	Millimeter
mm(hg)	*Millimeter (HG) (1 mm Hg = 133.322 kilopascals)
mm/hr	Millimeter/ Hour
mmol/kg	Millimole / Kilogram (e.g., molar dose of medication per patient body weight)
mmol/(kg.d)	(Millimole / Kilogram) / Day = millimole / (kilogram D day) (e.g., molar dose of medication per patient body weight per day)
mmol/(kg.hr)	(Millimole / Kilogram) / Hour = millimole / (kilogram D hour) (e.g., molar dose of medication per patient body weight per hour)

Code/Abbr.	Name
mmol/(8.hr.kg)	(Millimole / Kilogram) / 8 Hour Shift = millimole / (kilogram D 8 hour shift) (e.g., molar dose of medication per patient body weight per 8 hour shift)
mmol/(kg.min)	(Millimole / Kilogram) / Minute = millimole / (kilogram D minute) (e.g., molar dose of medication per patient body weight per minute)
mmol/L	Millimole / Liter
mmol/hr	Millimole / Hour
mmol/(8hr)	Millimole / 8 Hour Shift
mmol/min	Millimole / Minute
mmol/m2	Millimole / Meter^2 (e.g., molar dose of medication per patient body surface area)
mosm/L	*Milliosmole / Liter
ms	Milliseconds
mv	Millivolts
miu/mL	*Milliunit / Milliliter
mol/m3	Mole per cubic meter
mol/kg	Mole / Kilogram
mol/(kg.s)	(Mole / Kilogram) / Second = mole / (kilogram D second)
mol/L	Mole / Liter
mol/s	Mole / Second
ng	Nanogram
ng/d	Nanogram / Day
ng/hr	*Nanogram / Hour
ng/(8.hr)	Nanogram / 8 Hour shift
ng/L	Nanogram / Liter
ng/kg	Nanogram / Kilogram (e.g., mass dose of medication per patient body weight)
ng/(kg.d)	(Nanogram / Kilogram) / Day = nanogram / (kilogram D day) (e.g., mass dose of medication per patient body weight per day)
ng/(kg.hr)	(Nanogram / Kilogram) / Hour = nanogram / (kilogram D hour) (e.g., mass dose of medication per patient body weight per hour)
ng/(8.hr.kg)	(Nanogram / Kilogram) / 8 Hour Shift = nanogram / (kilogram D 8 hour shift) (e.g., mass dose of medication per patient body weight per 8 hour shift)
ng/(kg.min)	(Nanogram / Kilogram) / Minute = nanogram / (kilogram D minute) (e.g., mass dose of medication per patient body weight per minute)
ng/m2	Nanogram / Meter^2 (e.g., mass dose of medication per patient body surface area)
ng/mL	Nanogram / Milliliter

Code/Abbr.	Name
ng/min	*Nanogram / Minute
ng/s	*Nanogram / Second
nkat	*Nanokatel
nm	Nanometer
nmol/s	Nanomole / Second
ns	Nanosecond
n	Newton (force)
n.s	Newton second
(od)	*O.D. (optical density)
ohm	Ohm (electrical resistance)
ohm.m	Ohm meter
osmol	Osmole
osmol/kg	Osmole per kilogram
osmol/L	Osmole per liter
/m3	*Particles / Meter^3
/L	*Particles / Liter
/(tot)	*Particles / Total Count
(ppb)	*Parts Per Billion
(ppm)	*Parts Per Million
(ppth)	Parts per thousand
(ppt)	Parts per trillion (10^12)
pal	Pascal (pressure)
/(hpf)	*Per High Power Field
(ph)	*pH
pa	Picoampere
pg	Picogram
pg/L	Picogram / Liter
pg/mL	Picogram / Milliliter
pkat	*Picokatel
pm	Picometer
pmol	*Picomole
ps	Picosecond
pt	Picotesla
(pu)	*P.U.

Code/Abbr.	Name
%	Percent
dm2/s2	Rem (roentgen equivalent man) = 10^{-2} $meter^2$ / $second^2$ = $decimeter^2$ / $second^2$ Dose of ionizing radiation equivalent to 1 rad of x-ray or gamma ray) [From Dorland's Medical Dictionary]
sec	Seconds of arc
sie	Siemens (electrical conductance)
sv	Sievert
m2/s	Square meter / second
cm2/s	Square centimeter / second
t	Tesla (magnetic flux density)
(td_u)	Todd Unit
v	Volt (electric potential difference)
1	Volume Fraction
wb	Weber (magnetic flux)

* Starred items are not genuine ISO, but do not conflict.

† This approach to units is discouraged by IUPAC. We leave them solely for backward compatibility.

Appendix D. Summary View of CALINX Lab 1.3

The table below shows the segments in the HL7 ORU message (version 2.4) that are relevant to the CALINX Laboratory Data Standard. For an explanation of the notation, see Section 2.1. For a listing of all of the segments that may appear in an HL7 ORU message, see Section 2.2.

CALINX ORU Message Structure

Segment ID	CALINX Opt	Segment Name
MSH	R	Message Header
{		
PID	R	Patient Identification
{		
OBR	R	Observations Report ID
[NTE]	RE	Notes and comments
{		
OBX	R	Observation/Result
[NTE]	RE	Notes and comments
}		
[FT1]	RE	Financial Transaction
}		
}		

The following tables show the fields in each segment that are relevant to the CALINX Laboratory Data Standard. For an explanation of the columns in these tables, see Section 3.1. Note that many optional fields are omitted from these listings, although delimiters for these fields (even if empty) must be included in valid CALINX messages. For a listing of all of the fields that appear in each segment of a CALINX message, see Sections 3.2 - 0.

HL7 Attribute Table - MSH - Message Header

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	Field Separator	1	ST	R	R		3.2.2
2	Encoding Characters	4	ST	R	R		3.2.3
4	Sending Facility	180	HD	O	RE		3.2.4
7	Date/Time Of Message	26	TS	R	R		3.2.5
9	Message Type	13	CM	R	R		3.2.6
10	Message Control ID	20	ST	R	R		3.2.7
11	Processing ID	3	PT	R	R		3.2.8
12	Version ID	60	VID	R	R		3.2.9
15	Accept Acknowledgment Type	2	ID	O	RE		3.2.10
16	Application Acknowledgment Type	2	ID	O	RE		3.2.11
21	Conformance Statement ID	10	ID	O	RE	Y	3.2.10

HL7 Attribute Table – PID – Patient identification

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/#	Comment/ Description
3	Patient Identifier List	250	CX	R	R	Y	3.3.2
5	Patient Name	250	XPN	R	R	Y	3.3.3
7	Date/Time of Birth	26	TS	O	RE		3.3.4
8	Administrative Sex	1	IS	O	RE		3.3.5
11	Patient Address	250	XAD	O	RE	Y	3.3.6
13	Phone Number - Home	250	XTN	O	RE	Y	3.3.7

HL7 Attribute Table – OBR – Observation Request

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/#	Comment/ Description
3	Filler Order Number	50	EI	C	R		3.4.3
4	Universal Service Identifier	250	CE	R	R		3.4.4
7	Observation Date/Time #	26	TS	C	R		3.4.5
8	Observation End Date/Time #	26	TS	O	O		3.4.6
15	Specimen Source *	300	CM	O	O		3.4.7
16	Ordering Provider	250	XCN	O	RE	Y	3.4.8
20	Filler Field 1 +	60	ST	O	RE		3.4.9
21	Filler Field 2 +	60	ST	O	RE		3.4.10
22	Results Rpt/Status Chng - Date/Time +	26	TS	C	RE		3.4.11
25	Result Status +	1	ID	C	R		3.4.12

HL7 Attribute Table - NTE - Notes and Comments

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/#	Comment/ Description
3	Comment	65536	FT	O	RE	Y	3.5.2

HL7 Attribute Table – OBX – Observation/Result

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/#	Comment/ Description
2	Value Type	2	ID	C	RE		3.6.2
3	Observation Identifier	250	CE	R	R		3.6.3
5	Observation Value	65536[5]	*	C	RE	Y[6]	3.6.4
6	Units	250	CE	O	RE		3.6.5
7	References Range	60	ST	O	RE		3.6.6
8	Abnormal Flags	5	IS	O	RE	Y/5	3.6.7
11	Observation Result Status	1	ID	R	R		3.6.8

HL7 Attribute Table - FT1 – Financial Transaction

SEQ	ELEMENT NAME	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/#	Comment/ Description
4	Transaction Date	26	TS	R	R		3.7.2
6	Transaction Type	8	IS	R	R		3.7.3
7	Transaction Code	250	CE	R	R		3.7.4
14	Insurance Plan ID	250	CE	O	RE		3.7.5
19	Diagnosis Code	250	CE	O	RE	Y	3.7.6

HL7 Attribute Table - FHS - File Header

SEQ	Comment/Description	LEN	DATA TYPE	HL7 OPT	CALINX OPT	RP/ #	Comment/ Description
1	File Field Separator	1	ST	R	R		3.8.1
2	File Encoding Characters	4	ST	R	R		3.8.2
4	File Sending Facility	50	ST	O	RE		3.8.3
6	File Receiving Facility	20	ST	O	RE		3.8.4
7	File Creation Date/Time	26	TS	O	RE		3.8.5

[6] May repeat for multipart, single answer results with appropriate data types, e.g., CE, TX, and FT data types.