HL7 Conformance Document

Ayenati

Version 2.1

About this

Document Purpose

This document provides complete information about the components and the integration requirements for integrating Ayenati with various applications using HL7 protocol.

This section also covers the objective of the systems interacting and the facility that this integration would provide.

Intended Audience

This document is intended for Integration personnel – HIS Team, MOH Project Team, Support Engineers Integration system team, Development Team, Architects, and Testers.

Document Revision History

Revision	Edit Date	Author	Requestor	References
1.0	02/25/2021	Muhannad Alsaif		HL7 International
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Contents

1. AYENATI SOLUTION OVERVIEW

1.1 Introduction

Over a period of time, specimen collection and specimen management paradigm extended to outside the hospital especially patient preferred locations with logistics involvement to transport the specimens to appropriate laboratories and reports to be made available for ordering provider.

Such requirements initiated the need of single efficient paper less system which can fulfil all mobility requirements by patient & provider and integrated with all healthcare centers and all laboratory organizations in the country and integration of other ancillary logistics organizations as mentioned below.

- Specimen may have to be collected outside healthcare centers.
- Logistics systems and agents to be notified to pick up the collected specimen from various locations within the country at periodic intervals.
- Specimens are to be transported to appropriate laboratories for subsequent process to get the test results.
- Logistics systems and agents are to ensure the delivery of specimens to appropriate destination lab organizations.
- Lab test reports to be routed to patients, providers, facilities seamlessly.
- All above activities should be paperless across the locations, across the systems, across the healthcare & non healthcare organizations to be managed electronically seamlessly within the country.

1.2 Document overview

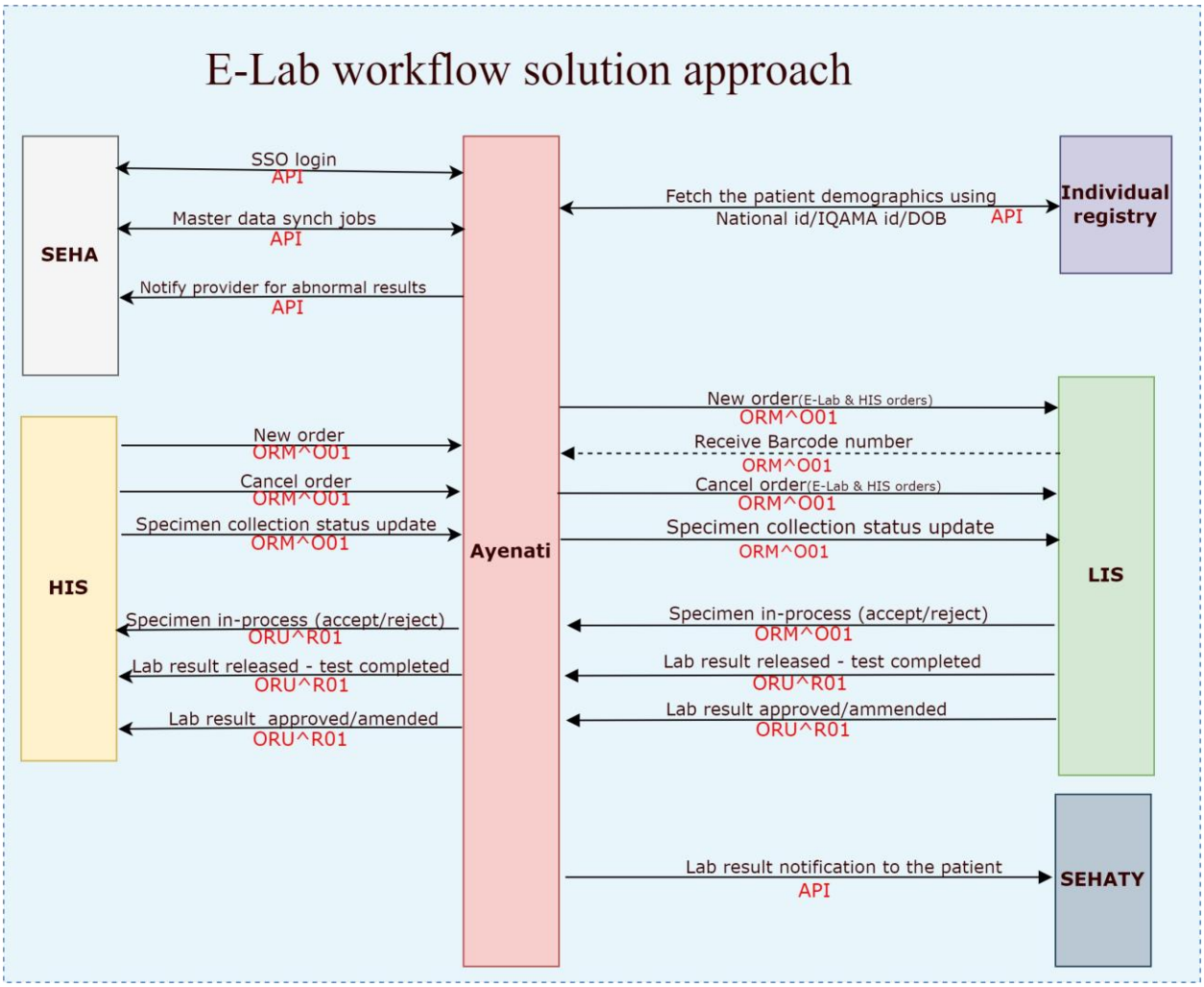
This document provides the required Interface Message Specification for integrating Ayenati with HIS and LIS systems.

- Please refer "use cases" section to know the data fields that are to be captured and exchanged against each Ayenati workflow use case.
- The present specification is based on the Health Level Seven Version 2.3.1 documentation. please refer to the Health Level Seven 2.3.1 documentation for any conflict details on this document.
- It has been designed so that, but with mutual agreement, implementation may communicate using the Health Level Seven Version 2.5.1.

TERMS/ ACRONYMS	DEFINITION
HIS – Hospital information system	**Order placer system** A system that generates test orders, collect the specimen and distributes those orders & specimens to the correct laboratory

LIS - Laboratory information system	**Filler order system** A system used by a laboratory organization, that receives test orders & specimens from Order Placer actors, schedules work orders, and sends them to one or more Lab analyzers, receives the results from each Lab analyzer, performs the clinical validation, appropriately manages all state changes of the order and sends the results to the Order placer systems.
Ayenati – Enterprise Lab	**Ayenati** Ayenati is centralised systems to receive the orders from all healthcare centres and receive the results from all LIS systems within the country. Ayenati is responsible to dispatch the specimens to logistics systems further logistics systems will ensure the delivery of the specimens to designated Labs.
HL7 – Health level 7	HL7 refers to a set of international standards for transfer of clinical and administrative data between software applications used by various healthcare providers

1.3 Integrated Ayenati workflow -HL7 integration scope



1.4 Labels used in Ayenati workflow

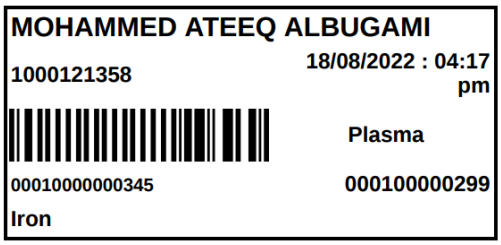
1.4.1 Batch ID label

1.4.1.1 Batch ID creation & utilization process

1. A new “Batch Label” to be generated by PHC staff via Ayenati and the label will be placed on a batch bag. Batch label will contain the Batch ID/number and Bar code.
2. In order to avoid the data entry errors, “Phlebotomist” will scan the batch label to default the batch ID.
3. Whenever a specimen is prepared and ready to be dispatched. “Phlebotomist” to scan the collected specimen prior placing it in the scanned batch bag to prepare the specimens for dispatching.

Please note: new unique number to be generated every time whenever a new batch is used at PHC/Facility.

1.4.2 Specimen label format



Field name	Example value
Patient Name	MARK RAMESH PAVAN K
Patient ID	100000044379
Specimen label generation date time	16/02/2021 10:18
Patient class	IP for in-patient
Order number	2102160009
Specimen number	210216000903
Test code	BI/S -- Blood and serum
Specimen type	Blood
Department code	MMW

1.4.3 Specimen ID rule

1. Prior onboarding a facility to Ayenati, a unique 4 digits identifier will be created and assigned to this facility.
2. The assigned 4 digits identifier will always be used as the first 4 digits of the specimen number.
3. The remaining digits has no special rules, and it will be determined by the facility HIS.

4. Total specimen number length is 12. Specimen number must be numeric

2. USAGE OF UNIQUE OBJECT IDENTIFIERS (OID)

Different structures of OID are used in the present specification. An overview is presented here for type of OID structure that depends on the filed/attribute by which it is conveyed.

2.1 OID used for the Individuals

OID will note used for individuals. Instead Ayenati will used national ID, Iqama or Border ID to identify individuals.

2.2 OID used for Assigning Authorities

This type of OID qualify Identifiers issued locally within the hospital. They ensure that in case there

are multiple sources for the same type of identifiers, they are distinguished thanks to their different

- Assigning Authority OIDs are used for:
    - Order Placer Numbers
    - Order Filler Numbers

- These Assigning Authorities are uniquely identified by an OID constructed as:
    - A unique OID root assigned for care delivery organizations in Saudi Arabia (including
    - MoH hospitals) by the NHIC. This OID root has been assigned by SeHe and has the fixed value: 2.16.840.1.113883.3.3731.1.2.2
    - A first numeric suffix (shown as XXXXXXXXX, with leading zeros removed) is added to
    - the above root following a "." dot separator. This suffix is assigned to a specific organization (e.g. hospital) at the national level by the NHIC that manages the registry of these suffixes (NHIC Organization Identifiers). Taking an example NHIC Organization identifier of "XXXXXXXXX", the OID structure looks like: "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX".
    - A second numeric suffix (shown as Y, with leading zeros removed) managed at the hospital level, is appended to the above, preceded by a dot "." Separator. This second suffix uniquely identifies the Assigning Authority. Following on the example with a "Y" suffix, the complete OID structure looks like: "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX.Y".

  Note: A first example of Assigning Authorities for Patient Primary Hospital Identifiers

  with a "Y" assigned the value 1 by the XXXXXXXX hospital.
  "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX.1" associated to the locally assigned ID: "NNNNNNNN".

  Note: That OID structure allows the support of several distinct assigning authorities

  within the same hospital (complex multi-site structures, order identifiers created by another system than HIS, etc.).

2.3 OID used for Applications and Facilities

This type of OID qualify entities that need to be locally identified within the hospital. They ensure

that with multiple such entities installed and potentially added in the future within the hospital, they are distinguished thanks to their different entity OID.

- Such OIDs are used for:
  - Sending or Receiving Facilities
  - Sending or Receiving Applications
- These entities are uniquely identified by an OID constructed as:
  - A unique OID root assigned for care delivery organizations in Saudi Arabia (including MoH hospitals) by the NHIC. This OID root has been assigned by SeHe has the fixed value: 2.16.840.1.113883.3.3731.1.2.2
  - A first numeric suffix (shown as XXXXXXXXX, with leading zeros removed) is added to the above root following a "." dot separator. This suffix is assigned to a specific organization (e.g. hospital) at the national level by the NHIC that manages the registry of these suffixes (NHIC Organization Identifiers). Taking an example NHIC Organization identifier of "XXXXXXXXX", the OID structure looks like: "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX".
  - A second numeric suffix (shown as Y, with leading zeros removed) managed at the hospital level, is appended to the above, preceded by a dot "." Separator. This second suffix uniquely identifies a different entity. Following on the example with a "Y" suffix, the complete OID structure looks like: "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX.Y".

    Note: A first example of a sending application with a "y" assigned the value 100 by the XXXXXXXX hospital results in an OID : "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX.100" while the receiving application has a "Y" assigned the value 101 by the hospital results in an OID: "2.16.840.1.113883.3.3731.1.2.2.XXXXXXXXX.101"

2.4 Other types of OID.

If other types of OIDs need to be created, and they are either an extension of the list of Assigning Authorities (Apply Section 2.2 above) or an extension with a new type of entities that need to be uniquely identified (Apply Section 2.3 above).

3. INTERFACE DESCRIPTION

#	Tasks (order/specimen status)	Specimen task group	Transaction system	HL7 message^ Event	ELAB to receive HIS order updates	ELAB to send HIS order updates to LIS	ELAB to receive HIS order & result updates from LIS	ELAB to send HIS order & result updates to HIS

1	Order generated	before dispatch in HIS	HIS/Ayenati	ORM^O01	Yes	Yes	Not applicable	Not applicable
2	Order cancelled		HIS/Ayenati	ORM^O01	Yes	Yes	Not applicable	Not applicable
3	specimen collected		HIS/Ayenati	ORM^O01	Yes	Yes	Not applicable	Not applicable
4	specimen in-process(accept/reject)		LIS	ORM^O01	Not applicable	Not applicable	Yes	Yes
5	Test completed		LIS	ORU^R01	Not applicable	Not applicable	Yes	Yes
6	Result approved/amended		LIS	ORU^R01	Not applicable	Not applicable	Yes	Yes

3.1 HL7 Message definition

3.1.1 Order message structure - ORM^O01

The Order Entry (ORM) message is generated for all orders. This includes placing new orders, canceling existing orders, specimen collection and other order status updates. The segments included is shown below

Segment	Segment Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
ORC	Common Order Segment
[{OBR}]	Order Detail

3.1.2 Observation Result message structure - ORU^R01

The Observation Result (ORU) is usually in response to an order and provides clinical observations. In HL7 messaging, ORU messages provide structured patient-oriented clinical data between systems. This segment included is given below

Segment	Segment Description
MSH	Message Header
EVN	Event Type
PID	Patient Identification
PV1	Patient Visit
ORC	Common Order Segment

[{OBR}]	Order Detail
[{OBX}]	Observation/Result

3.2 HL7 Segment Definition

3.2.1 MSH

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	1	ST	R	HL7	Field Separator	|
2	4	ST	R	HL7	Encoding characters	^~\&
3	180	HD	R	MOH	Sending application	A unique application identifier within the entire organization and all of its facilities. **It identifies the application instance that sends the message and is structured as an OID as defined in the note* below the Section 3.2.1 MSH table.**
4	180	HD	R	MOH	Sending facility	A unique facility identifier. **It is structured as an OID as defined in the note* below the Section 2.2.1 MSH**
5	180	HD	R	MOH	Receiving application	A unique application identifier within the entire organization and all of its facilities. **It identifies the application instance that is the destination of the message and is structured as an OID as defined in note* below the Section 3.2.1 MSH table.**

6	180	HD	R	MOH	Receiving facility	A unique facility identifier. **It is structured as an OID as defined in the note* below the Section 3.2.1 MSH**
7	26	TS	R	MOH	Date/Time of message	YYYYMMDDHHMMSS
8	40	ST	O		Security	
9	7	CM	R	HL7	Message type	Message Type^Event Type e.g. ORM^O01
10	20	ST	R	HL7	Message control ID	Interface transaction sequence number
11	3	PT	R	HL7	Processing ID	"P" = Production
12	60	VID	R	HL7	Version ID	2.3.1
13	15	NM	O		Sequence number	
14	180	ST	O		Continuation pointer	
15	2	ID	O		Accept acknowledgment type	
16	2	ID	O		Application acknowledgment type	
17	2	ID	O		Country code	
18	10	ID	O		Character set	
19	60	CE	O		Principal language of message	
20	20	ID	O		Alternate character set handling scheme	

***Note:**

1. The **Sending application and Receiving application attribute** uniquely identify a specific instance of an application that sends or receives HL7 V2 messages:

   - One hospital organization may encompass only one instance of a specific application, but sometimes multiple instances of the same application may exist. These shall be distinguished and uniquely identified so that messages be properly routed.
   - The Facility where such a Sending or Receiving application instance operates is conveyed by a distinct attribute: Sending or Receiving Facility (see below)
   - This Application unique identifier is assigned at the hospital level
   - When an instance of an application acts as both a sending and a receiving application, the same identifier shall be used.

   1.1. This identifier is conveyed as an HD Data Type field/component:

   - The MSH-3.1 and the MSH-5.1 components of the HD datatype are not expected to be used (way to convey entity designations with a local name text string).
   - The MSH-3.2 and the MSH-5.2 components conveys the Universal ID as OID that is uniquely assigned to each facility of an organization (e.g. Hospital). See above Section 1: Usage of unique Object Identifiers (OID)
   - The MSH-3.3 and the MSH-5.3 components conveys the Universal ID Type, where HL7 specifies a fixed value "ISO" to state that the Universal ID is an OID.

2. The **Sending facility and Receiving facility attribute** uniquely identify one of the facilities of the organization within which an application instance sends or receives HL7 V2 messages:

- One hospital organization may encompass only one facility or multiple facilities (different sites where care is delivered).
- This identifier is assigned at the hospital level
- When a facility acts as both a sending and a receiving facility, the same identifier shall be used.

2.1 This identifier is conveyed as an HD Data Type field/component.

- The MSH-4.1 and the MSH-6.1 components of the HD datatype are not expected to be used (way to convey entity designations with a local name text string).
- The MSH-4.2 and the MSH-6.2 components conveys the Universal ID as an OID that is uniquely assigned to each facility of an organizations (e.g. Hospital). See above Section 1: Usage of unique Object Identifiers (OID)
- The MSH-4.3 and the MSH-6.3 components conveys the Universal ID Type, where HL7 specifies a fixed value "ISO" to state that the Universal ID is an OID

3.2.2 PID

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	4	SI	O		Set ID - PID	"1"
2	20	CX	X	MOH	Patient ID	Not used
3	20	CX	R	HL7	Patient Identifier	National ID (Citizen ID/ Iqama/ Border ID)
4	20	CX	X	MOH	Alternate Patient ID - PID	Not used
5	48	XPN	R	HL7	Patient Name	English: Last Name^First Name^Second Name^Third Name^Fourth Name^title
6	48	XPN	O	MOH	Mother's Maiden Name	Name
7	26	TS	R	MOH	Date/Time of Birth	Format: YYYYMMDD
8	1	IS	R	MOH	Sex	See Section Gender for Value Set (GENDER)
9	48	XPN	O	MOH	Patient Alias	Arabic: Last Name^First Name^Second Name^Third Name^Fourth Name^title
10	80	CE	O		Race	
11	106	XAD	R	MOH	Patient Address	Street Address^^city^state (province)^mailing code^country^
12	4	IS	O	MOH	County Code	See Section Country &Nationality Value Set (COUNTRY & NATIONALITY)

13	40	XTN	O	MOH	Phone Number	
14	40	XTN	O		Phone Number - Business	
15	60	CE	O		Primary Language	
16	80	CE	O	MOH	Marital Status	See Section Marital Value Set (MARITAL STATUS)
17	80	CE	O	MOH	Religion	See Section Religion Value Set (RELIGION)
18	20	CX	O		Patient Account Number	
19	16	ST	O		SSN Number - Patient	Patient secondary number
20	25	DLN	O		Driver's License Number - Patient	
21	20	CX	O		Mother's Identifier	
22	80	CE	O		Ethnic Group	
23	60	ST	O	MOH	Birth Place	
24	1	ID	O		Multiple Birth Indicator	
25	2	NM	O		Birth Order	
26	80	CE	O	MOH	Citizenship	See Section country & nationality Value Set (COUNTRY & NATIONALITY)
27	60	CE	O		Veterans Military Status	
28	80	CE	R	MOH	Nationality	See Section country & nationality Value Set (COUNTRY & NATIONALITY)
29	26	TS	O	MOH	Patient Death Date and Time	
30	1	ID	O	MOH	Patient Death Indicator	

3.2.3 PV1

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	4	SI	O		Set ID - PV1	"1"
2	1	IS	O	HL7	Patient Class	#Patient class Section patient class Value
3	80	PL	R	MOH	Assigned Patient Location	Standard Format: area^sub- area^sub-sub-area^facility
4	2	IS	O	MOH	Admission Type	See Section admission type for Value Set
5	20	CX	O		Pre-admit Number	
6	80	PL	O		Prior Patient Number	
7	60	XCN	O		Attending Doctor	

8	60	XCN	R	MOH	Referring Doctor	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^ <Issuing Authority>^^^^ <Type (NI)> **See Note* below the section in ORC Table.**
9	60	XCN	O		Consulting Doctor	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below the section in ORC Table.**
10	3	IS	O		Hospital Service	
11	80	PL	O		Temporary Location	
12	2	IS	O		Pre-admit Test Indicator	
13	2	IS	O		Re-admission Indicator	
14	3	IS	O		Admit Source	
15	2	IS	O		Ambulatory Status	See Section 4.6 Value Set (AMBULATORY STATUS)
16	2	IS	O	MOH	VIP Indicator	This field indicates is the patient a VIP(Y,N)
17	60	XCN	O	MOH	Admitting Doctor	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below the section in ORC Table.**
18	2	IS	O		Patient Type	
19	20	CX	R	MOH	Visit Number	In case no visit it should be empty (unfilled)

20	50	FC	O	MOH	Financial Class	See Section 4.4 Value Set (FINANCIAL CLASS)
21	2	IS	O		Charge Price Indicator	
22	2	IS	O		Courtesy Code	
23	2	IS	O		Credit Rating	
24	44	TS	R		Admit Date/Time	Format yyyyMMddHHmmss

3.2.4 ORC

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	2	ID	R	HL7	Order control	NW=New order CA=Cancel order request XO=Change order request
2	22	EI	R	HL7	Placer order number	<entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)> **See Note* below.**
3	22	EI	R	HL7	Filler order number	This field can be used by placer order system, if placer order system generates specimen number for specimen collection purpose. <entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)> **See Note* below.**
4	22	EI	O		Placer group number	
5	2	ID	O	MOH	Order status	SC= Order is scheduled IP= Order is in process CA= Order was canceled CM=Order is completed
6	1	ID	O		Response flag	
7	200	TQ	O		Quantity/timing	
8	200	CM	O		Parent	
9	26	TS	O	MOH	Date/time of transaction	YYYYMMDDHHMMSS

10	120	XCN	O	MOH	Entered by	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below.**
11	120	XCN	O	MOH	Verified by	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below.**
12	120	XCN	O	MOH	Ordering provider	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below.**
13	80	PL	O		Enterer's location	User's location
14	40	XTN	O	MOH	Call back phone number	Provider's phone number
15	26	TS	O	MOH	Order effective date/time	
16	200	CE	O	MOH	Order control code reason	Order control code reasons
17	60	CE	O	MOH	Entering organization	Ordering organization Code ^desc
18	60	CE	O		Entering device	
19	120	XCN	O		Action by	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below.**
20	40	CE	O		Advanced beneficiary notice code	

21	60	XON	O		Ordering facility name	
22	106	XAD	O		Ordering facility address	
23	48	XTN	O		Ordering facility phone number	
24	106	XAD	O		Ordering provider address	

***Note:**

1. The **Placer order number or Filler order number attribute** uniquely identify a specific instance of an order from the placer and filler point pf views:

   - One hospital organization may generate orders in multiple systems (HIS, RIS, CIS, LIS, etc. and such orders shall be distinguished and uniquely identified so that they be processed correctly, status be accurately reported, and results properly linked.
   - Each one of the applications creating or accepting new order need to uniquely identify itself as an issuing authority, and this issuing authority identifier conveyed with the order number it has assigned. This allows such sources of Placer order numbers and Filler order numbers to assign these number independently ensuring that the same number will be distinguished by a different Assigning Authority.
   - This unique identifier of Assigning Authority for Placer order numbers and Filler order numbers is assigned at the hospital level.

2. These Placer order numbers and Filler order numbers are conveyed as an EI Data Type filed/component:

   - The ORC-2.1 and the ORC-3.1 components of the HD datatype conveys the identifier assigned by each order source assigning authority (e.g. could be a sequential number).
   - The ORC-2.2 and the ORC-3.2 components of the HD datatype are not expected to be used

     (way to convey entity designations with a local name text string).
   - The ORC-2.4 and the ORC-2.4 components conveys the Universal ID Type, where HL7

     specifies a fixed value “ISO” to state that the Universal ID is an OID.
   - The ORC-2.3 and the ORC-2.3 components conveys the Universal ID as OID that is uniquely assigned to each order number assigning authorities within an organization (e.g. Hospital). See above Section: Usage of unique Object Identifiers (OID)

3. Healthcare providers as professional have to be uniquely identified when recorded along with the health information they are producing or managing as **Referring Doctors, Ordering Providers, Entered by, Verified by, Action by**. They SHALL be uniquely identified through their respective National ID: Citizen's ID, Iqama Identifier or Border Control ID depending on their citizen or immigration status.

   Note: The Provider License ID is not always available (e.g. license pending) although the professional is authorized to practice and is therefore not used to identify the provider. It does not need to be conveyed alongside the provider National IDs, as the provider National ID may be used through an online Provider Directory service to access the provider License ID and its current licensing status.

   The above policies on the use of these two identifiers within a hospital are therefore consistent with the approach defined to identify healthcare provider professionals at the national level per the IS0002 Saudi eHealth Core IS for Healthcare Provider Directory Query (See requirement [KHPD

   0200] in https://nhic.gov.sa/eServices/STD/Documents/IS0002%20Saudi%20eHealth%20Core%20IS%20for

   %20Healthcare%20Provider%20Directory%20Query%20v1.0.pdf).

4. The **National ID of the provider** is conveyed as an XCN Data Type field/component, that contains:

   a) The Issuing Authority for the provider National ID shall be conveyed in XCN.9. An Assigning Authority value is itself broken down in **subcomponents:**
      i. The first one is not expected to be used (for locally defined namespaces)
      ii. The second one "Universal ID" is the OID identification of one of the following National ID Issuing Authorities values:
         - Citizen's ID - 2.16.840.1.113883.3.3731.1.1.100.2 for providers that are Saudi Arabia Citizens
         - Iqama Identifier - 2.16.840.1.113883.3.3731.1.1.100.3 for providers that are Saudi Arabia Residents
         - Border Control ID - 2.16.840.1.113883.3.3731.1.1.100.5 for providers that are Visitors of Saudi Arabia
      iii. iii. The third one is Universal ID Type, where HL7 specifies a fixed value "ISO" to state that the Universal ID is an OID.

   Note: The above OIDs values are the one specified by IS0001 Saudi eHealth Core Interoperability Specification for KSA-Wide Patient Demographic Query. Only the subset of possible issuing authorities listed above is allowable for healthcare provider identifiers.

b) The national ID of the provider SHALL be conveyed in XCN.1 and populated with the National Identifier value issued by the above listed issuing authorities for the healthcare provider professional.

c) The identifier type code in XCN.13 SHALL convey the value “NI” meaning National unique

individual identifier

d) The License Status of the healthcare provider professional SHALL be conveyed in XCN.8

Source Table, where the character string SHALL contain one of the License Status values defined by the KSA License Value Set (See Section 4.7).

e) The last name, first name, and degree of the healthcare provider SHALL be conveyed respectively in XCN.2, XCN.3, XCN.4, XCN.5 and XCN.6.

f) All other fields of XCN (XCN.7, XCN.10, XCN.11, XCN.12 and beyond) MAY be empty.

3.2.4.1 Customizations

We have listed all such Ayenati interface specific status fields in this section.

3.2.4.1.1 Order status codes synchronization across the systems

Apart from regular HIS LIS integration workflow, Ayenati solution to fulfil additional status update requirements as follows in HIS, LIS, Ayenati systems according to the use case scenario.

Status description	ORC-1	ORC-5	ORC-16.1	ORC-16.2
New Order	NW	IP	NW	New order
Specimen Number generated	SC	SC	BC	Barcode Generated
Cancel Order	CA	CA	CA	Cancel Order
Specimen collected	SC	SC	CL	Specimen collected
Specimen In process - reject	OD	DC	RJ	Specimen rejected
Specimen In process - accept	SC	IP	IP	In-process
Test completed	IP	CM	CM	Test completed
Result approved/amended	RE	CM	RA	Result Amended

3.2.5 OBR

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	4	SI	R	MOH	Set ID - OBR	1
2	22	EI	R	HL7	Placer Order Number	<entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)> **See Note* below the section in ORC Table.**
3	22	EI	R	HL7	Filler Order Number +	<entity identifier (ST)> ^ <namespace ID (IS)> ^ <universal ID (ST)> ^ <universal ID type (ID)> **See Note* below the section 2.3.8 ORC** **Table.**
4	200	CE	R	HL7	Universal Service ID	<identifier (ST)> ^ <text (ST)> ^ <name of coding system (ST)> See section 4.1 Value Set
5	2	ID	R	MOH	Priority - OBR	See section 4.10 Value Set (PRIORITY)
6	26	TS	R	MOH	Requested Date/Time	
7	26	TS	C		Observation Date/Time #	YYYYMMDDHHMMSS
8	26	TS	O		Observation End Date/Time #	YYYYMMDDHHMMSS
9	20	CQ	O		*	Qty^UOM The default unit is ML. Specifically, units should be expressed in the ISO Standard unit abbreviations (ISO-2955, 1977)
10	60	XCN	O		Collector Identifier *	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^ <Type

11	1	ID	O		Specimen Action Code *	
12	60	CE	O		Danger Code	
13	300	ST	O		Relevant Clinical Info.	Multiple line separated by "~" Clinical instructions~Clinical instruction2
14	26	TS	C		Specimen Received Date/Time *	YYYYMMDDHHMMSS
15	300	CM	R		Specimen Source *	<specimen source name or code (CE)> ^ <additives (TX)> ^ <freetext (TX)> ^ <body site(CE)> ^ <site modifier (CE)> ^ <collection method modifier code (CE)>
16	120	XCN	O	MOH	Ordering Provider	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)> **See Note* below section in ORC Table.**
17	40	XTN	O	MOH	Order Callback Phone Number	Provider's phone number
18	60	ST	O		Placer Field 1	Place field details
19	60	ST	O		Placer Field 2	
20	60	ST	O	MOH	Filler Field 1 +	Filler field details
21	60	ST	O		Filler Field 2 +	
22	26	TS	O		Results Rpt/Status Chng - Date/Time +	Result approved date/Result amended date
23	40	CM	O		Charge to Practice +	
24	10	ID	O		Diagnostic Serv Sect ID	
25	1	ID	O	MOH	Result Status +	F – Final results C – Correction to the results
26	200	CM	O		Parent Result +	
27	200	TQ	O		Quantity/Timing	
28	150	XCN	O		Result Copies To	
29	200	CM	O		Parent	

30	20	ID	O	MOH	Transportation Mode	See section Transportation Value Set (TRANSPORTATION MODE)
31	300	CE	O	MOH	Reason for Study	
32	200	CM	O		Principal Result Interpreter +	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)>
33	200	CM	O		Assistant Result Interpreter +	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<License Status(IS)>^<Issuing Authority>^^^^<Type (NI)>
34	200	CM	O	MOH	Technician +	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<LicenseStatus(IS)>^<Issuing Authority>^^^^<Type(NI)>
35	200	CM	O	MOH	Transcriptionist +	<National ID>^<family name (ST)>^<given name (ST)>^<middle initial or name (ST)>^<suffix (e.g., JR or III) (ST)>^<prefix (e.g., DR) (ST)>^^<LicenseStatus(IS)>^<Issuing Authority>^^^^<Type(NI)>
36	26	TS	O	MOH	Scheduled Date/Time +	YYYYMMDDHHMMSS
37	4	NM	O		Number of Sample Containers *	Number of sample containers
38	60	CE	O		Transport Logistics of Collected Sample *	

39	200	CE	O		Collector's Comment *	Phlebotomist comments Multiple line separated by "~"
40	60	CE	O		Transport Arrangement Responsibility	
41	30	ID	O		Transport Arranged	
42	1	ID	O		Escort Required	
43	200	CE	O		Planned Patient Transport	
44	80	CE	O		Procedure Code	
45	80	CE	O		Procedure Code Modifier	

3.2.5.1 Customizations

3.2.5.1.1 OBR-18 (placer field)

we have used "OBR-18 placer filed" to transfer below mentioned additional data elements from placer order system to Ayenati& filler order systems.

Field	Description	Workflow use case	Actor/Role
OBR[18.1]	Specimen type	"New order"	Ordering provider
OBR[18.2]	Collection center	"Collect specimen"	Phlebotomist

Note: Ayenati will combine all above mentioned additional placer with delimiter $#$ to form it as one string while sending the data from Ayenati in HL7 message. Receiver systems can store above information as one string OR separate the fields depending on their application & reporting requirements.

3.2.5.1.2 OBR-20 (filler field)

we have used "OBR-20 filler filed" to transfer below mentioned additional data elements from filler order system to Ayenati & placer order systems.

Field	Description	Workflow use case	Actor/Role
OBR[20.5]	Rejected reason	"Specimen in-process"	Lab technician/Lab staff
OBR[20.6]	Specimen in process	"Specimen in-process"	Lab technician/Lab staff

	date time		
OBR[20.7]	Specimen rejected date time	“Specimen in-process”	Lab technician/Lab staff

Note: Ayenati will combine all above mentioned additional filler fields with delimiter $#$ to form it as one string while sending the data from Ayenati in HL7 message. Receiver systems can store above information as one string OR separate the fields depending on their application & reporting requirements.

3.2.6 ZSP

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	4	SI	R	EPIC	Set-ZSP	1
2	3	ID	R	HL7	Specimen No (Bar Code)	19012520
3	80	CE	R	HL7	Container	EDTA 5mL

Note: There should be a separate ZSP message for each container in every order messages.

3.2.7 OBX

SEQ	LEN	DT	OPT	Set	ITEM# ELEMENT NAME	Description
1	4	SI	R	MOH	Set ID-OBX	1
2	3	ID	R	HL7	Value type	ST
3	80	CE	R	HL7	Observation identifier*	rBefText
4	20	ST	C		Observation sub-ID	
5	65536 1	ST	R	HL7	Observation value	Result data sent in multiple OBX Segment
6	60	CE	C		Units	Result Units. SI, and can be obtained from LOINC code for each test Refer UCUM value set
7	60	ST	C		Reference ranges	References Range

8	ID	C	C	Abnormal Flags	+ = High, - = Low	See section Normal - abnormal flags Value Set

4. LOOKUP TABLES

4.1 Universal Service ID:

- The Universal Service ID conveyed by OBR-4 identifies one or more requested
- procedures taken from a value set of “orderable procedures or examinations”.
- These procedures are specific to a type of diagnosis or care delivery specialties.
- The table below identifies an initial list of such specialties, and for each one identifies:
    - The reference where the specific value set of procedure codes can be found,
    - The entity responsible for maintaining the value set,
    - The name of the coding system (CE data type), plus recommended support of
- the CW data type adding the description of this value set by a “value set OID”
- and a “coding system OID”. Both are encoded in the CW Data Type used by
- OBR-4 starting with HL7 V2.6).

Specialty to fulfill the order	**Entity Responsible to Maintain Value Set**	**Value and Code System Representation**	**Reference to the Procedure Value Set**
Laboratory • Anatomic • Biochemistry • Cytology • Molecular Biology • Toxicology	SeHe	Only the values identified for Orders (O) and Both (B). <identifier (ST)> = Code <text (ST)> = Saudi Print Name <name of coding system (ST)> LOINC **Plus, recommended:** ||||||||<coding system Oid> = 2.16.840.1.113883.6.1 <Value set Oid> = 2.16.840.1.113883.3.3731.1.201.10	SeHe Data Dictionary IS0200 V1.1 Interoperability Specification: *Laboratory Orders and Results Value Set*

4.2 Patient class

SN	CODE	VALUE
1	I	Inpatient
2	O	Outpatient
3	E	Emergency
4	D	Inpatient Daycase

4.3 Transportation mode

This value set is applicable to the transport mode used within the hospital.

This transportation mode is typically associated to an order to facilitate the management of the patient when performing the order.

SN	CODE	VALUE
1	WL	Walking
2	WC	Wheelchair
3	TR	Trolley
4	BE	Bed
5	AM	Ambulance
6	WO	Wheelchair with
7	BO	Bed with Oxygen
8	TO	Trolley with
9	PM	Portable/Mobile
10	OT	Other

4.4 Financial class

SN	CODE	VALUE
1	SELF	Self-Pay
2	CO	Company
3	DIP	Diplomat
4	GOV	Saudi Government
5	RO	Royal Orders
6	NSGOV	Non-Saudi Government

4.5 Admission Type

SN	CODE	VALUE
1	A	Accident
2	E	Emergency
3	L	Labor and Delivery
4	R	Routine

4.6 Ambulatory Status

SN	CODE	VALUE
1	A0	No functional limitations
2	A1	Ambulates with assistive device
3	A2	Wheelchair/stretcher bound
4	A3	Comatose; non-responsive
5	A4	Disoriented
6	A5	Vision impaired
7	A6	Hearing impaired
8	A7	Speech impaired
9	A8	Non-English speaking
10	A9	Functional level unknown
11	B1	Oxygen therapy
12	B2	Special equipment (tubes, IVs, catheters)
13	B3	Amputee
14	B4	Mastectomy
15	B5	Paraplegic
16	B6	Pregnant

4.7 KSA License Value Set. Status

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)

2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (License Status) Sheet

4.8 KSA Individual Provider Type.

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below: (https://nhic.gov.sa/eServices/std/Pages/default.aspx)
2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Individual Provider Type) Sheet

4.9 Gender

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)
2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Gender) Sheet

4.10 Priority

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)
2. Go to (Admin – Patient identification)

3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Order Priorities) Sheet

4.11 Country & Nationality

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)

2. Go to (Admin – Patient identification)

   Go to (IS0200 Saudi Health Information Exchange Data Dictionary)

4. Check the (Country) Sheet

4.12 Marital status

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:
   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)
2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Marital Status) Sheet

4.13 Religion

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)

2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Religion) Sheet

4.14 Specimens Type

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)

2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Specimen Type) Sheet

4.15 Anatomical site (specimen source) – code

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)

2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Specimen source) Sheet

Code	Concept Name
Abscess	Abscess
Abscess, Pelvic	Abscess, Pelvic
Abscess, Perianal	Abscess, Perianal
Abscess, Rectal	Abscess, Rectal
Abscess, Scrotal	Abscess, Scrotal
Abscess, Submandibular	Abscess, Submandibular
Abscess, Submaxillary	Abscess, Submaxillary
Abscess, Testicular	Abscess, Testicular
Air Sample	Air Sample
Allograft	Allograft
Amniotic fluid	Amniotic fluid
Amputation	Amputation
Antrum, Gastric	Antrum, Gastric
Aspirate	Aspirate

Aspirate, Endotrach	Aspirate, Endotrach
Aspirate, Gastric	Aspirate, Gastric
Aspirate, Nasogastric	Aspirate, Nasogastric
Aspirate, Tracheal	Aspirate, Tracheal
Aspirate, Transtracheal	Aspirate, Transtracheal
Autopsy	Autopsy
Basophils	Basophils
Bile fluid	Bile fluid
Biopsy	Biopsy
Biopsy, Gastric	Biopsy, Gastric
Biopsy, Skin	Biopsy, Skin
Biospy, Cone	Biospy, Cone
Bite	Bite
Bite, Cat	Bite, Cat
Bite, Dog	Bite, Dog
Bite, Human	Bite, Human
Bite, Insect	Bite, Insect
Bite, Reptile	Bite, Reptile
Bleb	Bleb
Blister	Blister
Blood arterial	Blood arterial
Blood capillary	Blood capillary
Blood venous	Blood venous
Blood bag	Blood bag
Blood product unit	Blood product unit
Blood, Autopsy	Blood, Autopsy
Blood, Cell Saver	Blood, Cell Saver
Blood, Fetal	Blood, Fetal
Blood, Whole	Blood, Whole
Body fluid, unsp	Body fluid, unsp
Boil	Boil
Bone	Bone
Bowel contents	Bowel contents
Breast milk	Breast milk
Breath (use EXHLD)	Breath (use EXHLD)
Bronchial	Bronchial
Brush	Brush
Brush, Esophageal	Brush, Esophageal
Brushing	Brushing
Brushing, Gastric	Brushing, Gastric
Bubo	Bubo
Bulla/Bullae	Bulla/Bullae
Burn	Burn

Calculus (=Stone)	Calculus (=Stone)
Cannula	Cannula
Carbuncle	Carbuncle
Cardiac muscle	Cardiac muscle
Catheter	Catheter
Catheter Insertion Site	Catheter Insertion Site
Catheter tip	Catheter tip
Catheter Tip, Angio	Catheter Tip, Angio
Catheter Tip, Arterial	Catheter Tip, Arterial
Catheter Tip, CVP	Catheter Tip, CVP
Catheter Tip, Endotracheal	Catheter Tip, Endotracheal
Catheter Tip, Foley	Catheter Tip, Foley
Catheter Tip, Hemaquit	Catheter Tip, Hemaquit
Catheter Tip, Hemovac	Catheter Tip, Hemovac
Catheter Tip, Indwelling	Catheter Tip, Indwelling
Catheter Tip, Introducer	Catheter Tip, Introducer
Catheter Tip, IV	Catheter Tip, IV
Catheter Tip, Makurkour	Catheter Tip, Makurkour
Catheter Tip, Subclavian	Catheter Tip, Subclavian
Catheter Tip, Suprapubic	Catheter Tip, Suprapubic
Catheter Tip, Swan Gantz	Catheter Tip, Swan Gantz
Catheter Tip, Vas	Catheter Tip, Vas
Catheter Tip, Ventricular	Catheter Tip, Ventricular
Catheter, Groshong	Catheter, Groshong
Catheter, Hickman	Catheter, Hickman
Catheter, Porta	Catheter, Porta
Cathether Tip, Suprapubic	Cathether Tip, Suprapubic
Cathether Tip, Triple Lumen	Cathether Tip, Triple Lumen
Cerebral spinal fluid	Cerebral spinal fluid
Cervical mucus	Cervical mucus
Cervix	Cervix
Clippings	Clippings
Colostrum	Colostrum
Conjunctiva	Conjunctiva
Contact Lens	Contact Lens
Contact Lens Case	Contact Lens Case
Cord blood	Cord blood
Curettage	Curettage
Cyst	Cyst
Cyst, Baker's	Cyst, Baker's
Cyst, Inclusion	Cyst, Inclusion
Cyst, Pilonidal	Cyst, Pilonidal
Cyst, Renal	Cyst, Renal

Dialysate	Dialysate
Dialysis fluid	Dialysis fluid
Discharge	Discharge
Diverticulum	Diverticulum
Dose med or substance	Dose med or substance
Drain	Drain
Drain, Hemovac	Drain, Hemovac
Drainage Tube, Drainage (Gastrostomy)	Drainage Tube, Drainage (Gastrostomy)
Drainage, Gastric	Drainage, Gastric
Drainage, Ileostomy	Drainage, Ileostomy
Drainage, Jackson Pratt	Drainage, Jackson Pratt
Drainage, Jejunal	Drainage, Jejunal
Drainage, Nasal	Drainage, Nasal
Drainage, Nasogastric	Drainage, Nasogastric
Drainage, Penile	Drainage, Penile
Drainage, Penrose	Drainage, Penrose
Drainage, Rectal	Drainage, Rectal
Drainage, Sump	Drainage, Sump
Drainage, Tube	Drainage, Tube
Duodenal fluid	Duodenal fluid
Ear	Ear
Ear wax (cerumen)	Ear wax (cerumen)
Effusion	Effusion
Electrode	Electrode
Endocardium	Endocardium
Endometrium	Endometrium
Environment, Attest	Environment, Attest
Environmental, Autoclave Ampule	Environmental, Autoclave Ampule
Environmental, Effluent	Environmental, Effluent
Environmental, Eye Wash	Environmental, Eye Wash
Environmental, Food	Environmental, Food
Environmental, Isolette	Environmental, Isolette
Environmental, Other Substance	Environmental, Other Substance
Environmental, Soil	Environmental, Soil
Environmental, Solution (Sterile)	Environmental, Solution (Sterile)
Environmental, Spore Strip	Environmental, Spore Strip
Environmental, Sterrad	Environmental, Sterrad
Environmental, Unidentified Substance	Environmental, Unidentified Substance
Environmental, Water	Environmental, Water
Environmental, Water (Deionized)	Environmental, Water (Deionized)
Environmental, Water (Tap)	Environmental, Water (Tap)
Environmental, Water (Well)	Environmental, Water (Well)

Environmental, Water (Ocean)	Environmental, Water (Ocean)
Environmental, Whirlpool	Environmental, Whirlpool
Eosinophils	Eosinophils
Erythrocytes	Erythrocytes
Exhaled gas (=breath)	Exhaled gas (=breath)
Exudate	Exudate
Eye	Eye
Fibroblasts	Fibroblasts
Filter	Filter
Fistula	Fistula
Fluid	Fluid
Fluid, Abdomen	Fluid, Abdomen
Fluid, Cystostomy Tube	Fluid, Cystostomy Tube
Fluid, Acne	Fluid, Acne
Fluid, Cyst	Fluid, Cyst
Fluid, Hydrocele	Fluid, Hydrocele
Fluid, IV	Fluid, IV
Fluid, Joint	Fluid, Joint
Fluid, Kidney	Fluid, Kidney
Fluid, Lumbar Sac	Fluid, Lumbar Sac
Fluid, Other	Fluid, Other
Fluid, Pericardial	Fluid, Pericardial
Fluid, Renal Cyst	Fluid, Renal Cyst
Fluid, Respiratory	Fluid, Respiratory
Fluid, Shunt	Fluid, Shunt
Furuncle	Furuncle
Gas	Gas
Gastric fluid/contents	Gastric fluid/contents
Genital	Genital
Genital cervix	Genital cervix
Genital lochia	Genital lochia
Genital vaginal	Genital vaginal
Graft	Graft
Graft Site, Popliteal	Graft Site, Popliteal
Graft, Popliteal	Graft, Popliteal
Granuloma	Granuloma
Hair	Hair
Implant	Implant
Infiltrate	Infiltrate
Inhaled Gas	Inhaled Gas
Insect	Insect
Intrauterine Device	Intrauterine Device
Intubation tube	Intubation tube

Isolate	Isolate
Lamella	Lamella
Lavage	Lavage
Lavage, Bronhial	Lavage, Bronhial
Lavage, Gastric	Lavage, Gastric
Lavage, Peritoneal	Lavage, Peritoneal
Lavage, Pre-Bronch	Lavage, Pre-Bronch
Lesion	Lesion
Lesion, Oral	Lesion, Oral
Lesion, Penile	Lesion, Penile
Leukocytes	Leukocytes
Line	Line
Line arterial	Line arterial
Line venous	Line venous
Liquid NOS	Liquid NOS
Liquid, Other	Liquid, Other
Lymphocytes	Lymphocytes
Macrophages	Macrophages
Marrow	Marrow
Mass	Mass
Mass, Sub-Mandibular	Mass, Sub-Mandibular
Meconium	Meconium
Menstrual blood	Menstrual blood
Milk	Milk
Mucosa	Mucosa
Mucus	Mucus
Nail	Nail
Needle	Needle
Nodule(s)	Nodule(s)
Nodule, Cystic	Nodule, Cystic
Nose (nasal passage)	Nose (nasal passage)
Other	Other
Pacemaker	Pacemaker
Pancreatic fluid	Pancreatic fluid
Patient	Patient
Peritoneal fluid /ascites	Peritoneal fluid /ascites
Placenta	Placenta
Plant Material	Plant Material
Plasma	Plasma
Plasma bag	Plasma bag
Platelet poor plasma	Platelet poor plasma
Platelet rich plasma	Platelet rich plasma
Pleural fluid (thoracentesis fld)	Pleural fluid (thoracentesis fld)

Polymorphonuclear neutrophils	Polymorphonuclear neutrophils
Polyps	Polyps
Prosthetic Device	Prosthetic Device
Pseudocyst	Pseudocyst
Pus	Pus
Pus	Pus
Pustule	Pustule
Quality Control	Quality Control
Respiratory	Respiratory
Route of medicine	Route of medicine
Saliva	Saliva
Scalp, Fetal	Scalp, Fetal
Scratch, Cat	Scratch, Cat
Secretion(s)	Secretion(s)
Secretion, Nasal	Secretion, Nasal
Seminal fluid	Seminal fluid
Serum	Serum
Serum, Acute	Serum, Acute
Serum, Convalescent	Serum, Convalescent
Serum, Peak Level	Serum, Peak Level
Serum, Trough	Serum, Trough
Shunt	Shunt
Shunt, External	Shunt, External
Site	Site
Site, CVP	Site, CVP
Site, Incision/Surgical	Site, Incision/Surgical
Site, Naso/Gastric	Site, Naso/Gastric
Site, Nephrostomy	Site, Nephrostomy
Site, Pacemaker Insetion	Site, Pacemaker Insetion
Site, Peritoneal Dialysis	Site, Peritoneal Dialysis
Site, Peritoneal Dialysis Tunnel	Site, Peritoneal Dialysis Tunnel
Site, Pin	Site, Pin
Site, Popliteal Vein	Site, Popliteal Vein
Site, Shunt	Site, Shunt
Site, Tracheostomy	Site, Tracheostomy
Skeletal muscle	Skeletal muscle
Skin	Skin
Smear, Tzanck	Smear, Tzanck
Solution, Gastrostomy	Solution, Gastrostomy
Source of Specimen Is Illegible	Source of Specimen Is Illegible
Source, Other	Source, Other
Source, Unidentified	Source, Unidentified
Source, Unspecified	Source, Unspecified

Spermatozoa	Spermatozoa
Sputum	Sputum
Sputum - coughed	Sputum - coughed
Sputum - tracheal aspirate	Sputum - tracheal aspirate
Sputum, Deep Cough	Sputum, Deep Cough
Sputum, Inducted	Sputum, Inducted
Sputum, Simulated	Sputum, Simulated
Sputum, Spontaneous	Sputum, Spontaneous
Stone (use CALC)	Stone (use CALC)
Stone, Kidney	Stone, Kidney
Stool = Fecal	Stool = Fecal
Suprapubic Tap	Suprapubic Tap
Suture	Suture
Sweat	Sweat
Synovial fluid (Joint fluid)	Synovial fluid (Joint fluid)
Tears	Tears
Throat	Throat
Thrombocyte (platelet)	Thrombocyte (platelet)
Tissue	Tissue
Tissue gall bladder	Tissue gall bladder
Tissue large intestine	Tissue large intestine
Tissue lung	Tissue lung
Tissue placenta	Tissue placenta
Tissue small intestine	Tissue small intestine
Tissue ulcer	Tissue ulcer
Tissue, Acne	Tissue, Acne
Tissue, Herniated	Tissue, Herniated
Tissue, Keloid (Scar)	Tissue, Keloid (Scar)
To be specified in another part of the message	To be specified in another part of the message
Transudate	Transudate
Tube NOS	Tube NOS
Tube, Endotracheal	Tube, Endotracheal
Tube, Gastric	Tube, Gastric
Tubes	Tubes
Tubing Tip, IV	Tubing Tip, IV
Tumor	Tumor
Ulcer	Ulcer
Ulcer, Decubitus	Ulcer, Decubitus
Umbilical blood	Umbilical blood
Unknown medicine	Unknown medicine
Unknown substance	Unknown substance
Urethra	Urethra

Urine	Urine
Urine catheter	Urine catheter
Urine clean catch	Urine clean catch
Urine sediment	Urine sediment
Urine, Bladder Washings	Urine, Bladder Washings
Urine, Catheterized	Urine, Catheterized
Urine, Cystoscopy	Urine, Cystoscopy
Urine, Midstream	Urine, Midstream
Urine, Nephrostomy	Urine, Nephrostomy
Urine, Pedibag	Urine, Pedibag
Urine, Random	Urine, Random
Vitreous Fluid	Vitreous Fluid
Vomitus	Vomitus
Wart	Wart
Wash	Wash
Washing, e.g. bronchial washing	Washing, e.g. bronchial washing
Water	Water
Wen	Wen
Whole blood	Whole blood
Whole body	Whole body
Wick	Wick
Worm	Worm
Wound	Wound
Wound abscess	Wound abscess
Wound drainage	Wound drainage
Wound exudate	Wound exudate
Wound, Puncture	Wound, Puncture

4.16 Anatomical site (specimen source) – body part

Please refer "**Table 0163 - Administrative site**" table from HL7 standard document (HL7 2.3.1) document.

Code	Value Description
BE	Bilateral Ears LVL Left Vastus Lateralis
OU	Bilateral Eyes NB Nebulized
BN	Bilateral Nares PA Perianal
BU	Buttock PERIN Perineal
CT	Chest Tube RA Right Arm
LA	Left Arm RAC Right Anterior Chest
LAC	Left Anterior Chest RACF Right Antecubital Fossa
LACF	Left Antecubital Fossa RD Right Deltoid

LD	Left Deltoid RE Right Ear
LE	Left Ear REJ Right External Jugular
LEJ	Left External Jugular OD Right Eye
OS	Left Eye RF Right Foot
LF	Left Foot RG Right Gluteus Medius
LG	Left Gluteus Medius RH Right Hand
LH	Left Hand RIJ Right Internal Jugular
LIJ	Left Internal Jugular RLAQ Rt Lower Abd Quadrant
LLAQ	Left Lower Abd Quadrant RLFA Right Lower Forearm
LLFA	Left Lower Forearm RMFA Right Mid Forearm
LMFA	Left Mid Forearm RN Right Naris
LN	Left Naris RPC Right Posterior Chest
LPC	Left Posterior Chest RSC Right Subclavian
LSC	Left Subclavian RT Right Thigh
LT	Left Thigh RUA Right Upper Arm
LUA	Left Upper Arm RUAQ Right Upper Abd Quadrant
LUAQ	Left Upper Abd Quadrant RUFA Right Upper Forearm
LUFA	Left Upper Forearm RVL Right Vastus Lateralis
LVG	Left Ventragluteal RVG Right Ventragluteal

4.17 Anatomical site (specimen source) – site modifiers

Please refer "**Table 0070 - Specimen source codes**" from HL7 standard document (HL7 2.3.1) document.

Code	Value Description
ABS	Abscess FLU Body fluid, unsp SER Serum
AMN	Amniotic fluid GAS Gas SKN Skin
ASP	Aspirate GAST Gastric fluid/contents SKM Skeletal muscle
BPH	Basophils GEN Genital SPRM Spermatozoa
BIFL	Bile fluid GENC Genital cervix SPT Sputum
BLDA	Blood arterial GENL Genital lochia SPTC Sputum - coughed
BBL	Blood bag GENV Genital vaginal SPTT Sputum - tracheal aspirate
BLDC	Blood capillary HAR Hair STON Stone (use CALC)
BPU	Blood product unit IHG Inhaled Gas STL Stool = Fecal
BLDV	Blood venous IT Intubation tube SWT Sweat
BON	Bone ISLT Isolate SNV Synovial fluid (Joint fluid)
BRTH	Breath (use EXHLD) LAM Lamella TEAR Tears
BRO	Bronchial WBC Leukocytes THRT Throat
BRN	Burn LN Line THRB Thrombocyte (platelet)
CALC	Calculus (=Stone) LNA Line arterial TISS Tissue

CDM	Cardiac muscle LNV Line venous TISG Tissue gall bladder
CNL	Cannula LIQ Liquid NOS TLGI Tissue large intestine
CTP	Catheter tip LYM Lymphocytes TLNG Tissue lung
CSF	Cerebral spinal fluid MAC Macrophages TISPL Tissue placenta
CVM	Cervical mucus MAR Marrow TSMI Tissue small intestine
CVX	Cervix MEC Meconium TISU Tissue ulcer
COL	Colostrum MBLD Menstrual blood TUB Tube NOS
CBLD	Cord blood MLK Milk ULC Ulcer
CNJT	Conjunctiva MILK Breast milk UMB Umbilical blood
CUR	Curettage NAIL Nail UMED Unknown medicine
CYST	Cyst NOS Nose (nasal passage) URTH Urethra
DIAF	Dialysis fluid ORH Other UR Urine
DOSE	Dose med or substance PAFL Pancreatic fluid URC Urine clean catch
DRN	Drain PAT Patient URT Urine catheter
DUFL	Duodenal fluid PRT Peritoneal fluid /ascites URNS Urine sediment
EAR	Ear PLC Placenta USUB Unknown substance
EARW	Ear wax (cerumen) PLAS Plasma VOM Vomitus
ELT	Electrode PLB Plasma bag BLD Whole blood
ENDC	Endocardium PLR Pleural fluid (thoracentesis fld) BDY Whole body
ENDM	Endometrium PMN Polymorphonuclear neutrophils
WAT	Water
EOS	Eosinophils PPP Platelet poor plasma WICK Wick
RBC	Erythrocytes PRP Platelet rich plasma WND Wound
EYE	Eye PUS Pus WNDA Wound abscess
EXHLD	Exhaled gas (=breath) RT Route of medicine WNDE Wound exudate
FIB	Fibroblasts SAL Saliva WNDD Wound drainage
FLT	Filter SEM Seminal fluid XXX To be specified in another part of the message
FIST	Fistula

4.18 Anatomical site (specimen source) – specimen collection method

Download the Excel for **IS0200 Saudi Health Information Exchange Data Dictionary**

Use the steps below to download the document

1. Go to NHIC Website by this link below:

   (https://nhic.gov.sa/eServices/std/Pages/default.aspx)
2. Go to (Admin – Patient identification)
3. Go to (IS0200 Saudi Health Information Exchange Data Dictionary)
4. Check the (Specimen collection method) Sheet

Code	Concept Name
FNA	Aspiration, Fine Needle
PNA	Aterial puncture
BIO	Biopsy
BCAE	Blood Culture, Aerobic Bottle
BCAN	Blood Culture, Anaerobic Bottle
BCPD	Blood Culture, Pediatric Bottle
CAP	Capillary Specimen
CATH	Catheterized
EPLA	Environmental, Plate
ESWA	Environmental, Swab
LNA	Line, Arterial
CVP	Line, CVP
LNV	Line, Venous
MARTL	Martin-Lewis Agar
ML11	Mod. Martin-Lewis Agar
PACE	Pace, Gen-Probe
PIN	Pinworm Prep
KOFFP	Plate, Cough
MLP	Plate, Martin-Lewis
NYP	Plate, New York City
TMP	Plate, Thayer-Martin
ANP	Plates, Anaerobic
BAP	Plates, Blood Agar
PRIME	Pump Prime
PUMP	Pump Specimen
QC5	Quality Control For Micro
SCLP	Scalp, Fetal Vein
SCRAPS	Scrapings
SHA	Shaving
SWA	Swab
SWD	Swab, Dacron tipped
WOOD	Swab, Wooden Shaft
TMOT	Transport Media,
TMAN	Transport Media, Anaerobic
TMCH	Transport Media, Chalamydia
TMM4	Transport Media, M4
TMMY	Transport Media, Mycoplasma
TMPV	Transport Media, PVA
TMSC	Transport Media, Stool Culture
TMUP	Transport Media, Ureaplasma
TMVI	Transport Media, Viral
VENIP	Venipuncture

4.19 Container codes

Go to FHIR website(https://www.hl7.org/fhir/valueset-specimen-container-type.html) to fetch the container codes related value set.

Code	Display
22566001	Cytology brush, device
463568005	Pleural drainage system fluid collector
464527005	Paediatric blood donor set
464573007	Assisted reproduction needle, reprocessed
464784003	Assisted reproduction catheter
464946000	Assisted reproduction needle, single-use
465046006	Assisted reproduction cryotube
465091002	Tissue extraction bag
465141003	Otological bone particle collector
465487000	Rigid endotherapy cytology brush, reusable
466164006	Rigid endotherapy cytology brush, single-use
466421006	Viscerotome
466447002	Blood-processing autotransfusion system container
466623002	Blood gas syringe/needle, sodium heparin
466637006	Blood donor set, quad-pack
466704003	Blood collection/fat content reduction device
466844004	Blood donor set, double-pack
466898000	Blood donor set, quin-pack
466930006	Blood donor set, triple-pack
467030004	Blood gas syringe/needle, lithium heparin
467131002	Blood autotransfusion system tubing
467132009	Blood donor set, single-pack
467141004	Blood donor set, many-pack
467182004	Cervical cytology inflatable collector
467330006	Adipose tissue stem cell recovery unit
467431009	Abortion suction system collection bottle
467499008	Chorionic villus sampling catheter
467647004	Cryostat microtome
467697000	Cytology scraper, single-use
467743009	Bone marrow explant needle
467967005	Cytology scraper, reusable
467989009	Capillary blood collection tube, no-additive

468076003	Bone marrow collection/transfusion set
468131000	Cervical cytology brush
468200003	Epididymal fluid aspiration catheter
468981005	Dental bone particle collector
468999002	Endometrial cytology brush
469287008	Intrauterine secretion scoop
469322002	Intravascular catheter endoluminal brush
469454007	Intrauterine scoop
469822008	Flexible endotherapy cytology brush, single-use
470114007	Flexible endotherapy cytology brush, reusable
470547006	General-purpose cytology brush
470597005	Gastro-urological scoop
700855008	Tissue/fluid collection bag, sterile
700905004	Specimen container mailer, insulated
700906003	Specimen container mailer, non-insulated
700945008	Blood cell freeze/thaw system set
700955007	Blood collection Luer-syringe adaptor
700956008	Blood collection needle, basic
700957004	Blood/tissue storage/culture container
701394007	General specimen receptacle transport container
701516009	Evacuated blood collection tube transport container
701720006	Tissue/fluid collection bag, non-sterile
702120003	Blood collection Luer adaptor
702223006	Sputum specimen container
702224000	Midstream urine specimen container
702232008	Sweat specimen container IVD
702244006	Sterile urine specimen container
702256007	Non-evacuated blood collection tube, no additive
702264001	Non-sterile urine specimen container IVD
702268003	General specimen container, no additive, non-sterile
702269006	General specimen container, no additive, sterile
702275002	Microcapillary blood collection tube, ammonium heparin
702276001	Microcapillary blood collection tube, K2EDTA
702277005	Microcapillary blood collection tube, no additive
702278000	Evacuated blood collection tube, no additive/metal-free
702279008	Evacuated blood collection tube, gel separator
702280006	Evacuated blood collection tube, RNA stabilizer
702281005	Evacuated blood collection tube, thrombin/clot activator/gel separator
702282003	Non-evacuated blood collection tube, EDTA

702283008	Non-evacuated blood collection tube, gel separator
702284002	Non-evacuated blood collection tube, lithium heparin
702285001	Non-evacuated blood collection tube, lithium heparin/gel separator, sterile
702286000	Non-evacuated blood collection tube, NaEDTA/sodium fluoride
702287009	Non-evacuated blood collection tube, potassium oxalate/sodium fluoride
702288004	Evacuated urine specimen container, boric acid (H3BO3)/sodium formate
702289007	Evacuated urine specimen container, ethyl paraben/sodium porpionate/chlorhexidine
702290003	Cervical cytology microscopy slide
702292006	Evacuated blood collection tube , K3EDTA/sodium fluoride
702293001	Evacuated blood collection tube, K2EDTA/aprotinin
702294007	Syringe-blood collection tube transfer
702295008	Non-evacuated blood collection tube, clot activator/gel separator
702296009	Non-evacuated blood collection tube, sodium citrate
702297000	Non-evacuated blood collection tube, clot activator
702298005	Non-evacuated blood collection tube, K3EDTA
702299002	Non-evacuated blood collection tube, K2EDTA
702300005	Non-evacuated blood collection tube, lithium heparin/gel separator, non-sterile
702301009	Microcapillary blood collection funnel
702302002	Evacuated urine specimen container, boric acid (H3BO3)
702303007	Evacuated urine specimen container, multiple preservative
702304001	Microcapillary blood transfer tube, clot activator
702305000	Microcapillary blood transfer tube, sodium fluoride
702306004	Microcapillary blood transfer tube, EDTA
702307008	Microcapillary blood transfer tube IVD, heparin
702308003	Evacuated urine specimen container IVD, no additive
702309006	Saliva specimen container IVD, no additive
702310001	Evacuated saliva specimen container IVD, sodium azide
704866005	Orthopedic bone particle collector, reusable

704921002	Hemoperfusion tubing set
706042001	Clinical sampling brush
706044000	Endotherapy cytology brush
706045004	Bone particle collector
706046003	Specimen receptacle
706047007	Fecal specimen container
706048002	Blood specimen receptacle
706049005	Blood tube
706050005	Microcapillary blood collection tube
706051009	Non-evacuated blood collection tube
706052002	Evacuated blood collection tube
706053007	General specimen container
706054001	Urine specimen container
706055000	24-hour urine specimen container
706056004	Evacuated urine specimen container
706057008	Cytology specimen container
706058003	Secretory specimen container
706067003	Blood collection/transfer device
706070004	Blood donor set
706071000	Specimen receptacle transport container
712485008	Autologous blood collection tube
713951005	Adipose tissue stem cell recovery unit, ultrasonic
714731008	Blood component separator
718301008	Urological fluid funnel, sterile
718302001	Urological fluid funnel, non-sterile

4.20 Normal – Abnormal flags

Please refer "**HL7 table 0078 - Abnormal flags**" from HL7 standard document (HL7 2.3.1) document

Code	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
For microbiology susceptibilities only:	
S	Susceptible*
R	Resistant*
I	Intermediate*
MS	Moderately susceptible*
CS	Very susceptible*

4.21 Result units

Go to UCUM website (https://ucum.org/trac/attachment/wiki/adoption/common/TableOfExampleUcumCodesForElectronicMessaging.xlsx) to fetch the result unit codes related value set.

5. HL7 MESSAGE COMMUNICATION

5.1 Communication Protocol

- Systems which are installed over Lean exchange the HL7 messages via HTTP or TCP/IP
- Systems which are NOT installed over Lean to exchange the HL7 messages via HTTPS

5.2 Integration connectivity pre-requisites

- Register in the developer portal: https://devportal.lean.sa/ using a project or a department email. Example: Accepted: my-project@lean.sa, Not accepted: saud@lean.sa
- Provide us with the Public IP (Natted IP/Outbound IP) of your server
- HIS/LIS system integration SPOC name and contact details (Number and Email

Please refer the below mentioned text to know about HL7 encoded message.

- Once the “receiving application end point” is deployed over Lean network, receiver system would get the appropriate messages from sending application according to the routing criteria defined in sender system.
- Apigee middleware is responsible for receiving and sending the HL7 messages to appropriate senders and receivers.
- HTTP request details

  POST https://<tbd-apigee-endpoint>/<env>/v1/inbound

  Headers:
  Content-Type: text/plain

Authorization: Bearer <token>

Body: <HL7 Message text>

- HL7 Message Text
  Please refer below mentioned HL7 encoded sample format

- HL7 response message Text
  Standard HL7 encoded message with MSH & MSA segments

5.3 Message sample

5.3.1 New order

MSH|^~\&|ARCUS AIR|10000000008992|E-LAB|E-LAB|202305151246||ORM|20230515154643073|P|2.3

PID||3000000011676|1000000003||ALOTIBI^ABDURAHMAN^ABDULLAH^ABDULLAH RAJA||20020919|M|0501606064||^^^^|||^^^^^^عبدالله^العتيبي|Arabic|MARTST5^Unknown|||||||||||59^SAUDI ARABIA|||||||

PV1|1|O|T14^Family Medicine Clinic||||1016224204^^SOUSAN|||Family Medicine Clinic|||||||1016224204^^SOUSAN||408OP2302005859^|||||||||||||||||||||||||20230515120516

ORC|NW|4081502230040||4081502230040|IP||||20230515154643|||1016224204^SOUSAN||||NW|40051^AL Jesser PHC

OBR|1|40815022300401751-7||1751-7^Albumin [Mass/volume] in Serum or Plasma^LT|R|20230515123841|20230515123841|||||||20230515154643||^^^^^^||PRA03^Plasma^^^^^|||||||||||||||||

OBR|2|40815022300401975-2||1975-2^Bilirubin.total [Mass/volume] in Serum or Plasma^LT|R|20230515123841|20230515123841|||||||20230515154643||^^^^^^||PRA03^Plasma^^^^^|||||||||||||||||

OBR|3|408150223004057021-8||57021-8^CBC W Auto Differential panel - Blood^LT|R|20230515123841|20230515123841|||||||20230515154643||^^^^^^||WBRA17^Whole Blood^^^^^|||||||||||||||||

5.3.2 Receive Barcode Number

MSH|^~\&|LIS|10000000008992|E-LAB|E-LAB|202305151246||ORM|20230515154643073|P|2.3

PID|1||1006520070^^^RQG ID^RQG ID||ALKAHTANI^SAMAR||20000703|F|||Salahdin PHC|||||||557021-8|||||||||||N

PV1|1|O|C002|||||HPDOC^HP Doctor||||||||||5|||||20230712164938

ORC|SC|5|23H-H000000074^Beaker||SC||||20230712164938|INTF334371^INTERFACE^CLINICAL^LAB ORDERS IN||INTF334371^INTERFACE^CLINICAL^LAB ORDERS IN|||20230712164938|BC^Barcode-Generate|||||Salahdin PHC^D^^^^KFMC^XX^^^10000000036044|SALAHDIN DISTRICT-ABI DOGANAH STREET^^RIYADH^^^FSM^B

OBR|1|557021-8^External|23H-H000000074^Beaker|57021-8^CBC WITH AUTO DIFFERENTIAL^AYENATI^^^^^^CBC WITH AUTO DIFFERENTIAL|R|20230712145800|||||L||||Blood&Blood^^^Blood, Venou&Blood, Venous|INTF334371^INTERFACE^CLINICAL^LAB ORDERS IN|||||||Lab|||^^^^^R|||||||||20230712145800

ZSP|1|19012520|^EDTA 5mL

5.3.3 Collect specimen

MSH|^~\&|ARCUS AIR|10000000039246|E-LAB|E-LAB|202305140853||ORM|20230515144128915|P|2.3

PID||3300000000597|1055684128||ALHAMDAN^JAWAHER^BINT SAAD^BINT SAAD BIN ABDULLAH||19881004|F|الحمدان^بنت
0566944984|^^^^|||^^^^^^سعد|Arabic|MARTST4^Single||||||||||||59^SAUDI ARABIA|||||||

PV1|1|O|T14^Family Medicine Clinic||||1008320606^^AMAL|||Family Medicine
Clinic|||||||1008320606^^AMAL||33OP2302006478^|||||||||||||||||||||||||20230514081936

ORC|SC|331402230025||331402230025|SC||||20230515144128|||1008320606^AMAL||||CL|103980^Al Khobar South

OBR|1|3314022300253016-3|011023001564|3016-3^TSH [Thyrotropin][Units/volume] in Serum or
Plasma^LT|R|20230514085006|20230514085006|||||||20230515144128||^^^^^^||STU35^Serum^^^^^|||||||||||||||||

OBR|2|3314022300253024-7|011023001561|3024-
7^T4^LT|R|20230514085006|20230514085006|||||||20230515144128||^^^^^^||36^Serum^^^^^|||||||||||||||||

5.3.4 Specimen in-process - Accept

MSH|^~\&|VIDA^^^|10000300109400^^^|AYENATI^^^&ELABS|10000300126594^^^&10000000007377|20230515103840||ORM^
O01|20230515103840049|T|2.3||||

PID|||1007267691||AWAD^ALFURAYDI^MUHYILAH||19680923|F|ALFURAYDI||Rashid al asbahani, East Naseem Dist.,RIYADH,
14243^^^^|^SAUDI ARABIA||^^^^^^0532519266||M^|1^|||||||||^SAUDI ARABIA||^SAUDI ARABIA||N||||||

PV1|1|O|C002^|R^|||HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003||
||||A5^ Vision
impaired|N|HPDOC^^^^^DR^^^^^^112247003||256OP2302004251^^^&|GOV^SaudiGovernment||||20230515102250|||||||||
|||||||||||||

ORC|SC|256150223009^^^|^^^|20230515102254|IP||1^^^20230515102254||20230515102254|HPDOC^HP
Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP
Doctor^^^^DR^^^^^^112247003|||20230515102254|IP^In-process|||HPDOC^HP Doctor^^^^DR^^^^^^112247003

OBR|1|2561502230094548-4^^^|382561502230094^^^|4548-4^HEMOGLOBIN
A1C|R^Routine|20230515103516|20230515102254||0.5^mL|^^^^^DR^^Registered |||"Clinical
info"|20230515102254|^^^|HPDOC^HP
Doctor^^^^DR^^^^^^112247003||WBRA16||^^^^^^|||||||||TR^Trolley||||||3||Phlebotomist comments|

5.3.5 Specimen in-process – Reject

MSH|^~\&|VIDA^^^|10000300109400^^^|AYENATI^^^&ELABS|10000300126594^^^&10000000007377|20230515112100||ORM^
O01|20230515112100043|T|2.3||||

PID||1034769339|1034769339||MAYSUN^MOHAMMED^ALHARBI||19750710|F|ALHARBI||Rashid al asbahani, East Naseem
Dist.,RIYADH, 14243^^^^|SAU^SAUDI ARABIA||^^^^^^0555144085||M^|1^|||||||||SAU^SAUDI ARABIA||SAU^SAUDI
ARABIA||N||||||

PV1|1|O|C002^|R^|||HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003||
||||A5^ Vision
impaired|N|HPDOC^^^^^DR^^^^^^112247003||256OP2302004241^^^&|GOV^SaudiGovernment||||20230515092747|||||||||
|||||||||||||

ORC|OD|256150223004^^^|20230515092749^^^|20230515092749|DC||1^^^20230515092749||20230515092749|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|||20230515092749|RJ^Specimen rejected|||HPDOC^HP Doctor^^^^DR^^^^^^112247003

OBR|1|25615022300424356-8^^^&|39256150223004^^^|24356-8^Urine Analysis|R^Routine|20230515094455|20230515092749||0.5^mL|HPDOC^^^^^DR^^Registered |||"Clinical info"|20230515092749|^^^| 1000258369^Al-Harthi^^^^DR^^^^^^112247003||||^^^^Leaking container^^20230515112100|||||||||||||||||3|||

5.3.6 Test – Resulted & completed

MSH|^~\&|VIDA^^^|100003001094000^^^|AYENATI^^^&ELABS|10000000031029|20230515092830||ORU^R01|20230515092830069|T|2.3||||

PID|||1063526063||ALMESHARI^MARAM^HAMOUD||19890107|F|MARAM||Rashid al asbahani, East Naseem Dist.,RIYADH, 14243^^^^|SAU^SAUDI ARABIA||^^^^^^0566537788||M^|1^|||||||||SAU^SAUDI ARABIA||SAU^SAUDI ARABIA||N||||||

PV1|1|O|C002^|R^|||HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|||||A5^ Vision impaired|N|HPDOC^^^^^DR^^^^^^112247003||258OP2302001265^^^&|GOV^SaudiGovernment||||20230514093848|||||||||||||||||||||

ORC|IP|2581402230007^^^|^^^|20230514093849|CM||1^^^20230514093849||20230514093849|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|||20230514093849|CM^Test completed| OID.XXX||HPDOC^HP Doctor^^^^DR^^^^^^112247003

OBR|1|258140223000724356-8^^^&|392581402230007^^^|24356-8^Urine Analysis&^LT|R^Routine|20230514094028|20230514093849||0.5^mL|HPDOC^^^^^DR^^Registered |||"Clinical info"|20230514093849|^^^| 1000258369^Al-Harthi^^^^DR^^^^^^112247003||||^^^^^^|||||||||||||||||3|||

OBX|1|ST|5778-6^U-COLOR||yellow|||N|||F|||20230514124700

OBX|2|ST|24124-0^U-CASTS||nil|||N|||F|||20230514124700

OBX|3|ST|38459-4^U-CRYSTALS||nil||Nil|N|||F|||20230514124700

OBX|4|ST|8246-1^U-AMORPHOU||nil|||N|||F|||20230514124700

OBX|5|ST|28545-2^U-MUCUS||nil||Nil|N|||F|||20230514124700

OBX|6|ST|^U-MICROORG||nil|||N|||F|||20230514124700

OBX|7|ST|20455-2^U-WBC||2-5|hpf|Nil|N|||F|||20230514124700

OBX|8|ST|32776-7^U-RBC||5-10|hpf|Nil|N|||F|||20230514124700

OBX|9|ST|20453-7^U-EPICELLS||++|-|Nil|N|||F|||20230514124700

OBX|10|ST|^U-OTHERS||nil|||N|||F|||20230514124700

OBX|11|ST|11279-7^U-REMARKS||nil|||N|||F|||20230514124700

OBX|12|ST|5767-9^U-APPEAR||clear||Clear|N|||F|||20230514124700

OBX|13|ST|20455-2^U-LEUKOCYT||nil||Nil|N|||F|||20230514124700

OBX|14|ST|5794-3^U-BLOOD||nil||Nil|N|||F|||20230514124700

OBX|15|ST|5802-4^U-NITRATE||nil||Nil|N|||F|||20230514124700

OBX|16|ST|5803-2^U-PH||6||5 - 7.5|N|||F|||20230514124700

OBX|17|ST|5811-5^SGRAVITYUR||1020|-|1010 - 1030|N|||F|||20230514124700

OBX|18|ST|14957-5^U-ALBUMIN||nil|mg/dL| nil |N|||F|||20230514124700

OBX|19|ST|^U-GLUCOSE||nil|-|Nil|N|||F|||20230514124700

OBX|20|ST|^U-KETONE||nil||Nil|N|||F|||20230514124700

OBX|21|ST|5770-3^U-BILIRUBI||nil||Nil|N|||F|||20230514124700

OBX|22|ST|20405-7^U-UROBILIN||nil||Normal|N|||F|||20230514124700

5.3.7 Test – Result amended - Formatted text results

MSH|^~\&|VIDA^^^|10000300109400^^^|AYENATI^^^&ELABS|10000300126594^^^&10000000007377|20220908122200||ORU^R01|20220908122200206|T|2.3||||

PID|||1079343644||ALHARBI^ABDULMOHSEN^MANSOUR||19880530|M|ABDULMOHSEN||Rashid al asbahani, East Naseem Dist.,RIYADH, 14243^^^^|SAU^SAUDI ARABIA||^^^^^^0508187875||M^|1^|||||||||SAU^SAUDI ARABIA||SAU^SAUDI ARABIA||N||||||

PV1|1|O|C002^|R^|||HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|HPDOC^^^^^DR^^^^^^112247003|||||A5^ Vision impaired|N|HPDOC^^^^^DR^^^^^^112247003||256OP2209014577^^^&|GOV^SaudiGovernment||||20220908095545|||||||||||||||||||

ORC|IP|256080922017^^^|^^^|20220908095755|CM||1^^^20220908095755||20220908095755|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|HPDOC^HP Doctor^^^^DR^^^^^^112247003|||20220908095755|CM^Test completed| OID.XXX||HPDOC^HP Doctor^^^^DR^^^^^^112247003

OBR|1|256080922017630-4^^^&|39256080922017^^^|630-4^URINE CULTURE&^LT|R^Routine|20220908095801|20220908095755||0.5^mL|HPDOC^^^^^DR^^Registered |||"Clinical info"|20220908095755|^^^| 1000258369^Al-Harthi^^^^DR^^^^^^112247003||||^^^^^^|||||||||||||||||3|||

OBX|1|TX|630-4^C/S URINE||TX_RTF32 14.0.520.503;} Organisms Found : \.br\ WRITE MANUAL BY RECUSET . \.br\ Antibiotics123Antibiotics123Antibiotics123Penicillin Ampicillin Amikacin Oxacill/Methicill Augmentin Tienam Erythromycin Cefoxitin Aztreonam Ceph. Cefuroxime Nalidxic Cotrimox Cefataxine Norfl/Ciprofl Clindamycin Cefitriaxone Nitrofurant Tetracyclin Ceftazidime Carbencillin Vancomycin Ceftizox Piperacillin Fusidin Chloramph. Neomycin Novobiocin Gentamicin Polymyxin Bacitracin Tobramycin Rifampicin Remarks :S = Sensitive R = Resistant I = Intermediat|||||F|||20220908122100

6. HL7 DATA FIELD EXCHANGE REQUIREMENTS AGAINST THE AYENATI USE CASES

This section explains all possible (optional/mandatory) HL7 data fields that are to be exchanged against each Ayenati operational user case scenario.

6.1 Common segment (MSH, PID, PV1) fields required in Order & Result HL7 messages

These are the common segments used in all HL7 messages.

- MSH is Message Header segment
- PID – Patient Identification segment

- PV1 – Patient Visit/encounter segment.

MSH		PID		PV1	
#	**Description**	**#**	**Description**	**#**	**Description**
1	Field Separator	1	Set ID – PID	1	Set ID - PV1
2	Encoding Characters	2	Patient ID (external Id)	2	Patient Class
3	Sending Application	3	Patient ID (internal Id)	3	Assigned Patient Location
4	Sending Facility	5	Patient Name	4	Admission type
5	Receiving Application	7	Date/Time of Birth	7	Attending Doctor
6	Receiving Facility	8	Sex	8	Referring Doctor
7	Date/Time of Message	11	Patient Address	10	Hospital Service
9	Message Type	12	County Code	15	Ambulatory Status
10	Message Control ID	13	Phone Number – Home	16	VIP Indicator
12	Version ID	14	Phone Number – Business	17	Admitting Doctor
		15	Primary Language	19	Visit Number
		16	Marital Status	20	Financial class
		17	Religion	24	Admit visit date time
		19	Social security number-patient secondary number		
		26	Citizenship		
		28	Nationality		

Please note:

- # is field's positional number in respective segments.
- MSH should contain all the fields that are highlighted in above table
- PID segment should contain PID#1,2,3 as mandatory fields. Additionally, HL7 message sender system can fill the other data fields depending on the data fields that are captured in their system.
- PV1 segment should contain PV1#1,19 as mandatory fields. Additionally, HL7 message sender system can fill the other data fields depending on the data fields that are captured in their system.

6.2 Order segment (ORC, OBR) fields - New order use case

Order placer system should trigger "New order" related ORM message as on when order is placed in "Placer order systems" by ordering provider.

Name of the function	"New order"
Actor (user type)	Ordering provider
Role/purpose/objective	Place order by provider
Pre-condition - operational	Patient arrives at hospital where HIS system is implemented for place order and specimen collection.
Pre-condition - Ayenati application	
Pre-condition - integration	
Flow of activities	Order placed in "Placer order system". --New order information will be received to Ayenati via HL7 message -- Ayenati to create the patient if patient record is not available in Ayenati. --New order will be created in Ayenati with order status as "order generated"
Post conditions - operational	Specimen dispatch, pickup to be done using Ayenati system
Post conditions - application	Orders to be visible in Ayenati dashboard with status as "order generated". Dispatch will be prepared as next step.
Post conditions - integration	Orders are to be synchronized to Ayenati via HL7 message. Ayenati to create the patient if patient record is not available in Ayenati. Ayenati should create the Lab order and update the specimen details against the order
Exceptions	1. HIS system users can continue to place the orders and collect the specimen even though orders and specimens were not synchronized to Ayenati or due to scheduled/nonscheduled system outages in HIS.
Assumptions	

ORC		OBR	
#	**Description**	**#**	**Description**
1	Order Control	1	Set ID - OBR
2	Placer order number	2	Placer Order Number
3	Filler Order Number	4	Universal Service ID

5	Order Status	5	Priority
7	Quantity / Timing	6	Requested Date/Time
9	Order date time	13	Relevant Clinical Info.
10	Entered By	16	Ordering Provider
11	Verified by		
12	Ordering Provider		
14	Call Back Phone Number		
15	Order Effective Date/Time		
16	Order Control Code Reason		
17	Entering Organization		
19	Action by - completed/resulted/approve/amended		

Please note:

- # is field's positional number in respective segments.
- MSH, PID, PV1 common segments to be filled as mentioned in section 5.1
- Placer Order Number is mandatory keys. Additionally, HL7 message sender system can fill above mentioned data fields in ORC, OBR segments depending on the data fields that are captured in their system.

6.2.1 Order segment (ZSP) fields - New order use case

Order placer system should receive the specimen barcode number via HL7 message from LIS immediately after New order message is processed by LIS system.

Name of the function	"Receive Barcode number"
Actor (user type)	Ordering provider
Role/purpose/objective	Place order by provider
Pre-condition - operational	Patient arrives at hospital where HIS system is implemented for place order and specimen collection.
Pre-condition - Ayenati application	Order should be generated in the application

Pre-condition - integration	New order information to be received to Ayenati via HL7 message
Flow of activities	--Order placed in “Placer order system”. --New order information will be received to Ayenati via HL7 message --New order will be created in Ayenati with order status as "order generated" --Specimen barcode number via HL7 message from LIS immediately after New order message is processed by LIS system.
Post conditions - operational	Specimen to be collected from the patient
Post conditions - application	Specimen number get created in the application and specimen collection to be done.
Post conditions - integration	Orders are to be synchronized to Ayenati via HL7 message. Specimen barcode number via HL7 message will be received from LIS system There should be a separate ZSP message for each container in every order messages. Specimen information along with order details will be received via HL7 message to Ayenati system.
Exceptions	
Assumptions	

ORC		OBR		ZTC	
#	**Description**	**#**	**Description**	**#**	**Description**
1	Order Control	1	Set ID - ZSP	1	Set ID - ZSP
2	Specimen Number	2	Barcode	2	Barcode
3	Container	4	Container Type	4	Container Type

6.3 Order segment (ORC, OBR) fields - Specimen collection use case

Order placer system should trigger “Specimen collection” related ORM message as on when specimen was collected in “Placer order systems” by Phlebotomist.

Name of the function	Specimen collection
Actor (user type)	Phlebotomist

Role/purpose/objective	Specimen collection by Phlebotomist
Pre-condition - operational	Patient arrives at specimen collection centre and order is plaed
Pre-condition - Ayenati application	
Pre-condition - integration	
Flow of activities	Specimen collection done in HIS system. -- Specimen information along with order details will be received via HL7 message to Ayenati system. --Specimen details will be updated against the order in Ayenati with order status as "specimen collected"
Post conditions - operational	Specimen dispatch, pickup to be done using Ayenati system
Post conditions - application	Orders and specimen details to be visible in Ayenati dashboard with status as specimen collected. Dispatch will be prepared as next step.
Post conditions - integration	Orders & specimen details are to be synchronized to Ayenati via HL7 message. Ayenati should create the Lab order and update the specimen details against the order
Exceptions	HIS system users can continue to place the orders and collect the specimen even though orders and specimens were not synchronized to Ayenati or due to scheduled/nonscheduled system outages in HIS.
Assumptions	

ORC		OBR	
#	**Description**	**#**	**Description**
1	Order Control	1	Set ID - OBR
2	Placer order number	2	Placer Order Number
3	Filler Order Number	3	Filler Order Number
5	Order Status	4	Universal Service ID
7	Quantity / Timing	5	Priority
9	Order date time	6	Requested Date/Time

10	Entered By	7	Observation Date/Time
11	Verifiedby	9	Collection Volume
12	Ordering Provider	10	Collector Identifier
14	Call Back Phone Number	13	Relevant Clinical Info.
15	Order Effective Date/Time	15	Specimen Source
16	Order Control Code Reason	16	Ordering Provider
17	Entering Organization	18.1	Specimen type
19	Action by - completed/resulted/approve/amended	18.2	Collection center
		18.3	Container code
		18.4	Batch ID - entered during the specimen collection
		39	Collector's Comment

Please note:

- # is field's positional number in respective segments.
- MSH, PID, PV1 common segments to be filled as mentioned in section 5.1
- Placer Order Number & Filler order number are mandatory/primary keys. Additionally, HL7 message sender system can fill above mentioned data fields in ORC, OBR segments depending on the data fields that are captured in their system.

6.4 Order segment (ORC, OBR) fields - in-process use case

Filler order system should trigger "Specimen in-process/reject" related ORM message as on when specimen status was updated as "in-process/rejected" in filler order system" by Lab staff.

Name of the function	In-process
Actor (user type)	Lab technician, technologist, receiving recipient.
Role/purpose/objective	Lab workflow functions after the specimen delivered a. Specimen received status to be updated in Ayenati by receiving recipient b. Following statuses to be updated in LIS as a next step by Lab staff. 1. specimen rejected 2. specimen in-process

Pre-condition - operational	Specimens are delivered at Lab.
Pre-condition - Ayenati application	1. Specimens were transported and delivered at destination lab where the specimens to be processed.
Pre-condition - integration	
Flow of activities	1. Specimen received status to be updated in Ayenati by receiving recipient. 2. Lab staff to pick up the Batch. 3. Scan Batch ID and: a. Review all the all specimens that are received in a Batch. b. Review quality/usability of specimens and update the status in LIS using LIS system functions. 4. Update the status as follows. a. specimen rejected. b. specimen in-process.
Post conditions - operational	
Post conditions - application	Update the specimen in-process, specimen rejected status in “placer order system & Ayenati”.
Post conditions - integration	Ayenati to receive the order status updates (*i.e., specimen received, specimen rejected)* from LIS. Ayenati to communicate the status updates back to order originated HIS system.
Exceptions	
Assumptions	

ORC		OBR	
#	**Description**	**#**	**Description**
1	Order Control	1	Set ID - OBR
2	Placer order number	2	Placer Order Number
3	Filler Order Number	3	Filler Order Number
5	Order Status	4	Universal Service ID
7	Quantity / Timing	5	Priority
9	Order date time	6	Requested Date/Time

10	Entered By	7	Observation Date/Time
11	Verified by	9	Collection Volume
12	Ordering Provider	10	Collector Identifier
14	Call Back Phone Number	13	Relevant Clinical Info.
15	Order Effective Date/Time	15	Specimen Source
16	Order Control Code Reason	16	Ordering Provider
17	Entering Organization	18.1	Specimen type
19	Action by - completed/resulted/approve/amended	18.2	Collection center
		18.3	Container code
		20.5	Rejected reason
		20.6	Specimen in process date time
		20.7	Specimen rejected date time
		37	Number of Sample Containers
		39	Collector's Comment

Please note:

- # is field's positional number in respective segments.
- MSH, PID, PV1 common segments to be filled as mentioned in section 5.1
- Placer Order Number & Filler order number are mandatory/primary keys. Additionally, HL7 message sender system can fill above mentioned data fields in ORC, OBR segments depending on the data fields that are captured in their system.

a. Order segment (ORC, OBR) fields - Observation Result Message Structure use case

Filler order system should trigger Lab test related ORU message as on when specimen status was updated as "completed/result approved/result amended" in filler order system" by Lab technologist.

Name of the function	Observation result message
Actor (user type)	Lab technician, technologist
Role/purpose/objective	Lab workflow functions after the specimen in-process

	Following statuses to be updated in LIS as a next step by Lab staff. 1. Test completed 2. Result approved/amended
Pre-condition - operational	Specimens were in-process
Pre-condition - Ayenati application	Test completed in Lab-analyzer Lab-analyzer sent the results to LIS
Pre-condition - integration	
Flow of activities	1. Lab staff to complete the specimen status in LIS when test is completed. 2. Technologist to approve the result in LIS 3. Results to be amended by technologist in LIS depending on the need of amendment as per LIS workflow.
Post conditions - operational	
Post conditions - application	1. Results were approved by the Lab 2. Results were amended by the Lab.
Post conditions - integration	1. Ayenati to receive the order status updates (*i.e.., test completed, results approved, results amended)* from LIS. Ayenati to communicate the status updates back to order originated HIS system. 2. Ayenati to receive the approved results and amended results from LIS. Ayenati to communicate the result updates back to order originated HIS system.
Exceptions	
Assumptions	

ORC		OBR		OBX	
#	**Description**	**#**	**Description**	**#**	**Description**
1	Order Control	1	Set ID - OBR	1	Set ID – OBX
2	Placer order number	2	Placer Order Number	2	Sequence Number
3	Filler Order Number	3	Filler Order Number	3	Value Type

5	Order Status	4	Universal Service ID	4	Observation Identifier
7	Quantity / Timing	5	Priority	6	Observation Value
9	Order date time	6	Requested Date/Time	7	Units
10	Entered By	7	Observation Date/Time	8	References Range
11	Verified by	8	Observation end date time	9	Abnormal Flags
12	Ordering Provider	9	Collection Volume	12	Observation Result Status
14	Call Back Phone Number	10	Collector Identifier		
15	Order Effective Date/Time	13	Relevant Clinical Info.		
16	Order Control Code Reason	15	Specimen Source		
17	Entering Organization	16	Ordering Provider		
19	Action by - completed/resulted/approve/amended	18	Specimen type		
		18	Collection center		
		18	Container code		
		21	Specimen in process date time		
		22	Result approved date time		
		25	Result status		
		32	Principal result interpreter		
		33	Assistant result interpreter		
		34	Technician		
		35	Transcriptionist		
		37	Number of Sample Containers		
		39	Collector's Comment		

Please note:

- # is field's positional number in respective segments.

- MSH, PID, PV1 common segments to be filled as mentioned in section 5.1.
- Placer Order Number & Filler order number are mandatory/primary keys. Additionally, HL7 message sender system can fill above mentioned data fields in ORC, OBR, OBX segments depending on the data fields that are captured in their system.