Lab Results Integration

Contents

LABS OVERVIEW

Lab results are sent over MLLP/TCP or SFTP using HL7 version 2.3.1.

ORU MESSAGE STRUCTURE

Segment	Segment Name	Comments
MSH	Message Header	Required
PID	Patient Identification	Required
{[NTE]}	Notes and Comments	Optional, may repeat
PV1	Patient Visit	Required
{		
ORC	Common Order	Required, may repeat
OBR	Observation Report	Required, may repeat
{[NTE]}	Notes and Comments	Optional, may repeat
{OBX}	Observation Result	Required, may repeat
{[NTE]}	Notes and Comments	Optional in R01, may repeat.
}		

SEGMENT LAYOUTS

Heading	Contents	Values
Seq.	HL7 Field Sequence	Begins with '01' for each segment.
Name	HL7 Field Name	Defined by HL7.
R/O	Field/Component Required	R - Required field C - Conditional O - Optional B - Retained for backwards compatibility only G - Supported, but only by Grid
Comment	Field Usage Comments	

NOTE: If a field is not included, it is not supported. An application enhancement would be required to add the additional data and would need to be part of a sanctioned product release.

If a field is marked as required and cannot be provided by the data provider, a formal HL7 configuration discussion will have to take place between Netsmart and the client because this will result in adverse effects being encountered within the product.

CONTROL SEGMENTS

MSH – The Message Header segment defines the characteristics of the message and indicates the following:

- Sending Application
- Receiving Application
- Encoding Characters used as Delimiters
- Message Type being Transmitted (Specific HL7 message type and event triggering the message.)
  - o The Type must be 'ORU' and sent by the source system
  - o The Event must be 'R01'

NOTE: The MSH segment in the ACK (Acknowledgement) response will show the Sender and Receiver information in reverse (i.e. sender will be receiver and vice versa.)

The Encoding Characters are used to separate data field components, repeating data elements, and text control characters. They should be printable characters that will never be used in transmitted data, and are as follows:

- Field Separator: |
- Component Separator: ^
- Repetition Separator: ~
- Escape: \
- Sub-Component: &

MSH Seq.	Name	R/O	Comments
01	Field separator	R	Field separator. Value required is "|" – ASCII(124)
02	Encoding Character	R	Used to separate data field components, repeating data elements, and text control characters. Must be printable characters that will never be included in transmitted data. Required values: Pos 1: Component Separator '^' - ASCII(94) Pos 2: Repetition Separator '~' - ASCII(126) Pos 3: Escape '\', ASCII(92) Pos 4: Sub-component '&'- ASCII(38).
03	Sending Application	R	
03.1	Namespace ID	R	This is the unique string value assigned by the HIE for the Order Placer Vendor Product.
04	Sending Facility	R	
04.1	Namespace ID	R	This is the unique string value assigned by the HIE for the Order Placer Facility.

MSH Seq.	Name	R/O	Comments
05	Receive Application	R	
05.1	Namespace ID	R	This is the unique string value assigned by the HIE for the Order Placer Facility. Value should Equal "Netsmart"
06	Receiving Facility	R	
06.1	Namespace ID	R	This is the unique string value assigned by the HIE for the known Filler Facility.
07	Date/Time of Message	R	System date and time the message was formatted in the sending system.
09	Message Type	R	Specific HL7 message type and event triggering the message.
09.1	Type	R	Value must = 'ORU' and must be sent by the source system.
09.2	Event	R	Value must equal 'R01'
10	Message Control ID	R	Unique, Initiator generated. Responder returns sender value in ACK message in MSA:2. With acknowledgment messages, MSH:10 value may be identical to original sender value or may be a new unique value assigned by acknowledging system.
			Must append date/time to the message control ID if it is not unique prior to sending the message.
11	Processing ID	O	'P' = Production
			'T' = Test
11.1	Processing ID	O	
12	Version ID	R	HL7 version. Value = '2.3'.

Listed below is the set of concepts that need to have a unique HIE domain set of values.

Field #	Name	Purpose
MSH:3.1	Sending Application.NameSpace ID	Used to determine the specific set of transformer methods to be performed by Vendor Product Interface to normalize to HL7 2.3.
MSH:4.1	Sending Facility.NameSpace ID	Used to determine the Placer Facility for subsequent routing of the filler result, as well as identity of the Placer Facility in the filler system.

Field #	Name	Purpose
MSH:5.1	Receiving Application.NameSpace ID	Used for: • Possible routing to the Placer Order message • Some reference lab systems to determine routing to either a Patient Service Center or Central LIS system queue.
MSH:6.1	Receiving Facility.NameSpace ID	Used for basic routing within the Order Super Node to determine which filler system will receive the Placer Order.

PERSON SEGMENTS

PID – Patient demographics and encounter associated with the message are identified in this segment. ProAccess requires at least one primary Patient / Person Identifier to be listed here. The External Patient ID (PID:2) has been retained for backwards compatibility only. The Internal Patient ID (PID:3) supports multiple repetitions, but the first must contain the Placer Facility Assigned MRN and the Identifier Type must be "MR." The Patient Name (PID:5) also supports multiple repetitions, but the first must contain the primary or legal name. Please **note** that only 1 ID per ID Type is allowed and it is highly recommended to be a part of patient matching rules, as well as the Date of Birth (PID:7.) On the other hand, there can only be one patient address with multiple phone numbers.

PID Seq.	Name	R/O	Comments
01	Set ID- PID	O	
02	External Patient ID	B	Retained for backwards compatibility only.
02.1	Patient ID	B	
03	Internal Patient ID	R	Supports multiple repetitions (CX List). Only 1 ID per ID Type allowed. The first must contain the Placer Facility Assigned MRN.
03.1	Patient ID	R	
03.5	Identifier Type	R	Equal to "MR"
04	Alternate Patient ID	B	PID:4 should equal PID:3.1
04.1	Patient ID	B	

PID Seq.	Name	R/O	Comments
05	Patient Name	R	Supports multiple repetitions. First repetition must be the primary or legal name. Only 1 ID per ID Type allowed.
05.1	Last Name	R	Highly recommended to be part of patient matching rules.
05.2	First Name	O	
05.3	Second and Further Given Names or Initials Thereof	O	
07	Date of Birth	R	Highly recommended to be part of patient matching rules.
08	Sex	R	Must contain one of the following values: User-defined Table 0001 - Administrative Sex – Suggested Values
11	Patient Address	O	Only supports 1 repetition.
11.1	Address Line 1	O	
11.2	Address Line 2	O	
11.3	City	O	
11.4	State	O	
11.5	ZIP Code	O	

Value	Description
F	Female
M	Male
O	Other
U	Unknown

PID Seq.	Name	R/O	Comments
13	Home Phone Number	O	Supports multiple repetitions. First repetition must be the primary home phone. Suggested format (999) 999-9999
13.1	Phone Number	R	
13.2	Telecommunication Use Code	O	HL7 tables 0201 - Telecommunication use code

Value	Description
PRN	Primary Residence Number
ORN	Other Residence Number
WPN	Work Number
VHN	Vacation Home Number
ASN	Answering Service Number
EMR	Emergency Number
NET	Network (email) Address
BPN	Beeper Number

PID Seq.	Name	R/O	Comments
18	Patient Account Number	R	Patient Account Number can be sent in PID:3 or PID:18. If it is sent in both places, then defers to the value in PID:18.
18.1	Patient Account Number	R	
18.5	Identifier Type	R	Must always equal "AN" for Account Number.
19	SSN – Patient	B	Patient SSN can be sent in PID:3 or PID:19. If it is sent in both places, then defer to the value in PID:19. This number may also be an RR retirement number.

PV1 – Visit / Encounter information (required) – Patient Class will be "N" (PV1:2)

PV1 Seq.	Name	R/O	Comments
01	Set ID- PV1	R	Starts at 1; increments by 1.
02	Patient Class	R	Equal to "N"

PV1 Seq.	Name	R/O	Comments
20	Financial Class	O	Definition: This field contains the financial classes assigned to a patient for the purpose of identifying sources of reimbursement. Refer to User-defined Table 0064 - Financial Class for suggested values

User-defined Table 0064 - Financial Class

Value	Description	Comment
C	Client Bill	
P	Patient Bill	
T	Third Party Bill	

ORDER SEGMENTS

ORC – Common Order

ORC Seq.	Name	R/O	Comments
01	Order Control	R	
02	Placer Order Number	R	
02.1	Entity Identifier	R	The unique order number.
02.2	Namespace ID	R	The Namespace ID contains the Sending Facility's ID of the placing application. A given institution or group of intercommunicating institutions should establish a unique list of facilities that may be potential placers and fillers, and assign unique Sending Facility IDs.
03	Filler Order Number	O	
03.1	Entity Identifier	R	
03.2	Namespace ID	R	The Namespace ID contains the Sending Facility's ID of the placing application. A given institution or group of intercommunicating institutions should establish a unique list of facilities that may be potential placers and fillers, and assign unique Sending Facility IDs.

ORC Seq.	Name	R/O	Comments
12	Ordering Provider	C	This value can be placed in ORC:12 or OBR:16. If the value is sent in both fields, then the value in OBR:16 will be used.
			The value in this field can be used to determine result delivery routing to an end user.
			This field will only accept repetitions for the same provider. Multiple repetitions for different providers is not supported in ORC:12 – only a single provider is allowed.
12.1	Ordering Provider ID	R	
12.2	Last Name	R	When sending multiple IDs, the name is only required in the first repetition.
12.3	First Name	O	
12.8	Source Table	C	IF ORC:12.1 is populated, then "PRN"
12.13	Identifier Type	C	IF ORC:12.1 is populated then "XX"
14	Call Back Phone Number	O	This value can be placed in ORC:14 or OBR:17. If the value is sent in both fields, then the value in OBR:17 will be used.
14.1	Phone Number	O	

OBR – Order Detail – the Diagnostic Service Section ID (OBR:24) will be "LAB"

OBR Seq.	Name	R/O	Comments
01	Set ID- OBR	R	Set ID begins at 1 and increments by 1.
02	Placer Order Number	R	This is a unique number for the given order.
02.1	Entity Identifier	R	Equal to OBR 3.1 "-"
02.2	Namespace ID	R	The Namespace ID contains the Sending Facility's ID of the placing application. A given institution or group of intercommunicating institutions should establish a unique list of facilities that may be potential placers and fillers, and assign unique Sending Facility IDs.

OBR Seq.	Name	R/O	Comments
03	Filler Order Number	R	
03.1	Entity Identifier	R	
03.2	Namespace ID	R	The Namespace ID contains the Sending Facility's ID of the placing application. A given institution or group of intercommunicating institutions should establish a unique list of facilities that may be potential placers and fillers, and assign unique Sending Facility IDs. Cancellation
04	Universal Service ID	R	In general practice, it is LOINC as the test code, local as the alternate test code. In function, it is determined based on the coding system.
04.1	Test Code	R	
04.2	Test Description	R	
04.3	Coding System	R	(see table below)
06	Requested Date/Time	R	Can be copied from OBR:7 if not available
07	Observation Date	R	Can be copied from OBR:14 if not available
09	Collection Volume	G	
11	Specimen Action Code	O	Valued as "O" or "L" when specimen has been collected. See table below, an excerpt from HL7 table 0065 - Specimen action code.

Coding System (OBR 04.3):

Value	Description
99zzz	Local general code, where zzz is the alphanumeric characters of the facility ID
C4	CPT-4
LN	Logical Observation Identifier Names and Codes (LOINC)

Specimen Action Code (OBR 11):

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

OBR Seq.	Name	R/O	Comments
14	Specimen Received Date	O	
15	Specimen Source	O	
15.1	Source Code	O	
15.1.1	Code	O	
16	Ordering Provider	C	This value can be placed in ORC:12 or OBR:16. If the value is sent in both fields, then the value in OBR:16 will be used. The value in this field can be used to determine result delivery routing to an end user. Will only accept repetitions for the same provider. Multiple repetitions for different providers is not supported in OBR:16 – only a single provider is allowed.
16.1	Identifier	R	
16.2	Last Name	R	When sending multiple IDs, the name is only required in the first repetition.
16.3	First Name	O	
16.8	Source Table	R	If OBR:16.1 is populated, then = "PRN"
16.13	Identifier Type	R	If OBR:16.1 is populated, then "XX"
17	Order Call Back Phone Number	O	This value can be placed in ORC:14 or OBR:17. If the value is sent in both fields, then the value in OBR:17 will be used.
17.1	Phone Number	O	
18	Placer Field 1	O	
18.1	Entity Identifier	O	Unique HIE internally created Order ID.
18.2	Namespace ID	O	The value for the HIE system.
20	Filler Field 1	R	Copied from OBR:3.1
22	Result Report Change Date	O	
24	Diagnostic Service Section ID	R	Equals "LAB"

OBR Seq.	Name	R/O	Comments
25	Result Status	R	HL7 table 0123 - Result status

Value	Description
O	Order received; specimen not yet received
I	No results available; specimen received, procedure incomplete
S	No results available; procedure scheduled, but not done
A	Some, but not all, results available
P	Preliminary: A verified early result is available, final results not yet obtained
C	Correction to results
R	Results stored; not yet verified
F	Final results; results stored and verified. Can only be changed with a corrected result.
X	No results available; Order cancelled.

OBR Seq.	Name	R/O	Comments
26	Parent Order ID	G	
27	Quantity Timing	O	
27.6	Priority	O	HL7 table 0109 - Report priority

Value	Description
R	Routine
S	Stat
A	ASAP
C	Callback
T	Timing Critical
PRN	As needed
P	Pre-op

NTE – Results Comments – This segment is used to send textual comments. The Universal Interface will accept comments as multiple NTE segments, where each segment represents a hard carriage return or a new line. The comments can also be sent as a single NTE segment in which each comment field (NTE:3) is separated by the repeat delimiter (~), representing a new line. NTE segments can also be sent with blank comments to maintain blank line separations, in which case the segment will be processed as a carriage return.

NTE Seq.	Name	R/O	Comments
01	Set ID – NTE	R	
02	Source of Comment	R	HL7 2.3 Table 0105 – Source of Comment <table><tr><td>Value</td><td>Description</td></tr><tr><td>L</td><td>Ancillary (filler) department is source of comment</td></tr><tr><td>P</td><td>Order (placer) is source of comment</td></tr><tr><td>O</td><td>Other system is source of comment</td></tr></table>
03	Comment	O	Some NTE segments are sent with blank comments to maintain blank line separation - will be processed as a carriage return.

OBX – Clinical observation reporting for results and orders. It is intended to cover all types of patient observation reports except pharmacy. The Value Type (OBX:2) can be "NM" for numeric or "ST" for string and determines the data type of the Observation Value (OBX:5), which can repeat. The Units, Reference Range, and Abnormal Flags sections (OBX:6, 7, 8) will only be used if the value type is numeric and is for results that have to be trended.

NOTE: OBX segments 23, 24, and 25 are not used.

OBX Seq.	Name	R/O	Comments
01	Set ID- OBX	R	
02	Value Type	R	Allowable Fields: NM - Numeric ST – String

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OBX Seq.	Name	R/O	Comments
03	Observation Identifier	R	In general practice, it is LOINC as the test code, local as the alternate test code. In function, it is determined based on the coding system.
03.1	Test Code	R	
03.2	Test Code Description	R	
03.3	Coding Scheme	R	
03.4	Alternate Test Code	C	Used when both local and industry codes are sent.
03.5	Alternate Code Description	C	
03.6	Alternate Coding Scheme	C	See OBX:3.3 for allowable values
04	Observation Sub-ID	O	
05	Observation Value	C	The observation value must conform to the data type indicated in OBX:02.
05.1	LabCorp Value	C	This component can repeat.
06	Units	C	Conditional - if OBX:2 = 'NM' For numeric/discrete results that have to be trended.
06.1	Identifier	C	
07	Reference Range	C	Conditional - if OBX:2 = 'NM' For numeric/discrete results that have to be trended.

Value	Description
99zzz	Local general code, where zzz is the alphanumeric characters of the facility ID
C4	CPT-4
LN	Logical Observation Identifier Names and Codes (LOINC)

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OBX Seq.	Name	R/O	Comments
08	Abnormal Flags	C	Conditional - if OBX:2 = 'NM' For numeric/discrete results that have to be trended. 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)
null	No range defined, or normal ranges don't apply
U	Significant change up
D	Significant change down
B	Better--use when direction not relevant
W	Worse--use when direction not relevant

OBX Seq.	Name	R/O	Comments
11	Observation Result Status	O	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 changed to 'Final' without retransmitting results previously sent as 'preliminary.' E.g., radiology changes status from 'preliminary' to 'final'
W	Original post was wrong, e.g., transmitted for wrong patient

OBX Seq.	Name	R/O	Comments
14	Date/Time of the Observation	O	
15	Producer's ID	O	
15.1	Identifier	C	
15.2	Text	C	

OBX Seq.	Name	R/O	Comments
23	Performing Organization Name	G	
23.1	Organization Name	G	
24	Performing Organization Address	G	
24.1	Address Line 1	G	
24.2	Address Line 2	G	
24.3	City	G	
24.4	State	G	
24.5	ZIP Code	G	
24.6	Country	G	
25	Performing Organization Medical Director	G	
25.1	Identifier	G	
25.2	Last Name	G	
25.3	First Name	G	
25.4	Middle Name	G	
25.7	Degree	G	

METHODS OF CONNECTION

- MLLP/TCP – preferred
- SFTP

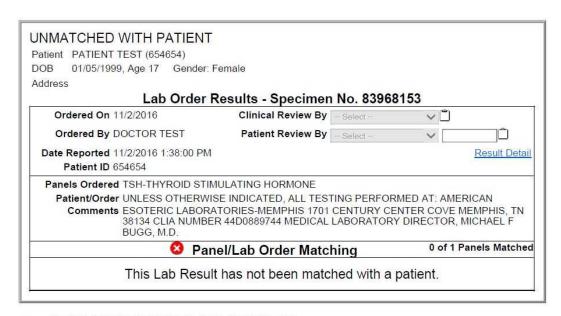## INFORMATION NEEDED TO CONFIGURE CONNECTION

- 3rd Party SSL Certificate
- 3rd Party Registry and Repository Endpoints (Test and Production)
- 3rd Party PIX Endpoints (Test and Production)
- 3rd Party OIDs (Test and Production)

CURRENT LAB CONNECTIONS

- Change Healthcare (formerly Emdeon)
- CORHIO
- Detroit Bio Medical
- Finlay
- Half Penny
- Health Bridge
- LabCorp
- Life Point
- PCL Alverno
- Primex
- Quest
- Sterling

EXAMPLE LAB RESULTS

UNMATCHED WITH PATIENT

Patient PATIENT TEST (654654)
DOB   01/05/1999, Age 17   Gender: Female
Address

Lab Order Results - Specimen No. 83968153

Ordered On 11/2/2016	Clinical Review By	-- Select --
Ordered By DOCTOR TEST	Patient Review By	-- Select --
Date Reported 11/2/2016 1:38:00 PM		Result Detail
Patient ID 654654		

Panels Ordered TSH-THYROID STIMULATING HORMONE

Patient/Order Comments UNLESS OTHERWISE INDICATED, ALL TESTING PERFORMED AT: AMERICAN ESOTERIC LABORATORIES-MEMPHIS 1701 CENTURY CENTER COVE MEMPHIS, TN 38134 CLIA NUMBER 44D0889744 MEDICAL LABORATORY DIRECTOR, MICHAEL F BUGG, M.D.

❌ **Panel/Lab Order Matching**   0 of 1 Panels Matched

This Lab Result has not been matched with a patient.

Panel - THYROID STIMULATING HORMONE

Collection Start Date:	11/2/2016 8:00:00 AM	Received Date:	11/2/2016 1:30:00 PM

Tests	Results	Flag	Units	Reference Interval	Result Status	Lab
TSH	3.466		uIU/mL	0.500-4.500	F	1

Performing Labs

Lab	Location	Address	Medical Director
1	AEL MEMPHIS	1701 Century Center Cove Memphis, TN 38141	

Result Status Legend

F - Final results; results stored and verified. Can only be changed with a corrected result.

Date	Modification	Modified By
1/9/2017	Initial Draft	Kayla Rowton

For questions, e-mail CConnect@ntst.com